ARGUS

Power System Manual
CXPS 48-2T 48V Pos Gnd

053-393-B0

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Power

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Power System Manual

CXPS 48-2T 48V Pos Gnd Power System

053-393-B0

Drawing List:

The following drawings are included in this manual to provide the necessary information required for routine operation and fault diagnosis of the system.

Specifications	053-393-B1
Safety and Installation Instructions	053-393-C0
Outline Drawing	053-393-06
Schematic, Power System	053-393-05
Customer Connections	053-393-08
Warranty and Service	048-700-10
Service Centers	048-693-10

Manuals to be included with this package are as follows:

Cordex Controller Software (Current Version)	CXC SOFT

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Specifications for Argus' CXPS 48-2T 48Vdc Power System

Output

Voltage:	42 to 60Vdc within rated limits
Current:	System: up to 825A standard configuration, (expandable to 1200A via additional rectifier shelf) Rectifier: 67A @ 48Vdc nominal (75A max.)
Power:	System: up to 39,600W standard configuration, (expandable to 57,600W via additional rectifier shelf) Rectifier: 3600W maximum
Heat Dissipation (per rectifier):	<1415 BTU per hour
Static Load Regulation:	Better than ±0.1% for any load change within rated limits
Dynamic Load Regulation:	Better than ±2% for 40% - 90% load step (output shall recover to static limits within 30ms)
Static Line Regulation:	Better than ±0.1% for any change in input voltage within rated limits
Electrical Noise:	<32dBrnC (voice band) <20mVrms 10kHz to 10MHz (wideband) <100mVp-p 10kHz to 100MHz <1.0mV (psophometric)
Acoustic Noise:	<60dBa @ 1m (3ft.) @ 30°C (86°F)

Input

Voltage:	208, 220, 230, 240, 277Vac nominal
Operational Range:	176 to 320Vac
Extended Operation:	Low: 176 to 90Vac (derated power)
Frequency:	45 to 66Hz
Current:	16.8A @ 240Vac 19.4A @ 208Vac 22.8A @ 176Vac (maximum)
Recommended Feeder Breaker	
Single Phase:	30A, #10 AWG (for a single rectifier module)
Three Phase:	50A, #6 AWG delta connection (for three rectifier modules) 30A, #10 AWG wye connection (for three rectifier modules)
Power Factor:	>0.99 at nominal conditions and 50-100% load
Protection:	10kA-interrupting capacity fuses in active and neutral lines
Efficiency:	>90% at nominal conditions and 50-100% load

Connections

Load Connections:	AM breakers (1-pole): 1/4" holes on 5/8" centers AM breakers (multiple pole): 3/8" holes on 1" centers GMT fuses: screw terminals 0.34mm^2 to 4mm^2 (#22 to #12 AWG)
Battery Terminations:	3/8" holes on 1" centers, 4 sets per polarity
Rectifier Terminations:	3/8" holes on 1" centers
Alarm Connections:	0.081mm^2 to 4mm^2 (#28 to #12 AWG)
Cable Access:	Top and/or bottom

Environmental

Operating Temperature:	-40 to +75°C, power derated above 65°C (149°F) (-40 to 167°F)
Storage Temperature:	-40 to +85°C (-40 to 185°F)
Humidity:	0 to 95% non-condensing
Elevation:	-500m to 2800m; to 4000m with temperature derated to 40°C (-1640 feet to 9186 feet; to 13124 feet with temperature derated to 104°F)

Miscellaneous

Maximum Number of Rectifiers:	Up to eleven (11) Cordex 48-3.6kW modules #010-600-20 (pre-RoHS #010-567-20); **NOTES:** One rectifier space is occupied by the CXCM4 #018-586-20 (pre-RoHS #018-574-20)
Distribution Capacity:	Tier 1: Up to eighteen (18) 48V, AM plug-in style breakers, 600A maximum **NOTE:** Tier may be factory or field configured for eight (8) 48V breaker positions and ten (10) 24V breaker positions for an optional 48V-24V DC-DC converter installation Tier 2: Up to twenty (20) 48V, AM plug-in style breakers, 600A maximum Up to ten (10) 48V, GMT fuse positions **NOTE:** Maximum 30A per GMT fuse assembly
Dimensions:	584mm W x 755mm H x 477mm D (23" W x 29.7" H x 18.8" D) [for additional options see outline drawings at the rear of this manual]
MTBF (rectifier module):	>350,000 hours ground benign @ 30°C (86°F)

Safety

NOTE: *Safety certifications performed at rectifier level only.*

EN 60950	Rectifier output shall be rated SELV suitable for connection to TNV-1 circuits
UL	60950
CSA	C22.2 No. 60950
CE	EN 60950, CB Scheme 73/23/EEC Low Voltage Directive with amendment 93/68/EEC
Telcordia (Bellcore)	GR-1089-CORE (requirements applicable to rectifier)

Other Referenced Standards

EN 300 386-2	EMC and ERM; Telecommunication Network Equipment
EN 55022 (CISPR 22)	Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement
EN 61000-3-2	Harmonic Current Emissions
EN 61000-3-3	Voltage Fluctuations and Flicker
EN 61000-4-2	ESD Immunity
EN 61000-4-3	Radiated Electromagnetic Immunity
EN 61000-4-4	Electrical Fast Transient/Burst Immunity
EN 61000-4-5	Power Line Surge Immunity
EN 61000-4-6	Conducted Electromagnetic Immunity
EN 61000-4-11	Voltage Dips, Short Interruptions and Variations
ETS 300 019-1-1	Environmental Conditions; Storage
ETS 300 019-1-2	Environmental Conditions; Transportation
ETS 300 132-2	Power Supply Interface at the Input to Telecommunications Equipment; Operated by Direct Current (DC)
ETS 300 753	Acoustic Noise Emissions
IEC 60950	Safety of Information Technology Equipment, Including Electrical Business Equipment (UL/CSA 60950)

The above information is valid at the time of publication. Consult factory for up-to-date ordering information.
Specifications are subject to change without notice.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This section contains important instructions that should be followed during the installation and maintenance of equipment and batteries. **Please read all of the instructions before operating the equipment, and save this manual for future reference.**

A licensed electrician MUST perform connections to the branch circuit of service feed. Installation of the power supply and batteries must be performed by, or under the direct supervision of service personnel knowledgeable of the required electrical and battery safety precautions.

If instructions in this manual conflict with local electrical codes, those instructions shall be superseded by the local code.

The following safety symbols will be found throughout this manual, carefully read all information and abide by the instructions:

DANGEROUS VOLTAGE
This symbol indicates a dangerous voltage exists in this area of the product.

GAS HAZARD
This symbol indicates a gas hazard exists in the area of vented batteries.

NO MATCHES OR OPEN FLAMES
This symbol indicates a fire or explosive hazard exists in the area of the product.

The following levels of warning will be used with the above symbols:

DANGER: You WILL be KILLED or SERIOUSLY INJURED if instructions are not followed closely.

WARNING: You CAN be KILLED or SERIOUSLY INJURED if instructions are not followed closely.

CAUTION: You CAN be INJURED or equipment can be DAMAGED if instructions are not followed closely.

Mechanical Safety

Keep hands and tools clear of fans. Fans are thermostatically controlled and will turn on automatically.

Power supplies can reach extreme temperatures under load.

Use caution around sheet metal components and sharp edges.

Electrical Safety

WARNING
Hazardous voltages are present at the input of a power system. The DC output from rectifiers and batteries, though not dangerous in voltage, has a 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; 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.

Lethal voltages are present within a power system. Never assume that an electrical connection or conductor is not energized. Check the circuit with a voltmeter with respect to the grounded portion of the enclosure (both AC and DC) prior to 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 240Vac. Ensure that utility power is disabled before beginning installation or removal.

Ensure no liquids or wet clothes contact internal components.

Hazardous electrically live parts inside this unit are energized from batteries even when the AC input power is disconnected.

Battery Safety

Servicing and connection of batteries shall be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.

Always wear eye protection, rubber gloves, and a protective vest when working near batteries. Remove all metallic objects from hands and neck.

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

Batteries contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Battery post terminals and related accessories contain lead and lead compounds; wash hands after handling (California Proposition 65).

WARNING
Follow battery manufacturer's safety recommendations when working around battery systems.

WARNING
Do not smoke or present an open flame when batteries (especially vented batteries) are on charge. Batteries vent hydrogen gas when on charge, which creates an explosion hazard.

Batteries are hazardous to the environment and should be disposed of safely at a recycling facility. Consult the battery manufacturer for recommended local authorized recyclers.

TABLE OF CONTENTS

1 Introduction

1.1 Scope of the Manual

This instruction manual covers the features and installation of Argus Technologies' CXPS 48-2T 48V 825A Power System.

For advanced detail on the system components used in the CXPS 48-2T, please refer to the following manuals:

- Cordex 48-3.6kW Rectifier Module: 010-600-B2 (010-567-20 pre-RoHS)
  [This manual also provides CXCM4 (controller) installation details.]
- Cordex Controller (CXC) Software: 034-109-B2 or latest revision of software.

NOTE: *To aid the user with installation, frequent reference is made to drawings located at the rear of this manual.*

1.2 Product Overview

The CXPS 48-2T is a complete integrated 48Vdc power system with 825A initial capacity; expandable up to 1200A. The system utilizes the advanced Cordex controller and 48V 3.6kW rectifier modules. The two-tier (Vista II series) distribution center provides front access for DC distribution, site controller, and battery connections.

Cordex rectifier modules use a high frequency, switched mode conversion technique to provide a fully regulated and isolated DC output from the AC mains. The rectifier input is wide range to allow use on 208/220/240Vac 50/60Hz electrical service.

Rectifier power modules are "hot swappable" meaning they can be inserted or removed from the shelf without cutting power to or from the system or the load.

NOTE: *Rectifier modules are not included with the base system, but may be purchased along with the system at the time of ordering or added after the shelf has been installed.*

The shelf rectifier system is designed to operate with the Argus Cordex System Controller (CXC).

This system uses the CXCM4 modular version of the controller, which plugs directly into the Cordex rectifier system shelf. The rectifier/shelf manual provides CXCM4 installation details.

The CXC allows the user to configure, monitor and control the entire DC power system from its touch screen display similar to that used in a personal digital assistant (PDA). Other features of the unit include temperature compensation, auto equalization, remote access, e-mail alarm notification, battery diagnostics, as well as web server and SNMP support for configuration and monitoring.
Details of controller operation are provided in the current version software manual.

Figure 1–Front angle view of the 053-393-20-000 rail mount CXPS 48-2T configuration

1.3 System Configurations

The system is available to order in the following configurations:

Description	Part Number
CXPS 48-2T, Cordex base 48V 825A power system, 23” rail mount	053-393-20-000
CXPS 48-2T system with 22RU relay rack, battery mount	053-393-20-010
CXPS 48-2T system with 7 foot Z4 relay rack	053-393-20-020
CXPS 48-2T system with 7 foot Z4 relay rack and 3x battery trays (3x strings)	053-393-20-030

1.4 Part Numbers and List Options

This product is available to order with the following options and accessories:

Description	Part Number
Cordex 48-3.6kW rectifier power module (pre-RoHS 010-567-20)	010-600-20-040
CXPS 48V-24V converter integration kit, CSM02 6-module converter shelf	038-276-20
Rack, relay, 7 foot, 23", seismic zone 4	030-638-20-023
Rack, battery mount, half-height, 23", 22RU	030-694-20-042
Breaker, AM-type mid-trip plug-in, 1A	470-300-10
Breaker, AM-type mid-trip plug-in, 3A	470-301-10
Breaker, AM-type mid-trip plug-in, 5A	470-302-10
Breaker, AM-type mid-trip plug-in, 10A	470-303-10
Breaker, AM-type mid-trip plug-in, 15A	470-304-10
Breaker, AM-type mid-trip plug-in, 20A	470-305-10
Breaker, AM-type mid-trip plug-in, 25A	470-306-10
Breaker, AM-type mid-trip plug-in, 30A	470-307-10
Breaker, AM-type mid-trip plug-in, 35A	470-308-10
Breaker, AM-type mid-trip plug-in, 40A	470-309-10
Breaker, AM-type mid-trip plug-in, 45A	470-310-10
Breaker, AM-type mid-trip plug-in, 50A	470-311-10
Breaker, AM-type mid-trip plug-in, 60A	470-312-10
Breaker, AM-type mid-trip plug-in, 70A	470-313-10
Breaker, AM-type mid-trip plug-in, 80A	470-314-10
Breaker, AM-type mid-trip plug-in, 90A	470-315-10
Breaker, AM-type mid-trip plug-in, 100A	470-316-10
Breaker, AM-type mid-trip plug-in, 110A (2-pole)	747-220-20
Breaker, AM-type mid-trip plug-in, 125A (2-pole)	747-147-20
Breaker, AM-type mid-trip plug-in, 150A (2-pole)	747-148-20
Breaker, AM-type mid-trip plug-in, 175A (3-pole)	747-149-20
Breaker, AM-type mid-trip plug-in, 200A (3-pole)	747-150-20
Breaker, AM-type mid-trip plug-in, 225A (3-pole)	747-200-20
Breaker, AM-type mid-trip plug-in, 250A (3-pole)	747-221-20
GMT fuse, 0.5A	460-004-10
GMT fuse, 1A	460-006-10
GMT fuse, 1.3A	460-081-10
GMT fuse, 1.5A	460-082-10
GMT fuse, 2A	460-083-10
GMT fuse, 3A	460-013-10
GMT fuse, 4A	460-085-10
GMT fuse, 5A	460-084-10
GMT fuse, 7.5A	460-105-10
GMT fuse, 10A	460-069-10
GMT fuse, 15A	460-150-10

The above information is valid at the time of publication. Consult factory for up-to-date ordering information.

2 Features

2.1 System Overview

The basic system configuration is called out by Argus part number 053-393-20-000 (Figure 1); which includes:

- 1200A Two-Tier Distribution Center (Vista II Two-Tier UDC)
- Cordex System Modular Controller 4RU (CXCM4)
- Two (2) Cordex 48-3.6kW 6-module rectifier shelves
- Kydex rear cover
- 23" rack mount rails
- System integration cabling and bus work.

Optional system configurations are available as:

053-393-20-010: basic configuration factory installed into a 22RU battery mount 23" relay rack.
053-393-20-020: basic configuration factory installed into a 7 foot 23" zone 4 relay rack.
053-393-20-030: basic configuration factory installed into a 7 foot 23" zone 4 relay rack and three (3) battery trays with cabling and 100A battery disconnects for up to three (3) 48V VRLA strings.

2.2 Tiered Distribution Features

2.2.1 Overview (Vista II Two-Tier)

The 1200A Two Tier Distribution Center is a modular, front access system that provides DC distribution, rectifier and battery connections. Coupled with Argus Cordex system controller, rectifiers and converters, it provides a complete solution in a compact integrated package.

The distribution center in the CXPS 48-2T is configured at the factory with:

- 48V, 20-position breaker tier with 600A low voltage disconnect (LVD)
- 48V, 18-position split-breaker tier with 600A LVD (can also be configured for split 48V/24V voltage applications)
- 48V, 10-position, 30A GMT fuse assembly
- Load shunts for current measurement.

The modular distribution center allows customization of integrated power systems; perfect for space-restricted installs. The system provides front access to controller interface and I/O connections, load breakers & fuses, and battery connections.

