# Cordex HP Controller and I/O Peripherals

## Hardware Manual

Part # 0180036-J0
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# Cordex HP Controller and I/O Peripherals Hardware Manual

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# 1 Safety

SAVE THESE INSTRUCTIONS: This manual 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 manual before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies or the nearest Alpha representative.

## 1.1 Safety Wording/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 manual. Where these symbols appear, use extra care and attention.

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

***NOTE:*** *Notes provide additional information to help complete a specific task or procedure.*

***CAUTION:*** *Cautions indicate safety information intended to PREVENT DAMAGE to material or equipment.*

***WARNING:*** *Warnings present safety information to PREVENT INJURY OR DEATH to personnel.*

***NOTE:*** *HOT! The use of Hot presents safety information to PREVENT BURNS to the technician or user.*

## 1.2 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.*

- Read and follow all instructions included in this manual.
- Only trained personnel are qualified to install or replace this equipment and its components.
- Use proper lifting techniques whenever handling equipment, parts, or batteries.

## 1.3 Electrical Safety

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

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 OSHA approved insulated hand tools. Do not rest tools on top of batteries.

***WARNING:*** *Lethal voltages are present within the power 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.*

- Do not work alone under hazardous conditions.
- A licensed electrician is required to install permanently wired equipment. Input voltages can range up to 480VAC 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.
- The enclosure which contains the DC or AC power system along with customer installed radios must remain locked at all times, except when authorized service personnel are present.
- 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.

## 1.4 Battery Safety

- 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, and/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.

***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.*

- 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 Scope of the Manual

This manual explains the installation and interconnection of Alpha Technologies Cordex™ High Performance System Controller (CXC HP) and related ADIO peripherals. Rack and DIN rail mounting options are also covered.

## 2.2 Overview

The CXC HP is an advanced system controller designed for operation with basic or complex power systems. Although developed primarily to optimize the features of the Cordex series of power products, the CXC HP may also be used for advanced site monitoring and automation.

The CXC HP controller uses external analog and digital I/O peripherals to enable a wide variety of monitoring applications. The Large Analog Digital Input Output (L-ADIO) is a low voltage system peripheral that provides eight digital inputs, 12 analog inputs, and 12 Form C relays. Additional I/O peripherals may be included with the system and can be easily field upgraded in future. The High Voltage Analog Digital Input Output (HV-ADIO) consists of four digital inputs, seven analog inputs and six Form C relays. The 6I-ADIO includes six current (shunt) inputs.

The CXC HP allows the user to configure, monitor and control an entire energy system from a local color touch screen display. The controller includes dual Ethernet and USB ports to provide multiple communication access points with a variety of benefits such as remote communications, local web UI access, and file management.

***NOTE:*** *Separate documentation is provided in the software documentation that details the CXC HP software features.*

**Figure 1:** CXC HP Controller



**Figure 2:** L-ADIO I/O Peripheral




**Figure 3:** 6I-ADIO




**Figure 4:** HV-ADIO




## 2.3 Part Numbers and Ordering Options

These products and accessories are available to order under the following part numbers.

**Table 1:** Part Numbers and Ordering Options (Sheet 1 of 2)

| Description | Part Number/List Option |
|---|---|
| **Loose Controllers and Peripherals** | |
| Standalone CXC HP Controller | 0180036-002 |
| Standalone L-ADIO | 0180039-002 |
| Standalone Redundant Input Power Module | 0180045-001 |
| Standalone 6I-ADIO | 0180051-001 |
| HV-ADIO | 0180057-001 |
| **19/23” 3U Rack Mount Assemblies** | |
| CXC HP, 19/23”, 3U Rack Mount; L-ADIO [I/O = 4V,4T,4C,8Dig,16Rel]; Redundant Power Input | 0180046-001 |
| CXC HP, 19/23”, 3U Rack Mount; 2x L-ADIO [I/O = 8V,8T,8C,16Dig,32Rel]; Redundant Power Input | 0180046-002 |
| CXC HP, 19/23”, 3U Rack Mount; L-ADIO [I/O = 4V,4T,4C,8Dig,16Rel];Redundant Power Input; 6I-ADIO | 0180046-009 |
| CXC HP, For 125/220Vdc HV Systems, 19/23in, 3U Rack Mount, 2x HV-ADIO [I/O = 4V,4T,2C,4CT,8Dig,12Rel], Redundant Power Input | 0180046-013 |
| CXC HP, For 125/220Vdc HV Systems, 19/23in, 3U Rack Mount, HV-ADIO [I/O = 2V,2T,1C,2CT,4Dig,6Rel], Redundant Power Input | 0180046-014 |
| Accessories | |
| CXC HP Controller DIN Rail Mount Kit | 0370190-001 |
| CXC HP ADIO DIN Rail Mount Kit | 0370196-001 |
| 6I-ADIO Mounting Adapter for 3U Rack Mount Panel | 5902352-001 |
| **Temp Probes** | |
| 1/4” lug, 6’ cable | 747-028-20-071 |
| 1/4" lug, 12' cable | 747-028-20-072 |
| 1/4" lug, 24' cable | 747-028-20-073 |

**Table 1:** Part Numbers and Ordering Options (Continued) (Sheet 2 of 2)

| Description | Part Number/List Option |
|---|---|
| 1/4" lug, 50' cable | 747-028-20-080 |
| 3/8" lug, 6' cable | 747-082-20-071 |
| 3/8" lug, 12' cable | 747-082-20-072 |
| 3/8" lug, 24' cable | 747-082-20-073 |
| 3/8" lug, 50' cable | 747-082-20-080 |
| **CAN Cables, RJ-12 offset to RJ-12 offset, sorted by length** | |
| 1' | 877-176-26 |
| 1.5' | 877-176-21 |
| 19" | 877-176-27 |
| 2' | 877-176-22 |
| 6' | 877-176-23 |
| 25' | 877-176-25 |
| **DCCT Cables** | |
| 2.5m | 877-273-20-000 |
| 50' | 877-623-20-000 |
| **DCCT Modules** | |
| Square Bus 200A | 173-002-10 |
| Circular Cable 1000A | 173-003-10 |
| Circular Cable 200A | 173-004-10 |
| Rectangular Bus 500A | 2420012 |

# 3 Features

## 3.1 CXC HP Controller

**Figure 5:** CXC HP Controller (Left Front View)




**Figure 6:** CXC HP Controller (Right/Top View )

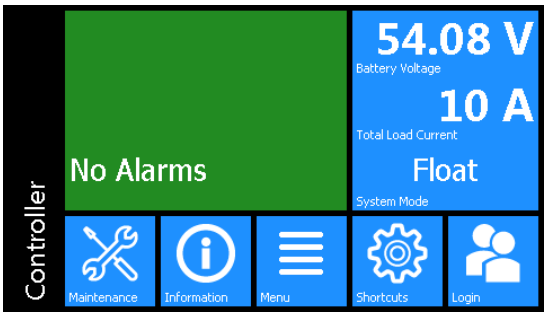



The CXC HP has the following features:

- Front touchscreen: full color LCD display, to access controls and menu items by using fingertip touch or a stylus.
- Home button: provides the ability to go directly back to the home screen from any menu.
- Front panel reset: for emergency use only to restart the CXC HP if the unit touch screen or home button are not responding.

- Front panel LEDs: for alarms, progress and status indication.Audio speaker: built-in audio tones during active alarms, and can be disabled if required.
- Ethernet: dual ports 10/100 Base T Ethernet connection on both the front and rear of the controller for remote or local communication.
- USB: dual ports on both the front and rear of the controller for upgrades and file management via a standard USB flash drive.
- CAN: dual independent CAN bus ports for communication with the Alpha Cordex™ and AMPS family of products, which allows for a greater number of devices.
- Real-time clock with field replaceable lithium battery: allows for timestamps on alarms and events.
- System fail alarm/relay: this activates when there is a major internal failure. During such a condition the unit attempts to reset.

