ARGUS

Pathfinder 48V-2kW Modular Switched Mode Rectifier System

010-558-B2

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Power

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Argus Technologies Ltd.

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Pathfinder 48V-2kW
Modular Switched Mode Rectifier System

010-558-B2

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

• **Specifications:**	010-558-B1 Rev A		
• **Warranty Policy:**	048-507-10		
• **Safety, Installation and Operation Instructions:**	010-548-C0 Rev A		
• **Outline Drawings**			
19” Shelf:	030-633-06	23” Shelf:	030-634-06
• **Customer Connections**			
19” Shelf:	030-633-08	23” Shelf:	030-634-08
• **Spare Parts List:**	010-558-G0		
• **Factory Service Information:**	048-527-10		

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MANUAL ADDENDUM

Unit Description: Pathfinder 1.5kW & 2kW Modular Switched Mode Rectifier Systems
Manual P/N: 010-548-C0 Applies to Manual Revision: A
Applies to Manuals: 010-548-B2 (48V-1.5kW) and 010-558-B2 (48V-2kW)

#	Date	Page#	Correction to be implemented
1	07-06-12	7, 15, 20 of 010-548-C0	**NOTE:** For Pathfinder 48-1.5kW and 48V-2kW rectifiers in the same shelf (or system) utilizing an Argus SM Series controller, set the current limit to no more than 33A (the maximum of the lower power unit).

SPECIFICATIONS FOR ARGUS' SWITCHED MODE RECTIFIER PATHFINDER 48V-2kW

Power Module Output

Voltage:	42 to 60VDC
Current:	0 to 44ADC
Maximum Power:	2000W continuous/module @ 50 to 56VDC
Heat Dissipation:	675 BTU/hr
Regulation:	±25mV line and load at zero slope
Transient Response:	≤2ms to 0.1% of output for 50 to 100% load step <1% deviation for 50 to 100% load step <2% deviation for 10 to 90% load step
Time Stability:	≤0.2% per year
Temperature Stability:	≤100ppm/°C over the operating range
Noise:	≤22dBrnC with battery (Voice Band) ≤10mVrms, 10kHz to 10MHz (Wide Band) ≤150mVp-p, 10kHz to 100MHz
EMI:	The unit meets the requirements of: EN 55022 (CISPR 22): 1994, Class B FCC Part 15, Class B ICES-003, Class B

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.

SPECIFICATIONS FOR ARGUS' SWITCHED MODE RECTIFIER PATHFINDER 48V-2kW

Power Module Input

Voltage:	208 to 240VAC nominal 184 to 265VAC operating 90 to 312VAC extended range (derated output power or input power factor)
Frequency:	45 to 70Hz
Current:	10.6A (208VAC nominal) @ 2000W/output 9.2A (240VAC nominal) @ 2000W/output
Power Factor:	>0.99 true @ 50 to 100% load
T.I.F. (Current):	<120 at 100% load
Efficiency:	≥91% @ 50 to 100% load (at nominal input voltage) (92% typical) >87% @ 25 to 50% load
Source Impedance:	≤25% inductive or 5% resistive
Fuse Type/Rating:	2x Bussmann ABC-15 / 15A, 250VAC fast blow 10kA @ 125VAC
Input Transient Suppression:	Meets IEEE/ANSI C62.41 Category B3

Miscellaneous

3 Module Cabinet Size:	133mm H x 432mm W x 346mm D[1] (5.25" H x 17" W x 13.6" D)
4 Module Cabinet Size:	133mm H x 533mm W x 346mm D[1] (5.25" H x 21" W x 13.6" D)
Cabinet Mounting:	19" or 23", flush, 1-1/8" offset, 6" offset
Acoustic Noise:	<60dBa @ 1m (3 ft)
Module Weight:	5.7kg (12.5 lb.)
3 Module Cabinet Weight:	7.3kg (16 lb.)
4 Module Cabinet Weight:	8.6kg (19 lb.)
Alarm Connection Ratings:	60VDC, 0.5A maximum

Environmental

Temperature:	0 to 65°C (32 to 149°F) [standard operating] -40 to 65°C (-40 to 149°F) [extended operating] -55 to 85°C (-67 to 185°F) [storage]
Humidity:	0 to 95% non-condensing
Elevation:	-500 to 3000m (-1640 to 9843 ft)

[1] 359mm D (14.1" D) including rear terminal cover.

SPECIFICATIONS FOR ARGUS' SWITCHED MODE RECTIFIER PATHFINDER 48V-2kW

Standards

Safety:	CSA C22.2 No. 60950-00 UL 60950-2000 EN 60950-1993 with Amendments 1-4, with deviation for Germany (CB Scheme).
Electromagnetic Compatibility:	
FCC 47 CFR Part 15:1998	Class B Radiated & Conducted Emissions
ENV 50204-1996	Radiated Electromagnetic Immunity Digital Radio Telephones
EN 55022 (CISPR 22):1994	Class B Radiated & Conducted Emissions
ICES-003	Class B
EN 61000-3-2:1995	Harmonic Current Emissions
EN 61000-4-2:1995	ESD Immunity
EN 61000-4-3:1996	Radiated Electromagnetic Immunity
EN 61000-4-4:1995	Electrical Fast Transients/Burst Immunity
EN 61000-4-5:1995	Power Line Surge Immunity Installation Class 4
EN 61000-4-6:1997	Conducted Electromagnetic Immunity
EN 61000-4-11:1994	Voltage Dips, Short Interruptions, Variations
IEEE/ANSI C62.41:1991	Surge Voltages, Location Category B3.
General:	
Bellcore GR-63-CORE:1995	Vibration & Shock, (Transport / Shock Packaged) Category A, (4.3.1 and 4.4.4)

Recommended Connection Wire Sizes (as per UL/CSA)

For operation @ 30°C:	**Recommended Feeder Breaker** (serves as a disconnect device for its associated modules):
#14 AWG, 3 Mod 3 Feed	15A, 1PH
#8 AWG, 3 Mod 1 Feed	50A, 1PH
#10 AWG, 3 Mod 3 Phase	30A, 3PH
#14 AWG, 4 Mod 4 Feed	15A, 1PH
#6 AWG, 4 Mod 1 Feed	60A, 1PH
#10 AWG, 4 Mod 2 Feed	30A, 1PH

NOTE: Check with local and/or national electrical codes for specific input wiring requirements, including temperature derating factors, etc.

Field Connection Terminals

AC Input (Terminal Blocks):	#10 to #14 AWG, 3 Mod 3 Feed (19" cabinet) #6 to #8 AWG, 3 Mod 1 Feed (19" cabinet) #10 AWG, 3 Mod 3 Phase (19" cabinet) #10 to #14 AWG, 4 Mod 4 Feed (23" cabinet) #6 AWG, 4 Mod 1 Feed (23" cabinet) #10 AWG, 4 Mod 2 Feed (23" cabinet)
DC Output:	3/8"-16 threaded inserts for 1" spacing lugs (customer supplied) with 3/8"-16 x ¾" bolts with lock and flat washers
Control/Alarm:	#14 - #26 AWG (mechanical compression)

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.

WARRANTY AND REPAIR INFORMATION

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.

Freight Policy

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

Terms of Payment (North America)

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

Terms of Payment (International)

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

Return Material Policy

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

To obtain a RMA 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. Both the shipping documents and the outside of the box must have the RMA # 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 RMA number.

Business Hours

Argus North American office hours are 7:30 am to 5:00 pm (Pacific Standard Time) Monday to Friday.

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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important safety and operating instructions for the Argus Pathfinder 1.5kW & 2kW rectifier series.

1. Please read this manual thoroughly prior to use to become familiar with the rectifier'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 or 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 rectifier.

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

4. Do not expose the rectifier to rain or snow.

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

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

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

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CONTENTS

1 INTRODUCTION 1
1.1 Scope of the Manual 1
1.2 Product Overview 1
1.3 Part Numbers and List Options 2
2 SYSTEM FEATURES, ALARMS AND CONTROLS 3
2.1 Shelf Features 3
2.2 Power Module Features 5
2.3 Module Fail Alarms 9
2.4 General Alarms 9
3 INSPECTION 11
3.1 Packing Materials 11
3.2 Check for Damage 11
4 SHELF INSTALLATION 12
4.1 Safety Precautions 12
4.2 Tools Required 12
4.3 Preparation/Mounting 12
5 SHELF GROUNDING, WIRING AND CONNECTIONS 13
5.1 Safety Precautions 13
5.2 Chassis Ground 13
5.3 AC Feeder Protection/Sizing 13
5.4 AC Input Connections 13
5.5 DC Output Connections 14
5.6 Alarm and Control Connections 14
5.7 Remote Communications Connections 14
6 INITIAL START-UP AND CHECKOUT 15
7 OPERATION AND ADJUSTMENTS 16
7.1 Start-up and Reset Procedure (after initial system installation) 16
7.2 Module Installation and Removal 16
7.3 Modes Of Operation 16
7.4 Menu Structure 17
7.5 Menu Descriptions 17
7.6 Miscellaneous Defaults/Adjustments/Controls 22
7.7 Factory Defaults and Ranges 23
8 REMOTE COMMUNICATIONS 24
8.1 Multiple Shelf Connections (RS-485) 24
8.2 Connecting the SM Series Panel (RS-485) 24
8.3 Communications using a PC/Terminal 25
9 MAINTENANCE AND SERVICE 26
9.1 Maintenance 26

9.2 Service 26
10 ARGUS CONVENTIONS 28
10.1 Numbering System 28
10.2 Acronyms and Definitions 28

FIGURES

Figure 1–Front perspective view of Pathfinder 19" shelf (with 1.5kw or 2kW modules) 1
Figure 2–Front view of Pathfinder (1.5kW or 2kW) shelf (modules removed) 3
Figure 3–Front perspective view of power module 5
Figure 4–Pathfinder LCD in Normal mode 16
Figure 5–Pathfinder menu tree 18
Figure 6–Pathfinder communications connections 24

TABLES

Table A–Alarm wiring connections 14
Table B–Control wiring connections 14
Table C–Adjustments menu defaults 23
Table D–Remote communications menu defaults 23
Table E–Test menu defaults 23
Table F–Navigation and status commands 25
Table G–Sample maintenance log 26

1 INTRODUCTION

1.1 Scope of the Manual

This instruction manual explains the installation, interconnection and operation of Argus Technologies' Pathfinder 1.5kW and 2kW modular, switched mode rectifier systems. The topics covered include: product specifications, features, installation and configuration, operation and maintenance.

NOTE: All references to the Pathfinder 48 VDC output rectifier system, also apply to the Pathfinder 24VDC output rectifier system, unless specified otherwise.

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

1.2 Product Overview

The Pathfinder 1.5kW and 2kW rectifier modules use a high frequency, switched mode conversion technique to provide a fully regulated and isolated DC output from the AC mains. 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 time of ordering or added after the shelf has been installed.

A complete rectifier system consists of one or more power modules and a common shelf enclosure to output up to 4.5kW (three 1.5kW modules) or 6kW (four 1.5kW modules or three 2kW modules) or 8kW (four 2kW modules). The shelf has connections for AC inputs, DC output, and various alarm/control relays.

The Pathfinder rectifier system is designed to operate with the Argus SM series of system control panels via RS-485 shelf connectors for communications. This allows the user to setup, control and monitor the entire power system and ancillary components from one central, easy-to-use source.

Pathfinder power modules can be adjusted and monitored locally via an optional front panel control-key interface and LCD display option.

Figure 1–Front perspective view of Pathfinder 19" shelf (with 1.5kw or 2kW modules)

1.3 Part Numbers and List Options

The Pathfinder 1.5kW or 2kW is available to order under the following part numbers and list options:

Description	Part Number/List Option
Pathfinder 48V-1.5kW power module	010-548-20
Pathfinder 24V-1.5kW power module	010-549-20
Pathfinder 48V-2kW power module	010-558-20
Basic module	*List 0
Standard temperature, 0 to +65 deg.C	List 40
Extended temperature, -40 to +65 deg.C	List 42
Gray finish	*List 55
No LCD display/keypad	List 80
With LCD display/keypad	List 81
Extended float voltage, 42-58V (48V-2kW power module only)	List 89
Pathfinder 19” shelf	030-633-20
24VDC output (24V-1.5kW power module only)	List 1
48VDC output	List 2
Universal mount	**List 18
6” offset mount for 19”rack	**List 19
Flush mount	**List 21
6” offset mount for 23”rack	**List 23
Flush mount for 23”rack	**List 25
Standard temperature	List 40
Extended temperature	List 42
Gray finish	*List 55
Multiple feed, 1-phase	List 80
Single feed, 1-phase	List 82
Single feed, 3-phase	List 83
Module blank plate, front	List 90
Module blank plate, front and top	List 91
Pathfinder 23” shelf	030-634-20
24VDC output (24V-1.5kW power module only)	List 1
48VDC output	List 2
Universal mount	**List 18
Flush mount	**List 21
6” offset mount for 23”rack	**List 23
Flush mount for 23”rack	**List 25
Standard temperature	List 40
Extended temperature	List 42
Gray finish	*List 55
Multiple feed, 1-phase	List 80
Single feed, 1-phase	List 82
Dual feed, 1-phase	List 84
Module blank plate, front	List 90
Module blank plate, front and top	List 91

* Default option
** Default option is List 18 for shipping. Customer may then re-configure as desired.

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

2 SYSTEM FEATURES, ALARMS AND CONTROLS

2.1 Shelf Features

The Pathfinder's shelf contains connections for up to four rectifier power modules, AC input, DC output, several remote alarm/controls, and RS-485 communications. When the power modules are removed from the shelf, all cabling connections to the shelf are front-accessible with exception of DC outputs. DC connections are made at the rear of the shelf. (DC cable entry is at the side of the shelf.)

