ARGUS

Cordex 48-1.2kW
19" 1 RU Shelf System
Up to 4800W w/ CXCM1
Up to 6000W Bulk Power

030-835-B2

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Power

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Argus Technologies Ltd.

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Applies to 030-835-20 (w/ CXCM1) and 030-845-20 (bulk power).

The following documents and drawings are included in this manual to provide the necessary information required for installation, operation and fault diagnosis of the unit:

- **Specifications, Shelf, 4-Module w/ CXCM1:** 030-835-B1
- **Specifications, Shelf, 5-Module Bulk Power:** 030-845-B1
- **Specifications, Rectifier:** 010-619-B1
- **Specifications, CXCM1:** 018-598-B1

- **CSA/NRTL Equivalence:** 048-554-10
- **Installation and Operation Instructions:** 030-835-C0

- **Schematic, 4-Module w/CXCM1:** 030-835-05
- **Outline Drawing, Shelf, 4-Module w/CXCM1:** 030-835-06
- **Customer Connections, 4-Module w/CXCM1:** 030-835-08

- **Schematic, 5-Module Bulk Power:** 030-845-05
- **Outline Drawing, Shelf, 5-Module Bulk Power:** 030-845-06
- **Customer Connections, 5-Module Bulk Power:** 030-845-08

- **Warranty and Service Information:** 048-700-10
- **Service Centers:** 048-693-10

Specifications for Argus' Cordex 48-1.2kW 19" 1RU Shelf System w/CXCM1

Basic Unit, Shelf

Maximum Output:	100A, 58Vdc
Recommended Feeder Breaker Single Phase:	120V, 15A, #14 AWG (per individual feed of two rectifiers) 240V, 20A, #12 AWG (per individual feed of two rectifiers)

Mechanical

Dimensions:	44mm H x 439.5mm W x 305mm D (rectifier front panel 12.5mm D) [1.75" H x 17.3" W x 12" D (rectifier front panel 0.49" D)]
Mounting*:	19" or 23" rack, center (5" or 6") or flush, EIA rack spacing
Weight:	3.0 kg (6.6 lb.)

Connections

AC Input (dual):	Dual IEC-60320-C20 MAIC connectors (for use with IEC-60320-C19 female line cords)
Chassis ground:	Via rack through mounting brackets and AC cords
Communications:	CAN (bus, single in/out) RJ-12 offset (female)
DC Output (bus bars):	7/16" on 1" centers, may accommodate up to two (2) 3/8"-1"C lugs in a back-to-back orientation
Signal wiring (CXCM1):	25-pin D-sub connector (refer to customer connections drawing)

Safety

EN 60950	Rectifier output shall be rated SELV suitable for connection to TNV-1 circuits
UL	60950-1-2002
CSA	60950-1-03
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)

* See drawings at the rear of this manual.

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.

Specifications for Argus' Cordex 48-1.2kW 19" 1RU Shelf System, Bulk Power

Basic Unit, Shelf

Maximum Output:	125A, 58Vdc
Recommended Feeder Breaker Single Phase:	120V, 15A, #14 AWG (per individual feed of two rectifiers) 240V, 20A, #12 AWG (per individual feed of two rectifiers)

Mechanical

Dimensions:	44mm H x 439.5mm W x 305mm D (rectifier front panel 12.5mm D) [1.75" H x 17.3" W x 12" D (rectifier front panel 0.49" D)]
Mounting*:	19" or 23" rack, center (5" or 6") or flush, EIA rack spacing
Weight:	3.0 kg (6.6 lb.)

Connections

AC Input:	Up to three IEC-60320-C20 MAIC connectors (for use with IEC-60320-C19 female line cords)
Chassis ground:	Via rack through mounting brackets and AC cords
Communications:	CAN (bus, dual in/out) RJ-12 offset (female)
DC Output (bus bars):	7/16" on 1" centers, may accommodate up to two (2) 3/8"-1"C lugs in a back-to-back orientation

Safety

EN 60950	Rectifier output shall be rated SELV suitable for connection to TNV-1 circuits
UL	60950-1-2002
CSA	60950-1-03
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)

* See drawings at the rear of this manual.

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.

Specifications for Argus' Switched Mode Rectifier CXRF-HP 48-1.2kW

Power Module Output

Voltage:	42 to 58Vdc within rated limits
Power:	1200W (176 to 300Vac input) 600W minimum (110 to 130Vac input) [Subject to de-rating below 110Vac due to current limited input and when operated above temperature thresholds listed below]
Current:	22.2A @ 54Vdc, 25A maximum @ 48Vdc (176 to 300Vac input) 11.1A @ 54Vdc, 12.5A maximum @ 48Vdc (110 to 130Vac input)
Static Load Regulation:	Better than ±0.5% for any load change within rated limits
Static Line Regulation:	Better than ±0.1% for any change in input voltage within rated limits
Dynamic Line Regulation:	Better than ±1% for any change in input voltage within rated limits (output voltage shall recover to static limits within 2ms)
Hold-up Time:	>10ms
Time Stability:	≤0.2% per year
Temperature Stability:	≤100ppm/°C over the operating range
Heat Dissipation:	<308 BTU per hour (per rectifier module)
Electrical Noise:	<38dBrnC (voice band) <30mVrms 10kHz to 10MHz (wideband) <150mVp-p 10kHz to 100MHz <2mV (psophometric)
Acoustic Noise:	<60dBa @ 1m (3ft.) @ 30°C (86°F)
EMI:	The unit meets requirements of EN55022: Class A for Radiated Emissions, and Class B for Conducted Emissions (see Standards for more EMC)

In accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Class B:

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

Any changes or modifications to this equipment not expressly described in this manual could void the FCC compliance.

Power Module Input

Voltage:	208/220/240Vac (continuous operation 90-300Vac) High: 277 to 300Vac (de-rated power factor) Low: 90 to 176Vac (de-rated output power)
Frequency:	50/60Hz nominal (45 to 66Hz)
Current:	7.5A maximum (176 to 300Vac) 6A maximum (90 to 176Vac)
Power Factor:	>0.99 at nominal conditions and 50-100% load
Protection:	10kA-interrupting capacity fuses in active and neutral lines
Efficiency:	>93% at nominal conditions and 50-100% load
Inrush Current:	≤ full load steady state current of the rectifier within rated limits
Start-up Ready Time:	<5 seconds (excluding soft start) to complete inrush limit routine and ac measurement (for OK signal)
Start-up Delay:	Programmable up to 120 seconds to enable stagger-start of multiple rectifiers and to minimize the effect on a supply source
Soft Start:	User adjustable to at least 5 seconds (not including start-up delay time) and is determined by output current limit ramp-up
T.H.D. (Current):	<5% at 100% load for 208 to 220Vac
Input Transient Suppression:	Meets ANSI/IEEE C62.41 Category B3
Input Leakage Current:	<3.5mA @ 265Vac 60Hz for up to two rectifiers* >5mA @ 265Vac 60Hz for three or more rectifiers* [*plugged inside 1RU or 2RU shelf] **See Warning note at the end of Important Safety Instructions page**

Environmental

Operating Temperature:	-40 to +65°C (-40 to 149°F) -40 to +80°C (-40 to 176°F) [de-rated output power]
Storage Temperature:	-40 to +80°C (-40 to 176°F)
Humidity:	0 to 95% non-condensing
Elevation:	-500 to +2800m; to 4000m with temperature de-rated to 40°C (-1640 feet to 9186 feet; to 13124 feet with temperature de-rated to 104°F)

Miscellaneous

MTBF:	<222,469 hours ground benign @ 25°C (77°F)
Dimensions:	44mm H x 88mm W x 318mm D [1.73" H x 3.5" W x 12.5" D]
Weight:	1.23 kg (2.72 lb.)

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, Class A and Class B
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
GR-63-CORE:	Physical Protection
GR-1089-CORE:	Electromagnetic Compatibility and Electrical Safety

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.

