

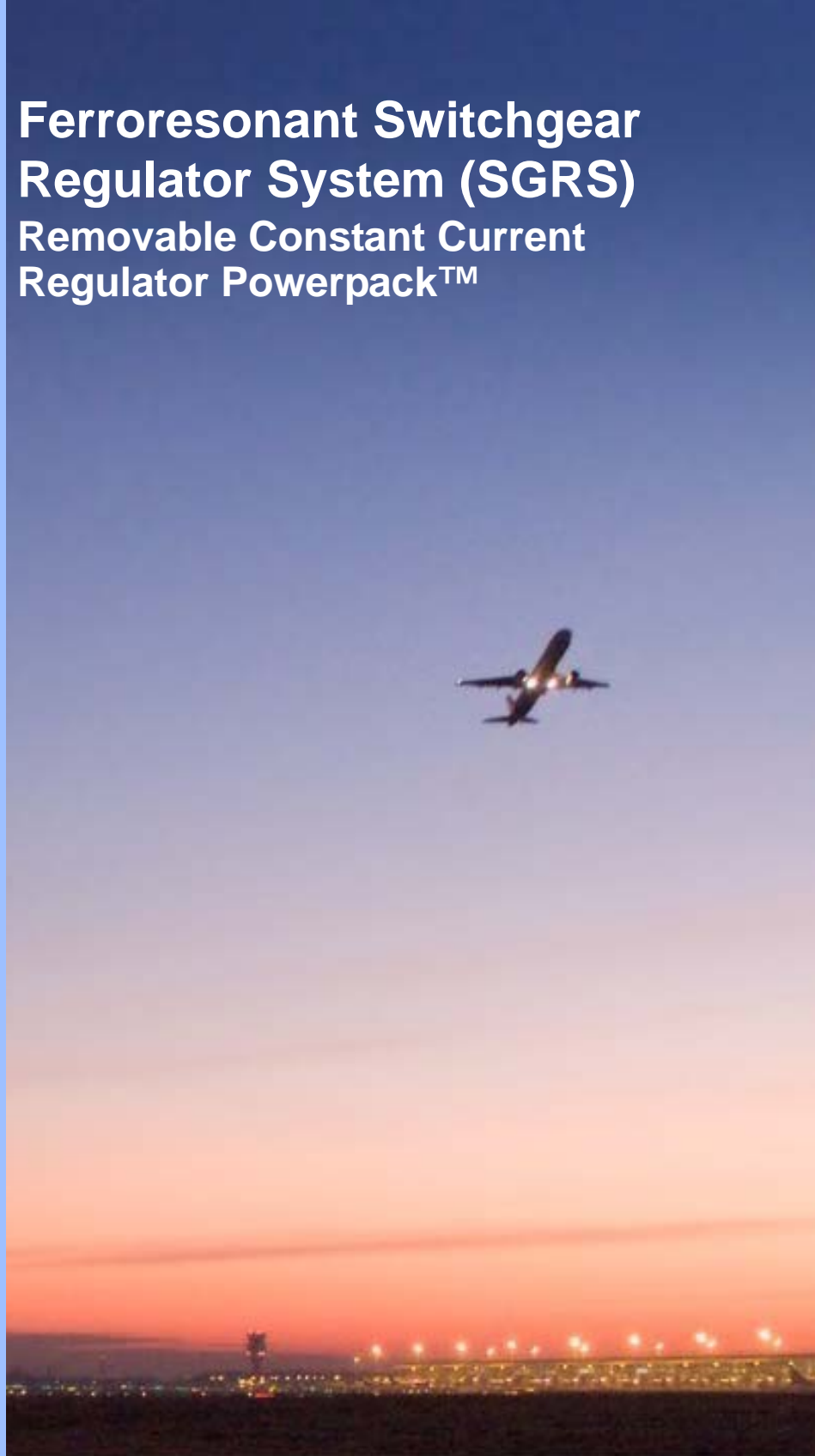
# Ferroresonant Switchgear Regulator System (SGRS) Removable Constant Current Regulator Powerpack™

Operation Manual

96A0304

Retain for future use.