**Figure 7:** CXC HP Controller LCD




**Active Alarms** color coded alarms based on severity

**System Status** battery voltage load current system mode

**Maintenance** access to alarm cutoff settings

**Information** access to serial number software and OS version

**Menu** access all controller menus

**Shortcuts** access to most often used areas

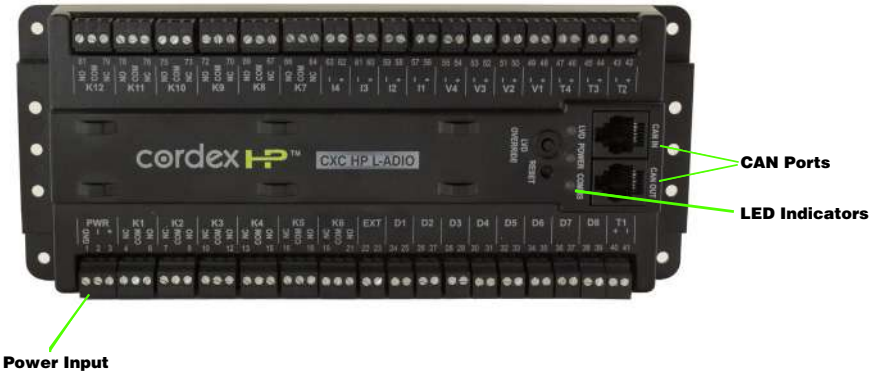
**Login** or **Logout**

# 4 External Peripherals

## 4.1 L-ADIO

The L-ADIO is the standard analog and digital I/O peripheral for low voltage (<60Vdc) systems. The L-ADIO communicates on CAN bus to the controller and provides user access to I/O management via the CXC HP controller.

**Figure 8:** L-ADIO I/O Peripheral




### 4.1.1 Analog Inputs

Four voltage inputs, V1 – V4, are provided on the L-ADIO for a variety of voltage monitoring requirements. The input channels can measure a signal between -60Vdc and +60Vdc.

Four current input channels, I1 – I4, provide monitoring of current; e.g., discharge (load) and charge (battery). The CXC HP is capable of monitoring standard shunts of 25, 50 and 100mV as well as applications specifications of up to 200mV. The shunt current rating can be configured in the controller user interface and is set by default to 800A 25mV. The maximum input range for this signal is -200mV to +200mV.

Four temperature input channels, T1 – T4, provide monitoring of temperature probes (thermistors). These are typically used for either ambient temperature, or for battery post monitoring to enable battery temperature compensation. The temperature sensor is provided by Alpha in various lengths. The input range for this signal is 0V to 5V and is powered internally from the L-ADIO.

### 4.1.2 Digital Inputs

The L-ADIO can accommodate up to eight digital input channels, D1 – D8. Each channel responds to a zero or system voltage potential at the input to activate or deactivate the appropriate condition. These channels can monitor digital alarm/control signals from rectifiers, converters and many other types of equipment.

An additional digital input, “EXT” is reserved for monitoring an external LVD override

### 4.1.3 Alarm and Control Output Relays

Each L-ADIO contains twelve Form C alarm output relays to extend alarms and control external apparatus. Each internally generated alarm or control signal may be mapped to any one of the 12 relays, or, several signals may be mapped to just one relay or none at all

### 4.1.4 LEDs

Each L-ADIO contains three LEDs for peripheral status indication.

| LED | Color | Status Indicator |
|---|---|---|
| LVD | Yellow | LVD override engaged |
| Power | Blue | Power present to the device |
| Comms | Green | L-ADIO has been acquired by the CXC HP |

### 4.1.5 Front Panel Reset

A reset button is located on the front panel for restarting the L-ADIO microprocessor. It takes approximately 15 seconds before the unit is reacquired after pressing the reset button.

During a reset condition, the L-ADIO will keep relays in their last known state to prevent false alarm notifications and possible changing system LVD states. ***CAUTION:*** *Pressing the reset button will cause the L-ADIO to lose communication with the controller.*

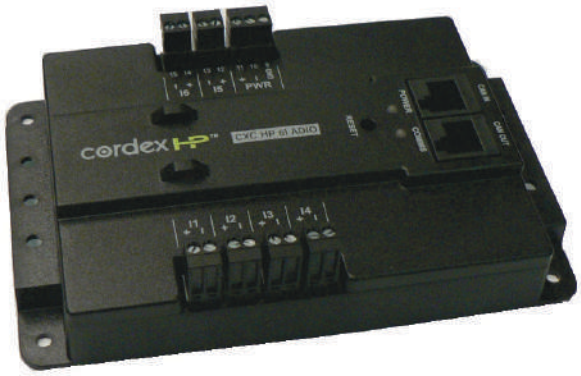
### 4.1.6 LVD Override

An LVD override button is located on the L-ADIO. This is for a future feature which is not currently implemented.

## 4.2 6I-ADIO

The 6I-ADIO is an analog input peripheral providing six isolated shunt inputs. The 6I-ADIO communicates on CAN bus to the controller and provides access to shunt inputs via the CXC HP controller.

**Figure 9:** 6I-ADIO Power Module



## 4.3 HV ADIO

The HV-ADIO is the standard analog and digital I/O peripheral for high voltage (>60 to <300Vdc) systems. The HV-ADIO communicates on CAN bus to the controller and provides user access to I/O management via the CXC HP controller.

**Figure 10:** High Voltage ADIO




See the customer connections drawing (xxx-08) at the rear of this manual for additional information on the HV-ADIO.

### 4.3.1 Analog Inputs

Two voltage inputs, V1 – V2, are provided on the HV-ADIO for a variety of voltage monitoring requirements. The input channels can measure a signal between -300Vdc and +300Vdc.

One current input channel, I1, provides monitoring of current; e.g., discharge (load) and charge (battery). The CXC HP is capable of monitoring standard shunts of 25, 50 and 100mV as well as applications specifications of up to 200mV. The shunt current rating can be configured in the Controller user interface and is set by default to 800A 25mV. The input range for this signal is -200mV to +200mV.

Two temperature input channels, T1 – T2, provide monitoring of temperature probes (thermistors). These are typically used for either ambient temperature, or for battery post monitoring to enable battery temperature compensation. The temperature sensor is provided by Alpha in various lengths. The input range for this signal is 0V to 5V and is powered internally from the HV-ADIO.

Two DCCT inputs, DCCT1-DCCT2, are provided on the HV-ADIO. The input range for this signal is ±4V or ±10V for additional current measurements using isolated fall effect type sensors. Two sensor ranges are supplied by Alpha 4V and 10V. The sensors are powered by the ADIO using and internal +15V isolated power supply.

### 4.3.2 Digital Inputs

The HV-ADIO can accommodate up to four digital input channels, D1 – D4. Each channel responds to contact closure at the input to activate or deactivate the appropriate condition. These channels can monitor digital alarm/control signals from rectifiers, converters and many other types of equipment.

***WARNING:*** *Do not connect voltage to these inputs, they function differently than the digital OP on the L-ADIO.*

### 4.3.3 Alarm and Control Output Relays

Each L-ADIO contains six Form C alarm output relays to extend alarms and control external apparatus. Each internally generated alarm or control signal may be mapped to any of the six relays, disconnects or other contractors, up to a 50Att maximum load.