2.1.1 Shelf Descriptions

A brief description of each shelf feature is show below:

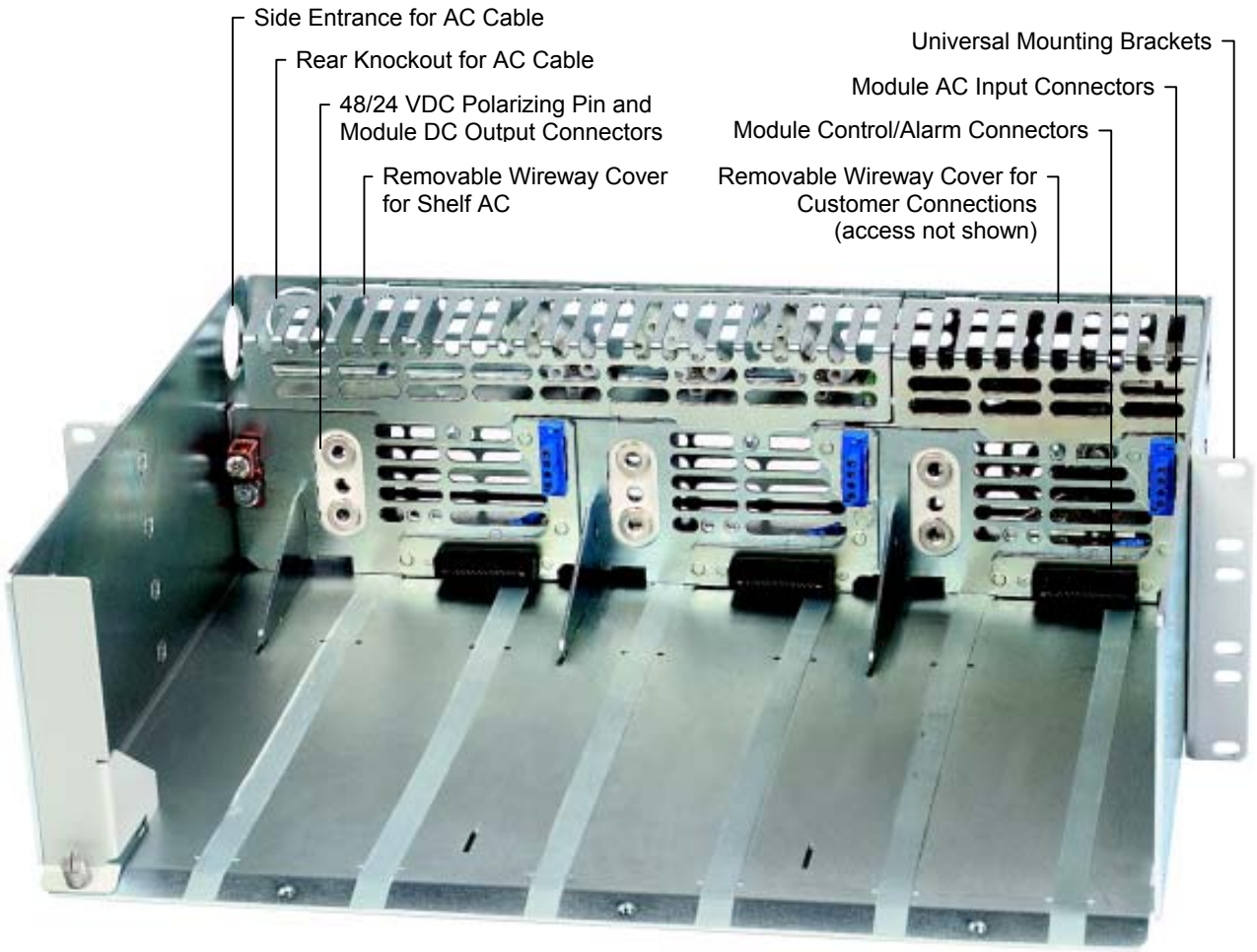


Figure 2–Front view of Pathfinder (1.5kW or 2kW) shelf (modules removed)

NOTE: Not all features appear as displayed on all models.

2.1.2 Shelf Alarms

The rectifier shelf has alarms entitled RECTIFIER MAJOR, RECTIFIER MINOR, GENERAL ALARM, and AC FAIL. All alarms are "real time" and therefore do not latch. The minor and major alarm contacts are "fail safe" and will extend an alarm even without a DC power source.

2.1.2.1 Rectifier Major Alarm

Indicates a module fail alarm condition is present in two or more power modules.

2.1.2.2 Rectifier Minor Alarm

Indicates a module fail alarm condition is present in one or more power modules.

2.1.2.3 General Alarm

Indicates a general alarm condition is present in one or more power modules.

2.1.2.4 AC Fail Alarm

Indicates loss of AC to one or more power modules.

2.1.3 Remote Equalize Control

A remote equalize control is available on the shelf for placing the power modules in Equalize mode. This feature operates when a positive or negative DC signal is applied to the REQ terminal with regards to REMOTE COMMON.

2.1.4 Remote Shutdown

A remote shutdown input is present on the shelf for each module to allow turning off individual modules.

2.1.5 Remote Sense

A remote sense connection is available for regulating the output voltage of the rectifier at a remote point such as at the system battery. With no connection to the remote sense input, the rectifier will regulate its output voltage at the rectifier output terminals.

2.1.6 Remote Monitoring and Control

All local controls and monitoring are accessible via the RS-485 serial communications interface. The Pathfinder shelf provides two connections for serial communications with other rectifier shelves as well as supervisory and control panels. This allows RS-485 cables to be "daisy-chained" from rectifier shelf to rectifier shelf.

2.2 Power Module Features

The power module converts AC line voltage (refer to the specifications near the front of this manual) to nominal 48 or 24 VDC output. The following section details the various features of the power modules:

Figure 3–Front perspective view of power module

2.2.1 LED Indicators

The LED indicators provide visual indication of module operational status and alarms. The indicators and associated colors are as follows:

2.2.1.1 AC Mains OK

This indicator illuminates when AC input to the Pathfinder is within the valid range and flashes when out of the normal range (described below).

2.2.1.2 Flashing AC Mains OK

The AC Mains OK LED will flash when the input voltage is out of range, but the module will continue to operate down to 90VAC (current limit gradually reduces automatically to approx. 15% of maximum rated at 90VAC). At a lower voltage, the module will shutdown, indicating an AC Mains Fail condition and the AC LED will extinguish.

2.2.1.3 Module ON/OK

The Module ON/OK LED illuminates when the module is running and sourcing power normally. The indicator will turn off under the following conditions:

- Remote or local shutdown
- High voltage shutdown
- Thermal shutdown
- Start-up pending

2.2.1.4 Flashing Module ON/OK

Quickly press and release the power button to view output current while the module is online. The Module ON/OK LED will flash once for every 20% (approx.) of the maximum output current.

2.2.1.5 Module FAIL

This indicator illuminates if the module is unable to source power as a result of any of the following conditions:

- Remote or local shutdown
- Input or output fuse blown
- AC Mains Input Fail
- High voltage shutdown
- Thermal shutdown
- UPF fail
- No output power
- Start-up pending

If the unit output is not connected to a battery or parallel rectifier, this LED may extinguish when the power runs out.

2.2.1.6 General Alarm

The red LED will flash during the following conditions:

- VAC meter fail
- AC mains input low
- AC mains input high
- Fan fail
- Over temperature foldback
- Low output voltage
- Current limit (programmable option)
- Temperature Sense Fail
- Fan speed error
- High output voltage
- Menu access from local display
- Soft start operation

2.2.2 OFF/ON (O/I) Button

The front panel O/I button shuts down the output power from the module. This button is also used to read the module's output current. To shut the module down, press and hold the button for 3 seconds and release. Pressing and holding the button for longer than five seconds (and releasing) causes the module to shutdown and then restart immediately — the Pathfinder interprets this as a remote signal to turn the module on. To get a reading of output current, quickly press and release the power button. The lower green LED will flash for every 20% (approx.) of maximum rated output current.

2.2.3 Liquid Crystal Display (Optional)

Pathfinder modules can be equipped with 2 x 16 character liquid crystal display (LCD) panel for local control and monitoring. This enables all of the module's operating parameters, status and alarms to be viewable from this display.

2.2.4 Control Buttons (Included with LCD Option)

Modules with the LCD option have three control buttons located on the front panel. They are labeled with an up arrow, down arrow and a curved arrow (ENTER). The up and down arrow buttons allow the user to scroll through the software menus and adjust values, whereas, the curved arrow button allows the user to enter functions and switch between Float and Equalize modes.

2.2.5 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, 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 and No Output Power alarms are 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. A minimum 2.5% load is required to avoid the No Output Power alarm. Activation of this alarm could indicate a failed module or a failed load.

NOTE: 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.

2.2.6 Thermal Protection

2.2.6.1 Thermal Shutdown

A module will shutdown and extend an alarm if the internal ambient temperature exceeds 75°C (167°F). The module will restart when the ambient internal temperature drops below 70°C (158°F). The module will also shut down if the heatsink temperature exceeds 125°C (257°F). When the heatsink temperature is less than 110°C (230°F) it will restart. The fan continues to operate during these shutdown conditions, unless the ambient temperature exceeds 80°C (176°F).

2.2.6.2 Over Temperature

Each module is protected in the event of an excessive increase in heatsink temperature due to fan failure or cooling airflow blockage. When the heatsink temperature exceeds normal maximum, the module's output current is reduced by 7% of maximum output current per °C to keep the temperature of the power semiconductors within operating limits until a maximum reduction at 125°C (257°F). Beyond this point the module goes into thermal shutdown. Normal capacity will be returned automatically when the heatsink temperature is reduced below 100°C (212°F).

2.2.7 Wide AC Range

An alarm is generated when the AC input voltage drops below specification. In this situation, current limit setting is reduced (in accordance with the input VAC) initially to 93% of the maximum output current @ 170VAC and at a linear rate down to approximately 15% at 90VAC. At a lower voltage the module will shutdown and will not restart until the AC is greater than 100VAC.

2.2.8 Current Limit/Short Circuit Protection

Each module has an adjustable current limit. The current limit function determines the maximum output current limit of the 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 limit the battery recharge current after the battery has been discharged for any reason.

2.2.9 Power Limiting

Each 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.

Flooded batteries may also be recharged faster with this feature.

NOTE: Current limiting overrides the power-limiting feature.

2.2.10 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 ramping the current limit up from zero to the actual or defined customer setting. The output voltage is ramped up from the minimum voltage to the Float voltage. The output current then increases at a rate of 3A (10%) per second (6A per second for the 24V module).

2.2.11 High Voltage Shutdown (HVSD)

The High Voltage Shutdown (HVSD) feature provides protection to the load from over voltage conditions originating from the rectifiers. It operates by shutting down the offending module when a high output voltage condition occurs. Indication is through a red LED. Modules will restart automatically when the HVSD condition clears. 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. When in HVSD pressing and releasing the O/I switch will restart the module.

2.2.12 AC Inrush/Transient Suppression

The modules' inrush current is limited to less than one time the nominal peak line current to prevent surge on the AC line. Modules are capable of withstanding input lightning and transient surges in accordance with IEEE/ANSI C62.41 Category B3.

2.2.13 Input/Output Fuses

Each module is equipped with fuses. Abnormal or fault conditions may blow the input or output fuse causing the red Module Fail LED to illuminate.

2.2.14 Forced Cooling

Each module is equipped with a front-mounted fan. The fan operates at temperatures above -10°C (14°F). Cooling of the module is front-to-rear with the hot exhaust exiting at the back.

2.2.15 Battery Eliminator Operation

Modules maintain all specifications (except where indicated) with or without a battery attached 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.

2.2.16 Start Delay

The 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 programmed. A minimum one-second delay is preset to allow charging of the input capacitors.

2.2.17 Float/Equalize/Test Modes

Modules can operate in one of three modes at any given time. The Float mode is the default-operating mode, where the rectifiers are supplying normal output voltage to the load and/or batteries. The Equalize mode is used when it is desired to increase the charging to the batteries to equalize cell voltages. Lastly, the Test mode offers an extended voltage range for testing functions such as SYSTEM ALARMS.

NOTE: Exercise caution when using the Manual Test function in Test mode. Adjustments to this feature will directly affect the module's output voltage and could result in a disruption of service.

2.2.18 Security Access Codes

An adjustable three-digit security code is programmed into the Pathfinder modules to prevent access to critical control functions by unauthorized users.

2.2.19 Battery Test Mode

This feature can be used to safely test the performance of a battery system connected to the output of the rectifier.

When initiated, the rectifier will force its output voltage down to a programmed level and the battery will be allowed to discharge through the connected load down to this voltage. When the voltage level is reached or after a programmed duration has expired, the rectifiers will be returned to Float mode (or Equalize mode if auto equalize is enabled).

Since the rectifiers are still on-line, this test can be performed without risk of dropping the load. An SM series power system monitor for battery capacity measurements.

2.3 Module Fail Alarms

The alarm conditions listed under this section signify a complete failure or shutdown of the module.

2.3.1 Remote Shutdown

A module will turn off and extend an alarm when it receives a remote shutdown signal.

2.3.2 Output Fuse Open

This alarm indicates the module's output fuse has blown.

2.3.3 Input Fuse Open

This alarm indicates that one or more of the module's input fuses have blown.

2.3.4 AC Mains Fail

This alarm is generated when the AC input voltage drops below 88V.

2.3.5 High Voltage Shutdown

This alarm is generated when the module enters HVSD mode.

2.3.6 Thermal Shutdown

A module will shutdown and extend an alarm if the internal ambient temperature exceeds 75°C (167°F).

2.3.7 UPF Fail / Primary Power Circuit Shutdown

This alarm is generated when the UPF section fails or primary power circuit goes into thermal shutdown.

2.3.8 No Output Power

This alarm is generated when the module ceases to produce output power for any reason.

2.3.9 Local Shutdown

This alarm is generated when the module is shut down from the local off/on button.

2.3.10 Programmable Start Delay

This alarm is generated when the rectifier is in the start delay mode after a power failure.

2.4 General Alarms

The alarms listed under this section signify conditions not immediately affecting basic operation of the unit, and have no immediate affect on module output. A flashing red FAIL LED signifies a minor alarm. Output capacity may be reduced during some general alarm conditions.