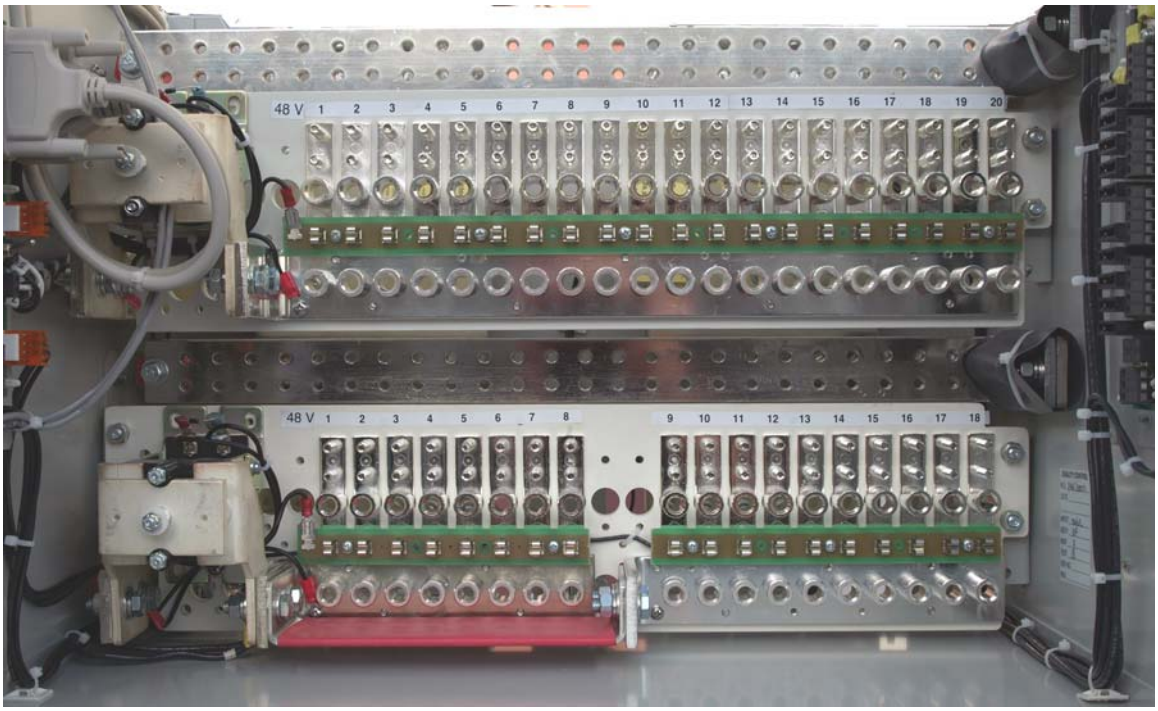

Figure 2–Example of distribution center in the CXPS 48-2T

2.2.2 DC Distribution Installed

2.2.2.1 Tier 1 (Lower)

The lower distribution tier in the CXPS 48-2T has support for eighteen (18) AM-type plug-in breaker positions with an 800A shunt and 600A LVD. This option is a split-tier design – factory configured – with a jumper to support eighteen (18) 48Vdc breaker positions.

The jumper is removable for future system installation / upgrade of 48V-24V converters. Removing the jumper will change the tier capacity to eight (8) 48Vdc breaker positions and ten (10) 24Vdc breaker positions.

NOTE: *When implementing the 48/24V split distribution configuration, the LVD will only be in series with the 48V distribution side. LVD for the 24V loads will be performed via the 48V input to the converter or via software at the converter level. For split voltage modification of Tier 1, please reference the installation section of this manual.*

2.2.2.2 Tier 2 (Upper)

The upper distribution tier in the CXPS 48-2T has support for twenty (20) AM-type plug-in breaker positions for 48Vdc distribution. The tier contains an 800A load shunt and a 600A LVD.

2.2.2.3 GMT Fuse Block

A 10-position GMT fuse block is also factory installed and is configured for additional primary voltage (48V) distribution. The GMT fuse block has a total capacity of 30A.

2.3 Cordex System Controller (CXC)

2.3.1 CXCM4 Overview

The CXCM4 (Cordex Controller, Modular, 4RU) is mounted in the rectifier system shelf and brings advanced monitoring technology to the Cordex series of rectifiers. This compact system controller is designed for seamless operation and set up of Argus power systems and is equipped with the complete range of Cordex software features, including the following:

- Designed to communicate directly with Cordex rectifiers
- Includes battery temperature compensation charging
- Battery performance diagnostics
- Provides local and remote communications
- User definable alarms
- Daily logging of power system events and system statistics.

Behind the CXCM4's front panel lies the main controller motherboard, which contains a microprocessor, memory, as well as numerous other electronic components.

The CXCM4 includes a web server providing easy set up and monitoring using an Internet connection with the standard Windows Internet Explorer browser.

The data logging feature allows the user to capture data from multiple inputs, for AC/DC voltages, load/battery current, cell voltages & temperatures (automatically for up to 16 user defined logs). Typical applications of the CXCM4 logging include power system details, thermal performance of outdoor enclosures, battery cell specifics, or mains variations captured by an AC voltage watchdog.

A built-in audio speaker sounds an intermittent tone during active alarms.

The input/output (I/O) board houses a series of terminal connections.

2.3.2 Front Panel

2.3.2.1 Display

Located on the front panel is a 160 x 160-pixel graphical LCD with touch screen similar to those used in PDAs. This graphical user interface (GUI) allows the operator to interact with screen selectable items using a fingertip.

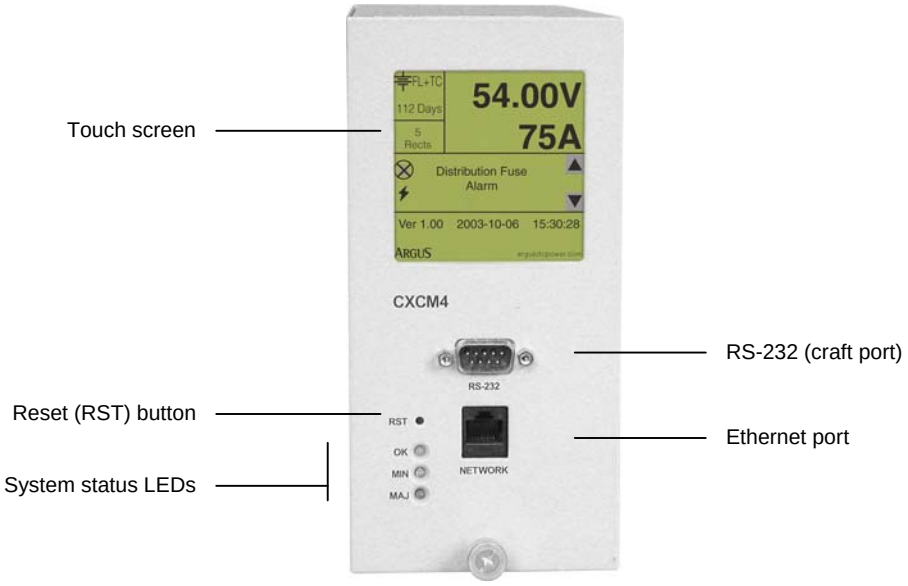

Figure 3–Cordex CXCM4 model system controller front panel

2.3.2.2 LEDs

The CXCM4 has three LEDs located on the front panel. These are used to display the alarm status of the power system, CXCM4 progress and status during startup, and file transfers.

Alarm Conditions
The CXCM4 illuminates the LED that corresponds to the system alarm status. The following show the corresponding alarm status for each LED color:

Green – OK, no alarms present
Yellow – Minor alarm is present (no major alarms)
Red – Major alarm is present.

Only one LED is illuminated at a time during alarm conditions.

Progress and Status Indication
The LEDs are also used in the following situations:

Base unit validation – all three LEDs are on at the same time.
File transfer – when recovering from invalid firmware application – the red LED is illuminated.

2.3.2.3 Reset

A reset button is located on the front panel for restarting the CXCM4's microprocessor. It takes approximately 15 seconds before the display reappears after pressing the reset button.

NOTE: *Refer also to the software manual – always select the shutdown menu item before pressing the reset button.*

2.3.2.4 Ethernet Port

The Ethernet port is designed for CXCM4 connection to a user supplied network (TCP/IP secured by user) via a front panel RJ-45 jack and a standard network cable.

Local access (e.g. laptop computer) is also possible from the Ethernet port connection using a standard network crossover cable.

2.3.2.5 RS-232 Serial (Craft) Port

Local access to the CXCM4 is possible through a front panel RS-232 serial port; using a null modem cable. The communication protocol supports a web interface (via Microsoft® Internet Explorer 6 or greater). The remote screen display is an enhanced version of the CXC's front panel display.

2.3.3 Analog Input Channels

The CXCM4 has analog input channels for voltage, current, and temperature.

2.3.3.1 Voltage Inputs

Two voltage input channels, V1 and V2, provide monitoring of discharge and charge voltage. The CXCM4 software is pre-configured to monitor V2 for both load and battery voltage. V2 is used as the system reference for rectifier float voltage, low voltage disconnect (LVD), system high voltage alarm, and system low voltage alarm. V1 is available for additional voltage measurements.

2.3.3.2 Current Inputs

The CXCM4 software is pre-configured to monitor for load current using an external 50mV current shunt.

2.3.3.3 Temperature Inputs

Two temperature input channels, T1 and T2, provide monitoring of battery temperature and temperature compensation (temp comp) or room/ambient temperature. A voltage is supplied by the CXC to these terminals to power the temperature sensors.

2.3.4 Digital Input Channels

The CXCM4 can accommodate up to four channels and can monitor digital alarm/control signals from rectifiers, converters and many other types of equipment.

2.3.5 Alarm and Control Output Relays

The CXCM4 contains eight Form C digital 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 relays, or, several signals may be mapped to just one relay or none at all.

2.3.5.1 LVD Control (External Option)

The LVD Control functions can be hardwired directly from the assigned relay output to an optional LVD override control and distribution alarm card. This provides a safety measure to protect against load disconnect during CXCM4 reset or replacement; e.g. when the controller is off-line. Operators may also perform test and maintenance procedures on the CXCM4 without disturbing the load.

2.3.6 System Fail Alarm/Relay

The CXCM4 system fail alarm (K0) activates because of a major internal failure. During such a condition, the unit will attempt to reset, but if this fails, an alarm condition will be extended to a relay and the red LED on the front panel will illuminate. This is a fail-safe signal to the remote monitoring equipment; i.e. alarm will be extended even if power to the unit is interrupted.

2.3.7 Network Connection and Remote Communications

The Cordex system can be set up, monitored and tested via ETHERNET 10/100 Base-T serial data connection. The communication protocol supports a web interface. All alarming and control of Cordex rectifiers is accomplished with a CXC via a CAN bus.

A step-by-step connection wizard – provided to establish remote communications with your CXC – is available via the Argus website (www.argusdcpower.com).

2.4 Cordex 48-3.6kW Rectifiers

2.4.1 Rectifier Overview

The CXPS 48-2T system is provisioned for use with the high-density Cordex 48-3.6kW rectifier system. The system ships complete with two (2) 23" 6-module rectifier shelves installed. Individual 3.6kW (75A) rectifiers are ordered separately.

NOTE: *The two (2) installed 6-module shelves with one CXCM4 (controller) allow for up to eleven (11) 3.6kW modules in a single 825A system. Distribution and buswork capacity allows for a total system load capacity of up to 1200A with the installation of an additional rectifier shelf.*

2.4.2 Remote Control

All alarming and control of Cordex rectifiers is accomplished with a CXC via a CAN bus. The Cordex rectifier shelves provide connections for serial communications with other rectifier shelves as well as supervisory and control panels.

2.4.3 Rectifier Front Panel

Figure 4–Cordex 48-3.6kW modular switched mode rectifier

2.4.3.1 LEDs

The front panel LEDs provide:

- Rectifier status summary,
- Rectifier software upgrade in progress indication,
- Locate module pattern.

Rectifier status summary will show the rectifier alarm status, communication fail status and rectifier on/off status.

AC ON
The top LED (green) is on when AC is within valid range. The LED will flash (twice per second) when AC is outside the nominal range – ***AC voltage is invalid if the AC Mains Low or AC Mains High alarm is active***. The LED turns off when AC has failed.

DC ON
The middle LED (green) is on when the rectifier is delivering power to the load. The LED turns off when the rectifier is off; e.g., when commanded via the CXC.

ALARM
The bottom LED (red) is on continuously in the event of an active Module Fail alarm; if the module is unable to source power as a result of any of the following conditions:

Output fuse blown	AC Mains Input Fail	Module fail (ramp test fail)
High voltage (OVP) shutdown	Thermal shutdown	Local shutdown
UPF fail	No output power	Fan (1 and 2) fail.

The LED will flash (twice per second) when a minor alarm is detected; if the modules output capability has been reduced or a minor component failure is detected during the following conditions:

VAC meter fail	AC foldback	Remote equalize
Fan (1 or 2) fail	Low output voltage	High output voltage
Current limit (programmable option)	Power limit (programmable option)	High temperature foldback
Temperature sense fail	Soft start operation	Communications lost.

The LED remains off in the absence of an alarm. If the unit output is not connected to a battery or parallel rectifier, the LED will extinguish if no AC power is present.

LED Activity During Software Upload
When a rectifier software upload is in progress, the LEDs will behave in a distinctly different way to indicate new rectifier software is being transferred from the CXC.

When a rectifier data transfer is in progress, all three LEDs will flash in a sequence lasting 1.5 seconds. When the last LED is lit, the sequence is repeated beginning at the first LED.

LED Activity During 'Locate Module' Command from CXC
When the 'locate module' command has been received from the CXC, the LEDs will behave in another distinct fashion so that the rectifier is easier to visually identify among adjacent rectifiers.

This state is entered when commanded via the CXC. The LEDs will flash in a ping-pong pattern repeating every 2 seconds.

The ping-pong pattern lights each LED sequentially. After the last LED is lit, each LED is lit in reverse sequence. When the first LED is lit, the pattern repeats. The effect makes it appear as if the light is bouncing between the first and last LED.

2.4.3.2 Mechanical

A thumbscrew is provided to secure the rectifier into the shelf. During normal operation the rectifier shall be locked into position. A handle (or grip) is incorporated into the front panel to facilitate the removal of the rectifier from the shelf. No special tools are required.

2.4.4 Rectifier Rear Panel

Located on the rear panel of the rectifier is a single connector for shelf power and communications.

2.4.5 True Module Fail Alarm

The power modules have a "true" fail alarm. This provides a true indication of the power module's ability to source current. When the module's output current drops below 2.5% of the rated output a low output current condition is detected and the Module Fail detection circuit is activated. This circuit momentarily ramps up the output voltage to determine if the module will source current. If no increase in current is detected, the Module Fail alarm is activated. The module will test once every 60 seconds for the condition until current is detected. Output voltage ramping will cease upon detection of current[1]. A minimum 2.5% load is required to avoid the Ramp Test Fail alarm; this can typically be provided with the parallel system battery. Activation of this alarm could indicate a failed module or a failed load.

[1] Under normal conditions, a battery connected to the output of the rectifier will draw current when the voltage ramp occurs. Therefore the rectifier fail alarm will not be generated with a battery connected.

NOTE: *For Cordex rectifier systems without batteries (or with a very light load; below 2.5% of rated output) it is recommended that the ramp test be disabled to avoid nuisance alarms. The Ramp Test feature is enabled/disabled via the CXC menu item: Rectifiers, Configure Settings.*

2.4.6 Heat Dissipation

Each rectifier module is equipped with at least one front-mounted fan. The fan operates at temperatures above 0°C (32°F). Cooling of the module is front-to-rear with the exhaust air exiting at the back. The fan is variable speed; which is determined by heatsink temperature and load.

