

Alpha® FXM HP Uninterruptible Power Supply Modules

User Guide ID: 0170022-J0
Effective: 11/2023



Read this document carefully.

Learn how to protect your equipment from damage and fully understand its functions.

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1. Safety


Save these instructions: This document contains important safety instructions that must be followed during the installation, servicing, and maintenance of the product. Keep it in a safe place. Review the drawings and illustrations contained in this document before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies Ltd. or the nearest Alpha® power system representative.


Safety wording and symbols


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 document. Where these symbols appear, use extra care and attention.

 **Attention:** *The use of attention indicates specific regulatory requirements that may affect the placement of equipment or installation procedures. Follow the prescribed procedures to avoid equipment damage or service interruption.*


 **Notice:** *A notice provides additional information to help complete a specific task or procedure or general information about the product.*


 **CAUTION:** *Cautions indicate the potential for injury to personnel.*

 **Warning:** *Risk of serious injury or death. Equipment in operation poses a potential electrical hazard which could result in serious injury or death to personnel. This hazard may continue even when power is disconnected.*

 **CAUTION:** *Risk of burns. A device in operation can reach temperature levels which could cause burns.*

General warning and cautions

 **Warning:** *You must read and understand the following warnings before installing the system and its components. Failure to do so could result in personal injury or death.*

 **Warning:** *This system is designed to be installed in a restricted access location that is inaccessible to the general public.*

Ce système est conçu pour être installé dans un endroit à accès restreint inaccessible au grand public.

! **Warning:** *This equipment is not suitable for use in locations where children are likely to be present.*

Cet équipement ne convient pas pour une utilisation dans des lieux où des enfants sont susceptibles d'être présents.

- Read and follow all instructions included in this document.
- Only trained personnel are qualified to install or replace this equipment and its components.
- Use proper lifting techniques whenever handling equipment, parts, or batteries.
- Alpha® FXM HP Uninterruptible Power Supply (UPS) models are certified as a part of a rack mounted uninterruptible power supply system where the suitability of the combination is to be determined in the end application by the local authority having jurisdiction.

Electrical safety

! **Warning:** *Hazardous voltages are present at the input of power systems. The DC output from some UPS devices and batteries can have high voltage and high short-circuit current capacity that may cause severe burns and electrical arcing.*

! **Warning:** *Lethal voltages are present within the system. Always assume that an electrical connection or conductor is energized. Check the circuit with a voltmeter with respect to the grounded portion of the enclosure (both AC and DC) before performing any installation or removal procedure.*

! **Warning:** *Risk of electric shock. Do not remove the cover. The Alpha® FXM HP UPS module has no user serviceable parts inside. Refer to qualified service personnel.*


! **Warning:** *Risk of electric shock. The UPS equipment powered by this service panel requires the neutral to be bonded to ground. Disconnect the UPS DC batteries before servicing this panel. This is applicable to the following permanently connected models: Alpha® FXM HP 2000 UPS, FXM HP 650-48 UPS, and FXM HP 650-24 UPS.*


Before working with any live battery or power system, follow these precautions:

- Remove all metallic jewelry, such as watches, rings, metal rimmed glasses, or necklaces.
- Wear safety glasses with side shields at all times during the installation.
- Use Occupational Health and Safety Association (OSHA®) approved insulated hand tools. Do not rest tools on top of batteries.

- Do not work alone under hazardous conditions.
- A licensed electrician is required to install permanently wired equipment. Input voltages can range up to 240 VAC. Ensure that the utility power is disconnected and locked out before performing any installation or removal procedure.
- Ensure that no liquids or wet clothes come into contact with internal components.
- Hazardous electrically live parts inside this unit are energized from the batteries even when the AC input power is disconnected.
- Always assume electrical connections or conductors are live. Turn off all circuit breakers and double-check with a voltmeter before performing installation or maintenance.
- Place a warning label on the utility panel to warn emergency personnel that a reserve battery source is present which will power the loads in a power outage condition or if the AC disconnect breaker is turned off.
- At high ambient temperature conditions, the internal temperature can be hot so use caution when touching the equipment.
- The Alpha® FXM HP UPS module shall be connected to a dedicated branch circuit.
- Branch rated circuit overcurrent protection for the AC input and AC output circuit shall be provided in the end installation.
- A disconnect switch shall be provided in the end installation for the AC input and AC output circuit.
- When stranded wires are used on the input and output terminal blocks, ferules or equivalent crimp terminal must be used.

Battery safety

 **Warning:** Follow battery manufacturer's safety recommendations when working around battery systems. Do not smoke or introduce an open flame when batteries (especially vented batteries) are charging. When charging, batteries vent hydrogen gas, which can explode.

 **Notice:** Read the material safety data sheet (MSDS) for any batteries used in the system before installation. The MSDS provides important information including hazard identification, first aid measures, handling and storage, and personal protective equipment (PPE).

- Never transport an enclosure with batteries installed. Batteries must only be installed after the enclosure has been securely set in place at its permanent installation location. Transporting the unit with batteries installed may cause a short circuit, fire, explosion, or damage to the battery pack, enclosure and installed equipment.

- Servicing and connection of batteries must be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.
- Batteries contain or emit chemicals known to cause cancer and birth defects or other reproductive harm. Battery post terminals and related accessories contain lead and lead compounds. Wash your hands after handling batteries.
- Batteries are hazardous to the environment and should be disposed at a recycling facility. Consult the battery manufacturer for recommended local authorized recyclers.

2. Introduction

2.1. Document scope

This document covers the features, options, installation, and startup of the Alpha® FXM high performance family of rugged uninterruptible power supplies (UPS). Images contained in this document are for illustrative purposes only and may not exactly match your installation. This document covers the following Alpha® FXM HP UPS models:

- **Alpha® FXM HP 650 UPS, 24VDC:** With a 24 VDC battery string voltage (120 VAC and 230 VAC)
- **Alpha® FXM HP 650 UPS, 48VDC:** With a 48 VDC battery string voltage (120 VAC)
- **Alpha® FXM HP 1100 UPS, 48VDC:** With a 48 VDC battery string voltage (120 VAC and 230 VAC)
- **Alpha® FXM HP 2000 UPS, 48VDC:** With a 48 VDC battery string voltage (120 VAC and 230 VAC)

2.2. Overview

About battery backup systems and uninterruptible power supplies

Battery backup systems (BBS) and uninterruptible power supply (UPS) modules are the first line of defense to keep critical loads backed up during power outages as well as increasing equipment reliability by protecting them against power disturbances. Battery backup systems need to be rugged, reliable, and informative in the data they provide. Typical applications include traffic infrastructure, intelligent transportation system (ITS) equipment, security devices, parking gates, ticket dispensers, variable message signs, and AC small cell power backup. Some of the benefits of a BBS are:

- Providing continual power to your operating system in the event of a power outage, sag or brown out, until regular utility power is restored.
- Conditioning and regulating the quality of the commercial power supply to your critical load.
- Keeping your traffic intersections and data flowing to prevent or minimize severe accidents and downtime.
- Reducing operating expenses by eliminating false service call outs and expensive truck roll outs.

About Alpha® FXM HP UPS modules

Alpha® FXM HP UPS modules are a line of high performance rugged uninterruptible power supply (UPS) modules for the most demanding environments where clean backup power is needed. Alpha® FXM HP UPS modules ensure equipment in critical applications remains safe and protected from power disturbances and outages. Some of the key features of Alpha® FXM HP UPS modules are:

- Integrated Cordex® HP controller system with full color touchscreen LCD panel
- Front panel LEDs for alarms, progress, and status indication
- Dual ethernet ports for remote or local communication

- USB A port for upgrades or file management via a standard USB drive
- USB Mini-B port for soft shutdown using MegaTec protocol compliant client
- Independent CAN bus ports for communication with the Cordex® HP family of products
- User programmable dry contacts for control and monitoring of key functions
- Customizable user configurations that can be exported and imported to other Alpha® FXM HP UPS modules

Peripherals

Alpha® FXM HP UPS modules can be used together with an external analog and digital input and output peripheral to monitor electrical signals (temperature, voltage, and current) and generate electrical signals through relays.

The most commonly used analog digital input output (ADIO) peripheral is the Cordex® HP L-ADIO (low voltage analog digital input output) peripheral for low voltage systems. Features include:

- Eight digital inputs
- Four voltage sensors
- Four temperature sensors
- Four current sensors
- 12 Form C relay outputs

Cordex® HP controller system

Alpha® FXM HP UPS modules use the advanced Cordex® HP controller system for monitoring and control. It offers a common user interface across all Alpha® products including FXM HP UPS modules, DC power plants, inverter systems, and line powering. This provides seamless integration of multiple systems allowing comprehensive management and common interface using a single Internet Protocol (IP) connection.



Notice: While referring to monitoring and control **Alpha® FXM HP UPS modules or controller systems** will be used interchangeably in this document.

3. Alpha® FXM HP UPS module specifications

3.1. Alpha® FXM HP 650 UPS module specifications

Table 3-1 Alpha® FXM HP 650 UPS module specifications

	FXM HP 650-24 UPS 120 VAC	FXM HP 650-24 UPS 230 VAC	FXM HP 650-48 UPS 120 VAC
Electrical input			
Voltage range in line mode ±2 V	85 to 171 VAC	153 to 322 VAC	85 to 171 VAC
Nominal frequency	50 or 60 Hz Autodetect Frequency is the default configuration, can also be manually configured.		
Frequency tolerance in line mode	±5%		
Maximum input current¹	8 A	4.4 A	10.5 A
AC breaker rating	10 A	5.5 A	15 A
Maximum discharging current	36 A	36 A	16 A
Electrical output			
Output voltage setting	120 V	210 V, 220 V, 230 V, 240 V	120 V
Regulation (line mode)	±10%		
Regulation (inverter mode)	±2%		
Rated power	650 W/VA	650 W/VA	650 W/VA
Frequency	50 or 60 Hz		
Battery			
Battery string voltage	24 V	24 V	48 V
Maximum charging current	10 A	10 A	10 A
Battery breaker rating	80 A	80 A	50 A
Short circuit current rating	Alpha® FXM HP 650 UPS - 120 V modules are evaluated with a short circuit current rating of 5 kA.		
	Alpha® FXM HP 650 UPS - 230 V modules are evaluated with a short circuit current rating of 2 kA.		
Performance			

1. Measured at nominal input voltage and load.

Table 3-1 Alpha® FXM HP 650 UPS module specifications (continued)

	FXM HP 650-24 UPS 120 VAC	FXM HP 650-24 UPS 230 VAC	FXM HP 650-48 UPS 120 VAC
Line mode efficiency ²	>98%	>98%	>97.5%
Inverter mode efficiency ³	>75%	>75%	>85%
Typical transfer time	5 ms		
Voltage THD	<3%	<3%	<3%
Waveform	Pure sine wave		
Load crest factor	3:1 (load dependent)		
Mechanical			
Dimensions H × W × D	3.47 × 17 × 9 in. (89 × 432 × 229 mm)		
Weight without batteries	25 lb (11.3 kg)		
Mounting	Shelf, rack, or wall; horizontal or vertical mount		
Cooling	Forced air (fan cooled) with optional external fan cooling for enclosure		
Display	Full graphic LCD panel, 480 × 272 pixels, resistive touchscreen		
Communication ports	2 × RJ45: Ethernet		
	1 × USB A		
	1 × USB Mini-B		
	1 × RJ12 offset (CAN)		
	1 × RJ11 (battery temperature compensation)		
Status indicators (LEDs)	Solid green: Line mode		
	Flashing green: Inverter mode		
	Solid yellow: Minor alarms		
	Solid red: Major or critical alarms		
Environmental			

2. Measured at nominal AC input and full load.
3. Measured at nominal DC input and full load.

Table 3-1 Alpha® FXM HP 650 UPS module specifications (continued)

	FXM HP 650-24 UPS 120 VAC	FXM HP 650-24 UPS 230 VAC	FXM HP 650-48 UPS 120 VAC
Full load operating temperature range ⁴	-40 to 131°F (-40 to 55°C) at 60 Hz	-40 to 104°F (-40 to 40°C) at 210 V	-40 to 131°F (-40 to 55°C)
	-40 to 122°F (-40 to 50°C) at 50 Hz	-40 to 122°F (-40 to 50°C) at 220 V	
		-40 to 131°F (-40 to 55°C) at 230, 240 V	
Relative humidity	Up to 95% (non condensing)		
Elevation ⁵	Up to 12,000 ft (3,700 m)		
Audible noise ⁶	45 dBa at 3.3 ft (1 m)		
Heat dissipation (inverter mode)	700 BTU/h (205.2 W)	845 BTU/h (247.7 W)	375 BTU/h (109.9 W)
Connections			
AC input and output connectors	Terminal block, Weco PN: 324-HDS/03 or equivalent, maximum 10 AWG (6 mm ²), 194°F (90°C) rated copper wire		
DC connection	Quick connect, Anderson SB-50 grey housing P/N: 992, 75 A rated terminals PN: 5952 or equivalent, maximum 8 AWG (10 mm ²)		
Dry contacts	C1 to C5 programmable NO/NC (240 VAC, 1 A maximum)		
	C6: 24 VDC at 500 mA, 3 user inputs ATS: 24 VDC/10 mA		
	C6: 48 VDC at 500 mA, 3 user inputs ATS: 48 VDC/10 mA		
	C7: User inputs <ul style="list-style-type: none">• S1: Self test• S2: User input• S3 Shutdown (EPO)		
	C8: ATS		

4. Derates 1.4% per °C past this range until a maximum of 165°F (74°C).

5. Derates 2°C per 1,000 ft (300 m) above 4,500 ft (1,400 m).

6. Measured at 77°F (25°C) ambient temperature.

Table 3-1 Alpha® FXM HP 650 UPS module specifications (continued)

	FXM HP 650-24 UPS 120 VAC	FXM HP 650-24 UPS 230 VAC	FXM HP 650-48 UPS 120 VAC
	<ul style="list-style-type: none"> Alpha® FXM HP 650-24 UPS module: 24 VDC at 10 mA Alpha® FXM HP 650-48 UPS modules: 48 VDC at 10mA 		
Regulatory compliance			
Safety	UL 1778		
	CAN/CSA-C22.2 No. 107.3		
	EN 62040-1		
EMC	FCC CFR 47 PART 15/B – Class A		
	CAN ICES-003(A) / NMB-003(A)		
	EN 62040-2 - UPS Category C2		
	EN 55022 (CISPR) Class A		
	C62.41		
	<p>Note: 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 his own expense.</p>		

3.2. Alpha® FXM HP 1100 UPS module specifications

Table 3-2 Alpha® FXM HP 1100 UPS module specifications

	FXM HP 1100 UPS 120 VAC	FXM HP 1100 UPS 230 VAC
Electrical input		
Voltage range in line mode ±2 V	85 to 171 VAC	153 to 322 VAC
Nominal frequency	50 or 60 Hz	

Table 3-2 Alpha® FXM HP 1100 UPS module specifications (continued)

	FXM HP 1100 UPS 120 VAC	FXM HP 1100 UPS 230 VAC
	Autodetect Frequency is the default configuration, can also be manually configured.	
Frequency tolerance in line mode	±5%	
Maximum input current⁷	15 A	8 A
AC breaker rating	20 A	10 A
Maximum discharging current	27 A	27 A
Electrical output		
Output voltage setting	120 V	210, 220, 230, 240 V
Regulation (line mode)	±10%	
Regulation (inverter mode)	±2%	
Rated power	1100 W/VA	1100 W/VA
Frequency	50 or 60 Hz	
Battery		
Battery string voltage	48 V	48 V
Maximum charging current	15 A	15 A
Battery breaker rating	50 A	50 A
Short circuit current rating	Alpha® FXM HP 1100 UPS and FXM HP 2000 UPS - 120 V modules are evaluated with a short circuit current rating of 5 kA.	
	Alpha® FXM HP 1100 UPS and FXM HP 2000 UPS - 230 V modules are evaluated with a short circuit current rating of 2 kA.	
Performance		
Line mode efficiency⁸	>98%	>97%
Inverter mode efficiency⁹	>85%	>85%
Typical transfer time	5 ms	
Voltage THD	<3%	<3.5%
Waveform	Pure sine wave	

7. Measured at nominal input voltage and load.

8. Measured at nominal AC input and full load.

9. Measured at nominal DC input and full load.

Table 3-2 Alpha® FXM HP 1100 UPS module specifications (continued)

	FXM HP 1100 UPS 120 VAC	FXM HP 1100 UPS 230 VAC
Load crest factor	3:1 (load dependent)	
Mechanical		
Dimensions H × W × D	5.22 × 15.5 × 8.75 in. (133 × 394 × 222 mm)	
Weight without batteries	31 lb (14 kg)	
Mounting	Shelf, rack, or wall; horizontal or vertical mount	
Cooling	Forced air (fan cooled) with optional external fan cooling for enclosure	
Display	Full graphic LCD panel, 480 × 272 pixels, resistive touchscreen	
Communication ports	2 × RJ45: Ethernet	
	1 × USB A	
	1 × USB Mini-B	
	1 × RJ12 offset (CAN)	
	1 × RJ11 (battery temperature compensation)	
Status indicators (LEDs)	Solid green: Line mode	
	Flashing green: Inverter mode	
	Solid yellow: Minor alarms	
	Solid red: Major or critical alarms	
Environmental		
Full load operating temperature range ¹⁰	-40 to 122°F (-40 to 50°C)	-40 to 131°F (-40 to 55°C) at 220, 230, 240 V
		-40 to 113°F (-40 to 45°C) at 210 V
Relative humidity	Up to 95% (non condensing)	
Elevation ¹¹	Up to 12,000 ft (3,700 m)	

10. Derates 1.4% per °C past this range until a maximum of 165°F (74°C).

11. Derates 2°C per 1,000 ft (300 m) above 4,500 ft (1,400 m).

Table 3-2 Alpha® FXM HP 1100 UPS module specifications (continued)

	FXM HP 1100 UPS 120 VAC	FXM HP 1100 UPS 230 VAC
Audible noise ¹²	45 dBa at 3.3 ft (1 m)	
Heat dissipation (inverter mode)	640 BTU/h (187.6 W)	675 BTU/h (197.8 W)
Connections		
AC input and output connectors	Terminal block, Weco PN: 324-HDS/03 or equivalent, maximum 10 AWG (6 mm ²), 194°F (90°C) rated copper wire	
DC connection	Quick connect, Anderson SB-50 grey housing P/N: 992, 75 A rated terminals PN: 5952 or equivalent, maximum 8 AWG (10 mm ²)	
Dry contacts	C1 to C5 programmable NO/NC (240 VAC, 1 A maximum)	
	C6: 24 VDC at 500 mA, 3 user inputs ATS: 24 VDC/10 mA	
	C6: 48 VDC at 500 mA, 3 user inputs ATS: 48 VDC/10 mA	
	C7: User inputs <ul style="list-style-type: none"> • S1: Self test • S2: User input • S3 Shutdown (EPO) 	
	C8: ATS 48 VDC at 10mA	
Regulatory compliance		
Safety	UL 1778	
	CAN/CSA-C22.2 No. 107.3	
	EN 62040-1	
EMC	FCC CFR 47 PART 15/B – Class A	
	CAN ICES-003(A) / NMB-003(A)	
	EN 62040-2 - UPS Category C2	
	EN 55022 (CISPR) Class A	

12. Measured at 77°F (25°C) ambient temperature.

Table 3-2 Alpha® FXM HP 1100 UPS module specifications (continued)

	FXM HP 1100 UPS 120 VAC	FXM HP 1100 UPS 230 VAC
	C62.41	
	<p>Note: 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 his own expense.</p>	

3.3. Alpha® FXM HP 2000 UPS module specifications

Table 3-3 Alpha® FXM HP 2000 UPS module specifications

	FXM HP 2000 UPS 120 VAC	FXM HP 2000 UPS 230 VAC
Electrical input		
Voltage range in line mode ± 2 V	85 to 150 VAC	153 to 322 VAC
Nominal frequency	50 or 60 Hz Autodetect Frequency is the default configuration, can also be manually configured.	
Frequency tolerance in line mode	$\pm 5\%$	
Maximum input current¹³	20 A	12 A
AC breaker rating	25 A	15 A
Maximum discharging current	52 A	52 A
Electrical output		
Output voltage setting	120 V	210, 220, 230, 240 V
Regulation (line mode)	$\pm 10\%$	
Regulation (inverter mode)	$\pm 2\%$	

13. Measured at nominal input voltage and load.

Table 3-3 Alpha® FXM HP 2000 UPS module specifications (continued)

	FXM HP 2000 UPS 120 VAC	FXM HP 2000 UPS 230 VAC
Rated power	2000 W/VA	2000 W/VA
Frequency	50 or 60 Hz	
Battery		
Battery string voltage	48 V	48 V
Maximum charging current	15 A	15 A
Battery breaker rating	80 A	80 A
Short circuit current rating	Alpha® FXM HP 2000 UPS - 120 V modules are evaluated with a short circuit current rating of 5 kA.	
	Alpha® FXM HP 2000 UPS - 230 V modules are evaluated with a short circuit current rating of 2 kA.	
Performance		
Line mode efficiency¹⁴	>97.5%	>97%
Inverter mode efficiency¹⁵	>85%	>85%
Typical transfer time	5 ms	
Voltage THD	<3%	<5%
Waveform	Pure sine wave	
Load crest factor	3:1 (load dependent)	
Mechanical		
Dimensions H × W × D	5.22 × 15.5 × 8.75 in. (133 × 394 × 222 mm)	
Weight without batteries	40 lb (18 kg)	
Mounting	Shelf, rack, or wall; horizontal or vertical mount	
Cooling	Forced air (fan cooled) with optional external fan cooling for enclosure	
Display	Full graphic LCD panel, 480 × 272 pixels, resistive touchscreen	
Communication ports	2 × RJ45: Ethernet	
	1 × USB A	

14. Measured at nominal AC input and full load.

15. Measured at nominal DC input and full load.

Table 3-3 Alpha® FXM HP 2000 UPS module specifications (continued)

	FXM HP 2000 UPS 120 VAC	FXM HP 2000 UPS 230 VAC
	1 × USB Mini-B	
	1 × RJ12 offset (CAN)	
	1 × RJ11 (battery temperature compensation)	
Status indicators (LEDs)	Solid green: Line mode	
	Flashing green: Inverter mode	
	Solid yellow: Minor alarms	
	Solid red: Major or critical alarms	
Environmental		
Full load operating temperature range ¹⁶	-40 to 122°F (-40 to 50°C)	-40 to 131°F (-40 to 55°C) at 220, 230, 240 V
		-40 to 113°F (-40 to 45°C) at 208/210 V
Relative humidity	Up to 95% (non condensing)	
Elevation ¹⁷	Up to 12,000 ft (3,700 m)	
Audible noise ¹⁸	45 dBA at 3.3 ft (1 m)	
Heat dissipation (inverter mode)	1235 BTU/h (361.9 W)	1185 BTU/h (347.3 W)
Connections		
AC input and output connectors	Terminal block, Weco PN: 324-HDS/03 or equivalent, maximum 10 AWG (6 mm ²), 194°F (90°C) rated copper wire	
DC connection	Quick connect, Anderson SB-50 grey housing P/N: 992, 75 A rated terminals PN: 5952 or equivalent, maximum 8 AWG (10 mm ²)	
Dry contacts	C1 to C5 programmable NO/NC (240 VAC, 1 A maximum)	
	C6: 24 VDC at 500 mA, 3 user inputs	
	ATS: 24 VDC/10 mA	
	C6: 48 VDC at 500 mA, 3 user inputs	

16. Derates 1.4% per °C past this range until a maximum of 165°F (74°C).

17. Derates 2°C per 1,000 ft (300 m) above 4,500 ft (1,400 m).

18. Measured at 77°F (25°C) ambient temperature.

Table 3-3 Alpha® FXM HP 2000 UPS module specifications (continued)

	FXM HP 2000 UPS 120 VAC	FXM HP 2000 UPS 230 VAC
	ATS: 48 VDC/10 mA	
	C7: User inputs <ul style="list-style-type: none"> • S1: Self test • S2: User input • S3 Shutdown (EPO) 	
	C8: ATS 48 VDC at 10mA	
Regulatory compliance		
Safety	UL 1778	
	CAN/CSA-C22.2 No. 107.3	
	EN 62040-1	
EMC	FCC CFR 47 PART 15/B – Class A	
	CAN ICES-003(A) / NMB-003(A)	
	EN 62040-2 - UPS Category C2	
	EN 55022 (CISPR) Class A	
	C62.41	
	<p>Note: 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 his own expense.</p>	

3.4. Automatic voltage regulation (AVR) transition

Table 3-4 Automatic voltage regulation (AVR) transition: Alpha® FXM HP 2000 UPS 120 V module

AVR transition	FXM HP 2000 UPS 120 V
Inverter to Boost 2	89.4 VAC
Boost 2 to Boost 1	99.5 VAC
Boost 1 to Line	112.7 VAC
Line to Buck 1	129.6 VAC
Buck 1 to Inverter	148.4 VAC
Inverter to Buck 1	141.5 VAC
Buck 1 to Line	126.4 VAC
Line to Boost 1	110.4 VAC
Boost 1 to Boost 2	96 VAC
Boost 2 to Inverter	84.8 VAC
Vin (VAC) all thresholds are within ± 0.5 V of the specified values	

Table 3-5 Automatic voltage regulation (AVR) transition: Alpha® FXM HP 650 UPS and FXM 1100 UPS 120 V modules

AVR Transition	FXM HP 650-24 UPS 120 V	FXM HP 650-48 UPS 120 V	FXM HP 1100 UPS 120 V
Inverter to Boost 2	89.1 VAC	89 VAC	89.4 VAC
Boost 2 to Boost 1	99.5 VAC	99.5 VAC	99.9 VAC
Boost 1 to Line	113.2 VAC	113.2 VAC	113.6 VAC
Line to Buck 1	129.6 VAC	129.6 VAC	129.6 VAC
Buck 1 to Buck 2	149.3 VAC	149 VAC	148.4 VAC
Buck 2 to Inverter	170.8 VAC	170.7 VAC	170.9 VAC
Inverter to Buck 2	162.9 VAC	162.8 VAC	163 VAC
Buck 2 to Buck 1	145.5 VAC	145.4 VAC	145.6 VAC
Buck 1 to Line	127.1 VAC	126.9 VAC	126.4 VAC
Line to Boost 1	110.4 VAC	110.4 VAC	110.4 VAC

Table 3-5 Automatic voltage regulation (AVR) transition: Alpha® FXM HP 650 UPS and FXM 1100 UPS 120 V modules (continued)

AVR Transition	FXM HP 650-24 UPS 120 V	FXM HP 650-48 UPS 120 V	FXM HP 1100 UPS 120 V
Boost 1 to Boost 2	96.1 VAC	96 VAC	96.4 VAC
Boost 2 to Inverter	84.5 VAC	84.4 VAC	84.8 VAC

Table 3-6 Automatic voltage regulation (AVR) transition: Alpha® FXM HP 650 UPS, FXM HP 1100 UPS, and FXM HP 2000 UPS 230 V modules

AVR Transition	FXM HP 650-24 UPS 230 V	FXM HP 1100-48 UPS 230 V	FXM HP 2000-48 UPS 230 V
Inverter to Boost 2	161.9 VAC	162 VAC	161.4 VAC
Boost 2 to Boost 1	183 VAC	182.7 VAC	182.4 VAC
Boost 1 to Line	212.1 VAC	211.8 VAC	211.8 VAC
Line to Buck 1	248.4 VAC	248.4 VAC	248.4 VAC
Buck 1 to Buck 2	280.8 VAC	280.6 VAC	280.1 VAC
Buck 2 to Inverter	321.7 VAC	322 VAC	322.4 VAC
Inverter to Buck 2	306.8 VAC	307.1 VAC	307.5 VAC
Buck 2 to Buck 1	274 VAC	274.3 VAC	274.6 VAC
Buck 1 to Line	239.2 VAC	239 VAC	238.6 VAC
Line to Boost 1	207.3 VAC	207 VAC	206.9 VAC
Boost 1 to Boost 2	174.5 VAC	174.4 VAC	173.9 VAC
Boost 2 to Inverter	153.6 VAC	153.6 VAC	153.1 VAC

