



Cordex Shunt Multiplexer

with CAN Interface

Installation & Operation Manual

Part # 018-568-B2

Effective: 05/2012

Cordex Shunt Multiplexer With CAN Interface

018-568-B2

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, Smart Peripherals:** **018-568-B1**
- **Outline Drawing:** **018-568-06**
- **Customer Connections:** **018-568-08**
- **Outline Drawing, Shelf:** **030-734-06**
- **Outline Drawing, Wall Mount:** **030-764-06**
- **Customer Connection Diagram, Cable Kit:** **038-983-08**

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.

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1 Introduction

1.1 Scope of the Manual

This instruction manual explains the installation, interconnection, and operation of Alpha Technologies' Cordex Smart Peripherals; such as the Shunt Multiplexer (Shunt MUX) with CAN Interface.

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

1.2 Product Overview

The Alpha Technologies Cordex Smart Peripherals are designed for remote monitoring of shunt currents or battery cell/string voltages on telecommunications power systems that utilize a standard CAN communications bus. The analog inputs of each module are isolated (one module from the next) for centralized monitoring. The data is gathered by an advanced system-monitoring unit such as the Alpha Cordex Series system controller (CXC); for example, each channel of the Shunt MUX (for the associated shunt current) may be stored and viewed on the CXC. The data logging capability of the CXC (version 1.4 software and greater) may then provide the user with monitoring information in an easy-to-read table format.

The Shunt MUX has 16 current inputs and the capacity is configurable via the CXC. Each separate Shunt MUX module can only monitor shunts that are at the same voltage potential level; for example, one module may be used for shunts on the positive side of a 24V system – another module will be required if there are also shunts on the negative side.

The 2V BCM can monitor 1 battery string. The inputs are configured as 24 x 2V cells in addition to the battery current, battery temperature inputs, and string voltage.

The 12V BCM can monitor 4 parallel (not series) battery strings. The inputs are configured as 16 x 12V cells in addition to the 4 battery currents and 4 battery temperature inputs.

The CXC supports a total of 16 peripheral modules per system; which may include the Shunt MUX or BCM modules in any combination. If you were to configure a system of all Shunt MUX modules (16-channels each), the number of current inputs would increase to a maximum of 256 channels.

The CAN communications bus supports a maximum of 125 nodes. Each CXC, or Cordex Smart Peripheral or Cordex rectifier would count as one node.

The standard shelf option provides for up to two modules mounted in a standard 1RU, 19" or 23" rack (Figure 1). A single module wall mount shelf is also available.

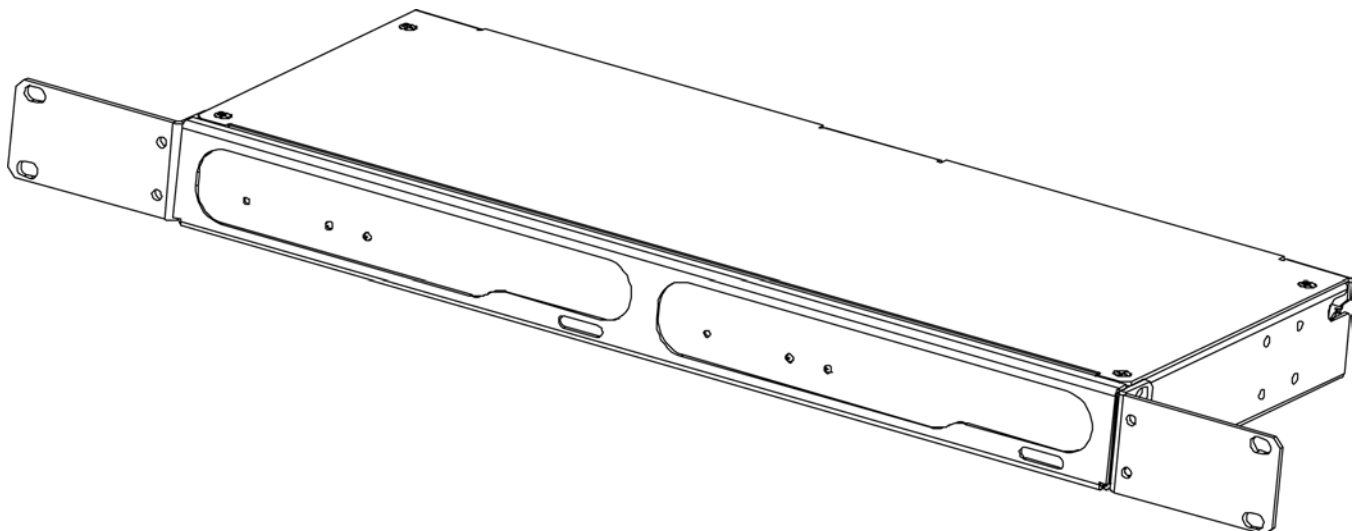


Figure 1—Isometric view of two Smart Peripherals in a common flush mounting shelf

2 Inspection

2.1 Packing Materials

All Alpha 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.

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

2.2 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 Alpha Technologies for advice on the impact of any damage.