2.4.7 Over Temperature Protection

Each rectifier module is protected in the event of an excessive increase in temperature due to component failure or cooling airflow blockage. During over temperature conditions, the rectifier limits the output power as well as the output current. If temperature continues to increase, a shutdown of the rectifier is initiated. The rectifier shall restart automatically if the temperature has returned to a safe level.

2.4.8 Wide AC Range

A minor alarm is generated when the AC input voltage drops below specification. Rectifier output power is reduced linearly between 176Vac and 150Vac to 75% of the rated output power (the unit will deliver derated output power down to 90Vac).

At 90Vac, the module will shut down and will not restart until the AC is greater than or equal to 150Vac; however, the restart voltage depends on the load current. At reduced load current the unit may restart with the input voltage as low as 100Vac.

For voltages above 277Vac, power factor and total harmonic distortion may be derated. Up to 320Vac, the rectifier will be operational and shall not suffer any damage.

2.4.9 AC Inrush/Transient Suppression

The inrush current of the rectifier module is limited to the full load steady state line current to prevent surge on the AC line. Modules are also protected from input lightning and transient surges in accordance with IEEE/ANSI C62.41 Category B3.

2.4.10 Soft Start

To eliminate an instantaneous demand on the AC source, a soft start feature is employed. Soft Start, sometimes referred to as “current walk-in”, works by gradually (up to five seconds) ramping the current limit up from zero to the actual or defined customer setting. The rectifier output voltage is ramped up from the minimum voltage to the float voltage.

2.4.11 Start Delay

The rectifier modules are equipped with a delay timer in order to stagger start a series of modules to prevent excessive loading of generators upon start up. The built-in timer delays the turn on of the module depending on the value selected (up to 120 seconds) via the CXC. A minimum one-second delay is preset to allow charging of the input capacitors.

2.4.12 Current Limit/Short Circuit Protection

The current limit function determines the maximum output current limit of the rectifier module, regardless of output voltage or power. Maximum output current is limited to a constant value down to short circuit condition. Current limiting can be used to mate the rectifier output current ampacity to the needs of the load and parallel battery to minimize excessive battery recharge current.

The rectifier will sustain a short circuit at the output terminals indefinitely. The maximum short circuit current shall not exceed 105% of the rated full load current.

2.4.13 Power Limiting

Each rectifier module is designed to limit power output to the module specification. This enables more current to be supplied at lower output voltages, and allows matching of output to the demand of constant power loads, normally seen with telecom equipment.

This feature may also be used for a faster recharge of flooded batteries paralleled with the load.

NOTE: *Current limiting overrides the power-limiting feature.*

2.4.14 High Voltage Shutdown (HVSD)

This feature provides protection to the load from over voltage conditions originating from the rectifiers. It operates by shutting down the offending rectifier module when a high output voltage condition occurs. Indication is through the red Alarm (Module Fail) LED. Modules will restart automatically; however, if more than three over voltage conditions occur in one minute, the module will latch off and remain shut down until it is reset (by restarting the rectifier) via the CXC.

2.4.15 Battery Eliminator Operation

Rectifier modules maintain all specifications (except where indicated) with or without a battery attached in parallel to the output; however, if a battery or another module supplying DC voltage in parallel is not present, there will be no monitoring or control activity if there is an AC power failure or input fuse failure.

Please see our website at www.argusdcpower.com for details on other custom products from Argus Technologies.

3 Inspection

3.1 Packing Materials

All Argus products are shipped in rugged, double walled boxes and suspended via solid inserts to minimize shock that may occur during transportation. Packaging assemblies and methods are tested to International Safe Transit Association standards. Power systems are custom packaged in heavy-duty plywood crates.

Products are also packaged with Cortex. This plastic wrap contains a corrosive-inhibitor that protects the product from corrosion for up to two years.

NOTE: *Rectifiers and batteries are shipped on individual pallets and are packaged per manufacturer's guidelines.*

3.1.1 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 the product is packed with at least three inches of shock-absorbing material to prevent shipping damage.

NOTE: *Argus Technologies is not responsible for damage caused by the improper packaging of returned products.*

3.2 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, please inform the carrier and contact Argus Technologies for advice on the impact of any damage.

3.3 General Receipt of Shipment

NOTE: *The inventory included with your shipment is dependant upon the options you have ordered. The options are clearly marked in the bill of materials at the back of this manual and on the labels on the shipping containers.*

3.3.1 Racks

Consult the packing slip and power system bill of materials to verify that you have the correct number of racks per your order.

3.3.2 Rectifiers (Purchased Separately)

Consult the packing slip to verify that you have the correct number of rectifiers per your order.

3.3.3 Miscellaneous Small Parts

Review the packing slip and bill of materials to determine the part number of the "configuration kits" included with your system; e.g., 053-393-20-010 for CXPS 48-2T system with 22RU battery-mount relay rack.

Review the bill of materials (per the configuration kits that you determined above) to verify all the small parts are included.

3.3.4 Batteries (Purchased Separately)

Verify that you have the correct number of batteries (if applicable). Refer to packing list.

Verify that you have all the necessary parts per your order for proper assembly.
Call Argus Technologies if you have any questions before you proceed: 1 (888) 462-7487

4 Installation

This chapter is provided for qualified personnel to install and interconnect the power components within the Argus power system. Regarding battery installation, refer primarily to the manufacturer's guidelines for more specific information.

NOTE: *To aid the user with installation, frequent reference is made to drawings located at the rear of this manual.*

4.1 Safety Precautions

Refer to the Important Safety Instructions near the front of this manual.

4.2 Tools Required

Various insulated tools are essential for DC power system installation. Use this list as a guide:

- Battery lifting apparatus (as required)
- Electric drill with hammer action, 1/2" capacity
- Various crimping tools and dies, to match lugs used in installation
- Load bank of sufficient capacity to load largest rectifier into current limit
- Digital voltmeter equipped with test leads
- Cable cutters
- Torque wrench: 1/4" drive, 0-150 in./lb.
- Torque wrench: 3/8" drive, 0-100 ft./lb.
- Insulating canvases as required (2' x 2', 1' x 1', 3' x 3', etc.)
- Various insulated hand tools (see Figure 5) including:
  -Combination wrenches -Ratchet and socket set
  -Various screwdrivers -Electricians knife
- Battery safety spill kit (required for wet cells only) including:
  -Protective clothing -Face shields
  -Gloves -Baking soda
  -Eye wash equipment
- Cutters and wire strippers (#14 to #22 AWG) [2.5 to 0.34mm^2].

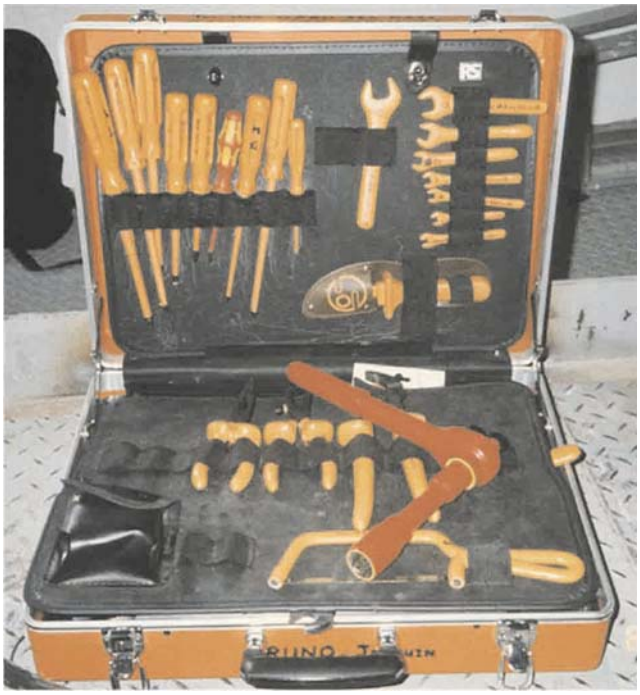

Figure 5–Example of an insulated tool kit

4.3 Power System Assembly and Mounting

The power system must be mounted in a clean and dry environment. Sufficient free space must be provided at the front and rear of the power system. This is to meet the cooling requirements of the rectifiers utilized in the power system and to allow easy access to the power system components.

4.3.1 Rack Mounted Systems

Attach the power system to the customer-provided relay rack using mounting screws and star washers to ensure an electrical bond between system chassis and relay rack.

4.3.2 Floor Mounted Systems

Secure the system to a concrete floor utilizing either heavy duty anchors (1/2" x 2-1/2") or, for wooden floors, heavy-duty lag screws (5/8" x 2-1/2"). Use appropriately sized flat washers.

Use isolating kits if required to isolate system from the floor.

It is recommended that the relay rack be secured to the overhead cable tray. Argus does not supply the mechanical details necessary for overhead support.

4.3.3 Half-Rack/Battery Mounted Systems

Obtain the appropriate battery to power system adapter plate. Secure the plate to the battery stack using heavy duty hardware.

Secure the power system to the adapter plate using heavy duty hardware.

It is recommended that the power system be secured to the overhead cable tray. Argus does not supply the mechanical details necessary for overhead support.

4.4 Rectifier Module Insertion/Removal

Insert by placing the rectifier module on the shelf bottom and sliding the module into the rear connector (inside of the shelf). Apply pressure on the module handle to engage the rear connector in the shelf receptacle.

NOTE: *It is recommended that the first module be inserted into the front leftmost position using the side of the shelf as a guide. Subsequent modules may be inserted using the previous module as a guide.*

Tighten the screw on the bottom of the faceplate to secure the module to the shelf.

NOTE: *Do not force a module into position if it does not seat properly. All modules are keyed to ensure that the correct module (voltage/polarity) type is used.*

To remove a module, loosen the screw on the bottom of the faceplate. Grasp handle and pull out, sliding the module away from the rear connector and out of the shelf.

4.5 Battery Installation

This information is provided as a guideline and is not meant to imply that batteries are part of this power system.

WARNING
Follow battery manufacturer's safety recommendations when working around battery systems and review the safety instructions provided in this manual.

4.5.1 Preparation/Mounting

Batteries should be located in a temperature-controlled environment. The temperature should be regulated at approx. 25°C (77°F). Significantly lower temperatures reduce performance and higher temperatures decrease life expectancy.

Provide adequate ventilation. VRLA batteries, though not requiring the special ventilation requirements of a flooded battery, should not be installed in an airtight enclosure. Hydrogen gas may be vented in a fault condition; i.e., failed battery.

Before assembly, clean cells (where applicable) as per the battery manufacturer's recommendations. First neutralize any acid with a baking soda and water solution. Then wipe the cells with clean water.

4.5.2 Installation of Batteries

Verify that all battery breakers, DC circuit breakers, and fuses on the distribution panels are either in the OFF position or removed.

Use a corrosion-inhibiting agent, such as NO-OX-ID "A"™, on all battery terminal connections.

1. Assemble battery rack (if required) and the cells or mono-blocks as per the installation instructions supplied with the batteries.
2. Ensure that the battery output cabling will reach the [+] and [–] terminals of the series battery string and that the batteries are oriented correctly for easy installation of the inter-unit "series" connectors.
3. Remove any NO-OX-ID "A"™ grease from battery terminals.
4. Burnish terminal posts with a non-metallic brush, polishing pad or 3M Scotch Brite™ scouring pad.
5. Apply a light coating of NO-OX-ID "A"™ grease to the terminal posts.
6. If lead plated inter-unit connectors are used, they should also be burnished and NO-OX-ID "A"™ grease applied as above. Install the inter-unit connectors.
7. After all battery connections are completed, torque per battery specifications (typically 100 in-lbs).

NOTE: *See system startup procedure before connecting batteries online.*

After assembly, batteries should be numbered and “as received” readings taken, including specific gravity, cell voltage and temperature. One cell will be designated as the pilot cell; this is usually the cell with either the lowest specific gravity or voltage. ***Refer to manufacturer's literature for guidelines.*** See following table for typical maintenance report:

Company: _____ Date: _____

Address:_____

Battery location and/or number:_____

No. of cells: _____ Type: _____ Date new: _____

Date installed: _____ Float voltage: _____ Ambient temp.: _____

Cell Readings

Cell #	Serial #	Voltage	Specific Gravity	Ohms	Mhos	Observations
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

Remarks and recommendations:_____

_____

_____

Readings taken by: _____

Table A–Typical VRLA battery maintenance report

5 Wiring

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

WARNING
Ensure that power is removed by turning off rectifiers and removing battery line fuse or connection before attempting work on the wiring 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.

Refer to the previous (Installation) chapter for safety precautions and tools required.

5.1 Grounding

The isolated power system battery return bus (BRB) should be connected to the building master ground bus (MGB) or floor ground bus (FGB) in a larger building. This acts as a system reference and as a low impedance path to ground for surges, transients, noise, etc. The MGB or FGB should have a direct low impedance path to the building grounding system. The cable from the power system to the MGB or FGB should be sized to provide sufficient ampacity to clear the largest fuse or breaker on the power system, excluding the battery protection fuse or circuit breaker. This is the minimum requirement; other factors including length of cable and special grounding requirements of the load should also be factored in. The insulated cable should be equipped with two-hole crimp type lugs and should not have any tight bends or kinks.

Power System Ampacity	Ground Reference Conductor Size
< 30A	#10
30 – 100A	#6-2
100 – 400A	0000
400 – 800A	350 MCM
> 800A	750 MCM

Table B–Typical ground reference conductor selection

The power system frame must also be connected to the MGB or FGB. This is done for personnel safety and to meet many Telco grounding requirements. Each bay should have its own frame or site ground connection (see Figure 6). Refer also to the Customer Connections drawing at the rear of the manual.

5.2 AC Feeder Protection/Sizing

To maximize system reliability, each power module should be fed from a dedicated protection feeder breaker located at the AC distribution panel. The feeder breaker can also act as the disconnect device for the connected module. Refer to the specifications at the front of this manual for Argus recommendations.

5.3 AC Input Connections

CAUTION: AC input wires should be routed in flexible or rigid conduit as far away as possible from the DC power wires to minimize EMI disturbances.

Ensure all modules are removed from the shelf and refer to the Customer Connections drawing at the rear of the manual for AC terminal block location.

Remove the covers (2 places) from the rear of the shelf to expose the AC input terminal blocks, L1 and L2 for each rectifier. Each terminal pair relates to an individual power module as marked.

WARNING
Use care when removing or replacing the covers for the AC input connections. Never assume that an electrical connection or conductor is not energized.

The wireway is designed for two customer-supplied 1” conduit fittings for AC supply located one on each side of the shelf. Attach the conduit retainers to the wireway hole(s) and route the AC cables through. Secure the wires to the AC input and chassis ground terminals as required. Tighten the cable connector to the AC cable (conduit similar).

Replace rear cover(s) once all connections have been completed.

5.4 DC Output Connections

WARNING
Leave cables or bus bars disconnected at battery and verify output polarity using a voltmeter. Make battery connections only after all other wiring is completed.

DC output wire shall be UL approved XHHW or RHH/RHW (for Canadian users, RW90 Type). Control and sense wires shall be UL approved Style 1015 (for Canadian users, TEW type).

The common output leg of the rectifier system should be connected to ground. This is typically done at the load common termination point.

5.4.1 Battery Connections

Battery cables should be sized for a 0.25V drop from battery to the power system at full load including anticipated growth. The cables should also meet ampacity requirements. Cables terminating directly on battery posts or connection details should be secured so that there is no stress on the battery posts. Lead plated lugs and lead plated or stainless steel hardware should be used on all terminations at vented batteries to reduce corrosion.