2.4.1 VAC Meter Fail

This alarm indicates that AC meter may have failed. A failed meter condition must exist for at least 10 seconds before the alarm is activated.

2.4.2 AC Mains Low

This alarm occurs when the AC input voltage is lower than the specified operating range.

2.4.3 AC Mains High

This alarm occurs when the AC input voltage is higher than the specified operating range.

2.4.4 Fan Fail

This alarm is generated when the fan has failed. The condition must exist for 20 seconds before the alarm is extended.

2.4.5 Over Temperature

This alarm is generated when the rectifier temperature exceeds the maximum normal range.

2.4.6 Low Output Voltage

This alarm is generated when the DC output voltage drops below the LVA setting. The alarm will clear when the voltage is 1V above the LVA setting (0.5V above the LVA setting for the 24V module).

2.4.7 Temperature Sense Fail

This alarm is generated if any of the DC/DC converter's internal temperature sensors fail.

2.4.8 Fan Speed Error

This alarm is generated when the fan is sending an incorrect speed signal e.g. from excessive fan bearing wear. This alarm provides a warning that the fan may need to be replaced. The Pathfinder module will continue to run normally during this condition.

2.4.9 High Output Voltage

This alarm is generated when the DC output voltage increases above the HVA setting. The alarm will clear when the voltage drops 1V below the HVA setting (0.5V below the HVA setting for the 24V module).

2.4.10 Local Access Alarm (only with optional LCD)

This alarm is generated when the front panel is displaying access to a menu item.

3 INSPECTION

3.1 Packing Materials

All Argus products are shipped in rugged, double walled boxes and suspended via solid polyurethane foam inserts to minimize shock that may occur during transportation. Packaging assemblies and methods are tested to National Safe Transit Association (NSTA) standards.

Products are also packaged with Cortex. This plastic wrap contains an inhibitor that protects the system from corrosion for up to two years.

3.1.1 Returns for Service

Save the original shipping container. If the unit needs to be returned for service, it should be packaged in its original shipping container. If the original container is unavailable, make sure the unit is packed with at least three inches of shock-absorbing material to prevent shipping damage. ***Argus Technologies is not responsible for damage caused by the improper packaging of returned units***.

3.2 Check for Damage

Prior to unpacking the equipment, note any damage to the shipping container. Unpack the equipment 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 the proper assembly of your system.

4 SHELF INSTALLATION

This section is provided for qualified personnel to install the Pathfinder shelf; which must be mounted in a clean and dry environment. ***Refer to Outline drawings 030-633-06 and 030-634-06.***

4.1 Safety Precautions

WARNING
Hazardous voltages are present at the input of power systems. The DC output from the rectifiers and the 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, the following precautions should be followed:

- Remove all metallic jewelry; e.g., watches, rings, eyeglasses, necklaces.
- Wear safety glasses with side shields at all times during installation.

Insulated metallic tools must be used.

The installer should follow all applicable local rules and regulations for electrical and battery installations; e.g., CSA, UL, CEC, NEC, and local fire codes.

4.2 Tools Required

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

- Philips head screwdriver, #1 (tip size 5/32”)
- Philips head screwdriver, #2 (tip size 3/16”)
- Slot head screwdriver (blade size 1/4”)
- Slot head screwdriver (blade size .09” x .02”) or tweaker
- Combination wrenches (Imperial measure)
- Digital voltmeter equipped with test leads
- Cutters and wire strippers (#10 to #22AWG) [6 to 2.5mm^2]
- Crimper (optional for large gauge wire)
- Adjustable 24/48VDC load (optional).

4.3 Preparation/Mounting

The rectifier shelf has been designed for mounting in a standard 19” or 23” EIA relay rack. Mounting brackets accommodate 1” or 1-3/4” rack spacing. The shelf should be mounted to the rack using a minimum of two, #12 – 24 x ½" 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.

Washers (such as internal tooth) that are designed to cut through the painted surface must be used under the mounting screws (where feasible) to ensure a good chassis ground.

The Pathfinder shelf should be mounted in a clean and dry environment. Also, make sure there is sufficient space (approximately 8cm or 3”) in front of and behind the unit for ease of access and unrestricted cooling airflow.

5 SHELF GROUNDING, WIRING AND CONNECTIONS

This chapter provides cabling details and notes on cable sizing for DC applications with respect to the Argus Pathfinder 1.5kW & 2kW. ***Refer to Customer Connections drawings 030-633-08 and 030-634-08.***

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

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.

The installer should follow all applicable local rules and regulations for electrical and battery installations; e.g., CSA, UL, CEC, NEC, and local fire codes.

5.2 Chassis Ground

The rectifier shelf (or "chassis") must be connected to the AC service ground for safety. This is accomplished by connecting the ***ground "green" or "green - yellow" lead*** of the AC input cable(s) to the terminal marked with the ground symbol.

5.3 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 will also act as the disconnect device for the connected module. Optionally, to minimize cost, a single 1-phase, dual 1-phase or 3-phase feeder breaker can be used to feed the entire shelf.

NOTE: See specifications section at the beginning of the manual for recommended feeder breaker and wire gauge sizes.

5.4 AC Input Connections

Ensure all modules are removed from the shelf. Remove the metal cover from the shelf backplane to expose the AC input terminals TB1, TB2, TB3 and TB4 (for 23" shelf). Each terminal relates to an individual power module.

NOTE: AC input wires should be tightly bundled and routed as far away as possible from the DC power wires to minimize EMI disturbances.

For the single feed options, route the AC cable to the main terminal block and ground lug. Inter-wiring from this terminal block to the individual module blocks is factory installed.

The wireway is designed for a single 1" cable knockout. Attach the cable connectors to the wireway hole and route the AC cables through the holes. Secure the wires to the AC input terminals for each of the modules. Tighten the cable connector to the AC cable (conduit similar).

5.5 DC Output Connections

WARNING
Leave cables disconnected at battery and verify output polarity using a voltmeter. Make battery connections only after all other wiring is completed. See initial start-up section.

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

Terminate cables leads with appropriate crimp lugs. Secure the positive and negative cable to the shelf output post of the correct polarity (i.e. +Vcable to +Vpost).

If a user-provided bolt is used instead of the bolt supplied by Argus Technologies, ensure that the bolt is not too long, so that pressure will not be applied to the insulating plate behind the bolt.

Ensure the washers are on the bolts in the same order in which they were shipped from the factory. Tighten the bolts as per Customer Connections drawing.

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

5.6 Alarm and Control Connections

See Customer Connections drawing and refer to the tables below for location of alarm and control terminals. Insert each wire into the appropriate terminal on TB5 and tighten the termination screw. Route the alarm and control cables through the alarm wireway on the rear of the shelf to the monitoring/control equipment as needed.

Terminal Label	Alarm Description	Default Signal Type	Jumper Selector
TB6 – 9,10	Rectifier Fail Major	NC***	P1, 2 to 3
TB6 – 11, 12	Rectifier Fail Minor	NC***	P2, 2 to 3
TB7 – 13, 14	General Alarm	NO	P3, 1 to 2
TB7 – 15, 16	AC Fail	NO	P4, 1 to 2

Table A–Alarm wiring connections

*** Fail-safe relays. Signal type is NO (normally open) during normal operation.

Terminal Label	Control Description	Trigger Signal Type or Connection
TB8 – 5	Remote Shutdown RSD1	Input Neg (-) or Pos (+)
TB8 – 6	Remote Shutdown RSD2	Input Neg (-) or Pos (+)
TB8 – 7	Remote Shutdown RSD3	Input Neg (-) or Pos (+)
TB8 – 8	Remote Shutdown RSD4	Input Neg (-) or Pos (+)
TB9 – 1	Sense (+)	System Pos (+)
TB9 – 2	Sense (-)	System Neg (-)
TB9 – 3	Remote Common	Remote Common Connection (usually system O/P hot)
TB9 – 4	Remote Equalize	Input Neg (-) or Pos (+)

Table B–Control wiring connections

5.7 Remote Communications Connections

See Remote Communications chapter for details on connections.

6 INITIAL START-UP AND CHECKOUT

WARNING
Confirm that the output polarity connection is correct to prevent damage to the load.

Before making the final battery connection, perform the following start-up and test procedure to prevent damage and ensure proper system operation:

1. Verify that cabling is installed correctly – refer to previous chapter. Record battery cell voltage readings if required by the battery manufacturer.
2. Ensure all power modules are removed from the rectifier shelf, all load fuses are removed and load circuit breakers turned off.
3. Verify correct load and battery polarity using a voltmeter, and connect battery (if required) to the output of the system.
4. Verify correct output voltage rating of power module(s). Install one power module.
5. Verify that the ***Module Fail LED(s)*** illuminate – assuming a battery is connected to the system providing backup power – as this indicates correct output polarity.
6. Verify AC input voltage is correct and turn on AC input feeder breakers.
7. Turn on the battery circuit breaker(s).
   Note: If the system is not equipped with battery circuit breaker(s) the rectifier Float voltage should be lowered to match the battery string voltage within 0.5V before the battery is connected to avoid sparks. This final connection should be made at the battery for ease of access.
8. The ***AC LED and ON LED*** should illuminate and the system will begin charging batteries (if connected).
9. Install the remaining power modules.
10. Test functionality of various alarm settings, relays and controls (see Operations and Adjustments section for details).
    - Increasing or decreasing the test voltage on the supervisory module and recording the voltage at which the appropriate LED illuminates can check OVP, HVA, and LVA settings. A voltmeter connected to the test jacks is required to verify the voltage setting. Relay continuity should also be verified.
    - AC failure, circuit breaker trip/fuse alarm, battery breaker trip, rectifier failure major and minor can be verified by simulating the appropriate condition and checking relay continuity.
11. In the Adjustments menu, set Float and Equalize voltage to the levels specified by the battery manufacturer.
12. Perform a load test with the system using a resistive load box if available.

7 OPERATION AND ADJUSTMENTS

7.1 Start-up and Reset Procedure (after initial system installation)

When the Pathfinder module is powered-up or reset, the optional LCD will display the product serial number and various identification messages. The three front panel LEDs will illuminate, however the FAIL LED should extinguish after the system has finished its start delay and soft start procedure. Next, the LCD will display the module's parameters. See the figure below for a sample screen.

7.2 Module Installation and Removal

CAUTION: Do not force a module into position if it does not seat properly. All modules are keyed to ensure that the correct module type is used.

7.2.1 Installing Power Modules

To insert a power module, place it on the shelf bottom and slide into the rear connector in the backplane. ***Ensure that the front retaining captive screw to the shelf is tightened.*** The module will automatically power up within seconds if AC is applied.

7.2.2 Removing Power Modules

Press and hold the O/I button for at least three seconds – this shuts down the module's output power. Loosen the two screws on the bottom of the module faceplate, grasp handle firmly and pull out of the shelf. Wait two minutes for all LEDs to extinguish before handling.

7.3 Modes Of Operation

The Pathfinder's default operation is in Float mode. The module AC LED and ON LED is illuminated and various identification messages are displayed on the (optional) LCD. See the figure below for a sample screen.

To enter the Equalize mode, hold down the ENTER key until the "FL" indicator changes to "EQ" (LCD equipped modules only).

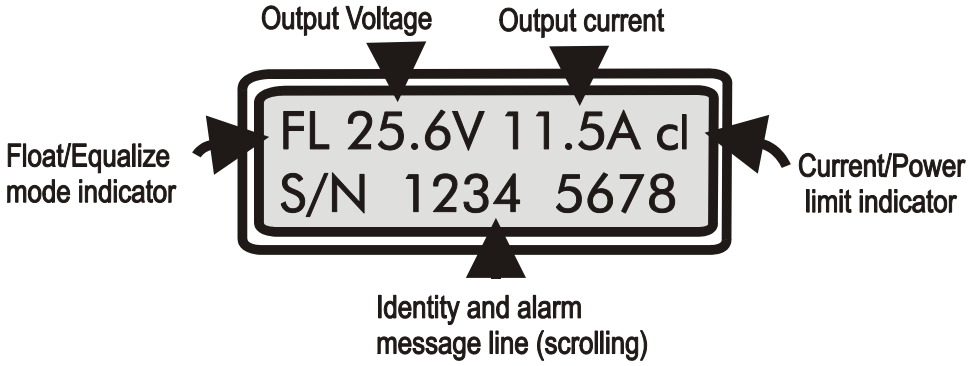


Figure 4–Pathfinder LCD in Normal mode

To display output current, depress O/I button momentarily to cause the POWER ON LED to flash (20% output current per flash).

7.4 Menu Structure

On the Pathfinder version with no LCD, the menu interface is only available remotely through the SM series system controller or a computer terminal emulation program (refer to these product manuals for more information on the user interface).

In both the Pathfinder LCD and no LCD version, the menu structure consists of two basic components: Menu Categories and Sub-Menu Items. To scroll through these items, press the up and down arrow buttons to display the correct item and then press the ENTER button to select that item or enter a submenu. This procedure is the same for both the Pathfinder and the SM series.

When a user attempts to scroll through the menu, he will be prompted to enter a password before entering some submenus. Once the correct password is verified, access will be granted. If no password is entered, the user will not gain access.

7.5 Menu Descriptions

The following section describes each of the Pathfinder's menu items, including alarms, controls and configuration items. They are arranged, as they would appear in the LCD menu. For a graphical representation of the Pathfinder software, command and menu structure, refer to the "menu tree" that follows.

7.5.1 Status Menu

This menu category is used for reviewing module setup and status information.

7.5.1.1 Module ID

Displays the assigned module identification number. Modules with the LCD option are assigned a factory default identification number of 01. The ID number is used for remote communications only. No user intervention is required for systems using the SM series supervisory panel.

7.5.1.2 Module Settings (Float, Equalize, Slope, Current Limit, etc.)

This function allows the user to scroll through the various power system parameters.

7.5.1.3 Input Voltage (I/P V)

Displays the AC input voltage to the module.

7.5.1.4 Fan Speed

Displays the status (off or on) of the fan speed function.

7.5.1.5 Fan Set

Displays the status (off or on) of the fan.