Rev. E, 6/27/11



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# TABLE OF CONTENTS

Ferroresonant Switchgear Regulator System (SGRS) .....i

**1.0: Safety ..... 1**

1.1 :To use this equipment safely: ..... 1

    1.1.1 :Additional Reference Materials: ..... 1

    1.1.2 :Qualified Personnel ..... 1

    1.1.3 :Intended Use ..... 1

    1.1.4 :Storage ..... 1

        1.1.4.1 :Operation ..... 2

        1.1.4.2 :Material Handling Precautions ..... 2

        1.1.4.3 :Action in the Event of a System or Component Malfunction..... 2

        1.1.4.4 :Maintenance and Repair..... 2

**2.0: Ferroresonant Switchgear Regulator System (SGRS) ..... 3**

2.1 :About this manual ..... 3

    2.1.1 :How to work with the manual ..... 3

    2.1.2 :Record of changes ..... 3

    2.1.3 :Icons used in the manual ..... 3

2.2 :Installation ..... 4

2.3 :Operation ..... 4

    2.3.1 :System or Component Malfunction ..... 4

    2.3.2 :Maintenance and Repair ..... 5

2.4 :Switchgear Regulator Overview ..... 5

2.5 :SGRS Configuration Options ..... 5

2.6 :Incoming Power Bay ..... 5

    2.6.1 :Single Main Fuseable Disconnect ..... 6

    2.6.2 :Dual Main Fuseable Disconnect ..... 7

    2.6.3 :Digital Voltage and Current Meter ..... 8

    2.6.4 :S1 Series Circuit Cutout Bay ..... 9

    2.6.5 :S1 Cutout Operations ..... 10

    2.6.6 :S1 Series Circuit Cutout with Optional Interlock ..... 11

    2.6.7 :S1 Cutout Interlock Operations ..... 12

    2.6.8 :Remote Control Bay ..... 13

    2.6.9 :Powerpack Bay(s) ..... 14

    2.6.10 :Powerpack Bay Overview ..... 14

    2.6.11 :Powerpack Stab Connector ..... 16

    2.6.12 :Powerpack Bay Door Assembly ..... 17

    2.6.13 :Powerpack Constant Current Regulator ..... 17

    2.6.14 :Advanced Control Equipment (ACE) ..... 17

    2.6.15 :SGRS Door Handles ..... 17

    2.6.16 :Door Handle ..... 18

2.7 :SGRS Specifications ..... 19

    2.7.1 :Power ..... 19

    2.7.2 :Bus Bar ..... 19

    2.7.3 :Fuseable Disconnect (Optional) ..... 19

2.8 :SGRS Enclosure ..... 20

    2.8.1 :SGRS Enclosure ..... 20

Document Date (12/2010) ..... 22

Table of Contents



## 1.0 Safety

This section contains general safety instructions for installing and using ADB Airfield Solutions equipment. Some safety instructions may not apply to the equipment in this manual. Task- and equipment-specific warnings are included in other sections of this manual where appropriate.

### 1.1 To use this equipment safely:



#### WARNING

Read installation instructions in their entirety before starting installation.

- Refer to the FAA Advisory Circular AC 150/5340-26, Maintenance of Airport Visual Aids Facilities, for instructions on safety precautions.
- Observe all safety regulations. To avoid injuries, always disconnect power before making any wiring connections or touching any parts. Refer to FAA Advisory Circular AC 150/5340-26.
- Become familiar with the general safety instructions in this section of the manual before installing, operating, maintaining or repairing this equipment.
- Read and carefully follow the instructions throughout this manual for performing specific tasks and working with specific equipment.
- Make this manual available to personnel installing, operating, maintaining or repairing this equipment.
- Follow all applicable safety procedures required by your company, industry standards and government or other regulatory agencies.
- Install all electrical connections to local code.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
- Protect components from damage, wear, and harsh environment conditions.
- Allow ample room for maintenance, panel accessibility, and cover removal.
- Protect components from damage, wear, and harsh environment conditions.
- Allow ample room for maintenance, panel accessibility, and cover removal.
- Protect equipment with safety devices as specified by applicable safety regulations.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning prior to returning power to the circuit.

#### 1.1.1 Additional Reference Materials:

- NFPA 70B, Electrical Equipment Maintenance.
- NFPA 70E, Electrical Safety Requirements for Employee Workplaces.
- ANSI/NFPA 79, Electrical Standards for Metalworking Machine Tools.
- OSHA 29 CFR, Part 1910, Occupational Health and Safety Standards.
- National and local electrical codes and standards.

#### 1.1.2 Qualified Personnel

The term **qualified personnel** is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations and have been trained to safely install, operate, maintain and repair the equipment. It is the responsibility of the company operating this equipment to ensure that its personnel meet these requirements.

Always use required personal protective equipment (PPE) and follow safe electrical work practices.

#### 1.1.3 Intended Use



#### WARNING

Using this equipment in ways other than described in this manual may result in personal injury, death or property and equipment damage. Use this equipment only as described in this manual.

ADB Airfield Solutions cannot be responsible for injuries or damages resulting from nonstandard, unintended applications of its equipment. This equipment is designed and intended only for the purpose described in this manual. Uses not described in this manual are considered unintended uses and may result in serious personal injury, death or property and equipment damage. Unintended uses may result from taking the following actions:

- Making changes to equipment that are not recommended or described in this manual or using parts that are not genuine ADB Airfield Solutions replacement parts.
- Failing to make sure that auxiliary equipment complies with approval-agency requirements, local codes and all applicable safety standards.
- Using materials or auxiliary equipment that are inappropriate or incompatible with ADB Airfield Solutions equipment.
- Allowing unqualified personnel to perform any task.

#### 1.1.4 Storage



#### CAUTION

If equipment is to be stored prior to installation, it must be protected from the weather and kept free of condensation and dust.

**Failure to follow this instruction can result in injury or equipment damage.**

#### 1.1.4.1 Operation



#### WARNING

- Only qualified personnel, physically capable of operating the equipment and with no impairments in their judgment or reaction times, should operate this equipment.
- Read all system component manuals before operating this equipment. A thorough understanding of system components and their operation will help you operate the system safely and efficiently.
- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves.
- Protect equipment with safety devices as specified by applicable safety regulations.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
- Never operate equipment with a known malfunction.
- Do not attempt to operate or service electrical equipment if standing water is present.
- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.
- Never touch exposed electrical connections on equipment while the power is ON.

#### 1.1.4.2 Material Handling Precautions



#### CAUTION

This equipment may contain electrostatic sensitive devices.

