

# ***SC100 System Controller Operation Handbook***

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## Scope

This guide covers operation of the SC100 system controller Version 2.12 or later.

## Audience

This guide is intended for use by:

- Installers competent in:
  - installing and commissioning dc power systems
  - safe working practices for ac and dc powered equipment
  - the relevant local electrical safety regulations and wiring standards
- Operators and maintenance staff competent in:
  - operation of dc power systems
  - safe working practices for ac and dc powered equipment

## Related Information

- *PowerManagerII* Online Help
- *DCTools* Online Help

## Reporting Problems with this Guide

Please use this email address to report any problems you find in this guide:

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EMAIL: [DCMarketingNZ@eaton.com](mailto:DCMarketingNZ@eaton.com)

## For Further Information and Technical Assistance

For further information and technical assistance see Worldwide Support on page [75](#).



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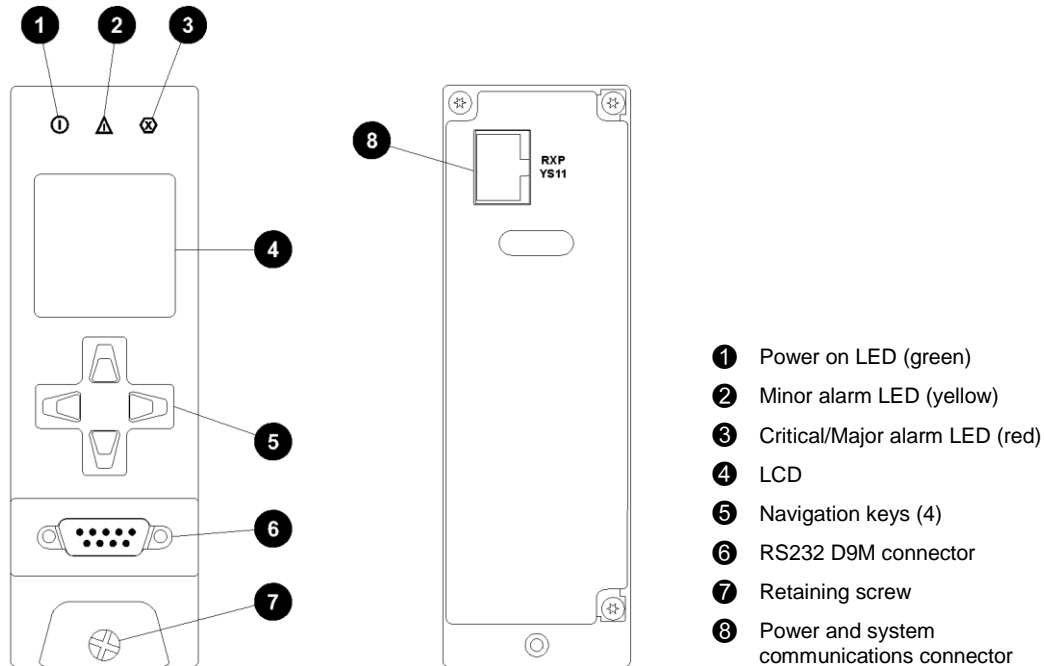
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## Overview

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## SC100 System Controller

The SC100 system controller is a full-featured control and monitoring solution which provides alarm notifications via dial-out modem to PowerManagerII remote monitoring software, SMS text messaging, or by relay contact closures.



- ❶ Power on LED (green)
- ❷ Minor alarm LED (yellow)
- ❸ Critical/Major alarm LED (red)
- ❹ LCD
- ❺ Navigation keys (4)
- ❻ RS232 D9M connector
- ❼ Retaining screw
- ❽ Power and system communications connector

The SC100 is supplied pre-configured with either a default configuration file, or with one factory customized for a particular application. Some configuration file changes can be made with the keypad, or all settings can be changed via a PC connected to the RS232 interface (see details on page 9).

For connector pin-outs see details on page 67. See Troubleshooting on page 56 for details of SC100 alarms.


## Input/Output Board

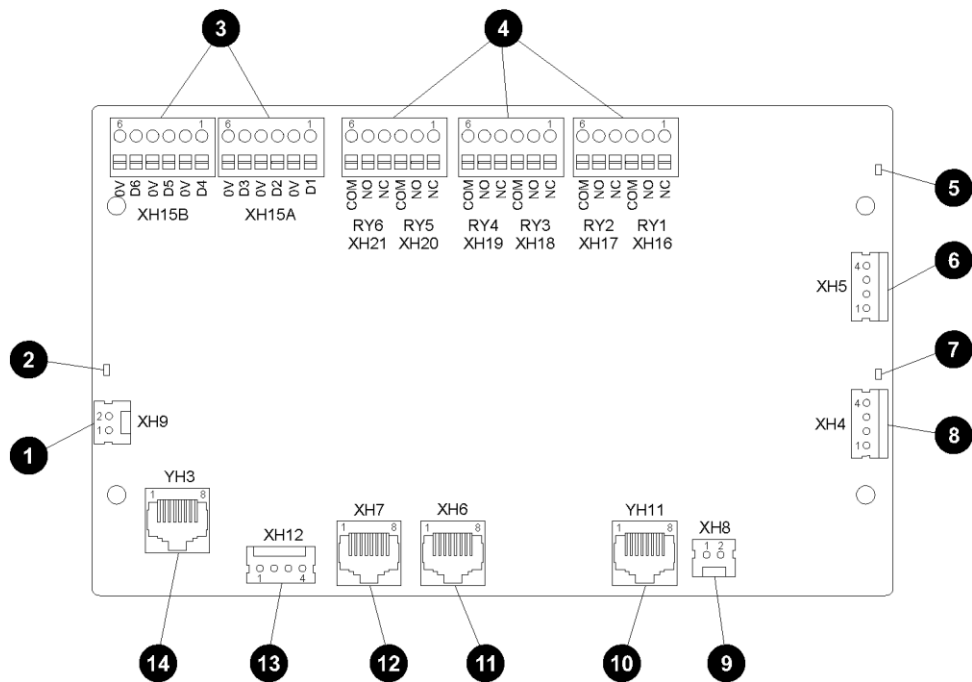
The input/output (I/O) board provides the I/O interfaces and connections for the SC100 system controller.

The I/O board includes a range of sense inputs for dc power system control and monitoring. It also allows real time data collection from building services and other external devices, and relay outputs for alarm signals or control of external devices.

The I/O functions are:

- Sensors: Current - 3, Bus voltage - 1, Temperature - 2
- Input/Output: Digital inputs: 4 pre-defined system functions, 6 user-defined
- Relay outputs: 6 (one also used as Monitor OK alarm)
- LVD contactor outputs: 2

 For input and output specifications see details on page 61. For connector pin-outs see details on page 68.