7.5.1.6 Internal Ambient Temperature (INT AMB TP)

Displays the internal air temperature of the module.

7.5.1.7 Heatsink Temperature (HSNK TEMP)

Displays the converter's heatsink temperature.

7.5.1.8 Current Limit Alarm (CL ALRM)

Displays the status (enable or disable) of the current limit alarm.

7.5.1.9 Power Limit Alarm (PL ALRM)

Displays the status (enable or disable) of the power limit alarm.

7.5.1.10 Remote Access

Displays the status (enable or disable) of the remote access function. This function is always enabled if no LCD is installed.

7.5.1.11 Remote Adjust (REMOTE ADJ ACCES)

Displays the status (enable or disable) of the remote adjust function. This function is always enabled if no LCD is installed.

7.5.1.12 Local Access Alarm (LCL ACC ALM)

Displays the status (enable or disable) of the local access alarm. Setting has no effect if no LCD is installed.

7.5.1.13 Software Version

Displays the current software version onboard the power module.

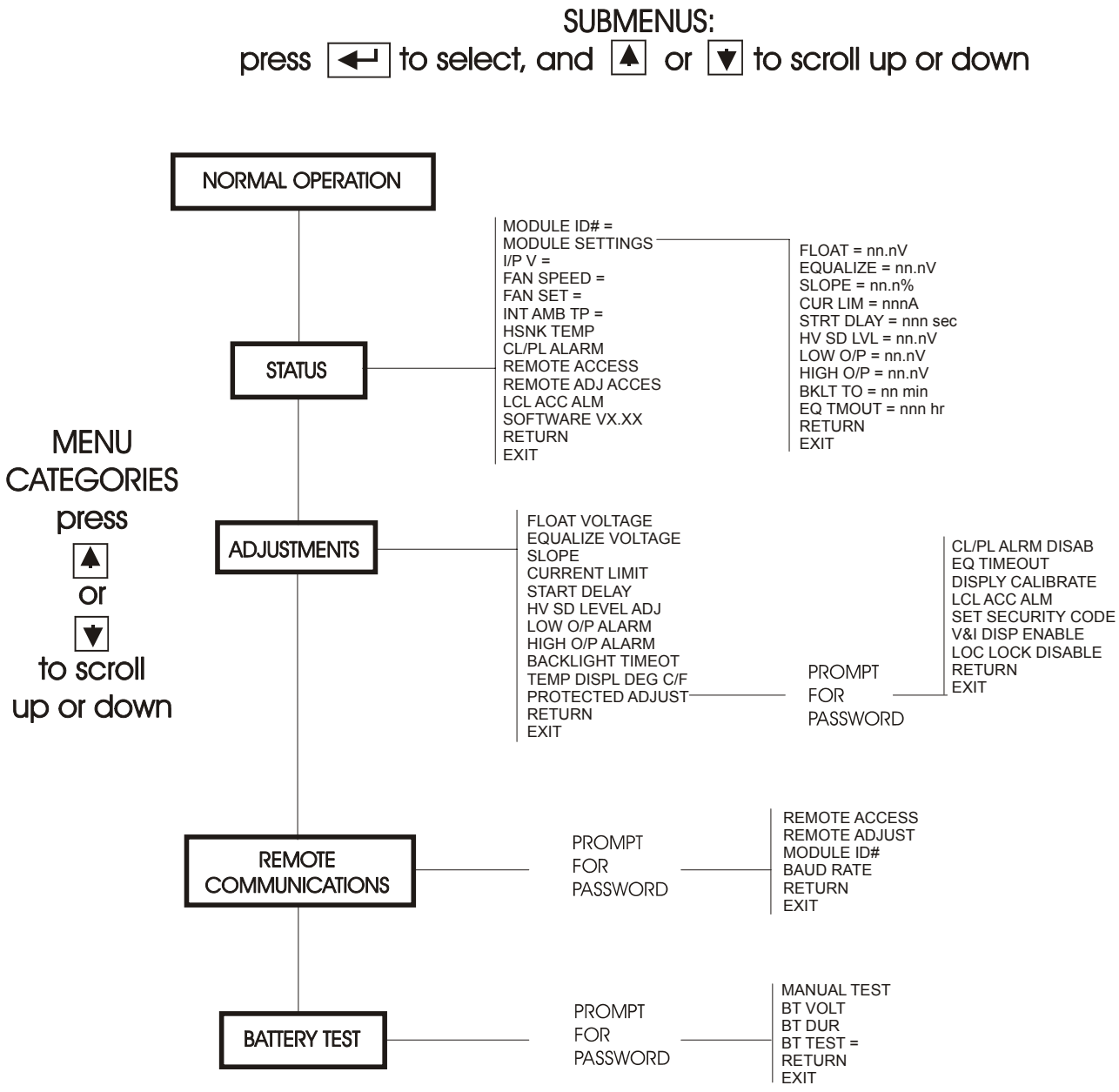


Figure 5–Pathfinder menu tree

7.5.2 Adjustments Menu

This menu category consists of functions that can be adjusted by the user. It includes Float and Equalize voltage, slope, current limit, alarms, etc. See Table C for default settings and ranges for each item below.

NOTE: Set slope before Float or Equalize adjustments.

7.5.2.1 Float Voltage

This is the module's default mode at startup and during normal system operation.

The "FL" on the LCD's upper left corner indicates this mode. The Float voltage cannot be changed when a module is off or in Equalize mode. Similarly, it cannot be increased while the module is in Current or Power Limit – an error message will result.

Float voltage should be adjusted to the level recommended by the battery manufacturer.

NOTE: All modules are connected in parallel. Local adjustment will cause interaction between modules.

To adjust Float voltage, follow the steps below:

1. Measure the battery voltage with a digital voltmeter at the battery output posts or with the power system's meter.
2. Scroll to the Float voltage item in the ADJUSTMENTS menu (Make sure the module is in Float mode).
3. Using the arrow buttons, adjust each module's Float voltage up or down until the battery voltage is set to the desired level. Avoid putting the modules in current limit during this procedure.
4. Once the battery voltage is correct, fine-tune each module's output voltages to balance the current outputs of different units equally.
5. With the digital voltmeter, check that the battery voltage is correct.

NOTE: To ensure accurate Float voltage setting, it is recommended that the Float voltage be measured at the battery posts.

7.5.2.2 Equalize Voltage

The Equalize mode is used to equalize or "boost charge" a battery string. The "EQ" on the LCD's upper left corner indicates this mode; which can be selected by pushing and holding the ENTER button (for more than three seconds) while in Normal operating mode, or via a remote command through the serial port, or remote hardware signal through the REQ terminal.

To adjust Equalize voltage, scroll to the Equalize item in the ADJUSTMENTS menu and follow the same series of steps as described above for the Float voltage.

NOTE: The Equalize voltage cannot be changed if the module is off and cannot be increased while in current or power limit – an error message will result.

NOTE: If a battery is connected across the load, it may be necessary to wait until the voltage has increased to allow Equalize adjustment.

7.5.2.3 Slope %

This function allows the user to adjust the slope percentage. Output slope is a method of load sharing which operates by altering the output voltage regulation of the Pathfinder module. Output slope is factory default at 1% and it is recommended to leave it at that value. Slope settings must be the same for all rectifiers in that system and should be 1%.

NOTE: Set slope before Float or Equalize adjustments.

7.5.2.4 Current Limit

This function allows the user to program the setting at which the current limit function engages. If the output current reaches this level, the output voltage will decrease and subsequently limit the output current of the module.

A current limit alarm will also be extended. If the module is driven far into current limit, the output voltage may decrease to the point of a LOW O/P VOLTAGE alarm.

During a MODULE FAIL condition, the current limit alarm may be activated. This may indicate a high current condition inside the module.

7.5.2.5 Start Delay

The modules are equipped with a delay timer in order to stagger start a series of modules to prevent excessive loading of standby generators upon start up. The timer delays the AC start of the module depending on the value programmed. Delay time range from 5 to 250 seconds in five-second multiples. A minimum one-second delay is preset to allow for charging of the capacitors.

Delay is initiated upon application of AC. At the end of the delay period Soft Start is initiated and the module goes into Float mode by default. When active, the message START DELAY and the time remaining are displayed on the LCD.

The START DELAY message is extended remotely in the Operation Status section of the Status screen. There is no delay when the module is returning to operation after a remote shutdown signal removal.

Toggling the remote shutdown control signal can also remotely activate the count.

The count can be aborted locally by pressing the ENTER button (local entry of Equalize is inhibited during delay start).

7.5.2.6 High Voltage Shutdown Level Adjust (HV SD Level ADJ)

This feature provides protection to the load from over voltage conditions originating from the power system. HVSD cannot be adjusted while the Pathfinder is operating in current limit or power limit. Minimum HVSD adjustment is either the Float or Equalize level plus 1.0V whichever is higher. HVSD trigger hysteresis is 1.0V.

The Module Fail LED will turn on and the Module Fail Relay will de-energize. The O/P HV SHUTDOWN and MODULE FAIL alarms will be extended remotely.

The over voltage shutdown feature of the Pathfinder is selective and operates at 5% higher voltage in a less than 2.5% load condition.

7.5.2.7 Low O/P Alarm

This function allows the user to program the setting for the low output voltage alarm. When the output of the module drops below this level, the LOW O/P VOLTAGE alarm will be extended remotely. The alarm has a fixed hysteresis of 1.0V (0.5V for 24V modules). When the output rises above the hysteresis voltage level, the alarm extinguishes.

7.5.2.8 High O/P Alarm

This function allows the user to program the setting for the high output voltage alarm. When the output of the module rises above this level, the HIGH O/P VOLTAGE alarm will be extended remotely. The alarm has a fixed hysteresis of 1.0V (0.5V for 24V modules). When the output falls below the hysteresis voltage level, the alarm extinguishes.

7.5.2.9 Backlight Timeout

This function allows the user to adjust the duration that the LCD backlight stays on after the last keypress.

7.5.2.10 Temperature Display C/F

This function allows the user to toggle the display of ambient and heatsink temperature values between the Celsius and Fahrenheit scales.

7.5.2.11 Protected Adjustments
This function allows the user to enter a list of password-protected settings.

7.5.2.12 Power Limit / Current Limit Alarm
When enabled, power limit and current limit conditions cause the General Alarm to be activated. The POWER LIMIT and CURRENT LIMIT alarms are extended remotely. This control toggles between the enabled and disabled states; setting does not affect flashing "PL" & "CL" indicators which are always enabled.

7.5.2.13 Equalize Timeout
This adjusts the maximum time that the module will remain in Equalize mode when this mode is selected locally or from the Equalize key on the SM series front panel. Equalize time-out is overridden by the remote equalize signal.

7.5.2.14 Display Calibrate
This function allows increases/decreases to output voltage display calibration offset.

7.5.2.15 Local Access Alarm
When this function is enabled, activity of the module control buttons in the ADJUSTMENTS, REMOTE COMMUNIC and TEST MODE menus causes the Minor alarm to be activated. The control toggles between the enabled and disabled states.

7.5.2.16 Set Security Code
This function allows the user to set the security code for access to the Protected Adjust, Remote Communication and TEST menus. The security code is set one digit at a time with the up or down arrow buttons until the desired number is displayed and the ENTER button is used to select the number.

Anytime a menu item that requires a password is selected, the message “SECURITY = - - - ” will show and the first dash will be replaced with a zero as the first digit.

7.5.3 Remote Communications
This menu category consists of functions and controls related to remote communications between the module and a SM series supervisory panel, a computer terminal emulation program, etc.

7.5.3.1 Remote Access
This function allows the user to enable/disable access to the module from a remote site. It is always enabled on modules with no LCD.

When set to LOCKOUT: All remote communications are disabled by this selection. If baud rate is set correctly, the module always responds "REMOTE LOCKOUT" to any received communication.

7.5.3.2 Remote Adjust
This control allows the user to enable/disable remote adjustment control from specific menus. It is always enabled on modules with no LCD.

When set to ACCESS: Full access is granted to all Setup, Adjustment and Remote Communication menu items.

When set to LOCKOUT: Access is allowed only to the Status menu; accessing the Status menu causes the Status screen to be transmitted. Access is not allowed to the Adjustments and Test Mode menus; accessing these menus causes the Pathfinder to respond with "ADJUST LOCKOUT".

Access must be allowed to the Remote Communications menu. The Pathfinder security code is required to make any changes.

7.5.3.3 Module ID#
This control allows the user to set the module ID#. In order for a module to be correctly identified for remote communications, every module on the same RS-485 bus must be assigned a unique identification number.

If two modules have the same ID#, a line conflict will occur which will result in garbled communications (this is not applicable to SM series controller communications).

7.5.3.4 Baud Rate

This control allows the user to set the baud rate for communications between the module and a remote site.

7.5.4 Test Mode

This menu category enables operators to check the functionality of the output voltage. To activate, scroll to the relevant menu item and press the ENTER button or use the SM controller.

7.5.4.1 Manual Test

The "MT" beside the output voltage display indicates Manual Test mode. The purpose of this function is to provide an extended operating voltage range for testing power system parameters.

NOTE: Exercise caution when using the Manual Test function in Test mode. Adjustments in this mode will directly affect the module's output voltage and could result in a disruption of service. For example, decreasing the voltage below the LVD setting may engage the LVD and potentially cut power to the load.

7.5.4.2 Battery Test Voltage

This Test mode sets the rectifier output voltage when battery testing is activated. It should be set to the maximum battery end voltage for discharge performance in accordance with the battery manufacture's literature.

7.5.4.3 Battery Test Duration

This feature will switch the rectifiers back to Float mode from battery Test mode if the timer expires. This safeguard was designed to prevent unintentional long duration discharge of the battery.

7.5.4.4 Battery Test Activate

This mode forces the rectifier output to the level set for the battery test voltage (see above). The rectifier output will return to Float mode once the rectifier sources current or the timer expires. This test is used in combination with the SM series of power monitors to evaluate battery performance.

