




AlphaCap-665


Installation & Operation Manual

Part # 013-015-B2
Effective: 03/2014


AlphaCap-665

 **NOTE:**

Photographs contained in this manual are for illustrative purposes only. These photographs may not match your installation.

 **NOTE:**

Operator is cautioned to review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, contact Alpha Technologies or your nearest Alpha representative.

 **NOTE:**

Alpha shall not be held liable for any damage or injury involving its enclosures, power supplies, generators, batteries, or other hardware if used or operated in any manner or subject to any condition inconsistent with its intended purpose, or if installed or operated in an unapproved manner, or improperly maintained.

For technical support, contact Alpha Technologies:

Canada and USA: **1-888-462-7487**

International: **+1-604-436-5547**

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1. Safety

SAVE THESE INSTRUCTIONS: This manual contains important safety instructions that must be followed during the installation, servicing, and maintenance of the product. Keep it in a safe place. Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies or the nearest Alpha representative. Save this document for future reference.

1.1 Safety Symbols

To reduce the risk of injury or death, and to ensure the continued safe operation of this product, the following symbols have been placed throughout this manual. Where these symbols appear, use extra care and attention.

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



NOTE:

A NOTE provides additional information to help complete a specific task or procedure. Notes are designated with a checkmark, the word NOTE, and a rule beneath which the information appears.



CAUTION!

CAUTION indicates safety information intended to PREVENT DAMAGE to material or equipment. Cautions are designated with a yellow warning triangle, the word CAUTION, and a rule beneath which the information appears.



WARNING!

WARNING presents safety information to PREVENT INJURY OR DEATH to personnel. Warnings are indicated by a shock hazard icon, the word WARNING, and a rule beneath which the information appears.



HOT!

The use of HOT presents safety information to PREVENT BURNS to the technician or user.

1.2 General Safety



WARNING!

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

1.3 Mechanical Safety

- Keep hands and tools clear of fans. Fans are thermostatically controlled and switch on automatically.
- Power supplies can reach extreme temperatures under load.
- Use caution around sheet metal components and sharp edges.

1.4 Electrical Safety



WARNING!

Hazardous voltages are present at the input of power systems. The DC output from rectifiers and batteries, though not dangerous in voltage, has a high short-circuit current capacity that may cause severe burns and electrical arcing.

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

- a. Remove all metallic jewelry, such as watches, rings, metal rimmed glasses, or necklaces.
- b. Wear safety glasses with side shields at all times during the installation.
- c. Use OSHA approved insulated hand tools.



WARNING!

Lethal voltages are present within the power system. Always assume that an electrical connection or conductor is energized. Check the circuit with a voltmeter with respect to the grounded portion of the enclosure (both AC and DC) before performing any installation or removal procedure.

- Do not work alone under hazardous conditions.
- A licensed electrician is required to install permanently wired equipment. Input voltages can range up to 240 Vac. Ensure that the utility power is disconnected and locked out before performing any installation or removal procedure.
- Ensure that no liquids or wet clothes come into contact with internal components.
- Hazardous electrically live parts inside this unit are energized from the batteries even when the AC input power is disconnected.

1.5 Battery Safety

- Servicing and connection of batteries must be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.
- Always wear eye protection, rubber gloves, and a protective vest when working near batteries. Remove all metallic objects from your hands and neck.
- Use OSHA approved insulated hand tools. Do not rest tools on top of batteries.
- Batteries contain or emit chemicals known to cause cancer and birth defects or other reproductive harm. Battery post terminals and related accessories contain lead and lead compounds. Wash your hands after handling batteries.



WARNING!

Follow battery manufacturer's safety recommendations when working around battery systems. Do not smoke or introduce an open flame when batteries (especially vented batteries) are charging. When charging, batteries vent hydrogen gas, which can explode.

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

2. Introduction

2.1 Scope of the Manual

This instruction manual explains the installation, interconnection, and operation of Alpha Technologies' AlphaCap-665 short duration backup supply module. To aid the user with installation, frequent reference is made to specifications and drawings located at the rear of the manual.

- Specifications 013-015-B1
- Outline Drawing 013-015-06
- Customer Connections 013-015-08

2.2 Product Overview

The product is designed to be used for short duration power backup (holdup) of 48 Vdc powered remote loads such as xDSL and FTTx equipment.

The AlphaCap system uses an array of Ultra™ capacitors in conjunction with a DC-DC converter board. Similar to a battery, the system is paralleled on the 48 Vdc bus of the load.

A typical application is holding up remote equipment that are deployed using network or line powering systems and that are susceptible to brief outages due to transients and Ground Fault Interupt (GFI) resets. Another application is local powered remote systems deployed with battery eliminators (DC rectifier without battery backup).

The AlphaCap-665 provides continuous voltage output for a load up to 750W over a period of time.

2.3 Ordering Information

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

Description	Part Number/List Option
AlphaCap-665	013-015-20
Basic module	*List 0

* Default option

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

3. Features

3.1 Electrical

The AlphaCap-665 is designed with a single connector for input and output for a single “+” and “-” connection to the -48 Vdc system bus similar to a battery.