Prepare, route and connect cables from power system to battery termination details. Terminating points should be burnished and a corrosion-inhibiting agent, such as NO-OX-ID “A”™, should be applied to all battery terminal connections.

The 1200A Two Tier Distribution Center (Vista II Two-Tier UDC) allows for (4) sets of battery connections for both hot and return. Connections allow for 3/8” on 1”C lug connections.

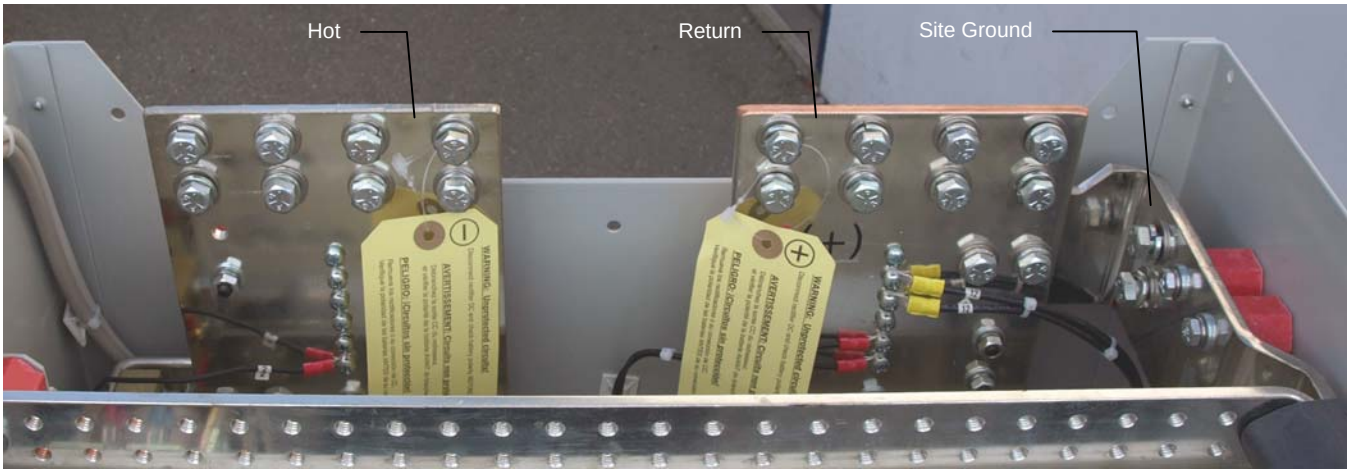

Figure 6–Vista II two-tier battery connections (hot and return)

NOTE: *Final connection to battery live should not be made, insulate and leave disconnected or remove the battery fuses. Switch battery contactors off (if used). See system startup procedure before connecting batteries online.*

5.4.1.1 Back-To-Back Connections

To allow for back-to-back connections on the battery bus bars, the PEM nuts must be removed from rear side of each bar. This requires rear access to the system. Reference Figure 7 for PEM nut removal detail.

To remove PEM nuts:

1. Place a 9/16" socket over the PEM nut to be removed.
2. Insert a 3/8" bolt through the socket and thread into the PEM nut.
3. Using a socket wrench with a 9/16" drive, tighten the head of the bolt until the action pulls the PEM nut from the bus bar.

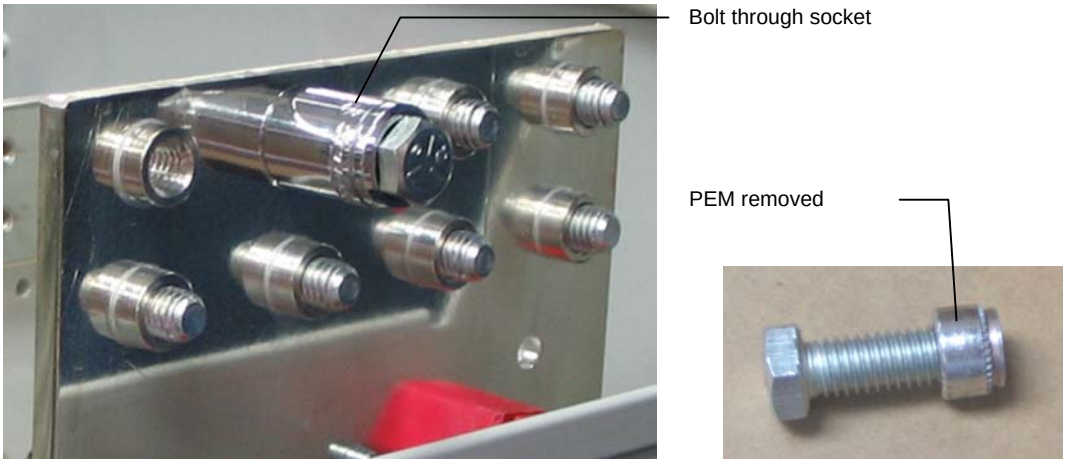

Figure 7–PEM nut removal for back-to-back connections on the battery bus bars

5.4.2 Load Distribution

Refer to guidelines supplied with the load equipment. Typically distribution cables are sized to provide a 0.5 V loop drop at full load as well as meeting ampacity requirements of the protection fuse or circuit breaker.

5.4.2.1 AM Breakers

The CXPS 48-2T is factory configured with (38) total single-pole AM-type plug-in breaker positions for 48V load distribution. The breakers have bullet terminals, which plug into the breaker tier for simple installation and removal. Each distribution tier has a 1/4" – 5/8"C hole set for the breaker output and on the ground bar located directly above the breaker panel.

- 1 to 100 amp breakers require 1 position.
- 110 to 150 amp breakers require 2 positions*.
- 175 and 200 amp breakers require 3 positions*.

***** *2-position and 3-position breakers have an output adapter that provides a single 3/8" hole on a 1" center output. The return must use one of the battery or rectifier terminations.*

Figure 8–Front view of the 2-Pole and 3-Pole output adapters

It is recommended to install the largest capacity circuit breakers on the top distribution tier to optimize cable management. It is imperative to plan circuit breaker installation to allow for

proper cable management and to not overload the capacity of a single tier (600A LVD limitation).

TPS fuses may be used instead of breakers via a plug-in breaker cartridge, which installs into any AM-type plug-in breaker panel configuration. See Figure 9 below:

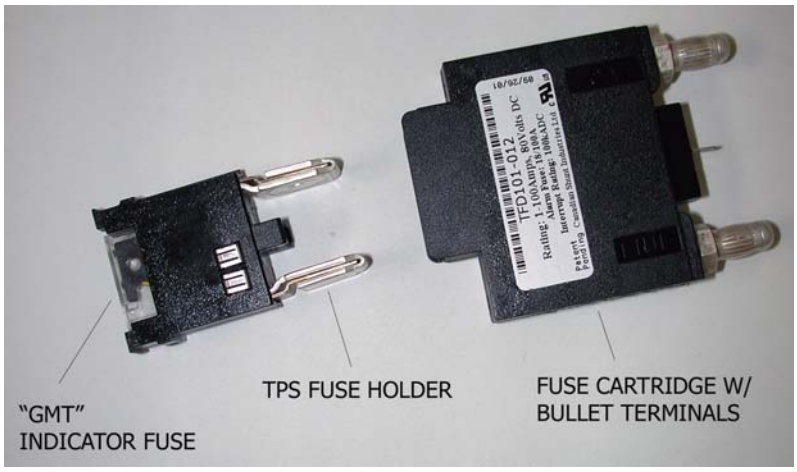

Figure 9–Plug-in breaker/fuse cartridge

5.4.2.2 GMT Fuses

The CXPS 48-2T is factory configured with (10) GMT type fuse positions for additional 48V load distribution. The fuse assembly is rated for maximum capacity of 30A.

Connections for hot and return are made via screw terminal connections on the assembly.

Figure 10–GMT fuses

5.5 DC-DC Converter Connections

The CXPS 48-2T is factory configured as a 48Vdc power system. A dual 48/24V output option is available via factory or field upgrade with DC-DC converters.

Reference the DC-DC converter manual for full installation and operation procedures.

5.5.1 Re-Configure Split Tier Distribution

1. Remove the copper jumper bridging the 8-position and 10-position breaker rows.
2. Locate the alarm card on the left hand side of the internal wall of the distribution center. Reference the Customer Connections drawing at the rear of the manual.
3. Locate the terminal blocks. The 10-position breaker alarming – factory configured for 48V distribution – is wired to TB12-42 “Pri Alm In.” Refer to the system schematic located at the rear of this manual for terminal block location and factory wiring.
4. Remove the alarm wire and re-terminate to TB12-43 “Sec Alm In.”

5.5.2 Argus CSM02 Six-Module Converter Shelf Installation Method Of Procedure (MOP)

The CSM02 six-module converter shelf kit, # 038-276-20, includes a cable kit for integration into a CXPS 48-2T power system. Please reference CSM02 manual # 012-502-B2 for drawings, specifications, and operation of converter system. Please also reference schematic included with 038-276-20 kit for detailed wiring instructions.

NOTE: *Rear access to CXPS system is required for this installation.*

The kit includes:

- One six-module CSM02 23” converter shelf
- One 50A plug-in feeder breaker
- Two converter input cables (+/–), #6 AWG flex cable, pre-terminated with 1/4”-5/8”C lugs on converter shelf end (un-terminated on other)
- Two converter output cables (+/–), #2 AWG flex cable, pre-terminated with 1/4”-5/8”C lugs on converter shelf end (un-terminated on other)
- Two loose 1/4”-5/8”C lugs for terminating #6 AWG converter input cabling to Vista II UDC (requires customer supplied crimp tool)
- Two loose 3/8”-1”C lugs for terminating #2 AWG converter output cabling to Vista II UDC (requires customer supplied crimp tool)
- Hardware for attaching -GND converter output cable to Vista II UDC return bus
- Two #18 AWG signal cables for connecting converter fail alarm (digital) signal to controller.

5.5.2.1 Installation Procedure

Preparation
Mount converter shelf into 23” rack channels below the CXPS power system leaving 1 RU space between converter shelf and bottom of rectifier shelf for cooling.

Remove the rear panel of the converter shelf.

Insert the pre-terminated lug ends of the two #2 AWG cables into the converter output wireway on the right hand side of the shelf.

Insert the pre-terminated lug ends of the two #6 AWG cables into the converter input wireway on the left hand side of the shelf.

Converter Output Cabling (-GND Connection)
Terminate the #2 AWG cable with pre-terminated 1/4”-5/8”C lug (with wire marker #15) to the -GND output terminal labeled “E4” using hardware supplied with shelf.

Route the un-terminated wire end up to the system return bus, cut wire to size, strip cable sheath, crimp supplied 3/8”-1”C lug.

Attach to system return bus bar as per Figure 11 using hardware supplied with kit.

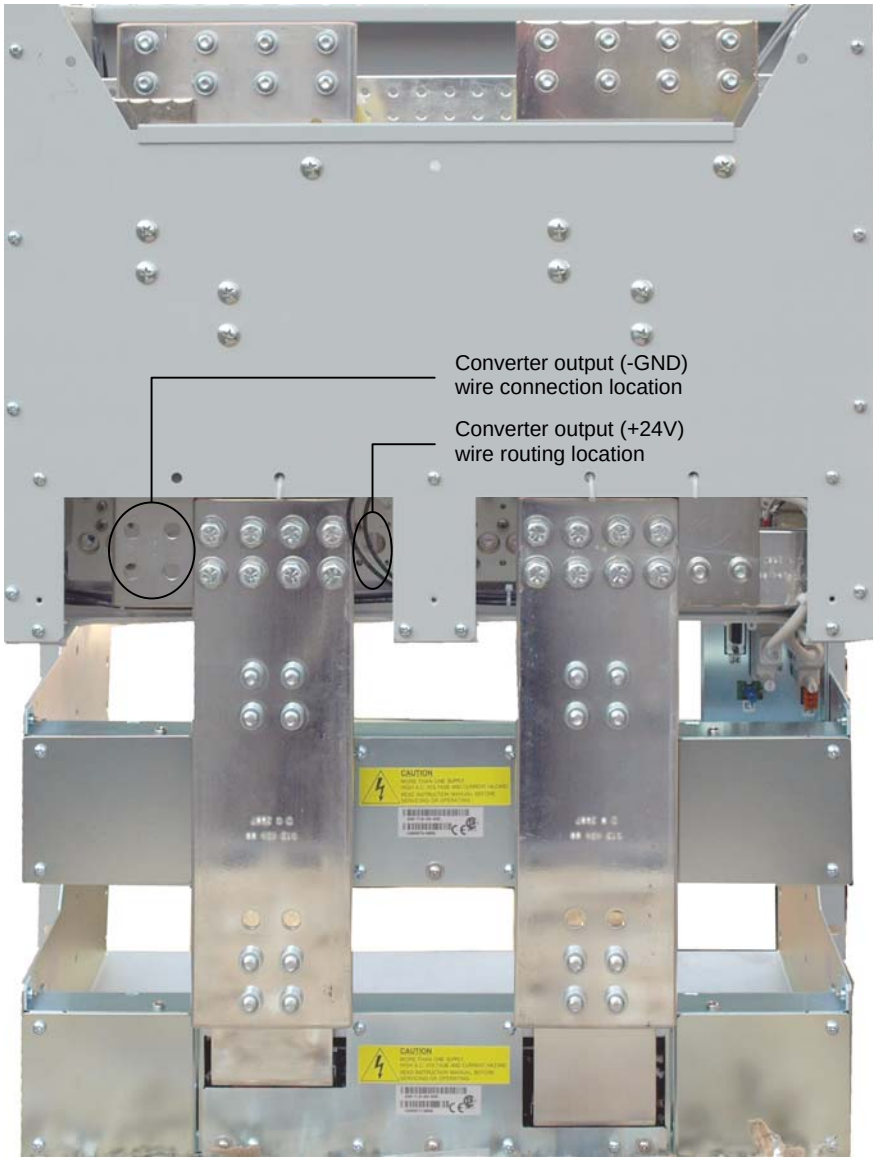

Figure 11–Rear of CXPS 48-2T system showing converter -GND output connection and converter +24V wire routing location

Converter Output Cabling (+24V HOT Connection)
Terminate the #2 AWG cable with pre-terminated 1/4”-5/8”C lug (With wire marker #16) to the +24V (hot) output terminal labeled “E3” using hardware supplied with shelf.

Route the un-terminated wire end up in between the system bus bars towards the front of the distribution center (reference Figure 11 for routing location).

Fish the wire through the existing hole in the glastic insulator of the bottom distribution tier (reference Figure 12 for routing location).

Cut wire to size, strip cable sheath, and crimp supplied 3/8”-1”C lug. Note: This lug must be crimped after it has been routed through the distribution tier.

Attach lug to input bar using the hardware originally used for attaching copper jumper bar.

Figure 12–Connection points and wire routing for +24V input into split tier distribution

Converter Input Cabling (+GND Connection)
Terminate the #6 AWG cable with pre-terminated 1/4”-5/8”C lug (with wire marker #13) to the +GND input terminal labeled “E2” using hardware supplied with shelf.

Route the un-terminated wire end up behind the CXPS system over the top of the distribution center.

Cut wire to size, strip cable sheath, and crimp supplied 1/4”-5/8”C lug.

Attach lug to distribution tier return bar. It is recommended to utilize the top distribution tier for feeder breaker installation. Use the hardware supplied with the CXPS system for attaching lug (reference Figure 12 for breaker locations in 2-tier UDC).