### 4.3.4 LEDs

Each HV-ADIO contains two LEDs for Power and Comms status indication.

| LED | Color | Status Indicator |
|---|---|---|
| Power | Blue | Power present to the device |
| Comms | Green | L-ADIO has been acquired by the CXC HP |

### 4.3.5 P-Out Connector

This port is used to power the CXC HP module. The maximum load is 0.7A or other low voltage ADIOs.

## 4.4 Redundant Input Power Module

The redundant input power module (RIPM) provides multiple power inputs to power the CXC HP controller and any I/O peripherals such as the L-ADIO. The unit enables users to wire system power into the control devices from multiple locations (e.g., on battery and load side of LVD's) and provides Diode-Or protection between power inputs.

**Figure 11:** Redundant Input Power Module



# 5 Specifications

## 5.1 Specifications: L-ADIO and 6I-ADIO

**Table 2:** Specifications: 3RU Rack Mount CXC HP (Sheet 1 of 4)

| Cordex Controller Panel/Rack Mount | |
|---|---|
| **Basic Unit** | |
| Input Voltage: | 12V to 60Vdc within rated limits |
| Electrical Ratings: | Controller: 10 to 60Vdc, 1.6A max. |
| | L-ADIO: 10 to 60Vdc, 1.6A max. |
| | 6I-ADIO: 10 to 60VDC, 0.2A max |
| MTBF: | 472,000 @ 25°C (77°F) |
| EMC: | The unit meets requirements of: |
| | ICES-003 Class B |
| | EN 55022 Class B (CISPR 22) |
| | ETSI EN 300-386 Class B |
| | EN 61000-4-2 ESD* |
| | EN 61000-4-3 Radiated Immunity |
| | EN 61000-4-4 EFT /Burst |
| | EN 61000-4-6 Conducted Immunity |
| | EN 61000-4-5 Surge |
| | FCC Part 15 Class B |
| *NOTE: A grounded wrist strap is required when wiring to L-ADIO peripherals. | |

**Table 2:** Specifications: 3RU Rack Mount CXC HP (Continued) (Sheet 2 of 4)

| **Cordex Controller Panel/Rack Mount** | |
|---|---|
| In accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Class B:<br>***NOTE:*** *This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*<br>• Reorient or relocate the receiving antenna.<br>• Increase the separation between the equipment and receiver.<br>• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.<br>• Consult the dealer or an experienced radio/TV technician for help.<br>Any changes or modifications to this equipment not expressly described in this manual could void the FCC compliance. | |
| **Environmental** | |
| Operating Temperature: | -40 to 70°C standard @ 2000m |
| Storage Temperature: | -40 to +80°C standard (-40 to 185°F) |
| Humidity: | 5% to 95% non-condensing |
| Elevation: | -500 to +2000m |
| | (-1640 to 6562ft.) |
| **Hardware Specifications** | |
| **CXC HP** | |
| CPU: | ARM Cortex A8 |
| RAM: | 256MB |
| Flash: | 256MB |
| Display: | 480 x 272 pixel color LCD |
| Front Panel Controls: | Recessed reset button, touchscreen LCD, Home button |

**Table 2:** Specifications: 3RU Rack Mount CXC HP (Continued) (Sheet 3 of 4)

| **Cordex Controller Panel/Rack Mount** | |
|---|---|
| LED's: | System OK (Green) |
| | Power System Minor Alarm (Yellow) |
| | Power System Major/Critical Alarm / Controller Fail (Red) |
| Internal Battery: | 3V Lithium CR2032 |
| Audio: | Built-in speaker for alarm tones |
| Mounting: | 3U 19/23" Rack Mounting |
| | DIN Rail Mounting |
| | Panel Mounting |
| Dimensions: | CXC HP: 84mm H x 161mm W x 50mm D (3.3" x H x 6.33" W x 1.96" D) |
| | Rack Mount: 131mm H x 431mm W x 100mm D (5.1" x H x 16.9" W x 3.9" D) |
| Weight: | CXC HP: 500 grams (1.10 lb.) |
| | Rack Mount: 6.2 kg (13.8 lb.) |
| Communication Ports: | 2x Ethernet port, |
| | 2x CAN (bus), |
| | 2x USB Host |
| Relay | Controller-fail alarm relay contacts (Form C NO / NC) |
| **L-ADIO** | |
| Front Panel Controls: | Recessed reset button |
| LED's: | Communication established (Green), Power (Blue) |
| Mounting: | 3RU 19/23" Rack Mounting |
| | DIN Rail Mounting - option |
| | Panel Mounting- option |
| Dimensions: | 84mm H x 200mm W x 30mm D (3.3" x H x 7.87" W x 1.18" D) |

**Table 2:** Specifications: 3RU Rack Mount CXC HP (Continued) (Sheet 4 of 4)

| **Cordex Controller Panel/Rack Mount** | |
|---|---|
| Weight: | 200 grams (0.440 lb.) |
| Voltage Inputs: | 4 BiV (-60 to ±60Vdc) |
| Shunt Inputs: | 4 (25 to 200Mv) |
| Analog Inputs: | 4 DC voltage, 4 DC current, 4 temperature |
| Digital Inputs: | 8, plus dedicated LVD override |
| Relay Outputs: | 12 Form C, 60Vdc 1A maximum |
| **6I-ADIO** | |
| Power: | 10-60Vdc, 5W |
| Front Panel Controls: | Recessed reset button |
| LED's: | Power (Blue), Comms (Green) |
| Mounting: | 3U 19/23" Rack Mounting |
| | DIN Rail Mounting - option |
| | Panel Mounting - option |
| Dimensions: | 84mm H x 31mm W x 30mm D (5.1" x H x 16.9" W x 3.9" D) |
| Weight: | 200 grams(0.440 lb.) |
| Shunt Inputs: | 6 (25 to 200mV) |
| Analog Inputs: | 6 DC current ±200mV |
| Communication Ports: | CAN In/CAN Out |
| **Recommended Connection Wire Sizes (per UL/CSA)** | |
| Wire Size Range: | #16 to #26 AWG |
| ***CAUTION:*** *TO REDUCE RISK OF FIRE, USE ONLY #26 AWG (0.14mm2) OR LARGER WIRE. Ensure any wiring to bus voltages is appropriately protected with fuses or circuit breakers.* | |

## 5.2 Specifications: HV-ADIO

**Table 3:** Specifications: HV-ADIO (Sheet 1 of 2)

| HV-ADIO | |
|---|---|
| **Safety and Certifications** | |
| | IEC\CSA\UL 60950 |
| | ICES-003 Class A |
| | EN 55022 Class A (CISPR 22) |
| | EN 61000-4-2 ESD |
| | EN 61000-4-3 Radiated Immunity |
| | EN 61000-4-4 EFT /Burst |
| | EN 61000-4-5 Surge/Lightning |
| | EN 61000-4-6 Conducted Immunity |
| | FCC Part 15 Class A, FCC Part 68 |
| In accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Class A: | |
| ***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. Any changes or modifications to this equipment not expressly described in this manual could void the FCC compliance.* | |
| **Environmental** | |
| Operating Temperature: | -40 to 65°C |
| Storage Temperature: | Storage Temperature: -40 to 80°C (-40 to 176°F) |
| Humidity: | 5 to 95% non-condensing |
| Elevation: | -500 to +2000m (-1640 to 6562ft.) |
| MTBF: | Est 500,000hrs |