3.2 Input

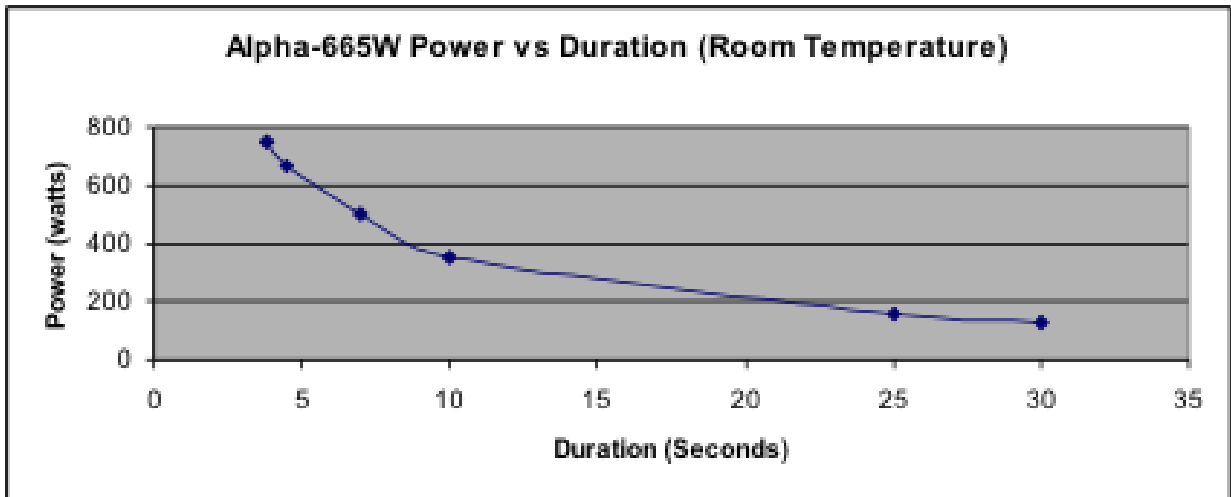
The AlphaCap-665 has a built in charge limit of 160 mA to ensure only minimal DC power provisioned to the remote load is consumed.

The AlphaCap will recharge to full capacity within 30 minutes regardless of depth of discharge.

3.3 Output

The unit supplies 665W continuous power for 4.5 seconds under nominal operating conditions. The unit will supply 665W for at least 3 seconds down to -40°C (-40°F).

Under nominal operating conditions, the maximum duration holdup is 30 seconds on a 130W load. The Alpha-Cap-665 can provide up to 750W of power for 3.8 second duration under normal operating conditions.



4. Operating Temperature

4.1 Operating range

The AlphaCap-665 operating range is -40°C to +65°C (-40°F to +149°F).

4.2 High-temperature shutdown

A temperature of +65°C will trigger a high-temperature shutdown. Normal holdup and charging functions will resume when the temperature drops to +60°C (+140°F). In other words, there is a 5°C (9°F) hysteresis.

4.3 Ambient versus case temperature

In most cases, the temperature limitations are based on the ambient temperature. Because a fully charged Alpha-Cap-665 dissipates very little heat, the case temperature is assumed to be equal to the ambient temperature.

4.4 Temperature effects

4.4.1 Holdup duration

The holdup duration decreases as the temperature increases. The power output also affects the holdup duration, making this a 3-dimensional analysis.