- Protect from electrostatic discharge.
- Electronic modules and components should be touched only when this is unavoidable e.g. soldering, replacement.
- Before touching any component of the cabinet you should bring your body to the same potential as the cabinet by touching a conductive earthed part of the cabinet.
- Electronic modules or components must not be brought in contact with highly insulating materials such as plastic sheets, synthetic fiber clothing. They must be laid down on conductive surfaces.
- The tip of the soldering iron must be grounded.
- Electronic modules and components must be stored and transported in conductive packing.

#### 1.1.4.3 Action in the Event of a System or Component Malfunction



#### WARNING

- Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.
- Disconnect and lock out electrical power.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component according to instructions provided in its manual.

#### 1.1.4.4 Maintenance and Repair



#### WARNING

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.

- Only persons who are properly trained and familiar with ADB Airfield Solutions equipment are permitted to service this equipment.
- Disconnect and lock out electrical power.
- Always use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in the product manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Connect all disconnected equipment ground cables and wires after servicing equipment. Ground all conductive equipment.
- Use only approved ADB Airfield Solutions replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.
- Check interlock systems periodically to ensure their effectiveness.
- Do not attempt to service electrical equipment if standing water is present. Use caution when servicing electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.

## 2.0 Ferroresonant Switchgear Regulator System (SGRS)

Removable Constant Current Regulator Powerpack™  
[4-30kW, 6.6 A / 20 A]

### 2.1 About this manual

The manual shows the information necessary to:

- Install
- Carry Out Maintenance
- Carry Out Troubleshooting on the SGRS.

#### 2.1.1 How to work with the manual

1. Familiarize yourself with the structure and content.
2. Carry out the actions completely and in the given sequence.



#### 2.1.2 Record of changes

Page	Rev	Description	Checked	Approved	Date
	A	Manual release	RH	CS	5/15/01
	B	Update with digital meter	CS	CS	4/2004
	C	Updated cover sheet	NJH	NJH	3/7/07
	D	Updated pictures	JRB		1/13/10
All	E	Updated for the new ADB format	RH	CS	4/1/11

#### 2.1.3 Icons used in the manual

For all WARNING symbols see the Safety section.

Carefully read and observe all safety instructions in this manual, which alert you to safety hazards and conditions that may result in personal injury, death or property and equipment damage and are accompanied by the symbol shown below.

	<p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Failure to observe a warning may result in personal injury, death or equipment damage.</li> </ul>
	<p><b>CAUTION</b></p> <ul style="list-style-type: none"> <li>• Failure to observe a caution may result in equipment damage.</li> </ul>

About this manual

## 2.2 Installation

Read the installation section of all system component manuals before installing the equipment. A thorough understanding of system components and their requirements helps install the system safely and efficiently.



### WARNING

Failure to follow these safety procedures can result in personal injury or death.

- Allow only qualified personnel to install ADB Airfield Solutions and auxiliary equipment. Use only approved equipment. Using unapproved equipment in an approved system may void agency approvals
- Make sure all equipment is rated and approved for the environment in which it is being used. Follow all instructions for installing components and accessories
- Install all electrical connections to local code
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment
- Protect components from damage, wear, and harsh environment conditions
- Allow ample room for maintenance, panel accessibility, and cover removal
- Protect equipment with safety devices as specified by applicable safety regulations
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning

## 2.3 Operation

Only qualified personnel, physically capable of operating the equipment and with no impairments in their judgment or reaction times, should operate this equipment.

Read all system component manuals before operating this equipment. A thorough understanding of system components and their operation will help you operate the system safely and efficiently.

- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves
- Never operate equipment with a known malfunction
- Do not attempt to operate or service electrical equipment if standing water is present
- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments
- Never touch exposed electrical connections on equipment while the power is ON

### 2.3.1 System or Component Malfunction

Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.

- Disconnect and lock out electrical power.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component according to instructions provided in its manual.



### 2.3.2 Maintenance and Repair

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks. Only persons who are properly trained and familiar with ADB Airfield Solutions equipment are permitted to service this equipment.

- Always use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Connect all disconnected equipment ground cables and wires after servicing equipment. Ground all conductive equipment.
- Use only approved ADB Airfield Solutions replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.
- Check interlock systems periodically to ensure their effectiveness.
- Do not attempt to service electrical equipment if standing water is present. Use caution when servicing electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.

### 2.4 Switchgear Regulator Overview

The ADB Airfield Solutions L-828/L-829 Switchgear Regulator System (SGRS) supplies either three or five precision output current levels (6.6 A/20 A maximum) for series lighting circuits on airport runways and taxiways. The SGRS Constant Current Regulators (CCRs) referred to as Powerpacks™ are available in 4 kW through 30 kW sizes.

The ADB Airfield Solutions L-828 air-cooled SGRS CCRs are designed to:

- Accurately regulate the output current to within  $\pm 3\%$  of the adjustable nominal level from no load to full load and with input voltage variations of  $-5\%$  to  $+10\%$  of nominal ( $-40\text{ }^{\circ}\text{C}$  to  $+55\text{ }^{\circ}\text{C}$ ).
- Maintain the nominal output current levels even when 30 percent of the isolation transformers in the series lighting circuit supplied by the regulator have open secondaries.