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

3 Assembly and Installation

The following illustration shows the components that make up a typical assembly:

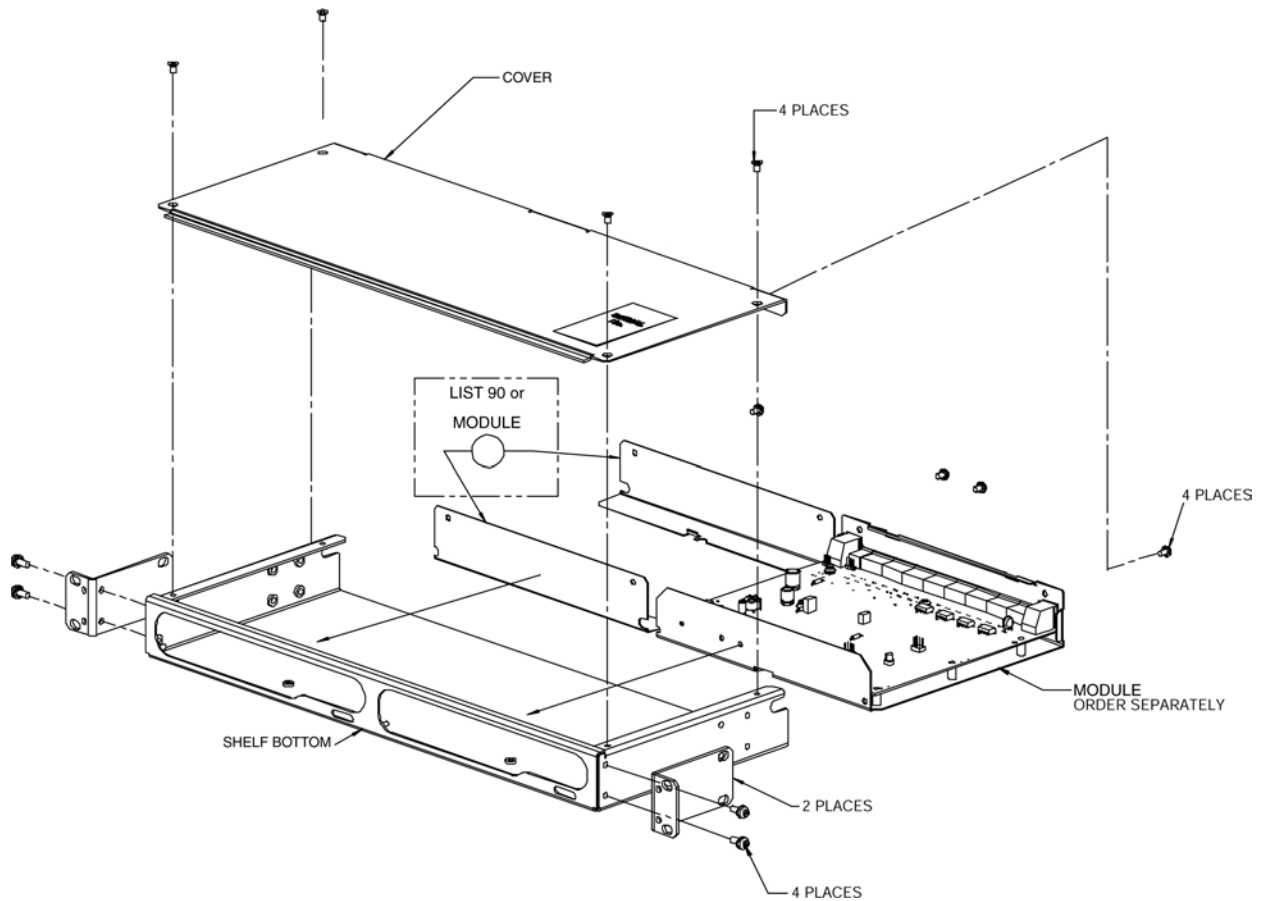


Figure 2—Illustration of typical assembly

The standard shelf consists of a one-piece bottom, sides, and front panel with cutouts. Mounting brackets and a top cover with screws are also provided. The Cordex Smart Peripheral modules and blanking plates are separate.

NOTE: See drawing 030-764-06 for wall mounting details.

3.1 Module Mounting

The Cordex Smart Peripheral modules (two per shelf maximum) slide from the rear of the shelf. Use the screws provided with the top cover of the shelf to secure the assembly.

An optional blanking plate (List 90) may be used to cover unused module cutouts (front and rear of shelf); for example, when only one module is used in a (two-module) shelf.

3.2 Shelf Preparation/Mounting

The standard shelf is supplied with universal-rack mounting brackets and may be mounted in a standard 19" or 23" relay rack. See drawing 030-734-06. Install brackets as required.

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

Secure the shelf to the rack using 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. Washers (such as internal tooth) or special screws that are designed to cut through the painted surface should be used to ensure a good chassis ground.

4 Wiring and Connections

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

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, eyeglasses, necklaces.
- Wear safety glasses with side shields at all times during installation.

Metallic tools must be insulated.

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 Tools Required

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

- Philips head screwdriver, #3 (tip size 1/4")
- Slot head screwdriver (blade size 1/8")
- Digital voltmeter equipped with test leads
- Cutters and wire strippers (#14 to #22AWG) (0.34 to 2.5mm²).

4.3 Connections

All wiring connections are accessible at the rear of the module. All cables should be routed together, bundled with clips (user supplied) and clamped directly into applicable terminal blocks.

NOTE: *Unused inputs must be shorted together.*

Twist positive and negative wire pairs together to minimize electrical noise pickup.

4.3.1 Shunt MUX and 2V BCM Power

The input power to the module is supplied via the system DC voltage:

- Verify jumper position for SYSTEM GROUND SELECT and set to positive or negative ground as required.
- Connect system (+) power bus lead to (+) module supply terminal.
- Connect system (-) power bus lead to (-) module supply terminal.

4.3.2 12V BCM Power

The input power to the module is supplied via each of the four signal inputs; either 24V or 48V taps.

4.3.3 CAN Serial Ports

Two CAN Serial ports (modular jack with offset latch) for communications with Alpha's Cordex System Controller and other CAN-enabled equipment (nodes) on the same system, are located at the rear of each module.

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

4.3.3.1 CAN Termination

A jumper allows the CAN bus to be open (to the next module in the system) or terminated. Termination must be set to "IN" (enabled) only on the final node on the CAN bus; otherwise, set termination to "OUT."

5 Operation

Cordex Smart Peripheral module operation is controlled via the web browser interface built into the Alpha Cordex Series system controller (CXC). Refer to the CXC Software manual (current version).