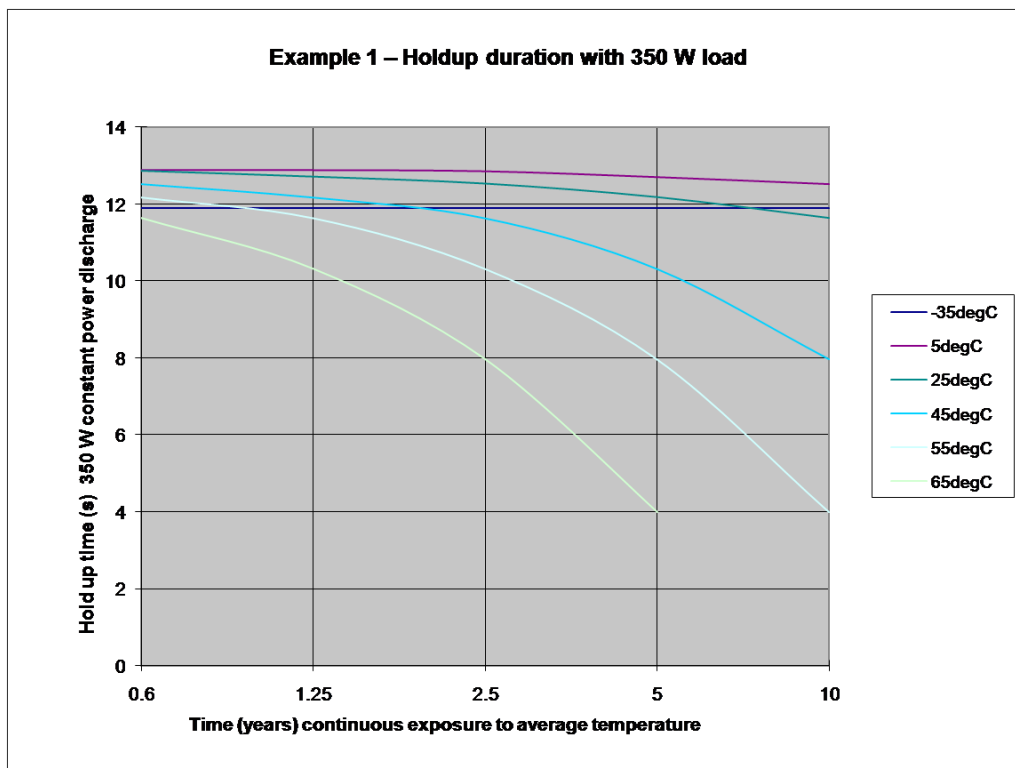
4.4.2 Capacitor life expectancy

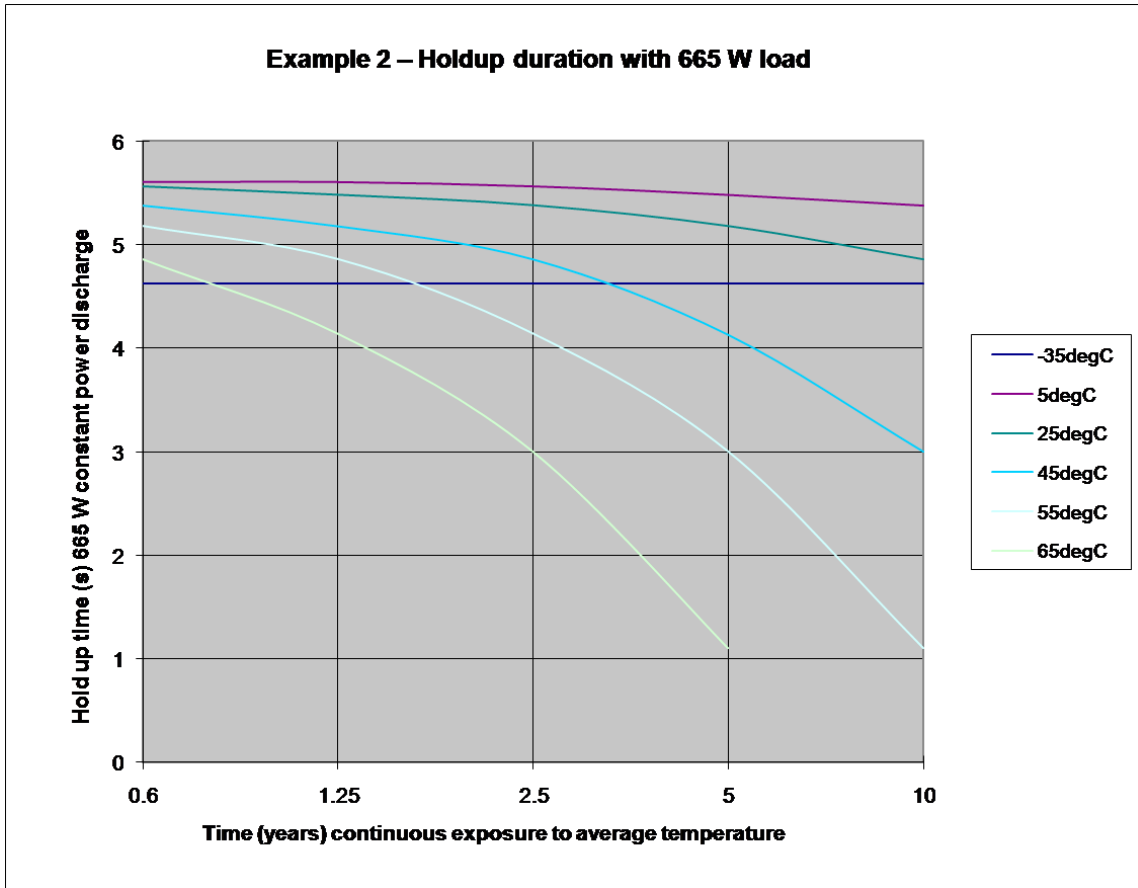
High temperatures decrease the life of an AlphaCap-665, for example:

- 350 W load at 25°C (77°F) 11 s of holdup after 10 years.
- 350 W load at 45°C (113°F) 8 s of holdup after 10 years.
- 350 W load at 55°C (131°F) 4 s of holdup after 10 years.

4.5 Electrical

The AlphaCap-665 is designed with a single connector for input and output for a single “+” and “-” connection to the -48 Vdc system bus similar to a battery.





4.6 Signals

LED Indicator - The AlphaCap-665 has a bi-color LED displayed at two locations on the chassis. LED indications are as follows:

- Green (Solid): OK
- Green (Flashing): Charging
- Green / Amber (Alternating): Backup
- Green / Red (Alternating): Over-charging, charging circuit failure
- Red (Solid) or OFF: Module Fail.

Alarm Relay - The AlphaCap-665 has a dry contact alarm relay to signal module failure. The alarm relay is a normally closed (NC) configuration. During normal operating conditions, the relay is energized for open circuit, and on alarm the relay de-energizes closing the relay. The alarm relay will trigger under the following conditions:

- Capacitor fully discharged
- Low voltage input shutdown
- Cap overcharge shutdown
- Over temperature shutdown
- Internal voltage reference error
- Blown fuse.