Specifications for Argus' CXCM1 Cordex Controller

Basic Unit, CXCM1

Input Voltage:	17 to 65Vdc within rated limits
Current:	<100mA @ 48Vdc <200mA @ 24Vdc
MTBF:	472,000 hours @ 25°C (77°F)
Safety:	CSA 60950-1-03 IEC/EN 60950-1 CE Mark
EMC:	The unit meets requirements of: EN 300 386-2 EMC and EMR, Telecommunications Network Equipment Emissions: EN 55022 Class A (CISPR 22) CFR47 (FCC) Part 15 Class A Immunity: EN 61000-4-2 ESD EN 61000-4-3 Radiated EN 61000-4-4 EFT /Burst EN 61000-4-6 Conducted Environmental: ETS 300 019-1-1 Environmental Conditions, Storage ETS 300 019-1-2 Environmental Conditions, Transportation NEBS: GR-63-CORE Physical Protection GR-1089-CORE Electromagnetic Compatibility and Electrical Safety

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

Temperature:	-40 to 75°C (-40 to 167°F) operating -40 to 80°C (-40 to 176°F) storage
Humidity:	0 to 95% non-condensing
Elevation:	-500 to +4000m (-1640 to 13124 ft)

Hardware Specifications, CXCM1

CPU:	Coldfire
RAM:	8MB
Flash:	4MB standard
Display:	4 digit LCD
Front Panel Controls:	Display pushbutton toggle switch for voltage (V) or current (A) Reset switch (soft reset button; hold for 3 seconds to reset IP)
LED's:	System OK (Green) Power System Minor Alarm (Yellow) Power System Major Alarm / Controller Fail (Red)
Audio:	Built-in speaker for alarm and popup message tones
Dimensions:	44mm H x 88mm W x 318mm D [1.73" H x 3.5" W x 12.5" D]
Weight:	0.62 kg (1.36 lb.)
Mounting:	Modular on Cordex CXRF 48-1.2kW series shelves [options for 1RU horizontal or 2RU vertical orientation depending on shelf]
Relay Outputs:	Four (4) Form C, 60Vdc 1A maximum
Digital Inputs:	Two (2), 0 to 60Vdc
Analog Inputs:	One (1) DC voltage, 0 to 60Vdc One (1) DC current, ±50mV Two (2) temperature, 0 to 20Vdc with power source
Communication Ports:	Ethernet RJ-45, Argus Modem DB-9, CAN [see shelf specifications]

Recommended Signal Wire Sizes (as per UL/CSA)

Wire Size Range:	#16 to #26 AWG) (1.5 to 0.14mm^2)
Temperature Range:	0 to 50°C (32 to 122°F)

CAUTION – TO REDUCE RISK OF FIRE, USE ONLY #26 AWG (0.14mm^2) OR LARGER WIRE.

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.

CSA/NRTL — MARKS — BACKGROUND

What are the CSA and NRTL?

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]

C US NRTL/C

The product on which either of these marks appear has been certified by CSA as meeting applicable Canada/US standards.

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)

Argus rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 950 and UL 1950, or CSA/UL 60950.

c UL US

The product on which this mark appears has been certified by UL as meeting applicable Canada/US standards.

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 licence for the use of this mark, which indicates compliance with both Canadian and US requirements. (3)

What are NRTLs and what do they do?

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)

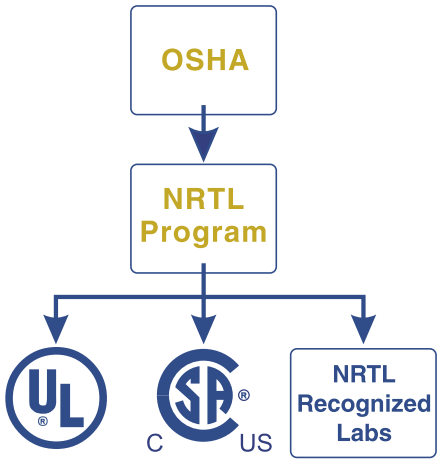
The NRTL determines that a product meets the requirements of an appropriate consensus-based product safety standard either by successfully testing the product itself, or by verifying that a contract laboratory has done so, and the NRTL certifies that the product meets the requirements of the product safety standard. (4)

When was the NRTL started and who governs it?

In 1983, in a suit brought on by an independent testing laboratory, OSHA was court ordered to remove specific references to UL (Underwriters Laboratories) and FMRC (Factory Mutual Research Corporation) from its regulations.

In 1988, OSHA revised its regulations to remove those references and the NRTL program was established.

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



References:
Information in this document has been developed from the official websites of the respective organizations.
(1) www.csa-international.org
(2) www.scc.ca
(3) www.ulc.ca
(4) www.osha.gov

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

1. Please read this manual prior to use to become familiar with the product's numerous features and operating procedures. To obtain a maximum degree of safety, follow the sequences as outlined.

2. This manual provides warnings and special notes for the user:
    a. Points that are vital to the proper operation of the product or the safety of the operator are indicated by the heading: **WARNING**.

    b. A notation that is in ***Bold Italic*** typeface covers points that are important to the performance or ease of use of the product.

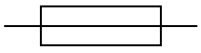
3. Before using the product, read all instructions and cautionary markings on the product and any equipment connected to the product.

4. Do not expose the product to rain or snow; install only in a clean, dry environment.

5. **CAUTION** – Unless otherwise noted, use of an attachment not recommended or sold by the product manufacturer may result in a risk of fire, electric shock, or injury to persons.

6. **CAUTION** – Do not operate the product if it has received a sharp blow, it has been dropped, or otherwise damaged in any way – return it to a qualified service center for repair.

7. **CAUTION** – Do not disassemble the product – call our qualified service centers for servicing. Incorrect reassembling may result in a risk of electrical shock or fire.

8. **CAUTION** – Double pole / Neutral fusing.   N

9. **WARNING** – High leakage current – Earth connection essential before connecting supply.

TABLE OF CONTENTS

1 Introduction

1.1 Scope of the Manual

This instruction manual explains the installation, interconnection, and operation of Argus Technologies' Cordex CXRF-HP 48-1.2kW 1RU 19" shelf systems: a) 4-module shelf up to 4800W output power with CXCM1 and b) 5-module shelf up to 6000W output power.

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

1.2 Product Overview

Designed specifically for restricted space installations, this 48Vdc power system incorporates the "HP" (high performance) series of 48V 1.2kW Cordex rectifier modules in a compact 1RU package.

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 Cordex CXRF-HP 48-1.2kW rectifier model input is universal to allow use on 120/208/220/240Vac 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.

Additional power modules can be included with the system at the time of ordering or added after the shelf has been installed.

The equipment is suitable for installation in Network Telecommunication Facilities.

The shelf is designed for horizontal mounting in a 19" or 23" center (5" or 6") mount installation via universal mounting brackets (EIA rack spacing) and utilizes IEC-type connectors for multiple AC line cord solutions.

The Argus Cordex CXCM1 was designed as a modular CXC controller for the Cordex CXRF-HP 48-1.2kW rectifier series.
Details for installation and wiring are provided in the respective chapters of this documentation package.

All models of the CXC allow the user to set up, control and monitor the entire power system and ancillary components from one central, easy-to-use source: your web browser. The CXCM1 model does not have a touch screen display; therefore, system setup and management is performed exclusively with the web interface.
Details of controller operation are provided in the current version software manual.

Figure 1–Cordex CXRF-HP 48-1.2kW 19" 1 RU shelf systems

1.3 Part Numbers and List Options

This product is available to order under the following part numbers and list options:

Description	Part Number/List Option
Cordex CXRF-HP 48-1.2kW center mounting 1RU shelf for systems up to 4800W	030-835-20
[equipped to receive one CXCM1 controller and up to four CXRF-HP 48-1.2kW rectifiers]	*List 0
48Vdc output	*List 2
19” center (6” offset) mount	*List 19
23” center (6” offset) mount	List 24
Universal AC line cords, C19R – flying leads, 3.5m long	List 88
120Vac line cords, L5-15P plugs, 2.5m long	List 89
Blank panel (for power module slot)	List 90
CXCM1 controller	List 99
Cordex CXRF-HP 48-1.2kW center mounting 1RU shelf for systems up to 6000W	030-845-20
[equipped to receive up to five CXRF-HP 48-1.2kW rectifiers]	*List 0
48Vdc output	*List 2
19” center (6” offset) mount	*List 19
19” flush mount	List 21
23” center (6” offset) mount	List 23
23” flush mount	List 25
Universal AC line cords, C19R – flying leads, 3.5m long	List 88
120Vac line cords, L5-15P plugs, 2.5m long	List 89
Blank panel (for power module slot)	List 90
CXCM1 controller	018-598-20
Basic module	*List 0
Horizontal mount (1RU high)	*List 90
Cordex CXRF-HP 48-1.2kW rectifier power module, 120Vac-208-240Vac universal input	010-619-20
Basic module	*List 0
Front cover, black plastic [material complies with GR-63 flame spread test]	*List 58
One universal AC line cord, C19R – flying leads, 3.5m (as used in List 88)	877-671-19
One 120Vac line cord, L5-15P plugs, 2.5m (as used in List 89)	877-690-19
Blank panel (for power module slot)(same as List 90)	747-622-20-000
Kydex cover, single shelf	567-837-19
Dual shelf bus bar connection (qty 2 req’d) ***consult factory for application***	615-368-43
I/O terminal block wire harness kit for CXCI/CXCM1	036-201-20-000

* Default option

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

2 Features

2.1 NEW! Rectifier High Performance (HP) Design

The Cordex CXRF-HP series of 48V 1.2kW rectifier modules employ an advanced resonant power conversion technology featuring high power conversion efficiency. All internal semiconductor devices operate under “soft-switching” conditions and exhibit very low power loss. The reduced power loss leads to lower thermal stress on the semiconductors and thus improves reliability.