Table 3-7 Automatic voltage regulation (AVR) transition: Alpha® FXM HP 2000 UPS 208/240VAC modules

AVR Transition	FXM HP 2000-48 UPS 208 VAC	FXM HP 2000-48 UPS 240 VAC
Inverter to Boost 2	147.1	170.3
Boost 2 to Boost 1	166.4	191.6
Boost 1 to Line	193.3	222.6
Line to Buck 1	226.4	260.6

Table 3-7 Automatic voltage regulation (AVR) transition: Alpha® FXM HP 2000 UPS 208/240VAC modules (continued)

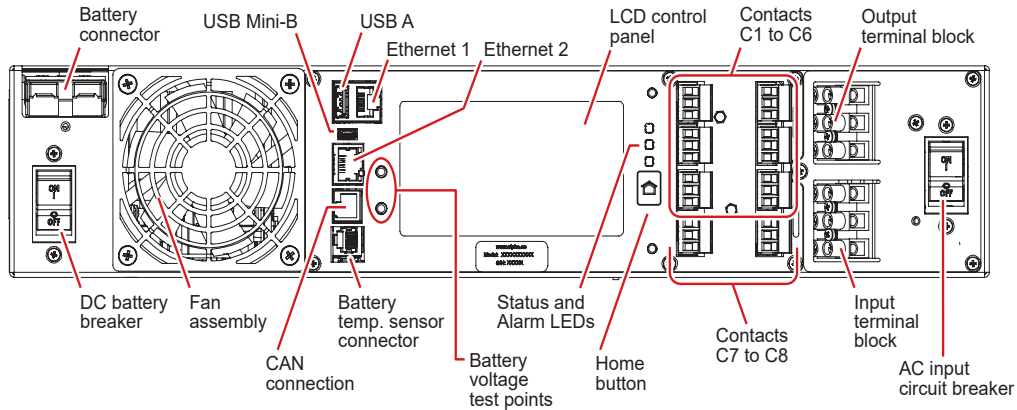
AVR Transition	FXM HP 2000-48 UPS 208 VAC	FXM HP 2000-48 UPS 240 VAC
Buck 1 to Buck 2	255.4	294.3
Buck 2 to Inverter	294.1	339.4
Inverter to Buck 2	279.2	321.8
Buck 2 to Buck 1	250	288.4
Buck 1 to Line	217	250.6
Line to Boost 1	188.4	217.4
Boost 1 to Boost 2	158.5	182.7
Boost 2 to Inverter	140	160.6

4. Features

4.1. Alpha FXM HP 650 UPS module front panel

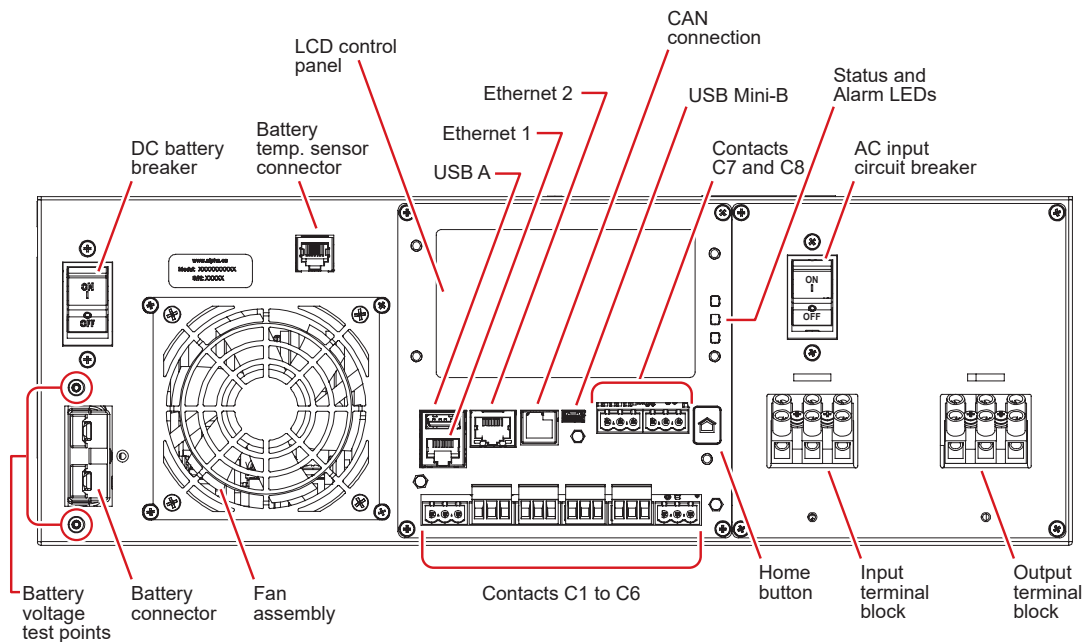
The following figure show the front panel connectors and circuit breakers.

Figure 4-1
Alpha® FXM HP 650 UPS module



4.2. Alpha® FXM HP 1100 UPS and FXM HP 2000 UPS module front panel

The following figure show the front panel connectors and circuit breakers.


Figure 4-2 Alpha® FXM HP 1100 UPS and FXM HP 2000 UPS modules

4.3. Feature description

Table 4-1 Feature description

Feature	Description
AC input circuit breaker	This circuit breaker is an on/off switch for the utility or line power into the unit. It must be switched on for proper operation.
Battery breaker	This circuit breaker provides over current protection and is used as an on/off switch for the battery power. It must be switched on for proper operation.
Battery connector	The battery connector connects the external batteries to the unit.
Battery temperature sensor connector	The battery charging voltage is temperature dependent when compensation is not set to 0 mV/°C/cell. A battery temperature sensor connects to the unit so the microprocessor can adjust the charging voltage for optimum charging. Refer to UPS Maintenance > Battery . The sensor must be attached to the unit for normal operation. If the sensor is not attached, a Temperature Probe Unplugged alarm appears on the LCD panel.
Battery voltage test points	These test points accept 0.87 inch (2 mm) diameter test probe tips. The battery circuit breaker must be on to measure the battery voltage.

Table 4-1 Feature description (continued)

Feature	Description
	 Notice: The battery voltage test points are not to be used as a power port.
CAN connection	CAN connector connects additional I/O ADIO modules to the system.
Ethernet (1 & 2)	Ethernet ports 1 and 2 connect the unit system to the network. The default IP address for Ethernet port 1 is static IP address 192.168.0.90 and the Ethernet port 2 is DHCP .
Fan assembly	This microprocessor controlled fan turns on at a preset temperature to lower the unit's internal temperature. It must not be blocked or obstructed. An alarm is generated if the fan fails; a failed fan can be replaced in the field.
Input terminal block	The UPS module's AC line power input.
LCD control panel	The LCD panel control panel is used to monitor and control the unit.
Status indicators (LEDs)	Solid green: The UPS module is in line mode and line power is provided to the load.
	Flashing green: The UPS module is in inverter mode and backup battery power is provided to the load.
	Solid yellow: There is one or more minor active alarm in the unit.
	Solid red: There is one or more major or critical active alarm in the unit.
Output terminal block	The UPS module's AC power output.
USB-A input	The USB input connector connects USB memory stick for system backup, restore and download of logs and configuration files.

4.4. Dry contact description

Contacts C1 to C5 allow the unit to be connected to an external monitoring panel or to traffic control equipment.

Figure 4-3
Dry contact overview

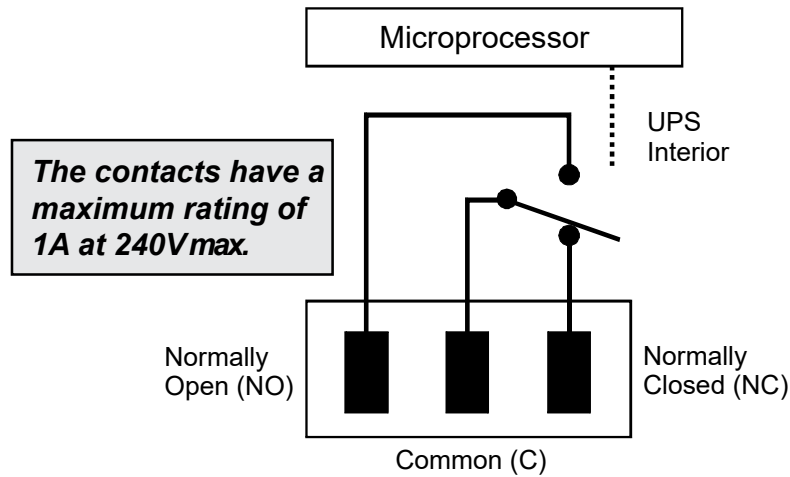


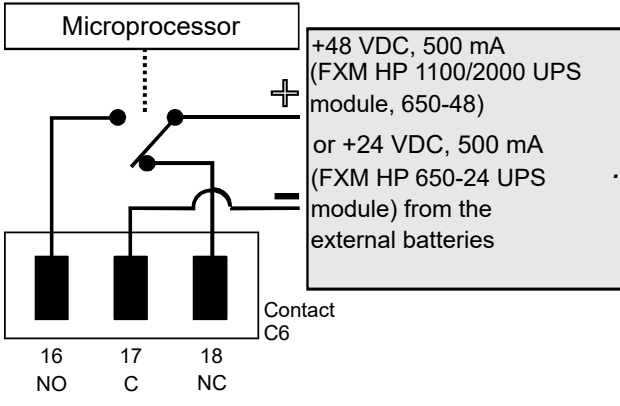
Table 4-2 C1 to C5 dry contacts

Dry contact	Description
C1 (On Battery)	The C1 contact is energized when line power is unqualified and the unit provides backup battery power to the loads. It can be used to generate an On Battery contact.
C2, C3 (Low Battery + No Line_LOBAT NOLIN)	These contacts are energized when the battery drops below a pre-set voltage level and line is not present. They can be used to generate a Low Battery alarm. To change the pre-programmed level to match the batteries used and the actual operating conditions, see Low Battery Warning in UPS Maintenance > Battery .
C4 (Timer)	This contact is energized after the unit has been in Inverter mode for two hours. To change the pre-programmed two hours to match your operating conditions, see <i>Load Shedding Relays</i> .
C5 (Alarm)	The C5 contact is energized when any alarm is generated.

Table 4-3 C6 dry contact

Dry contact	Description
C6	The factory default layout for the C6 contact is a relay that is energized when the unit is in Line or Inverter modes and is de-energized when in Standby mode. It provides 48 VDC (500 mA) or 24 VDC (500 mA) from the external batteries to an external fan or other equipment. C6 can alternatively be factory-configured as a dry contact.

Table 4-3 C6 dry contact (continued)

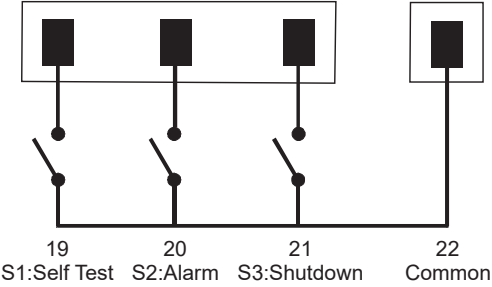
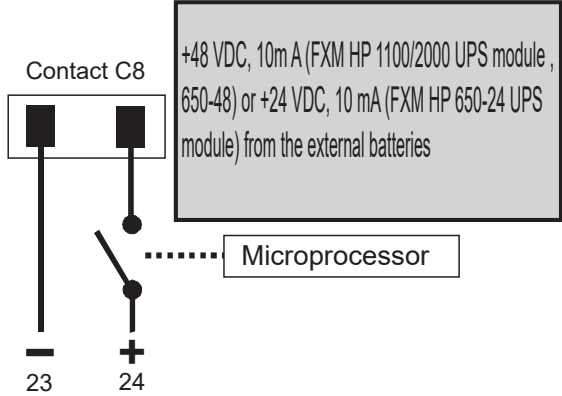
Dry contact	Description
	<p>Figure 4-4 Contact layout (de-energized shown, factory default for C6)</p>  <p>Microprocessor</p> <p>+48 VDC, 500 mA (FXM HP 1100/2000 UPS module, 650-48) or +24 VDC, 500 mA (FXM HP 650-24 UPS module) from the external batteries</p> <p>16 NO 17 C 18 NC</p> <p>Contact C6</p>

Optically isolated user inputs C7 and contacts C8 are used to attach an external switch panel for remote control, or to allow the unit to control optional Alpha® offline automatic transfer switch (ATS) device.

Table 4-4 C7 to C8 optically isolated user inputs

Dry contact	Description
<p>C7 (User inputs)</p>	<p>This relay has three contacts that are used to control the unit:</p> <p>S1 (19): Shorting this contact starts the UPS module self test.</p> <p>S2 (20): Shorting this contact activates an alarm.</p> <p>S3 (21): Shorting this contact disables the AC output. There is no AC output power, but the unit is still energized if connected to a battery.</p> <p>A manual restart is required to put the unit back to normal operation.</p> <p>C (22): Isolated return for contacts S1, S2, and S3.</p>

Table 4-4 C7 to C8 optically isolated user inputs (continued)

Dry contact	Description
	<p>Figure 4-5 User input layout</p> 
<p>C8 (ATS)</p>	<p>When the unit is in Inverter mode, this normally open relay closes sending 48 VDC (Alpha® FXM HP 650-48 UPS, FXM HP 1100 UPS, FXM HP 2000 UPS modules) or 24 VDC (Alpha® FXM HP 650-24 UPS module) from the external batteries to this dry contact. If the optional Alpha® offline automatic transfer switch (ATS) device is connected, it will cause the ATS to switch the load from line power to battery backup power.</p> <p>Figure 4-6 ATS layout</p> 

5. Inspection

The inventory included with your shipment is dependent upon the options you have ordered. The options are clearly marked on the shipping container labels and on the bill of materials.

Check for damage

Before unpacking the product, note any damage to the shipping container. Unpack the product and inspect the exterior for damage. If any damage is observed, contact the carrier immediately. Continue the inspection for any internal damage. In the unlikely event of internal damage, inform the carrier and contact Alpha Technologies Ltd. for advice on the impact of any damage.

Packaging materials

Alpha Technologies Ltd. is committed to providing products and services that meet our customers' needs and expectations in a sustainable manner, while complying with all relevant regulatory requirements. As such Alpha® strives to follow our quality and environmental objectives from product supply and development through to the packaging for our products.

Rectifiers and batteries are shipped on individual pallets and are packaged according to the manufacturer's guidelines.

Almost all Alpha® packaging material is from sustainable resources and or is recyclable.

Returns for service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is unavailable, make sure that the product is packed with at least three inches of shock-absorbing material to prevent shipping damage.

If you have any questions before you proceed, contact Alpha Technologies Ltd. or your Alpha® power system representative.

6. Installation

6.1. Installation

! **Warning:** *The Alpha® FXM HP UPS module must be correctly grounded for proper operation. The input and output lines to and from the UPS module must have disconnect devices attached. This device is designed to be installed in a restricted area accessible by qualified service personnel.*

Once the installation location has been planned and prepared, you are ready to install the Alpha® FXM HP UPS module. There are three steps to setting up the UPS module:

1. Mount the Alpha® FXM HP UPS module.
2. Wiring the external battery.
3. Wiring the Alpha® FXM HP UPS module.

6.1.1. Tools required

Various tools are essential for product installation. Insulated tools are recommended. Use this list as a guide:

- AC/DC voltmeter
- Labels or masking tape and marker
- Torque wrench for I/O terminal blocks
- Slot head screwdriver to fit the terminal blocks
- Minimum 10 AWG (6 mm²) copper wire for I/O terminal blocks
- High strength flame proof tape
- Battery terminal corrosion inhibitor such as The Noco Company NOCO® NCP-2 battery corrosion preventative grease or Sanchem Inc. NO-OX-ID® Grease “A-SPECIAL” electrical contact grease

6.2. Mounting the Alpha® FXM HP UPS module

The Alpha® FXM HP UPS module can be placed on a shelf with no other parts needed. It can also be rack or wall mounted or secured to a shelf, such as on an outdoor enclosure shelf, with the optional mounting brackets, as shown in the following figure. The brackets and screw kit is available from Alpha Technologies Ltd.

! **Important:** *To ensure sufficient air flow for cooling, do not cover the air vents on top of the UPS module. Routinely remove dust and debris that may impede air flow.*

Table 6-1 Alpha® FXM HP UPS module and accessory part numbers

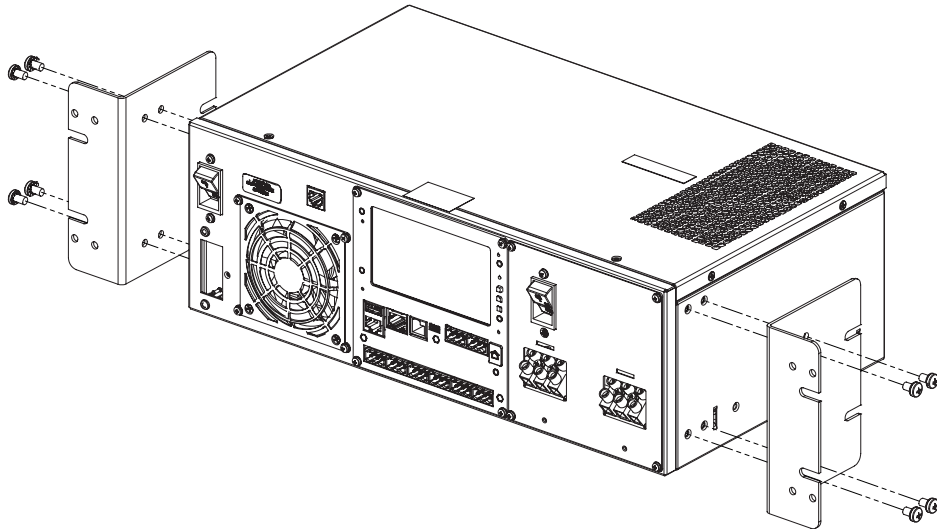
Product	Part number
Alpha® FXM HP 650-24 UPS module, 120 V	0170023-002
Alpha® FXM HP 650-24 UPS module, 230 V (L, N, G)	0170023-201
Alpha® FXM HP 650-48 UPS module, 120 V	0170023-101
Alpha® FXM HP 1100 UPS module, 120 V	0170024-001
Alpha® FXM HP 1100 UPS module, 230 V (L, N, G)	0170024-101
Alpha® FXM HP 2000 UPS module, 120 V	0170022-001
Alpha® FXM HP 2000 UPS module, 230 V (L, N, G)	0170022-101
Alpha® FXM HP 2000 UPS module, 208/240 VAC (L1, L2, G)	0170022-201
Rack mount bracket kit	740-697-21 (Alpha® FXM HP 1100 UPS and FXM HP 2000 UPS modules) 740-697-22 (Alpha® FXM HP 650 UPS module)
Fan replacement kit	0370554-001
CR2023 lithium battery, 3 V, 225 mAh	1850002
Wire assembly, battery temperature sensor, 2M, 3/8 in. lug	8701145-001
Terminal block covers and battery harness restraining bracket	0370555-001

⚠ CAUTION: For non-restricted access, terminal block covers and the battery harness restraining bracket must be used and are available from Alpha Technologies Ltd. If the UPS end application is mounted inside an enclosure or in an area restricted to authorized personnel, then the covers and bracket may not be needed.

When installing the unit in a rack frame:

1. Clean all attachment points on the UPS module, as well as the rack and mounting brackets and bring them to a bright finish.
2. Coat the attachment points with an antioxidant such as Sanchem Inc. NO-OX-ID® "A-Special" electrical grade contact grease or equivalent.

3. Attach the mounting brackets with the thread forming screws and the paint piercing washers provided.

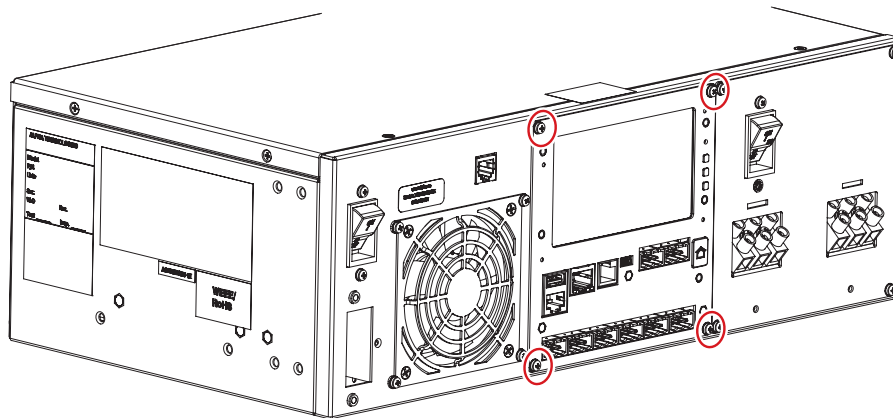


6.2.1. Rotate the control panel

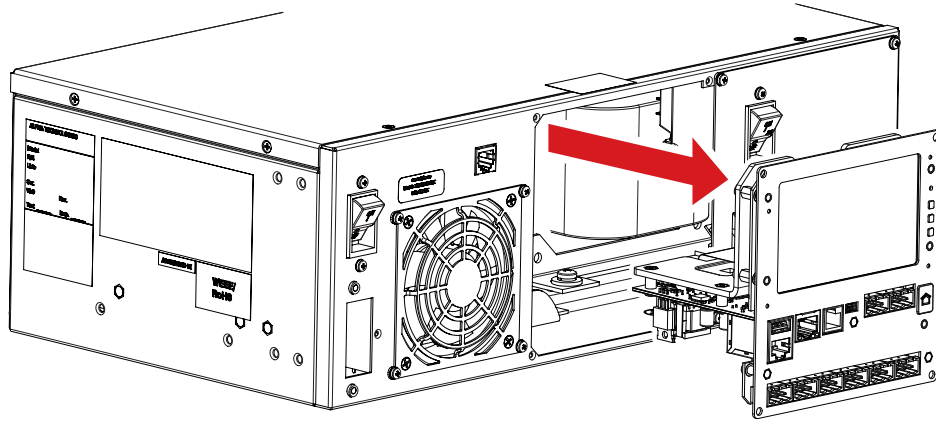
On the Alpha® FXM HP 1100 and FXM HP 2000 UPS modules only, the control panel and the power connection panel can be rotated to suit your needs.

To rotate the control panel:

1. Remove the four screws holding the control panel to the UPS module.

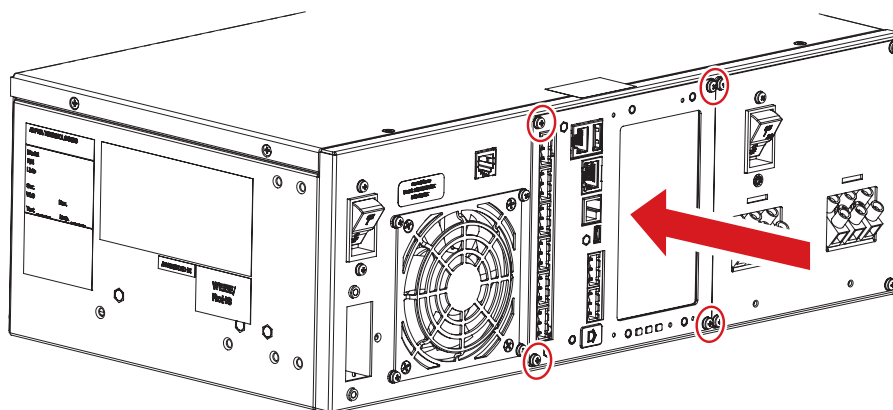
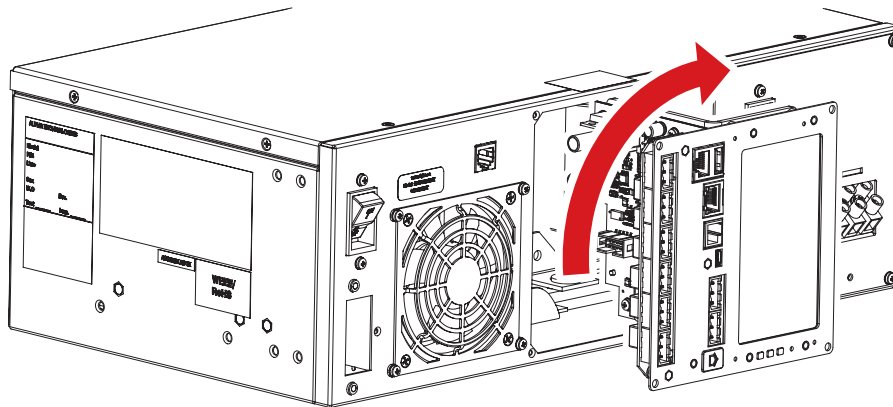


2. Gently pull the control panel sub-assembly out of the unit.

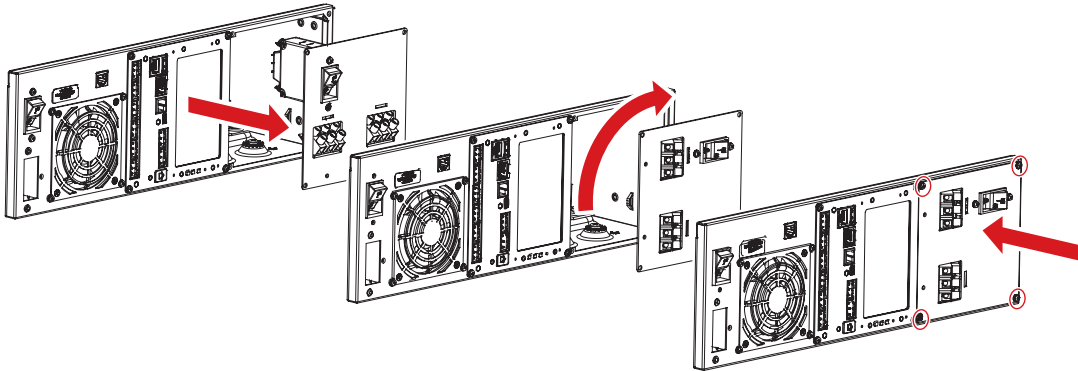


! **Important:** Use care not to stretch the wires or the ribbon cables attached to the back of the unit.

3. Rotate the control panel 90 degrees clockwise. Note that the control panel can only be rotated clockwise 90 degrees.



4. Carefully reinstall the control panel. Smooth out the wires and cables so they do not get caught or pinched. Replace the four screws.
5. Follow the same steps if you want to rotate the terminal block (TB) plate.



6.3. Wiring external batteries

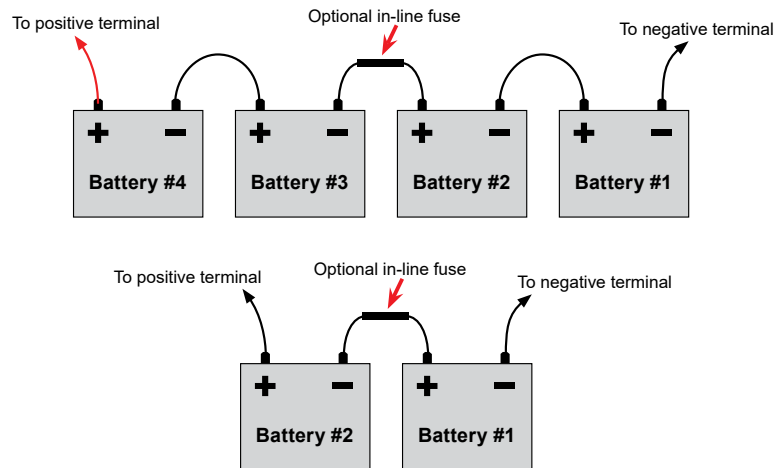
⚠ Warning: Batteries must be installed by qualified personnel trained in the safe use of high-energy power supplies and their batteries. Refer to the safety section in this document.

⚠ Warning: Multiple input feeds. Ensure the AC input feed is disconnected and the DC batteries are disconnected. Additionally, switch off all circuit breakers on the Alpha® FXM HP UPS module before making any electrical connections.