5. Inspection

5.1 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. Power systems are custom packaged in heavy-duty plywood crates.

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

Rectifiers and batteries are shipped on individual pallets and are packaged according to the manufacturer's guidelines.

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

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

5.2 Check for Damage

Before unpacking the product, note any damage to the shipping container. Unpack the product and inspect the exterior for damage. If any damage is observed, contact the carrier immediately.

Continue the inspection for any internal damage. In the unlikely event of internal damage, inform the carrier and contact Alpha Technologies for advice on the impact of any damage.

5.3 General Receipt of Shipment

The inventory included with your shipment depends on the options you have ordered. The options are clearly marked on the shipping container labels and bill of materials.

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

6. Installation and Connections

Only qualified personnel should install the product which shall be mounted in a clean and dry environment.

6.1 Safety Precautions

Refer to the Safety section at the front of this manual.

6.2 Tools Required

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

- Battery lifting apparatus if required.
- Electric drill with hammer action, 1/2" capacity.
- Various crimping tools and dies to match lugs used in installation.
- Load bank of sufficient capacity to load largest rectifier to its current limit.
- Digital voltmeter equipped with test leads.
- Cable cutters.
- Torque wrench: 1/4" drive, 0 - 150 in-lb.
- Torque wrench: 3/8" drive, 0 - 100 ft-lb.
- Insulating canvases as required (2' x 2', 1' x 1', 3' x 3', etc.).
- Various insulated hand tools including:
 - Combination wrenches.
 - Ratchet and socket set.
 - Various screwdrivers.
 - Electricians knife.
- Battery safety spill kit required for wet cells only:
 - Protective clothing.
 - Face shields.
 - Gloves.
 - Baking soda.
 - Eye wash equipment.
- Cutters and wire strippers (#14 to #22 AWG) [2.5 to 0.34 mm²].

6.3 Wall Mount

The standard unit consists of a one-piece top, sides with cutouts and a bottom cover. The unit may be installed with the wall mounting holes in the flanges of the chassis. See drawing 013-015-06.

The product must be mounted in a clean and dry environment.

6.4 Connections

All wiring connections are accessible at the side of the module. See drawing 013-015-08.

6.4.1 Grounding

Two standoffs (#10-32, 5/8" center) are provided on the chassis for earth ground.

6.4.2 Power

Connect -48 and +RTN power supply connections to the 2-position Tyco (193839-1) terminal block provided using #12-18 AWG TEW 90 wire or equivalent.

The mating connector requires a Mate-N-Lok Amp 770017-1 (housing) and two (2) Amp 193841-1 crimp contacts.

Ensure power supply connection is to a voltage source within the limits of the device configuration. Refer to the technical specifications in this manual.

6.4.3 Alarm

Alarm relay connection at the AlphaCap-665 is made via an Amp Mate-N-Lok connection. The relay is rated for a maximum load of 2A / 60W. The connector located on the AlphaCap is Amp 2-1445055-2.

The mating connector required for connecting to the alarms on the AlphaCap is Amp 1445022-2 (housing). The housing requires two (2) Amp 794610-1 female crimp contacts:

- Pin 1 on the connector = Common
- Pin 2 on the connector = NC

7. Maintenance

Although very little maintenance is required with Alpha systems, routine checks and adjustments are recommended to ensure optimum system performance. These procedures should be performed at least once a year.

Only qualified service personnel should do the repairs.

The following table lists a few maintenance procedures for this system.



WARNING!

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

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

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

Stored energy hazard. Do Not Open the cover. No serviceable parts inside.

Table A — Sample maintenance log

Procedure	Date Completed
Inspect all system connections. Re-torque if necessary.	
Verify alarm/control settings.	

8. Warranty and Service Information

8.1 Technical Support

Free Technical Support is part of the Alpha customer satisfaction commitment. The phone numbers below can also be used to access a wide range of service solutions both at your premise and at the Alpha facility nearest you.

In Canada and the USA, call toll free 1-888-462-7487 24 hours a day, seven days a week.

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

8.2 Warranty

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.

8.3 Battery Warranty

Note that battery warranty terms and conditions vary by battery and by intended use. The most common battery warranty provided by Alpha is a two year full replacement warranty with a pro-rated warranty for the following three years. Pro rated warranty provides a credit applicable toward the purchase of new batteries from Alpha. The credit is calculated as the purchase price multiplied by the percentage of the battery life that was not available (in months). Battery warranty coverage is lost where the battery charge is not maintained for 6 months. Contact your Alpha sales representative or the Technical Support team at the above number to understand your entitlements under Battery Warranty.

8.4 Return of Material

Please contact Technical Support at the number above to obtain a Service Repair Order (or Return Material Authorization) number BEFORE sending material back. This will ensure that your service needs are handled promptly and efficiently.

8.5 Service Centers

For a list of service centers, refer to the Alpha website:

<http://www.alpha.ca/web2/services-and-support/service-and-repair.html>.