Converter Input Cabling (-48V Connection)
Terminate the #6 AWG cable with pre-terminated 1/4”-5/8”C lug (with wire marker #14) to the -48V (hot) input terminal labeled “E1” using hardware supplied with shelf.

Route the un-terminated wire end up behind the CXPS system over the top of the distribution center.

Cut wire to size, strip cable sheath, and crimp supplied 1/4”-5/8”C lug.

Attach lug to breaker output terminal. It is recommended to utilize the top distribution tier for feeder breaker installation. Use the hardware supplied with the CXPS system for attaching lug (reference Figure 12 for breaker locations in 2-tier UDC).

5.5.2.2 Converter Fail Alarm

Locate #18 AWG wire with tag #17
Attach end with ring lug to -GND output terminal on converter shelf (E4).
Attach unterminated wire end to TB2-8 “Conv Fail” on alarm connection at rear of CSM02 shelf.

Locate #18 AWG wire with tag #18
Attach unterminated wire end to TB2-7 “Conv Fail” on alarm connection at rear of CSM02 shelf.
Attach other unterminated wire end to TB11-36 “Conv Fail” on internal alarm board with Vista II UDC (reference Figure 13 for alarm board details as well as -08 connection drawing at rear of this manual).

5.5.2.3 Final Steps

Reattach back cover to converter shelf.

Install breakers as needed in 10-position breaker tier for required 24V distribution.

Cable from 24V loads to distribution as required.

Plug in 50A 48V feeder breaker into upper distribution tier.

Switch 50A feeder breaker to “ON” position to supply power to converter shelf.

Refer to Cordex Controller Software manual for custom alarming options using the two new digital alarms (+24V distribution and converter fail).

5.6 Controller I/O Connections

WARNING
Ensure that input power and output power is removed before attempting work on the CXC's wiring connections.

System integration cabling is utilized to bring the controller I/O connections to the front (left side) of the distribution center:

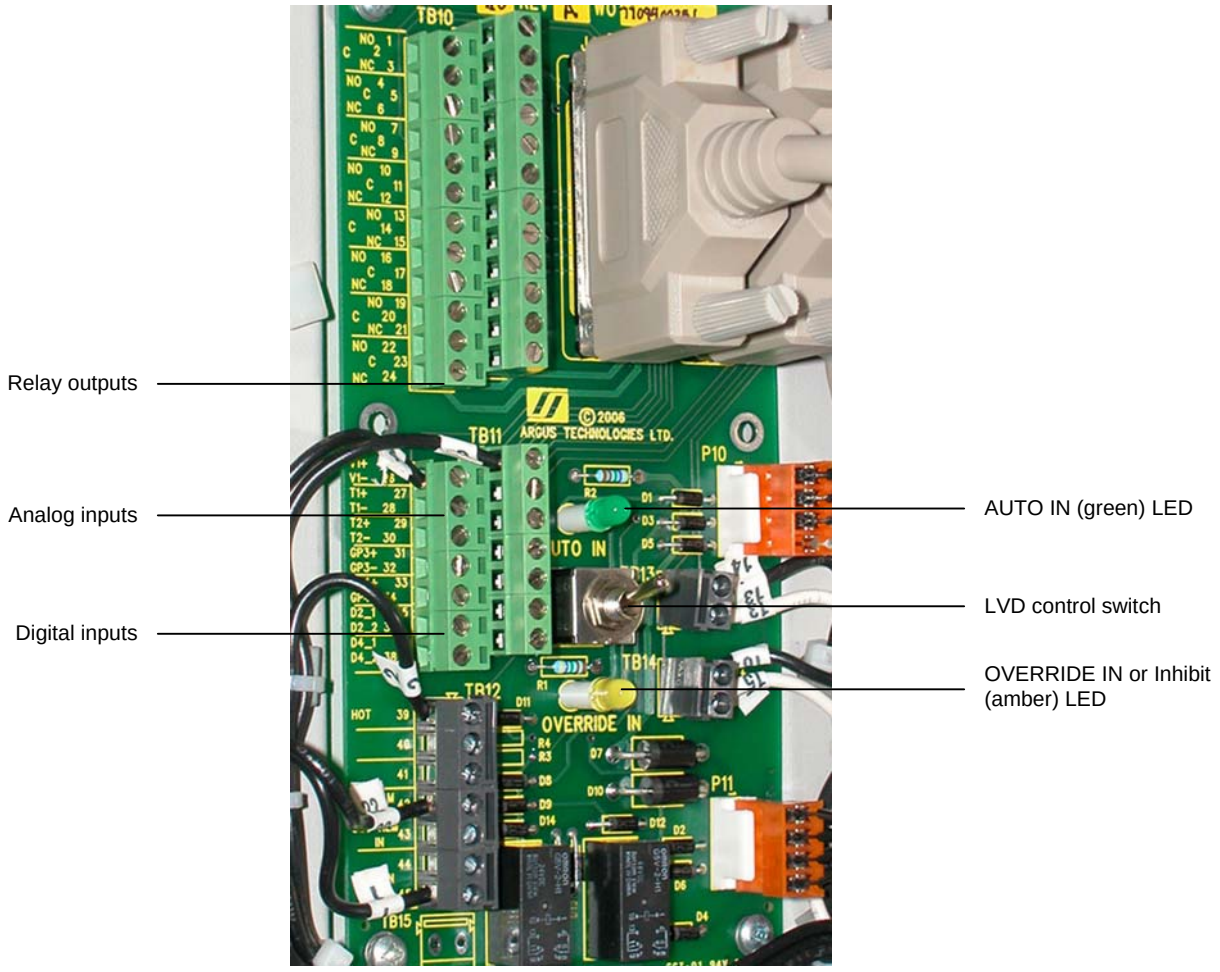

Figure 13–Controller I/O connections and LVD control card

(illustration only and may not match your installation)

5.6.1 Analog Inputs

WARNING
Ensure the correct polarity is used for all input cable terminations.

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. The input cables should be bundled together and routed through the entry holes, if applicable.

Default configurations and terminal numbers described below have been summarized in the foldout drawings located at the rear of this manual.

CAUTION: to reduce risk of fire, use only 0.129mm^2 (#26 AWG) or larger wire.

5.6.2 Digital Inputs

The digital input channels 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.

5.6.2.1 Connection Method

Typical Argus 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., 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 (see Figure 14) allows the digital input to receive (or not receive) a Ground signal on an alarm.

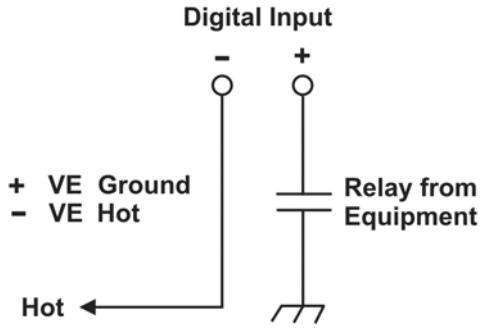

Figure 14–Showing digital input connection method

5.6.2.2 Programming the Digital Input

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.” See CXC Software manual for detailed instruction on programming.

Voltage Range (VDC)	Voltage Level (VDC) Considered As “0” (Off)	Voltage Level (VDC) Considered As “1” (On)
0—60 (system voltage setting)	0—3	18—60

Table C–Voltage level definitions for digital inputs

5.6.3 Relay Outputs

Terminals provide contacts for extending various alarm or control signals. Each relay output can be wired for NO or NC operation during an alarm or control condition. See Figure 15.

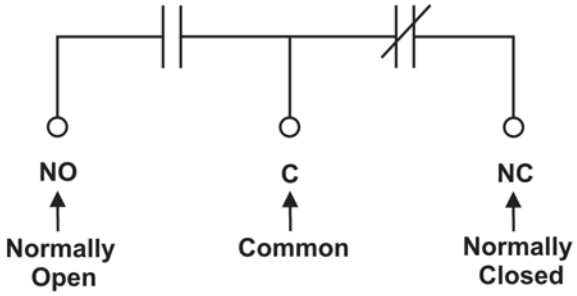

Figure 15–Showing relay connections in the de-energized state

Relays can be programmed to energize or de-energize during an alarm condition (see CXC Software manual). When the CXC reset button is pressed or power is lost, all relays de-energize.

5.6.3.1 System Fail Relay

System Fail output relay (K0) is fail-safe and will de-energize during an alarm condition.

5.6.3.2 LVD Control

The LVD Control functions can be hardwired directly from the assigned relay output to the LVD contactor panel. See Controls Menu Defaults in the CXC Software manual.

5.6.4 CAN Port

The CAN port or “CAN bus” allows communications between the CXC and Cordex series rectifiers or other CXC system peripherals. These are located on the left side of the rectifier shelf (as viewed from the front).

5.7 Network Connection and Remote Communications via CXC

The Cordex system can be set up, monitored and tested via ETHERNET 10/100 Base-T serial data connection. The communication protocol supports a web interface.

Some standard scenarios are described below:

5.7.1 Ethernet Port for Network Connection (Standard Network Cable)

The Ethernet port is designed for CXC connection to a user supplied network (TCP/IP secured by user) via a front panel RJ-45 jack. Connect to the Cordex shelf using a standard network cable.

5.7.2 Ethernet Port for Local Connection (Crossover Cable)

Local access (e.g. laptop computer) is also possible from the Ethernet port connection using a standard network crossover cable.

6 System Startup

Visually inspect the installation thoroughly.

After completing the system installation and power system wiring, perform the following startup and test procedure to ensure proper operation:

6.1 Check System Connections

- Ensure ac is off, battery is disconnected, and all power modules are removed from the shelf.
- Triple-check the polarity of all connections.

6.2 Verify AC and Power the Rectifier Shelf

- Install one power module.
- Verify ac input voltage is correct and turn on the corresponding feeder breaker.
- The power module OK LED should illuminate after a preset start delay.
- Using the CXC, test functionality of various module alarms and controls.

6.3 Check Battery Polarity and Connect

- Verify correct battery polarity using a voltmeter (ensuring no cells or batteries are reversed).
- Connect battery as required to the output of the system.
- Install remaining power modules.
- In the adjustments menu of the CXC, set float and equalize voltage to the levels specified by the battery manufacturer.
- Using the CXC, test functionality of various module alarms and controls. In addition, perform a load test with the system using a resistive load box as needed.
- Enable the temperature compensation (temp comp) feature (Batteries menu) and program the settings for slope and breakpoints (upper and lower) with respect to the specific batteries used.

6.4 CXC Reset

The reset button located on the front panel of the optional CXC is for restarting the microprocessor. When pressed momentarily, the unit beeps twice then resets. The front-panel LED's will illuminate temporarily, but will extinguish after the system has finished its 15-second self-test.

WARNING
Before removing a CXC from a live system, or performing controller maintenance, an external LVD override is required to avoid a disruption of service.

The LVD Control functions are hardwired directly from the assigned relay output to the LVD override control and distribution alarm card (Figure 13).

Place the LVD Control switch to the OVERRIDE IN position to keep the LVD contactor engaged.

NOTE: *The single LVD Control switch will override both upper and lower tier LVDs when placed in the OVERRIDE IN position.*

WARNING
Do not leave the switch in the OVERRIDE IN position. Doing so may result in a complete discharge of the batteries during a power failure situation.

To allow the CXC to resume automatic control of the LVD contactor, **check that the AUTO IN (green) LED is lit confirming that the CXC will keep the LVD contactor engaged**. Then you may return the LVD Control switch to the AUTO IN position.

Canada and USA toll free 24-hour emergency technical support: +1 888 GO ARGUS (462 7487).

7 Operation

7.1 Main Rectifier States

Rectifier operation can be broken up into five main states:

1. Off,
2. Start delay,
3. Soft start,
4. Normal operation,
5. Turning off.

Each state is characterized as being distinct and necessary for the operation of the rectifier. These states are briefly described below.

7.1.1 Off State

The rectifier will be in the Off state immediately after power is applied to the rectifier or after a rectifier shutdown. The shutdown source may be remote or local shutdown, AC shutdown, OVP or thermal shutdown.

When the rectifier is in this state the DC-DC converter is turned off and the CXC will be monitoring its inputs for the proper conditions to begin the start up sequence.

When the conditions have been met for the rectifier to start up, it will transition to the Start Delay state.

7.1.2 Start Delay State

When the rectifier is in the Start Delay state, the DC-DC converter is held off and still not sourcing power and is waiting for a given amount of time before transitioning to the next state.

When in this state, the CXC continues to monitor its inputs.

After the Start Delay state the rectifier will transition to the Soft Start state.

NOTE: *Soft start, or current walk-in, gradually increases the voltage and current output of the rectifier upon startup. This is done to reduce the instantaneous load on the AC source.*

7.1.3 Soft Start State

When the Soft Start state is entered, the rectifier will be turned on and the output voltage and output current will be gradually increased. If a load is present, the rectifier will begin to source power.

When the voltage and current limit ramps have finished, the rectifier will transition to the Normal Operation state.

7.1.4 Normal Operation State

The Normal Operation state is the state that the rectifier will be in performing all of the rectifier functions and features specified herein.

From this state, the only valid transition is to the Turning Off state. This transition will happen if the rectifier is required to shut down.

7.1.5 Turning Off State

The Turning Off state is entered because a short delay is required before the rectifier actually turns off to take care of any initialization requirements.

When this short delay has elapsed, a transition to the Off state is made.

7.2 Main Rectifier Modes

In addition to Main Rectifier States, there is a set of Main Rectifier Modes. These modes can be divided into two categories as follows:

7.2.1 Output Voltage Modes

Voltage modes can be thought of as modes that, under software control, can directly adjust the output voltage. The qualification of 'under software control' is made because there are processes that occur in the rectifier that can change the output voltage that do not adjust the output voltage directly (such as the rectifier being in current limit).

The following table lists four Output Voltage Modes and a description of when they are active:

Output Voltage Modes	Active when…
Float	Output voltage is set to the float voltage setting.
Equalize	Output voltage is set to the equalize voltage setting.
Battery Test	Output voltage is set to the battery test voltage setting.
Safe	Output voltage is set to the safe mode voltage setting.

Table D–Output voltage modes

7.2.2 Output Current/Power Modes

These modes directly affect the output current and power.

The following table lists the four Output Current/Power Modes and a description of when they are active:

Output Current/Power Mode	Active when…
Temperature foldback mode	Output current and power limit have been reduced due to high temperature of the heatsink or internal ambient temperature sensor.
AC foldback mode	Output current and power limit have been reduced due to low AC input voltage. *Note: this will reduce the risk of tripping an AC breaker due to increased AC current draw as the AC voltage decreases.*
Short circuit foldback mode	Output current limit has been reduced due to a short circuit at the output.
Internal fault foldback mode	Output current limit has been reduced due to an internal fault.

Table E–Output current/power modes

7.3 Factory Ranges and Defaults

The following table lists the rectifier settings/ranges/defaults; changes are made via the CXC:

Setting	Range (minimum to maximum)	Default
Float (FL) Voltage	47.5 – 58.2V	54V
Equalize (EQ) Voltage	49.8 – 60.2V	55V
Battery Test (BT) Voltage	44 – 52V	46V
OVP	See note below – 63V	57V
Current Limit (CL)	23 – 100%	100%
Power Limit (PL)	0 – 100%	100%
Module Start Delay	0 – 250s	1s
System Start Delay	0 – 600s	0s
Low Voltage Alarm (LVA)	42 – 52V	44V
High Voltage Alarm (HVA)	52 – 63V	55.5V
EQ Timeout	1 – 2399h	30h
BT Timeout	1 – 250h	8h
Softstart Ramp-rate	Normal/Fast	Normal
CL/PL Alarm	Enable/Disable	Enable
Remote Shutdown	Enable/Disable	Enable
Ramp Test	Enable/Disable	Enable

Table F–Cordex 48-3.6kW factory ranges and defaults

NOTE: *OVP cannot be set below the present system/FL/EQ/BT voltage setting or the safe mode voltage of 51.4V.*

8 Maintenance

Although very little maintenance is required with Argus 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.