**Table 3:** Specifications: HV-ADIO (Continued) (Sheet 2 of 2)

| HV-ADIO | |
|---|---|
| **Hardware Specifications** | |
| CPU: | Texas Instruments Piccolo |
| LED's: | Communication established (Green), Power (Blue) |
| Mounting: | 4 holes on standard CXCHP pitch, optional DIN rail mounting kit |
| Weight: | 1 kg (2 lb.) |
| Power Requirements: | 90-300VDC 50W |
| | 125VDC 0.4A |
| | 220VDC 0.2A |
| Analog Inputs: | |
| | 2 voltage +/-300VDC |
| | 1 current (shunt range 25mV to 200mV) |
| | 2 temperature (using Alpha sensor) |
| | 2 DCCT (hall effect current sensor with bias voltage) +-10VDC signal +-15VDC Bias for sensor |
| Ground Fault Detect Alarms: | 1 user configurable on V2 input (current detect up to 15mA and resistance measurement option) |
| Digital Inputs: | 4 contact closure detect only, MAX VOLTAGE 5VDC |
| Relay Outputs: | 6 Form C, 220VDC 50W max |
| Communication Ports: | Isolated CAN |
| | Low Voltage (30V) protected power output to run CXC-HP controller and other low voltage ADIO modules (Maximum 0.7A/25W output) |
| **Recommended Connection Wire Sizes** | |
| Wire Size: | #18 to #24 AWG 600V |

# 6 Mounting Options

The CXC HP controller has been designed as a compact modular controller offering to provide maximum flexibility for various mounting options. Modular, external I/O peripherals allow for additional flexibility with mounting provisions for the entire control system

## 6.1 Rack Mount

A 3U high panel is available for 19/23" rack mount applications. The rack mount panel provides flush mounting for a CXC HP controller and rear mounting for one or two ADIO peripherals. Standard mounting positions are provided for future ADIO peripheral mounting options. The rack mount panel may also be configured with a Redundant Input Power Module for utilizing redundant input feeds to power the controller and up to two ADIO peripherals.

The rack mount panel provides front accessibility to all controller and I/O connection points.

**Figure 12:** CXC HP 3RU Rack Mount Panel




## 6.2 DIN Rail Mount

The CXC HP, the L-ADIO, 6I-ADIO, RIPM, can all be mounted standalone onto DIN rails. This option permits wall mounting and allows for other unique mounting applications.

# 7 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 (BOM).

## 7.1 Check for Damage

Prior to 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 for advice on the impact of any damage.

## 7.2 Packing Materials

Alpha 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 Packaging assemblies and methods are tested to International Safe Transit Association standards. Rectifiers and batteries are shipped on individual pallets and are packaged according to the manufacturer's guidelines. Almost all of Alpha's packaging material is from sustainable resources and or is recyclable. See the following table for the material and its environmental codes.

**Figure 13:** Packing Materials and Environmental Codes

| 20 PAP/PCB | 01 PET | 04 PE-LD | 06 PS | 40 FE | 41 ALU | 50 NW |
|---|---|---|---|---|---|---|
| **Cardboard** | **Polyethylene Terephthalate** | **Low Density Polyethylene** | **Polystyrene** | **Steel** | **Aluminum** | **Wood** |
| Packing boxes<br>Caps | Flexible film<br>Packaging | Bubble wrap<br>Shrink wrap<br>Plastic bags | Foam | Strapping on pallets | Strapping on pallets | Pallets<br>Lumber |

## 7.3 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. Alpha Technologies is not responsible for damage caused by improper packaging of returned products.

**If you have any questions before you proceed, call Alpha Technologies: 1 888 462-7487.**

# 8 Installation

## 8.1 Installation (Low Voltage)

This chapter is provided for qualified personnel to install the product.

### 8.1.1 Safety Precautions

***WARNING:*** *The CXC HP power system is SELV so no shock hazard exists. However, high currents are possible if IO lines are not correctly fused. The DC output from the rectifiers and the battery system has a high short circuit current capacity that may cause severe burns and electrical arcing. Use extreme care when working inside the shelf while the system is energized. Do not make contact with live components or parts.*

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

- Remove all metallic jewelry; e.g., watches, rings, metal rimmed glasses, necklaces.
- Wear safety glasses with side shields (and prescription lenses if necessary) at all times during installation.
- Use OSHA approved insulated hand tools.

The installer should follow all applicable local rules and regulations for electrical and battery installations; e.g., CSA, UL, CEC, NEC, OSHA, and local fire codes.EUT is suitable for installation as part of the Common Bonding Network (CBN) in one or more of the following locations:

- Network Telecommunication Facilities
- Locations where the NEC applies
- OSP

## 8.2 Installation (High Voltage)

This chapter is provided for qualified personnel to install the product.

### 8.2.1 Safety Precautions

***WARNING:*** *The HV-ADIO is a high voltage system, and a serious shock hazard exists. High currents are also possible if IO lines are not correctly fused. The DC output from the rectifiers and the battery system has a high short circuit current capacity that may cause severe burns and electrical arcing.* ***Do not work inside the shelf while the system is energized. Do not make contact with live components or parts.***

Before working with any high voltage power system/distribution center, follow these precautions:

- Remove all metallic jewelry; e.g., watches, rings, metal rimmed glasses, necklaces.
- Wear safety glasses with side shields (and prescription lenses if necessary) at all times during installation.
- Use OSHA approved insulated hand tools.

The installer should follow all applicable local rules and regulations for electrical and battery installations; e.g., CSA, UL, CEC, NEC, OSHA, and local fire codes.EUT is suitable for installation as part of the Common Bonding Network (CBN) in one or more of the following locations:

- Network Telecommunication Facilities
- Locations where the NEC applies
- OSP

***ATTENTION:*** *A licensed electrician is required to install permanently wired equipment. Input voltages can range up to 300Vdc. Ensure that the all input DC power sources to the equipment are disconnected and locked out before performing any installation or servicing.*

***ATTENTION:*** *This equipment is intended for installation in a restricted access location.*

## 8.3 Shelf Preparation and Mounting

***NOTE:*** *The equipment shall be mounted in a clean and dry environment.*

***CAUTION:*** *For the HV-ADIO a suitable enclosure must be provided around the HV wiring and modules.*

### 8.3.1 Panel Mount

The CXC HP is capable of being panel or door mounted inside an Alpha integrated distribution center. The preparation and mounting are done at the factory.

### 8.3.2 Rack Mount

The CXC HP rack mount model fits horizontally in a 19" or 23" rack. The CXC HP rack mount configuration should be mounted to the rack using two #12 – 24 x 1/2" screws in each bracket. Phillips-type screws and screwdriver should be used to eliminate the possibility of slippage and scratching of the unit’s exterior.

### 8.3.3 DIN Rail Mount

The CXC HP controller and peripheral modules can be mounted onto a DIN rail with optional DIN mount kits.

# 9 Wiring and Connections

## 9.1 Safety Precautions

This chapter provides cabling details and notes on cable sizing for DC applications with respect to the product.

***WARNING:*** *Hazardous energy levels are present at both the input and the output of power systems. Ensure that input power and output power is removed before attempting work on the CXC connections. Use a voltmeter to verify the absence of voltage. Clearly mark the correct polarity of the battery leads before commencing work on DC connections.*

***WARNING:*** *The CXC HP and L-ADIO are SELV and Class2 LPS devices so all signals connected to them must be compliant with the associated energy levels.*

***NOTE:*** *HV-ADIO connections contain hazardous voltage and should be protected with double insulation. Do not bundle hazardous voltage wires with SELV wires such as CAN, USB, Ethernet or the P-out for the controller.*

***WARNING:*** *The intra-building port(s) (Ethernet ports, CAN Bus ports) of the equipment or subassembly is suitable for connection into intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE,) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.*

***WARNING:*** *Interconnect wire shall satisfy the VW-1 requirements contained in ANSI/UL 1581-2001 reference standard for electrical wires, cables, and flexible cords.*

Refer to the previous (Installation) chapter for additional safety precautions.