9. Acronyms and Definitions

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

10. Certification

About CSA and NRTL

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



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

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



Alpha rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 60950-01 and UL 60950-01. Alpha UPS products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 107.3 and UL 1778.

As part of the reciprocal, US/Canada agreement regarding testing laboratories, the Standards Council of Canada (Canada's national accreditation body) granted Underwriters Laboratories (UL) authority to certify products for sale in Canada. (2)



Only Underwriters Laboratories may grant a licence for the use of this mark, which indicates compliance with both Canadian and US requirements. (3)

NRTLs capabilities

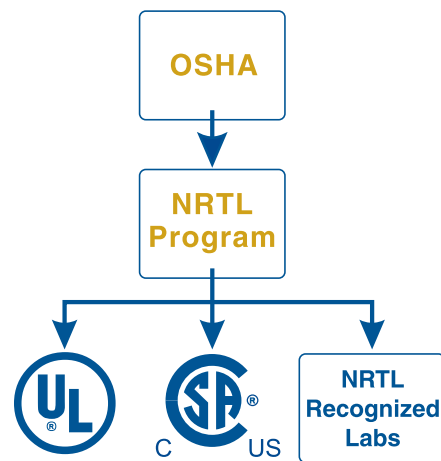
NRTLs are third party organizations recognized by OSHA, US Department of Labor, under the NRTL program.

The testing and certifications are based on product safety standards developed by US based standards developing organizations and are often issued by the American National Standards Institute (ANSI). (4)

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

Governance of NRTL

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



(1) www.csagroup.org

(2) www.scc.ca

(3) www.ulc.ca

(4) www.osha.gov

Specifications for Alpha Technologies' AlphaCap-665

Input

Voltage:	-48 to -56 Vdc
Current (Charge):	160 mA \pm 10% maximum

Output

Voltage:	-46 Vdc \pm 3%
Power:	665 W nominal 750 W maximum
Duration Backup:	4.5 seconds, 665 W @ 5 to 55°C 3 seconds minimum, 665 W load over full temperature range 30 seconds maximum duration at low load 3.8 seconds, 750 W load

Interface

Display:	Status indicator LEDs (2)
Alarm:	Relay output connection for system fail

Connections

I/O (-48V / +RTN):	Tyco (193839-1) connector Mate with Amp 770017-1 (housing) plus 2x Amp 193841-1 (contacts)
Chassis/Frame Ground:	2x #10-32 stud connections, 5/8" center
Alarm (single Form B relay):	Amp 2-1445055-2; common with normally closed state terminations Mate with Amp 1445022-2 (housing) plus 2x Amp 794610-1 (contacts)

Mechanical

Mounting:	L-shaped brackets for wall mounting
Dimensions:	43.1 mm H x 183.4 mm W x 350.5 mm D (1.70" H x 7.22" W x 13.8" D)

Environmental

Temperature:	5 to 55°C nominal operating (41 to 131°F) -40 to 65°C extended operating (-40 to 149°F). See manual for details on how temperature affects performance. Derated duration backup below 5°C, derated capacitor life above 55°C.
Humidity:	0 to 95% non-condensing
Elevation:	-500 m to +4000 m, derated for ambient temperature above 2000 m to 40°C at 4000 m. (-1640 feet to 13124 feet, derated for ambient temperature above 6562 feet to 104°F at 13124 feet).

Compliance

This product is designed to meet or exceed the following:

UL	60950-1-2002
CSA	C22.2 No. 60950
Telcordia (Bellcore)	GR-1089-CORE (requirements where applicable)