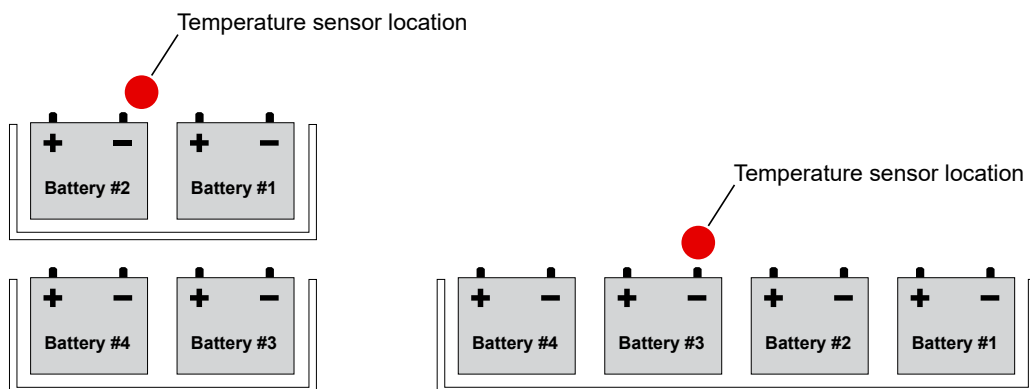
- Use new batteries when installing a new unit. Verify that all batteries are the same type with identical date codes.
- For the Alpha® FXM HP 650-24 UPS module, the battery string is 24 VDC. For Alpha® FXM HP 650-48 UPS, FXM HP 1100 UPS, and FXM HP 2000 UPS modules, the battery string is 48 VDC.
- If you are making your own battery wiring harness, use at least 10 AWG (6 mm²) wire for Alpha® FXM HP 650 UPS and FXM HP 1100 UPS modules. Use 8 AWG (10 mm²) wire for Alpha® FXM HP 2000 UPS module.
- The battery return connection is to be treated as an isolated DC return (DC-I) as defined in GR-1089-CORE.

To wire batteries:


1. For Alpha® FXM HP 650-48 UPS, FXM HP 1100 UPS, and FXM HP 2000 UPS modules (48 volt battery string), number the batteries from 1 to 4 with labels or tape. For the Alpha® FXM HP 650-24 UPS module (24 volt battery string), number the batteries from 1 to 2 with labels or tape.
2. Coat the battery terminals with a corrosion inhibitor.
3. Connect the batteries as shown. If used, install the in-line fuse as shown.

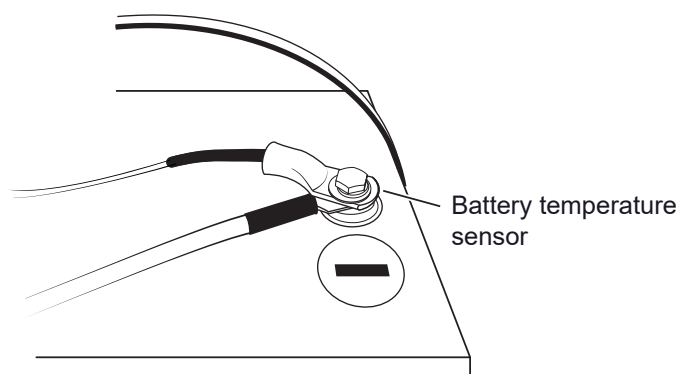


4. Connect the black battery cable to the negative terminal of the battery string, and the red battery cable to the positive terminal of the battery string.
5. When the batteries are wired, measure the voltage at the battery connection terminals. It should read between 42 and 54 volt for the Alpha® FXM HP 650-48 UPS, FXM HP 1100 UPS, and FXM HP 2000 UPS modules or 21 and 27 volt for the Alpha® FXM HP 650-24 UPS module. Ensure the correct polarity.
6. Ensure the battery cable connector is disconnected and the DC breaker is **OFF**.
7. Connect the external batteries to the battery connector on the front panel of the UPS module.
8. Route the sensor end of the battery temperature sensor to the batteries.
9. Attach the battery temperature sensor to the negative terminal of the battery string. Chose one of the inner batteries as the temperature in this region will be higher due to reduced airflow.




10. Make sure the battery temperature sensor is placed over top of the battery cable.


 **Notice:** Ensure that there is good connection in order to prevent localized heating.



11. If multiple battery strings are used, repeat steps 1 to 4 as required.


 **Attention:** Torque the battery terminals according to the manufacturer's specifications on the battery name plate or data sheet.


6.4. Wiring the Alpha® FXM HP UPS module

 **Warning:** Make sure the line power is off. Switch off all circuit breakers on the Alpha® FXM HP UPS module before making any electrical connections.

If stranded wires are used to connect the input and output terminal blocks, ferules, or equivalent crimping terminals must be used.

1. If used, connect the following ports:
 - Ethernet port
 - Dry contacts C1 to C6
 - User inputs C7 and C8
2. Connect the load to the UPS module **output terminal block**. Torque to 12 lb-in. (1.4 Nm).
3. Connect the line power to the UPS module **input terminal block**. Torque to 12 lb-in. (1.4 Nm).
4. If needed, attach the terminal block covers and battery harness restraining bracket.

 **CAUTION:** Before proceeding, verify that the line wire is attached to the line terminal block, the ground wire is attached to the ground terminal block, and the neutral wire is attached to the neutral terminal block to prevent accidental shocks or electrocution.


 **CAUTION:** Ensure AC input and AC output are not swapped at the UPS module terminal blocks.

6.5. Alpha® Universal Automatic Transfer Switch (UATS) and Universal Generator Transfer Switch (UGTS) device option

The Alpha® universal automatic transfer switch (UATS) and universal generator transfer switch (UGTS) devices are the next generation of automatic transfer switch (ATS) and generator transfer switch (GTS) products. They are optional add-on switching units specifically designed for the Alpha® FXM HP UPS family (Alpha® FXM HP 650 UPS, FXM HP 1100 UPS, and FXM HP 2000 UPS modules).

These switching units provide power or bypass capacity (automatic or manual) so that the operator may safely disconnect the UPS module from line or generator power for easy removal and servicing. In bypass mode, the loads are directly connected to the line or generator power without any conditioning.

Depending on the use of one or the other, the UATS or UGTS device allows the use of up to three different backup sources (line, batteries, and generator).

 **CAUTION:** Make sure you have read and understood the instructions given in the Alpha® UATS/UGTS device Installation Manual before making any connection to the supply.

7. Operating the Alpha® FXM HP UPS module

7.1. Switching the Alpha® FXM HP UPS module on and off

Under normal operation, the Alpha® FXM HP UPS module is always powered on to supply uninterruptible power to the load. Switching off the UPS module (AC and DC breaker) will disconnect the power supply to the load. If for any reason you need to switch off the UPS module while maintaining power to your critical load, make sure that you have a plan that provides an alternate source of power.

Switch off procedure

1. Switch the AC circuit breaker **OFF**.
2. Switch the battery circuit breaker **OFF**.

The LCD panel goes blank. The UPS module is now switched off and no backup power is supplied to the load.

Switch on procedure (line mode)

Before you put the UPS module back into commission, make sure that the line is qualified and the batteries are fully charged.

1. Switch the battery circuit breaker **ON**. The LCD panel displays **STANDBY** in the system mode field.
2. Switch the AC input circuit breaker **ON**. The UPS module qualifies the line power. The LCD panel displays **RETRANSFER** then shows **LINE, BUCK 1, BUCK 2, BOOST 1, BOOST 2** depending on the input voltage.
3. If there is no line power, the UPS module remains in **STANDBY** mode until the line power is qualified. To provide backup battery power to the load, run the **Start Up** command on the LCD panel's **System Shortcut Status** screen.

The UPS module, by default, is configured for auto-frequency detection. When the UPS module is first switched on, it senses the line frequency and adjusts its output frequency to match that of the input.

If the auto-frequency detection feature is configured, the UPS module may not startup in **Inverter** mode since an output frequency is not yet defined. A **Frequency Unknown** alarm will be activated. To start up the inverter manually when frequency is undefined, run the **Configure FXM System** wizard on the LCD panel's **System Shortcut Status** screen to select either 50 Hz or 60 Hz output frequency.

Switching the Alpha® FXM HP UPS module from line mode to inverter mode

You can force the UPS module to operate in the **Inverter** mode by manually switching off the AC input circuit breaker. Doing so will effectively disconnect any line power to the UPS module, simulating a power outage which triggers the UPS module to switch to the inverter mode of operation.

To switch the Alpha® FXM HP UPS module from line mode to inverter mode:

Switch the AC input circuit breaker **OFF**. The LCD panel displays **INVERTER** in the operating mode field. The status LED starts flashing green to indicate that the UPS module is running on backup battery power. Confirm the load receiving power.



Notice: Do not leave unit in this mode as it will drain the batteries.

Switching the Alpha® FXM HP UPS module from inverter mode to line mode

The UPS module remains in the **Inverter** mode for as long as the AC input circuit breaker is switched off, or until there is loss of AC power. Backup power is provided to the load until the batteries are drained to a preset level which triggers the UPS module to shutdown automatically. If it is not necessary to operate the UPS module in **Inverter** mode, switch the UPS module back to the **Line** mode as soon as possible.

To switch the Alpha® FXM HP UPS module from Inverter mode to Line mode:

Switch **ON** the AC input circuit breaker. The UPS module qualifies the line power. The LCD panel displays **RETRAN**, then shows **LINE, BUCK 1, BUCK 2, BOOST 1, BOOST 2**.

If the UPS module constantly switches between inverter and line modes because of a noisy line, broaden the input parameter tolerances from **Normal** to **Generator**. See **AC Input > AC Input Sense > Generator**.

Alpha® FXM HP UPS module cold start

The Alpha® FXM HP UPS module, by default, is configured for auto-frequency detection. When the unit is first switched on, it senses the line frequency of the incoming AC power and adjusts its output frequency to match.

To start up the inverter manually when initially there is no AC power and the frequency is undefined, run the **Configure FXM System** wizard on the LCD panel's **Maintenance** menu to select either 50 Hz or 60 Hz output frequency.

To change the AC input frequency from Auto Detect to 50 Hz or 60 Hz:

Go to **Systems > FXM UPS System > Configure System** and select the **Configure FXM System** button in the **Configuration** table to launch the **Configure FXM System** wizard.

To change the AC input frequency from the LCD panel, select the **Maintenance** shortcut, select the **FXM HP UPS System**, select **Configure FXM System**, select **AC Input Frequency**, and then select the frequency.

To turn on Inverter mode:

Go to **Systems > FXM HP UPS System > Configure System** and select the **Start Up** button in the **Configuration** table. Select **Yes** in the dialog box.

To turn on **Inverter** mode from the LCD panel, select **Start Up** then select **Execute**.

8. Getting Started

This section explains how to navigate the menus and do basic connection, monitoring and control functions using the LCD panel and the web interface of the Alpha® FXM HP UPS module controller.

8.1. Navigating the Alpha® FXM HP UPS module user interface

Both the web and the LCD panel dashboard provide a summary of system, controller and alarm information. When you sign in to the web interface or the LCD panel, the dashboard provides an at-a-glance view of the overall systems.

8.1.1. Sign in to the controller system

You can sign in to the controller system via the LCD panel or the web interface.

1. Enter the default IP address (192.168.0.90) into the web address bar on the browser.
2. Sign in to the web interface.
 - a. Enter the default **User Name: admin** (or the user name supplied by your administrator).
 - b. Enter the default **Password: admin** (or the password supplied by your administrator).



Notice: Once signed in, the session expires after 3 hours, or after 60 minutes with no activity.

Sign in to the LCD panel interface:

3. From the main dashboard of the LCD panel, select **Login**.
 - a. Enter the default **User Name: admin**.
 - b. Enter the default **Password: admin**.
4. Select the check mark to complete the sign in process. The main dashboard displays.

8.1.2. Overview of the LCD panel interface

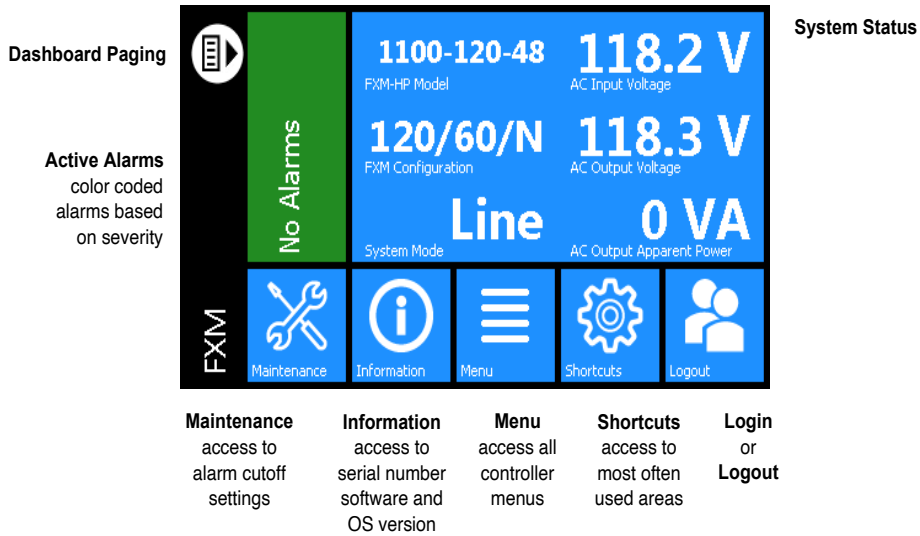
The LCD panel is a touch-sensitive color panel on the front of the controller system. The display is always on when the controller system is first powered up but after 20 minutes of inactivity the user will be logged out and the display will be turned off. Touching the home button or the LCD panel in any spot reactivates the LCD panel.

It is possible to change the inactivity timeout of the LCD panel in the **Controller > Settings > User Interface** menu. The time-out can be set to 20 minutes, 1 hour, 4 hours, or 8 hours. However, to prevent the LCD panel from wearing out, it is strongly recommended to leave this setting at 20 minutes, unless temporarily changing it for commissioning or demonstrations purposes.

The LCD panel is most responsive to touch when firm, substantial pressure is applied. A stylus may be used if desired.

The default screen that displays on the controller when it is powered up and running normally is called the dashboard. See the following figure.

Figure 8-1
Alpha® FXM HP UPS module controller system dashboard



The upper-left area of the dashboard is the **Alarm** tile. If there are active alarms the LCD panel will show the top three active alarms.

If there are no alarms in the system, the LCD panel displays **No Alarms** and the display will be green in color. If there are active alarms the color will match the state of the highest priority alarm as follows:


- Green for okay, no alarms present
- Yellow/orange for minor alarms
- Red for major and critical alarms

Pressing the **Alarm** tile takes you to the **Active Alarms** menu to see a full list of active alarms. From the **Active Alarm** view, you can also activate the alarm cutoff (ALCO) as well as press the individual alarms to get detailed information on each specific alarm.

The upper-right area of the dashboard is the **System Status** tile. This tile displays the key values of a system such as float voltage, battery voltage and system mode. The **System Status** tile has 24 user configurable fields and can display up to six fields at a time. Pressing the **Dashboard Paging** button on the left can rotate six fields at a time. To configure the dashboard fields, refer to **Changing the Dashboard Values** section.

Pressing the **System Status** tile takes you to the **System Shortcuts** page.

Below the **Alarm** and **System Status** data tiles there are five buttons providing access to the rest of the controller's functionality.

 **Notice:** The Alpha® FXM HP UPS module does not have an internal speaker.

Maintenance: Provides easy access to frequently needed maintenance tasks including the alarm cut-off. Pressing the **Maintenance** button takes you to the maintenance screen. The first page contains general shortcuts, such as **Alarm Cut-Off**, **Forget All in Comms Lost**, and **Replace ADIO**. Each system defined is also listed on the main page. Pressing a system button provides access to a page of system-related maintenance shortcuts.

Figure 8-2
Maintenance page



Figure 8-3
System maintenance page



Information: Provides contact information for technical support, as well as general information about the controller such as the serial number, software version, and operating system version.

Menu: Provides access to the controller menu, which follows almost the same menu structure as the web interface.

Shortcuts: Provides quick access to several key functions that are used often, such as the **Ethernet** settings. The **Shortcuts** menu also provides access to functions only supported via the LCD panel such as:

- USB file browser
- Backup
- Restore
- Display calibration

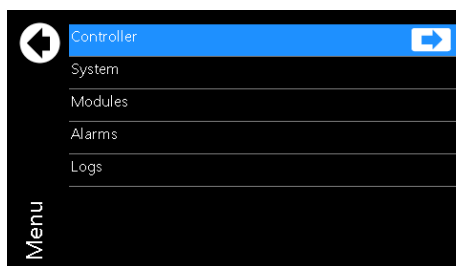
8.1.2.1. LCD panel menu button

This section provides an overview of all the LCD panel menus on the controller. The LCD panel has a menu structure that mirrors the web interface. Select the **Menu** button on the LCD panel dashboard to navigate and select menu items. The menu items are as follows:

- Controller
- System
- Modules
- Alarms
- Logs

When a menu item is selected, it is highlighted in blue, and an **arrow** displays on the right side of the screen. Select the arrow to navigate to the next page.

Figure 8-4 LCD panel menu page



For example, select **Menu > Controller > About > General** to view detailed information about the controller.

Figure 8-5 Controller status page

	Reset Controller	👍	
	Export Diagnostic Information	👍	
Controller Status	Serial Number	12344/1118	
	Part Number	0123547-00	
	Operating System Version	v4.70	
	Software Version	v5.20 Dev 1615	
	Hardware Version	S111P1	
	Controller ID	CXC4-QU69-AJAX-WQ7R	
	CPU Usage	23 %	

When selected, some views display a **pencil** or **hand** icon on the right side of the screen which means you can edit settings or perform actions.

For example, from the **Controller > Settings > Time and Date** screen select the **pencil** icon to set the following:

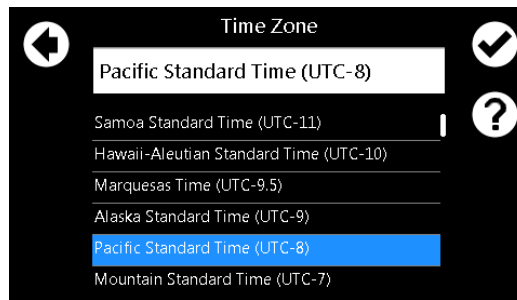
- Current time and date
- Time zone
- Daylight saving time method
- Network time server address

Figure 8-6 Time and date page

	Synchronize Time and Date to Network Time Server	👍	
	Synchronize Time and Date to Web Browser	👍	
Time and Date	Current Time and Date	4/12/2017 11:01:56 AM	✎
	Time Zone	Pacific Time (UTC-8)	✎
	Daylight Saving Time Method	US/Can: 2nd Sunday in March to 1st Sunday in November	✎
	Network Time Server Address	time.nist.gov	✎

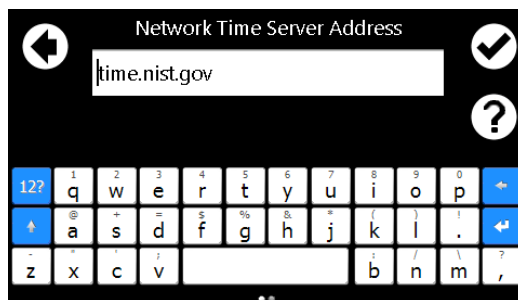
To edit the time zone, you can choose from the list of supported time zones.

Figure 8-7 Time zone page



If **Network Time Server Address** is selected, a text field, and on screen keyboard displays.

Figure 8-8 Network time server page

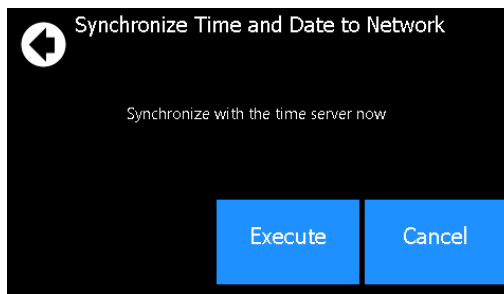


Selecting the **back arrow** cancels an edit, selecting the **check mark** accepts the changes. Selecting the **Help** icon displays a help screen with more information about the item. If the edit is unsuccessful an error displays in red text below the text box. You can either try again, or select the back arrow to abandon the change.

Another screen that displays when selecting items, is the **Execute** screen. For example, **Synchronize Time**. Most edits and executable actions (except **ALCO** and **Restart**) require you to sign in. If you select an editable item or executable action before logging in, the controller responds providing an opportunity to log in and then continue with the action.

When you select the **back arrow** the action is canceled. If you select **Execute**, the command is executed, and the controller provides feedback on whether the action was successful.

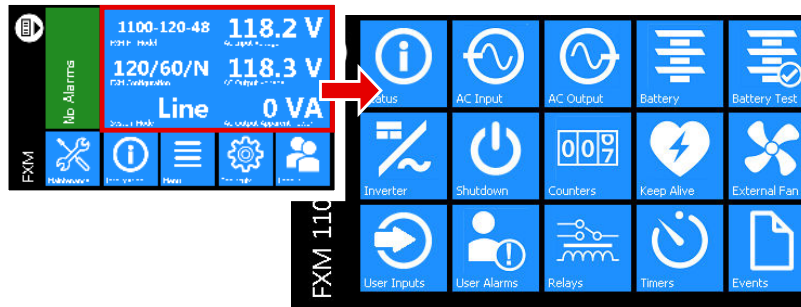
Figure 8-9 Synchronize time



8.1.2.2. Alpha® FXM HP UPS module shortcuts

The LCD system shortcut screen provides quick access to often-used areas of the Alpha® FXM HP UPS module. To get to the system shortcut screen, press anywhere on the system area of the dashboard.

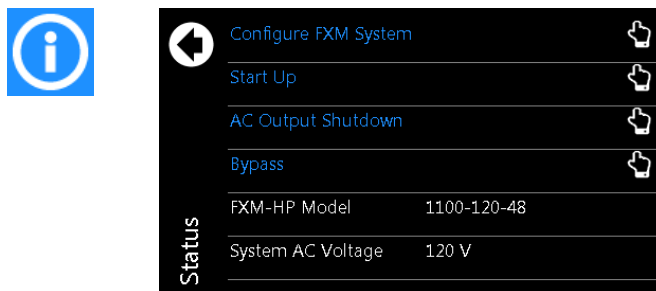
Figure 8-10
System shortcuts



System functions available through the **System Shortcuts** menu are as follows:

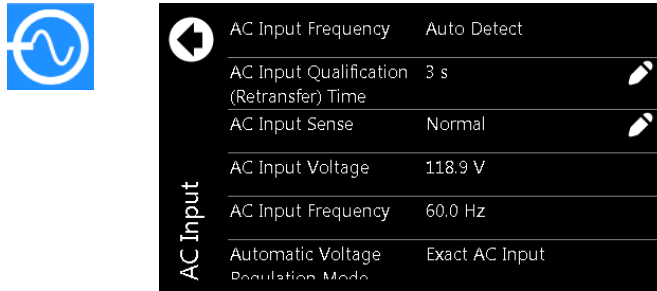
Status: Provides a summary page of the Alpha® FXM HP UPS module.

Figure 8-11
Status



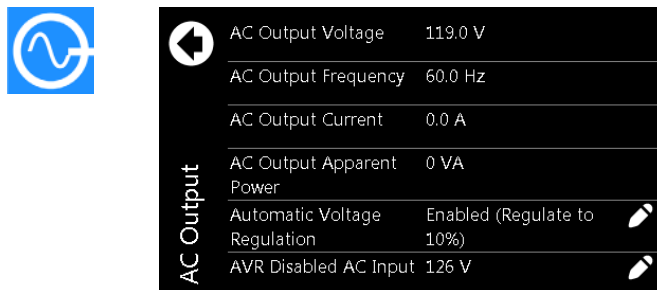
AC input: Provides a shortcut to **Systems > FXM HP UPS System > Status > AC Input** page.

Figure 8-12
AC input



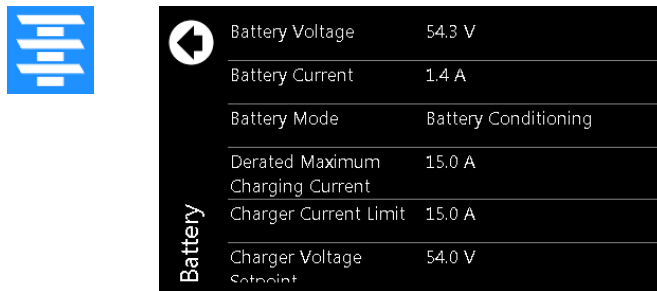
AC output: Provides a shortcut to **Systems > FXM HP UPS System > Status > AC Output** page.

Figure 8-13
AC output



Battery: Provides a shortcut to the **Systems > FXM HP UPS System > Status > Battery** page.

Figure 8-14
Battery



Battery test: Provides a shortcut to the **Systems > FXM HP UPS System > System Functions > Battery Test** page.

Figure 8-15
Battery test



	Start Manual Battery Test	
	Stop Manual Battery Test	
Battery Test	Battery Test State	Inactive
	Time Remaining in BT	--- h
	Last Battery Test Completed	5/29/2019 4:58:56 PM
	Last Battery Test Error Condition	None

Inverter: Provides a shortcut to the **Systems > FXM HP UPS System > System Functions > Inverter Control** page to configure the inverter settings. The inverter cannot be turned on or off here.

Figure 8-16
Inverter control



	Inverter Status	Off
	Maximum Time On Inverter Enable	Disabled
	Maximum Time On Inverter Shutdown Voltage	301 s
	Inverter Shutdown Voltage	42.0 V
	Inverter Manual Start Up Voltage	50.0 V

Shutdown: Provides a shortcut to the **Systems > FXM HP UPS System > System Function > AC Output Shutdown** page.

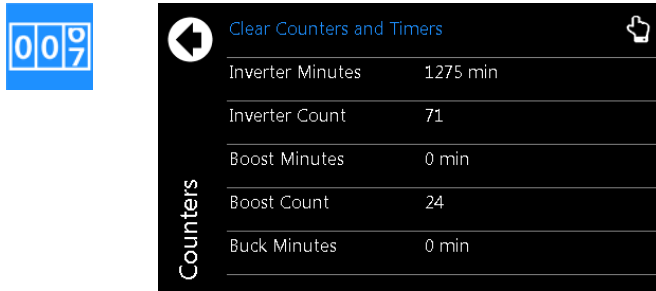
Figure 8-17
AC output shutdown



	AC Output Shutdown Status	Inactive
	AC Output Shutdown Trigger State	Inactive
	AC Output Shutdown Trigger Source	FXM ADIO: Shutdown
	AC Output Shutdown Operation	Auto On After Delay
	Auto On Delay	30 s

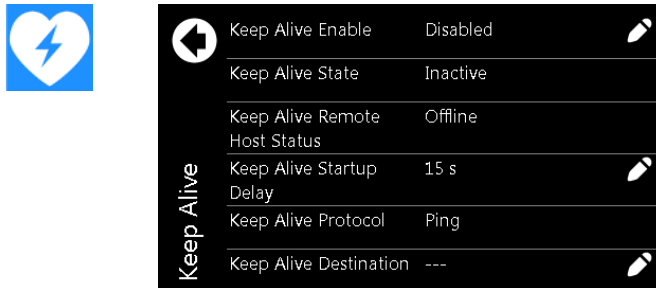
Counters/Statistics: Provides a shortcut to the **Systems > FXM HP UPS System > Status > Statistics** maintenance page to clear **Counters and Timers**.

Figure 8-18
Counters



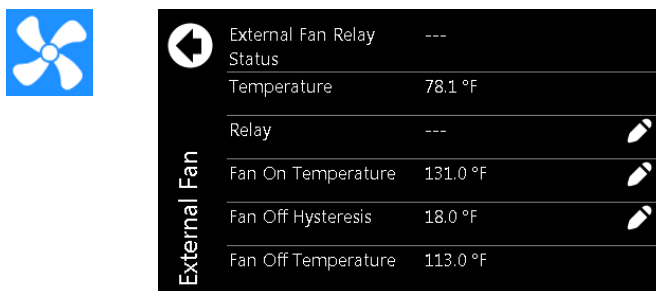
Keep alive: Provides a shortcut to the **Systems > FXM HP UPS System > System Functions > Keep Alive** page.