The SGRS system provides for maximum safety and maintainability by:

- Providing the industry's only slide-out Powerpack™ design.
- Separating high voltage and low voltage components.
- Mounting only low voltage components to the doors, for example, printed circuit boards.
- Placing high voltage components behind an additional clear polycarbonate shield.
- Using color warning labels throughout the system for technician safety.

### 2.5 SGRS Configuration Options

The SGRS consists of a multipurpose indoor enclosure system designed to use a bus bar style system to distribute input power to a series of regulator bays. The enclosure integrates the input power, control signal wiring connections and airfield series circuit output cables in a single station. The SGRS system consists of a combination of several possible types of bays:

- Incoming Power Bay
- Remote Lighting Control Bay
- S1 Series Circuit Cutout Bay
- L-847 Circuit Selector Bay
- L-828 / L-829 Powerpack Bay)

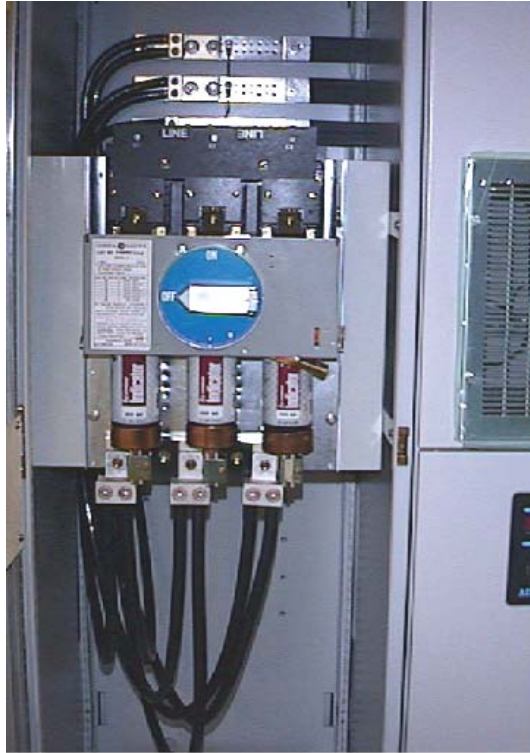
**NOTE:** SGRS System are designed to the requirements of each airport. Please refer to the system prints package supplied with the SGRS system for the bay configuration of a particular SGRS.

### 2.6 Incoming Power Bay

The Incoming Power Bay houses terminals for the input electrical power wiring and a step-down power transformer and protective fuses.

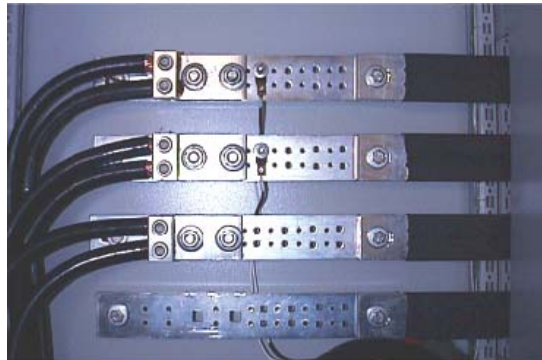
The optional main fuseable disconnect for the SGRS is located on the front door of the Incoming Power Bay. By transferring the disconnect to the ON or OFF position, power to the entire SGRS can be turned ON or OFF. See Figure 1.

**Figure 1: Fuseable Disconnect**



From the main fuseable disconnect (optional) power is distributed to the bus bar located at the back of the SGRS enclosure. See Figure 2.

**Figure 2: Incoming Electrical Power from Disconnect**



### 2.6.1 Single Main Fuseable Disconnect



#### **WARNING**

If the disconnect option is not included in the present system configuration, technicians must provide adequately rated overcurrent protection prior to incoming service to the SGRS. Failure to observe this warning may result in personal injury, death, or equipment damage.

The optional main fuseable disconnect provides properly rated overcurrent protection and the ability to disconnect incoming service to the SGRS. Two options exist in the Incoming Power Bay; a single disconnect, discussed in this section, and a dual disconnect, discussed in next section.

**Table 1: Single Disconnect Operation**

Single Disconnect Position	Function
On	Incoming service is supplied to entire SGRS
Off	Incoming service is disconnected from entire SGRS

See Table 1 for summary of operation. When the disconnect is set to the ON position:

- Input power from the disconnect is routed to bus bars A, B, and C, run in the back of the SGRS enclosure
- Bars A, B, C, N (Neutral), and GND (Ground) run horizontally across the top and the back of the enclosure
- Power to lower bays is via electrical wiring from upper bus bar to lower bay regulators
- Input power is also routed to an auxiliary step-down Transformer T1 (480 V/120 VAC) which provides dedicated 120 VAC power for other auxiliary equipment. Refer to wiring diagrams in the SGRS system drawings for more information

**2.6.2 Dual Main Fuseable Disconnect**



**WARNING**

If the disconnect option is not included in the present system configuration, technicians must provide adequately rated overcurrent protection prior to incoming service to the SGRS. Failure to observe this warning may result in personal injury, death, or equipment damage.

The optional dual main fuseable disconnect provides properly rated overcurrent protection and the ability to disconnect incoming service to both the upper and lower SGRS independently of each other.