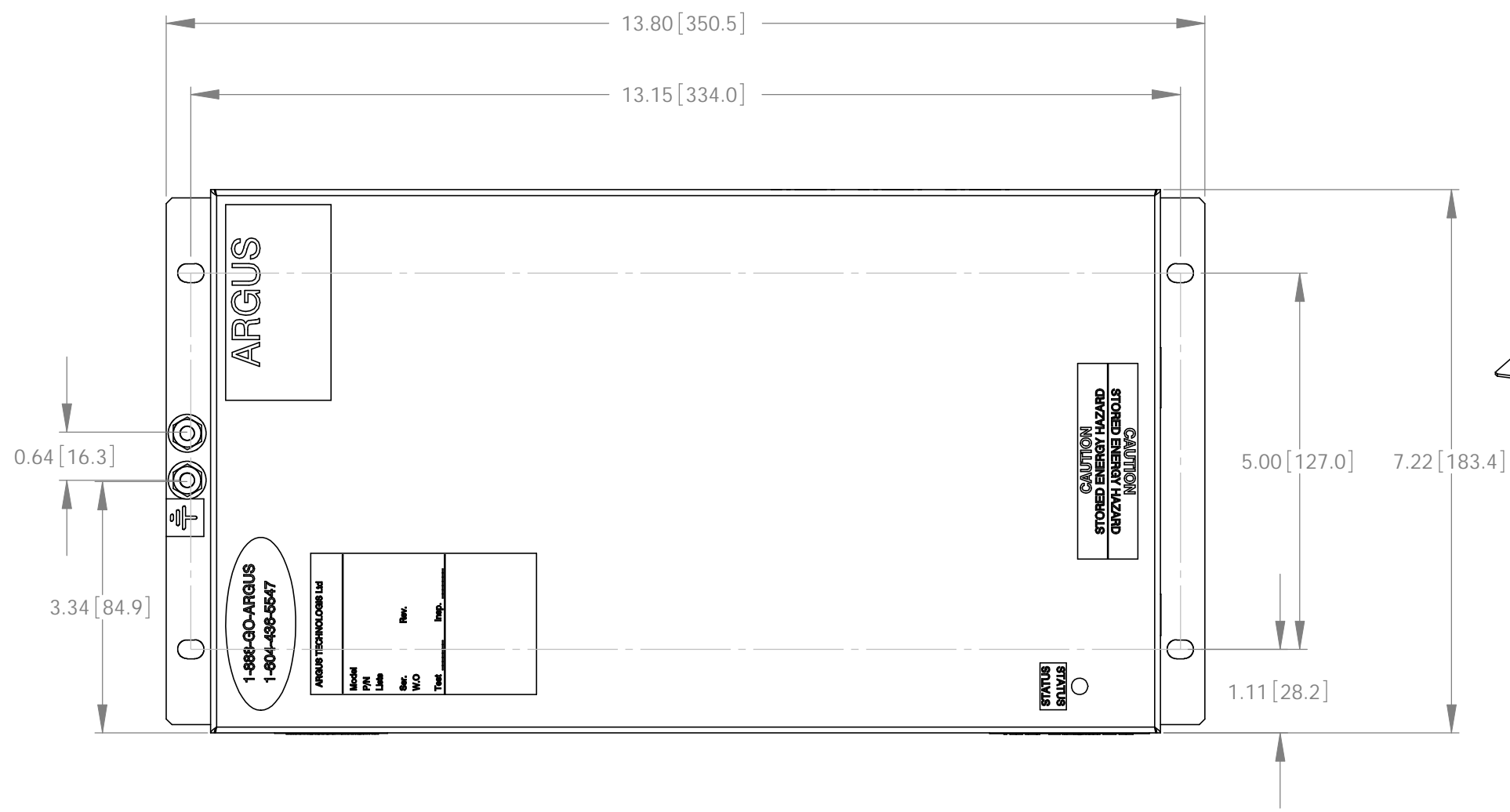
In accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Class A:

NOTE: *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

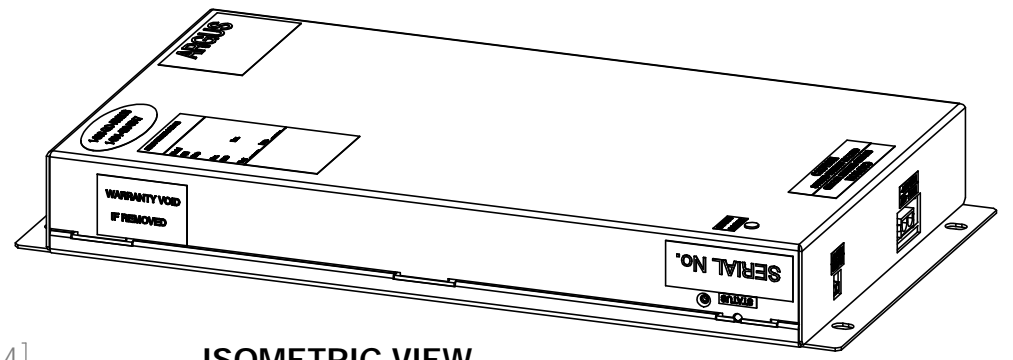
Any changes or modifications to this equipment not expressly described in this manual could void the FCC compliance.

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.

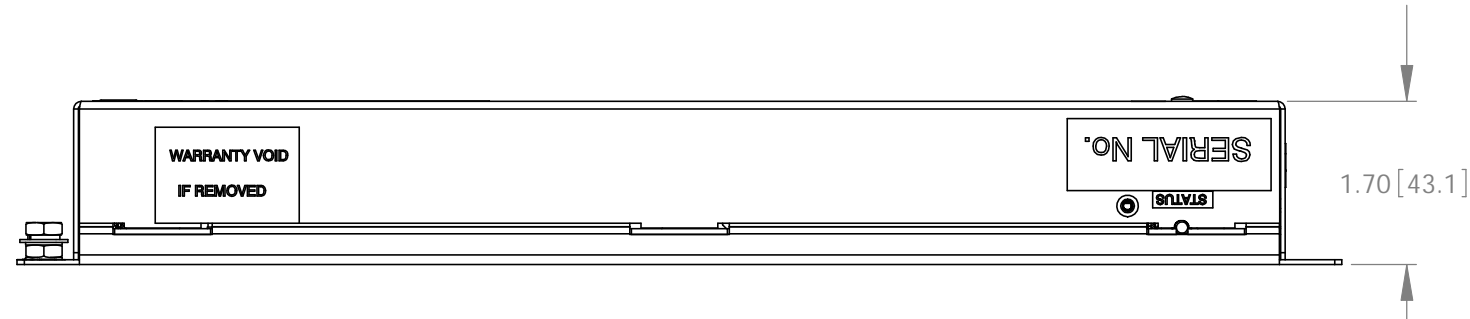
REVISIONS				
LTR	DESCRIPTION	REV BY	DATE	APPD
B	REV'D TO MATCH 013-015-04 REV B	W.H	2008/02	GS
C	REVISED PER EO'S A2 AND A7	M.P	2008/10	