5.1 Front Panel Display

The POWER ON LED will light when valid DC power is connected to the module.

The MODULE ACQUIRED LED will light when the CXC has assumed control of the module. This LED will flash to signal which module specifically is being monitored/pollled; e.g., when a user is querying signals via the CXC. This allows the user to identify the physical location of the module.

5.2 Front Panel Reset

To RESET the module, press the respective pushbutton switch. The MODULE ACQUIRED LED will turn off. The CXC will poll the module after a (brief) preset interval and then attempt to re-acquire the module.

5.3 Can Bus Communications

The CAN bus is used for communication between the Cordex Smart Peripheral module and the CXC; which consists of commands and data transfer that are used during the operation of the power system to monitor the status of the module and the equipment connected to the system via the module.

5.4 CXC Data Logging

Data collected from the Cordex Smart Peripherals by the CXC may be exported into a standard spreadsheet format for analysis. Graphs may then be generated to depict status (e.g. deterioration of a battery) over time. Records may be taken over a preset interval or when certain conditions are met; such as, charge and discharge cycles.

NOTE: See *CXC Software manual* for detailed instruction on programming.

6 Maintenance

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

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



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
Inspect all system connections (re-torque as necessary)	
Verify alarm/control settings	

Table A—Sample maintenance log

NOTE: *There are no field replaceable parts.*

7 Warranty

Visit <http://www.alpha.ca/web2/services-and-support/warranty.html> for full warranty information.

7.1 Warranty

Alpha Technologies Ltd. warrants all equipment manufactured by it to be free from defects in parts and labor, for a period of two years from the date of shipment from the factory. The warranty provides for repairing, replacing or issuing credit (at Alpha's discretion) for any equipment manufactured by it and returned by the customer to the factory or other authorized location during the warranty period. There are limitations to this warranty coverage. The warranty does not provide to the customer or other parties any remedies other than the above. It does not provide coverage for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. No other obligations are expressed or implied. Warranty also does not cover damage or equipment failure due to cause(s) external to the unit including, but not limited to, environmental conditions, water damage, power surges or any other external influence.

The customer is responsible for all shipping and handling charges. Where products are covered under warranty Alpha will pay the cost of shipping the repaired or replacement unit back to the customer.

8 Acronyms and Definitions

AC	Alternating current
ANSI	American National Standards Institute
AWG	American Wire Gauge
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
EIA	Electronic Industries Alliance
EMI	Electromagnetic interference
FCC	Federal Communications Commission (for the USA)
IEEE	Institute of Electrical and Electronics Engineers
LED	Light emitting diode
NEC	National Electrical Code (for the USA)
NSTA	National Safe Transit Association
OSHA	Occupational Safety & Health Administration
RAM	Random access memory
UL	Underwriters Laboratories

SPECIFICATIONS FOR ALPHA'S CORDEX CONTROLLER SMART PERIPHERALS

Basic Unit

Software:	Cortex Controller Software version 1.4 (minimum requirement)
System:	Maximum 16 peripheral modules on CAN bus
Communications Bus Length:	Maximum 100m (328 ft) from CAN bus controller to the end CAN Termination
Standards:	EN55022 radio interference class B EN6100-4-3 adiated EMI (susceptibility) level A

Shunt Multiplexer

Input Voltage:	± 20 to 60VDC (supply)
Analog Inputs:	16 per module for monitoring current through a shunt (50mV rating) [configured to amperage capacity]

Interface

Front Panel:	LEDs for Power ON and Module Aquired; Recessed pushbutton switch for reset
Internal:	RJ-12 offset connectors (CAN in and CAN out) to daisy-chain modules for Cortex Series communications; Jumper for CAN Termination selection; Jumper for positive or negative ground selection

Mechanical

Mounting:	19"/23" relay rack (flush/offset), wall
Module Size:	40.6mm H x 211.5mm W x 197.3mm D (1.6" H x 8.33" W x 7.77" D)
Shelf Size:	44mm H x 432mm W x 178mm D (1.75" H x 17" W x 7" D) [all dimensions do not include mounting brackets]

Environmental

Temperature:	-40 to 65°C operating (-40 to 149°F) -40 to 85°C storage (-40 to 185°F)
Humidity:	0 to 95% non-condensing

Recommended Connection Wire Sizes (as per UL/CSA)

Temperature Range:	0 to 50°C (32 to 122°F)
Wire Size:	4.0 to 0.34mm ² (#12 to #22 AWG)

Part Numbers and List Options

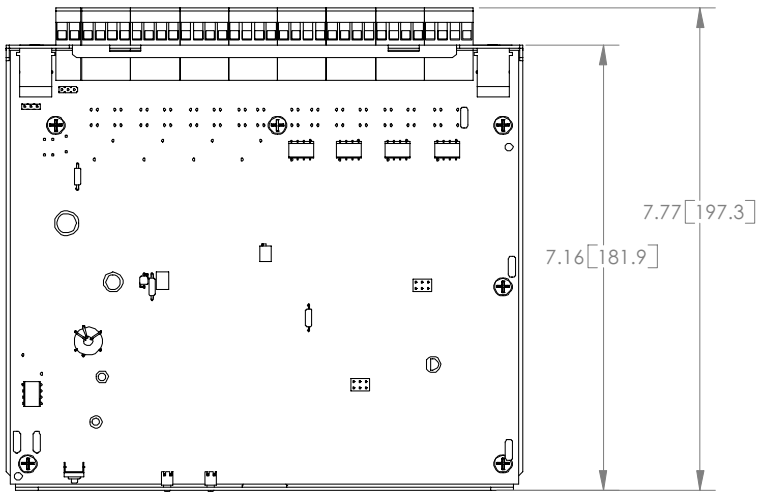
Product is available to order under the following part numbers and list options:

Description	Part Number/List Option
Cordex Shunt Multiplexer with CAN Interface.....	018-568-20
Basic module.....	*List 0
Gray finish with blue silkscreen.....	List 50
Charcoal finish with white (contrasting) silkscreen	*List 56
Shunts in negative lead.....	*List 84
Shunts in positive lead	List 86
Shelf, Cordex Smart Peripheral (fits 2 modules).....	030-734-20
Basic shelf.....	*List 0
Universal mounting brackets, SEE OUTLINE DRAWING FOR MOUNTING OPTIONS.....	*List 18
Gray finish with blue silkscreen.....	List 50
Charcoal finish with white (contrasting) silkscreen	*List 56
Module blank.....	List 90
(Module) Blank plate, charcoal	List 91
Wall Mount Shelf, Cordex Smart Peripheral (fits 1 module)	030-764-20
Basic shelf.....	*List 0
Gray finish with blue silkscreen.....	List 50
Charcoal finish with white (contrasting) silkscreen	*List 56
Cable Kit.....	038-983-20
Basic unit.....	*List 0
10m cable.....	List 70
20m cable.....	List 71
1/4" ring, #22-18AWG	List 80
3/8" ring, #22-18AWG	List 81
#10 ring, #22-18AWG	List 82
Cable, RJ-12 to RJ-12; sorted by length:	
0.3m (1')	877-176-26
0.5m (1.5')	877-176-21
6.3m (19')	877-176-27
0.6m (2')	877-176-22
2.0m (6')	877-176-23
4.0m (12')	877-176-24
8.2m (25')	877-176-25

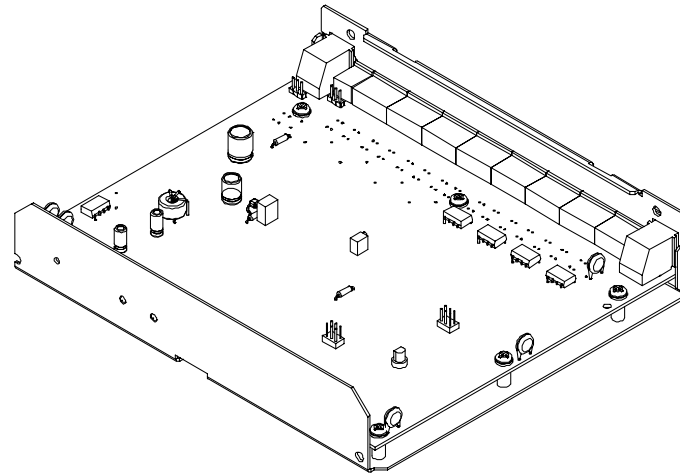
* Default option

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.

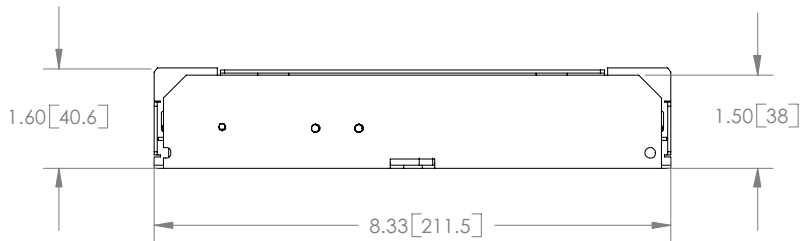
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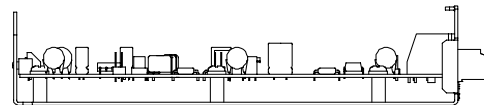
TOP VIEW
(SOME COMPONENTS ARE NOT SHOWN)



ISOMETRIC VIEW
(SOME COMPONENTS ARE NOT SHOWN)