**Table 2: Dual Disconnect Operation**

Upper Disconnect Position	Lower Disconnect Position	Function
Off	Off	Incoming service is disconnected from both upper and lower SGRS
Off	On	Incoming service is connected to lower SGRS only
On	Off	Incoming service is connected to upper SGRS only
On	On	Incoming service is supplied to both upper and lower SGRS

Refer to Table 2 for a summary of operations. When the corresponding disconnect is set to the ON position:

- Input power from the corresponding disconnect is routed to bus bars A, B, and C run in back of the SGRS enclosure
- Upper bus bars A, B, C, and N (Neutral) are run horizontally across the top and back of the enclosure
- Lower bus bars A, B, C, and N (Neutral) are run horizontally across the bottom back of the enclosure

Incoming Power Bay

- The GND (Ground) bus is run approximately in the back middle of the enclosure and provides ground connections for both upper and lower cabinets
- Input power is also routed to an auxiliary step-down Transformer T1 (480 V/120 VAC) which provides dedicated 120 VAC power for other auxiliary equipment. Refer to wiring diagrams in the SGRS system drawings for more information



**WARNING**

Operating the upper bank of CCRs with the lower main breaker OFF could cause the CCRs to overheat. It is recommended that if the lower circuit breaker is OFF, the CCRs should not run.

**2.6.3 Digital Voltage and Current Meter**

See Figure 3. The Incoming Power Bay may optionally be designed with an input digital voltage and current meter. The meter is located on the front door of the Incoming Power Bay and is interfaced to the incoming power bay bus bar and installed Current Transformers (CT).

**Figure 3: Digital Voltage and Current Meter**



See Figure 4. The incoming power cable is routed through the CTs before being attached to each phase of the incoming power. The secondary side of each CT is interfaced with the digital meter.

**Figure 4: Current Transformer Installation**



### 2.6.4 S1 Series Circuit Cutout Bay

An optional cabinet in the SGRS line-up exists to accommodate S1 Series Circuit Cutout(s) and a convenient tie-in for the output electrical wiring to the airfield lighting circuit. Typically, there is one S1 plug cutout for each series lighting loop circuit. Refer to Figure 8.

**Figure 5: S1 Series Circuit Cutout**



The S1 cutout is a device that shorts the output of the regulator together when the handle is removed. The airfield circuit is also be shunted together to dissipate any electrical charge built up in the circuit



**WARNING**

S1 cutouts are not designed to be removed while the load is active. Circuits connected to S1 cutout must be turned OFF prior to S1 removal. Failure to observe this warning may result in personal injury, death, or equipment damage..

Incoming  
Power Bay

The S1 cutouts are panel-mounted and arranged so the output field cabling is routed from each CCR to the S1 cutout, and from the S1 cutout to the airfield lighting circuit. See Figure 6.

**Figure 6: S1 Series Circuit Cutout Bay**



### 2.6.5 S1 Cutout Operations

Refer to S1 cutout manual for more detailed information on S1 operation. Table 3 provides basic information for operation of the S1 cutout.

**Table 3: S1 Series Circuit Cutout Operation**

Operation	Result
Remove the handle portion of the cutout	Shorts the output of the regulator and shunts the airfield circuit
Re-insert the handled portion of the cutout	Connects the field circuit to the output of the regulator

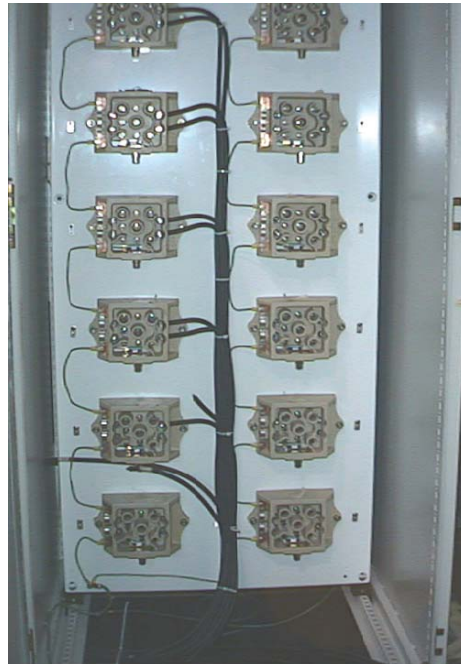
The S1 cutout has two functions:

1. To disconnect and shunt the airfield lighting circuit from the regulator configuration for maintenance.
2. To short the output of the constant current regulator, to allow for equipment tests and calibration that would not be available otherwise.

Figure 7 with its S1s removed, shows the S1 cutout bay with the S1 housings.



**Figure 7: S1 Series Circuit Cutout Bay with S1s Removed**



Incoming  
Power Bay

### 2.6.6 S1 Series Circuit Cutout with Optional Interlock

The optional S1 cutout interlock provides an additional safety feature to prevent a de-energized circuit from being energized while being serviced by maintenance personnel.

This is accomplished by using interlocks on both the CCR powering the circuit and on the S1 enclosure doors. See Figure 8 for an example of this option.