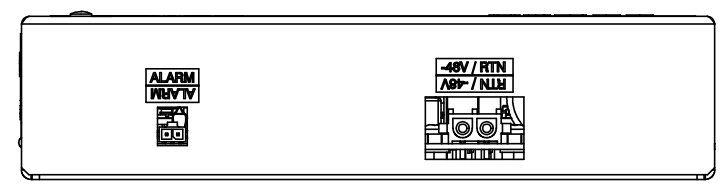
TOP VIEW



ISOMETRIC VIEW



SIDE VIEW



FRONT VIEW

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

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DESIGN	WH	2007/11	MATERIAL
DRAWN	J.U.	2007/12	
CHECKED	M.C	2007/15	
APPROVED	G.S	2007/12	FINISH

TOLERANCES

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

PER P.O. and Doc. 070-024-83

SCALE N.T.S.

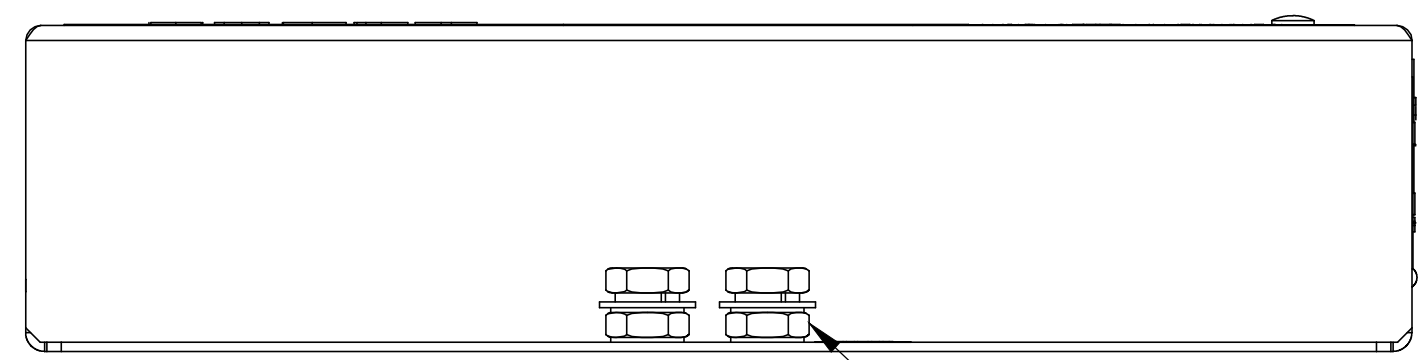
TITLE

OUTLINE DRAWING
SDB, ALPHACAP-665W

ISSUE DATE	SHEET 1 OF 1
SIZE TYPE DWG NO.	REV
B D2	013-015-06 C

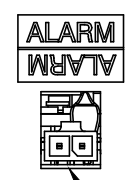
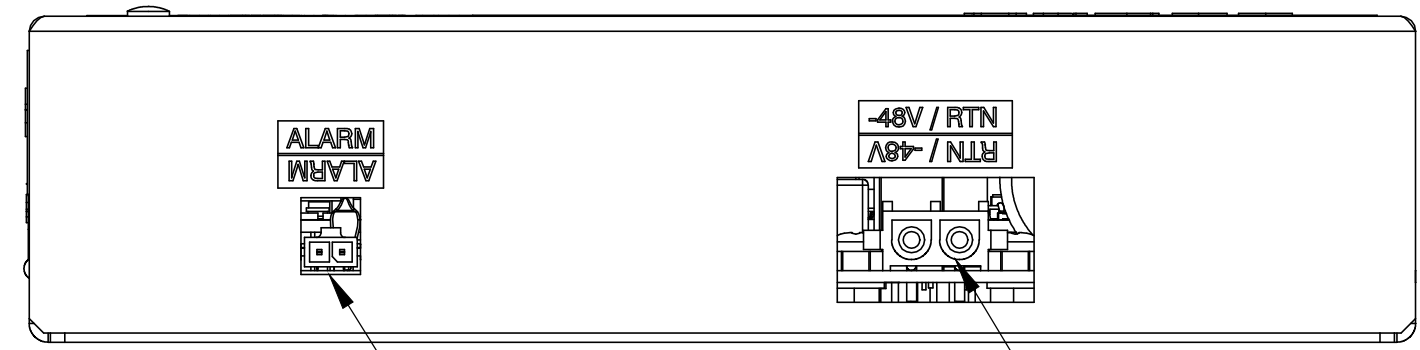
REVISIONS				
LTR	DESCRIPTION	REV BY	DATE	APPD
B	REV'D TO MATCH 013-015-04 REV B	W.H	2008/02	G.S
C	REVISED PER EO'S A2 AND A7	M.P	2008/10	