## 9.2 Front Access

***CAUTION:*** *The IO connections on the L-ADIO and other IO devices should be made while wearing an ESD wrist strap securely connected to a system ground location connected to the terminal block pin labeled GND (1) of the device being wired.*

All wiring connections are accessible from the front of systems when using the 3U rack mount panel configuration. For example, to gain access to the terminal block connectors for the rack model:

1. Depress the two front panel latches towards the center of the panel.

   ***NOTE:*** *For HV systems, there is a locking feature that requires a flat blade screw driver.*

2. Tilt the front panel forward and down.

**Figure 14:** CXC HP Rack Mount, Panel Folded Down




Terminal blocks can accommodate wire sizes specified in section . Route all cables through the access holes, bundle them together with clips and clamp directly into applicable terminal blocks.

***NOTE:*** *Connections to the CXC should comply with all local electrical codes and ordinances*

### 9.2.1 Tools Required

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

- Slot head screwdrivers (blade sizes: 1/4", 1/8", 1/16")
- Phillips head screwdriver, #2 (tip size 3/16")
- Digital voltmeter equipped with test leads
- Adjustable 24/48Vdc load (optional)
- Anti-static wrist strap
- Computer (laptop) with a current web browser
- Crossover or straight Ethernet cable RJ-45 (for access using the Ethernet port)
- USB thumb drive
- Cutters and wire strippers

## 9.3 Power System Chassis Ground and DC Ground Reference

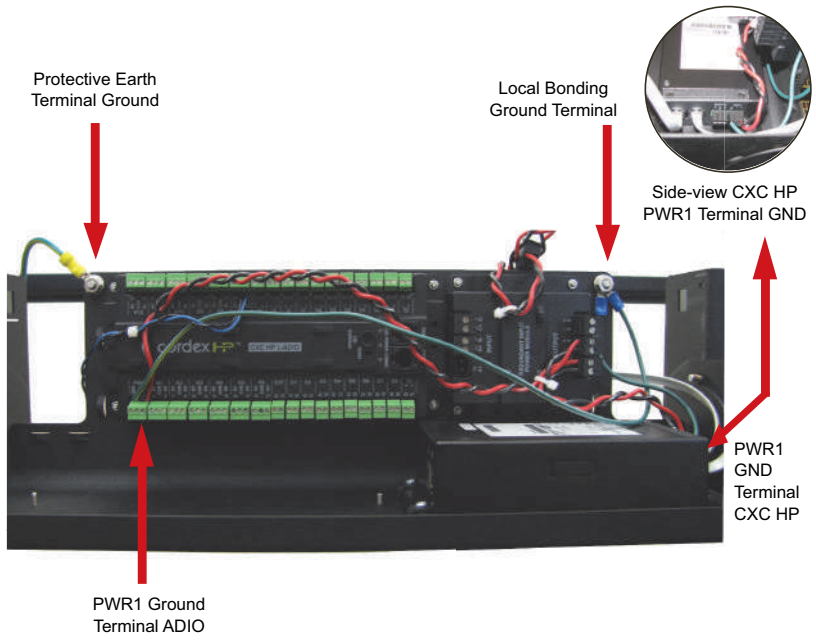
***WARNING:*** *For safety reasons, ensure the system is properly bonded to the building's ground grid. The Battery Return input terminal shall be treated as Isolated DC return (DC-I). In this configuration, the DC return terminal or conductor is not connected to the equipment frame or the grounding means of the equipment.*

Connect the CXC HP chassis ground and/or the system common return to the site ground to ensure correct operation of the CXC and ADIO modules. The HV-ADIO module requires an earth connection for the GFD to function correctly.

### 9.3.1 Grounding the Equipment

1. Using 18AWG wire, connect into the PWR1 GND1 connector terminal on the L-ADIO.
2. Run the wire to the PEM stud on the panel. Crimp the wire to a circular lug suitable for 18AWG wire and connect.
3. Using 18AWG wire, connect into the PWR1 GND1 connector terminal of the CXC HP.
4. Run the wire to the same PEM stud on the panel. Crimp the wire to a circular lug and connect.
5. Use 12AWG wire to connect the protective earth ground terminal on the panel to the central office ground or the ground means of the equipment.
6. Crimp the wire to a circular lug suitable for 12AWG wire and connect to the PEM stud on the panel.

**Figure 15:** Ground Wiring




## 9.4 Power Inputs

The low voltage system can operate from ±12, ±24 or ±48Vdc input.

An HV system can operate at an output of a rectifier nominal ±120Vdc or ±220Vdc.

If low voltage is not available, an HV-ADIO must be used to power the other low voltage devices such as the CXC HP. L-ADIO and the 6I-ADIO.

### 9.4.1 Redundant Input Power Module (if equipped)

1. Connect system (+) power bus lead to (+) terminal inputs. Three input positions are available (terminals12, 10, 8).
2. Connect system (-) power bus lead to (-) terminals inputs. Three input positions are available (terminals, 11, 9, 7).
3. Connect (+) terminal outputs (terminals, 2, 4, 6) and wire to CXC HP and ADIO peripherals as required.
4. Connect (-) terminal outputs (terminals, 1, 3, 5) and wire to CXC HP and ADIO peripherals as required.

### 9.4.2 CXC HP - Low Voltage

1. Connect system (+) power bus lead or Redundant Input Power Module Output (+) to (+) terminal 1.
2. Connect system (-) power bus lead or Redundant Input Power Module Output (-) to (-) terminal 2.
3. Connect system earth connection to terminal 3.

### 9.4.3 L-ADIO - Low Voltage

1. Connect system (+) power bus lead or Redundant Input Power Module Output (+) to (+) terminal 3.
2. Connect system (-) power bus lead or Redundant Input Power Module Output (-) to (-) terminal 2.
3. Connect system earth connection to terminal 1.

### 9.4.4 6I-ADIO - Low Voltage

1. (+) = terminal 11,( -) = terminal10, earth to terminal 9.

### 9.4.5 CXC HP - High Voltage

1. Connect 17 on HV-ADIO POUT to terminal 1 on the CXC HP.
2. Connect 16 on HV-ADIO POUT to terminal 2 on the CXC HP.
3. Connect system earth connection to terminal 3.

### 9.4.6 L-ADIO - High Voltage

1. Connect 17 on HV-ADIO POUT to terminal 1 on the CXC HP.
2. Connect 16 on HV-ADIO POUT to terminal 2 on the CXC HP.
3. Connect system earth connection to terminal 1.

### 9.4.7 6I-ADIO - High Voltage

1. Connect 17 on HV-ADIO to terminal 11on the 6I-ADIO.
2. Connect 16 on HV-ADIO to terminal 10 on the 6I-ADIO.

## 9.5 Analog Inputs

***WARNING:*** *Ensure the correct polarity is used for all input cable terminations. For terminations made to bus voltages (e.g. voltage inputs or current shunt inputs) ensure the terminations are fused. Do not place resistors in line with the analog inputs.*

The analog input channels are used to monitor various types of electrical signals. Some of the analog channels are reserved for specific signals, while others are designated as general-purpose inputs, which accommodate various types of analog signals.Bundle the input cables together, secure to the tie down locations on the ADIO(s), and secure the wire bundle to an external location (e.g., rack mount panel, cable tie bracket, etc.)