FRONT VIEW



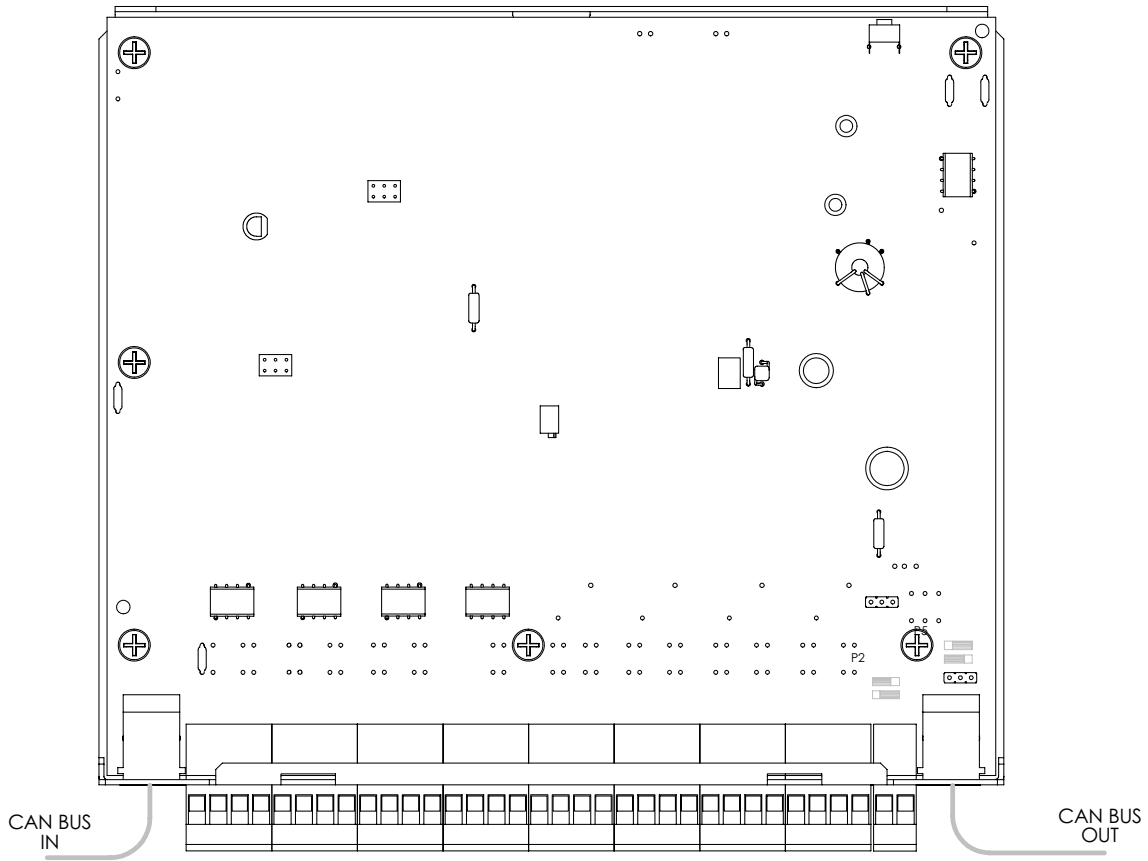
LEFT SIDE VIEW

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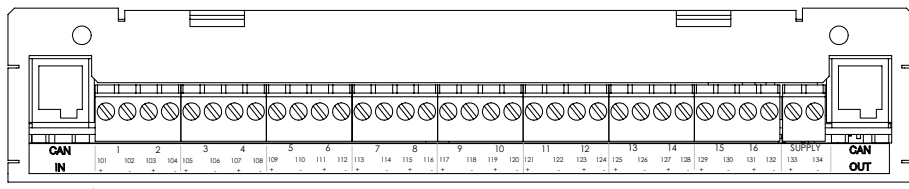
DIMENSIONS ARE IN INCHES WITH METRIC [mm] IN BRACKETS: INCHES [mm]

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B	D2	018-568-06	A

REVISIONS				
LTR	DESCRIPTION	REV BY	DATE	APPD
B	UPDATED JUMPER SETTING FOR P2; ADDED NOTE.	MP	2005/12	



TOP VIEW
(SOME COMPONENTS ARE NOT SHOWN)



REAR VIEW

JUMPER SETTING FOR P5 - CAN BUS TERMINATION



JUMPER SETTING FOR P2 - SHUNT POLARITY

FOR SHUNTS IN THE POSITIVE LEAD:



FOR SHUNTS IN THE NEGATIVE LEAD:



NOTE: ALL SHUNTS CONNECTED TO A SINGLE SHUNT MULTIPLEXER MUST BE IN THE SAME LEAD.

ARGUS

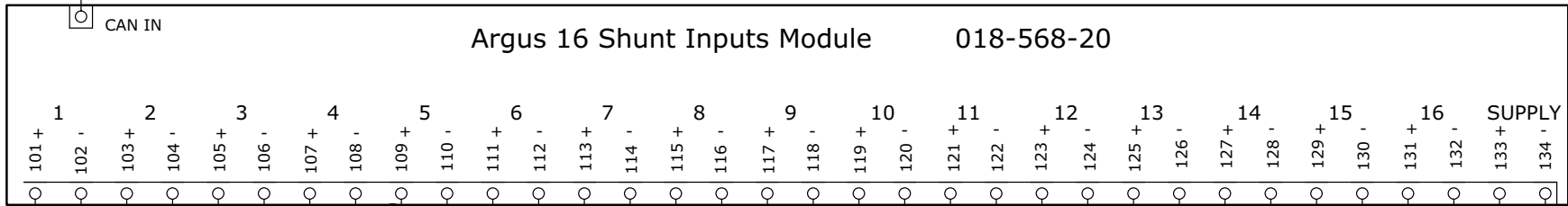
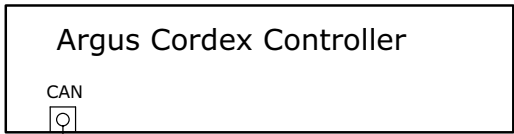
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CUSTOMER CONNECTION, SHUNT MULTIPLEXER			NTS
ISSUE	DATE		SHEET 1 OF 1
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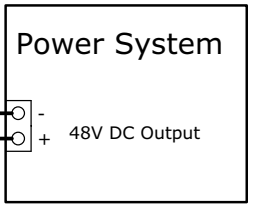
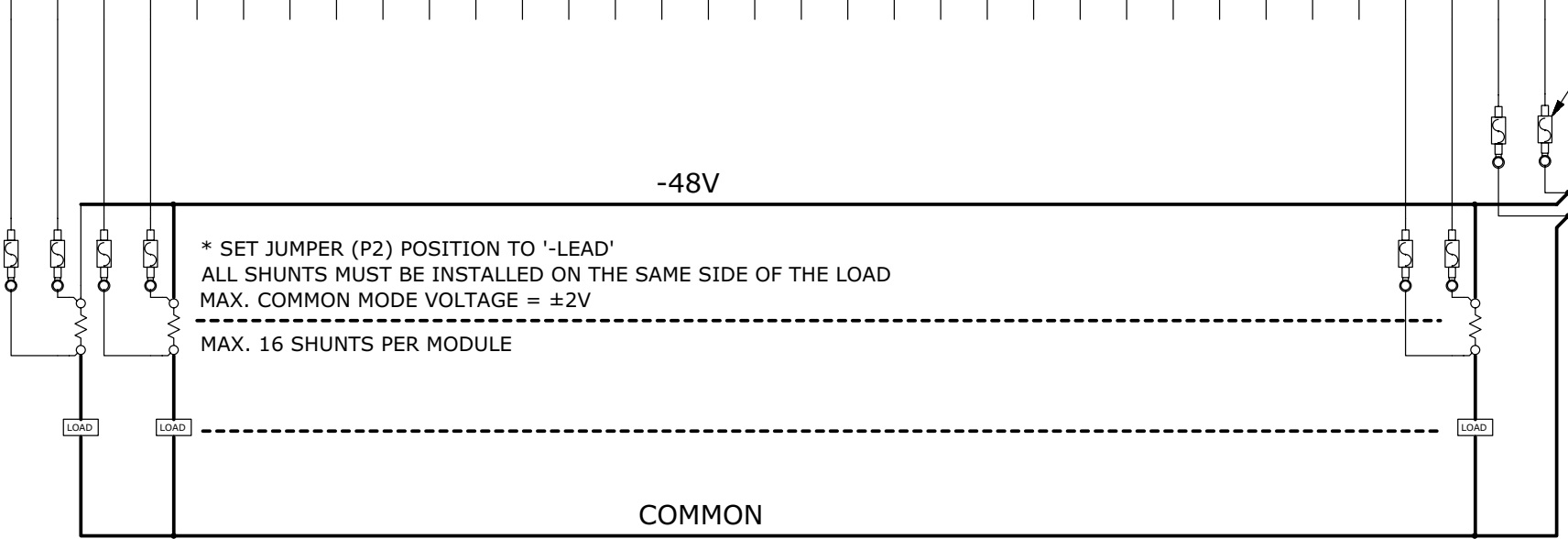
1 2 3 4 5 6 7 8 9 10 11 12