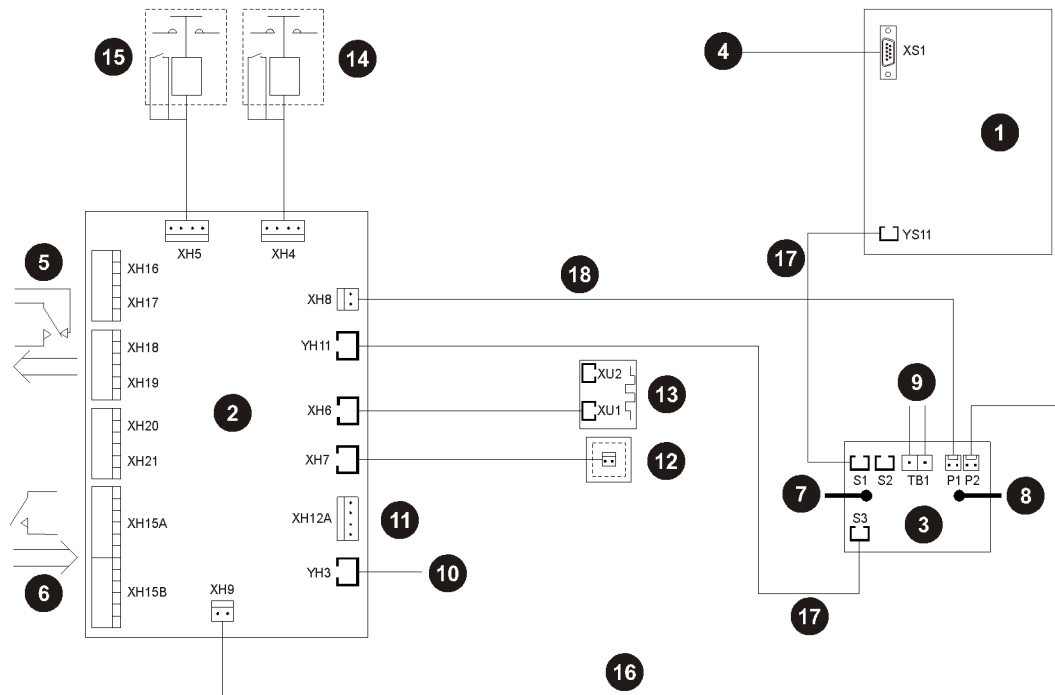


- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>❶ Bus voltage sense input - XH9</li> <li>❷ Power/Comms OK LED (green)</li> <li>❸ Digital inputs D1-D6 (6 user defined) - XH15A, XH15B</li> <li>❹ Digital (relay) outputs RY1-RY6 (6) - XH16-XH21</li> <li>❺ LVD contactor 2 status LED (green)</li> <li>❻ LVD contactor 2 connector - XH5</li> <li>❼ LVD contactor 1 status LED (green)</li> </ul> | <ul style="list-style-type: none"> <li>❽ LVD contactor 1 connector - XH4</li> <li>❾ LVD power input connector - XH8</li> <li>❿ Power and RXP comms input - YH11</li> <li>⓫ Current sense inputs (3) - XH6</li> <li>⓬ Temperature sense inputs (2) - XH7</li> <li>⓭ Not used with SC100 - XH12</li> <li>⓮ DC power system digital inputs (4 pre-defined: Load Fuse Fail, Battery Fuse Fail, AC Distribution Fan Fail, AC Distribution MOV Fail) - YH3</li> </ul> |
|---|---|

📄 See Troubleshooting on page 56 for details of I/O board LED signals.

## Connections

The following diagram shows the connections between the SC100, the I/O board, the other dc power system components and external devices.



- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>① SC100 system controller</li> <li>② I/O board</li> <li>③ Voltage feed module</li> <li>④ RS232 communications to local PC or laptop, or an external modem</li> <li>⑤ Digital relay outputs (6) to external devices and/or alarm indication system</li> <li>⑥ Digital inputs (6) from external voltage-free switches or relay contacts</li> <li>⑦ Connection to dc common bus</li> <li>⑧ Connection to dc live bus</li> <li>⑨ Communications to rectifiers</li> </ul> | <ul style="list-style-type: none"> <li>⑩ DC power system digital inputs (Load Fuse Fail, Battery Fuse Fail, AC Distribution Fan Fail, AC Distribution MOV Fail)</li> <li>⑪ Not used with SC100</li> <li>⑫ Connection to temperature sensors (2)</li> <li>⑬ Connection to current sensors (3)</li> <li>⑭ Optional LVD1 contactor (with or without auxiliary switch*)</li> <li>⑮ Optional LVD2 contactor (with or without auxiliary switch*)</li> <li>⑯ Bus voltage sense connection</li> <li>⑰ I/O power and RXP comms connection</li> <li>⑱ LVD power</li> </ul> |
|---|--|



\* See LVD Characterization on page 28.



For connector pin-outs see details on page 68. For input and output specifications see details on page 61.

## Compatible Software

The following software is compatible with the SC100 system controller:

- DCTools Configuration Software. Latest version is available free from [dcpower.eaton.com/downloads](http://dcpower.eaton.com/downloads).
- PowerManagerII Remote Control and Monitoring Software. Contact your Eaton dc product supplier for further information (see Worldwide Support on page 75).

## Overview

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## Configuration File

The operational settings of the dc power system are stored in a configuration file loaded into the SC100 system controller.

The SC100 is supplied pre-loaded with a configuration file. If this configuration file has been customized for the site then no further configuration changes will be necessary.

Otherwise, it is important that the settings of this configuration file are checked and changed as required for site-specific conditions. In particular, settings that may affect the performance and life expectancy of the battery must be checked and set according to the battery manufacturer's recommendations.

Some settings in the configuration file can be edited using the system controller's keypad (see details on page [8](#)), or all settings can be edited using a PC/laptop with DCTools (see details on page [9](#)) or remotely, see Communications Options on page [48](#).

The configuration file settings in the SC100 can be saved to (Backup) or loaded from (Restore) a PC/laptop using DCTools. See Backup and Restore on page [44](#).

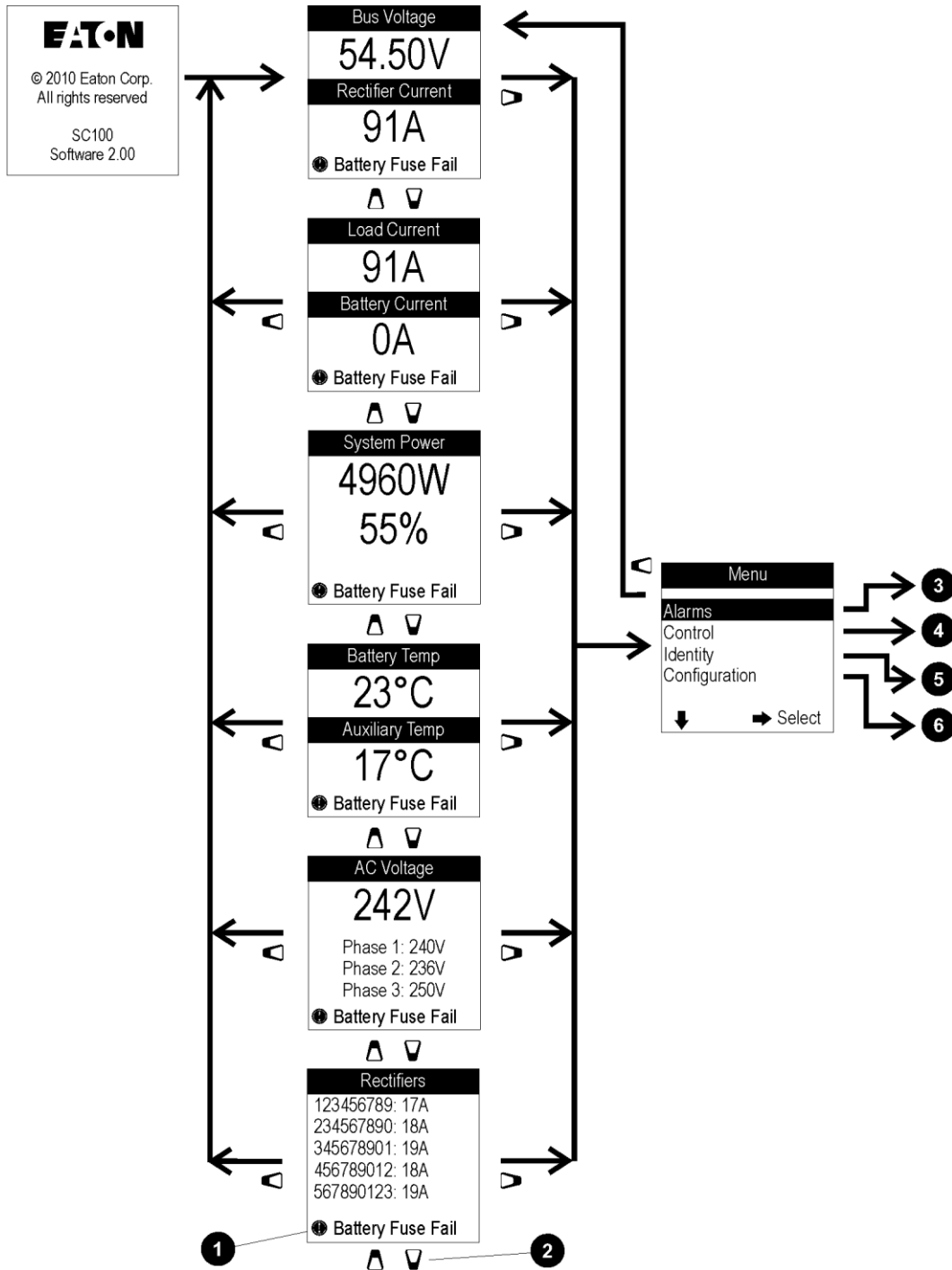
## Starting the SC100

When dc power is applied to the SC100 (via the RXP connector YS11) the start-up sequence begins.

The following diagram shows the Status Screens and main navigation.



See Analog System Values on page [41](#) for details of the values displayed.



- ① Any active alarms are displayed in rotation.
- ② Scroll to show any other rectifiers.
- ③ List of any active alarms.
- ④ Operate control processes.
- ⑤ SC100, I/O board and rectifier identity information.
- ⑥ Configure control processes.