WARNING: HIGH VOLTAGE AND SHOCK HAZARD.

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

Circuit cards, including RAM chips, can be damaged by static electricity. Always wear a grounded wrist strap when handling or installing circuit cards.

Ensure redundant modules or batteries are used to eliminate the threat of service interruptions while performing maintenance on the system's alarms and control settings.

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

Table G–Sample maintenance log

8.1 Fan Replacement

Figure 16–Fan replacement

1. Shut off the unit and unscrew the front fastener that secures the power module to the shelf.
2. Slide the module 10 cm (4”) out of the shelf and wait two minutes for module capacitors to discharge.
3. Remove the four screws (two each side) that secure the front panel to the module chassis.
4. Slide the front panel out.
5. Disconnect the fan power lead wires (one set per fan) and front panel ribbon cable from the module.
6. Remove the screws that secure the fans to the front panel.
7. Note the direction of airflow and remove the fans from the front panel.
8. Install the replacement fans following the preceding steps in reverse order.

8.2 MOV Replacement

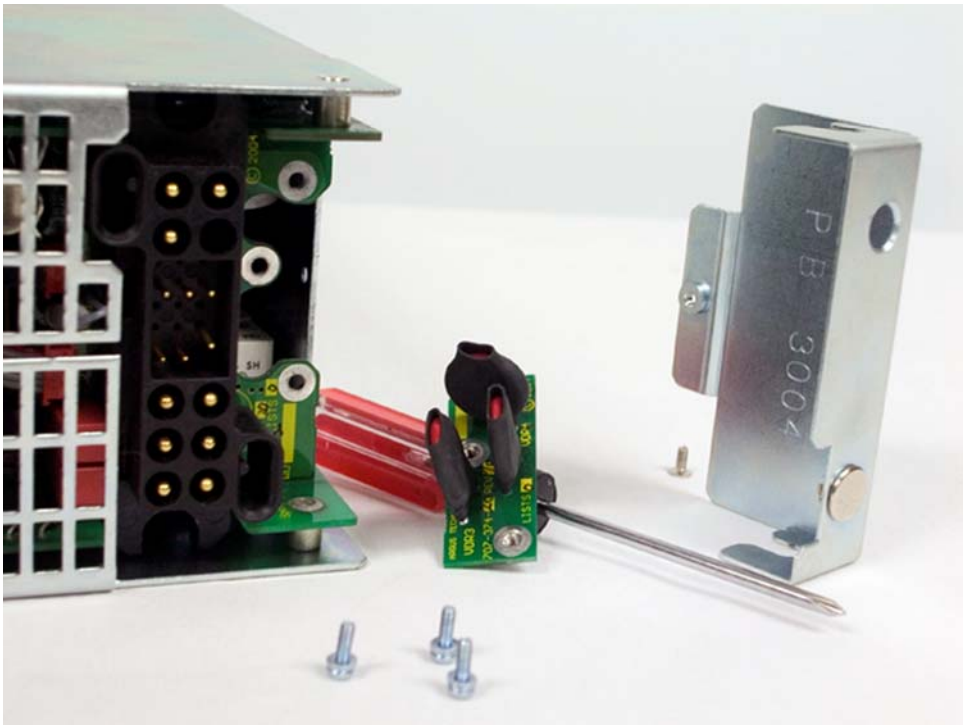

Figure 17–MOV replacement

The MOVs (metal oxide varistor) are used to protect the power modules from power line surges and the surges caused by lightning strikes. High capacity surges may permanently damage MOVs but they are easily replaced in the field using the following procedure:

1. Shut off the unit and unscrew the front fastener that secures the power module to the shelf.
2. Slide the module 10 cm (4”) out of the shelf and wait two minutes for module capacitors to discharge.
3. Turn the module around to face the back of the unit and remove the one screw (module bottom toward the rear) securing the MOV cover.
4. Remove the cover and locate the MOV printed circuit board (PCB).
5. Remove the three screws that secure the MOV PCB.
6. Decontaminate the area and unit with flux remover or a similar cleaning compound. This is to remove any metallic particles or carbon, which may have been deposited when the MOV failed.
7. Install the replacement MOV PCB following the preceding steps in reverse order.

9 Argus Conventions

9.1 Numbering System

Argus Technologies uses an eight-digit drawing number system, which is broken into three blocks. The first three digits describe the category of the product; e.g., rectifier or fuse panel. The next three digits indicate the sequence in which the product number was allocated in a particular category. The last two digits indicate the type of drawing, for example:

"-05" Schematic
"-06" Outline Drawing
"-20" Main Assembly

Argus uses an eight-digit part numbering system for all components and sub assemblies. Each part is covered by its own unique number. Due to the quantity, categories will not be listed within this manual.

9.2 Acronyms and Definitions

AC	Alternating current
ANSI	American National Standards Institute
AWG	American Wire Gauge
BTU	British thermal unit
CAN	Controller area network
CEC	Canadian Electrical Code
CSA	Canadian Standards Association
CX	Cordex™ series; e.g., CXC for Cordex System Controller
DC	Direct current
DHCP	Dynamic Host Configuration Protocol
EIA	Electronic Industries Alliance
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
ERM	Electromagnetic Compatibility and Radio Spectrum Matters
ESD	Electrostatic Discharge
FCC	Federal Communications Commission (for the USA)
GSM	Group Speciale Mobile (global system for mobile communications)
HVSD	High voltage shutdown
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
LED	Light emitting diode
LVD	Low voltage disconnect
MIL	One thousandth of an inch; used in expressing wire cross sectional area
MOV	Metal oxide varistor
MTBF	Mean time between failures
NC	Normally closed
NEC	National Electrical Code (for the USA)
NO	Normally open
OSHA	Occupational Safety & Health Administration
OVP	Over voltage protection
RAM	Random access memory
RU	Rack unit (1.75")
TCP/IP	Transmission Control Protocol / Internet Protocol
THD	Total harmonic distortion
UL	Underwriters Laboratories
VRLA	Valve regulated lead acid

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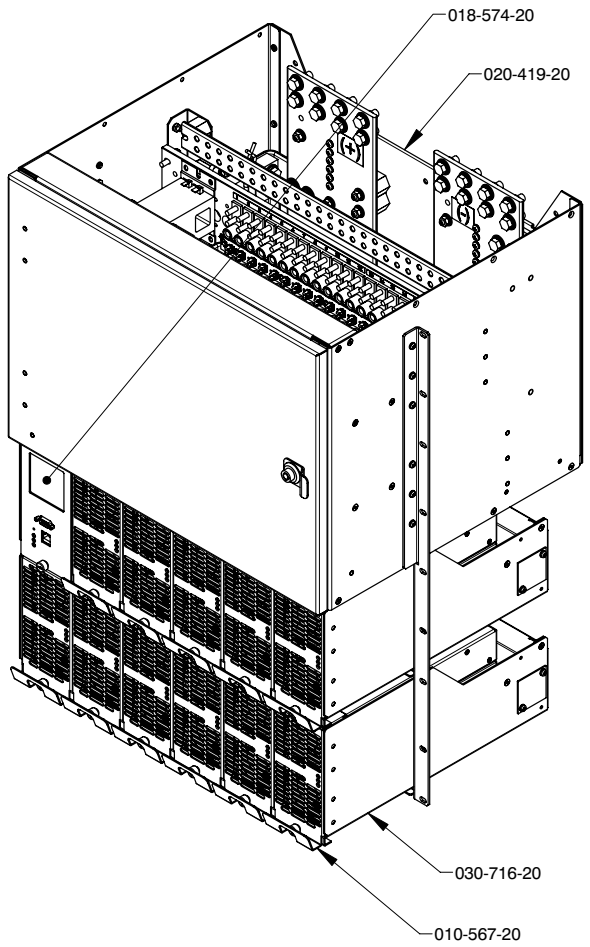

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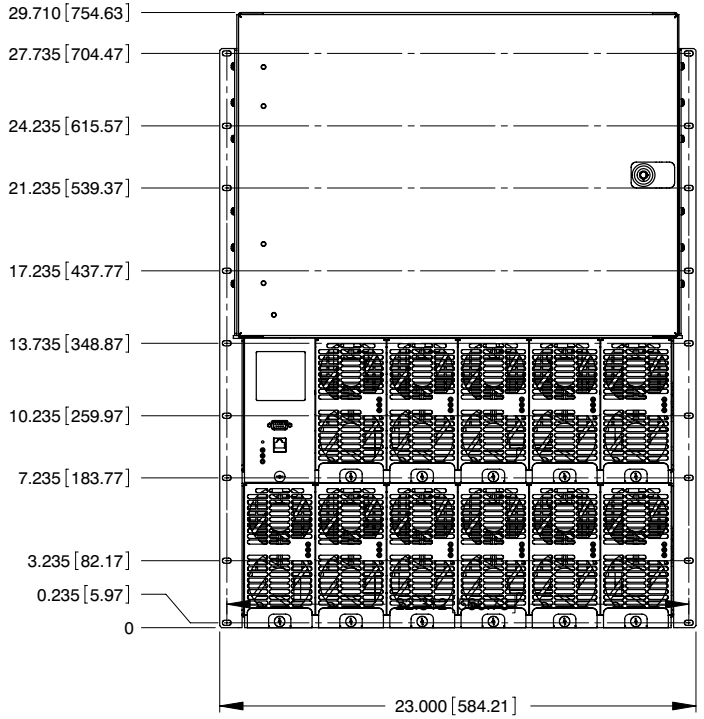

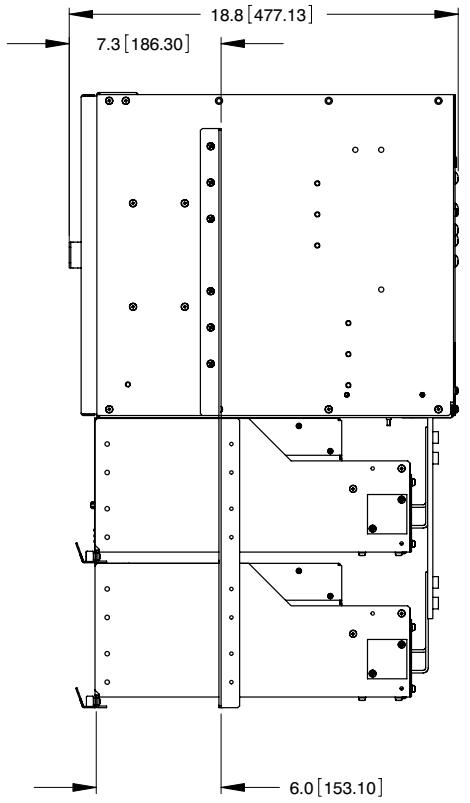

DIMENSIONS ARE IN INCHES WITH METRIC (mm) IN BRACKETS: INCHES [mm]

ARGUS

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CHECKED	RP	2007/08	
APPROVED	GS	2007/08	FINISH: PER P.O. and Doc. 070-024-83

TOLERANCES: X.X ±0.04" [X] ±1mm; X.XX ±0.02" [X.X] ±0.5mm; X.XXX ±0.01" [X.XX] ±0.25mm

SCALE: NTS

TITLE: OUTLINE, CXPS 48-2T CORDEX POWER SYSTEM

ISSUE DATE

SHEET 1 OF 3

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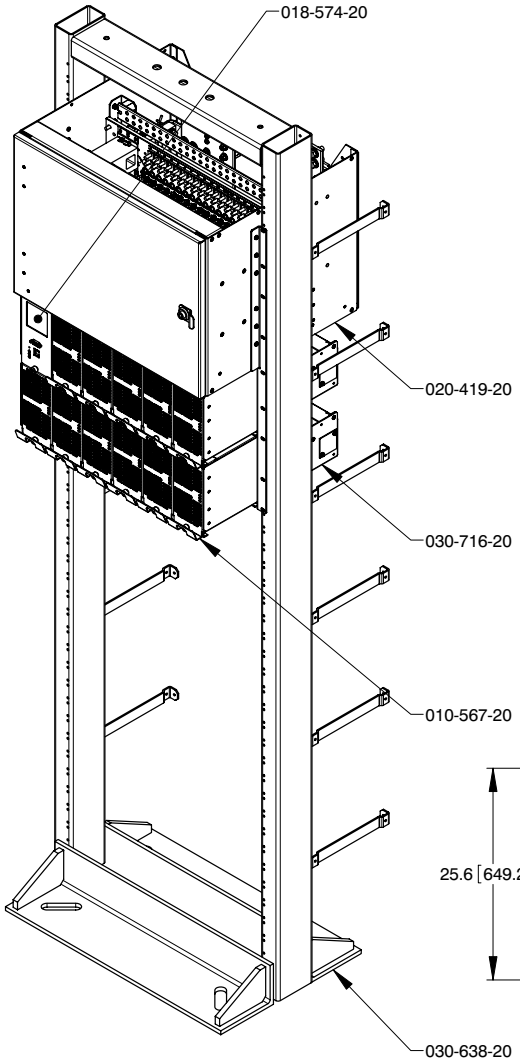

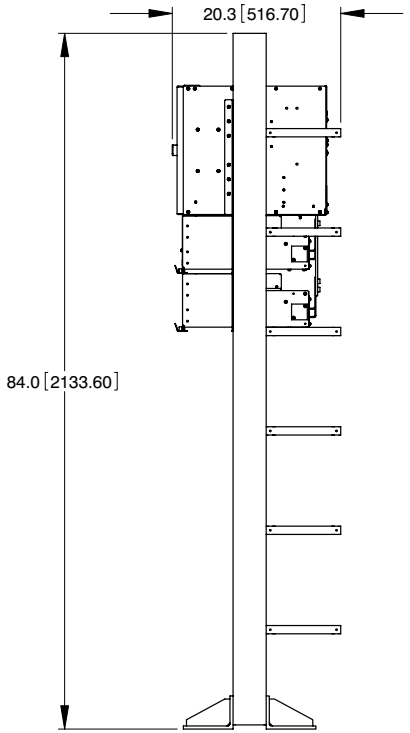

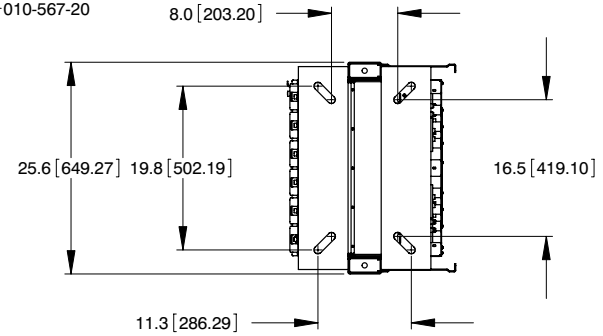

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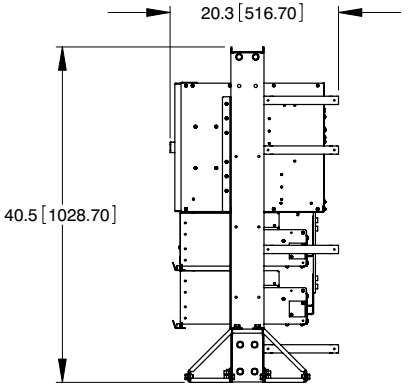