REVISION			
LTR	DESCRIPTION	DATE	APPD

TYPICAL SHUNT MUX CONNECTION DIAGRAM (SHOWN WITH -48V SYSTEM)



PART OF KIT (Qty. 34)
WIRE TERMINATION ASSY with
0.5A, 60V Protection Fuse or
MAY BE USER SUPPLIED
0.5 - 5 AMP, 60VDC RATED



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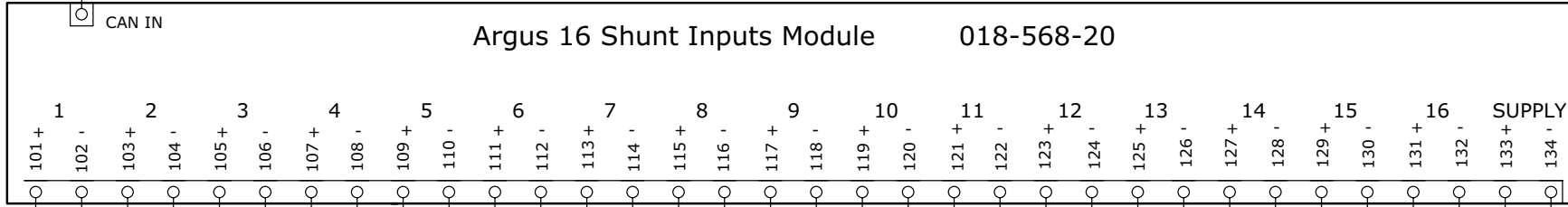
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APPROVED	RD	2006/10	
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ISSUE			SHEET 5 of 6
DATE			
SIZE B	TYPE S3	DWG NO. 038-983-08	REV B

REVISION			
LTR	DESCRIPTION	DATE	APPD

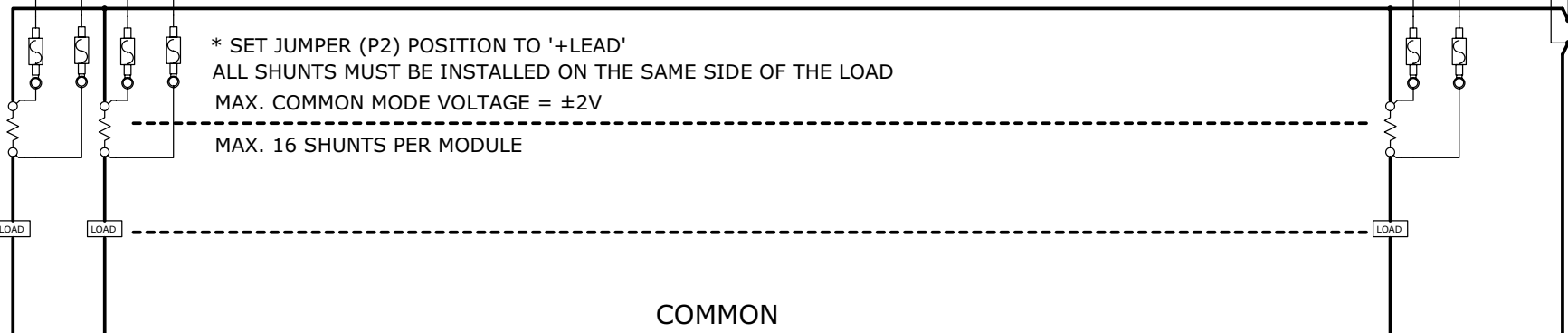
TYPICAL SHUNT MUX CONNECTION DIAGRAM (SHOWN WITH +24V SYSTEM)

Argus Cordex Controller

Argus 16 Shunt Inputs Module 018-568-20



PART OF KIT (Qty. 34)
WIRE TERMINATION ASSY with
0.5A, 60V Protection Fuse or
MAY BE USER SUPPLIED
0.5 - 5 AMP, 60VDC RATED



*** SET JUMPER (P2) POSITION TO '+LEAD'**
ALL SHUNTS MUST BE INSTALLED ON THE SAME SIDE OF THE LOAD
MAX. COMMON MODE VOLTAGE = ±2V
MAX. 16 SHUNTS PER MODULE