Figure 8-19
Keep alive



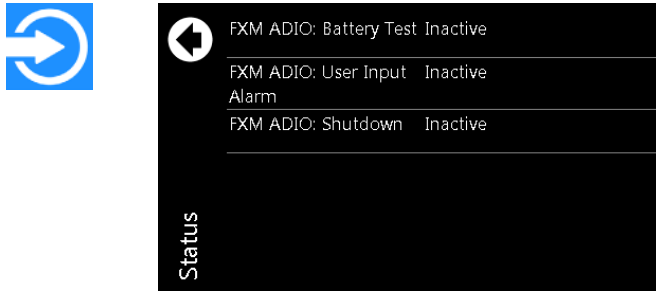
External fan: Provides a shortcut to the **Systems > FXM HP UPS System > System Functions > External Fan** page.

Figure 8-20
External fan



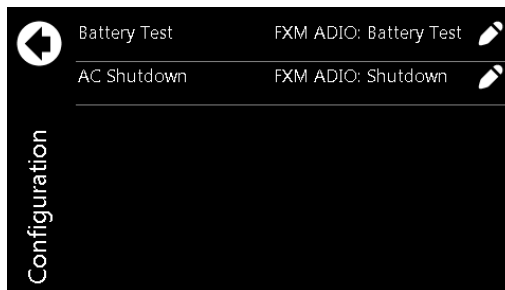
User inputs status: Provides a maintenance page to monitor and configure the user inputs.

Figure 8-21
User inputs status



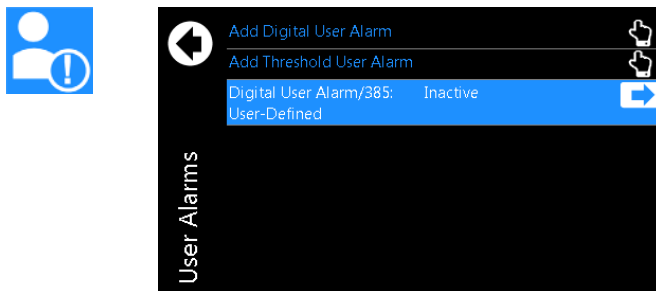
User inputs configuration: Provides a maintenance page to monitor and configure the user inputs.

Figure 8-22
User inputs configuration



User alarms: Provides a shortcut to the **Controller > Programmability > User Alarms** page. This page provides the ability to create any user alarms which can be triggered by the status of a user input. See *Working with Alarms* for more details.

Figure 8-23
User alarms



Relays: Provides a maintenance page to monitor and configure the relays.

Figure 8-24
Relays

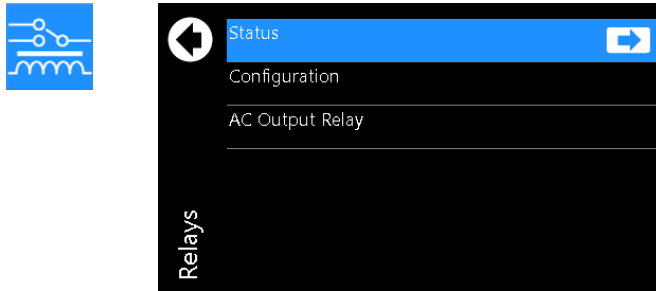
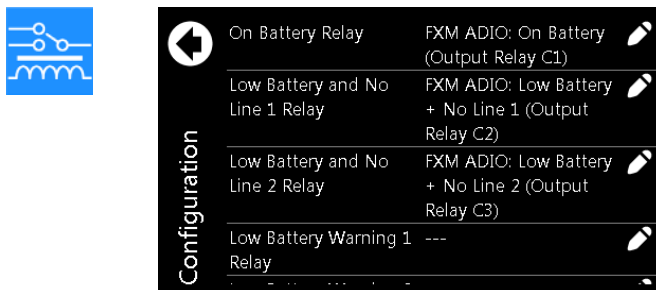


Figure 8-25
Relays status

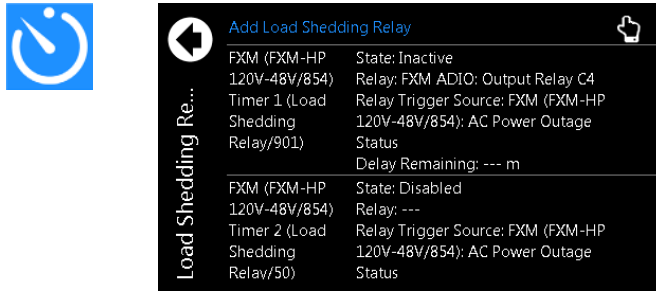


Figure 8-26
Relays configuration



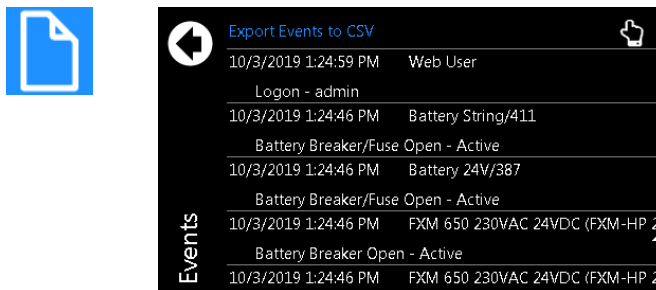
Timers: Provides a maintenance page to configure the load shedding timers. See **Load Shedding Relays** for more information.

Figure 8-27
Load shedding relays



Event logs: Provides a record of changes to the state of the system to help with troubleshooting.

Figure 8-28
Events logs



8.1.3. Overview of the web interface

The dashboard is the default view displayed when you sign in to the controller via the web interface. It provides an up-to-date overview of most critical information of your system. It displays controller information, a system summary table, and the list of any active alarms.

The upper-left tile of the screen provides a color-coded live status view of these alarm notifications. The upper-right tile provides a system status bar with detailed information about the systems.

If there are active alarms, the **Alarm Notification** tile displays the last active alarm according to alarm priority:

- Red for major or critical alarms
- Amber for minor alarms
- Blue for warnings

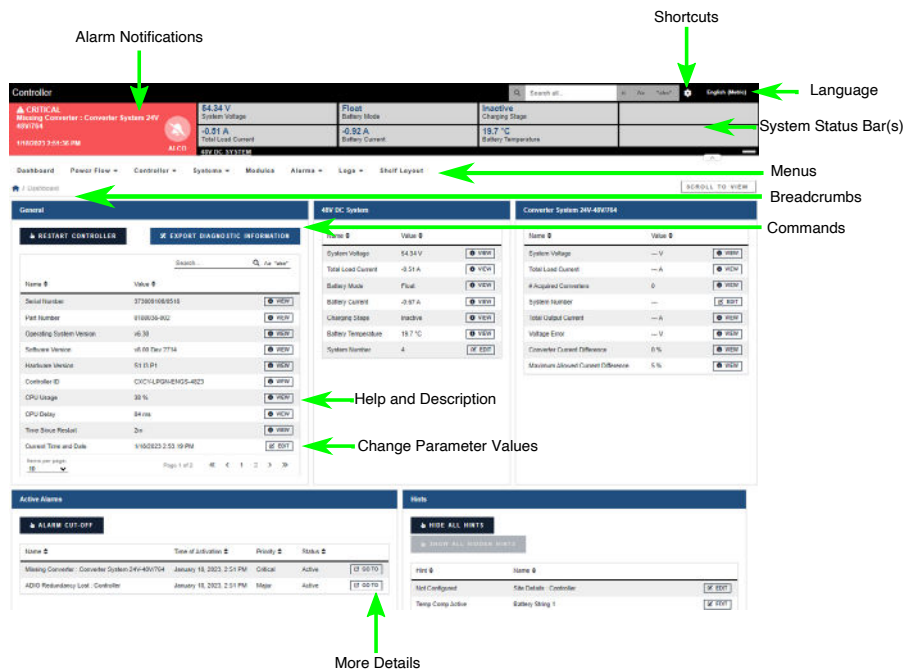
Selecting the Alarm tile takes you directly to the **Active Alarms** menu.

If there are no active alarms, a **No Alarms** message will be shown. In some situations, the controller will provide hints as to certain behaviors of systems, or misconfigurations. If there are no alarms, one hint may be displayed below the **No Alarms** message. Hints are explained in more detail in later sections.

The upper-right tile displays **System Status Bars** which contains summary information for the systems. Selecting the system link at the top of the **System Status Bars** takes you directly to the **Systems** status page.

The upper right-side of the of the web interface also provides the **Shortcuts** and **Language** dropdown menus. The small cog icon is the **Shortcuts** menu which provides a quick link to the user manual, account settings, and a few other often-used items. From the **Language** dropdown menu you can change the language from English to other languages as well as choose imperial or metric measurement units for the display.

Figure 8-29 Dashboard overview on web interface



Under the **Alarm Notification** and the **System Status Bar** are the main menus for the controller:

Dashboard (Home), Controller, System, Modules, Alarms and Events, and Shelf Layout.

As you enter the menus, the interface provides a context sensitive breadcrumb trail at all levels so that you can “see” where you are within the system and go back to any previous menu. The lower area of the main dashboard contains system tables with detailed information about:

- Controller status
- Systems
- Active alarms

You can work with the system directly from this area.

8.1.3.1. Global search

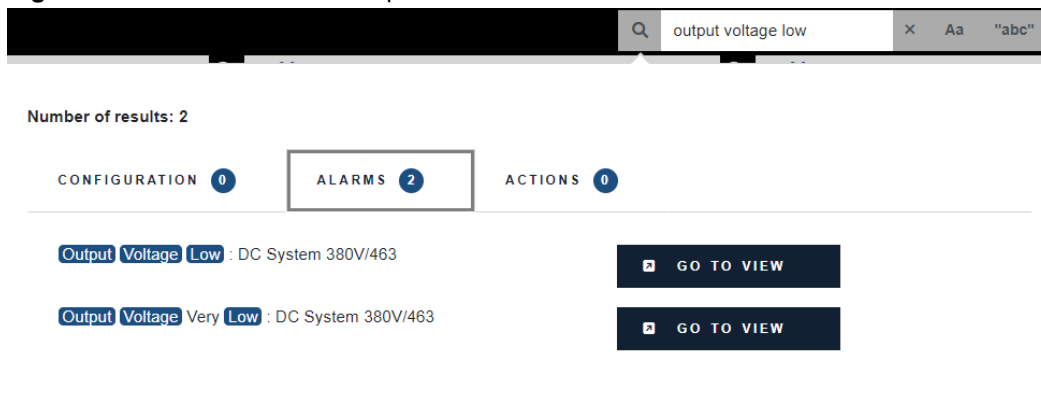
Within the web interface, there is a search bar at the top-right of the screen. This search bar allows you to quickly find the following information:

- Configuration
- Alarms
- Buttons

To search, enter terms into the search box. After the search returns a result, you can select the **Go To View** button to go to the view the status of that **Configuration**, **Alarm**, or **Actions**. For **Configuration**, you can select the **Edit** button to directly edit this value.

The following example illustrates the usage of the search bar to find the **Output Voltage Low** alarm for a DC system.

Figure 8-30 Global search example



8.1.3.2. Paging, sorting, and filtering

Within the web interface there are three additional features that help you find information: paging, sorting and filtering.

Paging: Displays multiple page tabs on tables that have a large quantity of information. If there is too much information for one table the table's lower right corner contains a list of numbers which allows you to scroll through the information.

Sorting: Provides a way to sort the table columns, either ascending or descending similar to any standard spreadsheet program.

Filtering: Provides an easy way to refine the information shown in a particular table.

The search bar on the upper-left side performs a search on each of the space-separated terms in all columns of the table. The **Aa** toggle can be used to make the search case-sensitive, and the **abc** toggle can be used to only match whole words. For example, typing *dc system major* will display all alarms of priority **Major** on the DC system.

The following example shows these features on the **All Alarms** table.

Figure 8-31 Web interface table features

Name	Status	Limit	Priority	Relay
Output Voltage Very High : DC System 48V/338	Inactive	56.50 V	Major	---
Output Voltage High : DC System 48V/338	Inactive	55.50 V	Minor	---
Output Voltage Low : DC System 48V/338	Inactive	48.00 V	Minor	---
Output Voltage Very Low : DC System 48V/338	Inactive	46.50 V	Major	---
Invalid System Voltage Reading : DC System 48V/338	Inactive	5.00 V	Major	---
AC Input Voltage High : DC System 48V/338	Inactive	250.0 V	Minor	---
AC Input Voltage Low : DC System 48V/338	Inactive	198.0 V	Minor	---
Long Term AC Input Fail : DC System 48V/338	Inactive	10m	Major	---
Total Load Current High : DC System 48V/338	Disabled	--- A	Minor	---
Total Load Current Very High : DC System 48V/338	Disabled	--- A	Minor	---

8.1.3.3. Controller menu

This section provides an overview of the **Controller** menu. The controller menu has a total of six sub-menus: **Status**, **Settings**, **Communication**, **Files & Upgrade**, **User & Security**, and **Programmability**.

About: Provides access to sub-menus providing various status information about the controller system, including:

- **General:** General information and active user sessions. The **General** table includes a button to reset the controller system or export diagnostic information.
- **Storage & Memory:** Flash refresh, flash disk, application storage, memory, and alarms tables.
- **Factory Information:** Factory information and branding tables.

Settings: Provides access to configuration sub-menus including the following:

- **Site Information:** Description and location tables.
- **Time & Date:** Time and date table for all related settings. You can also synchronize time and data to a network time server or to a web browser with the buttons.
- **Speaker** (if available): View the speaker state, enable or disable it, and edit the external speaker relay.
- **User Interface:** User interface, LCD panel preferences, in-shelf controller display preferences, file preferences, web interface preferences, custom views, and system dashboard values.
- **Maintenance Mode:** See status, alarms, and relay behavior during maintenance. You can also manually start and stop maintenance mode on this page.

Communication Provides sub-menus for the many different communication protocols the controller supports, including:

- **Ethernet:** Configure Ethernet, ports, and virtual local area network (VLAN) support.
- **CAN:** Settings for the two Controller Area Network (CAN) ports on the controller.
- **SNMP:** Configuration, SNMPv3 configuration, read communities, write communities, Simple Network Management Protocol (SNMP) destination, SNMP and component reference.
- **Modbus:** Configuration, system device IDs, and Modbus reference tables.
- **Email:** Simple Mail Transfer Protocol (SMTP) configuration and email destination tables.
- **Webserver:** Webserver ports and secure web server.
- **Data Sharing:** A method for sharing data to another controller. Published data and systems and data subscription tables.
- **Syslog:** Configuration and syslog destinations tables. Select *SEND TEST MESSAGE TO ALL DESTINATIONS* to test connected systems.
- **Soft Shutdown:** View and edit status and configuration tables.
- **Controller Redundancy:** A method for keeping configuration in sync with a backup controller.

Files & Upgrades: Provides access to sub-menus related to the various files that can be uploaded and downloaded to the controller, including configuration files, backup files, upgrade files, license files, and software manual files:

- **Configuration & Software Backup:** Import and export configuration files including clones. Create configuration restore points, export a controller backup, and view restore point information.
- **Software Upgrade:** Upload new controller system software and operating system to upgrade or download the controller system.
- **Licenses:** Import and export the license key file, enable and disable temporary licenses, and view related alarms.
- **Software Manual:** Upload the HyperText Markup Language (HTML) software manual to the controller.

Users & Security: This menu provides access to user configuration and other settings related to authentication and permissions, such as:

- **Users:** Configure users, view active user sessions, and machine account status.
- **Remote Authentication:** Configure Remote Authentication Dial-In User Service (RADIUS) and Terminal Access Controller Control System (TACACS+) settings.
- **Remote Configuration Lockout:** View and configure remote configuration lockout including status and related alarms.

Programmability: The controller system provides some features to allow users to customize its behavior, for example, custom alarms, a calculation engine, and a scheduler:

- **User Alarms:** Add digital user alarms and threshold user alarms.
- **Custom Data:** Custom data, counters, timers, and change field to variable actions.
- **Scheduler:** Scheduled actions and time spans.

8.1.3.4. Systems menu

This section provides an overview of the **Systems** menu.

Depending on a created system, there can be a variety of sub menus that will vary from system to system. For example, sub menus such as **Status**, **Configure System**, **Inventory**, **System Functions**, and more.

If the controller is new, and a system hasn't been created yet, then selecting the **Systems** menu on the navigation bar will lead to the **Add or Remove Systems** page. The **Create System** wizard can be selected in the table to launch the process to create a specific system. Follow the wizard step by step to create the desired system.

After the creation of a new system, the **Add or Remove Systems** table will be populated with the newly created system. To go to any created systems sub menus, select the **Systems** menu which will display created systems and their potential sub menus.

Note: Upper level sub menus are displayed in the navigation tree and there can be further lower level sub menus after selecting an upper level sub menu. For example, the **Battery** inventory item in a DC system can have battery strings. In this case, battery strings are not displayed in the upper level menu.

8.1.3.5. Modules menu

This section provides an overview of the **Modules** menu.


The **Modules** menu has the following tables: **CAN Modules**, **Power-Line Comms Modules**, **Firmware Upgrade**, and **Firmware Files**.

CAN Modules: Provides a table to view or locate all modules.

Power-Line Comms Modules: To view all power line communication modules in this table, their parent CAN module must be part of a system.

Firmware upgrade: Provides a table to start and monitor a firmware upgrade.

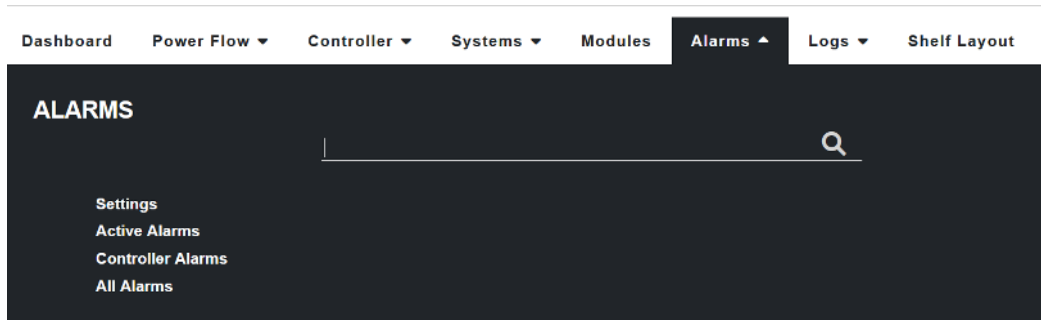
Firmware files: Provides a table to view, upload, or delete firmware files.

 **Notice:** Even if a system is configured to auto-assign devices, once a rectifier has been unassigned from the system, it must be manually reassigned back into the system. This is necessary to avoid unintentional auto-assignment. If a device is unassigned using the **Forget** button, then it will auto-assign when discovered on the CAN bus.

8.1.3.6. Alarms menu

The alarms sub menus are: **Settings**, **Active Alarms**, **Controller Alarms**, and **All Alarms**.

Figure 8-32 Alarms menu



Settings: Provides alarm cut-off functionality, configuration, and settings for global alarm behavior. This menu also includes the **Alarm Summary Relays** table.

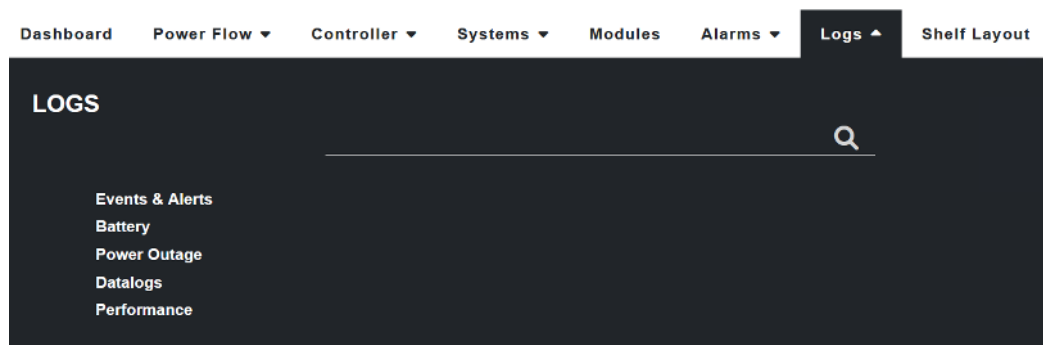
Active Alarms: Provides tables to view and configure active alarms, module alerts, and hints as well as an **Alarm Cut-Off** button.

Controller Alarms: Provides a table to view and configure alarms not belonging to a given system or module.

All Alarms: Provides a table to view and configure all possible alarms. Any alarms can be easily searched for and configured (for example, with a mapped relay) using this table.

8.1.3.7. Logs menu

The logs section has several log-related sub menus: **Events & Alerts**, **Battery**, **Power Outage**, **Datalogs**, and **Performance**. Every log can be exported to comma separated values (CSV) files for further analysis.

Figure 8-33 Logs menu

Events & Alerts: The **Events** table provides a list of system and controller events that record configuration changes, alarms and general controller and system operation. The **Module Alerts** table shows the module alert name and module serial number when a module reports an alert condition.

Battery: The battery log records the duration and change in capacity (Ah) for every charge and discharge of a battery. If you have **Battery Runtime & Health** enabled, the log will also record the change in State of Charge (SoC) and State of Health (SoH).

Power Outage: The power outage log records the start time, end time and duration of each power outage.

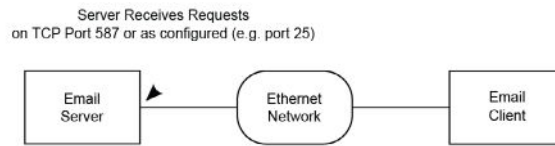
Datalogs: The datalog allows users to record measurements at set intervals over a period of time using the controller sensors and calculated values as inputs.

Performance: The performance log provides daily roll-ups with a minimum, maximum and average value for key usage statistics. For power systems, that usually includes the input voltage and current and the output voltage and current. For the controller system, the central processing unit (CPU), and memory usage are tracked.

8.2. Email notification

The controller can be configured to send alarm summary emails. In this case the controller is acting as an Simple Mail Transfer Protocol (SMTP) client. This section describes the features of and how to set up the controller system email client.

For email notifications in a different language, go to **Controller > Settings > User Interface** and set the **LCD Language** in the **LCD Preferences** table to a preferred language. Although this setting is called **LCD Language**, it serves as the default language for the controller, and will affect the language of email notifications.

Figure 8-34 SMTP client and server default ports

A summary of alarm activities in the controller can be delivered using email. A period of monitoring time is configured, and then all alarms within that period are reported.

This summary is designed to assist decision making when determining the urgency of any action required to resolve issues that may occur in your system.

Table 8-1 Email notification features

Feature	Description
HTML based emails	HTML based emails provide better formatting features such as color coding and table alignment.
Multilevel security	Different security levels are available and automatic detection is executed to support the appropriate level. Direct Secure Sockets Layer (SSL) connection (default port 486) is not currently supported.
Encrypted SMTP server password	The password used for authentication on the Simple Mail Transfer Protocol (SMTP) server is securely encrypted.
Test email capability	A test button is available to send a test email ensuring proper configurations are set for email notifications to reach the appropriate monitors.
Public SMTP server	We currently support the following public server: Google® Gmail: With less secured connection set in the Google® Gmail account. (OAuth2 protocol is not supported. Please refer to Google® developer site for more details. https://developers.google.com/identity/protocols/OAuth2)
Private SMTP server	The controller supports private servers with the following security settings: <ul style="list-style-type: none"> • Transport Layer Security (TLS) • Clear text with authentication • Clear text anonymous

Email content

- Subject line with filterable text and alarm counts.
- Static title for filtering.

- Configurable name of the controller.
- Configurable location of the controller which provides a link to open Google Maps showing the location of the controller (internet connection required).
- Time and date of the notification.
- List of up to ten active alarms sorted by priority with an active alarm count indicator showing total active alarms.
- List of up to ten cleared alarms sorted by priority with a cleared alarm count indicator showing total cleared alarms.

How email notification works

- An alarm activity is the main item that will trigger an email notification. To avoid overwhelming the network, emails are only sent out at the configured interval set in the **Email Destination** table.
- When alarm transitions occur (for example, alarms activating or clearing) a timer starts from the first transition. During this collection period, all alarm transitions are collected for reporting in the email that is sent out at the end of the period. Continued transitions after the email is sent will start another timer for the next email notification.
- Active alarms are reported as a snap shot of all currently active alarms, regardless of when they activated or if they were a part of a previous notification.
- All cleared alarms are collected based on the last occurrence within the collection period. This is to avoid multiple entries of the same alarm in the case the alarm toggled multiple times.

Secured email

Connection to a SMTP server defaults to TLS secured connection on port 587. Checks are done via the controller and if Transport Layer Security (TLS) is not supported, proper degradation of security features is done in the following sequence:

1. TLS handshake attempt.
2. Clear-text authentication with username and password.
3. Anonymous clear-text transmission with no authentication.

The checks are done by following SMTP protocol for SMTP server commands and responses. Please see SMTP protocol standards for more details.

Table 8-2 Email configuration

Configuration	Description
Enable	Email notification defaults to inactive. Enabling allows email notifications to go out when all configuration information is set correctly.
SMTP Server Address	A Domain Name Serve (DNS) name or an IPv4 or IPv6 address will work in providing a target location of the email server.

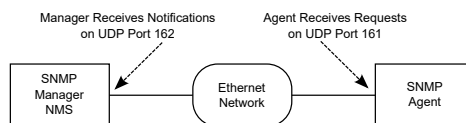
Table 8-2 Email configuration (continued)

Configuration	Description
Port	Default port is 587.
Domain	This is a DNS formatted string (words separated by '.') used for identifying the client to the SMTP server. Required for most public SMTP servers like Google.
SMTP User Name	The username used for authentication to the server to access SMTP resources.
SMTP Password	The password used for authentication to the server to access SMTP resources. Set this value by using the Set SMTP Server Password button. You can clear the configured password by using the Clear Server Password button.
From	The From field is used as the source of the email and is usually the same as the Username provided to authenticate the client to the SMTP server. For example, Gmail requires this value to be the email address of the account in use.
To	The To field is for the destination or receiver of the email notification. This field allows multiple email address entries separated by commas.

8.3. Setup SNMP communication

Simple Network Management Protocol (SNMP) is a standard protocol or language that Network Management Systems (NMS) or SNMP manager use to control network devices and report information. A typical SNMP system is often represented as one SNMP manager collecting data from several SNMP agents or devices.

The controller acts as an agent or device in an SNMP system. This section of the manual describes how to add a new agent (the controller) to an existing SNMP system. It does not cover how to set up an SNMP manager nor does it explain how to correctly set up an SNMP system. Those topics are specific to the SNMP management software chosen which will have its own documentation.

Figure 8-35 SNMP manager and agent default ports

There are two main steps required to add a new agent to your SNMP system:

- Configure the agent with the IP address of your SNMP manager (tell the agent to send information to the manager).
- Compile the agent's Management Information Bases (MIBs) into the manager (tell the manager how to interpret information sent by the agent).

Configure an IP address to receive notifications

Configuring an IP address for notifications is referred to as *Subscribing to Notification Services*. Up to 10 IP addresses can be configured. SNMP monitoring systems need to compile and install the ALPHA-NOTIFICATION-MIB. Please refer to the user guide of the SNMP manager for this process.

For each of the ten SNMP notifications addresses, the user can select the address and select the **Go To** button to see more details about that particular monitoring destination, and to edit details.



Notice: For detailed information on using SNMP, see the **SNMP Integrator Guide (User Guide ID: 0350099-J0)** on the EnerSys® website, www.enersys.com.

9. Alpha® FXM HP UPS system

This section provides a brief overview of the components and functions within a typical Alpha® FXM HP UPS system. A basic Alpha® FXM HP UPS system usually consists of an Alpha® FXM HP UPS module, a battery, and a load, but can also include other components.

9.1. Guidelines for setting up the Alpha® FXM HP UPS system

The following section contains basic guidelines for setting up the Alpha® FXM HP UPS system. System setup consists of four parts: AC system inspection, battery inspection, setting up the system, and testing the system. System setup should only be conducted by a qualified technician.