## SC100 Operation using the Keypad and Screen

### Navigation


Symbol	Function
↑	<ul style="list-style-type: none"> <li>Move up/down to previous/next screen.</li> </ul>
↓	<ul style="list-style-type: none"> <li>Move up/down in a list (hold to go to the top or bottom of the list).</li> <li>Highlight options in a screen.</li> <li>Increase/decrease a value in a configuration screen.</li> </ul>
↑↓	<ul style="list-style-type: none"> <li>Use either up/down key to scroll</li> </ul>
➔	<ul style="list-style-type: none"> <li>Go to Main Menu screen</li> <li>Perform the action shown</li> </ul>
←	<ul style="list-style-type: none"> <li>Go to default status screen</li> </ul>

### Keypad Access Security

This feature prevents accidental or unauthorized changes to settings from the SC100 keypad.

- ▶ **To use DCTools to enable/disable keypad access**
  - In DCTools go to *Communications*.
  - Set *UI Access* to:
    - *Unprotected* - keypad access is allowed, or
    - *Protected* - keypad access is denied (can be temporarily over-ridden, see below).
- ▶ **To temporarily enable keypad access at the SC100 when access is set to Protected**
  - Press *Up* and *Down* keys together for 5 seconds.
  - ☐ *Keypad access is now temporarily enabled. Keypad access control reverts back to Protected mode after the display goes back to the Summary screen.*

### Display Settings




- ▶ **To change the display contrast**
  - Use the keypad to go to *Menu > Configuration > Controller > Edit > Contrast*.
- ▶ **To test the LCD**
  - Use the keypad to go to *Menu > Controls > Screen Test > Start*.
  - Press  to stop the screen test.
- ▶ **To change the display orientation (horizontal/vertical)**
  - Use the keypad to go to *Menu > Configuration > Controller > Edit > Display*.

### Display Time-out


If there is no keypad activity for 2 minutes the display will go back to the default Status Screen.

## Alarm Indicators


### Visual indicators

-  Power on LED (green)
  -  Minor Alarm LED (yellow)
  -  Critical/Major Alarm LED (red)
  - ???
- The system value cannot be displayed because of a failed, disconnected or unconfigured sensor.

### Audible indicator

- One beep – indicates an invalid key press
  - One beep every 2 seconds – Minor alarm is active
  - Continuous sound – Critical/Major alarm is active
-  *Critical/Major alarms always override Minor alarms.*

#### ► To stop the audible indicator

- Press any key
-  *The audible indicator will restart at the next active alarm or alert message.*

#### ► To enable/disable the audible alarm indicator

Either:

- Use the keypad to go to: Menu > Configuration > Audible Alarm.

Or:

- In DCTools go to: Alarms > Alarm Configuration.

 *When Disabled, the audible indicator will still indicate an invalid key press.*

## SC100 Operation Using a PC/Laptop

DCTools is configuration software for editing a system controller's configuration file (on-line) and monitoring the operation of Eaton's dc power systems. It is available free from [dcpower.eaton.com/downloads](http://dcpower.eaton.com/downloads).

DCTools can be run on a PC/laptop connected to the SC100's RS232 port.


 *For remote PC/laptop connection details see Communications Options on page [48](#).*


Before you start you will need:

- The latest version of DCTools available from: [dcpower.eaton.com/downloads](http://dcpower.eaton.com/downloads).
- A PC/laptop with RS232 port and DB9 F/F Null-modem cable (RadioShack 55010600, Jaycar WC7513, or similar. Cross-over connections: 5-5, 2-3, 3-2.)

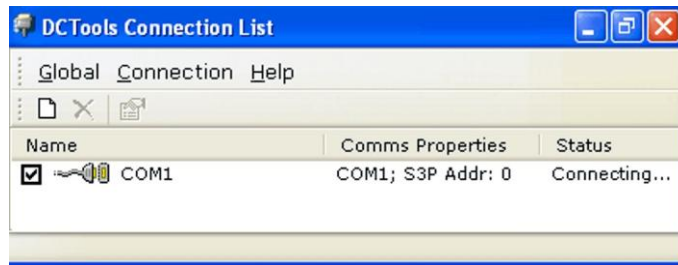
► **To connect a PC/laptop to the SC100:**

- 1 Download the latest version of *DCTools* from: [dcpower.eaton.com/downloads](http://dcpower.eaton.com/downloads).
- 2 Install *DCTools* on the PC/laptop.
- 3 Connect a null-modem cable from the COM1 RS232 port on the PC/laptop to the RS232 connector on the SC100.

 *Ensure the cable is secured so that no force is applied to the RS232 connector as this may damage the connector.*

 *If COM1 port is not available or for more details see [Direct RS232 Communications](#) on page [48](#).*


- 4 Start *DCTools* to open the Connection List. Check the box for the COM1 connection.

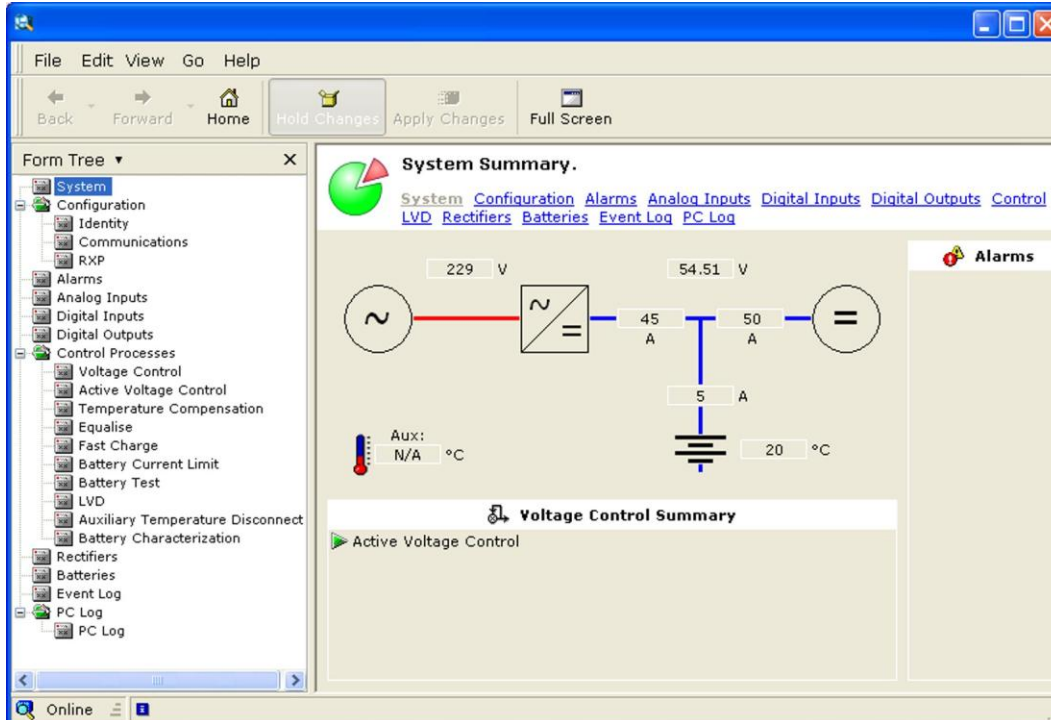


- 5 *DCTools* will now connect to the SC100.

 *If connection is unsuccessful refer to *DCTools* help (press F1) or [Troubleshooting](#) on page [56](#).*

- 6 For details of the SC100 control and monitoring functions available via *DCTools* see [System Operation](#) on page [13](#).

 *For help using *DCTools* press F1.*



## SC100 Identity Information

The following identity information is stored in the SC100.

Parameter	Description	Where to find:
Serial Number	The SC100 serial number (factory set).	SC100: Menu > Identity > SC100 Identity
Software Version (App Version)	The version of the embedded software in the SC100 (factory set).	DCTools: Configuration > Identity

If required, the following site specific information can be stored in the SC100 to assist site management.

Parameter	Description	Where to find:
System Manufacturer	The manufacturer of the dc power system.	
System Type	The dc power system model number.	
System Serial Number	The dc power system serial number.	
System Location	Location of dc power system at the site.	
Site Name	Name of the site.	DCTools: Configuration > Identity
Site Address	Address of the site.	
Site Notes	Any notes relevant to site access, location or other matters.	
Contact	Contact name, phone number, and so on.	
Configuration Name	Reference name of the configuration file in the SC100.	