Power System

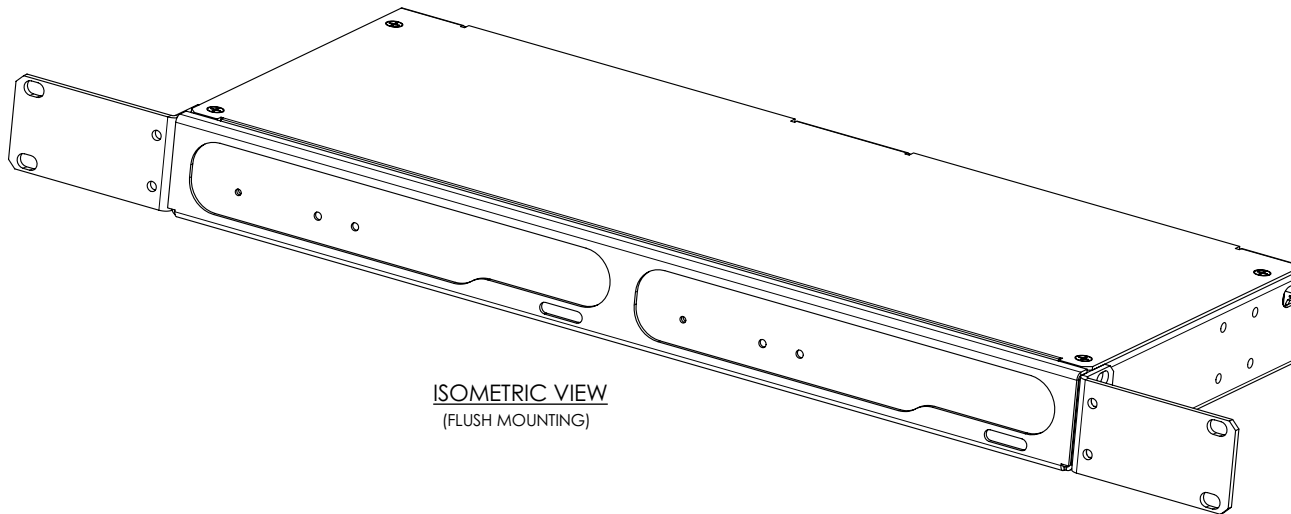
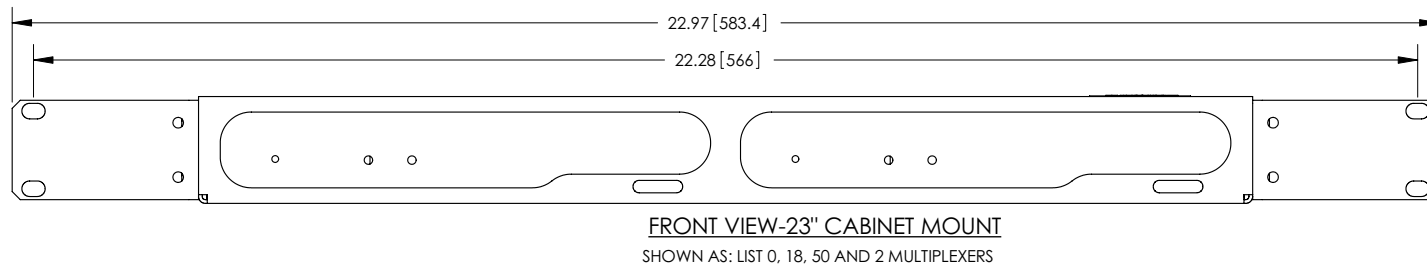
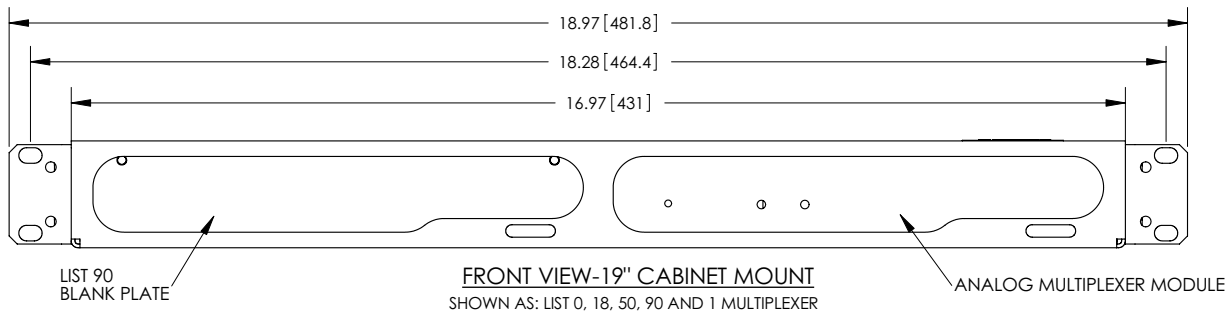
+
- 24V DC Output

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DATE			
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			REV B