Perform an inspection of the power system to confirm that the mechanical and electrical requirements and parameters are within specification. Pay special attention to the battery to ensure it is installed safely and correctly, and that the battery terminals are torqued to specification.

1. Make sure all power to the system is off.
2. Make sure the battery polarity is correct. Use a voltmeter if necessary to confirm.
3. Install the Alpha® FXM HP UPS module.
4. Turn on the AC to the Alpha® FXM HP UPS module and allow it to start up.
Verify that the system starts up, and the controller system turns on.
5. Confirm the battery settings on the controller: capacity, charge limit, the Peukert exponent, and other settings.
6. Check that the battery polarity is correct and turn on the breaker for the batteries.
7. Follow the initial battery charge procedure as indicated in the manufacturer's instructions.

The Alpha® FXM HP UPS module is operating normally. There may or may not be active alarms depending on system configuration.

Perform tests to confirm that the system is operating properly. Specific tests to perform will depend on the system configuration but may include:

- Correct AC input voltage and DC voltage
- Battery test
- Relay test
- Battery disconnect operation
- Alarm test

9.1.1. The system mode

The system mode indicates the state of the Alpha® FXM HP UPS module. The mode can be observed in the system summary banner (if set as a preference) or on the **System Status** page.

In a system operating normally, the **System Mode** will be **Line** mode. The charging value will show **Float** which indicates the battery is floating.

In a system that is charging, the charging mode value will either be **Bulk** (battery is charging at constant current) or **Absorption** (battery is in the absorption phase of charging).

In a system that is providing backup power, the **System Mode** will be in **Inverter** mode (AC line has failed, or not within acceptable limits).

When the **System Mode** shows **Error**, then the controller is unable to communicate with the Alpha® FXM HP UPS module. If this value persists for more than a minute or so, it may indicate that the Alpha® FXM HP UPS module is not configured or working properly.

The Alpha® FXM HP UPS module can be in one of the following modes:

Table 9-1 Alpha® FXM HP UPS module operating modes

Mode	Description
Standby	The UPS module is switched on and waiting for the line power to qualify or resolution of pending faults or alarms.
Retransfer	The UPS module is transferring to Line mode from the following modes: Inverter, Shutdown or Standby.
Boost1 and Boost2	The UPS module transformer is increasing output line voltage due to the input voltage being lower than specification.
Line	The UPS module is switched on and line power is provided to the load.
Buck1 and Buck2	The UPS module transformer is decreasing output line voltage due to the input voltage being higher than specification.
Inverter	The UPS module is providing backup battery power to the load.
Bypass	The UPS module is feeding input directly to the load without providing any features such as automatic voltage regulation or a backup power.
Shutdown	The output is turned off via a user input or via web interface or LCD, and the power to the load is disconnected. For safety reasons, the AC input breaker and DC breaker should be opened before servicing the unit.
Fault	The UPS module has a recoverable fault. AC and DC outputs are off until the fault is cleared.
Permanent Failure	The UPS module has a permanent failure. Example: backfeed relay failure.
Battery Test	The UPS module is running a battery test. The UPS module is providing battery power to the load.

9.2. Alpha® FXM HP UPS module functions

9.2.1. Modules, inventory, and system functions

To setup an Alpha® FXM HP UPS system on the controller system, there must be configurations completed for various parts of the system like **Modules**, **Inventory**, and **System functions**. This section will explain the terms which will assist in navigating the menu structure.

Modules

A module is a device that communicates information. Most modules in a controller system will be CAN devices such as the Alpha® FXM HP UPS ADIO peripheral (called “FXM ADIO”) and other ADIO peripherals. Detailed information about modules can be found under the top level **Modules** menu.

The Alpha® FXM HP UPS ADIO peripheral is an independent device that handles all the real time control functions of the inverter. The front LCD panel can be thought of as the communications controller, often referred to as “the controller”. The controller system communicates with the various modules of the system to fulfill the monitoring and control functions.

Inventory

An inventory item is an item that is directly involved in the flow of power through the system. For example, a battery is an inventory item but a controller system or an ADIO module is not. Setting up the inventory of a system focuses on the monitoring. The control of the system is done under advanced functions. Inventory of a system can be found under the **Systems > FXM HP UPS System > Inventory** menu. Battery, shunts, and transducers are inventory items applicable to the Alpha® FXM HP UPS system.

System functions

System functions are the major features of the system. Some examples are:

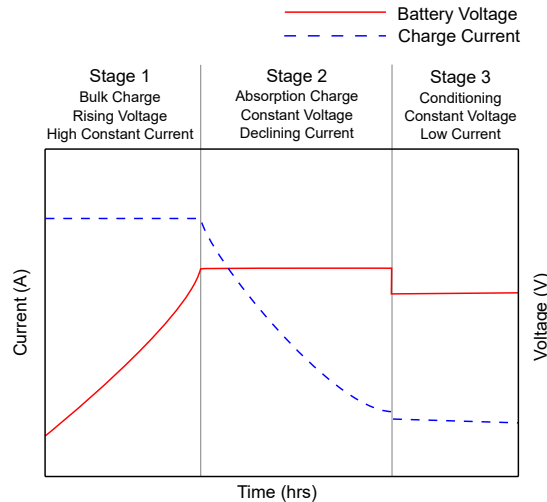
- Battery charging
- Battery test
- Battery runtime & health
- Temperature compensation
- AC output
- Inverter control
- Load shedding relays
- External fan
- Keep alive

System functions can be found under **Systems > FXM HP UPS System > System Functions**. The system functions interact with the battery inventory item and the Alpha® FXM HP UPS ADIO peripheral. Once these are configured you can test the system functions to ensure that the system is working as intended.

9.2.2. Battery charging

The controller applies a typical three-stage charging cycle including bulk charging, absorption charging, and conditioning which is sometimes called float charging.

Figure 9-1 Three-stage charging cycle



Bulk charging

After the bulk charging stage, the battery should be in a 70 to 90 percent state of charge. In the **Bulk Charging**, the charging current is limited to the **Charge Current Limit** setting.

Absorption charging

After the absorption charging stage, the battery should be in a 95 to 98 percent state of charge. In the **Absorption Charging** menu, you have the option to charge the battery at a voltage higher than the float voltage. The higher voltage is used to speed up the absorption charging stage after a prolonged AC power failure.

Float charging

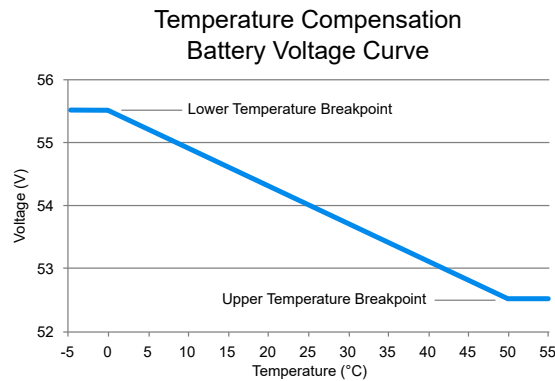
The float charging stage brings the batteries to 100 percent state of charge and maintains it there. When the system is in the float stage it is usually at the **Float Voltage**.

9.2.3. Battery temperature compensation

Temperature compensation is used to prolong battery life and help prevent thermal runaway. When battery temperature compensation is enabled, the controller uses the battery temperature to calculate an offset which is applied to the battery voltage.

A typical temperature compensation curve for a 48 volt battery system is shown in the following figure.

Figure 9-2 Temperature compensation battery voltage curve



Battery performance and life expectancy are directly related to the battery ambient temperature.

Thermal runaway occurs if the internal temperature rises due to overcharge, high ambient temperature or internal fault. Temperature compensation automatically adjusts the float voltage as the battery temperature changes to protect the battery from thermal runaway.

The temperature compensation function adjusts the system voltage every two seconds, as the temperature changes, and provides for a maximum voltage change of 0.2 volts over this interval. Temperature compensation occurs at standard rates commonly referred to as slope-compensation settings.

The slope of the temperature compensation curve in either mV/°F/Cell or mV/°C/Cell can be set via the **Systems > FXM HP UPS System > System Functions > Temperature Compensation**. The value is set based on the battery manufacturer's information.

If the battery temperature probes appear to be disconnected or broken, then the temperature compensation function calculates the enabled setpoints as if the temperature reached the **Upper Temperature Breakpoint**.

9.2.4. Battery test

Battery test is used to determine the **Estimated State of Health** of the battery by discharging it to a certain state.

Definitions

- **Battery test termination voltage:** The voltage threshold at which the test normally ends.
- **Battery test timeout:** The maximum time the test can run before it is stopped.
- **Battery test alarm:** The battery test is active.
- **Battery test termination on SoC:** Enable or disable the **Battery Test Termination SoC** threshold to terminate a battery test.
- **Battery test termination SoC:** The State of Charge (SoC) threshold at which the test normally ends.

There are three ways to start a battery test:

- **Manual battery testing:** Battery test can be started by selecting the **Start Manual Battery Test** button.
- **Automatic testing:** Battery test can be scheduled to start automatically and periodically.
- **Remote triggered battery testing:** Battery test can be triggered to start by the state of a user input.

Using the battery test

If the test is started when the battery is fully charged, the results of the battery capacity estimate will be more accurate. Use charge current control to limit the battery recharge current to the battery manufacturer's specified maximum value.

During a test, the **Estimated State of Charge** and **Estimated Battery Runtime** hours can be viewed via the **Systems > FXM HP UPS System > Status** menu or the **System > System Functions > Battery Runtime & Health Estimation** menu.

Battery test initiation

When the test begins, an entry is made in the event log. If the **Battery Test Alarm** has been enabled, it would be activated to provide a warning to indicate that a battery test is in progress. The Alpha® FXM HP UPS module mode is changed to **Inverter** mode to allow the battery to discharge by providing power to the AC load. Battery test will run for the period set as timeout or until the battery test termination voltage is reached.

Activity during battery test

Temperature compensation features are suspended during a battery test. When the battery is discharging, the battery test alarm is active. Battery state of health estimation begins at three percent of depth of discharge, but is not displayed unless depth of discharge > 20 percent; the point at which reasonable accuracy can be assured.

Conditions to watch for during battery test

If the voltage drops below 46 volts (23 volts for 24 volt battery system) before or when three percent Depth of Discharge (DoD) is reached, the test is aborted and the battery health is set to 0 percent (resulting in a **Battery Health Low** alarm). This provides an indication that the battery is very weak. Battery State of Health must be manually reset to 100 percent before the next battery test is started, so that the battery monitor can properly estimate the battery health.

Canceling battery test

Battery Test mode can be canceled by stopping the test manually. To stop the battery test manually go to **Systems > FXM HP UPS System > System Functions > Battery Test** and select the **Stop Manual Battery Test** button.

Battery test completion

Once the battery begins to charge, the recharge cycle begins. Live battery recharge information is available via the **Systems > FXM HP UPS System > System Functions > Battery Runtime & Health Estimation** menu. The test is considered complete once the battery begins to charge. This is due to either, the test ending from timeout, the system reaching the termination voltage or from an abort condition.

9.2.5. Battery runtime and health estimation

If **Battery Estimation** is enabled, the controller calculates an **Estimated State of Charge (SoC)**, and an **Estimated Battery Runtime** remaining (RTR) at all times. It is not always practical to estimate these values. For example, if the system goes into a charging stage immediately after a restart, there is no way to estimate the State of Charge or Runtime Remaining.

The accuracy of the estimated battery health improves as the battery undergoes more discharge cycles and it also improves with deeper discharges.

If a battery discharge occurs that goes below an State of Charge (SoC) value of 80 percent, then the **Battery Runtime & Health Estimation** function creates a **Last Battery Discharge Summary**, a **Last Battery Recharge Summary** and recalculates the **Estimated Battery Health**.

9.2.6. AC output


AC shutdown

AC shutdown is used to shut off the AC output power. When the unit is in shutdown mode, the inverter is turned off. Neither the AC line nor inverter power is supplied to the load.

AC output can be turned off by a trigger source (Trigger Input Control) such as a user input. When the trigger source is active, the unit goes into shutdown mode. After the trigger source is inactive, there are two options for restarting the Alpha® FXM HP UPS module output by setting **Start Up Option After Triggered Shutdown**.

AC output can also be turned off manually (**Manual Control**) by going to **AC Shutdown (Manual Control)** table and clicking on the **AC Output Shutdown** command. There are two options for restarting the Alpha® FXM HP UPS module output setting **Start Up Option After Manual Shutdown**:

- **Manual Start Up:** The unit remains in shutdown mode. The output of the unit must be turned on manually by clicking on the **Start Up** command.

 **Notice:** AC output will be off due to shutdown. If the router is on, the output of Alpha® FXM HP UPS module communication will be lost. To turn on output local access will be required.

- **Auto Start Up After Delay:** After the unit is in shutdown mode, the unit will restart automatically after **Auto Start Up Delay After Manual Shutdown** has elapsed.

Output relay status

The output relay can be configured for an external relay, to disconnect the load when the AC output voltage is out of the predefined range.

The output relay selects the relay to be activated when the AC output voltage is out of range.

Upper Disconnect Voltage and **Upper Reconnect Voltage** define the upper range of activating or deactivating the selected relay.

Lower Disconnect Voltage and **Lower Reconnect Voltage** define the lower range of activating or deactivating the selected relay.

9.2.7. Inverter control

The Alpha® FXM HP UPS module goes to inverter mode when there is no AC input power, or the AC input is not qualified. For the inverter to work properly, there must be a fully charged battery and the unit must be configured as **Normal UPS**.

The inverter control configuration table has the following fields:

Table 9-2 Inverter control configuration table

Name	Definition
Maximum Time On Inverter Enable	Controls the function of turning off the inverter after running for a configured period. The intent of this function is to conserve battery power while giving enough time for the load to be turned off properly.
Maximum Time On Inverter	Defines the maximum time in seconds the inverter will run before going to standby mode.
Inverter Shutdown Voltage	Defines the lower battery voltage limit when the inverter will be turned off. The UPS module goes to standby mode. Once the inverter has been turned off, the unit waits for the AC input power.

Table 9-2 Inverter control configuration table (continued)

Name	Definition
Inverter Manual Start Up Voltage	Define the minimum battery voltage which the inverter can be started manually.
Close to Inverter Shutdown	Alarm is activated when the inverter is running with the battery discharged to within five percent of the inverter shutdown voltage.

9.2.8. Load shedding relays

A load shedding relay can be configured to trigger a relay after the trigger condition is true for the configured time period.

The **Load Shedding Relays** table gives a status summary of all relays. The **Add Load Shedding Relay** button is used to create a new load shedding relay.

The **Load Shedding Relays** configuration table has the following fields:

Table 9-3 The load shedding relays configuration table

Name	Definition
Name	Name of this relay.
Description	Description of this relay.
Relay Enable	Enable the function of this relay.
Relay	Select the relay to energize.
Relay Trigger Source	Defines the condition to activate this relay.
Activation Delay	Defines the time delay before energizing the relay after the trigger source is activated. Set to 0 if no delay is needed.
Time Periods 1	Defines the first time of day period. During this period, the loading shedding relay will not be activated, and the relay will be de-energized. Once the time is outside this time of day period, the relay will resume to function. If no Time of Day period is needed, set to ---
Time Periods 2	Defines the second time of day period. During this period, the loading shedding relay will not be activated, and the relay will be de-energized. Once the time is outside this time of day period, the relay will resume to function. If no Time of Day period is needed, set to ---.

9.2.9. External fan

External fan is used to trigger a designated relay when the temperature is above a threshold setting. This relay can be wired to turn on an external fan.

The external fan configuration table has the following fields:

Table 9-4 External fan configuration table

Name	Definition
Relay	Selects the relay to be activated when the temperature is out of range.
Temperature Sensor	Selects the temperature input.
Fan On Temperature	Defines the temperature to activate the relay.
Fan Off Hysteresis	Defines the temperature to deactivate the relay.

9.2.10. Keep alive

Keep alive is used to detect a communication failure and to provide a method to restore communication. A reset removes power either by temporarily shutting off the output of the UPS module or by changing the state of a dry contact relay which resets the local communication equipment powered by this unit. If the **Keep Alive** function is enabled, the Alpha® FXM HP UPS module waits for the initial **Keep Alive Startup Delay** period before initiating communication with the destination IP address.

Detecting communication failure

After the initial startup delay, the Alpha® FXM HP UPS module pings the destination IP address every **Protocol Interval** seconds. If no response is received within the **Protocol Timeout** period, the unit waits for **Protocol Interval** seconds before sending another ping. After retrying for **Maximum Protocol Retries** times and pinging still fails, the Alpha® FXM HP UPS module runs the selected **Keep Alive Action**.

Running failure action

After the communication fails, the unit runs the selected **Keep Alive Action** to either shutdown the **AC Output** or change the state of a dry contact relay. This action needs to be configured by the user if it is preferred to drive a dry contact relay, because by default it is set to **Reset AC Power**. This function turns off the AC power to reset the local communication equipment. After the output power is restored, the unit waits for **Keep Alive Startup Delay** before retrying to ping the destination IP address.

If the communication still fails after running the selected **Keep Alive Action** for **Keep Alive Maximum Action Retries**, the **Keep Alive** function goes to a **Failure** state. In the **Failure** state, the **Keep Alive Failure Alarm** is activated and the unit will stop pinging the destination IP address until **Keep Alive Failure** is reset.

The **Keep Alive** configuration table has the following fields:

Table 9-5 Keep alive configuration table

Name	Definition
Keep Alive Enable	Controls the function of running failure action after detecting communication failure.

Table 9-5 Keep alive configuration table (continued)

Name	Definition
Keep Alive Startup Delay	Defines the initial time delay at startup before starting communication.
Keep Alive Protocol	Defines the protocol to use to detect communication failure. It can be either Ping or Transmission Control Protocol (TCP). Ping can only be used with IPv4 and TCP can be used with either IPv4 or IPv6.
Keep Alive TCP Protocol Port	Defines the port to be used if TCP protocol is selected. The commonly used ports are 80 and 443. It is important that a service such as web server is running on the destination computer and listening to the selected port.
Keep Alive Destination IP Address	Defines the destination IP address. It can be a hostname, IPv4 or IPv6 address.
Keep Alive Protocol Timeout	Defines the timeout period for the protocol.
Keep Alive Protocol Interval	Defines the retry interval
Keep Alive Maximum Protocol Retries	Defines the number of retries before running the action.
Keep Alive Action	Defines action after a keep alive failure, reset AC power, or activate fail relay.
Keep Alive Action Duration	Defines the duration the AC output will be turned off.
Keep Alive Maximum Action Retries	Defines the number of retries turning the AC output off.
Keep Alive Failure	Alarm is triggered when the communication failure is detected after maximum number of retries.
Keep Alive Failure Restart Delay	Defines the time delay between a failure and the when the next communication test is restarted.
Keep Alive Fail Relay	Defines the relay to be activated when keep alive fails with the activate fail relay action is selected.
Keep Alive Fail Relay Status	Defines the status of the relay that activates when keep alive fails with the activate fail relay action is selected.

9.3. Create an Alpha® FXM HP UPS system manually

On a controller, if there is no Alpha® FXM HP UPS system defined, you can easily create the inventory items needed to monitor and control an Alpha® FXM HP UPS system. There are three steps to creating a new Alpha® FXM HP UPS system.

1. Create the Alpha® FXM HP UPS system and other inventory items, and then configure the inventory to use the inputs and relays to monitor the system.
2. Configure each of the system function to correctly control the Alpha® FXM HP UPS system and manage the battery.
3. Adjust threshold, enable/disable alarm, and set up any remote alarm reporting using alarm relays or SNMP notification.

9.3.1. Quick reference for configuring an Alpha® FXM HP UPS system

The following figure shows the key configuration settings for an Alpha® FXM HP UPS system that should be set or checked so that the system operates correctly.

There are many optional and alarm reporting settings that can also be configured.

Figure 9-3 Quick Reference for Configuring an Alpha® FXM HP UPS system

<p>Controller > Inventory</p> <p>Create FXM System</p>	<p>System > FXM System > System Functions > Charging > Primary Charge Control</p> <p>Turn Off Charger</p> <p>Turn On Charger at Max Current</p> <p>Charge Current Limit (C/X)</p>	<p>System > FXM System > System Functions > Load Shedding Relays</p> <p>Load Shedding Relay Enabled = Enabled</p> <p>Relay = FXM ADIO C4</p> <p>Relay Trigger Source = AC Power Outage</p> <p>Relay Activation Countdown = 120 minutes</p> <p>Time Period 1 = ---</p> <p>Time Period 2 = ---</p>
<p>System > FXM System > Configure System</p> <p>Configure FXM System</p> <p>Start Up</p> <p>AC Output Shutdown</p> <p>Bypass</p> <p>Float Voltage = 54V</p> <p>System Type = Normal UPS</p> <p>Low Battery Threshold = 40%</p> <p>AC Input Frequency = Auto Detect</p> <p>AC Input Qualification 3 sec</p> <p>AC Input Sense = Normal</p> <p>Automatic Voltage Regulation = Enabled</p> <p>AVR Disabled High Limit = 126V</p> <p>AVR Disabled Low Limit = 114V</p>	<p>System > FXM System > System Functions > Charging > Absorption Charging</p> <p>Elevated Absorption Charging = Enabled</p> <p>Arming Threshold = 48V</p> <p>Absorption Voltage = 55V</p> <p>Absorption Termination Threshold = 0.5A</p> <p>Absorption Timeout = 7.0h</p>	<p>Controller > Advanced Functions > Scheduler</p> <p>Days = All Days</p> <p>Time Period 1 = 6:00AM - 9:00 AM</p> <p>Time Period 2 = 3:00 PM - 6:00 PM</p>
<p>System > FXM System > Configure System > Alarms</p> <p>Low Battery + No Line 1 = FXMADIO: C2</p> <p>Low Battery + No Line 2 = FXMADIO: C3</p> <p>On Battery = FXMADIO: C1</p>	<p>System > FXM System > System Functions > Temperature Compensation</p> <p>Temp Comp In Float = Enabled</p> <p>Temp Comp in Absorption = Enabled</p>	<p>System > FXM System > System Functions > External Fan</p> <p>Relay</p> <p>Temperature Sensor</p> <p>Fan On Temperature = 131 deg F</p> <p>Fan Off Temperature = 113 deg F</p>
<p>Controller > Configure Controller > Alarms and Alarm Summary Relays</p> <p>Controller Critical Relay = FXM ADIO C5</p> <p>Controller Major Relay = FXM ADIO C5</p> <p>Controller Minor Relay = FXM ADIO C5</p>	<p>System > FXM System > System Functions > Battery Test</p> <p>Start Manual Battery Test</p> <p>Remote Battery Test = Enabled</p> <p>Trigger Input: FXM ADIO:S1</p>	<p>System > FXM System > System Functions > Keep Alive</p> <p>Keep Alive Enable = Disabled</p> <p>Start Up Delay = 15 sec</p> <p>Destination IP Address</p> <p>Ping Protocol Timeout = 2 sec</p> <p>Ping Protocol Interval = 5 sec</p> <p>Maximum Retries = 3</p> <p>Keep Alive Action = Reset AC Power or Activate Fail Relay</p> <p>Action Duration = 5 sec</p> <p>Maximum Action Retries = 5</p> <p>Failure Restart Delay = 40 sec</p>
<p>System > FXM System > Inventory > Battery > Battery String</p> <p>Battery Voltage = FXM ADIO:Battery Source</p> <p>Battery Current = FXM ADIO:Battery Current</p> <p>Battery Temperature Source: FXM ADIO</p> <p>Battery Temperature</p> <p>Capacity Rating = 100 A-h</p> <p>Peukert Exponent = 1.00</p> <p>Breaker/Fuse Source: FXM ADIO: Battery Breaker Open</p>	<p>System > FXM System > System Functions > AC Output Shutdown</p> <p>Shutdown Trigger Source = FXM ADIO:S3</p> <p>Shutdown Operation = Manual</p> <p>Shutdown Auto On Delay = 30 seconds</p>	<p>Module > FXM ADIO</p> <p>Digital Input S1 Name = Battery Test</p> <p>Digital Input S2 Name = User Input Alarm</p> <p>Digital Input S3 Name = Shutdown</p> <p>Relay C1 Name = On Battery</p> <p>Relay C2 Name = Low Battery + No Line 1</p> <p>Relay C3 Name = Low Battery + No Line 2</p> <p>Relay C4 Name = Timing Relay 1</p> <p>Relay C5 Name = Controller Alarm</p> <p>Relay C6 Name = External VDC</p>
	<p>System > FXM System > System Functions > Output Relay Configuration</p> <p>Relay</p> <p>Upper Disconnect Voltage = 135V</p> <p>Lower Disconnect Voltage = 100V</p>	
	<p>System > FXM System > System Functions > Inverter Control</p> <p>Max Time on Inverter Enabled = Disabled</p> <p>Max Time on Inverter = 300 seconds</p> <p>Inverter Shutdown Voltage = 42V</p> <p>Manual Start Up Voltage = 50V</p>	

9.3.2. Alpha® FXM HP UPS system default values

When an Alpha® FXM HP UPS system is created, all user configurable parameters are set to their default values.

Table 9-6 Alpha® FXM HP UPS system default values

Parameters	Default settings
System Type	Normal UPS
Battery Float Voltage	54 V (48 V)
	27 V (24 V)
AC Input Frequency	Auto Detect
AC Input Qualification Time	3 seconds
AC Input Sense	Normal
Automatic Voltage Regulation	Enabled
AC Input High Limit (AVR Disabled)	132 V (120 V)
	253 V (230 V)
AC Input Low Limit (AVR Disabled)	108 V (120 V)
	207 V (230 V)
Battery Capacity Rating	100 Ah
Battery Open Circuit Voltage	51.4 V (48 V)
	25.7 V (24 V)
Battery Peukert Exponent	1.00
Battery Runtime Low Alarm	60 minutes
Battery Health Low Alarm	70%
Battery Temperature High Alarm (°C)	75
Battery Temperature Low Alarm (°C)	-20
Charging Current Limit Amps	15 A (Alpha® FXM HP 1100 and FXM HP 2000 UPS modules)
	10A (Alpha® FXM HP 650 UPS module)
Elevated Absorption Charging	Enabled
Elevated Absorption Arming Threshold	48 V (48 V)
	24 V (24 V)
Elevated Absorption Voltage	55 V (48 V)
	27.5 V (24 V)
Elevated Absorption Termination Threshold	0.5 A
Elevated Absorption Timeout	7.0 hour

Table 9-6 Alpha® FXM HP UPS system default values (continued)

Parameters	Default settings
Temperature Compensation Slope (mV/°C/Cell)	-3.3
Temperature Compensation in Float	Enabled
Temperature Compensation in Absorption	Enabled
Temperature Compensation Lower Voltage Breakpoint	52.5 V (48 V)
	26.25 V (24 V)
Temperature Compensation Upper Voltage Breakpoint	57.4 V (48 V)
	27.75 V (24 V)
Battery Test	Enabled
Battery Test Trigger Input	User Input S1
Battery Test Termination Voltage	49 V (48 V)
	24.5 V (24 V)
Battery Test Timeout	1 hour
Battery Estimation	Enabled
Battery Estimation Load Model	Resistive
AC Output Shutdown Trigger Input	User Input S3
AC Output Shutdown Operation	Manual
AC Output Shutdown Auto On Delay	30 seconds
AC Output Relay	Unassigned
AC Output Upper Disconnect Voltage	135 V (120 V)
	239 V (230 V)
AC Output Upper Reconnect Voltage	130 V (120 V)
	254 V (230 V)
AC Output Lower Reconnect Voltage	105 V (120 V)
	197 V (230 V)
AC Output Lower Disconnect Voltage	100 V (120 V)
	192 V (230 V)
Inverter Maximum Time On Enable	Disabled
Inverter Maximum Time On	5 minutes
Inverter Shutdown Voltage	42 V (48 V)

Table 9-6 Alpha® FXM HP UPS system default values (continued)

Parameters	Default settings
	21 V (24 V)
Inverter Manual Start up Voltage	50 V (48 V)
	25 V (24 V)
External Fan Relay	Unassigned
External Fan Temperature Sensor	Unassigned
External Fan On Temperature (°C)	55
External Fan Off Temperature (°C)	45
Keep Alive Enabled	Disabled
Keep Alive Destination IP Address	Unassigned
Keep Alive Startup Delay	15 seconds
Keep Alive Ping Timeout	2 seconds
Keep Alive Protocol Retries Interval	5 seconds
Keep Alive Protocol Maximum Retries	3
Keep Alive Action	Reset AC Power
Keep Alive Action Duration	5 seconds
Keep Alive Action Maximum Retries	5
Keep Alive Action Failure Restart Delay	40 seconds
Low Battery Alarm Threshold	40%
Programmable Dry Contact #1	On Battery Alarm
Programmable Dry Contact #2	Low Battery + No Line 1 Alarm
Programmable Dry Contact #3	Low Battery + No Line 2 Alarm
Programmable Dry Contact #4	Timer 1 Relay
Programmable Dry Contact #5	Controller Alarms
User Input #1	Battery Test Trigger
User Input #2	User Alarm Trigger
User Input #3	AC Shutdown Trigger
Time Period 1 Days	All Days
Time Period 1 Start Time	6:00AM
Time Period 1 End Time	9:00AM

Table 9-6 Alpha® FXM HP UPS system default values (continued)

Parameters	Default settings
Time Period 2 Days	All Days
Time Period 2 Start Time	3:00PM
Time Period 2 End Time	6:00PM
Timer 1 Enabled	Enabled
Timer 1 Relay	Dry Contact #4
Timer 1 Trigger	AC Power Outage Status
Timer 1 Activation Delay	2:00:00
Timer 1 Time Period #1	Unassigned
Timer 1 Time Period #2	Unassigned
Timer 2 Enabled	Disabled
Timer 2 Relay	Unassigned
Timer 2 Trigger	AC Power Outage Status
Timer 2 Activation Delay	2:00:00
Timer 2 Time Period #1	Unassigned
Timer 2 Time Period #2	Unassigned
Timer 3 Enabled	Disabled
Timer 3 Relay	Unassigned
Timer 3 Trigger	AC Power Outage Status
Timer 3 Countdown	2:00:00
Timer 3 Time Period #1	Unassigned
Timer 3 Time Period #2	Unassigned

9.3.3. Create an Alpha® FXM HP UPS system

An Alpha® FXM HP UPS system is pre-configured on a brand-new unit. However, if the Alpha® FXM HP UPS system is removed, you can create a new system, or import a configuration file containing an Alpha® FXM HP UPS system from another controller. In the current release, only a single Alpha® FXM HP UPS system is supported; if a system already exists on the controller, the option to create a new Alpha® FXM HP UPS system will not be available.