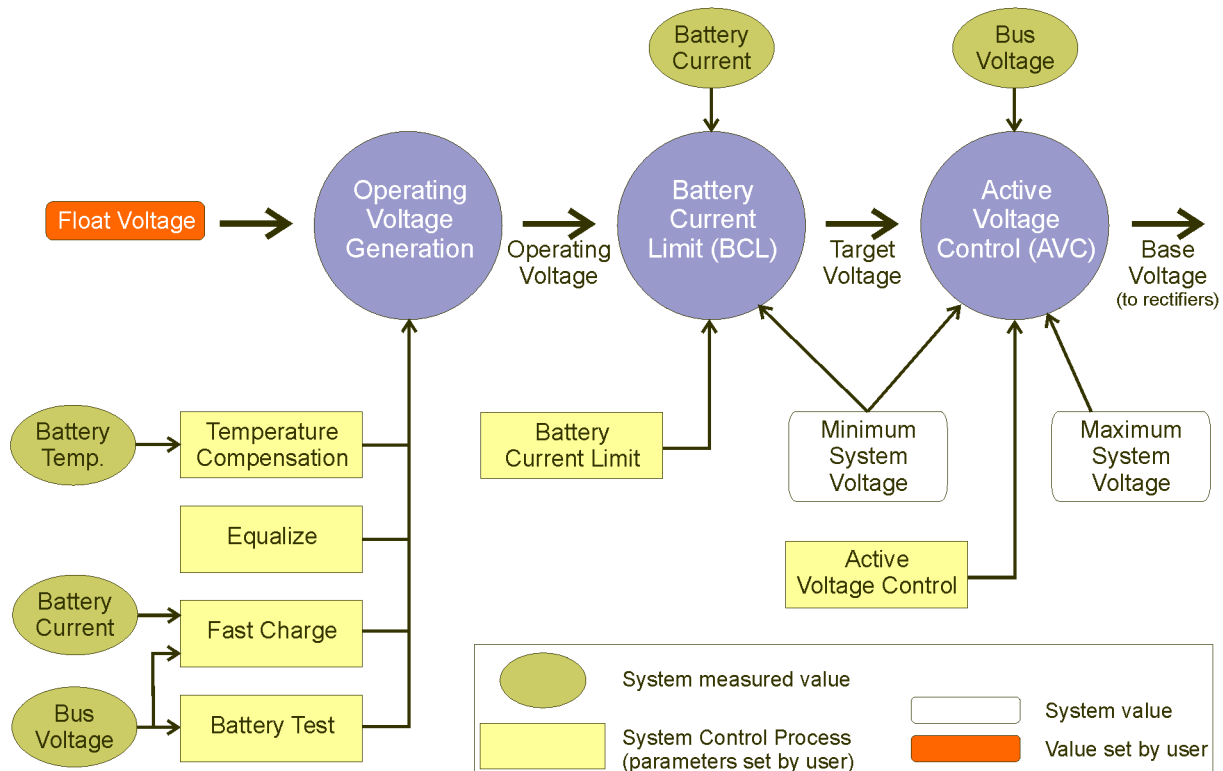
## Overview

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## Voltage Control

The output voltage of the rectifiers is controlled by a number of control processes. The following diagram shows the various control processes, measured values and operating values that determine the rectifier output voltage.

☐ If ac fails then any active control process stops. No control process can start until the ac supply is restored.



### Float Voltage

#### Configuration

Set the following parameter.

Parameter	Description	Where to find:
Float Voltage	Set to the voltage required to maintain optimum battery charge (at the nominal ambient temperature*) as specified by the battery manufacturer. The bus voltage may be adjusted above or below this value by the System Control Processes.  ☐ *This is the same as the Reference Temperature used by Temperature Compensation. See details on page <a href="#">21</a> .	SC100: Menu > Configuration > System > Edit > Float Voltage DCTools: Control Processes > Voltage Control


☐ The system voltage is limited by maximum and minimum values. The values are viewable in DCTools at Control Processes > Voltage Control. These values are not configurable.

## Active Voltage Control (AVC)

Active Voltage Control maintains a constant float voltage under varying load current by monitoring the bus voltage and adjusting the rectifier output voltage to compensate for any voltage drop. This prevents undercharging the batteries during high load demand.

### ► To enable Active Voltage Control

- In DCTools go to: Control Processes > Active Voltage Control.

 *Active Voltage Control is normally enabled. Only disable if there are particular reasons.*

### Information

The following information is available about AVC.

Parameter	Description	Where to find:
State	Indicates if AVC is active or inactive.	
Target Voltage	AVC will set the Base Voltage to attempt to maintain the bus voltage to this value.	DCTools: Control Processes > Active Voltage Control
Voltage Offset	The difference between the Base Voltage and the Target Voltage.	

## Battery Current Limit (BCL)


Battery Current Limit automatically limits the battery recharge current to:

- Prevent excessive battery charge current in under-loaded systems
- Minimize gas release in VRLA batteries
- Reduce the load on a standby generator.

Two current limit values can be set (both are a percentage of the C10 rating of the battery):

Battery Current Limit (Normal Limit): BCL value for use when utility ac is available.

Engine Run Limit (optional): BCL value for use when ac is supplied by a standby generator. This reduces the load on the generator and allows a smaller generator to be used.

 *Engine Run Limit is activated by a signal from an ac standby generator.*

### ► To enable BCL

- Use the SC100 keypad to go to: *Menu > Configuration > Battery Current Limit > Edit*
- Or, in DCTools go to: *Control Processes > Battery Current Limit*.

### ► To activate Engine Run BCL

- Connect a voltage free relay contact (that will operate when the standby generator starts) to a Digital Input.
- In DCTools go to *Digital Inputs*.
- Configure the selected Digital Input and set *Function* to *Engine Run*.
- In DCTools go to *Control Processes > Battery Current Limit* and set the *Engine Run Limit*.

**Information**

The following information is available about BCL.

Parameter	Description	Where to find:
State	Indicates if BCL is active or inactive.	SC100: Menu > Configuration > Battery Current Limit > Edit DCTools: Control Processes > Battery Current Limit
Engine Run State	Indicates if Engine Run BCL is active.	DCTools:
Voltage Offset	The bus voltage adjustment made by Battery Current Limit is applied to the Operating Voltage to produce the Target Voltage. Target Voltage is used as the input to the AVC function.	Control Processes > Battery Current Limit

**Configuration**

Set the following parameters.



Parameter	Description	Where to find:
Battery Capacity	Set to the rated 10 hour capacity of the installed battery strings. Zero means no battery is installed.	SC100: Menu > Configuration > System > Edit > Battery Capacity > Edit DCTools: Batteries
Current Limit	BCL maintains the battery current below this value, which is a percentage of the installed C10 Battery Capacity.	
Engine Run Limit	The Battery Current Limit setting when Engine Run is active. BCL maintains the battery current below this value when the engine run digital input is active (engine run is enabled). This limit is expressed as a percentage of the installed C10 Battery Capacity.	DCTools: Control Processes > Battery Current Limit

**Battery Test**

Battery Test is a preventative maintenance tool that monitors the discharge capabilities to ensure that the condition of the battery has not deteriorated over time.

The SC100 temporarily reduces the output voltage of the rectifiers to just below the bus voltage for a set duration. The battery then supplies power to the load. A battery test passes if the battery voltage remains above a predetermined level for the duration of the test.

Battery Tests can be scheduled to occur at regular intervals, and/or can be started/stopped manually, and/or can be started by an external relay contact or switch.

-  *Battery Test does **NOT** function during a Fast Charge or Equalize, or during the lock-out period after an ac supply failure.*
-  *If a Digital Input has the function "Start Battery Test" then a Battery Test will start when the Digital Input becomes active.*

- ▶ **To enable Battery Test (or to start or stop a test manually)**
  - Use the SC100 keypad to go to: *Menu > Configuration > Battery Test > Edit.*
  - Or, in DCTools go to: *Control Processes > Battery Test*
- ▶ **To use an external relay contact to activate a Battery Test (optional)**
  - Connect a voltage free relay contact or switch to any Digital Input.
  - In DCTools go to *Digital Inputs.*
  - Configure the selected Digital Input and set *Function* to *Start Battery Test.*
- ▶ **To reset a Battery Test Fail alarm**
  - In DCTools go to: *Alarms.*
  - Click on *Reset Battery Test Fail.*

### Information

The following information is available about Battery Test.

Parameter	Description	Where to find:
State	Indicates if Battery Test is disabled, locked-out, active or inactive.	SC100*: Menu > Controls > Battery Test
Remaining Time	The time to the end of the currently active Battery Test.	DCTools: Control Processes > Battery Test
Next Start Time	The time to the start of the next Battery Test.	
Lockout Remaining	The time remaining until a Battery Test can be started.	
Voltage Offset	The adjustment to the bus voltage being applied due to the Battery Test. While a Battery Test is running, the rectifiers are turned down to force the battery to carry the load.	DCTools: Control Processes > Battery Test

*\*Only if Battery Test is Enabled.*

### Configuration

Set the following parameters.