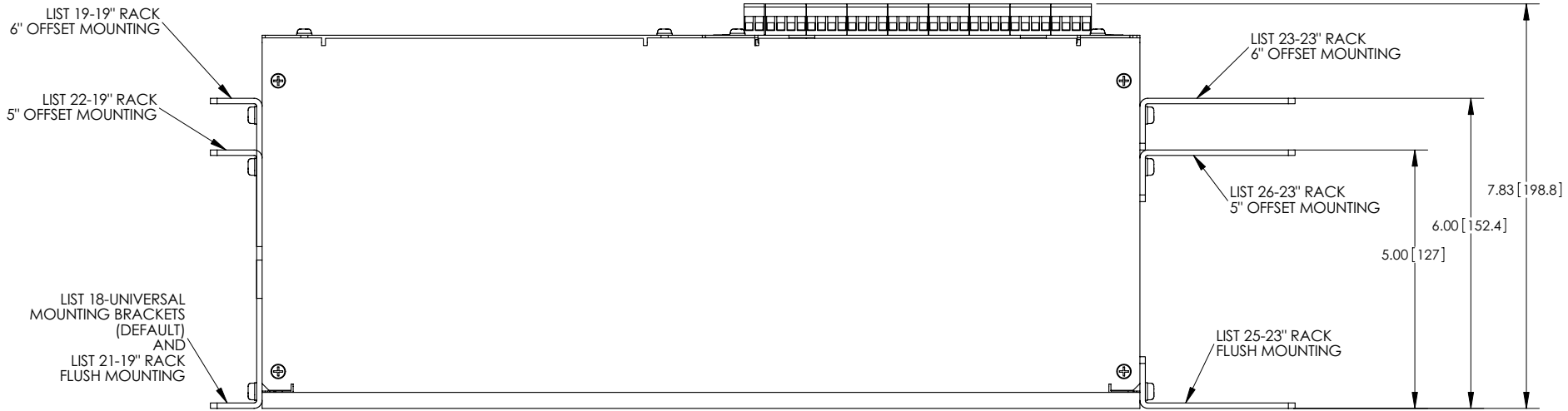
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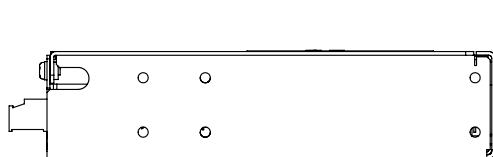
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XXX	±0.02"	[XX]	±0.5mm
XXXX	±0.01"	[XXX]	±0.25mm
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ISSUE DATE	SHEET 1 OF 2		REV
SIZE B	TYPE D2	DWG NO. 030-734-06	REV B

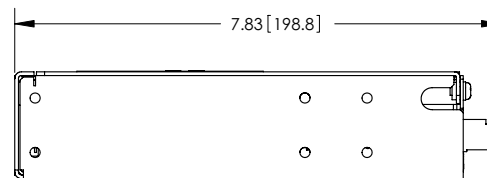
REVISIONS				
LTR	DESCRIPTION	REV BY	DATE	APPD



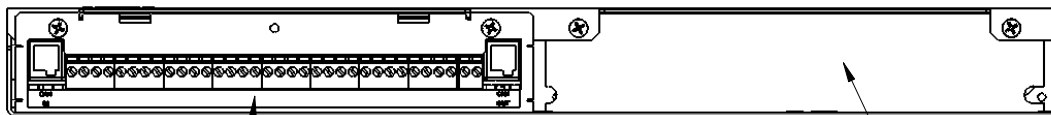
TOP VIEW-MOUNTING OPTIONS



LEFT SIDE VIEW



RIGHT SIDE VIEW



REAR VIEW

BLANK PLATE

MODULE TERMINAL BLOCKS FOR MULTIPLEXER INPUTS, AND POWER CONNECTIONS SHOWN AS AN EXAMPLE. SHELF WILL ACCOMMODATE OTHER MODULES.

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

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DESIGN	JULIURD	2004/08	MATERIAL
DRAWN	EOF	2004/08	
CHECKED	RD	2004/08	
APPROVED	RD	2004/08	FINISH
TOLERANCES			PER P.O. and Doc. 070-024-83
XX	±0.04"	[X]	±1mm
XXX	±0.02"	[XX]	±0.5mm
XXXX	±0.01"	[XXX]	±0.25mm
SCALE			1:2
TITLE			
OUTLINE, SHELF CXC PERIPHERALS			
ISSUE	DATE	SHEET	2 OF 2
SIZE	TYPE	DWG NO.	REV
B	D2	030-734-06	B

**Alpha Technologies Ltd.**

7700 Riverfront Gate
Burnaby, BC V5J 5M4
Canada
Tel: +1 604 436 5900
Fax: +1 604 436 1233
Toll Free: +1 800 667 8743

Alpha Energy

1628 W Williams Drive
Phoenix, AZ 85027
United States
Tel: +1 602 997 1007
Fax: +1 623 249 7833

Alpha Technologies Europe Ltd.

Twyford House Thorley
Bishop's Stortford
Hertfordshire, CM22 7PA
United Kingdom
Tel: +44 1279 501110
Fax: +44 1279 659870

Alpha Technologies

Unit 504, 5/F,
Fourseas Building
No 208-212 Nathan Road
Kowloon, Hong Kong
Tel: +852 2736 8663
Fax: +852 2199 7988

Alpha Technologies Inc.

3767 Alpha Way
Bellingham, WA 98226
United States
Tel: +1 360 647 2360
Fax: +1 360 671 4936

Alpha Technologies GmbH

Hansastraße 8
D-91126
Schwabach, Germany
Tel: +49 9122 79889 0
Fax: +49 9122 79889 21

Alphatec Ltd.

339 St. Andrews St.
Suite 101 Andrea Chambers
P.O. Box 56468
3307 Limassol, Cyprus
Tel: +357 25 375 675
Fax: +357 25 359 595

Alpha Innovations Brasil

Rua Manuel Augusto
de Alvarenga, 155
São Paulo, SP - Brasil
Tel: +55 11 2476 0150
Fax: +55 11 2476 0150

Alpha Industrial Power Inc.

1075 Satellite Blvd NW,
Suite 400
Suwanee, GA 30024
United States
Tel: +1 678 475 3995
Fax: +1 678 584 9259

**Technologies Argus
First de Mexico**

Anatole France Num. 17
Colonia Polanco
11560, México D.F.
Tel: +52 55 5280 6990

Alpha TEK ooo

Khokhlovskiy Pereulok 16
Stroenie 1, Office 403
Moscow, 109028
Russia
Tel: +7 495 916 1854
Fax: +7 495 916 1349

Alphatec Baltic

S. Konarskio Street 49-201
Vilnius, LT-03123
Lithuania
Tel: +370 5 210 5291
Fax: +370 5 210 5292

For technical support, contact Alpha Technologies:
Canada and USA: 1-888-462-7487
International: +1-604-436-5547

Visit us at www.alpha.ca

Power