A new Alpha® FXM HP UPS system can be created via the **Systems** menu from either the LCD or the web interface. Both have wizard assistance to help step you through the process to create the new system. You can create either a 120 or 230 volt system with a 24 or 48 volt battery system.

The Alpha® FXM HP UPS system will also be created with a reasonable set of defaults and associated alarms.

You can configure the alarms associated with the system. You can enable or disable the alarms, change the priority, map relays to the alarms, and where applicable, modify the thresholds.

To create an Alpha® FXM HP UPS system:

1. Go to **Systems > Add or Remove Systems** and use the **Create FXM System** wizard.
2. Select the **System Type** from the dropdown menu and then select **Next**.
3. Confirm the system type detected from the hardware and then select **Next**.
4. Select the **Configure Battery String** option to configure the battery, or select **Done** if finished. The battery can be configured later by going to **Systems > FXM System > Inventory > Battery**.

9.3.3.1. Create a Alpha® FXM HP UPS system from a configuration file

A system can be created by importing from a configuration file. See the *Importing a System* section in the **Cordex® HP Controller System Software Manual**.

9.3.3.2. Configure the basic Alpha® FXM HP UPS system settings

The **Configure System** page has five tables (**Configuration**, **System Properties**, **AC Input**, **AC Output**, and **Alarms**) with some basic settings that must be configured.

To configure an Alpha® FXM HP UPS system:

1. Go to **Systems > FXM HP UPS System > Configure System**.
2. In the **Configuration** table, configure the following:
 - a. Set the system name, description, system number, and serial number.
 - b. Set the system float voltage.
3. In the **System Properties** table set the low battery threshold so it will trigger the **Low Battery Warning** and **Low Battery + No Line** alarms.
4. Set the **Power Outage Alarm Delay** so that power outages shorter than delay setting will be ignored. **AC Power Outage** and **On Battery** alarms will not be triggered. Short power outage events will be logged in the **Power Outage Logs**.
5. In the **AC Input** table, set the **AC Input Sense**.
6. In the **AC Output** table, set the **Automation Voltage Regulations (AVR)** mode.
7. In the **Alarms** table, configure the alarms.

9.3.3.3. Configure output voltage and frequency for bypass

Several parameters of the Alpha® FXM HP UPS system must be configured if the system is to be put into **Bypass** mode. This is to ensure that the power to the load would not be disrupted.

To configure an Alpha® FXM HP UPS system for bypass mode:

1. Go to **Systems > FXM HP UPS System > Configure System**.
2. In the **Configuration** table, select the **Configure FXM System** wizard.
3. Select **Next** to start the wizard.
4. Select **System Type**: Normal UPS is for a system with battery backup, and **AC Input Only** is without battery.
5. Select **AC voltage** and **AC Frequency**.
6. Select **Next** to complete the configuration.

9.3.4. Configure the battery parameters

The system is only permitted to have a single battery group.

! **Attention:** *If the system does not have batteries connected, the battery string must be deleted. This is important to have the system mode reported correctly. Go to **Systems > FXM HP UPS System > Inventory > Battery**, and then remove the battery string.*

If a battery is required, configure it as follows:

1. Go to **Systems > FXM HP UPS System > Inventory > Battery**. On the **Batteries** table, you will see a list with one battery.
2. Select the **Go To** button on the right-side of the table.
3. Select the **Edit** icon on the right-side of the **Battery Configuration** table.
4. In the **Configuration** table assign the battery a name and description if required.
5. Select the **Battery Voltage Source**. This is the battery voltage reading from the Alpha® FXM HP UPS system ADIO module.
6. Select the **Battery Current Source**. This is the battery current reading from the Alpha® FXM HP UPS system ADIO module.
7. Configure the battery temperature values. See the following section for instructions on how to do this.
8. Configure the battery capacity. This value is usually available from the battery specification sheet. Use the capacity at the 20-hour rate (C/20).
9. Configure the open circuit voltage. This value is sometimes available from the battery specification sheet. If it is not, leave it at the default value.
10. Use the wizard to configure the Peukert exponent. This value usually available from the battery specification sheet.

If the Peukert exponent (n) is not supplied in the battery specification, calculate it by the equation:

$$n = \frac{[\log(T_2) - \log(T_1)]}{[\log(I_1) - \log(I_2)]}$$

where T is the discharge time in hours and I is the corresponding discharge current in amps. Both T and I are often available in the battery specification sheet.

11. In the **Alarms** table, configure the alarms.

9.3.5. Configure the battery temperature sensors

The battery can have any number of battery temperature sensors. Depending on your requirements you can choose to have only a single temperature reading for your battery, or one for each battery block, or one for each battery cell.

To add and configure battery temperature sensors:

1. Go to **Systems > FXM HP UPS System > Inventory > Battery > Battery String**. On the **Temperatures** table, select the **Add Temperature Value** button. The table will be populated with a new line for temperature value.
2. Select the more details icon on the right-side of the line for the new temperature value.
3. A new page displays with information about the new temperature value. In the **Configuration** table you can enter an optional name and description if desired.
4. It is mandatory to select a **Battery Temperature Source** for the temperature value. Select the more details icon and select the desired temperature input. The dropdown list displays all available temperature inputs. The Alpha® FXM HP UPS system has one temperature sensor, used for battery temperature, from the Alpha® FXM HP UPS system ADIO module.
5. In the **Status** table, verify that the temperature is now reading a temperature value.
6. Repeat these steps for each temperature value required. When finished navigate back to the **Battery** page.

In the **Temperatures** table on the **Battery** page, you should now see a list of temperature values. The battery **Status** table should show the minimum, average and maximum temperature values as determined from the list of temperatures. The system battery temperature should now show a valid reading for battery temperature.

9.3.6. Configure the charging system function

You can enable or disable and set the charging voltage in the absorption charging state. If you disable **Elevated Absorption Charging** or the arming threshold was not reached, then the absorption charging stage will be done at the float voltage. You can configure **Elevated Absorption Charging** to terminate on a timeout and a low current threshold.

Absorption charging, at an increased voltage, is normally done for deep discharges only so there is an **Absorption Arming Threshold**. A battery discharge must reach a voltage below the **Absorption Arming Threshold** for **Elevated Absorption Charging** to be activated on the recharge.

To configure the charging system:

1. Go to **Systems > FXM HP UPS System > System Functions > Charging**.
2. In the **Primary Charge Current Control** table, select the **Turn Off Charger** button to turn off the charger.
3. Select **Turn on Charger at Maximum Current** to set the nominal charging current limit.
4. To set the current limit to a specific value, set the **Charge Current Limit** to an appropriate value. See your battery manufacturers' data sheet for charging recommendations.
5. Confirm the value of **Charge Current Limit Amps** is correct.

9.3.7. Configure the elevated absorption charging system

To configure the elevated absorption charging system:

1. Go to **Systems > FXM HP UPS System > System Functions > Charging**.
2. From the **Automatic Elevated Absorption Charging Configuration** table, enable **Elevated Absorption Charging**.
3. Set the **Elevated Absorption Arming Threshold** to a voltage that indicates a deep enough discharge to warrant absorption charging at a higher voltage.
4. Set the **Elevated Absorption Voltage** to a value recommended by the battery manufacturer.
5. Set the **Elevated Absorption Termination Threshold** in amps.
6. Set the **Elevated Absorption Timeout** in hours.
7. From the **Elevated Absorption Charging Status** table, select the **Start Manual Elevated Absorption Charging** to manually launch **Elevated Absorption Charging**.

9.3.8. Configure the temperature compensation system function

The **Temperature Compensation** function uses the battery temperature to adjust battery voltage. The default value for temperature compensation is $-1.8 \text{ mV}/^{\circ}\text{F}/\text{Cell}$ ($-3.3 \text{ mV}/^{\circ}\text{C}/\text{Cell}$).

To configure the temperature compensation:

1. Go to **Systems > FXM HP UPS System > System Functions > Temperature Compensation**.
2. Enable or disable **Temp Comp in Float** and **Temp Comp in Absorption**.
3. Set the **Slope** based on the battery manufacturer's information.
4. Set the **Upper Temperature Breakpoint Voltage** to a value below the float voltage.
5. Set the **Lower Temperature Breakpoint Voltage** to a value above the float voltage.
6. Adjust the values and enable or disable the **Temp Comp Sensor Fail** and **Temp Comp Voltage Warning** alarms.

9.3.9. Running battery tests

The **Battery Test** function allows the unit to test the charge and health of the battery.

9.3.9.1. Run a manual battery test

To run a manual battery test:

1. Go to **System > FXM HP UPS System > System Functions > Battery Test**. Note that you must have a battery subsystem defined in the Alpha® FXM HP UPS system in order to have this menu item available under **System Functions**.
2. From the **Configuration** table, set the **Termination Voltage** and **Timeout** values.

Which ever of these two conditions occurs first will terminate the battery test.

3. From the **Status** table, press the **Start Manual Battery Test** command.

To start a battery test, the **Battery Mode** must be in the **Float** mode, otherwise the battery test cannot start.

There are a number of reasons why the test might terminate early. Two examples are:

- Detection of a weak battery - where the voltage drops too quickly.
- AC failure.

If **Battery Runtime & Health Estimation** is enabled you should see the battery State of Charge (SoC) and Runtime Remaining (RTR), update during the test. If the test runs long enough, the test results should be stored in the **Battery Log** page.

The **Battery Runtime Remaining** algorithm attempts to calculate an accurate prediction of the remaining battery runtime. An accurate estimate of the battery health requires at least one discharge greater than 20 percent from when the unit is switched on.

When the unit is powered on, the algorithm assumes that a new battery is connected to the unit. Each discharge greater than 20 percent will result in a new calculation for the relative battery health. This value is used in the **Battery Runtime Prediction** algorithm to compensate for an aging battery. It is recommend the user set up a battery test with a depth of discharge of at least 20 percent every six months or so.

The **Battery Runtime Remaining** algorithm uses the battery voltage to predict the remaining runtime. Battery voltage changes rapidly during the first few minutes of discharge due to charging and discharging while the unit is in inverter mode. This results in a less accurate predicted runtime. The battery voltage may change rapidly during the last 20 percent of the discharge when the battery is almost drained.

9.3.9.2. Schedule a battery test

To schedule a battery test:

1. Go to **Systems > FXM HP UPS System > System Functions > Battery Test**.
2. From the **Automatic Testing** table, set the number of days between testing.
3. Set the start hours.
4. Set the number of days to wait before retrying to run a failed battery test.
5. Select **Reschedule Next Time** to schedule the next battery test.

9.3.9.3. Run a battery test remotely

To run a battery test remotely:

1. Go to **Systems > FXM HP UPS System > System Functions > Battery Test**.
2. From the **Remote BT Configuration** table, set **Remote BT** to **Enabled**.
3. Select a user input to trigger the **Battery Test**.
4. When the **Trigger Input** is active and the conditions for the battery test are met, **Battery Test** will start to run.

Once **Remote BT** is triggered, **Battery Test** will continue to run even when the **Trigger Input** is no longer active.

9.3.10. Configure battery runtime and health estimation

The **Battery Runtime and Health Estimation** is used to calculate **Estimated State of Charge**, **Estimated Battery Health** and **Estimated Battery Runtime**. **Estimated Battery Health** is only updated when the battery is discharged below 80 percent state of charge.

To configure battery runtime and health estimation:

1. Go to **Systems > FXM HP UPS System > System Functions > Battery Runtime & Health Estimation**.
2. From the **Configuration** table, enable **Battery Estimation**.
3. Set the **Load Model**. The load model has no affect on calculating **Estimated State of Charge** or **Estimated Battery Health**, but it has a significant impact on calculating the **Estimated Battery Runtime**.
 - a. With the constant current model, the load current is expected to stay the same as the load voltage decreases.
 - b. With the resistive model, the load current is expected to decrease as the load voltage decreases.
 - c. With the constant power model, the load current is expected to increase as the load voltage decreases.
4. Set the **Battery LVD**. Most Alpha® FXM HP UPS module do not have an external **Low Voltage Disconnect (LVD)**; if this is the case, this setting can be left unknown.

9.3.11. Configure AC shutdown

The **AC Shutdown** function is used to turn off the AC output. With the inverter turned off, neither the inverter nor the AC line is supplying power to the load. The Alpha® FXM HP UPS module will go to **Shutdown** mode. There are two ways to turn off AC output: manually or with a triggering source.

To turn off AC output manually:

1. Go to **Systems > FXM HP UPS System > System Functions > AC Output**.
2. From the **AC Shutdown (Manual Control)** table, ensure that the **AC Output Shutdown State** is inactive.
3. Select the **AC Output Shutdown** command to turn off the AC output
4. **Manual Start Up:** The unit remains in shutdown mode. The output of the unit must be turned on manually by selecting the **Start Up** command.
5. **Auto Start Up After Delay:** After the unit is in shutdown mode, the unit will restart automatically after a delay.



Notice: AC output will be off due to shutdown. If the router is on, the output of Alpha® FXM HP UPS module communication will be lost. To turn on output local access will be required.

9.3.11.1. Turn off AC output using a triggering source

To turn off AC output using a triggering source:

1. Go to **Systems > FXM HP System > System Functions > AC Output**.
2. From the **AC Shutdown (Trigger Input Control)** table, select the **Go To** button of **AC Output Shutdown Trigger Input** to select a triggering field.
3. Verify that value of **AC Output Shutdown Trigger State** is correct.
4. When the triggering field is active, the AC output will be turned off. The Alpha® FXM HP UPS module goes to **Shutdown** mode.
5. When the triggering field is inactive, the output of the unit must be turned on manually by selecting the **Start Up** command.
6. **Manual Start Up:** The unit remains in shutdown mode. The output of the unit must be turned on manually by selecting the **Start Up** command.
7. **Auto Start Up After Delay:** After the unit is in shutdown mode, the unit will restart automatically after a delay.



Notice: AC output will be off due to shutdown. If the router is on, the output of Alpha® FXM HP UPS module communication will be lost. To turn on output local access will be required.

9.3.12. Configure the external fan

The **External Fan** function is used to trigger a dry contact to control an external fan. When the battery temperature reaches the **Fan On Temperature** threshold, the assigned relay closes and turns on the external fan. Once the battery temperature drops below **Fan Off Temperature** threshold, the assigned relay opens, and turns off the fan.

To configure external fan function:

1. Go to **Systems > FXM HP UPS System > System Functions > External Fan**.
2. Assign a **Relay** that will be used to turn on the external fan.
3. Assign the **Temperature Sensor** that will be used to read the battery temperature.
4. In the status table, verify that the temperature is now reading a valid temperature value.
5. Set the **Fan On Temperature** threshold value.
6. Set the **Fan Off Hysteresis** value.
7. Verify the **Fan Off Temperature** threshold value is correct.

9.3.13. Configure keep alive

The **Keep Alive** function provides a method of restoring communication when a communication failure is detected. A reset temporarily removes power and resets the local communication equipment powered by this unit.

To configure the keep alive function:

1. Go to **Systems > FXM HP UPS System > System Functions > Keep Alive**.
2. From the **Status** table, enable **Keep Alive Enable**.
3. From the **Configuration** table, configure the **Destination IP Address**.
4. From the **Action Configuration** table, configure the **Keep Alive Action**. Select **Reset AC Power** to power cycle the unit. Select **Activate Fail Relay** to cycle the selected relay in **Keep Alive Fail Relay**.
5. If there is an active **Keep Alive** failure alarm, select the **Reset Keep Alive Failure** button to clear the failure.

9.3.14. Configure soft shutdown

The **Soft Shutdown** function allows a third-party software that is compatible with MegaTec protocol to monitor the status the Alpha® FXM HP UPS module and shutdown the system during AC failure.

To configure the Soft Shutdown function:

1. Go to **Controller > Communications > Soft Shutdown**.
2. In the **Configuration** table, set the **Soft Shutdown System** value.
3. Verify the **Soft Shutdown State** is **Ready**.
4. Connect a serial cable from the USB Mini-B connector to the computer running third-party software.

9.3.15. Configure SNMP UPS management information base

The SNMP UPS management information base (MIB) allows a third-party software to monitor the status of the Alpha® FXM HP UPS module and shutdown the system during AC failure over the SNMP network.

To configure the UPS MIB system function:

1. Go to **Controller > Communications > SNMP**
2. Set the **SNMP Agent** to **Enabled**.
3. In the **Configuration** table, set the **UPS MIB System** value.

9.3.16. Configure relays

Contacts C1 to C5 allows the Alpha® FXM HP UPS module to be connected to an external monitoring panel or traffic control equipment. For contact C6, the default factory configuration is +48 or +24 VDC output.

The Alpha® FXM HP UPS module has a list of predefined conditions that can energized a relay.

- **On Battery:** The battery is providing backup power to the load.
- **Low Battery 1:** The battery voltage drops below a preset level.
- **Low battery 2:** The battery voltage drops below a preset level.
- **Low Battery + No Line 1:** The battery voltage drops below a preset level with no AC.
- **Low Battery + No Line 2:** The battery voltage drops below a preset level with no AC.
- **Controller Minor Alarm:** There is an active minor alarm.
- **Controller Major Alarm:** There is an active major alarm.
- **Controller Critical Alarm:** There is an active critical alarm.
- **Low Battery Shutdown:** The battery voltage drops below the **Inverter Shutdown Voltage**, the inverter will shut down and go to **Standby** mode.

On battery

To configure the relay activated by **On Battery** status on the LCD panel:

1. Go to the **System Shortcuts** menu and select **Relays**.
2. On the **Relays** page, select **Configuration**.
3. Select the **Edit** icon on **On Battery** and select a relay to be energized when the **On Battery** status is active.

To configure the relay activated by **On Battery** status on the web interface:

1. Go to **Systems > FXM HP UPS System > Configuration > Alarms** page.
2. Select the **On Battery** more details icon.
3. Select the **On Battery Relay Edit** icon to select a relay.

Low battery and low battery + no line

To configure the relay activated by **Low Battery** status or **Low Battery + No Line** status on the LCD:

1. Go to the **System Shortcuts** menu and select **Relays**.
2. On the **Relays** page, select **Configuration**.

3. Select the **Edit** icon of **Low Battery 1** and select a relay to be energized when the **Low Battery** status is active.
4. Select **Low Battery 2**, **Low Battery + No Line 1** or **Low Battery + No Line 2** to select a relay to be energized for the corresponding status.

To configure the relay activated by **Low Battery** status on the web interface:

1. Go to **Systems > FXM HP UPS System > Configure System > Alarms** page.
2. Select the **Low Battery Warning 1** more details button.
3. Select **Low Battery Warning 2**, **Low Battery + No Line 1** or **Low Battery + No Line 2** to select a relay to be energized for the corresponding status.

Controller minor, major, or critical alarm

To configure the relay activated by **Controller Minor Alarm**, **Major Alarm**, or **Critical Alarm Status** on the LCD panel:

1. Go to the **System Shortcuts** menu and select **Relays**.
2. On the **Relays** page, select **Configuration**.
3. Select the **Edit** button of **Controller Minor Alarm** and select a relay to be energized when the **Controller Minor Alarm** status is active.
4. Select **Controller Major Alarm** or **Controller Critical Alarm** to select a relay to be energized for the corresponding status.

To configure the relay activated by **Controller Minor Alarm**, **Major Alarm**, or **Critical Alarm Status** on the web interface:

1. Go to **Alarms > Setting > Alarm Summary Relays** page.
2. Select the **Controller Critical Relay Edit** icon to select a relay.
3. Select **Controller Major Relay** or **Controller Minor Relay** to select a relay to be energized for the corresponding status.

Low battery shutdown

To configure the relay activated by **Low Battery Shutdown Status** on the LCD panel:

1. Go to the **System Shortcuts** menu and select **Relays**.
2. On the **Relays** page, select **Configuration**.
3. Select the **Edit** icon of **Low Battery Shutdown** and select a relay to be energized when the **Low Battery Shutdown** status is active.

To configure the relay activated by **Low Battery Shutdown Status** on the web interface:

1. Go to **Systems > FXM HP UPS System > Configure System > Alarms** table.
2. Select the **Go To** button on the **Low Battery Voltage Shutdown** line.
3. Select the **Low Battery Voltage Shutdown Relay Edit** icon to select a relay.

9.3.17. Configure power outage alarm delay

Frequent short power outages can generate a lot of unnecessary alarms and email notifications.

The **Power Outage Alarm** function can be configured to ignore short power outage and trigger only when the outage is longer than a user defined duration. Similarly, **On Battery** alarm is triggered only when the power outage is longer than the minimum power outage duration.

To configure the minimum power outage duration

1. Go to **Systems > FXM HP UPS System > Configure System**.
2. From the **System Properties** table, configure **Power Outage Alarm Delay**.

Short power outage will not trigger the alarms, but they will be logged in the **Power Outage** log.



Note: *The default setting is 1 minute. Activation of C1 on battery relay will be delayed by the value of this setting.*

10. Maintaining the controller system

When maintaining your controller system always check for known issues within the read me file that ships with your software. This section covers the following:

- Ethernet communications
- Working with alarms
- Controller maintenance
- Working with logs
- User account maintenance
- File maintenance

10.1. Ethernet communications

By default, Ethernet port 1 on the controller system is configured to use a static IP address of 192.168.0.90, and Ethernet port 2 is configured to use Dynamic Host Configuration Protocol (DHCP). The LCD panel can be used to view and configure the IP addresses that are being used on both Ethernet ports.

To view or configure the IP addresses:

1. From the LCD panel main dashboard select **Shortcut**, and then select **Ethernet**.
2. The LCD panel displays the IP address currently used on both Ethernet ports.
3. Select to highlight the row of the port you want to view or configure.
4. Select the arrow on the right-side of the screen and then LCD panel displays the menus: **Status**, **IPv4 Address**, **IPv6 Addresses** and **Configuration**.

To change the IP address settings:

5. Select the **Configuration** menu to highlight, then press the arrow on the right-side of the screen to enter.
6. Select **Change Network Configuration** to highlight that row, and then select the arrow on the right-side of the screen to start the wizard.
7. Enter the desired IPv4 settings using the **Previous**, **Next** and **Cancel** buttons.
If you are configuring a manual IPv4 address, you must supply all four values: address, subnet, gateway and DNS server. If you do not know the DNS server address, you can set it to 0.0.0.0. If you do not have a gateway address, it is common to substitute the number 1 for the last entry. So, if your IP address is 192.168.0.90, then you can set your gateway to 192.168.0.2.
8. When complete, select **Finish** and the changes are applied.
9. Select the back arrow, on the upper-left side of the screen twice and go back to the **Ethernet** screen to confirm the new settings.

On the Ethernet screen, verify that the new IP address settings are in use.

10.1.1. Connect via the web interface

To configure the IP addresses via the web interface:

1. From the main dashboard, go to **Controller > Communication > Ethernet**.
2. In the **Ethernet** table, select the **Go To** button on the row you want to configure.
3. In the **Configuration** table, select **Change Network Configuration** and follow the steps in the wizard.

From the **Ethernet** table, view and verify the new IP address settings.



Notice: *If you change the IP address that you are using, you will need to type the new IP address into your browser so that you can log in again.*

10.2. Working with alarms, alerts, and hints

10.2.1. Active alarms

When there are active alarms in the system, both the LCD panel and web interface display these alarms prominently.

Depending on how the alarms are configured, an internal speaker (if present and installed) may sound an alarm tone, and one or more relays may be activated. The internal speaker is intended to give the on-site technician audible notification that an alarm is active. The relays are intended to give external monitoring equipment notification through a relay contact closure (or opening) that an alarm is active.

On both the web interface and the LCD panel, the top left region of the page displays the most recent alarms in order of the highest priority. This area of the display will be red when there are critical or major alarms, yellow for minor alarms, and green if there are only warnings or no alarms. Selecting this region takes you to the **Active Alarms** table where you can get more details.

The **Active Alarms** table displays the name of the alarm, time of activation, priority, and status. The status of an active alarm can be active or acknowledged. An alarm moves from the active to the acknowledged state when the alarm cut-off (ALCO) button is pressed. The ALCO button is at the top of the **Active Alarms** table.

On the web interface there is also a small ALCO button in the **Active Alarms** region of the main dashboard that will acknowledge any active alarms, and then take you to the **Active Alarms** list.

On the LCD panel, ALCO can also be accessed via the **Maintenance** button on the main dashboard.

To view details of an active alarm select the **Go To** button on the right-side of the row in the **Active Alarms** table. This screen shows you the state of the alarm, time of activation, time of acknowledgment,

priority, and the relay that is mapped to the alarm. To get troubleshooting information about the alarm, select the information icon beside the row that shows the alarm state.

10.2.2. Alarm cut-off (ALCO)

The **Alarm Cut-off** (ALCO) button is used to silence the speaker (if installed) while technicians are investigating and troubleshooting an active alarm. ALCO can also be configured to deactivate alarm relays.

ALCO functionality is configured via **Settings > Alarm Cut-Off & Global Settings**.

ALCO can be configured to either:

- Acknowledge active alarms, deactivate relays, and silence speaker
- Silence the speaker only

When the **Alarm Cut-off** button is pressed, the user configured ALCO period begins to countdown. When the countdown reaches zero the ALCO period expires.

When ALCO expires the configured action is canceled. If you configured ALCO to acknowledge active alarms, deactivate relays, and silence speaker then alarms return to the active state which means the alarm relays are activated and the speaker begins sounding. If you configured ALCO to silence the speaker only, the speaker will start sounding as long as there are active alarms.

If a new alarm activates after **Alarm Cut-off** button is selected, the speaker will sound the appropriate alarm tone. Any existing alarms that have been acknowledged from a previous ALCO selection will remain acknowledged.