7.6 Miscellaneous Defaults/Adjustments/Controls

7.6.1 Adjusting the LCD Viewing Angle

Adjustment of the viewing angle/LCD contrast is made by pressing and holding the ENTER button and the up arrow button together. Next, adjust the angle to the setting desired using the up and down arrow buttons and then press the ENTER button to return to Normal mode. The unit should be in the Normal (or START) operating mode.

7.7 Factory Defaults and Ranges

Submenu Item	Programmable Range	Default Setting 24VDC Systems	Default Setting 48VDC Systems
Float Voltage	24.0 – 29.0V (24V) 48.0 – 58.0V (48V)	27.0V	54.0V
Equalize Voltage	25.0 – 30.0V (24V) 50.0 – 60.0V (48V)	27.5V	55.0V
Slope %	0 – 2%	1%	1%
Current Limit	18 – 60A (24V-1.5kW) 9 – 33A (48V-1.5kW) 24 – 80A (24V-2kW) 11 – 44A (48V-2kW)	60A (1.5kW) 80A (2kW)	33A (1.5kW) 44A (2kW)
Start Delay	1 – 250 seconds	1 second	1 second
HVSD Level (OVP)	27.0 – 31.5V (24V) 54.0 – 63.0V (48V)	28.5V	57.0V
Low O/P Alarm (LVA)	21.0 – 26.0V (24V) 42.0 – 52.0V (48V)	22.0V	44.0V
High O/P Alarm (HVA)	26.0 – 31.5V (24V) 52.0 – 63.0V (48V)	28.0V	55.5V
Backlight Timeout	1 – 255 minutes	5 minutes	5 minutes
Temp Display C/F	Celsius/Fahrenheit	Celsius	Celsius
P/I Limit Alarm	Enable/Disable	Disable	Disable
Equalize Timeout	1 – 255 hours	30 hours	30 hours
Display Calibrate	N/A	N/A	N/A
Local Access Alarm	Enable/Disable	Enable	Enable
Set Security Code	000 – 999	123	123
V&I Display	Enable/Disable	Enable	Enable
Local Lock	Enable/Disable	Disable	Disable

Table C–Adjustments menu defaults

Submenu Item	Programmable Range	Default Setting 24VDC Systems	Default Setting 48VDC Systems
Remote Access	Enable/Disable	Enable	Enable
Remote Adjust	Enable/Disable	Enable	Enable
Module ID#	01 – 99	01	01
Baud Rate	1200 – 38400 baud	9600 baud	9600 baud

Table D–Remote communications menu defaults

Submenu Item	Programmable Range	Default Setting 24VDC Systems	Default Setting 48VDC Systems
Manual Test	21.0 – 30.0V (24V) 42.0 – 60.0V (48V)	Front setting	Front setting
Battery Test Duration	0 – 99 hours	0.1 hour	0.1 hour
Battery Test Voltage	22.0 – 26.0V (24V) 44.0 – 52.0V (48V)	23.0V	46.0V

Table E–Test menu defaults

8 REMOTE COMMUNICATIONS

The Pathfinder rectifier system is optimized for remote communications. It can be controlled, monitored and tested via the SM series intelligent supervisory panel or via an ASCII display terminal.

8.1 Multiple Shelf Connections (RS-485)

Rectifier shelves can be daisy-chained together via the RS-485 interface. Refer to the customer connection drawings 030-633-08 for locations and pinout details of the serial communications interface (SCI) connectors. The interconnect cable is an RJ11 telephone-type connector with an offset locking pin. Plug the cable from one connector labeled RS-485 to another connector labeled RS-485 on the next shelf.

8.2 Connecting the SM Series Panel (RS-485)

Local control and monitoring can be accomplished by connecting to the SM series RS-485 interface. Connect the straight through RJ11 interconnect cable to the SM series RS-485 port from one of the available Pathfinder shelf's RS-485 port.

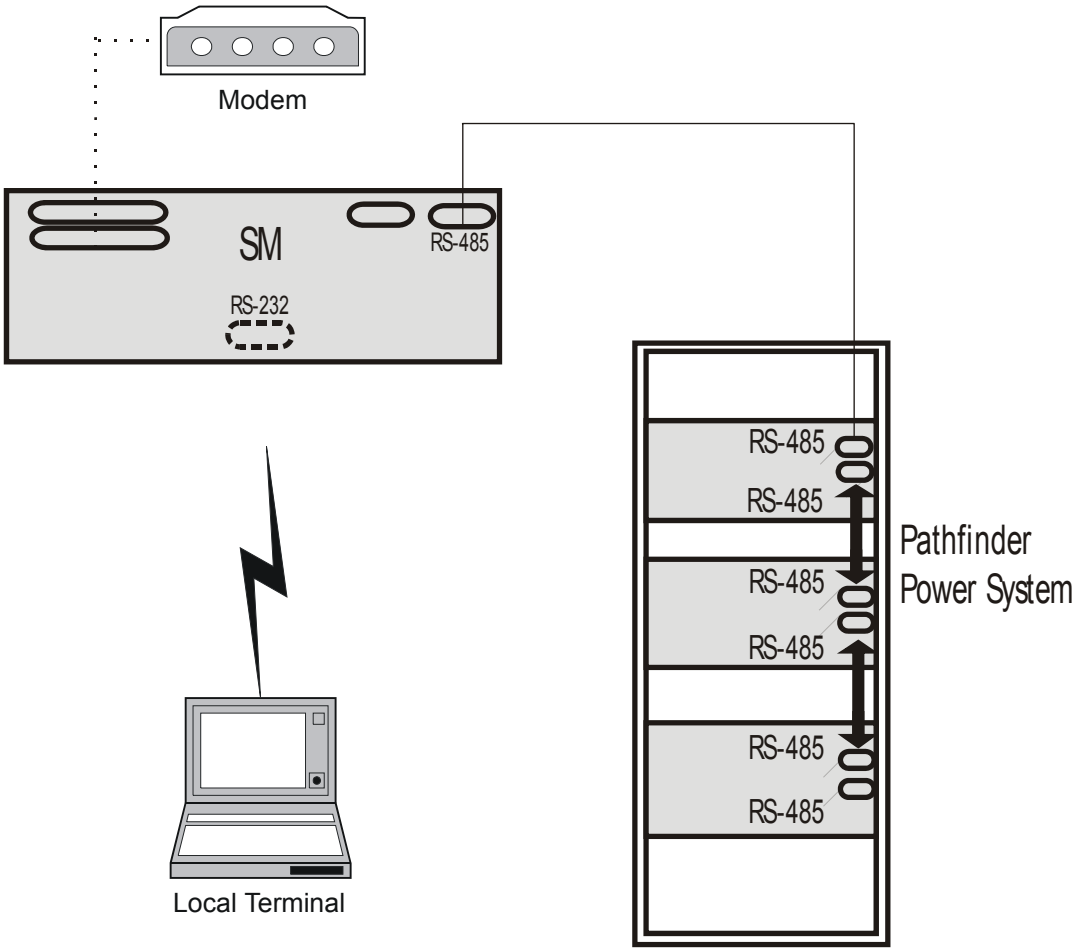


Figure 6–Pathfinder communications connections

8.3 Communications using a PC/Terminal

A terminal may also be connected to the rectifier RS-485 bus to perform monitoring and control. A RS-485 to RS-232 converter may be required.

The Pathfinder is designed to communicate directly with an ANSI terminal to eliminate the need for additional software. Communication with a PC is also possible with a terminal emulation program such as PROCOMM or TELIX. Display information and setup parameters are virtually identical to that available from the built-in front panel keyboard and LCD.

Before connecting the host equipment, ensure the communications access parameters – including default baud rate of your terminal – is set to match the Pathfinder module. The default parameters are set to **8 data bits, 1 stop bit, and no parity**.

The remote terminal must be capable of handling continuous communications at the Pathfinder's specified baud rate. Set the remote terminal for Half Duplex (Local Echo) communications in order to view commands entered.

There has to be DC power present at the output for the remote communications to function.

Once all hardware is setup and a communications link is established, you will need to know how to talk to the Pathfinder modules. There are five commands available for navigating the Pathfinder menus and retrieving status information. The **Up** and **Down** commands are used to scroll through menu items and change module settings. The **Enter** command is used to select menu items and accept changes. The **Status** command causes a formatted screen of information to be sent from the module containing the module settings and operating status. The **Display** command causes the Pathfinder to respond with the 2-line x 16-character display information as found on the power module. Commands are not case sensitive and can be sent as either upper or lower case characters.

Command String format:

[	Command initiator character
##	Module ID# '01' - '99'; use 00 to broadcast the command to all modules
@.	Remote command character
]	Command terminator character

Command	Definition	Description	Command Example
U	Up	Scroll up or increase setting	[01U]
D	Down	Scroll down or decrease setting	[01D]
E	Enter	Select menu item or accept module setting	[00E]
S	Status	Send status screen	[10S]
?	Display	Send display information	[08?]

Table F–Navigation and status commands

9 MAINTENANCE AND SERVICE

Refer to the Specifications section at the front of this manual for replacement parts.

9.1 Maintenance

Although very little maintenance is required with Argus rectifier systems, routine checks and adjustments are recommended to ensure optimum performance. Repairs should be done by qualified service personnel.

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

WARNING

Use extreme care when working inside the shelf while the system is energized. Do not make contact with live components or parts. HIGH VOLTAGE AND SHOCK HAZARD.

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 fans (if equipped)	
Inspect all system connections (re-torque as necessary)	
Inspect batteries (consult battery manufacturer's recommended procedure)	
Verify alarm/control settings	
Verify Float voltage	

Table G–Sample maintenance log

9.2 Service

9.2.1 Tools Required

- Philips head screwdriver, #1 (tip size 5/32")
- Philips head screwdriver, #2 (tip size 3/16")
- Slot head screwdriver (blade size 1/4")
- Nut driver, 7/16", or socket, rachet, and extension.

9.2.2 Fan Replacement

1. Shut off the unit and remove the screw 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 that secure the front panel to the module chassis.
4. Slide the front panel out.
5. Disconnect the fan power lead wires and front panel ribbon cable 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.

NOTE: Use care with fan wire routing so that the lead wires do not become pinched when the front panel is reattached.

9.2.3 Fuse Replacement

9.2.3.1 AC Fuse Replacement

1. Shut off the unit and remove the screw 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 four screws securing the rear cover.
4. Remove the cover and locate the AC fuses on the vertical printed circuit board to the left side of the module, they are the round cartridge fuses in the clip-style holder.
5. Remove the fuse(s) and install the new fuse(s), then replace the cover and secure with the screws and replace the module in the shelf and secure with retaining screw.

9.2.3.2 DC Fuse Replacement

1. Shut off the unit and remove the screw 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. Locate and remove the DC fuse on the left of the main DC output socket.
4. Install the new fuse, and then reassemble the unit following the preceding steps in reverse order.

9.2.4 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 remove the screw 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 four screws securing the rear cover.
4. Remove the rear cover and locate the MOV printed circuit board (PCB).
5. A "MOV PCB" may be removed by using a screwdriver to gently pry up on the MOV PCB until the leads are free from the spade terminations.
6. Decontaminate the printed circuit board and unit with flux remover or a similar cleaning compound. This is to remove any metallic particles or carbon that may have been deposited when the MOV failed.
7. Install a replacement MOV PCB by plugging it into the available spade terminations.
8. Replace the cover and secure with the screws, replace the module in the shelf and secure with retaining screws.

10 ARGUS CONVENTIONS

10.1 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:

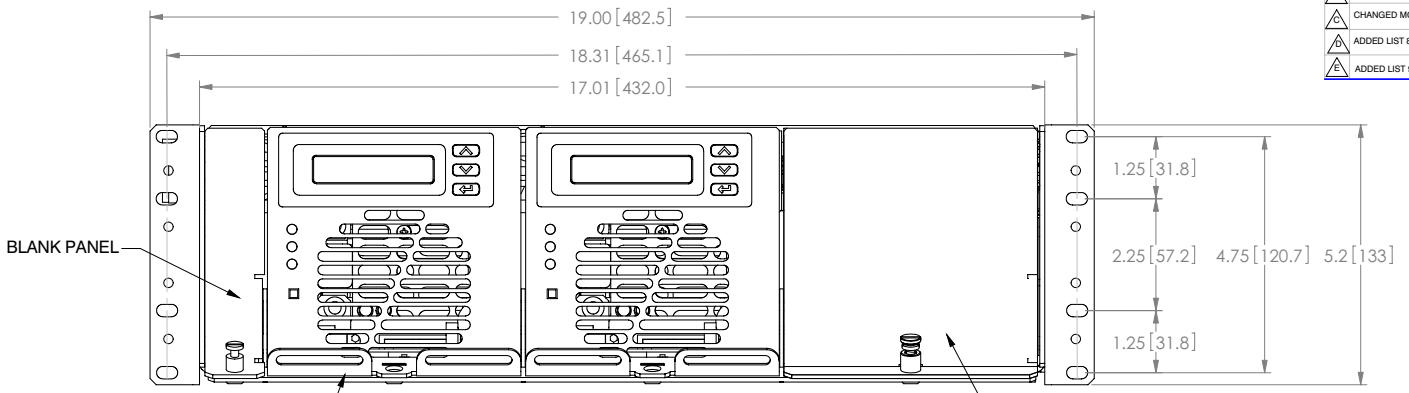
"-05" Schematic
"-06" Outline Drawing
"-20" Main Assembly

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.