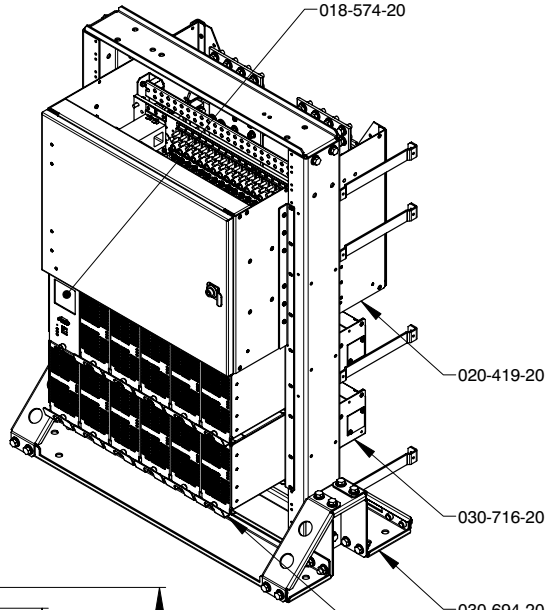

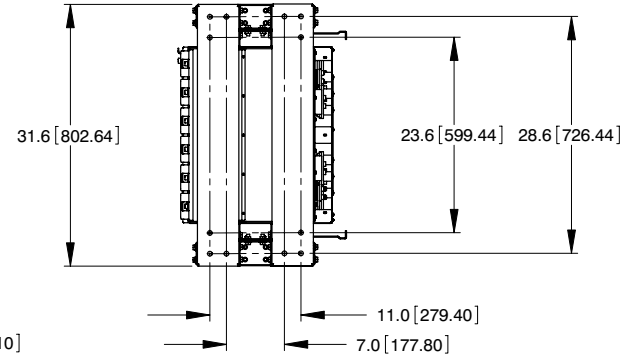

CXPS 48-2T
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(INCLUDES 1/2 HEIGHT RACK (030-694-20))

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ARGUS

SCALE NTS

TITLE
OUTLINE, CXPS 48-2T
CORDEX POWER SYSTEM

ISSUE DATE

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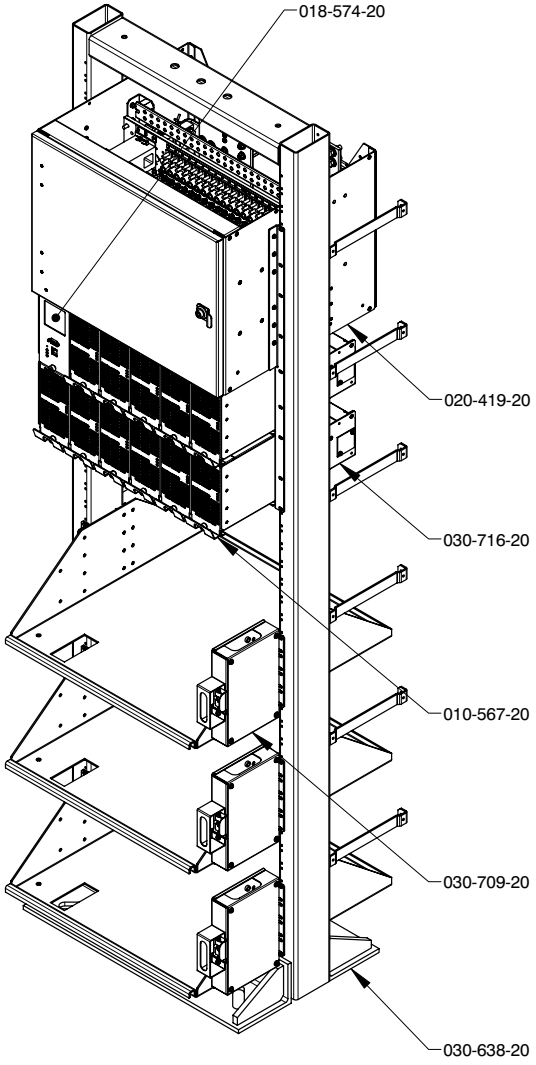

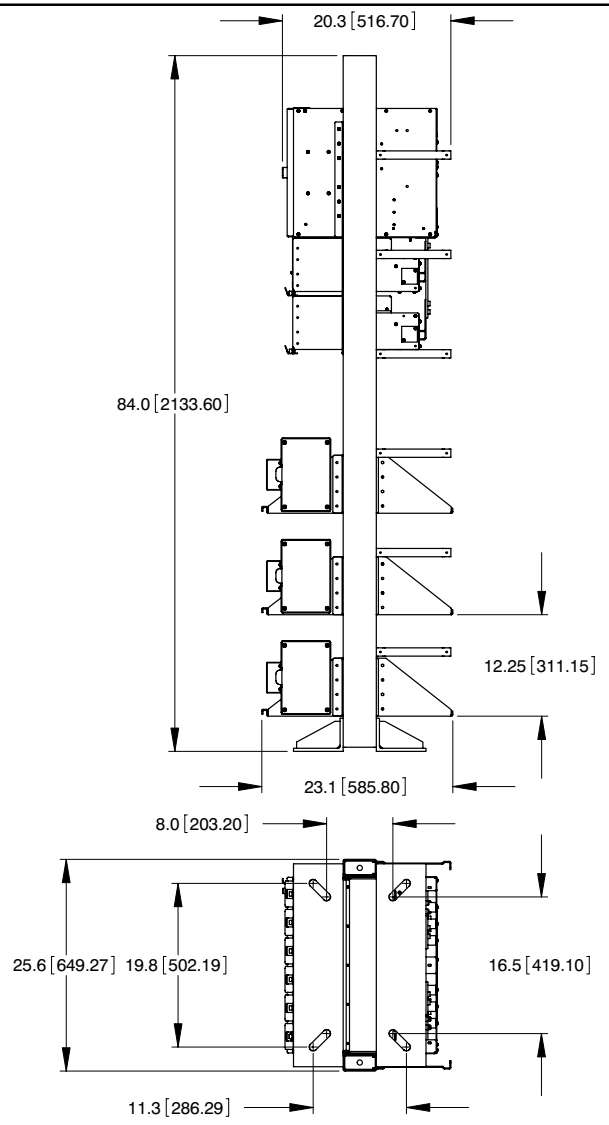

CXPS 48-2T
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(3) BATTERY TRAYS (030-709-20))

DIMENSIONS ARE IN INCHES WITH METRIC (mm) IN BRACKETS: INCHES [mm]

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TITLE
OUTLINE, CXPS 48-2T
CORDEX POWER SYSTEM

ISSUE DATE

SHEET 3 OF 3

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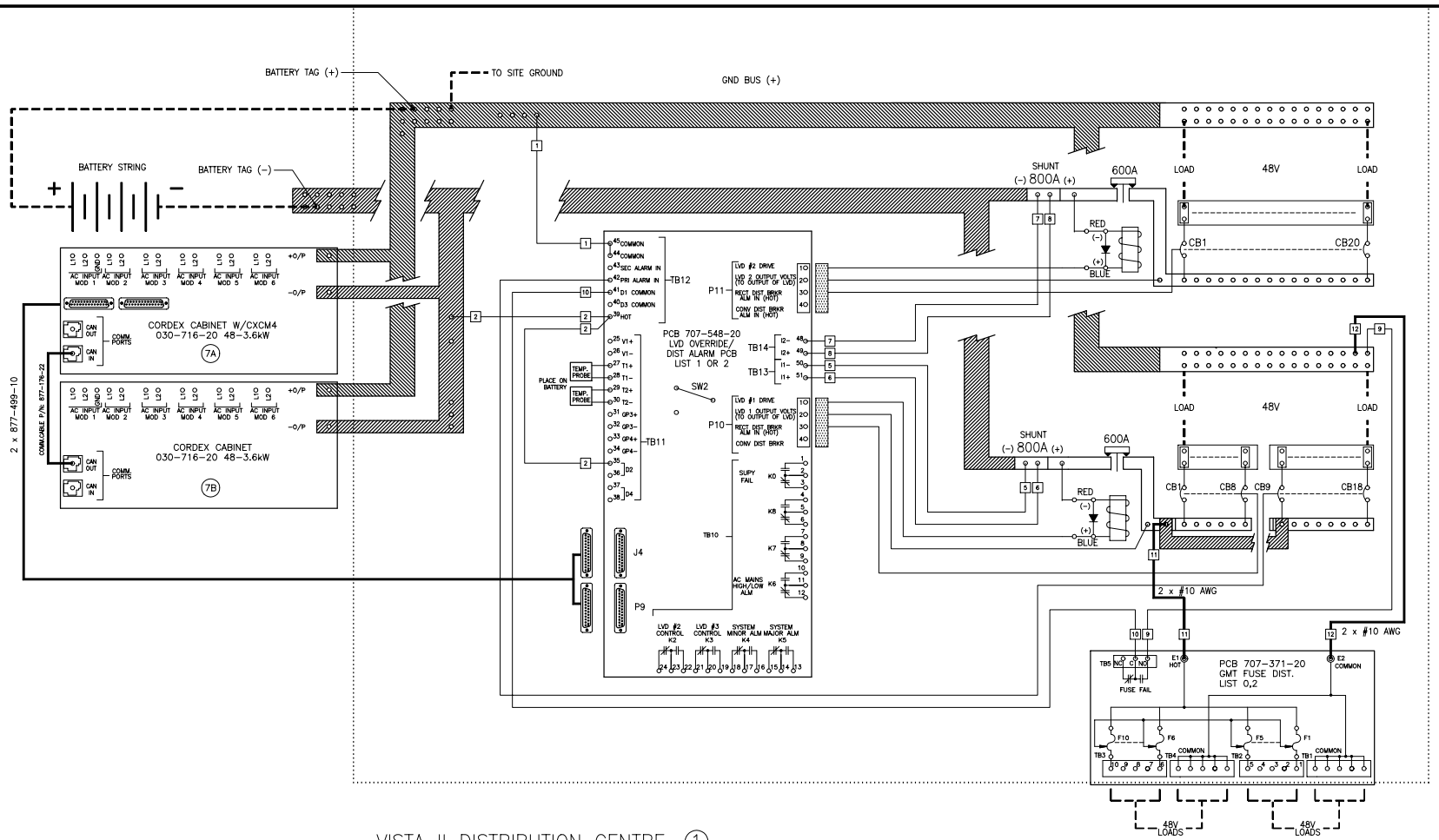

VISTA II DISTRIBUTION CENTRE ①

WIRING FOR:

053-393-20-000
053-393-20-010
053-393-20-020
053-393-20-030

NOTES:

1) FOR CONTINUOUS OPERATION, IT IS RECOMMENDED THAT SHUNTS ARE NOT RUN AT MORE THAN 80% THE RATED CURRENT UNDER NORMAL CONDITIONS.
2) DASHED LINES DENOTE CUSTOMER WIRING.
3) ALL WIRES ARE #18AWG EXCEPT AS NOTED.
4) NUMBERS IN BUBBLES REFER TO ITEM NUMBERS ON BILL OF MATERIALS.
5) [ ] REFERS TO WIRE TAG NUMBERS ON WIRES.
6) • REFERS TO TERMINALS ON DIGITAL METER.
7) SHUNT WIRE ARE AS FOLLOWS:
WHITE (+) & BLACK (-) TWISTED.

REVISIONS			
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A	Moved wire #2 to TB11-35 Swapped wires at I1 and I2	07/11	ER
B	Added TB10 to 707-548-20	08/06	

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

ARGUS®

DESIGN	ER	07/10/04	MATERIAL
DRAWN	ER	07/10/04	
CHECKED			
APPROVED	ER	07/10	FINISH
TOLERANCES (UNLESS OTHERWISE NOTED)			SCALE N/A

TITLE
CXPS 48-2T
48V Pos Gnd Power System

ISSUE DATE | SHEET 1 OF 2

SIZE	TYPE	DWG NO.	REV
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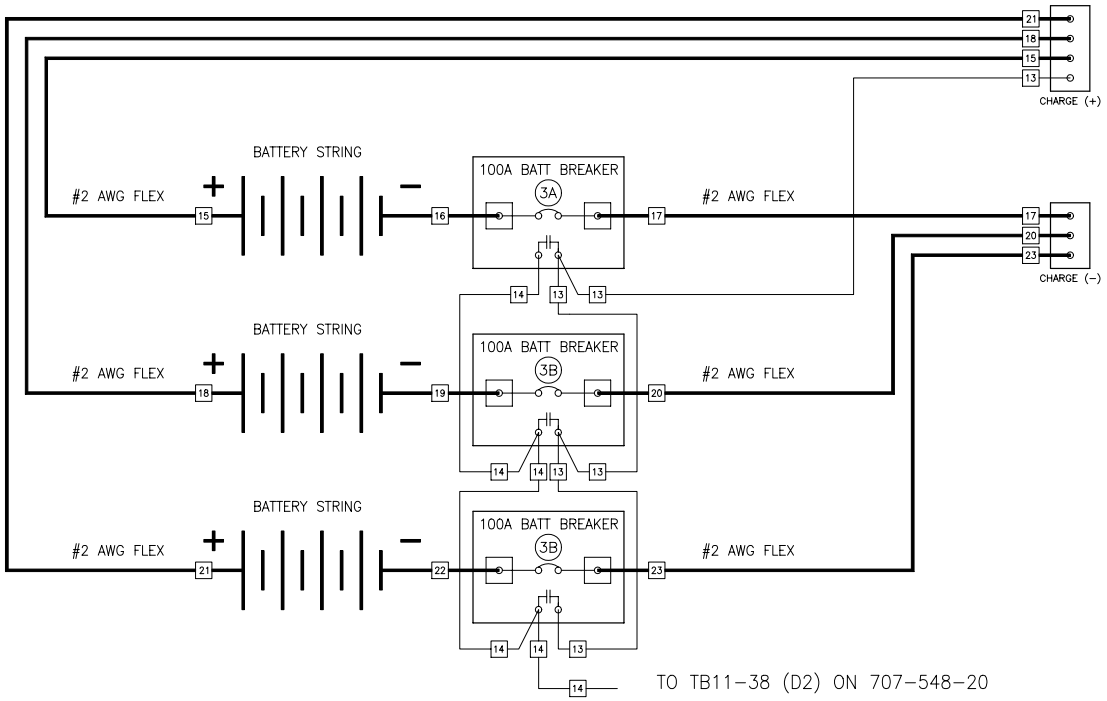
BATTERY TRAYS WIRING
FOR 053-393-20-030 ONLY



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ARGUS®

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APPROVED	ER	07/10	FINISH
TOLERANCES (UNLESS OTHERWISE NOTED)			SCALE N/A