Parameter	Description	Where to find:
Termination Voltage	If the bus voltages drops below this value during a Battery Test, then the test fails.	SC100: Menu > Configuration > Battery Test
Duration	The maximum time a Battery Test process will be active. The battery test will pass if the bus voltage remains above the Battery Test Termination Voltage for the duration of the test.	DCTools: Control Processes > Battery Test
Interval	The time between scheduled battery tests. The interval period begins at the start of a battery test. Zero disables scheduled battery tests. Zero also disables the Lockout following an ac supply failure, allowing an immediate manual test.	DCTools: Control Processes > Battery Test
Lockout	Battery Test is is not able to start for this period after an ac fail. This allows time for a battery to recharge before a Battery Test.	

## Equalize

Equalize charges batteries at a higher voltage after they have been fully charged to ensure that all individual cell voltages are the same, that electrolyte is distributed evenly, and that sulfate crystal buildup on the plates is reduced.

Equalize can be scheduled to occur at regular intervals and/or can be started/stopped manually.

- ☐ Refer to the battery manufacturer's instructions before using Equalize.
- ☐ If a Digital Input has the function "Start Equalize" then a manual equalize cycle will start when the Digital Input becomes active.

### ► To enable Equalize (or to start or stop Equalize manually)

- Use the SC100 keypad to go to: *Menu > Configuration > Equalize > Edit.*
- Or, in DCTools go to: *Control Processes > Equalize.*

### ► To use an external relay contact to activate an Equalize (optional)

- Connect a voltage free relay contact or switch to any Digital Input.
- In DCTools go to: *Digital Inputs.*
- Configure the selected Digital Input and set *Function* to *Start Equalize.*

## Information

The following information is available about Equalize.

Parameter	Description	Where to find:
State	Indicates if Equalize is Disabled, Active or Inactive.	SC100*: Menu > Controls > Equalize
Next Start	The time to the start of the next scheduled Equalize.	DCTools: Control Processes > Equalize
Remaining Time	The time to the end of the currently active Equalize.	DCTools: Control Processes > Equalize
Voltage Offset	The adjustment to the bus voltage being applied due to the Equalize.	DCTools: Control Processes > Equalize

*\*Only if Equalize is Enabled.*

## Configuration

Set the following parameters.

Parameter	Description	Where to find:
Interval	The time between scheduled Equalize. The interval period begins at the start of an Equalize. Zero disables scheduled Equalizes.	SC100: Menu > Configuration > Equalize > Edit
Duration	The duration of a scheduled Equalize. Use the value recommended by the battery manufacturer.	DCTools: Control Processes > Equalize
Equalize Voltage	The bus voltage maintained during an Equalize cycle. Use the value recommended by the battery manufacturer. The bus voltage is further adjusted by Temperature Compensation.	

## Fast Charge

After an ac supply failure, Fast Charge automatically increases the float voltage of the power system to recharge the batteries as quickly as possible.

Enable Fast Charge if the site experiences frequent ac supply failures.

- Fast Charge does **NOT** function during a Battery Test, Equalize or if the battery current sensor fails.*
- If Fast Charge is used then Battery Current Limit (BCL) should also be used. See Battery Current Limit on page [15](#) for details.*

### ► To enable Fast Charge (or to stop Fast Charge manually)

- Use the SC100 keypad to go to: *Menu > Configuration > Fast Charge > Edit.*
- Or, in DCTools go to: *Control Processes > Fast Charge.*

### Information

The following information is available about Fast Charge.

Parameter	Description	Where to find:
State	Indicates if Fast Charge is Disabled, Active or Inactive.	
Ah Discharged	The current level of battery discharge. A Fast Charge cycle is started if this value is above the Ah Threshold.	SC100*: Menu > Controls > Fast Charge
Maximum Time Remaining	The maximum time to the end of the currently active Fast Charge.	DCTools: Control Processes > Fast Charge
Voltage Offset	The adjustment to the bus voltage being applied due to the Fast Charge.	

*\*Only if Fast Charge is Enabled.*

## Configuration

Set the following parameters.

Parameter	Description	Where to find:
Voltage	The bus voltage maintained during a Fast Charge. Use the value recommended by the battery manufacturer.	SC100: Menu > Configuration > Fast Charge > Edit DCTools: Control Processes > Fast Charge
Voltage Threshold	If the bus voltage drops below this value during an ac supply failure, then <i>Fast Charge</i> starts when the ac supply is restored. <i>Fast charge</i> can also be started based on the <i>Ah Threshold</i> .	
Ah Threshold	If <i>Ah Discharged</i> exceeds this value during an ac supply failure, then <i>Fast Charge</i> starts when the ac supply is restored. The threshold is given as a percentage of installed C10 battery capacity. <i>Fast charge</i> can also be started based on the <i>Voltage Threshold</i> .	DCTools: Control Processes > Fast Charge
Maximum Duration	The maximum duration of a <i>Fast Charge</i> . Use the value recommended by the battery manufacturer.	
Recharge Percentage (%)	The ratio of ampere-hours recharged to the ampere-hours discharged. <i>Fast Charge</i> stops either when the Ah recharged equals the Ah discharged x <i>Fast Charge Recharge Percentage</i> , or after <i>Maximum Duration</i> .	
Battery Capacity	Set to the rated 10 hour capacity of the installed battery strings. Zero means no battery is installed.	SC100: Menu > Configuration > System > Edit > Battery Capacity > Edit DCTools: Batteries

## Reset Battery State

The SC100 monitors battery discharge and maintains a value called *Ah Discharged*. In a new SC100 *Ah Discharged* is set to zero. During operation of the dc power system the value is increased as the battery is discharged, and reduced as the battery is recharged.

The value of *Ah Discharged* is used to start the *Fast Charge* control process. See details on page [19](#).

### ► To view current value of Ah Discharged

- In DCTools go to: Batteries.

If a battery or the SC100 is changed, then reset the value of *Ah Discharged* to zero (when the battery is fully charged).

### ► To set the value of Ah Discharged back to zero

- In DCTools go to: Batteries. Click Reset Battery State.




*Any active or pending Fast Charge or Equalize will be cancelled.*

## Temperature Compensation

As the ambient temperature of a battery drops (or rises) the voltage required to maintain full charge increases (or decreases). Temperature Compensation automatically varies the float voltage to cancel the effects of changing temperature.

Enable Temperature Compensation for optimum battery life and battery capacity over a wider temperature range.

 *Temperature Compensation does NOT function during a Battery Test.*

### ► To enable Temperature Compensation

- Use the SC100 keypad to go to: *Menu > Configuration > Temp Compensation > Edit.*
- Or, in DCTools go to: *Control Processes > Temperature Compensation.*


### Information

The following information is available about Temperature Compensation.

Parameter	Description	Where to find:
State	Indicates if Temperature Compensation is active or inactive.	SC100: Menu > Configuration > Temp Compensation > Edit DCTools: Control Processes > Temperature Compensation
Battery Temperature	The temperature measured by the battery temperature sensor.	SC100: Battery Temp DCTools: Batteries
Voltage Offset	The adjustment to the bus voltage being applied due to the Temperature Compensation. Offset is zero when the battery temperature equals the reference temperature.	DCTools: Control Processes > Temperature Compensation

### Configuration

Set the following parameters.



Parameter	Description	Where to find:
Cells Per String	The number of 2V cells per battery string (for example: 24 in a 48V nominal system).	SC100: Menu > Configuration > Temp Compensation > Edit > Cells Per String DCTools: Batteries
Slope	Bus voltage adjustment rate. Use the value recommended by the battery manufacturer.  <i>No additional voltage adjustment is made below 0°C or above 50°C.</i>	SC100: Menu > Configuration > Temp Compensation > Edit DCTools: Control Processes > Temperature Compensation
Reference Temperature	The temperature where no voltage adjustment is applied. Refer also to Float Voltage on page <a href="#">14</a> .	

## Rectifiers

The SC100 registers all rectifier modules as they are inserted into the dc power system.



### Information


The following information is available from rectifiers.

Parameter	Description	Where to find:
Software Version	Version of rectifier embedded software.	SC100: Menu > Identity > Rectifier Identity DCTools: Configuration > RXP
Serial Number (S/N)	Rectifier serial number.	SC100: Menu > Identity > Rectifier Identity
Power	Rectifier output power as a percentage of Max. Power Limit.	DCTools: Rectifiers
State	<b>Registered</b> - communicating with the SC100. <b>Un-registered</b> - there is a rectifier compatibility or communications problem.	
AC Voltage	The ac voltage measured by the rectifier.	
Voltage	Rectifier's dc output voltage. This is the Float Voltage adjusted by any the voltage control processes such as Temperature Compensation, Active Voltage Control, and so on. See further details on page <a href="#">14</a> .	
Current	Rectifier's output current.	
Heatsink Temp	The measured rectifier heatsink temperature.	DCTools: Rectifiers
Max Power Limit	Rectifier's maximum output power (factory set).	
Max Current Limit	The maximum dc current limit value of the rectifier.  <i>Adjust Rectifier Current Limit to set a lower operating current limit.</i>	
Max AC Current Limit	The maximum ac current limit value of the rectifier.  <i>Adjust Rectifier AC Current Limit to set a lower operating current limit.</i>	
Status	Information about rectifier alarms.	