Sustaining low component temperatures is again the primary factor with meeting the three worst-case field scenarios: 65 deg. C ambient temperatures, full output power, and low AC input (176Vac). While meeting these specifications, Cordex rectifiers also offer roughly twice the reliability at 55 deg. C and up to four times more at 45 deg. C ambient temperature.

2.2 Rectifier Front Panel

Figure 2–Cordex CXRF-HP 48-1.2kW rectifier front panel

2.2.1 LEDs

The front panel LEDs provide rectifier status summary and help to locate a specific module under CXC control.

2.2.1.1 AC ⏻

The top LED (green) is on when AC is within valid range and the rectifier is delivering power to the load. The LED will flash (~2Hz) 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 (or no AC power is present).

2.2.1.2 DC ⎓

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

2.2.1.3 Alarm 🔔

The bottom LED (red) is on continuously in the event of an active Module Fail alarm. The LED will flash (~2Hz) when a minor alarm is detected. 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.

2.2.1.4 LED Activity During ‘Locate Module’ Command from CXC

When the ‘locate module’ command has been received from the CXC, the LEDs will behave in a distinctly different way 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 distinct pattern repeating every 2 seconds.

2.2.1.5 LED Activity During Firmware Upload

When a rectifier firmware upload is in progress, the LEDs will behave in the same way as the 'locate module' command described above.

2.2.2 Mechanical

A locking clip 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. A 1/8 x 4 flat head screwdriver is used to lift and release the clip from the locked position.

2.3 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.

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 Heat Dissipation

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.

2.5 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.

2.6 Wide AC Range

A minor alarm is generated when the AC input voltage drops below specification.

Output power is reduced linearly between 176Vac and 132Vac to 60% of the rated output power.

Input current is limited to less than 6A for operation from 132Vac to 90Vac. 600W constant power output is available from 132Vac to 112 Vac. Output power is derated linearly from 600W to ~475W @ 90Vac.

At a lower voltage the module will shut down and will not restart until the AC is greater than 90Vac.

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

2.7 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.

[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.

2.8 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.

2.9 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.

2.10 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.

2.11 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.*

2.12 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.

2.13 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.

2.14 Cordex Modular System Controller (CXCM1)

The Cordex CXCM1 modular system controller is mounted in the rectifier system shelf and brings advanced monitoring technology to the Cordex CXRF-HP 48-1.2kW 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 CXCM1's front panel lies the main controller motherboard, which contains a microprocessor, memory, as well as numerous other electronic components.

The CXCM1 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 CXCM1 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.

NOTE: *Customer settings for the CXCM1 will be provided separately in the system documentation package.*

2.15 System Controller Front Panel

The CXCM1 has a 4-digit display for monitoring system voltage (V) and current (A). A pushbutton toggle switch allows the user to alternate the display reading.

System status LEDs

Ethernet port

Soft reset,
push once
[Hold for 3 seconds
to reset IP address]

LCD screen (V/A)

Display pushbutton
toggle switch (V/A)

Modem port

CAUTION
Do not connect anything other than the Argus modem and Argus-supplied DB-9 cable to the D-sub port on the front of the CXCM1

Figure 3–Cordex CXCM1 model system controller front panel

Details of controller operation are provided in the current version software manual.

2.15.1 LEDs

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

2.15.1.1 Alarm Conditions

The CXC 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.

2.15.1.2 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.
Lamp Test – all three LEDs flash on and off at the same time for 2 seconds.

2.15.2 Reset

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

See Section 7.4 for more information on CXC Reset functions.

2.15.3 Modem Port

The Modem port is designed for CXCM1 connection to Argus Technologies' Cordex DC Modem #018-585-20.

CAUTION
Do not connect anything other than the Argus modem and Argus-supplied DB-9 cable to the D-sub port on the front of the CXCM1.

2.15.4 Ethernet Port

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 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.

2.16 Analog Input Channels

2.16.1 Voltage Inputs

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

2.16.2 Current Inputs

The CXC software is pre-configured to monitor I1 for load current wired internally to the system current shunt.

2.16.3 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 to these terminals to power the temperature sensors.

2.17 Digital Input Channels

The CXCM1 can accommodate up to two (2) channels and can monitor digital alarm/control signals from rectifiers, converters and many other types of equipment. See Section 5.9.2.

2.18 Alarm and Control Output Relays

The CXCM1 contains four (4) 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. See Section 5.9.3.

2.19 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).

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.

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

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.

Verify that you have all the necessary parts per your order for proper assembly.

4 Installation

This chapter is provided for qualified personnel to install the product, which shall be mounted horizontally in a clean and dry environment.

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

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

4.1 Safety Precautions

WARNING
Hazardous voltages are present at the input of power systems. The DC output from the rectifiers and battery system, 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/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.

4.2 Shelf Preparation/Mounting

The shelf has been designed for center mounting in a 19” or 23” rack. See drawing 030-835-06 or 030-845-06.

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

Mounting brackets accommodate 1-3/4” rack spacing. The shelf should be mounted to the rack using at least two #12 – 24 x 1/2” screws in each bracket. Philips-type screws and screwdriver should be used to eliminate the possibility of slippage and scratching of the unit’s exterior.

NOTE: *An electrical conducting path shall exist between a unit’s chassis and the metalwork of the enclosure in which it is mounted or a grounding conductor. Electrical continuity shall be provided by the use of thread-forming type unit mounting screws that remove any paint or nonconductive coatings and establish metal-to-metal contact.*

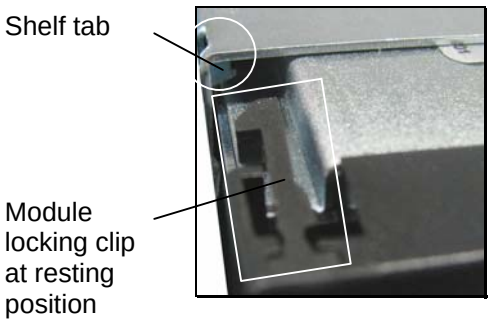
4.3 Module Insertion/Removal

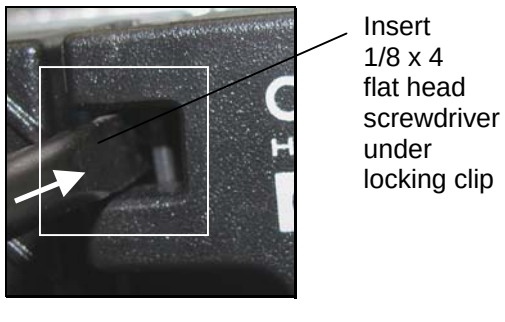
Insert by placing the module on the shelf bottom and sliding the module into the rear connector (inside of the shelf). Apply pressure on the front of the module to engage the rear connector in the shelf receptacle. A locking clip is provided to secure the rectifier into the shelf.

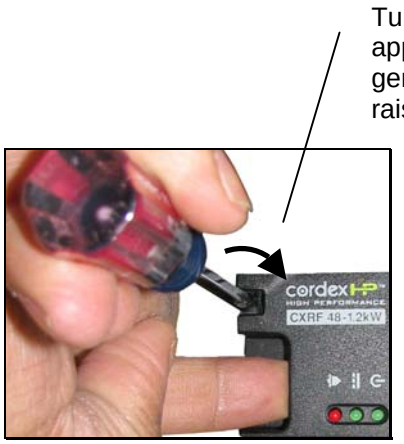
NOTE: *Do not force a module into position if it does not seat properly. All modules are keyed to ensure that the correct module (polarity/voltage) type is used.*

To remove a module, insert a 1/8 x 4 flat head screwdriver into the slot located on the top left corner of the front plastic panel. With one hand, turn the screwdriver clockwise approximately 30 degrees to move the clip from the resting state (locked position). With the other hand, grasp the ledge of the finger opening on the front panel to pull the module away from the rear connector and out of the shelf.