REAR VIEW



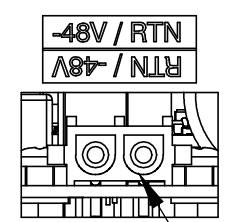
CHASSIS
GROUND CONNECTION
#10-32 STUD
5/8 CENTER

FRONT VIEW



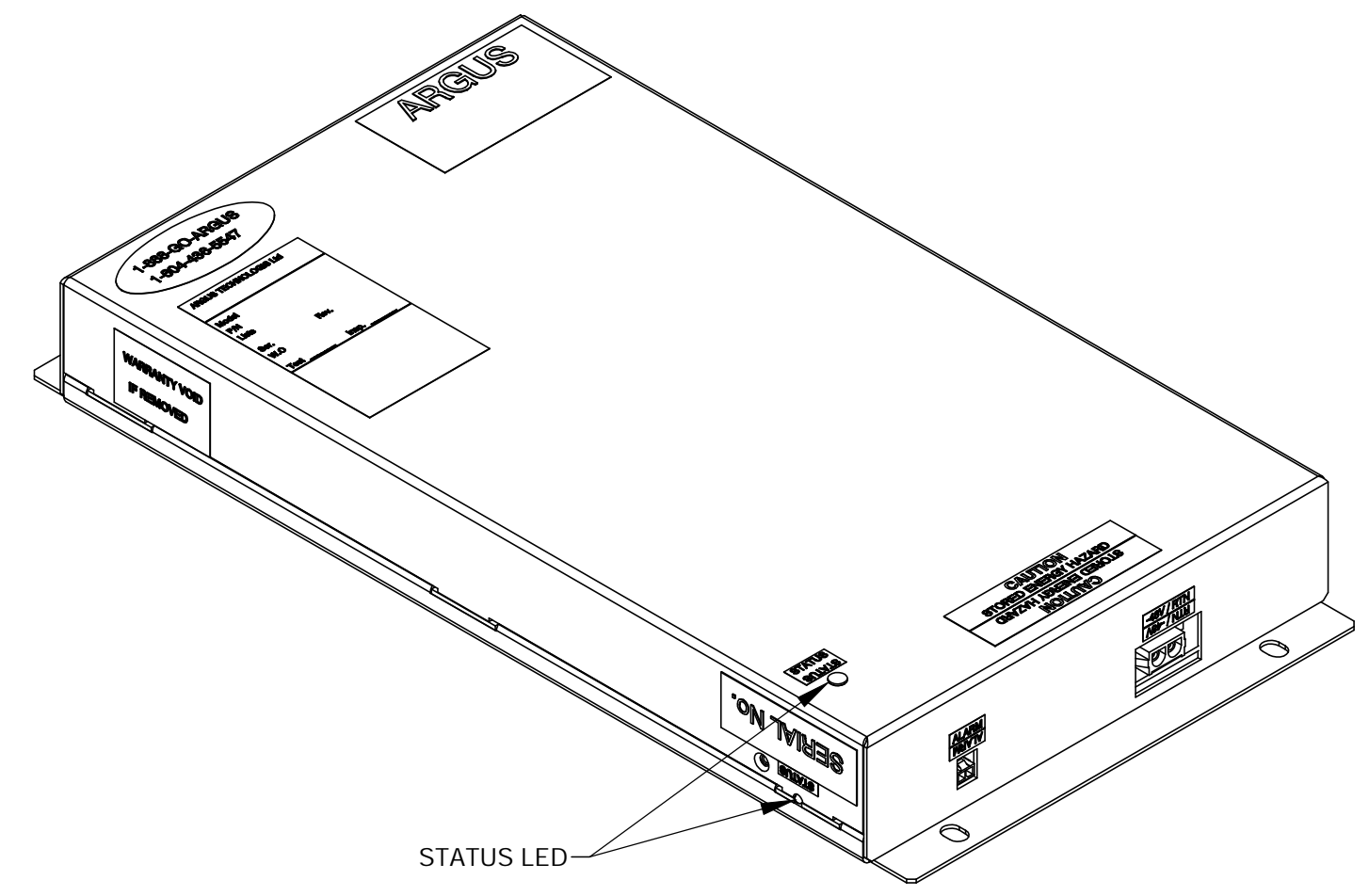
ALARM RELAY (C/NC)
AMP 2-1445055-2

MATE WITH AMP 1445022-2 (HOUSING)
2 x AMP 794610-1 (CONTACTS)



POWER I/O CONNECTER
TYCO 193839-1

MATE WITH AMP 770017-1 (HOUSING)
2 x AMP 193841-1 (CONTACTS)



STATUS LED

ISOMETRIC VIEW

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

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DESIGN	RP/WH	2007/11	MATERIAL
DRAWN	J.U.	2007/12	
CHECKED	M.C	2007/12	
APPROVED	G.S	2007/12	FINISH

TOLERANCES

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

PER P.O. and Doc. 070-024-83

SCALE N.T.S.

TITLE
**CUSTOMER CONNECTION
SDB, ALPHACAP-665W**

ISSUE DATE	SHEET 1 OF 1
SIZE TYPE DWG NO.	REV
B D2 013-015-08	C

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Power