## Common Rectifier Configuration

The following parameters (common to all rectifiers) can be configured.

Parameter	Description	Where to find:
Rectifier (DC) Current Limit	The output current limit of the rectifier. If set to zero, then the output current limit is maximum.	
AC Rectifier Current Limit	The input current limit of the rectifier. If set to zero, then the input current limit is maximum.	SC100: Rectifiers > Rect. Settings
Rectifier Current Share	Current Share ensures that the total output power of the power system is evenly shared between all rectifiers.  Set to <i>Enabled</i> unless there is a specific reason to disable.	DCTools: Rectifiers
OVSD Set Point	Over Voltage Shut Down. A rectifier will shut down if its output voltage exceeds this value.   <i>Recommended value is 59.2V for 48V nominal systems, 28.6V for 24V nominal systems.</i>	
Ramp Up Slope	The ramp-up slope of the rectifier, as a percentage of the rectifier rated current.	DCTools: Rectifiers
Enable Rectifier Shutdown	Set to <i>Enabled</i> to allow rectifier shut down.   <i>Load Based Rectifier Shutdown is not available with APR48-3G, EPR48-3G, APR24-3G and CR48-3G rectifiers.</i>	
Start Up Delay	The delay from ac turn-on before the rectifier output turns on.	


 See [Voltage Control](#) on page [14](#) for details of the rectifier's output voltage control.

## Identify

The rectifier's registration number does not correspond to a physical position in the dc power system.

### ► To identify a rectifier

- On the SC100 keypad go to: Menu > Identity > Rectifier Identity.
- Select a rectifier. All LEDs on the selected rectifier will flash for 60 seconds.

 *Rectifier serial numbers are printed on a label on the front of each rectifier.*

## Rectifier Shutdown

### Manual Rectifier Shutdown

#### ► To shut down a rectifier

- In DCTools go to: *Rectifiers > Configuration*.
- Set *Rectifier Shutdown* to *Enabled*.
- In the *Rectifiers* table select the *Shutdown* check box.
- The rectifier will shut down and the yellow LED will be on.



*The SC100 will restart any shutdown rectifiers if: ac has failed, or more than one rectifier has failed, or the bus voltage is below the Low Load threshold, or Rectifier Shutdown is disabled.*



*Shutdown rectifiers will restart if Load Based Rectifier Shutdown is enabled.*

### Rectifier Restart

#### ► To restart all shutdown rectifiers

- Use the SC100 keypad to go to: *Menu > Controls > Restart All Rectifiers*.

Or

- In DCTools go to: *Rectifiers*. Click *Restart All Rectifiers*.

#### ► To restart individual rectifiers

- In DCTools go to: *Rectifiers*.
- For each rectifier clear the *Shutdown* check box.

The rectifier(s) will then resume normal operation.



*The SC100 will restart any shutdown rectifiers if: ac has failed, or more than one rectifier has failed, or the bus voltage is below the Low Load threshold, or Rectifier Shutdown is disabled.*



*The SC100 will restart a shutdown rectifier if LBRS is active. See Load Based Rectifier Shutdown on page [24](#).*

### Load Based Rectifier Shutdown



*Load Based Rectifier Shutdown is not available with APR48-3G, EPR48-3G, APR24-3G and CR48-3G rectifiers.*

If Load Based Rectifier Shutdown (LBRS) is enabled then the SC100 automatically shuts down rectifiers when the total load current is significantly less than the total rectifier capacity.

This raises the average load on the remaining rectifiers which will then operate at a higher efficiency. This results in a decrease in system power consumption.

The run time of all rectifiers is recorded and balanced to ensure even aging (and a balanced number of rectifiers on each ac phase if rectifiers are assigned to phases).

The SC100 will progressively restart rectifiers if the load increases.



*Rectifiers shut down by LBRS will have the yellow LED on.*



*If N plus 0 rectifier redundancy is selected, then only sufficient rectifiers to supply the load will be on. If N plus 1 rectifier redundancy is selected, then one additional rectifier will always be on.*



*The SC100 will automatically restart all rectifiers if ac supply has failed, or more than one rectifier has failed, or Battery Test / Equalize / Fast Charge are active, or the bus voltage is below the Low Load threshold.*

### ► To enable Load Based Rectifier Shutdown

- In DCTools go to: Rectifiers > Load Based Rectifier Shutdown



Ensure that Rectifier Start Up Delay is less than 30 seconds. See information on page [23](#). LBRS will not function correctly if the start up delay is more than 30 seconds.

### Information

The following information is available about Load Based Rectifier Shutdown.

Parameter	Description	Where to find:
State	<b>Disabled:</b> LBRS is not enabled. <b>Inactive:</b> LBRS is enabled but not active. <b>Active:</b> LBRS is operating. <b>Testing:</b> See details on page <a href="#">26</a> . <b>Suspended:</b> See details on page <a href="#">26</a> . <b>Not enough Rectifiers:</b> See <i>Redundancy setting</i> on page <a href="#">25</a> .	SC100*: Controls > LBRS DCTools: Rectifiers > Load Based Rectifier Shutdown
Run Time	The run time of each rectifier	DCTools: Rectifiers

\*Only if Load Based Rectifier Shutdown is Enabled.

### Configuration

Set the following parameters.

Parameter	Description	Where to find:
Rectifier Cycle Interval	The time interval in hours that the SC100 will cycle rectifiers when the LBRS process is active.	
Redundancy	If N plus 0 rectifier redundancy is selected, then only sufficient rectifiers to supply the load will be on. If N plus 1 rectifier redundancy is selected, then one additional rectifier will always be on.	
Rectifier Cycle High Threshold	LBRS restarts rectifiers if the load is more than this percentage of the total rectifier capacity.	SC100: Control Processes > LBRS
Rectifier Cycle Low Threshold	LBRS shuts down rectifiers if the load is less than this percentage of the total rectifier capacity.	DCTools: Rectifiers > Load Based Rectifier Shutdown
Battery Test Before LBRS	See details on page <a href="#">25</a> .	
Restart All Rectifiers	Press to temporarily restart all rectifiers shut down by LBRS. Disable LBRS to permanently restart all rectifiers.	

### Battery Test Before LBRS

If LBRS and *Battery Test Before LBRS* are Enabled then, at startup of the SC100, a *Battery Test* will be started and LBRS will be *Inactive*. LBRS will only become *Active* if the *Battery Test* is successful.

If the *Battery Test* fails then LBRS will remain inactive until a successful *Battery Test* is completed (or *Battery Test Before LBRS* is Disabled).

## LBRS Test

The *LBRS Test* function will cycle the rectifiers once.

- ☐ *LBRS Test is not available if LBRS is Disabled, Suspended or Inactive. If Battery Test Before LBRS is enabled then a Battery Test will be performed (see details on page [25](#)).*

### ► To start an LBRS Test

- Configure and *Enable* LBRS (see details on page [25](#)).
- In DCTools go to: *Rectifiers > Load Based Rectifier Shutdown > LBRS Test*.
- Set *LBRS Restart After Test* to the required setting.
  - ☐ *When the test is completed or stopped normal LBRS operation will start after this delay.*
- When LBRS is *Active*, click *Start*.
  - ☐ *LBRS Test will cycle the available rectifiers with a cycle time of 90 seconds until all rectifiers have been shutdown and restarted.*
- If required, click *Stop* to end an *LBRS Test* before all rectifiers have been shutdown and restarted.

## LBRS Suspend

If required, when LBRS is active it can be temporarily suspended for system maintenance or other reasons.

- ☐ *LBRS Suspend is not available if LBRS is Disabled, Testing or Inactive.*

### ► To temporarily suspend LBRS

- In DCTools go to: *Rectifiers > Load Based Rectifier Shutdown > LBRS Suspend*.
- Set *LBRS Restart* to the required setting.
  - ☐ *Normal LBRS operation will start after this delay.*
- When LBRS is *Active*, click *Suspend*.
  - ☐ *LBRS will be suspended and all shutdown rectifiers will restart.*
- Normal LBRS operation will resume automatically after the *LBRS Restart* delay. Or, click *Resume*.
  - ☐ *LBRS is automatically suspended if the Battery Fuse Fail alarm is active.*

## Auxiliary Temperature Shutdown

- ☐ *This feature requires a second temperature sensor connected to the I/O board.*

All rectifiers can be shutdown if the temperature measured by the Auxiliary Temperature sensor is outside a configured range.