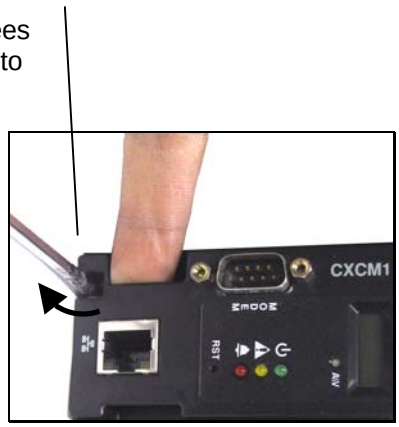
CXRF and CXCM1 removal shown as follows:







CXRF removal



CXCM1 removal

5 Wiring and Connections

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

NOTE: *Refer also to foldout drawings located at the rear of the manual.*

5.1 Safety Precautions

WARNING
Hazardous AC voltages may be present. Ensure power at the AC service panel is off before attempting work on the AC 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 additional safety precautions.

5.2 Tools Required

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

- Slot head screwdrivers (blade sizes: 1/4", 1/8", 1/16")
- Philips head screwdriver, #2 (tip size 3/16")
- Digital voltmeter equipped with test leads
- Adjustable 24/48Vdc load (optional)
- Cutters and wire strippers
- Crimping tool (optional for large gauge wire)
- Socket and rachet set (Imperial measure)
- Anti-static wrist strap
- Computer (laptop) with Microsoft® Internet Explorer 7 or greater
- Crossover cable RJ-45 (for access using the Ethernet port).

5.3 AC Feeder Protection/Sizing

To maximize system reliability, the AC feed divides the rectifiers into groups to be supplied by separate feeds. See customer connections drawing (modules are numbered left to right):

030-835-05: TBA-1 feeds modules 1 and 2. TBA-2 feeds modules 3 and 4.

030-845-05: TBA-1 feeds modules 1. TBA-2 feeds modules 2 and 3. TBA-3 feeds modules 4 and 5.

It is recommended for each feed to use a dedicated protection feeder breaker located at the AC distribution panel. The feeder breaker can also act as the disconnect device for the connected modules.

AC Input (Vac)	Number of Rectifiers (maximum) on AC Feed	Circuit Breaker Exact Value to Use (A)
120	2	15
220/240	2	20

Table A–Recommended AC supply configuration

5.4 AC Input

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.

Refer to Figure 3 and customer connections drawing 030-835-08 or 030-845-08.

NOTE: *The shelf incorporates IEC plug connections requiring line cords with C19R type receptacles. See ordering information for available cords.*

5.5 Calculating Output Wire Size Requirements

Wire size is calculated by first determining the appropriate maximum voltage drop requirement. Using the formula below calculate the CMA wire size requirement. Determine the size and number of conductors required to satisfy the CMA requirement.

CMA = (A x LF x K) / AVD, where:

CMA = Cross section of wire in circular MIL area
A = Ultimate drain in amps
LF = Conductor loop feet
K = 11.1 constant factor for commercial (TW type) copper wire
AVD = Allowable voltage drop

Check again that the ampacity rating of the cable meets the requirement for the installation application. Consult local electrical codes (NEC, CEC, etc.) for guidelines. If required, increase the size of the cable to meet the code.

5.6 DC Output

DC cable connections to the system are made at the rear of the shelf.

WARNING
Leave cables 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).

5.6.1 Chassis and Site Ground Connections

WARNING
For safety reasons, ensure the system is properly bonded to the building's ground grid.

Both the shelf chassis ground (via power system chassis ground) and common return shall be connected to the site ground to ensure correct operation of the system and to prevent drifting floating analog (especially current) readings.

The chassis is connected to the site ground via mounting brackets.

5.7 CAN Out Port

The 4-module shelf with CXCM1 has a single CAN Out port, for communications with CAN-enabled equipment (nodes), located on the side of the shelf. The 5-module shelf has two ports, one on each side.

Daisy-chain from node to node (CAN OUT of one node to CAN IN of another) as necessary and ensure that only the last node is terminated:

4-module shelf – termination IN – default
5-module shelf – termination OUT – default

NOTE: *This system has a limit of twelve Cordex 1.2kW rectifiers; they do not have self-powered CAN Bus nodes.*

5.8 Network Connection and Remote Communications via CXCM1

The Cordex system can be set up, monitored and tested via modem or ETHERNET 10/100 Base-T serial data connection. The communication protocol supports a web interface. Some standard scenarios are described below:

5.8.1 Modem Port

The Modem port is designed for CXCM1 connection to Argus Technologies' Cordex DC Modem #018-585-20.

CAUTION
Do not connect anything other than the Argus modem and Argus-supplied DB-9 cable to the D-sub port on the front of the CXCM1.

5.8.2 Ethernet Port for Network Connection (Standard Network Cable)

The Ethernet port is designed for CXCM1 connection to a user supplied network (TCP/IP secured by user) via a front panel RJ-45 jack.

Connect to the CXCM1 using a standard network cable. Pinouts are shown in drawing 030-834-08.

5.8.3 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.

5.9 Signal Wiring Connections

For terminal block connections, the recommended wire sizes are #16 to #26 AWG (1.5 to 0.129mm^2) for the temperature range of 0 to 50 deg. C (as per UL/CSA). Control and sense wires shall be UL approved Style 1015 (for Canadian users, TEW type).

CAUTION: to reduce risk of fire, use only #26 AWG (0.129mm^2) 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 Argus power system documentation package.*

The signal cables should be bundled together and routed through the entry holes of the shelf.

5.9.1 Analog Inputs for CXCM1

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

The analog input channels are used to monitor various types of electrical signals.

Voltage (Input) is 0—60Vdc. Temp Probe is 0—20Vdc with power source.

5.9.1.1 Voltage

Voltage Input #1 (load voltage per CXC software) terminals on the shelf provide connections to an optional secondary voltage input. For example, this can be terminated to the load side of an LVD contactor to monitor load voltage.

Voltage Input #2 (battery voltage per CXC software) is wired internally to the rectifier output voltage of the shelf. This is used as the reference for system alarming (such as high voltage) and control (such as LVD).

The Battery -48V should be connected at the battery system voltage terminal for CXCM1 reference when a battery disconnect device is used. It is critical to CXCM1 operation as it ensures a source of power to the CXCM1 should the disconnect device open the circuit.

5.9.1.2 Current

Current Input #1 (load current per CXC software) may be wired to an external system current shunt.

5.9.1.3 Temperature Sensor

Temperature Probe input channels provide connections for up to two temperature sensors. A voltage is supplied to these terminals for sensor measurements.

5.9.2 Digital Inputs for CXCM1

The digital input channels (factory-installed) 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.

D1 and D2 are available for customer connections as required.

5.9.2.1 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 9) allows the digital input to receive (or not receive) a Ground signal on an alarm.

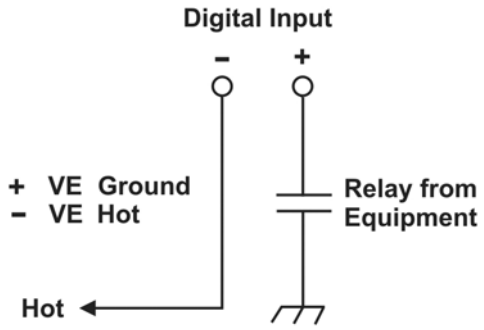


Figure 4–Showing digital input connection method

5.9.2.2 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	9—60

Table B–Voltage level definitions for digital inputs

5.9.3 Alarm (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 10.

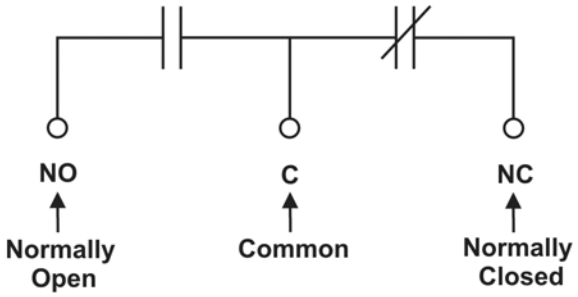


Figure 5–Showing relay connections

Relays can be programmed to energize or de-energize during an alarm condition (see CXC Software manual). When the CXCM1 reset button is pressed or power is lost, all relays de-energize.