10.2.3. Alarm activation delay at start up

Depending on system configuration there may be some alarms that activate shortly after start up then clear a few seconds later. These nuisance alarms are often caused due to the time it takes for the controller to reacquire modules on the CAN bus. To prevent these alarms from activating and triggering relays or SNMP traps there is a setting that delays alarm activation at start up.

The alarm delay is configured under **Alarms > Settings**.

The default value of 30 seconds works for most systems, however this value can be increased to accommodate systems that have a slower start up time, that is, large inverter systems.

10.2.4. Alarm summary relays

There are three alarm summary relays that can be configured on the controller system. These relays are connected to external monitoring equipment which provides a notification when the controller system enters an alarm state.

- Controller critical relay
- Controller major relay
- Controller minor relay

To view them, go to **Alarms > Settings > Alarm Summary Relay**.

The relay mapped to the **Controller Critical Relay** is active whenever one or more critical alarms are active. **Controller Major Relay**, **Controller Minor Relay**, and **Controller Warning Relay** work in the same way.

10.2.4.1. Alpha® FXM HP UPS system alarms

The following table describes the configurable alarms.

Alarm	Priority	Alarm description
AC Input Back Feed Failure	Critical	AC input relay did not open when the inverter started.
AC Input Breaker Open	Warning	AC input breaker is open.
AC Input Frequency High	Warning	AC input frequency is less than the allowed lower limit.
AC Input Frequency Low	Warning	AC input frequency is more than the allowed higher limit.
AC Output is Overloaded	Critical	The load is drawing more than the rated power.
AC Output Short Circuit	Critical	AC output is shorted.
AC Output Voltage High	Major	AC output voltage is more than the specified limit.
AC Output Voltage Low	Major	AC output voltage is less than the specified limit.
AC Power Outage	Warning	AC power failed.
Battery Breaker Open	Warning	Battery breaker is open.
Battery Fail Fault	Critical	Battery appears to have high impedance and has failed.
Battery Over Voltage	Critical	Battery voltage is too high
Battery Temperature Probe Unplugged	Minor	The temperature probe is unplugged or has failed.
Bypass Mode On	Minor	The UPS module is in bypass mode.
Close to Inverter Shutdown	Major	Battery voltage is low, and the inverter is about to shut down.
Fan Fail	Warning	The UPS module's fan has failed.
Frequency Unknown	Critical	The UPS module is unable to detect AC frequency.
Internal Temperature	Major	The UPS module's internal temperature is too high.
Keep Alive Failure	Major	Keep alive is unable to communicate with host.

Alarm	Priority	Alarm description
Low Battery and No Line 1 & 2	Major	The battery capacity is less than the low battery threshold and AC is not available.
Low Battery Voltage Shutdown	Critical	Battery voltage is less than inverter shutdown voltage and the unit goes to standby mode.
Low Battery Warning 1	Major	The battery capacity is less than the low battery threshold.
Low Battery Warning 2	Major	The battery capacity is less than the low battery threshold.
Missing FXM	Critical	The Alpha® FXM HP UPS hardware module is missing.
On Battery	Warning	The battery is providing power to the load.
AUX Shutdown Imminent	Critical	Auxiliary shutdown is imminent to conserve battery power when the battery is discharged to 42 volt (21 volt).

10.2.5. Create user alarms

The controller has a set of default standard alarms that are associated with a system or an inventory item such as a load or a disconnect. These standard alarms may be enough to support many system configurations. It is also common to need additional alarms, based on the status of the digital inputs or on the threshold of an analog value read from the input of an ADIO module.

You can create any number of digital or threshold alarms. These alarms have the same behavior as standard alarms such as alarm cut-off, SNMP traps, and relay mapping. These user-defined alarms can be created and removed via the **Controller > Programmability > User Alarms** menu.

To create a user alarm:

1. Go to **Controller > Programmability > User Alarms**.
2. Select the type of user alarm to create. A new row for the user alarm will display in the table.
 - If you want to create a digital alarm select the **Add Digital User Alarm** button.
 - If you want to create a high or low threshold alarm select the **Add Threshold User Alarm** button.
3. Select the **Go To** button in the alarm line item. Two tables display. One table shows the fields to configure that are specific to the selected user alarm. The other table shows the standard alarm configuration.
4. Give the alarm a descriptive name. This is important since the same type of user alarms have the same default name. The alarm description is optional.
5. Select the alarm input source. There are different options depending on the type of user alarm you are creating.

- A threshold alarm allows you select from ADIO module voltage and temperature inputs, current readings from shunts or DC current transformers (DCCTs) and any status count data about rectifiers or converters.
 - A digital alarm allows you to select digital inputs on any ADIO modules.
6. Set the priority and relay. If you want to set a severity value for the SNMP trap, use the Parameter 1 field.
 7. If you are configuring a digital alarm, this is all that is required. If you are configuring a threshold alarm, continue as described below.
 8. Select the type of threshold alarm from the **Alarm When Value** field.
 - Selecting **Above** turns this alarm into a high threshold alarm.
 - Selecting **Below** turns this alarm into a low threshold alarm.
 9. Set the threshold. For a high threshold alarm to activate, the source value must be greater than this value. For a low threshold alarm to activate, the source value must be less than this value.
 10. Set the hysteresis. The hysteresis is important when using an alarm input source that may be noisy or fluctuate periodically. Be sure to set the hysteresis large enough to avoid false alarms, but not too large to prevent the alarm from clearing properly.

The new alarm has been configured. Whenever possible, test to ensure that new alarm operates as expected.

10.3. Controller system maintenance

10.3.1. Restart the controller system

You can perform a restart via the web interface or the LCD panel. This first procedure covers restarting from the web interface.



Notice: Ensure that a backup has been performed before starting this process. Use the **Backup** feature accessed through the LCD panel at **Shortcuts > Backup**.




Notice: Ensure that the controller system software or operating system is not being updated.

To restart the controller from the web interface:

1. From the main dashboard go to **Controller > About > General**.
2. Select the **Restart Controller** button.
3. Select **Restart** when prompted.
4. The **Controller Restart** window displays progress via a progress bar.
5. The controller screen goes black, and the LEDs cycle while restart is in progress.

Once complete, the sign in page displays on the web interface, and the Cordex® HP logo displays on the controller.

10.3.2. Restart the controller system via the LCD panel

 **Notice:** Ensure that the controller system software or operating system software is not being updated.

To restart the controller via the LCD panel:

1. From the main dashboard of the controller, select **Shortcuts**, then select **Restart**.
2. Select the **Execute** button to confirm.

The front screen blacks out, and the LED status lights cycle until the restart is complete. Once the restart completes, the Cordex® HP logo displays.

10.3.3. Change the time and date

There are three options to change the date and time:


- Manually with the date/time picker
- Using the local browser on the management computer
- Using simple network time protocol (SNTP)

To set the date and time:

1. Go to **Controller > Settings > Time & Date**. In the **Time & Date** table, select the **Edit** button on the **Time Zone** row.
2. From the **Time Zone** dropdown menu, select your time zone, and then select **Save**.
3. If setting the time manually, select the **Edit** button on the **Current Time and Date** row. Use the date/time picker to change the date and time.
4. If setting the time and date with the local browser select **Synchronize Time and Date to Web Browser**. This reads the time from the browser and sends it to the controller.
5. If setting the time and date using SNTP, first enter a valid SNTP server address (DNS name or an IPv4/IPv6 address), and then select **Synchronize Time and Date to Network Time Server**. If you do not want to use the SNTP server, clear the **Network Time Server Address** field.

It is common for gateways and routers to also be SNTP servers. If you are unsure of a valid SNTP server address, try using the controller's assigned gateway or router address. If this does not work, consult your IT personnel.

The controller time and time zone have been correctly set.

 **Notice:** Whenever the time or time zone has been changed, an entry is recorded in the event log.

10.3.4. Change user interface strings

In rare occasions it may be desired to change some of the strings displayed on the user interface to conform to local terminology standards. The controller system allows a user to download a strings file that can be edited in a spreadsheet program. The strings file can then be uploaded to the controller system and after a restart, the changed strings will be used.



Notice: Use of this feature must be approached with caution as it may result in undesired consequences:

- Editing the strings requires familiarity with a spreadsheet program in order to correctly import the file and save the file with UTF-8 encoding.
- Edited strings that are longer than the original can distort the user interface and make navigation difficult.
- Spelling or grammar errors can make the user interface hard to understand.
- Uploading an incorrectly generated strings file can result in unexpected or missing strings that make the interface unusable.
- The changed strings can result in confusion when seeking technical support since the user interface may be unfamiliar to support personnel.
- Strings on the OLED display panel cannot be changed.

To change one or more strings on the user interface:

1. Go to **Controller > Settings > User Interface**.
2. In the **User Interface Preferences** table, select the **Export All English Strings** button. The file will be downloaded to the PC (when using the web interface) or to a USB drive (when using the LCD panel). It is also possible to only export previously uploaded user strings by selecting the **Export User Strings** button.
3. Import the file as a UTF-8 encoded CSV file to a spreadsheet program. Failure to do this may result in missing or unexpected strings.
4. Make the necessary edits to the strings in the second column. Do not change anything in column 1 or strings may not be imported as expected.
5. Save the file as a UTF-8 encoded CSV file. Failure to do this may result in missing or unexpected strings.
6. Select the **Import User Strings** button and select your strings file. If using the LCD panel, the uploaded file name must contain the word “strings” and end in “.csv”.
7. Restart the controller to load the new strings.
8. On start up, the new strings will be loaded. Any errors found while loading the new strings will be logged into the event log.

When interacting with technical support, you may be requested to hide the user strings from the user interface. To do this go to **Controller > Settings > User Interface** and change the **Visibility of User**

Strings setting to **Hide User Strings**. Restart the controller. The strings can be shown again by changing the setting to **Show User Strings** and restarting the controller.

10.3.5. Change the web session language

To support situations where users want different language options, you can change the language used for a specific sign in session. Most corporate security policies ban the storage of browser cookies, which means that the browser will not remember your selection from sign in to sign in so you need to select your web session language each time you sign in.



Notice: *Without cookie support, if you force a refresh (F5 for most browsers), the browser will not remember the language selection and you will need to change the web session language again.*

To change the web session language:

1. Go to the top right corner of the webpage.
2. From the **Language** dropdown menu, select your language preference.

10.3.6. Change the system status bar

By default, the controller dashboard displays your systems in the original order created, from left to right. The **System Summary Option** is **Automatic** by default but can be customized to display up to four systems slotted in any order required. This is done via the **System Summary Option**, in the **Web UI Preferences** table.

To customize the system status bar view:

1. Go to **Controller > Settings > User Interface**.
2. In the **Web UI Preferences** table, select **System Summary Option**.
3. From the **System Summary Option** dropdown menu, select how many systems to display, and then select **Save**.
4. To change which system displays in the left most area of the system status bar, select the **Edit** button for first system, and then select an option from the dropdown menu.
5. Continue to assign systems to the second, third, and fourth slots as required.


The system status bar displays the selected systems in the order selected.

10.3.7. Change the dashboard values

It is possible to change the values that show for a system on the **System Status Bar**, the LCD panel dashboard, and the web interface dashboard.

To change which values appear for a system:

1. Go to **Controller > Settings > User Interface**.
2. Look at the table for the system you wish to configure (DC system 48 V dashboard values for example).
3. Select the **Edit** button beside the **Dashboard Value** you would like to edit.


 **Notice:** The values in this table will appear on the different dashboards in the order they appear in this table (for example, **Dashboard Value 1**, then **Dashboard Value 2**, ...). To change the order, set the fields in this table in the desired order.


4. Select the value to show for this **Dashboard Value**, then select **Save**.

The new value selected will appear in the position of the **Dashboard Value** that was configured.

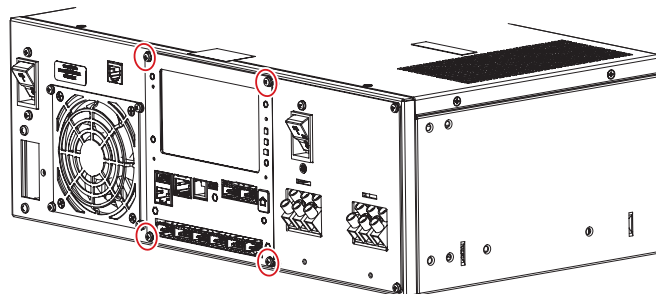
10.3.8. Replace the controller system battery

To replace the controller system battery:

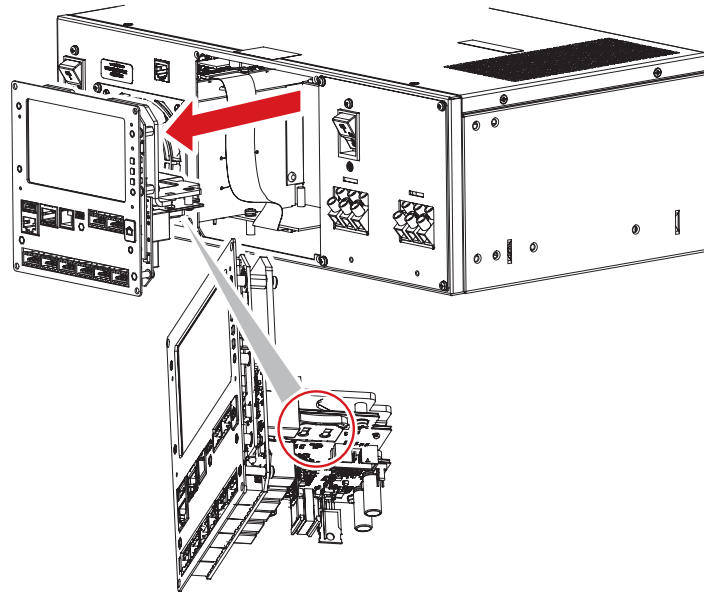
 **Warning:** Multiple input feeds. Disable the DC battery breaker and the AC input breaker before servicing.

 **Note:** Refer to the Installation chapter for the lithium battery part number. The controller system uses a standard CR2032 3 volt 225 mAh lithium battery.

1. Shut down the UPS module.
2. Remove the four screws holding the control panel to the unit.

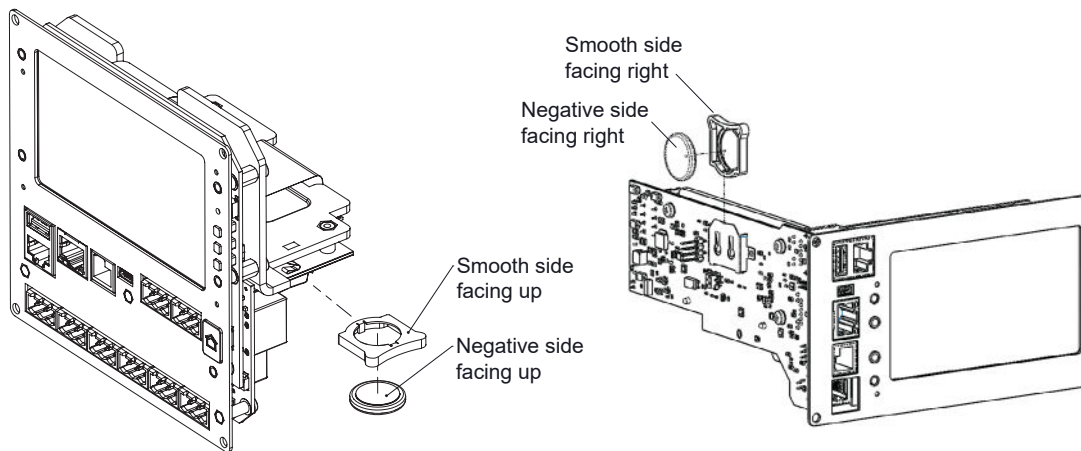


3. Gently pull the control panel sub-assembly out of the unit. Look for the battery and battery holder on the inside of the control panel assembly.



! **Attention:** Use care not to stretch the wires or the ribbon cables attached to the back of the unit.

4. Pull out the battery holder. Remove the battery from the holder. With the new battery, note the polarity of the battery and orientation of the holder when reassembling it back to the unit.




Alpha® FXM HP 1100 and FXM HP 2000 UPS module

Alpha® FXM HP 650 UPS module

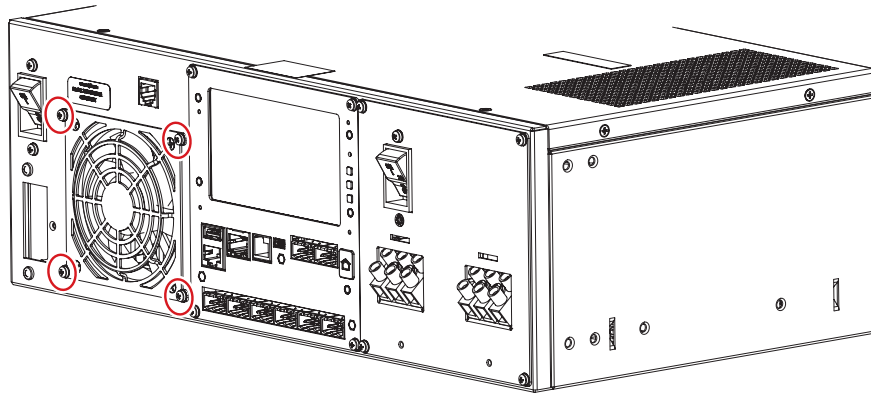
5. Carefully reinstall the control panel. Smooth out the wires and cables so they do not get caught or pinched.
6. Replace the four screws.

10.3.9. Replace the fan

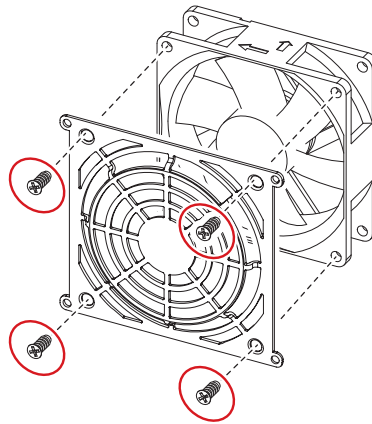
To replace the fan on the Alpha® FXM HP UPS module (Alpha® FXM HP 1100 UPS, FXM HP 2000 UPS module shown):

 **Note:** Refer to the Installation chapter for the fan replacement kit part number.

1. Shut down the UPS module.
2. Remove the four screws connecting the fan plate to the unit.

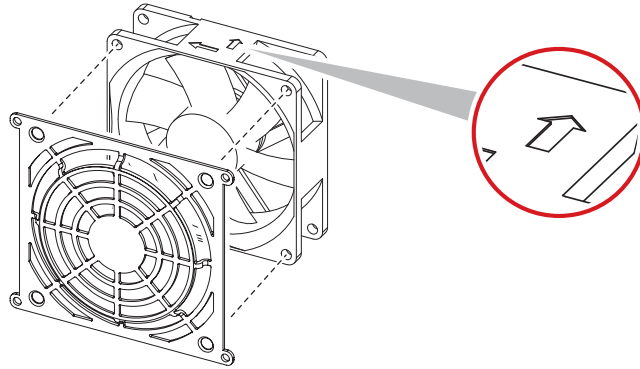


3. Pull the fan plate assembly out and disconnect the fan connector.
4. Remove the four screws connecting the fan plate to the fan.



Discard the old fan.

5. Confirm the air flow direction on the new fan using the air flow indicator. The air flow indicator must point into the UPS module.



6. Reassemble the fan and the fan plate with the four screws removed in Step 4.
7. Plug in the fan connector.
8. Carefully reinstall the control panel. Smooth out the wires and cables so they do not get caught or pinched.
9. Replace the four screws.

10.4. Working with logs

This section covers the following:

- Events and alerts log
- Battery activity log
- Power outage log
- Datalogs
- Performance log

10.4.1. Events and alerts logs

Figure 10-1 Events Log

Time	Source	Name	Value
January 10, 2023, 12:22 PM	Web User	Logon	admin
December 22, 2022, 2:53 PM	WebSession	Session ended (Http Request Timeout)	10.121.250.4
December 22, 2022, 2:50 PM	WebSession	Session ended (Http Request Timeout)	10.121.250.4
December 22, 2022, 2:49 PM	Web User	Logon	admin
December 22, 2022, 2:49 PM	Web User	Failed Logon	admin
December 22, 2022, 2:49 PM	Web User	Logon	admin
December 16, 2022, 1:36 PM	Test Site 1 (Controller)	Restore Point Description	Set to: Auto-generated
December 15, 2022, 2:21 PM	WebSession	Session ended (Http Request Timeout)	10.121.100.210
December 15, 2022, 1:37 PM	Battery 220V/706	Battery Mode	Float
December 15, 2022, 1:37 PM	Web User	Logon	admin

Events

The **Events** log table keeps a record of changes to the state of the system to help with troubleshooting. The types of state changes that are logged include:

- Alarm states
- Configuration changes
- Battery mode changes (for example, discharging)

To view the **Event** log, go to **Logs > Events & Alerts**.

Events are stored in a 'first in first out' (FIFO) buffer holds up to 3,000 events. Of the most recent events, up to 25 can be viewed on the LCD panel, and up to 300 can be viewed via the web interface. From the web interface, all 3,000 events can be exported as a CSV file.

To export an Event log go to **Logs > Events & Alerts**, and select the **Export** button at the top of the **Event** table.

Module alerts

The **Modules Alerts** log table tracks what is happening on individual modules without interfering with **Alarms** or the **Event** log.

10.4.2. Battery activity log

The **Battery Activity** log records the duration and change in capacity in amp hours (Ah) for every charge and discharge of a battery. If you have **Battery Runtime & Health** enabled, the log will also record the change in State of Charge (SoC) and State of Health (SoH).

Because of the large quantity of information that can be collected for battery charges and discharges, a complete dataset can only be obtained by exporting the log. The following three figures provide examples of the data.

When viewed on the LCD panel, the log shows time, activity type, duration and amp hours delivered.

When viewed on the web interface, the log includes the battery ID, battery capacity, State of Charge (SoC), State of Health (SoH), and the activity results.

When exported to a CSV file, the log includes the Peukert exponent, starting and ending voltages plus the minimum, maximum and average battery currents and temperatures.

The battery log will hold up to 300 entries in a first in first out (FIFO) method. When viewing entries on the LCD panel, up to 25 can be viewed. All 300 entries may be viewed on the web interface or exported to a CSV file.

Figure 10-2 Battery log on the web interface

Battery Identifier	Battery Activity	Start Time	Duration (h)	Battery Capacity (Ah)	Amp Hours Delivered (Ah)	Change in SOC (%)	Starting SOH (%)	Change in SOH (%)	Battery Current - Avg (A)	Activity Results
Battery 40V1116	Charge	January 4, 2023, 4:58 PM	0:03	100.0	0.0	---	---	---	1.0	Normal
Battery 40V234	Charge	January 4, 2023, 12:40 PM	0:07	110.0	0.2	---	100.0	---	3.2	Normal
Battery 40V234	Discharge	January 4, 2023, 12:39 PM	0:02	110.0	-0.2	0.0	100.0	---	-9.0	Normal
Battery 40V234	Charge	January 4, 2023, 12:08 PM	0:04	110.0	0.2	---	100.0	---	4.5	Normal
Battery 40V234	Discharge	January 4, 2023, 12:08 PM	0:00	110.0	-0.1	0.0	100.0	---	-20.6	Normal
Battery 40V234	Charge	January 4, 2023, 12:03 PM	0:06	110.0	0.3	---	100.0	---	5.3	Normal
Battery 40V234	Discharge	January 4, 2023, 12:02 PM	0:02	110.0	-0.6	0.0	100.0	---	-20.6	Normal
Battery 40V234	Charge	January 4, 2023, 12:01 PM	0:00	110.0	0.0	0.0	100.0	---	8.0	Interrupted by Discharge
Battery 40V234	Charge	December 23, 2022, 10:50 AM	0:02	104.0	2.2	0.0	100.0	---	119.2	Normal
Battery 40V234	Charge	December 22, 2022, 1:33 PM	0:07	104.0	0.3	---	100.0	---	4.5	Normal

Figure 10-3 Battery log in Excel

Battery Identifier	Battery Activity	Start Time	Duration (h)	Battery Capacity	Battery Capacity (Ah)	Amp Hours Delivered (Ah)	Peukert exponent	Starting voltage (V)	Ending voltage (V)	Starting SoC (%)	Change in SoC (%)	Starting SoH (%)	Change in SoH (%)	Peukert exponent	Battery Current - Min (A)	Battery Current - Avg (A)	Battery Current - Max (A)	Battery Temperature - Min (°C)	Battery Temperature - Avg (°C)	Battery Temperature - Max (°C)	Activity results
Battery String/7887	Charge	11/2/2016 12:18	1:58	Enabled	42	8.6	26.7	27	73.5	20.7	84.2	1	1.2	5.4	37.9	25	26	26	Normal		
Battery String/7887	Discharge	11/2/2016 11:58	0:34	Enabled	42	-9.4	27	24.2	100	-26.5	85	-0.8	1	-27	-27.2	-28.4	25	25	26	Normal	

10.4.3. Power outage log

The **Power Outage** log records time and duration of every power outage to the system. If you have **Battery Runtime & Health** enabled, you can refer to the battery log to determine the change in State of Charge (SoC) and State of Health (SoH).

When viewed on the LCD, the log shows start time, end time, and time and duration of each power outage.

When viewed on the web interface, the log includes the system ID, start time, end time, and duration of each power outage.

When exported to a CSV file, the log includes the system ID, start time, end time, and duration of each power outage.

10.4.4. Datalogs

Datalogs allows users to record measurements (data signals) at set intervals over a period of time. The datalog uses the controller sensors and calculated values as inputs. The controller supports up to 10 datalog, each of which may be recording up to 20 data signals.

The interval between samples can be configured, as well as the number of samples collected. When the maximum number of samples have been collected, the newest sample replaces the oldest sample. Data capture can either be started and run continuously or an equation can be used to control data capture.

Datalogs are saved to the file system when the controller is reset by a user, as well as being automatically saved once every day. If power is lost to the controller, there is potential for some data loss.

If any data signals are not configured, a datalog will not start.

If there is a **Clock Error Alarm**—which means that the date has not been set, a datalog will not start.

If a datalog is running and a controller reset occurs, the datalog will try to resume data collection on controller start up.

If there is data available, a **Preview Chart** displays up to 30 samples. If there are more than five data signals, only the first five signals are displayed in the preview. If a value is unknown, it is displayed on the preview as a zero value.

10.4.4.1. Create a datalog

There are three stages to setting up a datalog:

- Add a **Datalog**
- Add the **Data Signals**
- Run the **Start Capture** command

To create a datalog:

1. Go to **Logs > Datalogs** and select **Add Datalog**.

Up to 10 datalog can be created.

2. Select the **Go To** button of the new datalog.
3. From the **Configuration** table, select the **Edit** button to setup the following information:

- a. **Name:** The datalog name.
- b. **Description:** Describe the purpose or usage of the datalog.

c. **Number Of Samples To Capture:** From 60 to 3600 samples.

d. **Sampling Method:**

Datalogs can be configured to either **Sample at Fixed Time Intervals**, or **Sample on Trigger Data Signal Change** in which case a new sample of all data signals will be taken only when the **Trigger Data Signal** changes by more than the **Trigger Data Signal Deadband** compared to its value when the previous sample was taken.

e. **Sample Interval:** Set the interval from two seconds to three hours (10,800 seconds).

f. **Trigger Data Signal:** The data signal which triggers sampling, when the **Sampling Method** is set to **Sample on Trigger Data Signal Change**.

g. **Trigger Data Signal Deadband:** Determines how much the **Trigger Data Signal** has to change before a new sample is taken.

h. **Capture When True:** Controls whether data is captured continuously or only under certain conditions.

If the **Capture When True** value goes unknown, the datalog will ignore it. If the datalog is in the waiting state (or the sampling state), when the **Capture When True** value goes unknown, the datalog will stay in its current state, either waiting (or sampling) state.

4. From the **Data Signals** table, select **Add Data Signal** to add the number of data signals you need.

Up to 20 signals can be created.

5. From the **Configuration** table, select the **Edit** button to setup the following information for each **Data Signal**:

a. **Name:** The signal name.

b. **Description:** Document what the signal means or how its value should be interpreted.

c. **Field:** Bring up the field picker and select the ADIO module input or other value you want to monitor.