- If a sensor used for Auxiliary Temperature Shutdown becomes faulty or disconnected this may cause an unnecessary rectifier shutdown.

- ☐ *See also LVD Auxiliary Temperature Disconnect on page [31](#).*

► **To set Auxiliary Temperature Shutdown**

- In DCTools go to *Control Processes > LVD*.
- Set the Auxiliary Temperature High/Low Thresholds and Hysteresis values as required. See System Alarms on page [31](#).
- Set *Enable Aux Temp Rectifier Shutdown* to *Enabled*.
- If using PowerManagerII Groups, then in DCTools go to *Analog Inputs*. Set *Auxiliary Temperature Group* as required.
  - ☐ See PowerManagerII online help for details.

All rectifiers will now shutdown if the *Auxiliary Temperature* is out of range.

## AC Phase Voltages

The SC100 can display the three ac phase voltages in a three-phase system. The phase voltages are the average ac voltages measured by one or more rectifiers supplied from each of the three phases.

► **To assign rectifiers to phases from the SC100 keypad**

- On the SC100 keypad go to: *Menu > Identity > Rectifier Identity*.
- Select a rectifier.
  - ☐ As each rectifier is selected the *Identify* function will cause it to flash all its LEDs.
- Choose *Phase*, then choose the ac phase that supplies the rectifier (*Phase 1, Phase 2, or Phase 3*).
- Press *Select*.
- Repeat for other rectifiers.
  - ☐ For best accuracy assign all rectifiers to the appropriate *Phase*.

► **To assign rectifiers to phases in DCTools**

- Connect to the SC100 using DCTools. See details on page [9](#).
- In DCTools go to: *Rectifiers*. Expand the *AC Phase Allocations* table.
- Copy the *Serial Numbers* of registered rectifiers from the *Rectifiers* table to the *Serial Number* column in the *AC Phase Allocations* table.
- For each rectifier double click on the entry in the *Phase* column. Select the ac phase that supplies the rectifier (*AC Phase 1, AC Phase 2, or AC Phase 3*).

► **To view the phase voltages**

- On the SC100 keypad go to: *AC Voltage*. See Menu on page [6](#).
- In DCTools go to: *Analog Inputs*.
  - ☐ An *AC Phase Rectifier Missing* alarm is activated if a rectifier assigned to an ac phase is not registered.

## Low Voltage Disconnect (LVD)

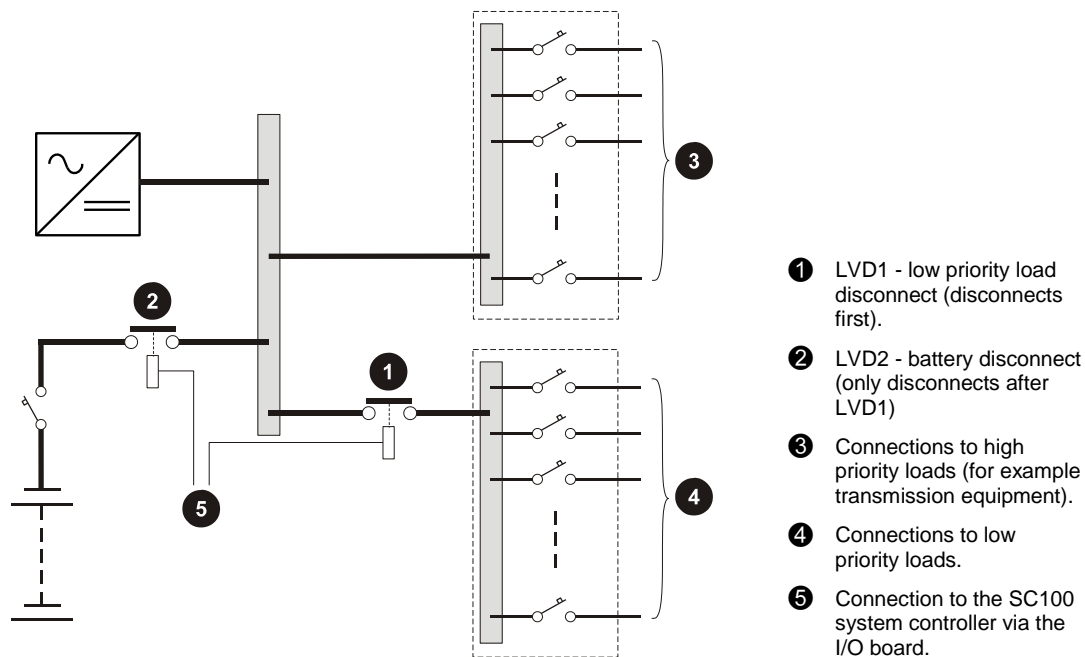
Low Voltage Disconnects may be connected either as load disconnect or battery disconnect depending on the dc power system model. They have two purposes:

- to protect a VRLA battery from deep discharge and premature failure, and/or
- to reduce the load on a battery under discharge so that high priority equipment operates for a longer time after an ac supply failure.

The SC100 has two LVD control channels (LVD1 and LVD2) with three modes of operation:

- 1 **Normal Mode:** In this mode *LVD2 Slave Mode* and *AC Timer Mode* are disabled, and LVD2 (if Enabled) will only disconnect after LVD1.
- 2 **LVD2 Slave Mode:** In this mode LVD2 has the same operating parameters as LVD1.
- 3 **AC Timer Mode:** The LVD will disconnect either after the AC Timer Disconnect Delay, or the bus voltage drops to the Disconnect Voltage, whichever happens first. Both LVD1 and LVD2 can be set to AC Timer mode if required (but LVD2 will only disconnect after LVD1).

The following diagram shows a typical two LVD configuration. This allows lower priority loads to be disconnected first (LVD1), either at a specified battery voltage or a specified time interval after an ac supply failure. This then prolongs battery power for the highest priority loads (LVD2). The battery will be disconnected when the battery voltage reaches its minimum preset voltage.




### Characterization


If auxiliary contacts are fitted to the LVD contactor(s)\*, then the LVD Characterization process determines the optimum operating voltages to suit the contactor(s) coil voltage. These values are stored in the SC100 and on the I/O board.


An *LVD Characterization Error* alarm will be activated if the SC100 detects that the characterization values stored in the SC100 and on the I/O board are different. This happens when:

- The SC100 is replaced. To clear the alarm, on the SC100 select *Use IOB Values*.
- The I/O Board is replaced. To clear the alarm, on the SC100 select *Use SC Values*.
- Both the SC100 and the I/O Board are replaced. In this case, re-characterize the contactor(s).

 When a contactor is re-characterized it will disconnect and re-connect several times. Refer to *Maintenance in the dc power system Installation and Operation Guide* for full instructions.

Factory-fitted contactors will be characterized at the factory. If an existing contactor is replaced, characterize the new contactor from the SC100.


 In this case, there will be no LVD Characterization Error alarm.

 \* LVD Characterization is only available for LVD contactors with auxiliary contacts. If auxiliary contacts are not fitted then the nominal LVD coil voltage must equal the dc power system nominal bus voltage. See LVD Specifications on page [62](#).

► **To enable LVD1 and/or LVD2**

- Use the SC100 keypad to go to: *Menu > Configuration > Low Volts Disconnect > Edit*
- Or, in DCTools go to: *Control Processes > LVD*

► **To manually connect or disconnect an LVD**

- Use the SC100 keypad to go to: *Menu > Controls > LVD1/LVD2 > Control*
- Select *Manual Connect* or *Manual Disconnect* to connect or disconnect the LVD contactor.
  -  *The LVD will remain in the selected state until another state or Automatic Control is selected.*
- Select *Automatic Control* to return the LVD to automatic operation.

**Information**


The following information is available about LVDs.

Parameter	Description	Where to find:
State	<p><b>Connected:</b> the LVD contactor is automatically connected.</p> <p><b>Disconnected:</b> the LVD contactor is automatically disconnected.</p> <p><b>Idle:</b> the LVD state has not been set since the SC100 last restarted.</p> <p><b>Manual:</b> the LVD contactor is set Manual Connect or Manual Disconnect from the SC100 keypad.</p> <p><b>Failed:</b> see <i>LVD Fail</i> alarm on page <a href="#">64</a>.</p> <p><b>Missing:</b> there is no connection to the I/O board.</p>	<p>SC100: Menu &gt; Controls &gt; LVD1/LVD2</p> <p>DCTools: Control Processes &gt; LVD</p>


## Configuration

The following parameters must be configured to set the LVDs.