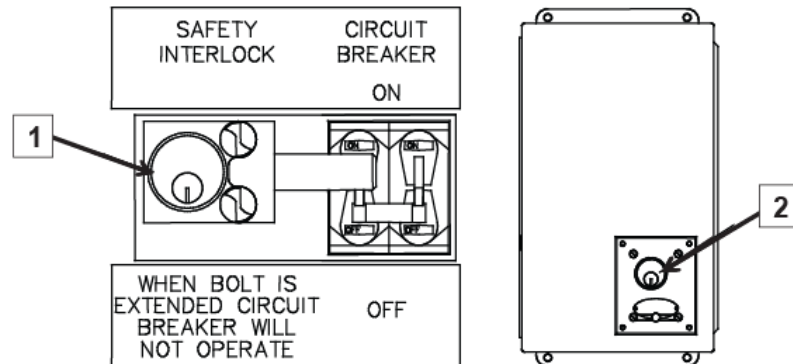
**Figure 8: S1 Cutout Bay with Interlock Option**



## 2.6.7 S1 Cutout Interlock Operations

A unique key is serialized for each CCR and associated S1 enclosure door interlock. Only one key opens both the CCR interlock (1) and the S1 enclosure door interlock (2) See Figure 9.. The key only functions with its associated CCR and S1 enclosure door. The key and the corresponding lock tumblers are identified by serial number.

**Figure 9: CCR breaker locked out with S1 enclosure**



This safety key can only be removed from the interlock on the CCR's circuit breaker when the interlock bolt is extended  $\frac{3}{4}$  locking the switch on the circuit breaker in the OFF position as seen in Figure 9.

### Lock out a circuit:

1. Turn CCR circuit breaker OFF.
2. Using key, extend interlock bolt past the circuit breaker switch and remove key. The circuit breaker is locked in the OFF position.
3. Using the same key, unlock the S1 cutout enclosure to access the S1 cutout inside.
4. Remove the S1 cutout from the cutout housing.

The airfield circuit is now shunted and the output of the constant current regulator is shorted.

### Return a circuit to operation:

1. Return the S1 cutout into the S1 cutout housing.
2. Using the key, lock the S1 enclosure and remove key.
3. Using the same key, retract the interlock bolt from the circuit breaker switch.
4. Turn the circuit breaker ON.



### 2.6.8 Remote Control Bay

The optional Control Bay houses the terminal blocks for controlling the brightness steps of the Constant Current Regulators (CCR) shown in Figure 10.

This bay is used when interfacing to an existing control system requires individual control wires for each CCR step. Each terminal block is labeled by the constant current regulator (CCR) reference and has connections for seven remote control wires. These wires are CCI, CC, B2, B3, B4, B5, and N.

**Figure 10:** Typical Control Bay



Incoming  
Power Bay

**NOTE:** Picture may not represent every SGRS exact layout. Refer to the SGRS system print package provided with the SGRS system present for details regarding the Control Bay.

### 2.6.9 Powerpack Bay(s)

The CCRs, also referred to as Powerpacks, have ratings ranging from 4kW up to 30kW. Output current options are 6.6A and 20A. Each Powerpack is installed in either an upper or a lower bay using ADB's Powerpack lift device (optional). See Figure 11 for one configuration.

**Figure 11: Powerpacks inserted into Bay**



The front doors of each Powerpack Bay have a three-point latching system for smooth operation and a positive seal. Each door has a locking handle for security and is provided with two keys. All door locks are keyed alike.

### 2.6.10 Powerpack Bay Overview

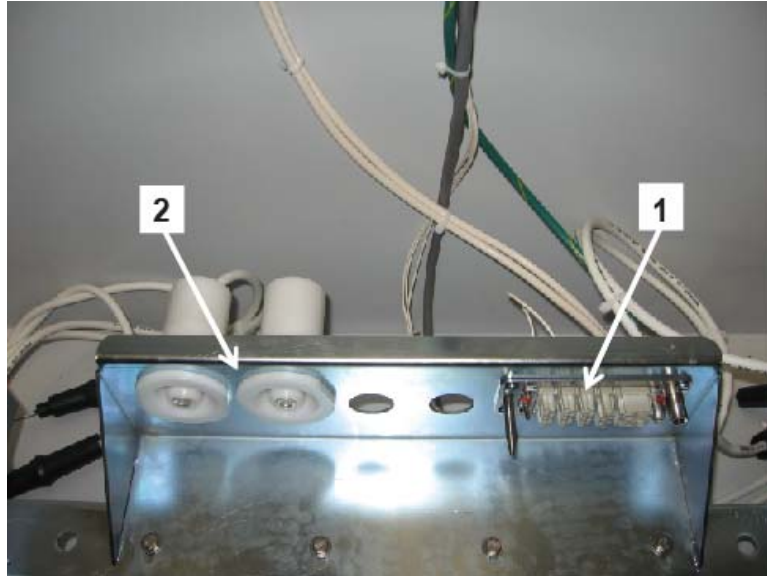
The Powerpack's incoming electrical power is distributed from the bus bars that run along the back of the cabinet. Electrical wiring is connected to the bar using bolt-on compression lugs. See Figure 12.

**Figure 12: Powerpack Electrical Power Connections**



See Figure 13. From the bus bar, the incoming power is inserted in the receptacle side of the Powerpack's 'Stab Connector' (1). The 5kV, series circuit, output cable from each Powerpack is connected to the high voltage stabs (2) and is directed into the high voltage tray at the bottom of the bay.