***NOTE:*** *For configurations with the HV-ADIO, separate HV cables from Low voltage (SELV) are required.*

***NOTE:*** *Default configurations and terminal numbers described below have been summarized in Table B. Refer also to foldout drawings located at the rear of this manual. Custom configurations may be detailed within the Alpha power system documentation package.*

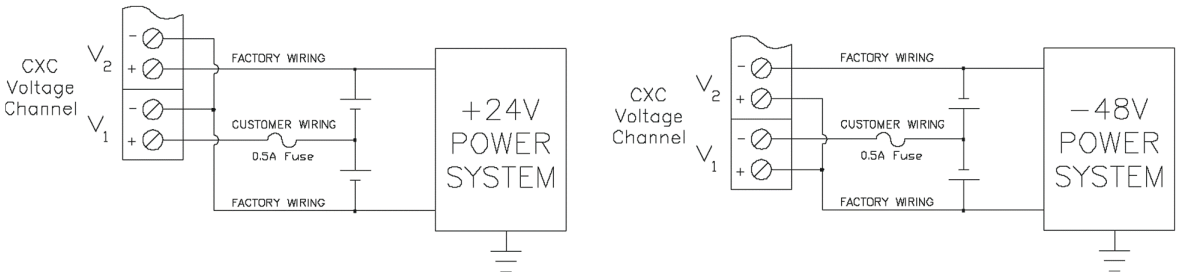
### 9.5.1 Midpoint Monitoring (connection example)

An analog signal configured (at the factory) for voltage can be used for mid-point monitoring. Channel V1 is used in the examples below but any of the available voltage channels can be used.

***NOTE:*** *See the CXC HP software manual (0350058-J0) for detailed instruction on programming.*

Connect as shown in the following examples to ensure correct polarity in each case:

**Figure 16:** Connection Example: Midpoint Monitoring




### 9.5.2 Ground Fault Detection (HV-ADIO only)

V2 is also used for ground fault detection (GFD) (internally connected circuit). Ground fault is detected when either terminal of V2 (system voltage that is normally connected to the battery string) is connected to earth ground either directly or through some conductive means.

The GFD circuit will detect a fault current range of 0 to 15mA of current flowing from either Batt+ or Batt- to earth. The GFD alarm threshold can be set in the CXC HP controller, see the software manual (0350058-J0) for details.

The GFD circuit is also able to measure the fault resistance and report the value from 0Ω to 10Meg Ω. The default setting for the alarm is OFF. When the GFD is disabled in OFF mode, the circuit is disconnected from earth and should not affect external ground fault measurements from other equipment. The GFD is factory calibrated and cannot be re-calibrated.

## 9.6 Digital Inputs

The digital input channels (terminals 24 through 39 on the L-ADIO) are used to monitor various alarm and control signals. All input channels are voltage activated and accept a bipolar (i.e. negative or positive) DC signal directly. Where terminations are made to bus voltages, ensure the terminations are fused.

For the HV-ADIO, all input channels are contact closure activated and are low voltage only. There is no connection to the bus voltage.

### 9.6.1 Connection Method - Low Voltage

Typical Alpha systems use the reset with Hot and trigger with Ground connection. The digital input is wired in such a way that the Hot is wired directly into one of the input terminals; e.g., positive input for +24V or negative input for –48V systems. The other input terminal is wired to the Ground (common) of the system through a relay (dry contact – usually located on the equipment requiring monitoring). This method allows the digital input to receive (or not receive) a Ground signal on an alarm.

**Figure 17:** Connection Method for +24V input

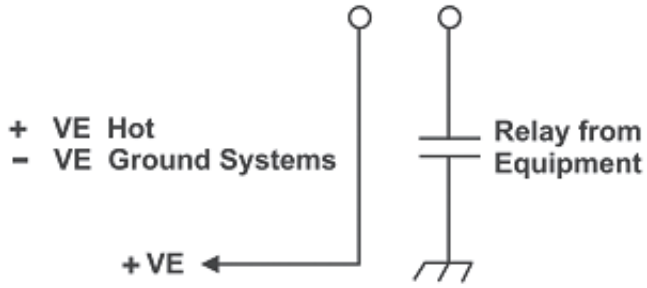


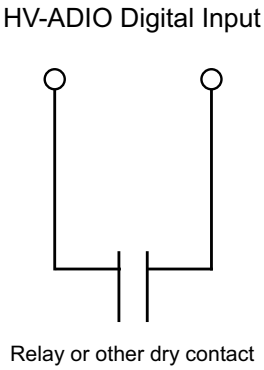

**Table 4:** Voltage Level Definitions for Digital Inputs

| Voltage Range (Vdc) | Voltage Level (Vdc) Considered as “0”(Off) | Voltage Level (Vdc) Considered as “1”(On) |
|---|---|---|
| 0-60 (system voltage settings) | 1V | 5V-60V |

## 9.6.2 Connection Method - High Voltage

Connect only to un-powered (dry relay) or switch contact rated for low voltages and low current switching.

**Figure 18:** Connection Method for HV




## 9.6.3 Programming Digital Inputs

The digital input channels can be programmed for “active high” or “active low.” Active high indicates, “alarm on the presence of a ground signal” and active low indicates, “alarm on the removal of a ground signal.”

***NOTE:*** *See CXC HP software manual (0350058-J0) for detailed instructions on programming.*

## Wiring Connections: L-ADIO

***CAUTION:*** *To reduce risk of fire, use only #26 AWG (0.14mm²) or larger wire.*

***NOTE:*** *To aid the user with installation, frequent reference is made to drawings located at the rear of this manual. Custom configurations may be detailed within the Alpha power system documentation package.*

**Table 5:** Wiring Connections: L-ADIO (Sheet 1 of 2)

| Terminal | Description | Signal Type | Range |
|---|---|---|---|
| **Analog Inputs and Power** | | | |
| 1, 2, and 3; PWR | Power Input | GND / Neg (-) / Pos (+) | 10 to 60Vdc |
| 40 and 41; T1 | Temperature 1 | Pos (+) / Neg (-) | 0-5Vdc; with power source |
| 42 and 43; T2 | Temperature 2 | Pos (+) / Neg (-) | 0-5Vdc; with power source |
| 44 and 45; T3 | Temperature 3 | Pos (+) / Neg (-) | 0-5Vdc; with power source |
| 46 and 47; T4 | Temperature 4 | Pos (+) / Neg (-) | 0-5Vdc; with power source |
| 48 and 49; V1 | Voltage 1 | Pos (+) / Neg (-) | -60 to +60Vdc |
| 50 and 51; V2 | Voltage 2 | Pos (+) / Neg (-) | -60 to +60Vdc |
| 52 and 53; V3 | Voltage 3 | Pos (+) / Neg (-) | -60 to +60Vdc |
| 54 and 55; V4 | Voltage 4 | Pos (+) / Neg (-) | -60 to +60Vdc |
| 56 and 57; I1 | Current 1 | Pos (+) / Neg (-) | ±200mV |
| 58 and 59; I2 | Current 2 | Pos (+) / Neg (-) | ±200mV |
| 60 and 61; I3 | Current 3 | Pos (+) / Neg (-) | ±200mV |
| 62 and 63; I4 | Current 4 | Pos (+) / Neg (-) | ±200mV |
| **Relay Outputs** | | | |
| 4, 5 and 6; K1 | Relay 1 | NC / COM / NO | 60Vdc / 1A |
| 7, 8 and 9; K2 | Relay 2 | NC / COM / NO | 60Vdc / 1A |
| 10, 11 and 12; K3 | Relay 3 | NC / COM / NO | 60Vdc / 1A |