These relays could be used for additional external LVD contactor control; however, this would not provide redundant LVD control.

5.9.4 LVD Control Alternative

The LVD Control functions can be hardwired directly from an alarm output relay to an external LVD contactor (or panel). See Controls Menu Defaults in the CXC Software manual.

6 Operation

6.1 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.

6.1.1 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.

6.1.2 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.*

6.1.3 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.

6.1.4 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.

6.1.5 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.

6.2 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:

6.2.1 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 the five 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.
Manual Test	Output voltage can be manually adjusted outside of the standard adjustment ranges.

Table C–Output voltage modes

6.2.2 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 D–Output current/power modes

6.3 Can Bus Communications

The CAN bus is used for communication between the rectifier and CXC.

The communication between the rectifier and CXC consists of commands and data transfer that are used during the operation of the power system to configure the rectifier with system settings and to monitor rectifier status.

6.4 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	48 – 58V	54V
Equalize (EQ) Voltage	50 – 58V	55V
Battery Test (BT) Voltage	44 – 52V	46V
OVP	See note below – 59V	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 – 59V	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 E–Cordex 48-1.2kW 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.*

7 System Startup

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

7.1 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.

7.2 Verify AC and Power the Shelf

- Install one power module.
- Verify AC input voltage is correct and turn on the corresponding AC input feeder breaker.
- The power module OK LED should illuminate after a preset start delay.
- Using the CXCM1, test functionality of various module alarms and controls.

7.3 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 or turn on battery breaker.
- Install remaining power modules.
- In the adjustments menu of the CXCM1 (web browser), set Float and Equalize voltage to the levels specified by the battery manufacturer.
- Using the CXCM1, test functionality of various module alarms and controls. In addition, perform a load test with the system using a resistive load box as needed.

7.3.1 CXCM1 Alarm Configuration for Nominal 120Vac Operation

The default setting for low AC voltage alarming is 180Vac. For nominal 120Vac operation, it is recommended to reset this value to 100Vac.

To reconfigure this alarm parameter, go to “Alarms” – “Configure Alarms”. Under “Alarm Configuration,” select “Voltage Alarms.” Select and modify the activation value for “AC Mains Low” to 100Vac. Submit changes to save the new configuration.

7.4 CXC Reset

7.4.1 Soft Reset

The reset button located on the front panel of the CXCM1 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.

7.4.2 IP Address Reset

To reset the IP address, press and hold the front panel reset button for three seconds. The CXCM1 unit will beep three times, IP will be reset (to 10.10.10.201) and DHCP will be disabled. The settings will be saved and the unit will then reset.

This will allow local access; e.g., with a laptop and a standard network crossover cable. See current version software manual for details.

7.4.3 Hard Reset

A hard reset of the CXCM1 may be performed by unplugging the module. This may be used to restart the microprocessor in the event that the front panel (soft) reset button fails to operate as described above.

CAUTION: Use of hard reset may cause loss of data.

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 shelf 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.

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

Table F–Sample maintenance log

8.1 Fan Replacement

1. Shut off the unit and unlock the power module.
2. Slide the module 10 cm (4”) out of the shelf and wait two minutes for module capacitors to discharge.
3. Remove the bottom screw that secures the front panel to the module chassis.
4. Slide the front panel out.
5. Disconnect the fan power lead wires from the module.
6. Note the direction of airflow and remove the fan from the front panel.
7. Install the replacement fan 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:

"-06" Outline Drawing
"-08" Customer Connections
"-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)
HVSD	High voltage shutdown
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
LED	Light emitting diode
LVD	Low voltage disconnect
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

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REVISION				
LTR	DESCRIPTION	REV BY	DATE	APPD

PCB ASSY, CXCI, MOTHERBOARD
PART NUMBER: 707-492-20
LIST 92

SCHEMATIC: 707-492-05

SCHEMATIC: 707-684-05

CAN IN

CAN TERMINATION JUMPER

DB 25 CXC I/O INTERFACE

RECTIFIER #1

RECTIFIER #2

RECTIFIER #3

RECTIFIER #4

SYSTEM OUTPUT

AC INPUT

AC FEED MDLS 1 & 2

AC FEED MDLS 3 & 4

PCB ASSY, 19" BACKPLANE CXRC 1.2kW
PART NUMBER: 707-660-19
SCHEMATIC: 707-660-05

ARGUS®

DESIGN	W.H	2009/04	MATERIAL
DRAWN	W.H	2009/04	
CHECKED		2009/04	
APPROVED		2009/04	FINISH
TOLERANCES			SCALE N/A

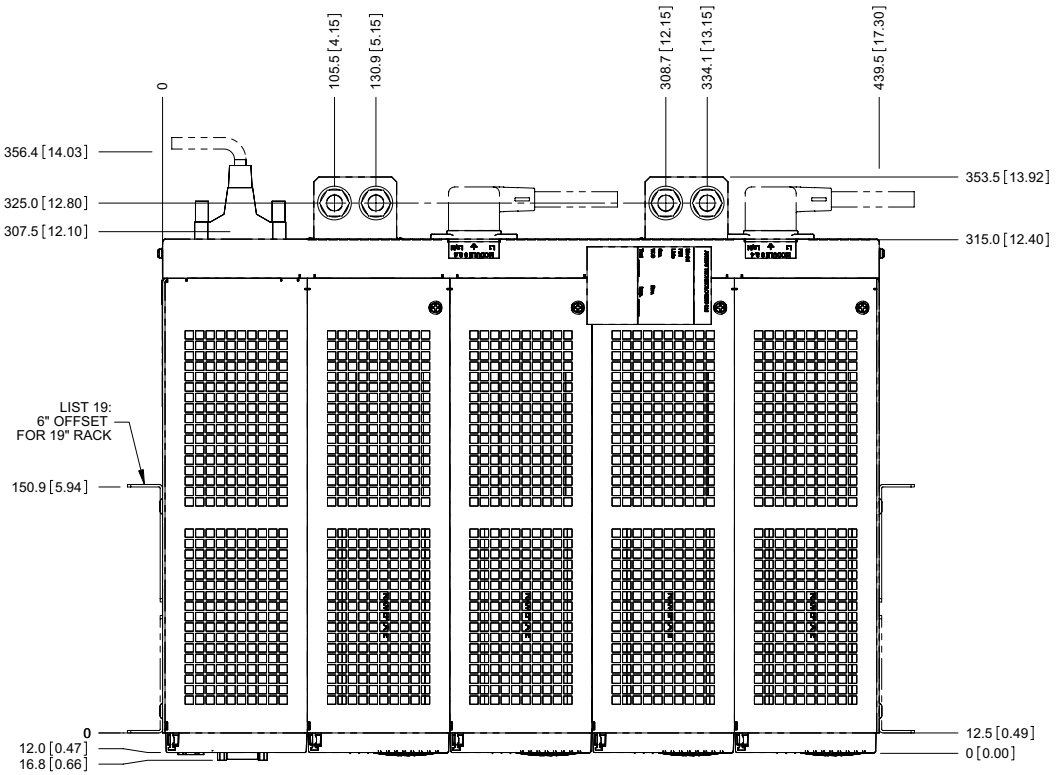
TITLE: SCHEMATIC, SHELF, 19", 4 MDL, CXCI, 1.2kW