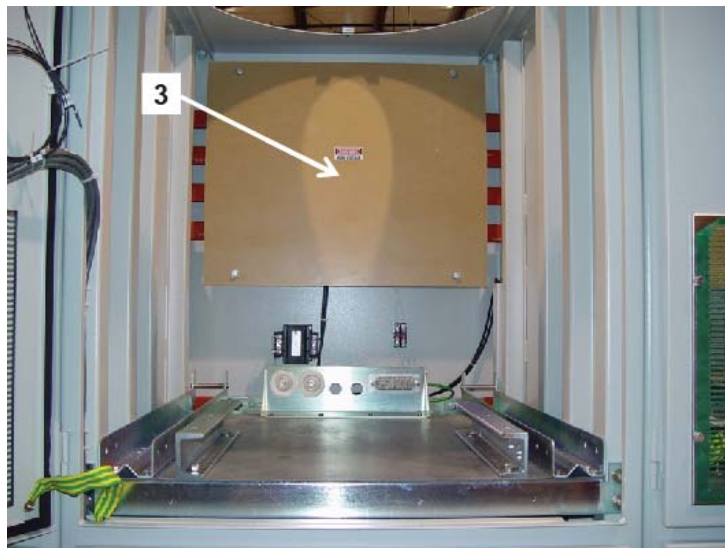
**Figure 13: Powerpack Stab Connector (Receptacle)**



Incoming  
Power Bay

See figure 14. The bus bar is shielded by a non-conductive, insulating plate (3) preventing accidental contact with live bus bar.

**Figure 14: Bus Bar Shield**



The recessed base has wireway channels that are divided into two (2) sections.

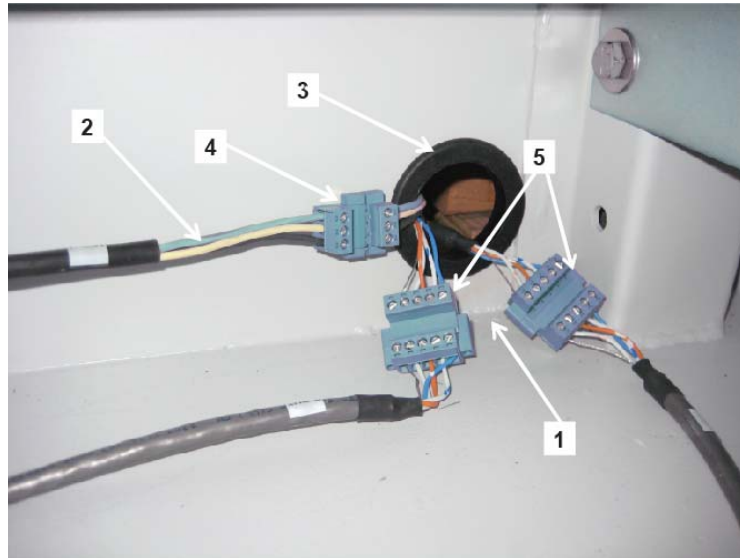
**High Voltage Wireway:** Contains the high voltage, 5000VAC, output series circuit cabling.

**Low Voltage Wireway:** Contains the low voltage power, 120VAC, for the communication equipment and for the individual remote control wiring (optional). Daisy-chained power for the system is connected at Terminal Block 1. Item 4 of illustration in Figure 15.

**Communication Wireway:** Contains the communication network, RS-422/485, for the control and monitoring system. This daisy-chained communication cable is connected at Terminal Block 2. Item 5 of illustration.

The Powerpack communications (1) and the ACE™ UPS power (2) are routed to the base of the Powerpack bay to the low voltage wiring tray (3). This wiring is daisy-chained from bay to bay via the wire tray and terminated at terminal blocks in each bay.

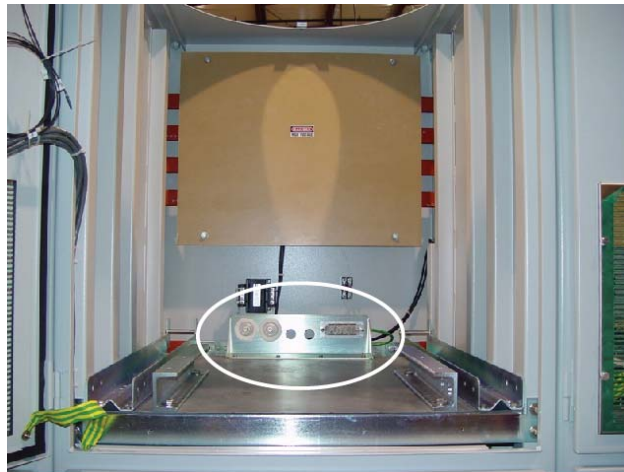
**Figure 15: Low Voltage Wiring**



### 2.6.11 Powerpack Stab Connector

See Figure 16. Each Powerpack has the plug side of a **Stab Connector** which mates with the receptacle installed in the Powerpack Bay.

**Figure 16: Powerpack™ Stab Connector (Plug)**



The 'Stab Connector' plug has five key elements:

1. **Input Power.** The connections for the CCR's input power.
2. **Early-break pins.** The connections for the CCR's early-break pins that de-energize the contactor before the input power is disengaged. This provides added safety in the event the Powerpack™ is removed before turning off the input power.