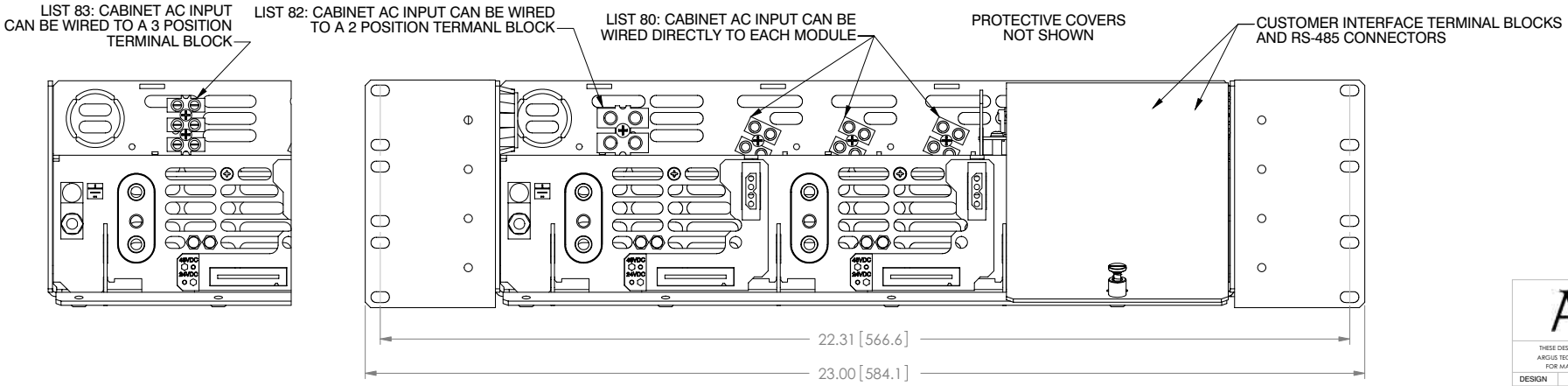
10.2 Acronyms and Definitions

AC Alternating current
ANSI American national standards institute
ASCII American standard code for information interchange
AWG American wire gauge
BFV Battery Float voltage
CSA Canadian Standards Association
DC Direct current
DVM Digital voltmeter
EIA Electronic Industries Association
EMI Electromagnetic interference
HVA High voltage alarm
HVSD High voltage shutdown
IEEE Institute of Electrical and Electronics Engineers
LCD Liquid crystal display
LED Light emitting diode
LVA Low voltage alarm
LVD Low voltage disconnect
NC Normally closed
NO Normally open
NSTA National Safe Transit Association
OVP Over-voltage protection
PCB Printed circuit board
RU Rack unit (1.75")
SCI Serial communication interface
UL Underwriters Laboratories
UPF Unity power factor

REVISIONS				
LTR	DESCRIPTION	REV BY	DATE	APPD
B	REDESIGNED		2000/08	CA
C	CHANGED MODULE AC FEED		2001/06	CDD
D	ADDED LIST 80 AND LIST 83	SDW	2003/11	GS
E	ADDED LIST 90	MP	2008/08	



FRONT VIEW - 19" RACK SPACING
(MODULES INSTALLED)



FRONT VIEW - 23" RACK SPACING
(MODULES REMOVED)

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

ARGUS

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APPROVED	RD	2000/06	FINISH

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X.XX ±0.02" [X.X] ±0.5mm
X.XXX ±0.01" [X.XX] ±0.25mm

SCALE NTS

TITLE
OUTLINE, 19" CABINET
PATHFINDER 1.5kW/2kW

ISSUE DATE

SHEET 1 OF 3

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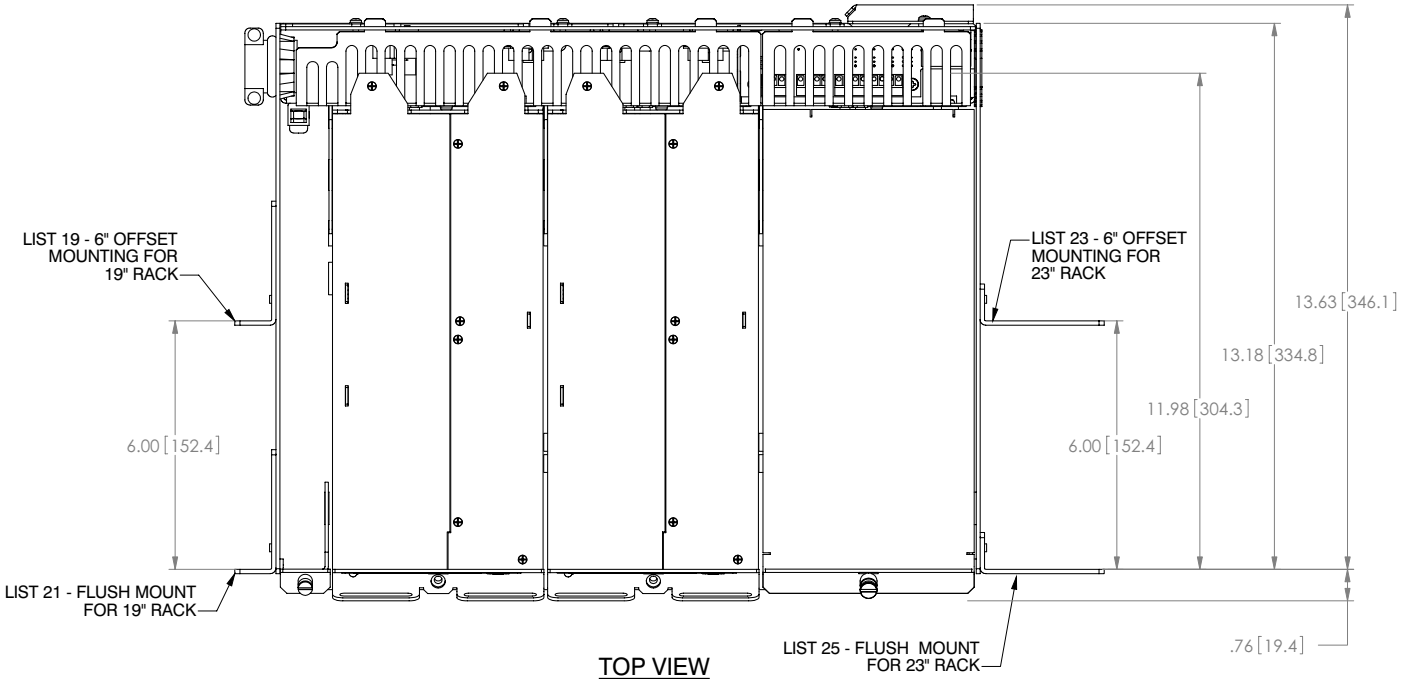
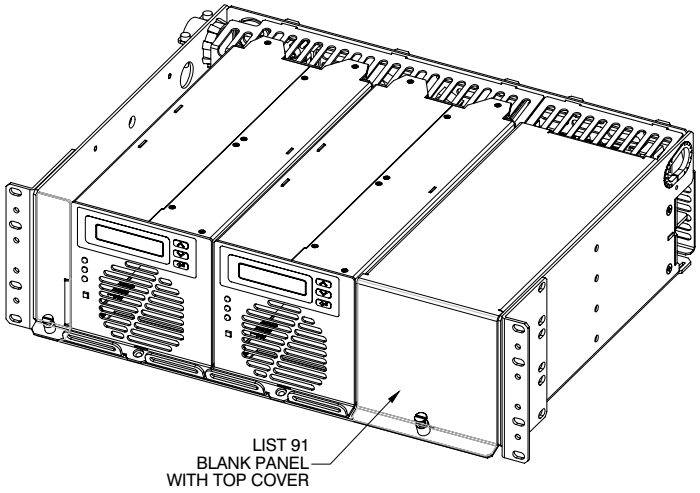
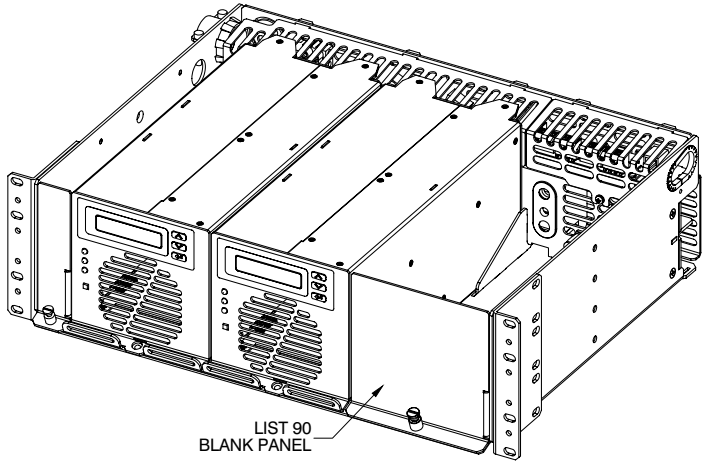


TOP VIEW





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APPROVED	RD	2000/06	FINISH

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X.XX ±0.02" [X.X] ±0.5mm
X.XXX ±0.01" [X.XX] ±0.25mm

SCALE NTS

TITLE
OUTLINE, 19" CABINET
PATHFINDER 1.5kW/2kW

ISSUE DATE

SHEET 2 OF 3

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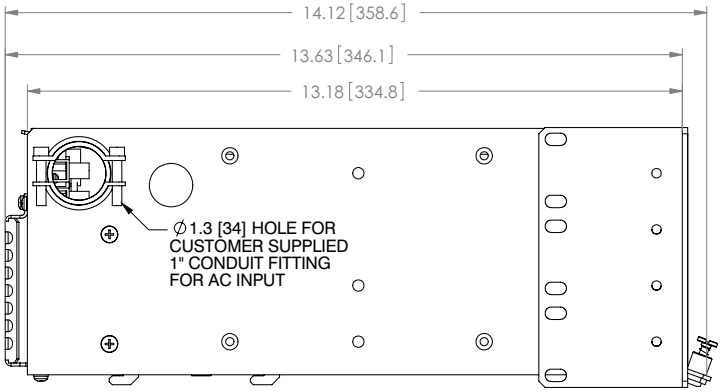

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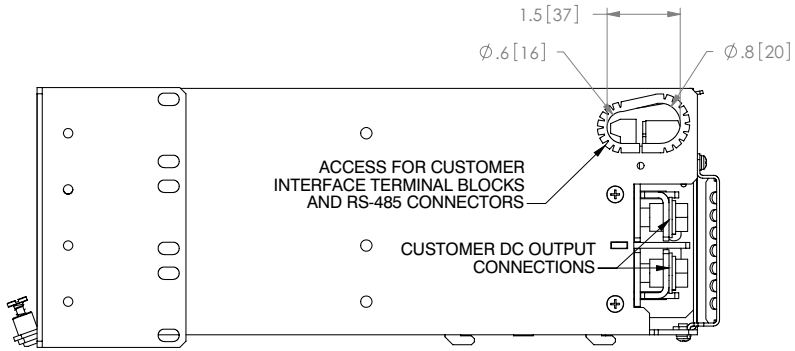

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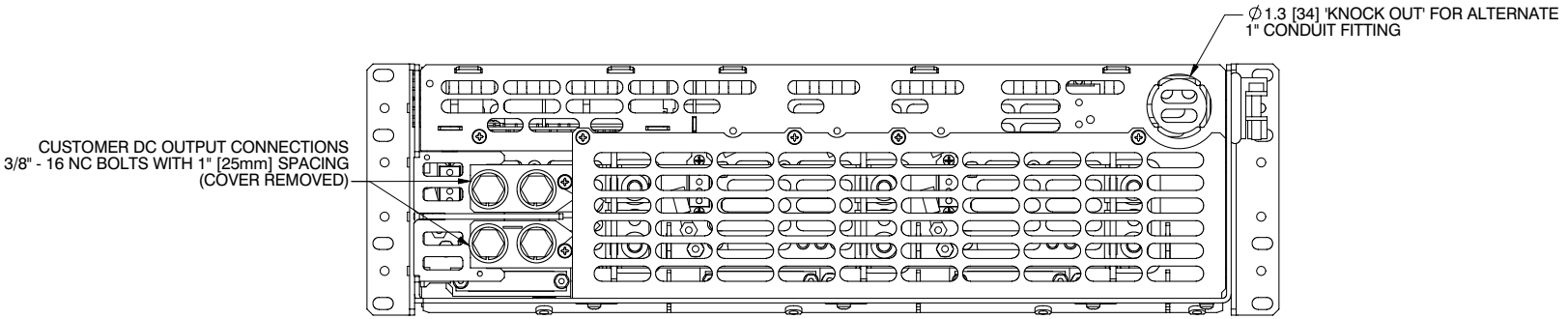

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APPROVED	RD	2000/06	FINISH

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X.XX ±0.02" [X.X] ±0.5mm
X.XXX ±0.01" [X.XX] ±0.25mm

SCALE NTS

TITLE
OUTLINE, 19" CABINET
PATHFINDER 1.5kW/2kW

ISSUE DATE

SHEET 3 OF 3

SIZE	TYPE	DWG NO.	REV
B	D2	030-633-06	E

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LTR	DESCRIPTION	REV BY	DATE	APPD
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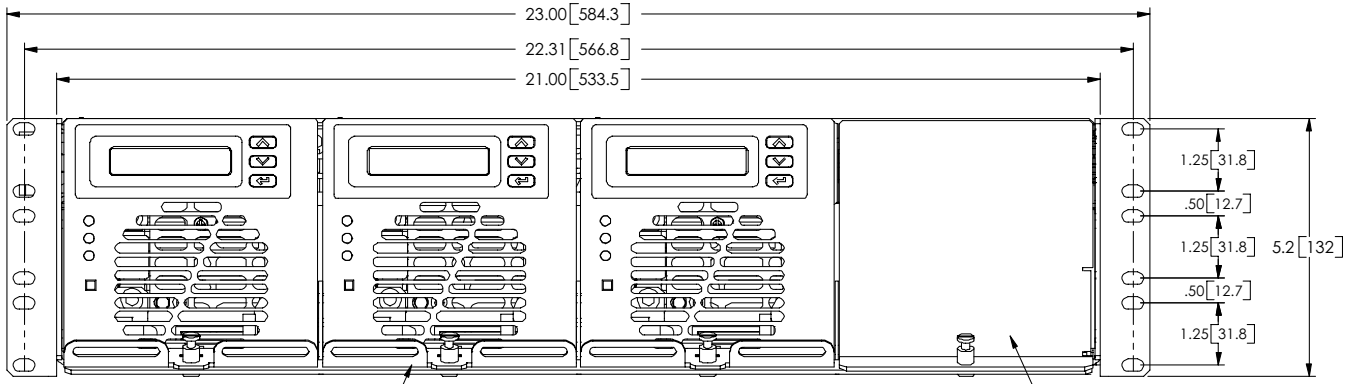
B	CHANGED MODULE AC FEED		2001/06	CDD
C	ADDED LIST 80 AND 84	SDW	2003/11	