TITLE
CXPS 48-2T
48V Pos.Gnd Power System

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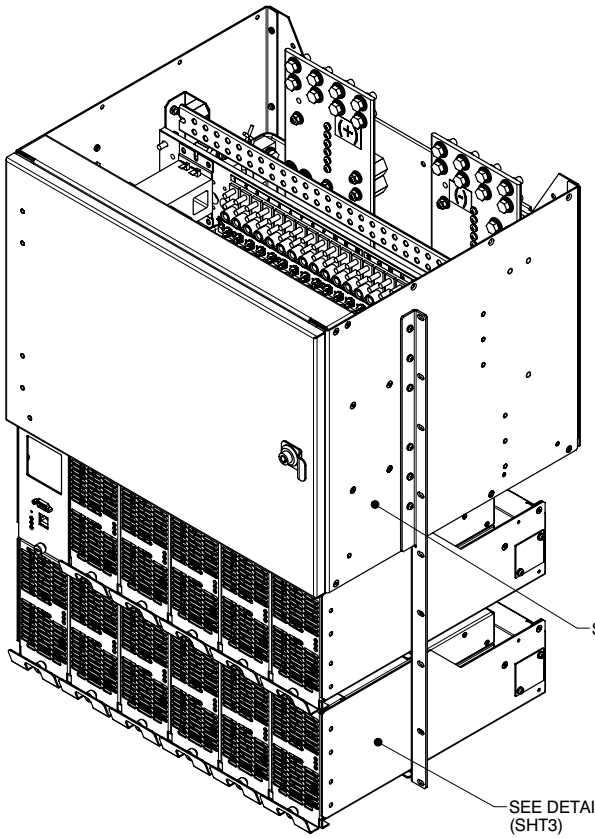
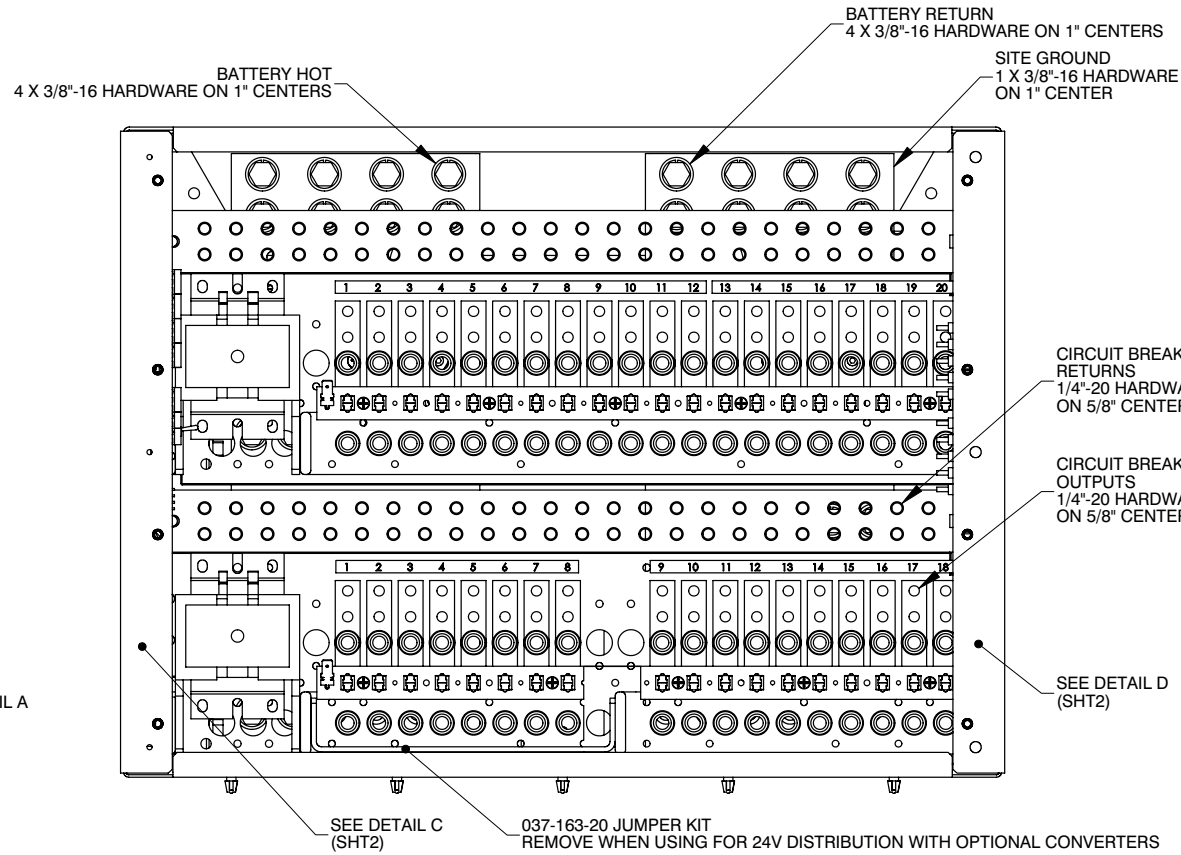


053-393-20-000



DETAIL A

(DOOR NOT SHOWN)
TOP TIER E/W 20 POS'N "AM" BREAKER MODULE W/600A LVD
BOTTOM TIER E/W 8/10 SPLIT POS'N "AM" BREAKER MODULE W/600A LVD

DIMENSIONS ARE IN INCHES WITH METRIC (mm) IN BRACKETS: INCHES [mm]

PART IDENTIFICATION This part must be identified in accordance with Argus document #071-014-10 by:			
STAMPING PART	TAGGING BOX	PEN	LABELING PART
			X

ARGUS

DESIGN	BK	2007/08	MATERIAL: SEE B.O.M.
DRAWN	RP	2007/08	
CHECKED	RP	2007/08	
APPROVED	GS	2007/08	FINISH: PER P.O. and Doc. 070-024-83

TOLERANCES: X.X ±0.04" [X] ±1mm; X.XX ±0.02" [X.X] ±0.5mm; X.XXX ±0.01" [X.XX] ±0.25mm

SCALE: NTS

TITLE: CONNECTION, CXPS 48-2T CORDEX POWER SYSTEM

ISSUE DATE

SHEET 1 OF 3

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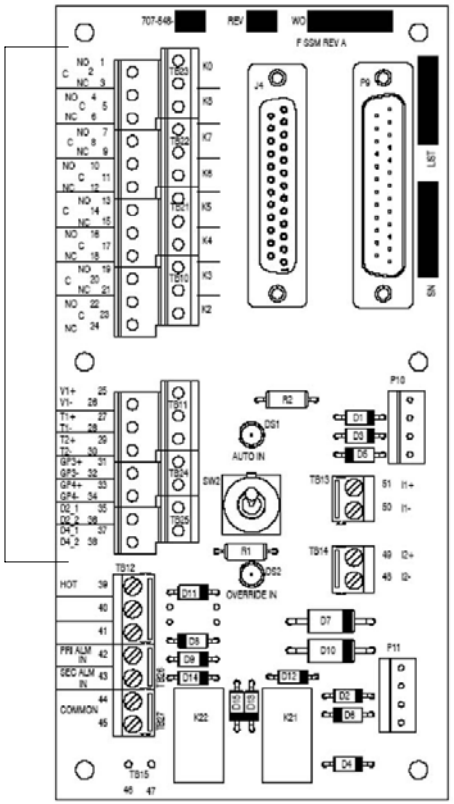
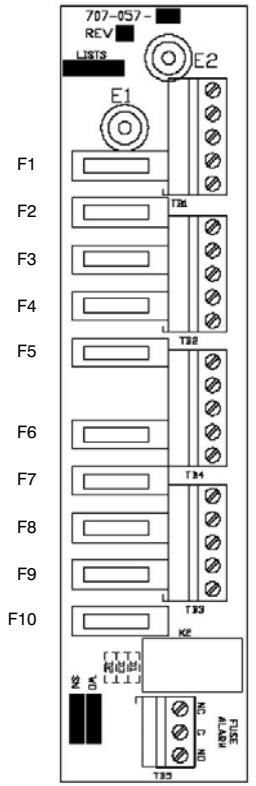
LTR	DESCRIPTION	REV BY	DATE	APPD

CXCM4 INTERFACE CONNECTIONS



DETAIL C
CXCM4 I/O PCB



DETAIL D
GMT FUSE PCB

DIMENSIONS ARE IN INCHES WITH METRIC (mm) IN BRACKETS: INCHES [mm]

ARGUS

SCALE NTS

TITLE
CONNECTION, CXPS 48-2T
CORDEX POWER SYSTEM

ISSUE DATE

SHEET 2 OF 3

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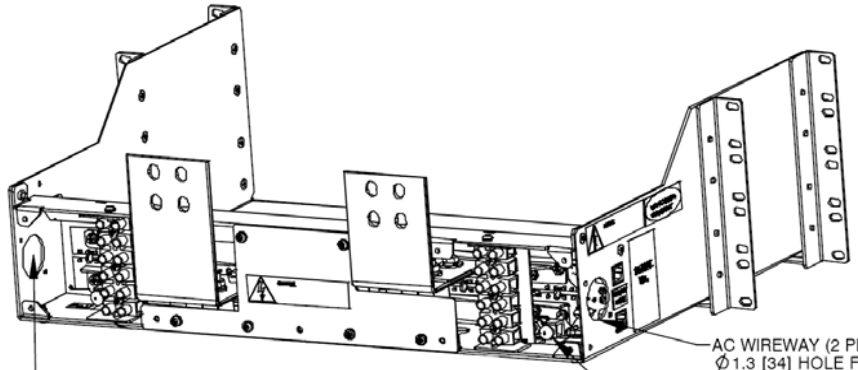
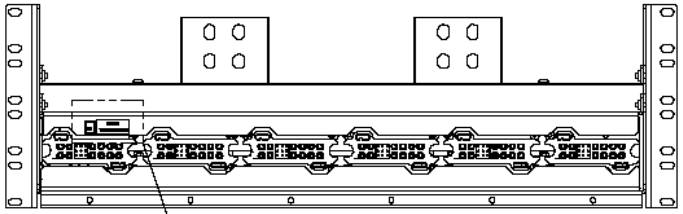
B	D2	053-393-08	A

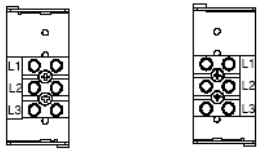
REVISIONS				
LTR	DESCRIPTION	REV BY	DATE	APPD



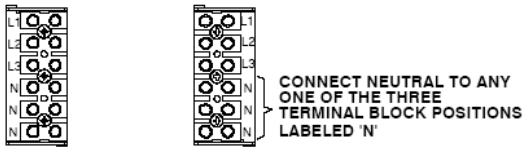
REAR VIEW - AC BACK COVER REMOVED



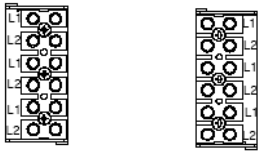
LIST 83: DUAL 3-PHASE INPUTS, 208 - 240VAC NO NEUTRAL

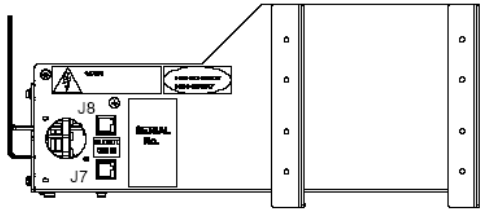


LIST 84 - DUAL 3-PHASE INPUTS, 360 - 480 VAC, WYE SOURCE, NEUTRAL REQUIRED



LIST 85 - SINGLE PHASE INPUTS, 208V - 277VAC





CAN OUT RJ12 OFFSET PIN OUT (J8)

1. GND
2. CAN H
3. NOT CONNECTED
4. CAN L
5. NOT CONNECTED
6. NOT CONNECTED

CAN IN RJ12 OFFSET PIN OUT (J7)

1. GND
2. CAN H
3. NOT CONNECTED
4. CAN L
5. NOT CONNECTED
6. NOT CONNECTED

DETAIL B
030-716-20 SHELF WIRING

DIMENSIONS ARE IN INCHES WITH METRIC (mm) IN BRACKETS: INCHES [mm]

ARGUS

SCALE NTS

TITLE
CONNECTION, CXPS 48-2T
CORDEX POWER SYSTEM

ISSUE DATE

SHEET 3 OF 3

SIZE	TYPE	DWG NO.	REV
B	D2	053-393-08	A

WARRANTY AND SERVICE INFORMATION

Technical Support

Technical support staff are available for answering general questions related to installation, operation and maintenance of Argus products. In Canada and the USA, call Argus toll free at +1-888-GO-ARGUS (+1-888-462-7487) 7:30 am to 5:00 pm Pacific Standard Time.

For emergencies, call +1-888-GO-ARGUS (+1-888-462-7487) 24 hours a day, seven days a week.
Customers outside Canada and the USA, call +1-604-436-5547 for technical support.

Factory Repair and Servicing

All service, beyond initial adjustments, should be carried out by qualified factory service personnel. For these procedures, please contact Argus Technologies at the locations listed in the Service Centers document.

Warranty Policy

Argus Technologies Ltd. warrants all equipment manufactured by it to be free from defects in parts and labor, excluding third party OEM materials (example: air conditioners, batteries), for a period of two years from the date of shipment from the factory. For third party products the OEM's warranty shall apply. The liability of Argus applies solely to repairing, replacing or issuing credit (at Argus' sole discretion) for any equipment manufactured by it and returned by the customer during the warranty period. The terms of the warranty are Ex Works (EXW) from Argus' factory service location.

Argus reserves the right to void the warranty if:
(1) identification marks or serial numbers are removed or altered in any way,
(2) invoice is unpaid, or
(3) defect is the result of misuse, neglect, improper installation, environmental conditions, non-authorized repair, alteration or accident.

Argus shall not be liable to the customer or other parties 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. There shall be no other obligations either expressed or implied. Argus will not honor warranties for batteries and other third party products without prior written Argus authorization.

Customer is responsible for all shipping and handling charges (COD and freight collect will not be accepted without prior approval from Argus Technologies).

Payment terms (North America) are net 30 days subject to prior credit approval. All other orders require payment before shipping.

Payment terms (International) are subject to prior approval and are typically through Tele-Transfer.

Return Material Policy

Our return policy is designed to ensure prompt, efficient and high quality factory service. A service request order (SRO) number must be obtained before products can be accepted for servicing by the Argus factory. For returns to an authorized service center (refer to the Service Centers document), please consult the individual service center for specific return policies and instructions.

To obtain an SRO number for a factory return, customers must call the appropriate location with the product serial and model number, as well as a brief description of the problem, shipment instructions and billing details.

The original packing container should be used whenever possible. The box should be completely enclosed and constructed of wood or double-wall, corrugated cardboard. At least 3" of foam or shock absorbing packing material must surround the unit. Both the shipping documents and the outside of the box must have the SRO # clearly marked and the product shipped prepaid to the Argus factory service center. Argus will endeavor to repair products within five working days of receipt. Repairs to the returned product are warranted for a period of six months. A service charge may be applied if no fault is found in the returned product. Argus will not accept products without an SRO number.

Service Centers

Factory Service Centers

Canada and International
Argus Technologies Ltd.
ATTN: RMA Returns
7033 Antrim Avenue
Burnaby, BC, V5J 4M5 Canada
Tel: +1 604 436 5900
Fax: +1 604 436 1233
Email: returns@argusdcpower.com

USA
Argus Technologies Inc.
ATTN: RMA Returns
3116 Mercer Avenue
Bellingham, WA, 98225 USA
Tel: +1-360 756 4904
Fax: +1-360 647 0498
Email: returns-usa@argusdcpower.com

Asia-Pacific
PCM Electronics (Dong Guan) Co., Ltd.
Hongli Industrial Area, Miaobian,
Liaobu Town, Dongguan City,
Guangdong Province, 523400 China
Tel: +86 755 8895 3310
Fax: +86 755 8895 3307

Authorized Service Center

Argentina
Argus Technologies de Argentina
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Fax: +54 (11) 4504 4698
Cell: +54 9 (11) 4993 9996
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Fax: +61 02 9822 8077

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Fax: +61 02 9602 9180

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Fax: +90 216 472 90 66

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