**Table 5:** Wiring Connections: L-ADIO (Continued) (Sheet 2 of 2)

| Terminal | Description | Signal Type | Range |
|---|---|---|---|
| 13, 14 and 15; K4 | Relay 4 | NC / COM / NO | 60Vdc / 1A |
| 16, 17 and 18; K5 | Relay 5 | NC / COM / NO | 60Vdc / 1A |
| 19, 20 and 21; K6 | Relay 6 | NC / COM / NO | 60Vdc / 1A |
| 64, 65 and 66; K7 | Relay 7 | NC / COM / NO | 60Vdc / 1A |
| 67, 68 and 69; K8 | Relay 8 | NC / COM / NO | 60Vdc / 1A |
| 70, 71 and 72; K9 | Relay 9 | NC / COM / NO | 60Vdc / 1A |
| 73, 74 and 75; K10 | Relay 10 | NC / COM / NO | 60Vdc / 1A |
| 76, 77 and 78; K11 | Relay 11 | NC / COM / NO | 60Vdc / 1A |
| 79, 80 and 81; K12 | Relay 12 | NC / COM / NO | 60Vdc / 1A |
| **Digital Inputs** | | | |
| 22 and 23; EXT | LVD Open | Pos (+) OR Neg (-) | 0 - 60Vdc |
| 24 and 25; D1 | Digital Input 1 | Pos (+) OR Neg (-) | 0 - 60Vdc |
| 26 and 27; D2 | Digital Input 2 | Pos (+) OR Neg (-) | 0 - 60Vdc |
| 28 and 29; D3 | Digital Input 3 | Pos (+) OR Neg (-) | 0 - 60Vdc |
| 30 and 31; D4 | Digital Input 4 | Pos (+) OR Neg (-) | 0 - 60Vdc |
| 32 and 33; D5 | Digital Input 5 | Pos (+) OR Neg (-) | 0 - 60Vdc |
| 34 and 35; D6 | Digital Input 6 | Pos (+) OR Neg (-) | 0 - 60Vdc |
| 36 and 37; D7 | Digital Input 7 | Pos (+) OR Neg (-) | 0 - 60Vdc |
| 38 and 39; D8 | Digital Input 8 | Pos (+) OR Neg (-) | 0 - 60Vdc |

## Wiring Connections: HV ADIO

***CAUTION:*** *For HV-ADIO wiring only use 600V rated insulation for any HV signals.*

**Table 6:** Wiring Connections HV-ADIO (Sheet 1 of 2)

| Terminal | Description | Signal Type | Range |
|---|---|---|---|
| **Power Connections** | | | |
| 1, 2, and 3; PWR | Power Input | GND / Neg (-) / Pos (+) | 90 to 300Vdc |
| 16 and 17 | Power Output | Neg (-) / Pos (+) | 25 to 55VDC 0.7A Max |
| **Analog Inputs** | | | |
| 26 and 27; T1 | Temperature 1 | Pos (+) / Neg (-) | -40C to 85C with Alpha Temp sensor |
| 28 and 29; T2 | Temperature 2 | Pos (+) / Neg (-) | -40C to 85C with Alpha Temp sensor |
| 30-33; DCCT1 | DCCT1 | 4pin Hall Sensor | -10V to +10V |
| 34-37; DCCT2 | DCCT2 | 4pin Hall Sensor | -10V to +10V |
| 38 and 39; V1 | Voltage 1 | Pos (+) / Neg (-) | -300 to +300Vdc |
| 40 and 41; V2 | Voltage 2 | Pos (+) / Neg (-) | -300 to +300Vdc |
| 42 and 43; I1 | Current 1 | Pos (+) / Neg (-) | ±25, ±50, ±100mV, ±200mV |
| **Relay Outputs** | | | |
| 4, 5 and 6; K1 | Relay 1 | NC / COM / NO | 300Vdc / 50W MAX |
| 7, 8 and 9; K2 | Relay 2 | NC / COM / NO | 300Vdc / 50W MAX |
| 10, 11 and 12; K3 | Relay 3 | NC / COM / NO | 300Vdc / 50W MAX |
| 13, 14 and 15; K4 | Relay 4 | NC / COM / NO | 300Vdc / 50W MAX |
| 44, 45 and 46; K5 | Relay 5 | NC / COM / NO | 300Vdc / 50W MAX |
| 47, 48 and 49; K6 | Relay 6 | NC / COM / NO | 300Vdc / 50W MAX |
| **Digital Inputs** | | | |
| 24 and 25; D1 | Digital Input 1 | Contact closure detect | Open or Short |
| 26 and 27; D2 | Digital Input 2 | Contact closure detect | Open or Short |
| 28 and 29; D3 | Digital Input 3 | Contact closure detect | Open or Short |

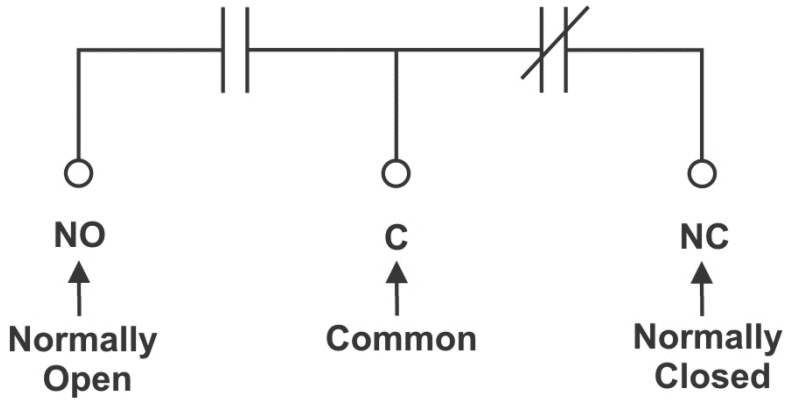
**Table 6:** Wiring Connections HV-ADIO (Continued) (Sheet 2 of 2)

| Terminal | Description | Signal Type | Range |
|---|---|---|---|
| 30 and 31; D4 | Digital Input 4 | Contact closure detect | Open or Short |

## 9.7 Relay Outputs

Terminals 4 to 21, and 64-81 provide 12 Form C contacts (NO, COM and NC) for extending various alarm or control signals. Each relay output can be wired for NO and/or NC operation during an alarm or control condition.

**Figure 19:** Relay Connections: De-energized State




Relays can be programmed to energize or de-energize during an alarm condition (for more details see the CXC HP controller software manual). When the CXC HP reset button is pressed or power is lost, all relays de-energize. Relay contacts may be used for LVD contactors (50W maximum).

### 9.7.1 System Fail Relay

On the CXC HP controller, terminals 4, 5, 6 provide connections for a system (supervisory) fail relay. This fail-safe relay (i.e. it is de-energized during an alarm condition) can be wired for NO or NC operation.

### 9.7.2 LVD Control

The LVD control functions can be hardwired directly from the assigned relay output pins to the LVD contactor panel. See Controls menu defaults in the software manual.

### 9.7.3 Additional I/O Expansion

Additional I/O peripherals may be added to the system if required to expand the number of I/O channels required in an application.

## 9.8 Rectifier Connections

### 9.8.1 Can Serial Port

The CXC HP controller has dual CAN bus ports, for communications with Alpha Cordex and AMPS family products and other CAN-enabled equipment on the same system. Connect, via daisy-chain from node to node - use CAN OUT of one node connected to CAN IN of another node, as necessary and ensure that only the last node is terminated.

## 9.9 Network Connection and Remote Communication

The Cordex system can be set up, monitored and tested via Ethernet.

***NOTE:*** *Pinouts use a standard Ethernet cable pinout.*

The communication protocol supports a web interface. The web interface is an enhanced view with the same structure and menus as the controller's LCD display.