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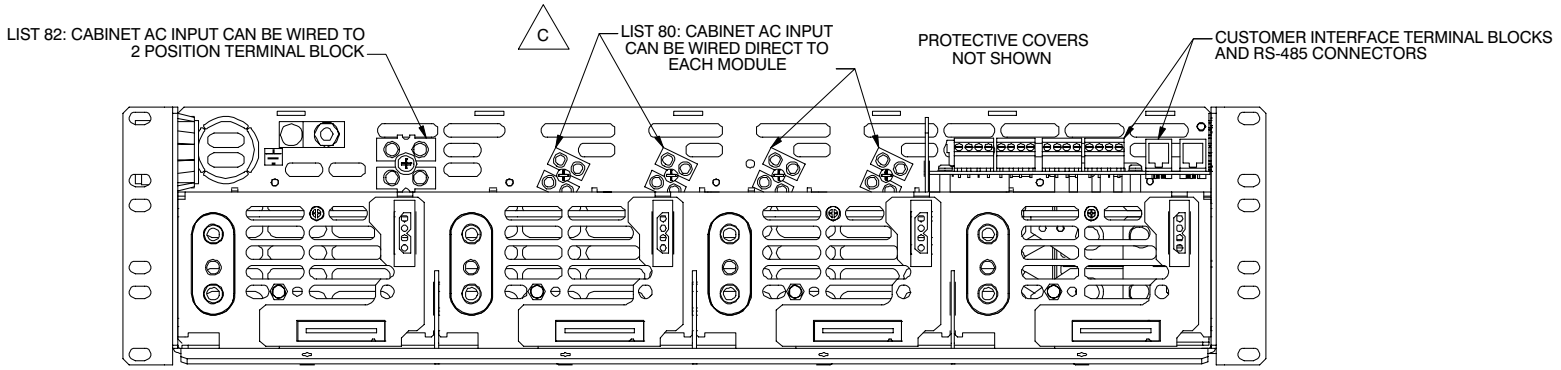

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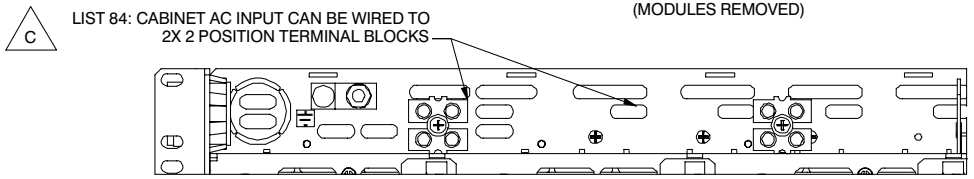

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CHECKED	CA	2000/08	
APPROVED	CA	2000/08	FINISH

TOLERANCES
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X.XX ±0.02" [X.X] ±0.5mm
X.XXX ±0.01" [X.XX] ±0.25mm

SCALE NTS

TITLE
OUTLINE, 23" CABINET
PATHFINDER 1.5kW/2kW

ISSUE DATE

SHEET 1 OF 3

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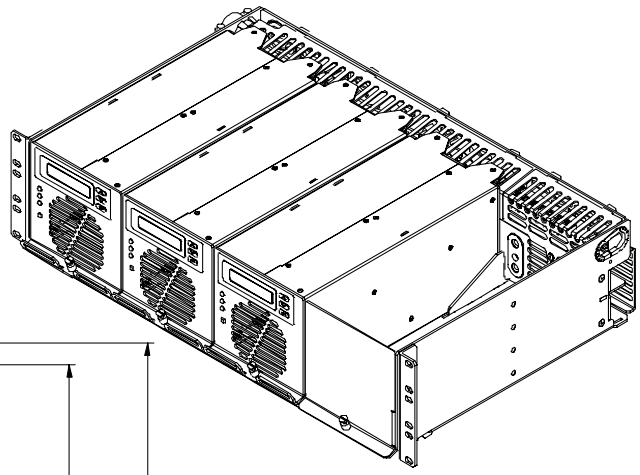

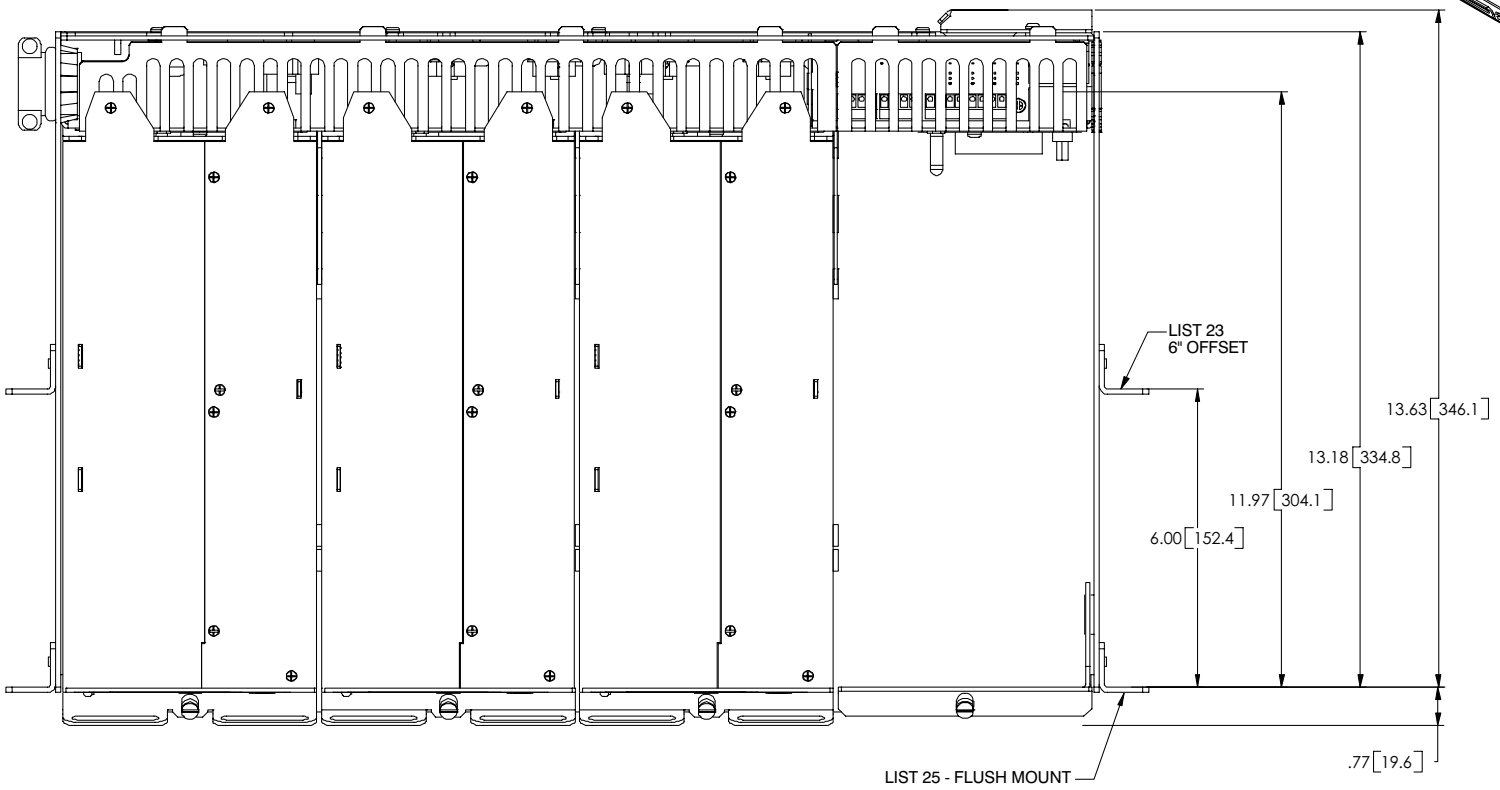

TOP VIEW

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DRAWN	SW	2000/07
CHECKED	CA	2000/08
APPROVED	CA	2000/08

MATERIAL

FINISH

TOLERANCES
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X.XX ±0.02" [X.X] ±0.5mm
X.XXX ±0.01" [X.XX] ±0.25mm

SCALE NTS

TITLE
OUTLINE, 23" CABINET
PATHFINDER 1.5kW/2kW

ISSUE DATE

SHEET 2 OF 3

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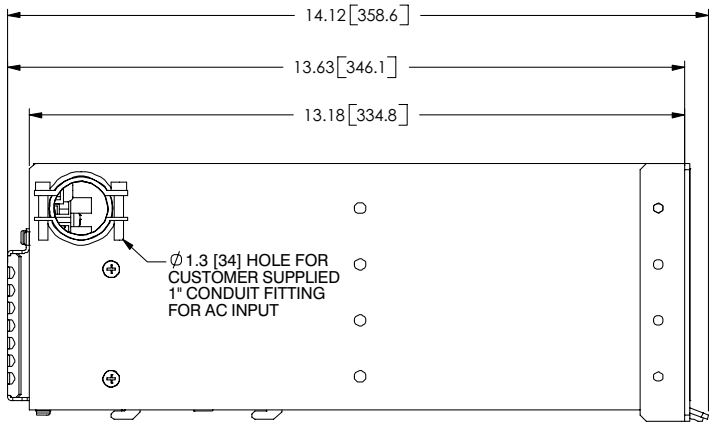

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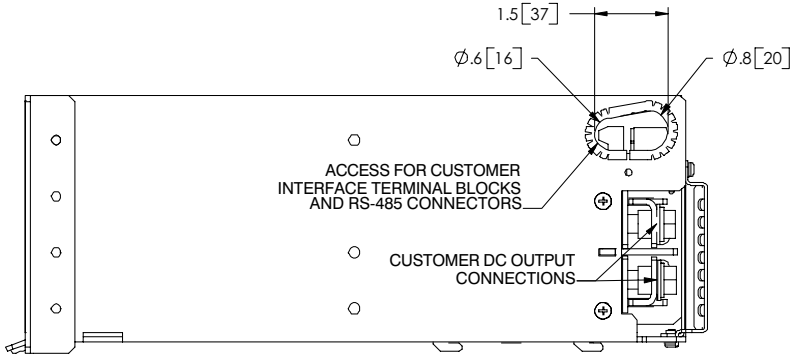

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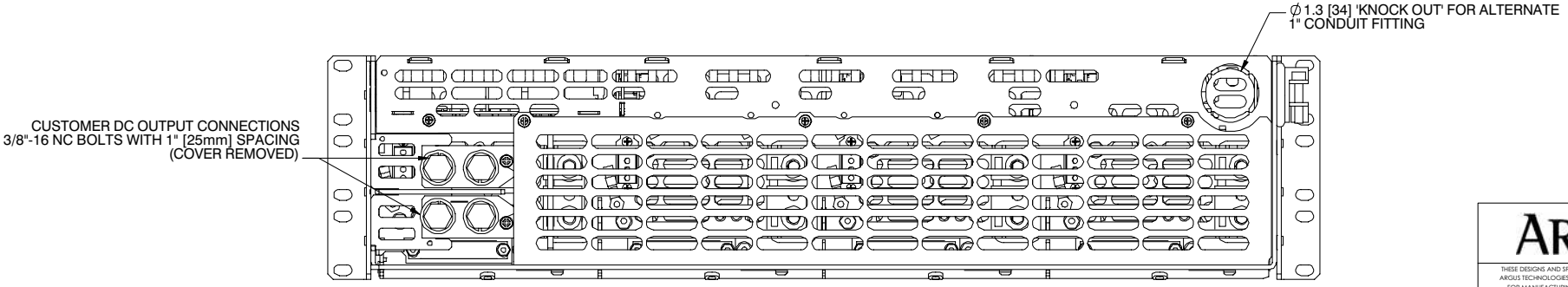

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CHECKED	CA	2000/08	
APPROVED	CA	2000/08	FINISH

TOLERANCES
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X.XX ±0.02" [X.X] ±0.5mm
X.XXX ±0.01" [X.XX] ±0.25mm