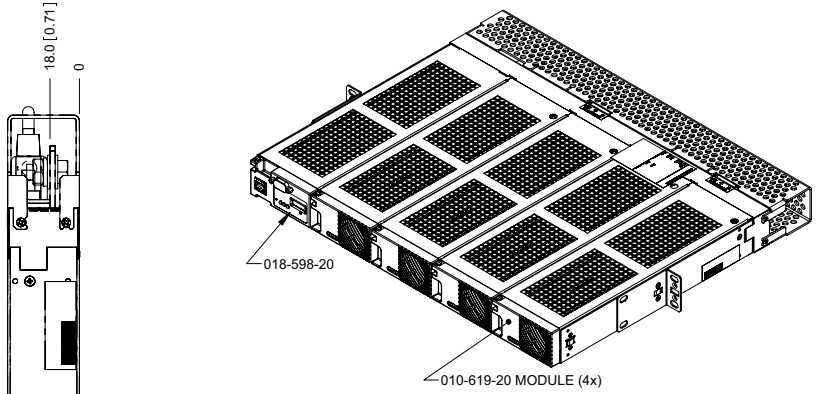
ISSUE DATE

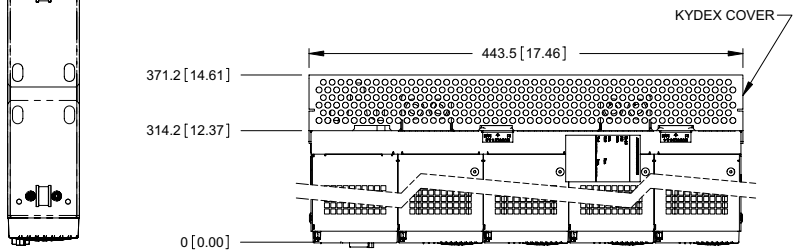
SHEET 1 of 1

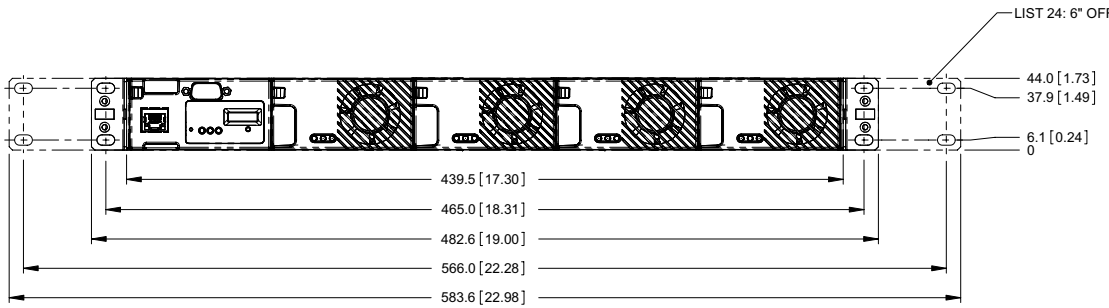
SIZE		DWG NO.	REV
B	S3	030-835-05	P/A

REVISIONS					
LTR	DESCRIPTION	DWN	DATE	CHKD	APPD
P/C	RE-DESIGNED; P/A ,P/B NOT RELEASED	WH	2009/05		









ITEM
QTY

ARGUS®

UNITS: mm [in]
X [X.X] ±1 [±0.040]
X.X [X.XX] ±0.5 [±0.020]
X.XX [X.XXX] ±0.05 [±0.002]
ANGULAR: ±0.5°

SCALE: NTS

TITLE: OUTLINE DRAWING, ASSY,SHELF,19",1RU HOR, 4MDL,CXRF48-1.2kW

	NAME	DATE
DESIGN	RP	2009/02
DRAWN	SY	2009/02
CHECKED	WH	2009/02
APPROVED	MC	2009/02

ISSUE DATE

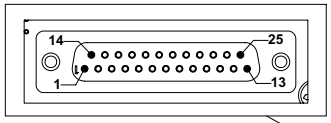
SHEET 1 OF 1

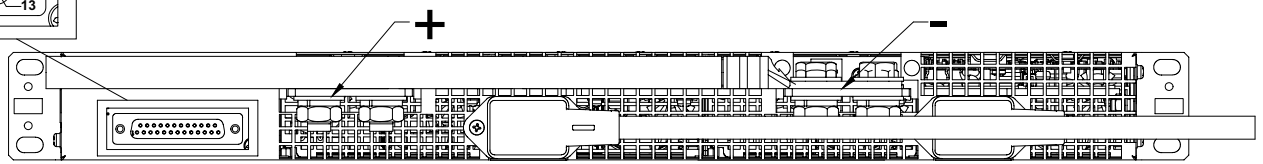
SIZE	TYPE	DWG NO.	REV
B	D2	030-835-06	P/C

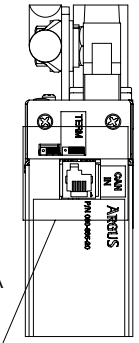
REVISIONS					
LTR	DESCRIPTION	DWN	DATE	CHKD	APPD

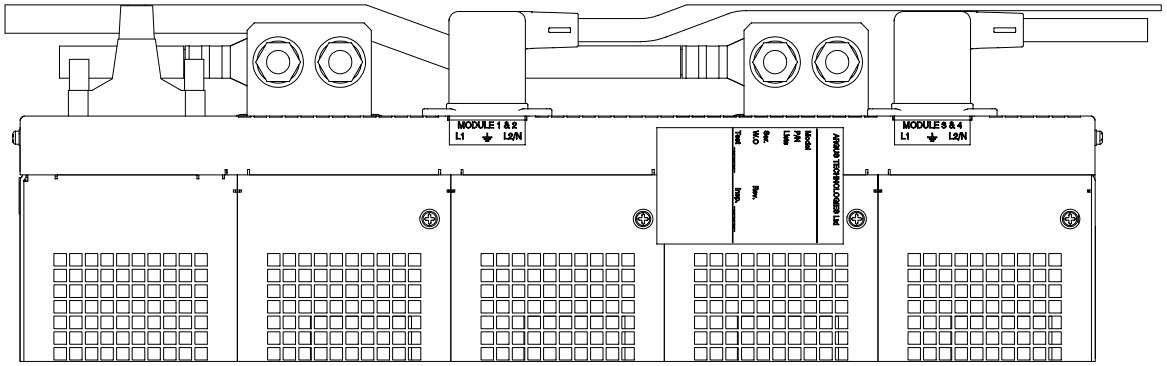
CXCI DB-25 (ALARM)	
PIN	FUNCTION
1	K1-COM
2	K1-NC
3	K2-COM
4	K3-NC
5	K3-NO
6	K4-COM
7	D1-1
8	D2-1
9	V1+
10	T1+
11	T2+
12	I1+
13	BATT HOT
14	K1-NO
15	K2-NC
16	K2-NO
17	K3-COM
18	K4-NO
19	K4-NC
20	D1-2
21	D2-2
22	V1-
23	T1-
24	T2-
25	I1-

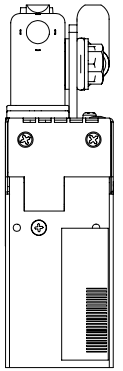
DETAIL C









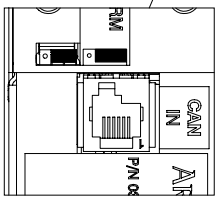


CAN TERMINATION

OPEN

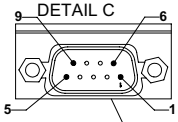
TERMINATED (DEFAULT)

DETAIL A

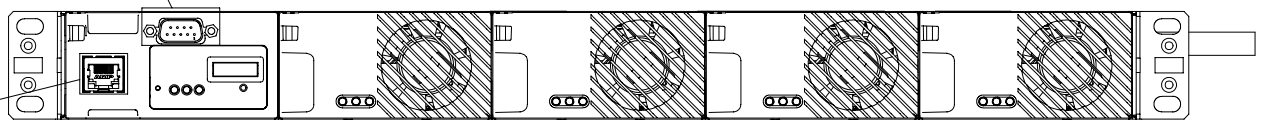


CAN IN RJ12 OFFSET	
PIN	FUNCTION
1	CAN COM
2	CAN H
3	NOT CONNECTED
4	CAN L
5	NOT CONNECTED
6	CAN +5V

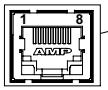
DETAIL C



DB9 (FOR ARGUS DC MODEM USE ONLY)	
PIN	FUNCTION
1	DCD
2	RX
3	TX
4	DTR
5	COM
6	DSR
7	RTS
8	CTS
9	RI



DETAIL B



ETHERNET RJ45	
PIN	FUNCTION
1	TX+
2	TX-
3	RX+
4	NOT CONNECTED
5	NOT CONNECTED
6	RX-
7	NOT CONNECTED
8	NOT CONNECTED

ITEM
QTY

ARGUS®

UNITS: mm [in]