### 9.9.1 Ethernet Port: Network Connection

The Ethernet port is designed for CXC connection to a user supplied network (TCP/IP secured by user) via an RJ-45 jack with a standard network cable.

The Ethernet cable should be a maximum of six meters in length to meet GR-1089 compliance. For Ethernet cable runs of greater than six meters, a shielded Ethernet cable must be used, with both ends of the shield firmly affixed to ground.

**Ethernet LED indication patterns** On the Ethernet connector there are two LEDs.

- The yellow LED indicates activity and flashes when Ethernet packages are being exchanged.
- The green LED will be lit for a 100BaseT connection, and will be unlit for a 10BaseT connection.

Both LEDs will be off if there is no cable is plugged into the Ethernet port.

### 9.9.2 Ethernet Port: Local Connection

Local access (e.g. to a laptop computer) is also possible from the Ethernet port connection via either a standard Ethernet or a network cable.

# 10 Maintenance

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

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

In areas where flying insects and other debris may routinely clog the rectifier fan filter, it may be necessary to inspect ventilation openings and replace the rectifier fan filter more often.

***WARNING:*** *HIGH VOLTAGE AND SHOCK HAZARD.*

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

***IMPORTANT:*** *Circuit cards can be damaged by static electricity. Always wear a grounded wrist strap when handling or installing circuit cards.*

**Table 7:** Sample Maintenance Log

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

## 10.1 Maintenance Cautions

***CAUTION:*** *The IO connections on the L-ADIO and other IO devices should be made while wearing an ESD wrist strap securely connected to the terminal block pin labeled GND (1) of the device being wired.*

**Figure 20:** Ground Terminal PIN



***CAUTION:*** *There are no user serviceable parts inside the CXC HP controller or L-ADIO; the battery is removable without tools for replacement. Opening the case will void warranty and could damage sensitive electronics inside.*

## 10.2 Replacing the Lithium Battery

A removable CR2032 lithium battery is located at the top of the CXC HP controller it is designed to be field replaceable and can be easily removed with no tools. The battery life is rated up to three years, but should be replaced if the panel does not maintain date and time during power interruption. It is also recommended to replace when the lithium battery voltage is less than 2.6Vdc

**WARNING**: *Exercise extreme caution and do not touch any connected equipment.*

To replace the lithium battery:

---

1. Depress the two front panel latches towards the center of the panel.
2. Tilt the front panel forward and down.
3. Pull battery out carefully.




4. Ensure that the new battery is the same as the one being replaced.
5. Slide the new battery into place. Be careful to insert the new battery in the correct polarity (not upside-down; there is a plus (+) sign marked on the battery holder).

---

*AFTER COMPLETING THIS TASK:*

If the controller is powered off when the battery is replaced, time will be lost. Once the controller is powered on, reset the time.

# 11 Warranty and Service Information

## 11.1 Technical Support

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

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

## 11.2 Warranty Statement

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

## 11.3 Product Warranty

Alpha warrants that for a period of two (2) years from the date of shipment its products shall be free from defects under normal authorized use consistent with the product specifications and Alpha's instructions, the terms of the manual will take precedence.The warranty provides for repairing, replacing or issuing credit (at Alpha's discretion) for any equipment manufactured by it and returned by the customer to the factory or other authorized location during the warranty period. There are limitations to this warranty coverage. The warranty does not provide to the customer or other parties any remedies other than the above. It does not provide coverage for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. No other obligations are expressed or implied. Warranty also does not cover damage or equipment failure due to cause(s) external to the unit including, but not limited to, environmental conditions, water damage, power surges or any other external influence.The customer is responsible for all shipping and handling charges. Where products are covered under warranty Alpha will pay the cost of shipping the repaired or replacement unit back to the customer.

## 11.4 Battery Warranty

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

## 11.5 Warranty Claims

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

## 11.6 Service Information

For a list of international service centers, visit: www.alpha.ca.

# 12 Certification

CSA (Canadian Standards Association also known as CSA International) was established in 1919 as an independent testing laboratory in Canada. CSA received its recognition as an NRTL (Nationally Recognized Testing Laboratory) in 1992 from OSHA (Occupational Safety and Health Administration) in the United States of America (Docket No. NRTL-2-92). This was expanded and renewed in 1997, 1999, and 2001. The specific notifications were posted on OSHA's official website as follows:

- Federal Register #: 59:40602 - 40609 [08/09/1994]
- Federal Register #: 64:60240 - 60241 [11/04/1999]
- Federal Register #: 66:35271 - 35278 [07/03/2001]

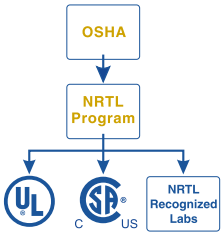
When these marks appear with the indicator "C and US" or "NRTL/C" it means that the product is certified for both the US and Canadian markets, to the applicable US and Canadian standards. (1)

Alpha rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 60950-01 and UL 60950-1. Alpha UPS products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 107.3 and UL 1778. As part of the reciprocal, US/Canada agreement regarding testing laboratories, the Standards Council of Canada (Canada's national accreditation body) granted Underwriters Laboratories (UL) authority to certify products for sale in Canada. (2) Only Underwriters Laboratories may grant a license for the use of this mark, which indicates compliance with both Canadian and US requirements.(3)

C US

NRTL/C

c UL US




**NRTL's Capabilities**

NRTLs are third party organizations recognized by OSHA, US Department of Labor, under the NRTL program. The testing and certifications are based on product safety standards developed by US based standards developing organizations and are often issued by the American National Standards Institute (ANSI). (4) The NRTL determines that a product meets the requirements of an appropriate consensus-based product safety standard either by successfully testing the product itself, or by verifying that a contract laboratory has done so, and the NRTL certifies that the product meets the requirements of the product safety standard. (4)

**Governance of NRTL**

The NRTL Program is both national and international in scope with foreign labs permitted.

(1) www.csagroup.org

(2)www.scc.ca

(3)www.ulc.ca

(4)www.osha.gov

# 13 Glossary

**AC**
Alternating Current

**ADIO**
Analog-digital input-output

**ALCO**
Alarm cutoff

**ATM**
Asynchronous Transfer Mode; e,g. ATM cell

**BCT**
Battery current termination

**BOD**
Battery on discharge

**BT**
Battery test (or test mode)

**CAN**
Controller Area Network

**CEMF**
Counter electro-motive force

**CX**
Cordex series; e.g. CXC for Cordex™ System Controller

**DC**
Direct current

**DOD**
Depth of discharge

**EQ**
Equalize (mode or voltage)

**FL**
Float (mode or voltage)

**GUI**
Graphical User Interface

**HVA**
High voltage alarm

**HVSD**
High voltage shutdown

**ICMP**
Internet control message protocol

**IP**
Internet Protocol

**LCD**
Liquid Crystal Display

**LED**
Light Emitting Diode

**LVA**
Low voltage alarm

**LVC**
Low voltage connect

**LVD**
Low voltage disconnect

**MAC**
Media Access Control; e.g. MAC address

**MIB**
Management Information Base

**MUX**
Multiplexer

**OCP**
Over Current Protection

**OLED**
Organic LED, in-shelf controller display

**OVP**
Over-voltage protection

**PDA**
Personal Digital Assistant

**PPP**
Point to Point Protocol

**RAS**
Remote access server

**SELV**
Safety Extra Low Voltage

**SCI**
Serial Communication Interface

**SNMP**
Simple Network Management Protocol

**TCP/IP**
Transmission Control Protocol / Internet Protocol

**Trap**
Event notification

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Power

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