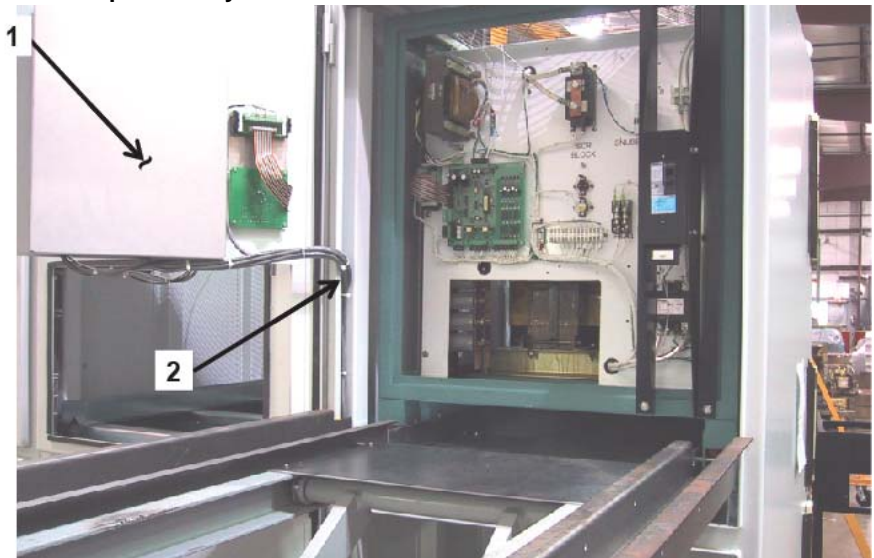
### 2.6.12 Powerpack Bay Door Assembly

3. **Control and monitoring connections.** The electrical connections for controlling the CCR, only used when a computer system is not used, and the fiber optic interface between the Powerpack™ monitoring components and the computer monitoring system.
4. **Ground.** The Ground connections between the Powerpack™ and the SGRS system.
5. **Self-aligning ‘Stab.’** Tapered steel pins are built into the plug and in the receptacle to “self-align when the Powerpack is installed into the bay.

See Figure 17. Each Powerpack™ bay has associated control and monitoring electronics referred to as Advanced Control Equipment or ACE™. These ACE™ circuit boards are responsible for controlling the brightness levels and for monitoring the status of each Powerpack.

ACEs are installed on the inside of the Powerpack Bay door in an aluminum enclosure (1). All electrical wiring is routed from the Powerpack to the front door via a cable harness (2).

**Figure 17: Powerpack™ Bay Door**



Incoming  
Power Bay

### 2.6.13 Powerpack Constant Current Regulator

For information on the Powerpack Constant Current Regulator, please refer to the **L-828/L-829 Constant Current Regulator Manual. Document Number: 96A0288**

### 2.6.14 Advanced Control Equipment (ACE)

For information on the ACE™ equipment, please refer to the **ACE™ Operator Manual. Document number's 96A0245 (ACE™) and 96A0357 (ACE™2)**

### 2.6.15 SGRS Door Handles

This subsection provides information for using the two styles of door handles located on the SGRS systems. Refer to system drawings to determine the style.

## 2.6.16 Door Handle

Below are procedures for opening locked and unlocked doors with door handle style 1.



**CAUTION:**

When closing the door, make sure both the top and bottom of the door is shut all the way before latching the door. If it doesn't latch properly, there is a risk of breaking the locking mechanism.

### Opening Unlocked Door

To open an unlocked bay door, rotate the handle 90 degrees in either direction.

### Opening Locked Door

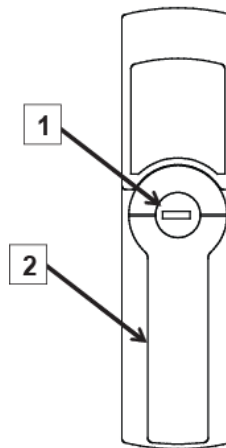
**NOTE:** The door is locked if the handle does not rotate left or right.

To open a locked bay door, perform the following procedure:

See Figure 18. Place the key in the lock (1) on the door handle and rotate the key.

Rotate the handle (2) 90 degrees in either direction.


**Figure 18: Door Handle**



## 2.7 SGRS Specifications

### 2.7.1 Power

#### Incoming Power Distribution

	<b>CAUTION:</b> The main input power to the SGRS system must be externally current limited to 600 Amps.
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The input power to the SGRS system is as follows:

- 480VAC, three phase A, B, and C
- Neutral bar is run to allow interface of 277 VAC hardware
- The Neutral is an integral component of the ALCS and must be landed
- A volt and ammeter provides true RMS values, within  $\pm 2\%$ , of the incoming main power

### 2.7.2 Bus Bar

The bus bar has the following specifications:

- The bus bar system is braced for faults of 25,000 Amps symmetrical.
- Each phase A, B, C, and N is a continuous horizontal copper bus bar.
- A total of four (4) bus bars are distributed in the enclosure for single bus systems.
- Each bar consists of two pieces of 2" x 0.25" copper. The effective area is one square inch per bar.
- A continuous, horizontal, copper GROUND bus is run inside the SGRS system.

### 2.7.3 Fuseable Disconnect (Optional)

The fuseable disconnect has the a bus bar system braced for faults of 25,000 Amps symmetrical.

## 2.8 SGRS Enclosure

### 2.8.1 SGRS Enclosure

The SGRS system is designed using an industrial enclosure with these specifications:

- Enclosure is NEMA 12 rated
- Designed for indoor use to provide protection against dust, dirt, dripping water, and external condensation of non-corrosive liquids
- Industrial enclosure includes a pagoda top with exhaust fan and ventilation kit for proper convection cooling





**Ferroresonant Switchgear Regulator System (SGRS)  
Operation Manual**

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