You cannot leave data signal fields unknown. You cannot select state or Boolean values for data signals.

6. Run the **Start Capture** command.

If all of the **Data Signals** are not configured when the **Start Capture** button is pressed, the capture will still start, but an entry is made in the event log to indicate a Data Signal is not configured.

You can configure the **Datalog** to run at certain times of day, or to stop after a certain time or number of samples, by configuring a Boolean **Custom Data** and then configuring **Capture When True** to use it.

If you change the **Data Signals, Sampling Method, Trigger Data Signal, Trigger Data Signal Deadband** or **Number Of Samples To Capture**, that will make the old data is incompatible with the new data. The old data will be deleted when you run the **Start Capture** command.

10.4.4.2. Transfer datalogs configuration to other controller systems

By importing and exporting a configuration file, some datalogs configuration can be transferred to a new controller system. A datalog sources information from data signals coming from various physical measurements on its system, and the data signal will only transfer to a new controller system if that measurement also exists on the new system.

For example, the **Total Load Current** is an attribute of the DC system. A datalog measuring the **Total Load Current** will only transfer to the new controller if it has a DC system in its inventory.

However, signals such as a rectifier's ambient temperature measurement are attributes of that specific rectifier module. If a configuration file is exported from one controller system and imported onto another, the ambient temperature data signal will not import, and it will raise an **Invalid Config Ignored** event. The new rectifier module will need to be reconfigured to the new controller system.

10.4.5. Performance logs

The **Performance** log holds up to one year's worth of daily roll ups with a minimum, maximum, and average value for key usage statistics. For systems, this includes: input voltage and current, and the output voltage and current. For the controller system, the CPU and memory usage are tracked.

To create the daily roll ups, the performance log is rolling up second data into minute data, minute data into hour data, and hour data into daily data. The web interface displays previews of all four sets of data as they are collected. In these previews, the horizontal axis shows the data sampled, not the time stamp. Daily statistics with minimum, maximum, and average values can be exported for each log by selecting the **Export data to CSV** button under the **Days** graph. Or you can export every log by selecting **Export All** via **Logs > Performance Logs**.

If the controller is shut down for some period of time, the preview window will not show the gap in time.

If there is a clock error, indicating that the time and date is unknown, a **Performance Log** will not collect data.



Notice: The performance log for the **DC System Total Rectifier O/P Current** has an additional table **Top Hourly Averages** that shows the top-three hourly averages and timestamps for the system total rectifier output current. This table does not exist on any other performance log.

10.5. File maintenance

This section of the manual covers the following:

- Using file preferences to name files
- Upgrading the controller operating system via the LCD panel
- Upgrading the controller software
- Configuration restore points
- Importing and exporting configuration files
- Exporting diagnostic information
- Importing and exporting license keys
- Exporting a snapshot of controller and system status

10.5.1. File preferences

If working with multiple systems, use the file naming options to keep your files organized. You can add the controller name or the date to exported and saved files.

If adding a date, the date string format is YYYY-MM-DD making it easy to sort in file browsers.

If adding the controller name, and that name contains whitespace, illegal characters for file names or some extended characters, those characters will be removed from the string that is added to the file name. This naming convention applies to most files that can be saved or exported from the controller for example: configuration files, log files, licensing files, and backup files.

To append a name or date:

1. Go to **Controller > Settings > User Interface**.
2. In the **File Preferences** table,
 - Select the **Edit** button in the **Append a Date String to Filenames** field to enable the add date to file names.
 - Select the **Edit** button in the **Change the Add the Controller Name to Filenames** field to add the controller name to file names.

10.5.2. File maintenance from the LCD panel

To enable more to be done with the LCD panel and USB mass storage devices, most of the file maintenance functions available via the web interface are available on the LCD panel. LCD panel file operations take place using the top-level or root directory of a File Allocation Table 32 (FAT32) formatted USB drive.

File operations that are available on both the web interface and LCD panel are as follows:

- **Import** and **Export** of configuration files.
- **Upgrade** of the controller software.
- **Upgrade** of the controller operating system.
- **Import** and **Export** of license key files.
- **Upgrade** of module software using ACAN files.
- **Downloading** of event logs and module alerts.
- **Export Backup** of the controller software and configuration.

File operations that are available only via the LCD panel:

- **Restore** of the controller software and configuration.

File operations that are available only via the web interface:

- **Downloading** of performance logs, datalogs, and tables.

10.5.2.1. Import and export

On the LCD panel, go to **Menu > Controller > Files & Upgrades > Configuration & Software Backup > Configuration File**. The **Export Controller Clone** command allows you to export the entire controller configuration to a connected USB drive. The other options **Export System or ADIO** and **Export Partial** are not supported on the LCD panel. The **Import** command allow you to import configuration files with limitations as noted.

Alternatively, go to **Shortcuts > Browse USB**. Here you can select a configuration file to perform an **Import**.



Notice: Using the **Import** command from the LCD panel has limitations. Importing a configuration file that is a clone of a controller will always work. However, importing a configuration file that is for a system, an ADIO module or a partial configuration will only work if the import can be achieved unambiguously. For example, if the import is intended to change some configuration for an ADIO module, but there are more than one ADIO module of the same type it will be ambiguous as to which ADIO module should receive the configuration. Therefore the import will fail. In this scenario, the web interface should be used to do the import so that the user can choose which ADIO module should receive the configuration.

10.5.2.2. Software upgrade

There are two ways to upgrade the controller software:

1. On the LCD panel, go to **Menu > Controller > Files & Upgrades > Software Upgrade**. The **Upgrade New Controller Software and Reboot** command will allow you to upgrade the software using an appropriate upgrade file.
2. On the LCD panel, go to **Shortcuts > Browse USB**. You can upgrade the controller software via an appropriate upgrade file that has been stored on a USB drive.

The software upgrade takes several seconds. The controller system reboots automatically when complete.

10.5.2.3. Operating system upgrade

On the LCD panel, go to **Shortcuts > Browse USB**. You can upgrade the controller operating system via an appropriate upgrade file that has been stored on a USB drive.



Notice: *There must be at least 33 Megabytes (MB) of free space to upgrade the operating system. To check the available free space, go to **Controller > About > Storage & Memory**. In the **Application Storage** table, check the **Free Space** row.*

The operating system upgrade takes several minutes. The controller reboots automatically when the upgrade completes.

10.5.2.4. Backup and restore

The **Backup** command allows you to make a full backup of a system so that it may be restored to a known state. To access the **Backup** function on the LCD panel, go to **Shortcuts > Backup**.

The **Restore** command allows you to take a previously created backup file and restore the contents of that file to the system. All existing application software and configuration information will be deleted and replaced by the contents of the backup file. To access the **Restore** function on the LCD panel, go to **Shortcuts > Restore**.

See section *Backup and Restore* for additional information and procedures.

10.5.3. Upgrade the controller system software

To perform a controller system software upgrade:

1. Go to **Controller > Files & Upgrade > Software Upgrade**.
2. Select the **Upload New Controller Software and Reboot** button.
3. From the **Upload File** window, select **Select File**, and then select the upgrade file.
4. Select **Upload** to begin upgrading.
5. After the upgrade is finished, the controller will restart automatically.

Once complete, the **Login** page displays and you must log back in to the controller.

After an upgrade, it is common to see a number of **Event Log** entries showing configuration fields being set. This is normal on an upgrade when the system needs to set up new features or options that have been added.

10.5.4. Upload the software manual

The controller software manual can be uploaded to the controller so it is directly accessible via the web interface. The controller can only contain one version of the software manual at a time.

To upload the user manual:

1. Go to www.alpha.com, and then download the HTML version of the software manual for controller upload.
2. Go to **Controller > Files & Upgrades > Software Manual**.
3. Select **Upload Software Manual**, and then select a file to import.
4. Select **Upload**. It takes several minutes for the file to upload and install. When the upload is complete, a notification is displayed.
5. Select **Account and Shortcuts** dropdown menu on the top right-side of the browser window to confirm that the file is installed.
6. Select the **Software Manual** entry at the top of the list. A new browser tab should open with the software manual. If not, try refreshing the browser using F5 on your keyboard.

A navigation and search pane opens on the left-side of the browser window. Use this to search for content. If required, it is also possible to print pages from this pane.

10.5.5. Export a configuration file

There are three options when exporting a configuration file.

Export Controller Clone: Is used to transfer the entire configuration. A common use for this type of export is to make a back-up of the current settings. When using this export, almost all information is saved to the exported file. See the following note for an explanation of what is not included in the export file.

Export System or ADIO: Is a way to copy a system or an ADIO module to another controller. Only a single system or an ADIO module may be selected. If selecting system, any ADIO module referenced by that system is also exported. For example, if an Cordex® HP L-ADIO smart peripheral is used for voltage measurements and Cordex® HP 6i-ADIO smart peripheral is used for shunt measurements they are saved to the export file.

Export Partial: Is used to select a specific set of information for export. This is commonly used for transferring user alarms, custom data, alarm thresholds or other configured data that may need to be common between controllers. A partial export must be performed on a set of related configurations. The wizard allows you to select either a controller, one or more system or ADIO modules. After the selection is made, all associated configurations are presented in a list and are exported by selecting the check-box. For example: to export a set of custom data, select controller; to export a set of DC system alarm

configurations, select the required system from the dropdown list. If any of the selected configuration references an ADIO module, that ADIO module is also exported.

Some items must be exported as a whole. This includes items that can be created and removed by a user (other than systems) or items that are permanent to the controller. For example if selecting:

- **Controller:** You can export a whole SNMP destination, but not a particular configuration within a destination; or if exporting custom data, you can export a whole custom data with all its variables, but not a specific variable defined within the custom data. The same applies to user alarms, datalogs, schedules.
- **DC system:** You can export a whole battery, load, shunt, or disconnect, but not the configuration within these items.
- Multiple systems of the same type such as line power system cannot be exported in the same configuration file.



Notice: Some configurations cannot be exported:

- Controller description and location information (this is unique to each controller)
- IP configuration (to avoid loss of Ethernet connectivity)
- Web server port configuration (to avoid loss of Ethernet connectivity)
- Line power channels (unique to line power modules)
- Power module (power modules are unique to a system)
- Users (to maintain password security)
- Server passwords (for example, email server password; to maintain password security)

To export settings:

1. From the main dashboard go to, **Controller > Files & Upgrades > Configuration & Software Backup**.
2. Select the type of export required:
 - **Export Controller Clone:** A file is generated and uploaded to your browser.
 - **Export System or ADIO:** A wizard displays in which you can select a system or an ADIO module. Select an item to export and then select **Next**. Use the **Download File** option to save your export file.
 - **Export Partial:** A wizard displays in which you can select a configuration source, select **Next**. In the **Select Configuration to Export** window, select each configuration item for

export, select **Next**. In **Select Another Configuration** window, select **Yes** and select **Next** to select another configuration source. Select **No** and select **Next** when all configuration items are selected. Once the configuration file is prepared, use the **Download File** option to save your export file.

3. To help distinguish among configuration files rename your export file with a unique identifier. This can be important when making a backup files for archiving or if a controller replacement is required.

10.5.6. Import a configuration file

When importing a configuration file, the controller will analyze the file to determine the type of import to perform. There are three types of import corresponding to the three types of export.

Clone

Clone is performed when a file that has been exported using **Export Clone Controller** is uploaded. The configuration of the controller is matched to that contained in the file. In addition all existing systems, custom data, timers, counters, datalogs are removed. Clone is also performed if a configuration file from a software version previous to software version 4.00 is uploaded.

Copy system or ADIO module

Copy system or ADIO module is performed when a file that has been exported using **Export System or ADIO** is uploaded. The system or ADIO module contained in the file is added to the controller. If a system is being imported, the new system is created and added to the controller under the **System** menu. If importing a DC system and a DC system already exists the import will fail because only one DC system is supported. It is necessary to first delete the existing DC system before doing the import. This also applies to converter systems. All other types of systems do not have this limitation. If importing an ADIO module, the ADIO module is added under the **Modules** page. After importing the ADIO module, use the **Replace ADIO** command to transfer the configuration of the imported ADIO module to an existing ADIO module.

Partial import

Partial import is performed when a file that has been exported using **Export Partial** is uploaded. The configuration contained in the file replaces that of any matching existing configuration settings. It is possible that the destination of the imported configuration cannot be automatically determined. For example, if configuration for a line power system is imported and there exists more than one line power system, the user will be required to select the which system should receive the configuration. Partial import can also be used to transfer custom data, counters and timers from one controller to another. If the file contains configuration of more than one system, each system will be imported one at a time until done.

Importing may not always be fully successful. Configuration values that point to another value, such as 'source' values that point to voltage, current or temperature, may not exist or may be ambiguous. If this is the case, the value is ignored and an entry is made in the event log. It is then necessary to remap the source field to a valid value.

 **Notice:** Some configurations cannot be exported:



- *Controller description and location information (this is unique to each controller)*
- *IP configuration (to avoid loss of Ethernet connectivity)*
- *Web server port configuration (to avoid loss of Ethernet connectivity)*
- *Line power channels (unique to line power modules)*
- *Power module (power modules are unique to a system)*
- *Users (to maintain password security)*
- *Server passwords (for example, email server password; to maintain password security)*

To import settings:

1. From the main dashboard go to, **Controller > Files & Upgrades > Configuration & Software Backup**.
2. Select the **Import** button, select a file to import and select the **Upload** button.
3. If the configuration cannot be imported without ambiguity, there will be a dropdown list on **Select System** page to select the destination system or ADIO module. This only happens if trying to do a partial import. Select the destination system and select **Next**.
4. A page displaying an **Settings to Import** is shown. Review the summary and select **Next** to import. If the summary looks incorrect, you can close the wizard and try **Import** again to select another file.
5. Perform **Replace ADIO** if required. When this operation is done, the controller gives special attention to the status of relays mapped to a disconnect. If, as a result of the replace operation, a disconnect relay will be shared with an alarm relay or if the state of a disconnect relay will change because of a change to the relay polarity, the replace will fail and an entry made in the event log identifying the alarm relay was causing the failure.

10.5.6.1. Import a system

It is common to create a system on the controller that has been already configured on a different controller. This can be done by first exporting a configuration file from the already configured controller, then importing it. When exporting, choose the appropriate export method, either clone or copy, as previously described.

To import a system in a configuration file:

1. Go to **Controller > Files & Upgrades > Configuration & Software Backup**.
2. Select the **Import** button to launch the import wizard.
3. Use **Select File** to browse to the configuration file on your local computer (for example, `exportconfig.xml`).

4. Select **Upload** to upload the file to the controller.
5. Review the **Import Summary** page. This shows a summary of what you are about to import. If it is not correct, close the wizard and start over to select a different configuration file.
6. Select **Next**, and then wait for the import to complete. If the import fails or encounters an error an error message is displayed.
7. Perform **Replace ADIO**, if necessary. If the imported system referenced one or more ADIO modules the import included these ADIO modules, and they now show up as **Comms Lost**. You should replace these **Comms Lost** ADIO modules with existing ADIO modules of the same type via the **Modules** menu.

The system has been imported and configured to use the existing ADIO module.

10.5.7. Export diagnostic information



Notice: To facilitate any support request, export a diagnostic information package before contacting support.

Exporting a diagnostic information package helps the support team provide assistance with any issues you may experience. This information package is an archive that contains the following:

- Controller clone
- Device log
- Event log
- Battery log
- Daily statistics for all performance logs
- Datalogs

Additionally, if any Alpha® T2S inverter controller modules for the Alpha® AMPS HP2 inverter system are acquired, an additional step will be available in the **Export Diagnostic Information** wizard to include their logs and configuration files in this package.

10.5.7.1. Export a diagnostic information package

This package can be obtained in the following ways, via the LCD panel or the web interface.

1. From the dashboard of the LCD panel, go to **Shortcuts > Export Diagnostic Information** to launch a wizard that will generate save the package to a USB drive.
2. From the web interface, select the **Accounts > Export Diagnostic Information** on the top bar to launch a wizard that will generate the file and let you download the file to your computer. This wizard is also available from **Controller > About > General**.

10.5.8. Export inventory file

A common system maintenance activity is to gather, record and archive a set of data about the controller and systems. This can be a tedious process depending on the amount of data required. To facilitate this

the controller provides a set of data, both live status data and configuration, as a downloadable file. This file contains most of the information that is viewable from the LCD panel and web interface and serves as a snapshot of the present state of the controller.

To download this file:

1. If using a controller with the LCD or OLED display panel, insert a USB drive.
2. Go to the menu location to find the download button:
 - a. On the LCD panel, go to **Maintenance** and scroll down to the **Export Inventory to CSV** button and select it.
 - b. On the web interface, go to **Controller > Inventory** and select the **Export Inventory to CSV** button in the **Inventory** table.
 - c. On the in-shelf controller with the OLED display panel, select the **Menu** button and scroll down to **ExplInv** and press the **Menu** button again.
3. Select the **Export** button to initiate the download.

Once started, the file is downloaded to the USB drive or PC depending on where the export was initiated from. If initiated from the LCD or OLED display panel it is downloaded to the USB drive. If initiated from the web interface it is downloaded to the PC. Depending on the amount of data to download, it may take several minutes to complete.

This file can now be opened in a spreadsheet program for analysis.



Notice: Sensitive data related to users and user permissions, passwords, and licensing is not included in the exported file.

10.5.9. Create configuration restore points

While configuration restore points will be created daily (if any configuration changes have been made), it is also possible to manually create a restore point. To manually create a configuration restore point:

1. Go to **Controller > Files & Upgrades > Configuration & Software Backup**
2. On the **Configuration Restore Points** table, select **Create Configuration Restore Point**
3. Read the **Preview**, then select **Next**
4. Enter in a **Description** and specify the **Deletion Policy** for this restore point, then select **Next**

Note: A maximum of five restore points can be marked as **Never Delete**. This should be used to ensure important restore points will never get deleted when daily restore points are created.

5. Review the data you entered in, then select **Next**

A new configuration restore point has now been created, and can be used to restore configuration of the controller to the configuration it had at this point in time.

10.6. User account maintenance

10.6.1. Set up users and permissions



Notice: These features are only available to those with administrator or account manager privileges.

By default, the controller has seven user accounts: one administrator, one account manager, and five operators. The **Name** field in these accounts is not editable. User accounts cannot be added or deleted, but they can be enabled or disabled.

Within the **Users & Security** menu in the **Users** table, you can configure what privileges each user has when accessing the system or changing passwords.

This section of the document covers the following:

- Edit user permissions
- Enable new users
- Disable users

10.6.2. Edit user permissions

These features are only available to those with administrator or account manager privileges.

To edit user permissions:

1. Go to **Controller > Users & Security > Users**.
2. In the **User** table, select the **Go To** button on the line of user whose access must be changed.
3. On the right-side of the **User Role** line, select the **Edit** button.
4. From the dropdown menu, set the **User Role** and select **Save**.

10.6.3. Enable new users

Within the **User & Security** menu you can enable, edit, and disable users. Only users with administrator or account manager privileges can enable users. Within the **User Roles** dropdown menu you can configure the privileges each user has as well as create passwords. The different levels of user permissions are as follows:

- **Administrator:** Can modify all configurations, perform any actions with the exception of factory information.
- **Account Manager:** Can only create and modify user accounts.
- **Operator:** Can modify all configurations, can change their own password.

- **Restricted Operator:** Can modify configuration values, but cannot add or remove systems or inventory, can change their own password.
- **Guest:** Can read any field, but can not configure any settings.

To enable a user:

1. Go to **Controller > Users & Security > Users**.
2. From the **Users** table, select the **Go To** button on the operator1 line.
3. **Optional:** Edit the **Description** and select **Save**.
4. **Optional:** Edit the **Alias** and select **Save**.

The alias field allows sign in names that a user is more familiar with. For example, if you set the *operator1* alias to *TL1*, you can sign in to the operator1 account using the *TL1* user name.

5. Set the **User Role** (permissions) and select **Save**.
6. From the operator1 table, select **Change User Password** to set the password and select **Save**.
7. Sign in using the updated password or permissions.

10.6.4. Disable users

These features are only available to those with administrator or account manager privileges. User accounts are not actually deleted, they are edited to remove a user's access to the system.

To disable users:

1. Go to **Controller > Users & Security > Users**.
2. From the **Users** table select the **Go To** button on the line of user account whose access must be changed.
3. On the right-side of the **User Role** line select the **Edit** button.
4. From the dropdown menu, set the **User Role** to **No Access**.
5. Select **Save**.

10.6.5. Change the default password from the LCD panel

This section describes how to change user passwords from the LCD panel.

You must be signed in to the controller to change passwords.

To change the default password:

1. From the main dashboard, select the **Menu** button.
2. Select **Controller** to highlight it and then select the arrow on the right-side.
3. Select to highlight **Configure Controller** and then select the arrow on the right-side.
4. Swipe with an upward motion on the touchscreen to scroll down to **Users and Security** and select to highlight it.

5. Select the arrow on the right-side and then select **admin**.
6. Select **Change User Password**.
7. Select the **Execute** button to modify the default and then select the check mark to save your changes.

10.6.6. Change the default password from the web interface

This section describes how to change the default password via the web interface.

To change the default password via the web interface:

1. From the main dashboard, go to **Controller > Users & Security > Users**.
2. From the **admin** line in the **Users** table, select the **Go To** button on the right-side of the table.
3. From the admin table, select the **Change User Password** button.
4. Enter your existing password, a new password then again confirm the password. Select **Save** to save the password change.

10.6.7. User account password requirements

When changing a user account password, the following requirements apply:

- **Minimum password length:** 4 characters.
- **Maximum password length:** 60 characters.
- Any characters (including those from non-Latin alphabets) are allowed.
- There are no complexity requirements, such as requiring numbers or symbols.
- Passwords do not expire.



Notice: *The use of some non-Latin characters may reduce the maximum allowable password length.*

10.6.8. Remote configuration lockout

The **Remote Configuration Lockout** feature allows for a complete lockout of configuration changes from the web interface. When this feature is active, no user, regardless of permission level, will be able to change or modify the configuration via the web interface. Configuration changes will still be possible via the LCD panel.

To enable this feature:

1. On the LCD panel, go to **Maintenance > Remote Configuration Lockout**.
2. Select the **Edit** button beside **Remove Configuration Lockout**, change the value to **Disabled** (sign in if required), then save.
3. Select the **Edit** button beside **Lockout Override Time**, enter in the desired time to override the lockout (more on the override in the following sections), then select **Save**.

After the **Remote Configuration Lockout** feature is enabled, no configuration changes will be allowed from the web interface.

10.6.8.1. Override the remote configuration lockout from the LCD panel

After the **Remote Configuration Lockout** feature has been enabled, it is possible to override the lockout for a user-specified amount of time. This will allow a technician on site to override the lockout temporarily to allow for a user off-site to perform some configuration via the web interface.

To override the remote configuration lockout from the LCD panel:

1. On the LCD panel, go to **Maintenance > Remote Configuration Lockout**.
2. Select **Override Remote Configuration Lockout**, then select **Execute**.

The configuration lockout will be overridden for the amount of time that has been configured. The time remaining in the override can be seen via **Lockout Override Time Remaining**.

10.6.8.2. Override the remote configuration lockout from the OLED display panel

To override the remote configuration lockout from the OLED display panel:

1. On the OLED display, go to the menu by selecting the **Select** button.
2. Scroll down and select the **RemCfg** button.

You will be shown a **Lockout Overridden success** confirmation message, and the configuration lockout will be overridden for the amount of time that has been configured.

10.6.9. Backup and restore

A full backup of the controller can be created using the backup feature. The created backup can then be used to restore to a known software version and configuration. The **Backup** command will make a copy of the software and configuration information for that version of application in a single backup file. This includes controller-specific information such as IP addresses, usernames, and passwords.

The **Restore** command provides the ability to take an existing backup file and restore the contents of that file into a controller. All existing software and configuration information will be deleted and replaced by the contents of the backup file.

The **Backup and Restore** feature is intended to be used to recover from severe errors. If a controller was damaged and required a replacement, then a backup file can be used to restore a new controller to the same software version and configuration as the previous controller.

A **Backup** command can be initiated via the web interface or LCD panel while a **Restore** command can only be initiated via the LCD panel.

10.7. Module firmware upgrades

This section covers how to upgrade the firmware on CAN devices attached to the controller.

10.7.1. Module firmware upgrade

To upgrade the firmware on a module, go to the **Modules** menu, then go to the **Firmware Upgrade** table from either the web interface or the LCD panel.

10.7.2. Upload a firmware file

Upload a firmware file from the LCD panel

From the LCD panel you can either choose a file uploaded from a USB drive or one from the local files folder. The **Local Files** menu contains a list of files previously uploaded via the web interface. Go to **Menu > Modules > Firmware Upgrade > File**.

Upload a firmware file from the web interface

To upgrade a module over the web interface the firmware file must be uploaded to the controller first.

1. Go to the **Modules** menu. In the **Firmware Files** table, select the **Upload Firmware File** button.

An **Upload Firmware File** dialog box displays.

2. Select **Select File** and choose the file to upload then select the **Upload** button.

Once the file is uploaded, the dialog closes. The uploaded file is now visible in the **Firmware Files** table and available to upgrade a module.

10.7.3. Select the file to upgrade

In the **Firmware Upgrade** table, there are buttons at the top to start or stop the firmware upgrade. These buttons are not active until a firmware file is selected. The first three rows of the **Firmware Upgrade** table display information about the selected upgrade file.

The rest of the table rows show information about the last upgrade that occurred.

The **File Info** field is informational, it displays information about how to proceed with an upgrade. Before a file is selected it displays the message **Select a Firmware (ACAN) File**.

The **File** field is used to select a file for the upgrade. From the web, the upgrade file must be chosen from those previously uploaded to the controller. On the LCD, you can select either from the list of previously uploaded files (local files), or from a USB drive.

Once a file is selected, the first three rows of the table are updated with new status. If the file chosen is not a valid upgrade file or if there are no modules to which that file can be applied, the number of **Modules Compatible With File** will be 0 and the **File Info** field will display **Select a Different Firmware File**.

If the file is valid and applicable to your modules the **Modules Compatible With File** field will display how many devices need to be upgraded and the **File Info** field will display **Ready to Start**. If the number of **Modules Compatible With File** is smaller than you expected or zero, it may be because some or all of the modules have already been upgraded to this version. There is no need to reload a module with the same version of firmware. If the firmware is corrupt, the module will detect it and go into a **Waiting for Software** state.

If an upgrade has been completed since the last restart, the bottom rows of the table will still contain information about that last upgrade until the **Start Firmware Upgrade** button is selected.

10.7.4. Upgrade the module

Once a valid firmware file is uploaded and the **File Info** field displays **Ready to Start**, select **Start Firmware Upgrade**.

As the upgrade progresses, the **Firmware Upgrade** table updates with information about the upgrade. The **Last Upgrade Percent Complete** counts up from 0 percent, and then **Last Upgrade Remaining Modules** counts down (if there is more than one module being upgraded).

If there is more than one module being upgraded, the percent complete will show the total (100 percent will be reached once all modules are upgraded) instead of a per-module completion.

The firmware upgrade can be stopped if necessary. If you select **Stop Firmware Upgrade** button the controller finishes upgrading the current module so as not to leave it in a non-functional state. If multiple modules are queued, the next module will not be upgraded.

If the upgrade fails on a module, the controller stops the upgrade and will not attempt to continue on any further modules that have been queued.

Once the upgrade is finished, the **Last Upgrade Percent Complete** displays **100%**, and the **Last Upgrade Status** displays **Succeeded**.

11. Appendix A - Triggers

The Alpha® FXM HP UPS module works solely with level toggle triggers.

When the **Active When** field is set to **Circuit Closed**, the UPS module is triggered to perform the assigned action when the **User Input** pin is shorted to common.

When the **Active When** field is set to **Circuit Open**, the UPS module is triggered to perform the assigned action when the **User Input** circuit is open.

To configure the user input's active level:

1. Go to the **Modules** menu.
2. In the **CAN Modules** table, select the **Go To** button of the module.
3. In the **Digital Inputs** table, select the **Go To** button of the user input.
4. In the selected **User Input Alarm** table, select the **Edit** button of **Active When**.
5. Select **Circuit Open** or **Circuit Closed** to configure the trigger level of the user input.