X [X.X]	±1	[±0.040]
X.X [X.XX]	±0.5	[±0.020]
X.XX [X.XXX]	±0.05	[±0.002]
ANGULAR:	±0.5°	

SCALE: NTS

TITLE: CUSTOMER CONN. SHELF 19", 1RU HOR 4MDL

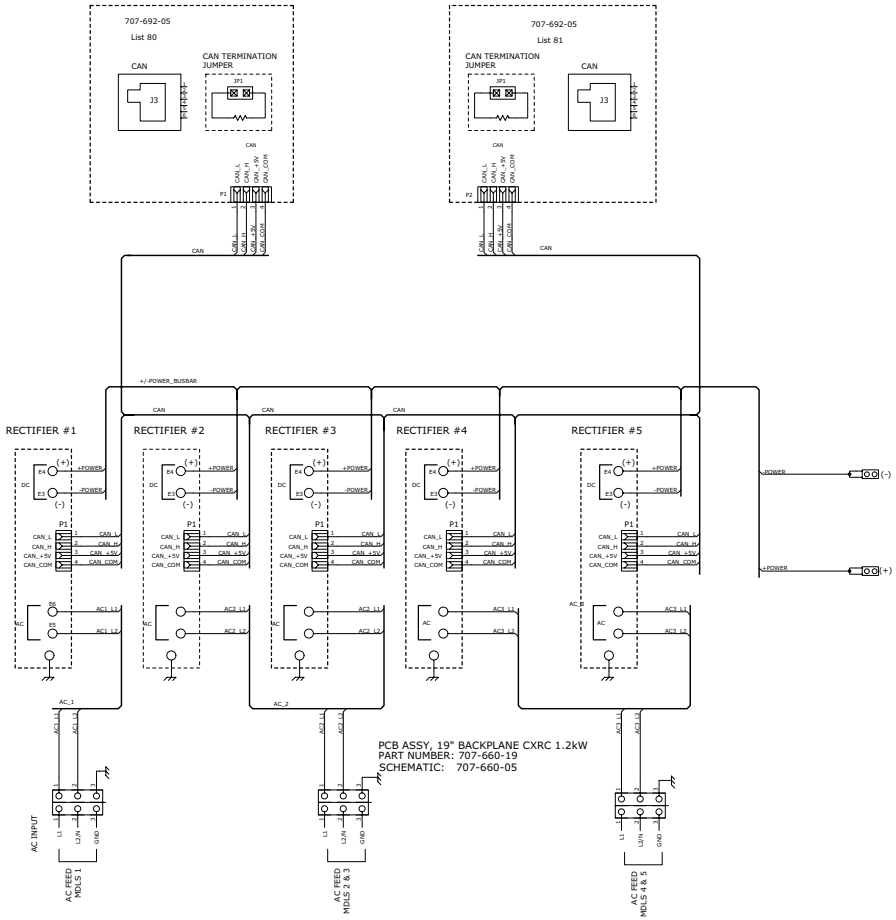
	NAME	DATE
DESIGN	WH	2009/05
DRAWN	WH	2009/05
CHECKED	SY	2009/05
APPROVED	MC	2009/05

ISSUE DATE

SHEET 1 OF 1

SIZE	TYPE	DWG NO.	REV
B	D2	030-835-08	P/A

REVISION				
LTR	DESCRIPTION	REV BY	DATE	APPD



ARGUS®

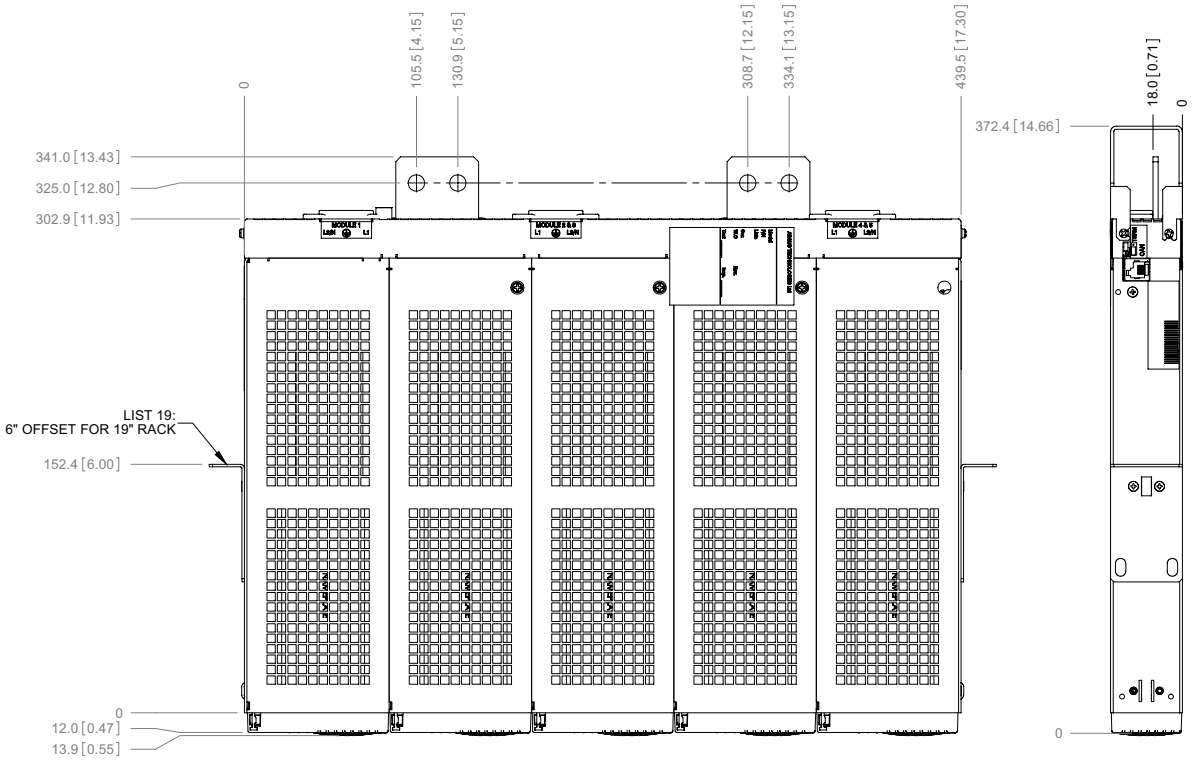
DESIGN	W.H	2009/04	MATERIAL
DRAWN	W.H	2009/04	
CHECKED		2009/04	
APPROVED		2009/04	FINISH
TOLERANCES			SCALE N/A

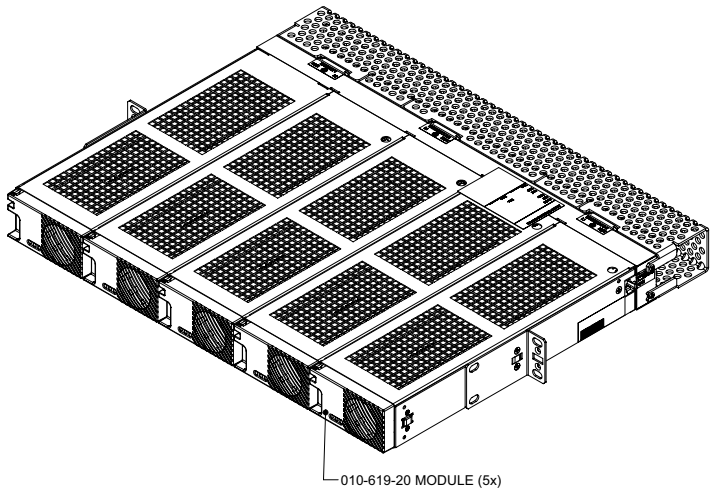
TITLE: SCHEMATIC, SHELF, 19", 1RU HOR, 5MDL, CXRF 48-1.2kW