SCALE NTS

TITLE
OUTLINE, 23" CABINET
PATHFINDER 1.5kW/2kW

ISSUE DATE

SHEET 3 OF 3

SIZE	TYPE	DWG NO.	REV
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REVISIONS				
LTR	DESCRIPTION	REV BY	DATE	APPD
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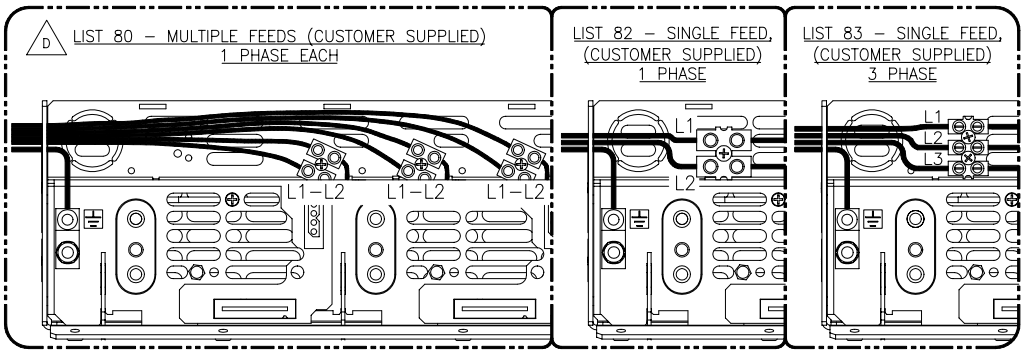
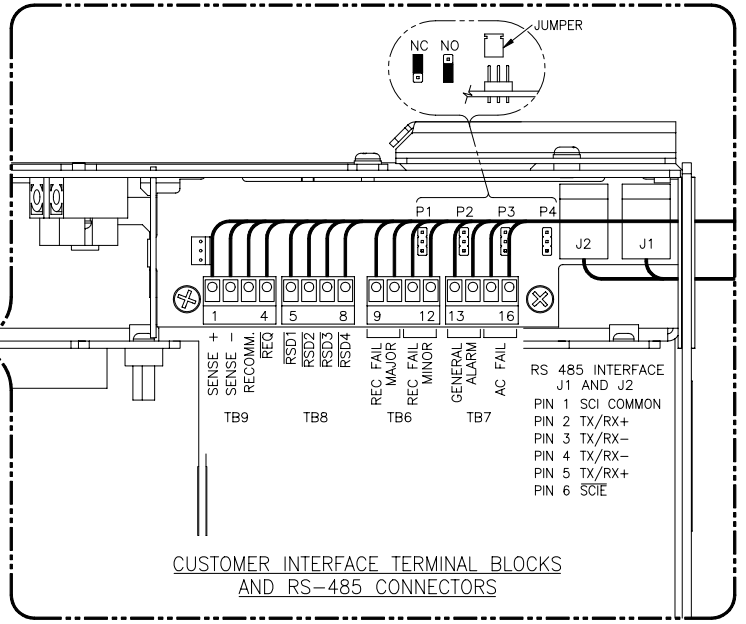
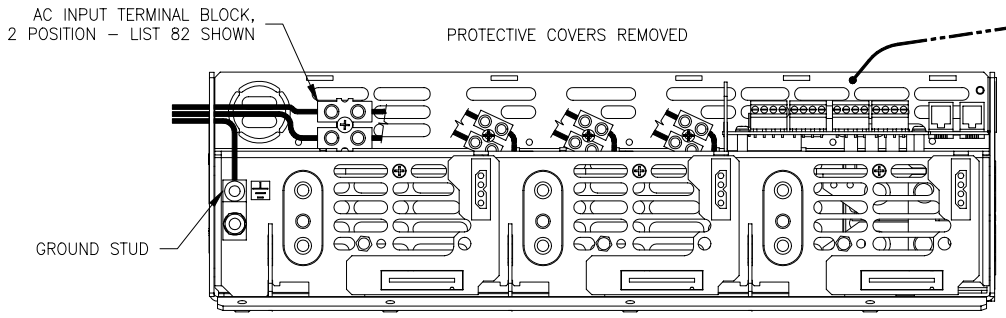
D	ADDED LIST 80	SDW	2003/11	

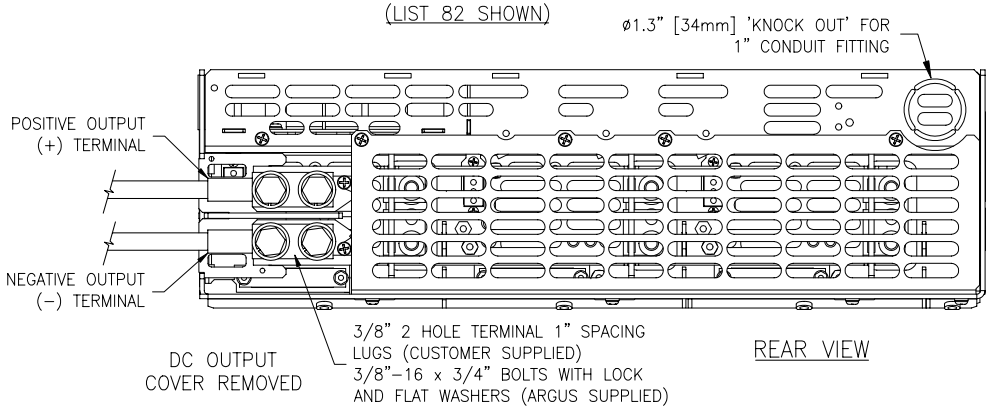




CUSTOMER INTERFACE TERMINAL BLOCKS
AND RS–485 CONNECTORS



FRONT VIEW
(LIST 82 SHOWN)



REAR VIEW

B O M: 030–633–20

©2000 ARGUS TECHNOLOGIES LTD.

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

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DESIGN	CA	1999/11	MATERIAL
DRAWN	SW	2000/05	
CHECKED	CA	2000/06	
APPROVED	RD	2000/06	FINISH

TOLERANCES (UNLESS OTHERWISE NOTED)
x.x ±0.04" [x] ±1mm
x.xx ±0.02" [x.x] ±0.5mm
x.xxx ±0.01" [x.xx] ±0.25mm

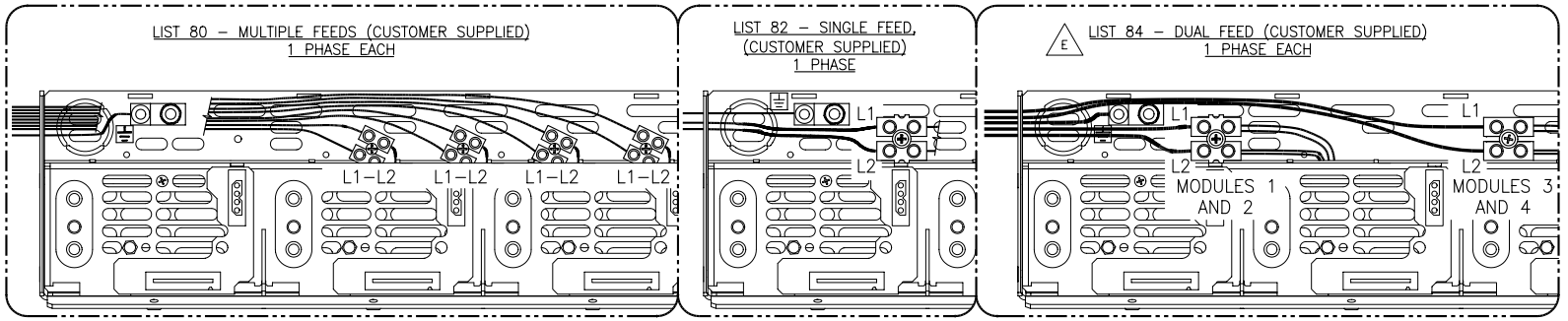
SCALE N.T.S.

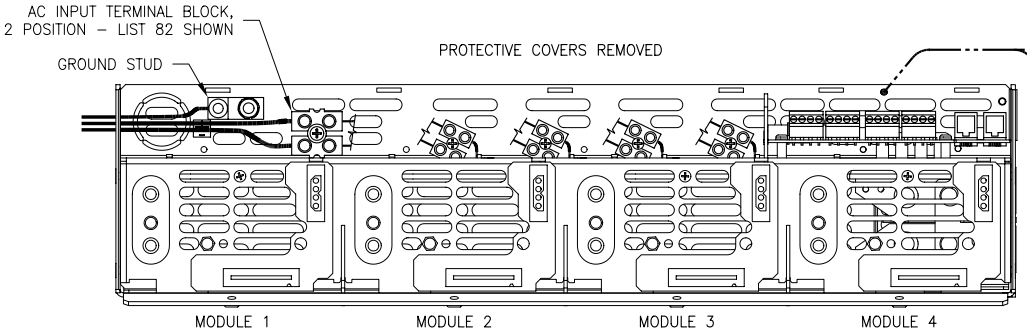
TITLE
CUSTOMER CONNECTION DRAWING
19" CAB., PATHFINDER 1.5kW/2kW

ISSUE DATE | SHEET 1 OF 1

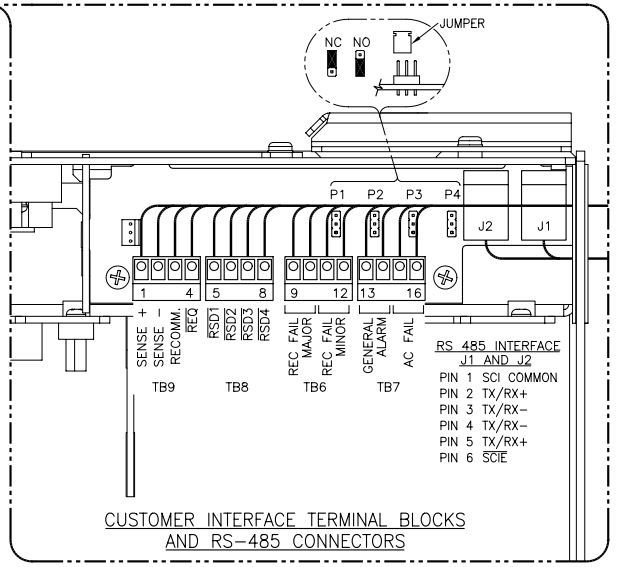
SIZE	TYPE	DWG NO.	REV
B	A1	030–633–08	D

REVISIONS				
LTR	DESCRIPTION	REV BY	DATE	APPD
B	REDESIGNED		2000/08	CA
C	REMOVED LIST 80; CHANGED MODULE AC FEEDS		2001/06	CDD
D	ADDED LIST 80 AND 84	SDW	2003/11	CDD
E	ADDED POWER MODULUE DESIGNATIONS	SDW	2004/12	

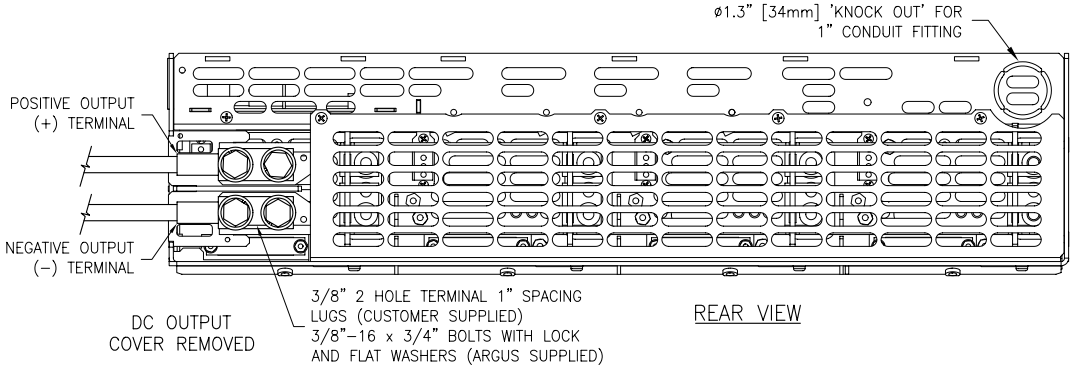




FRONT VIEW
(LIST 82 SHOWN)



CUSTOMER INTERFACE TERMINAL BLOCKS
AND RS–485 CONNECTORS



REAR VIEW

B O M: 030–634–20

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LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

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DESIGN	CA	2000/05	MATERIAL
DRAWN	SW	2000/07	
CHECKED	CA	2000/07	
APPROVED	RD	2000/07	FINISH

TOLERANCES (UNLESS OTHERWISE NOTED)
x.x ±0.04" [x] ±1mm
x.xx ±0.02" [x.x] ±0.5mm
x.xxx ±0.01" [x.xx] ±0.25mm

SCALE N.T.S.

TITLE
CUSTOMER CONNECTION DRAWING
23" CAB., PATHFINDER 1.5kW/2kW

ISSUE DATE

SHEET 1 OF 1

SIZE	TYPE	DWG NO.	REV
B	A1	030–634–08	E

BILL OF MATERIAL
SPARE PARTS KIT
POWER MODULE,
PATHFINDER 48V-2KW

APPROVED: _____
ISSUED: _____

ITEM	QTY	PART NO.	REV	DESCRIPTION	CIRCUIT DESIGNATION OR REMARKS
List 0; On Site:					
1	1	747-151-20 List 0,2	B	Assy, Module,Cooling Fan, Pathfinder 48V-2KW	Dwg(A) 747-136-04
2	1	707-254-20 List 0		Assy, PCB, Transient Protection Pathfinder 1.5KW	(A1)
3	2	460-042-10		Fu,1/4"x1-1/4",15A 250V,Fast	F1,2(A1)
4	1	460-232-10		Fu,63A 140VDC 240VAC,1.65" Ctr	F3(A3)
5	1	460-180-10		Fu,0.1”x0.3”,1A 125V,Very fast,Ax Ld	F4(A4)

List 1; On Site Options:

None

List 2; Depot Repair (Internal Use Only):

None

Revisions:

A 2002-05-07 First Release
B 2004-02-18 Item Affected: 1

FACTORY 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 7:30 am to 5:00 pm Pacific Standard Time at:

+1-888 GO ARGUS

(+1-888-462-7487)

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

Training

Argus offers various levels of product and technical training. These workshops provide a mix of theory and hands on application for qualified customers. Please consult your sales representative for course schedules, locations and costs, or visit our website at ***www.argusdcpower.com***.

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 to the right.

Product Returns

Before returning any product for service, please obtain a Return Material Authorization (RMA) number from an Argus factory service representative. The representative will require the model and serial number, as well as a brief description of the problem prior to issuing the RMA number. All material must be pre-authorized before being returned.
See document 048-507-10 "Warranty and Repair Information" for more details.

Moving and Storage

Units must be suitably packed in the original shipping container (or equivalent) prior to re-shipping. 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.

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,
1407I Argentina
Tel: +54 (11) 4672 4821
Fax: +54 (11) 4504 4698
Cell: +54 9 (11) 4993 9996
Email: lkleiman@argus.ca

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Fax: +65 6458 2122

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Moorebank, NSW, 2170 Australia
Tel: +61 02 9822 8977
Fax: +61 02 9822 8077

Australia/New Zealand
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Unit 3, 30 Heathcote Road
Moorebank, NSW, 2170 Australia
Tel: +61 02 9602 8331
Fax: +61 02 9602 9180

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Carole Park QLD 4300
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Tel: +61 07 3361 6587
Fax: +61 07 3361 6705
New Zealand Sales & Service
Tel: +64 9 978 6689
Fax: +64 9 978 6677

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Toronto, ON, M1V 5N2 Canada
Tel: +1 416 293 3088
Fax: +1 416 293 0671

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Cartel Business Estate
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Tel: +44 1279 422110
Fax: +44 1279 423355

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Col. Polanco
Mexico City, 11560 Mexico
Tel: +52 55 5280 6990
Fax: +52 55 5280 6585

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Fax: +90 216 472 90 66

048-527-10-I1 Rev L (09/2007)