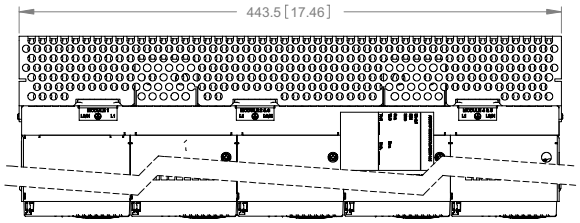
ISSUE DATE | SHEET 1 of 1

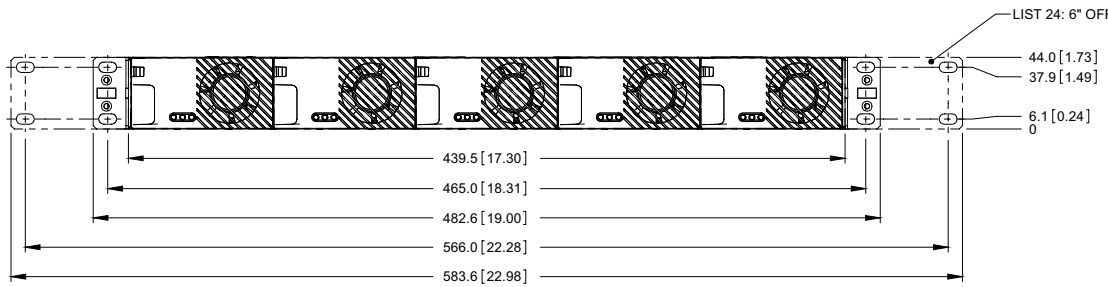
SIZE		DWG NO.	REV
B	S3	030-845-05	P/A

REVISIONS					
LTR	DESCRIPTION	DWN	DATE	CHKD	APPD









ITEM
QTY

ARGUS®

UNITS: mm [in]
X [X.X] ±1 [±0.040]
X.X [X.XX] ±0.5 [±0.020]
X.XX [X.XXX] ±0.05 [±0.002]
ANGULAR: ±0.5°

SCALE: NTS

TITLE: OUTLINE DRAWING, ASSY,SHELF,19",1RU HOR, 5MDL,CXRF48-1.2kW

	NAME	DATE
DESIGN	SY	2009/05
DRAWN	WH	2009/05
CHECKED	SY	2009/10
APPROVED	MC	2009/10

ISSUE DATE

SHEET 1 OF 1

SIZE	TYPE	DWG NO.	REV
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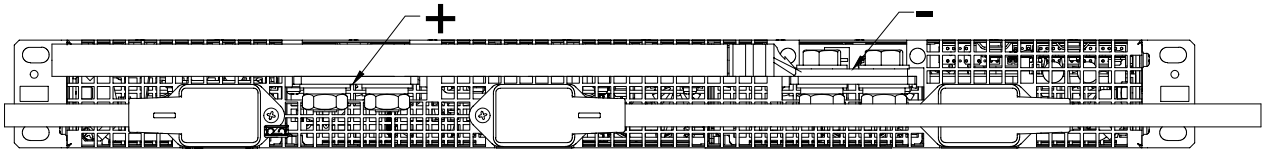
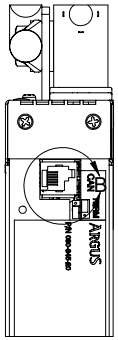
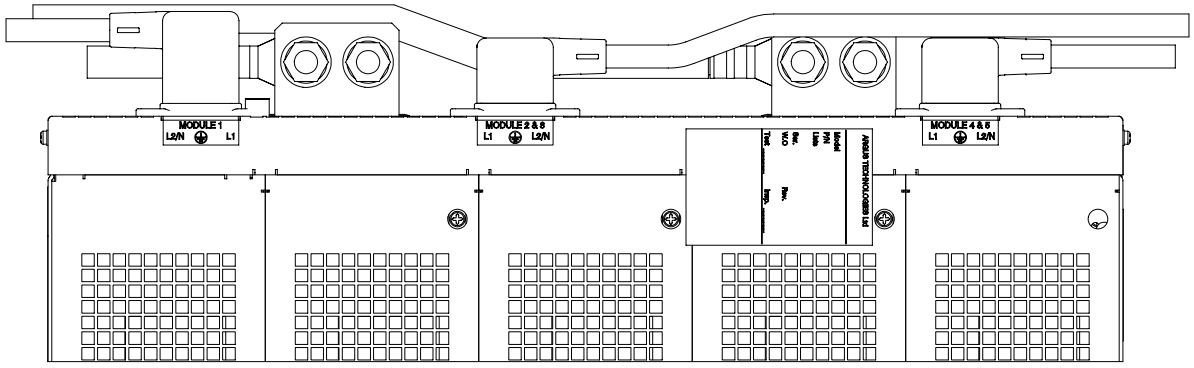
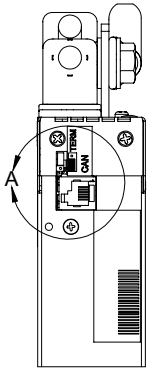
REVISIONS					
LTR	DESCRIPTION	DWN	DATE	CHKD	APPD

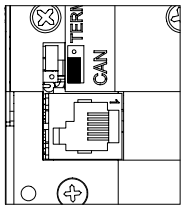






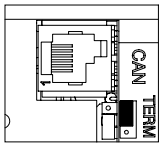


CAN TERMINATION
TERMINATED
OPEN (DEFAULT)



DETAIL A

CAN IN RJ12 OFFSET	
PIN	FUNCTION
1	CAN COM
2	CAN H
3	NOT CONNECTED
4	CAN L
5	NOT CONNECTED
6	CAN +5V



DETAIL B

CAN IN RJ12 OFFSET	
PIN	FUNCTION
1	CAN COM
2	CAN H
3	NOT CONNECTED
4	CAN L
5	NOT CONNECTED
6	CAN +5V

CAN TERMINATION
OPEN (DEFAULT)
TERMINATED

ITEM
QTY

ARGUS®

UNITS: mm [in]
X [X.X] ±1 [±0.040]
X.X [X.XX] ±0.5 [±0.020]
X.XX [X.XXX] ±0.05 [±0.002]
ANGULAR: ±0.5°

SCALE: NTS

TITLE: CUSTOMER CONN. SHELF 19", 1RU HOR 5MDL

	NAME	DATE
DESIGN	WH	2009/05
DRAWN	WH	2009/05
CHECKED	SY	2009/05
APPROVED	MC	2009/05

ISSUE DATE

SHEET 1 OF 1

SIZE B | TYPE D2 | DWG NO. 030-845-08 | REV P/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
Belen 315, Capital Federal, Buenos Aires,
1407l Argentina
Tel: +54 (11) 4672 4821
Fax: +54 (11) 4504 4698
Cell: +54 9 (11) 4993 9996
Email: lkleiman@argus.ca

Asia
Argus Technologies Asia Pte Ltd
Blk 6 Tagore Lane #160
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Tel: +65 6458 8900
Fax: +65 6458 2122

Australia
CPS National
8/376 Newbridge Rd
Moorebank, NSW, 2170 Australia
Tel: +61 02 9822 8977
Fax: +61 02 9822 8077

Australia/New Zealand
Alpha Power Systems Pty Ltd.
Unit 3, 30 Heathcote Road
Moorebank, NSW, 2170 Australia
Tel: +61 02 9602 8331
Fax: +61 02 9602 9180

Century Yuasa
37 - 65 Colbalt Street
Carole Park QLD 4300
Australian Sales & Service
Tel: +61 07 3361 6587
Fax: +61 07 3361 6705
New Zealand Sales & Service
Tel: +64 9 978 6689
Fax: +64 9 978 6677

Brazil
Argus Brasil Serviços e Comércio Ltda
Rua: Constituição,145/147 - Santos
São Paulo – Brasil 11015-471
Tel: +55 (13) 3234 2469
Fax: +55 (13) 3234 2469
Cell: +55 (13) 7806 1438
Email: argusbrasil@bignet.com.br

Canada
Compower Systems Inc.
118 Tiffield Road
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Tel: +1 416 293 3088
Fax: +1 416 293 0671

Europe
Alpha Technologies Europe Ltd.
Cartel Business Estate
Edinburgh Way
Harlow, Essex, CM20 2DU UK
Tel: +44 1279 422110
Fax: +44 1279 423355

Mexico & Central America
Technologies Argus First De Mexico
SA de CV
Anatole France No. 17
Col. Polanco
Mexico City, 11560 Mexico
Tel: +52 55 5280 6990
Fax: +52 55 5280 6585

Romania
Alphapower SRL
Str. Paul Constantinescu nr.5
Timisoara, Romania
Tel: +40 21 569 1214
Cell: +40 31 816 1491

South America
Argus Technologies Argentina
Santo Tome 2573, Capital Federal
Buenos Aires, 1416 Argentina
Tel: +54 11 4504 4698
Cell: +54 9 11 4993 9996
E-pager: 541149939996@nextel.net.ar

Turkey
IPC Enerji Elk San ve TIC AS
Inonu cad. Kanarya sok. No:20
Yenisahra - Kadikoy
Istanbul, Turkey
Tel: +90 216 317 41 42
Fax: +90 216 472 90 66

048-693-10 Rev C (04/2008)