Parameter	Description	Where to find:
Inhibit Period	The minimum time an LVD stays connected or disconnected before it can change state.	DCTools: Control Processes > LVD
Allow Front Panel LVD Control	Disables LVD manual control from the controller front panel.	DCTools: Configuration > Communications
LVD1/LVD2 Type	Select the correct contactor type (NO or NC) and if auxiliary contacts are used.  <div style="border: 1px solid black; padding: 5px; width: fit-content;">                     If auxiliary contacts are not used, then the nominal contactor coil voltage must equal the nominal dc power system voltage (LVD Characterization is not available).                 </div>	
Enable Slave Mode (LVD2 only)	LVD2 will disconnect and reconnect simultaneously with LVD1. Other LVD2 configuration parameters are ignored.	
Enable AC Timer	If <i>Enabled</i> , LVD will disconnect after the <i>AC Timer Disconnect Delay</i> or at the <i>Disconnect Voltage</i> , whichever occurs first.	
AC Timer Disconnect Delay	See <i>Enable AC Timer</i> .	
LVD1 Disconnect Voltage	If the bus voltage drops to this value, then any shutdown rectifiers are restarted (even if LVD is disabled). If the bus voltage is still lower than this value after the LVD Recognition Period, then the LVD will disconnect.	
LVD2 Disconnect Voltage	If the bus voltage drops to this value after the <i>LVD Recognition Period</i> , then the LVD will disconnect. This parameter is ignored if <i>Enable LVD2 Slave Mode</i> is <i>Enabled</i> .	DCTools: Control Processes > LVD
LVD1 Reconnect Voltage*	LVD1 reconnects when the bus voltage has been above this value for the LVD1 Recognition Period and LVD2 is disabled, or has already reconnected, or is in slave mode.	
LVD2 Reconnect Voltage*	LVD2 reconnects when the bus voltage has been above this value for the <i>LVD2 Recognition Period</i> . This parameter is ignored if <i>Enable LVD2 Slave Mode</i> is <i>Enabled</i> .	
LVD1 Recognition Period	See <i>LVD1 Disconnect Voltage</i> and <i>LVD1 Reconnect Voltage</i> .	
LVD2 Recognition Period	See <i>LVD2 Disconnect Voltage</i> and <i>LVD2 Reconnect Voltage</i> .	
Enable LVD1/LVD2 Aux Temp Disconnect	See Auxiliary Temperature Disconnect on page <a href="#">31</a> .	

 \* If the LVD is used as a load-disconnect, ensure the reconnect voltage is set higher than the expected open-circuit recovery voltage of the discharged batteries.

### Auxiliary Temperature Disconnect

 This feature requires a second temperature sensor connected to the I/O board.

An LVD can be set to disconnect if the temperature measured by the Auxiliary Temperature sensor is outside a configured range (as well the standard voltage controlled LVD operation).



- If a sensor used for Auxiliary Temperature Disconnect becomes faulty or disconnected this may cause an unnecessary LVD disconnect.

 See also *Rectifier Auxiliary Temperature Shutdown* on page [26](#).

#### ► To set Auxiliary Temperature Disconnect

- In DCTools go to *Control Processes > LVD*.
- Set the Auxiliary Temperature High/Low Thresholds and Hysteresis values as required. See System Alarms on page [31](#).
- Set *Enable LVD1 Aux Temp Disconnect* and/or *Enable LVD2 Aux Temp Disconnect* to *Enabled* as required.
- If using PowerManagerII Groups, then in DCTools go to *Analog Inputs*. Set *Auxiliary Temperature Group* as required.

 See *PowerManagerII online help* for details.

LVD1 and/or LVD2 will now disconnect if the *Auxiliary Temperature* is out of range.

## Alarms

An SC100 supplied with a standard configuration file (see details on page [6](#)) has a standard set of alarms configured and enabled. This will be sufficient for standard dc power system operation.

For specific alarm arrangements all SC100 alarms can be individually enabled or disabled and are configurable.

### Types of Alarms































The SC100 provides two types of alarms:

Alarm type	Description	Configuration
System alarms	Generated by the operating values of dc power system (voltages, currents, temperatures, etc) and the operation of power system modules (rectifiers, circuit breakers, fuses, and so on). The SC100 system alarms are listed in Alarm Descriptions on page <a href="#">63</a> .	See details on page <a href="#">34</a> .
Digital Input (DI) alarms	Activated when a DI is in its active state.	See details on page <a href="#">42</a> .

## Active Alarm Indications

All alarms have a configured *Severity*:  Critical  Major  Minor  Warning

The *Severity* determines how an active alarm is indicated:

Severity	Alarm indications	Details
 	SC100 Major alarm LED will turn on.	See details on page <a href="#">9</a> .
	SC100 Minor alarm LED will turn on.	See details on page <a href="#">9</a> .
  	If the SC100 audible indicator is enabled, it will sound until a key is pressed.	See details on page <a href="#">9</a> .
   	The alarm name and severity icon will be displayed on the SC100 main screen.	See details on page <a href="#">6</a> .
   	The <i>Event Log</i> will record the alarm activation.	See details on page <a href="#">43</a> .
   	If configured, an SMS text message will be sent to one or more cell phones.	See details on page <a href="#">53</a> .
   	If configured, PowerManagerII control and monitoring software will be notified by modem callback. PowerManagerII can initiate various actions when it receives an alarm notification.	Refer to the PowerManagerII online Help.
   	In DCTools (if connected), the alarm name and severity icon will be displayed in the <i>Alarms</i> list on the <i>System</i> page.	See DCTools screen.
   	If configured, one or two digital outputs (relays) will be operated.	Refer to the alarm's configuration details.

► **To view a list of active alarms**

- Use the SC100 keypad to go to: *Menu > Alarms*.
- Or, in DCTools go to *System*.

## Common Alarm Parameters

The following parameters are common to multiple alarms.

Parameter	Description	Where to find:
Enable Audible Alarm Indication	Enable or disable the audible alarm indicator.	
Alarm Recognition Period	All alarms (except those listed below) are activated only after the alarm condition is present for this period. <input type="checkbox"/> <i>These alarms have individual recognition periods: AC Fail, System Overload.</i> <input type="checkbox"/> <i>These alarms do not have recognition periods: Battery Test Fail, Configuration Error, Missing Hardware, Unknown Hardware, and all LVD alarms.</i>	DCTools: Alarms > Alarm Configuration

## System Alarm Configuration

The following system alarm parameters can be configured.

Parameter	Description	Where to find:
Severity	Set to <i>Disabled</i> if no indication is required when the alarm is active. Or, set to the required alarm priority. See details on page <a href="#">32</a> .	
DO Mapping A	If required, select a digital output (relay) that will be operated when the alarm is active.	DCTools: Alarms > Alarm State
DO Mapping B	If required, select a second digital output (relay) that will be operated when the alarm is active.	
AC Fail Recognition Period	An ac supply failure condition must be continuously active for this period before an AC Fail alarm is generated.	
Enable High Float Tracking	The High Float alarm threshold will be adjusted when the operating voltage is changed by a voltage control process.	
High Float Threshold	High Float alarm is activated if the bus voltage is above this value.	
Enable Low Float Tracking	The Low Float alarm threshold will be adjusted when the operating voltage is changed by a voltage control process.	
Low Float Threshold	Low Float alarm is activated when the bus voltage is below this value.	
High Load Threshold	High Load alarm is activated if the bus voltage is above this value.	
Low Load Threshold	Low Load alarm is activated if the bus voltage is below this value.	
Battery Fuse Fail Active State	Specifies if the alarm activates from an open or closed contact.	DCTools: Alarms > Alarm Configuration
Battery Temperature High Threshold	Battery Temperature High alarm is activated if the battery temperature is above this value.	
Battery Temperature Low Threshold	Battery Temperature Low alarm is activated if the battery temperature is below this value.	
System Overload Type	See details on page <a href="#">35</a> .	
System Overload Recognition Period	See details on page <a href="#">35</a> .	
System Overload Threshold	See details on page <a href="#">35</a> .	
AC High Threshold	AC High alarm is activated if the ac voltage is above this value.	
AC Low Threshold	AC Low alarm is activated if the ac voltage is below this value.	

Parameter	Description	Where to find:
Battery Charge Over Current Threshold	Battery Charge Over Current alarm is activated if the battery charge current is above this percentage of the battery capacity or 2A, which ever is greater.	
Auxiliary Temperature Low Threshold*	Auxiliary Temperature Low alarm is activated if the auxiliary temperature is below this value.	
Auxiliary Temperature Low Hysteresis*	The hysteresis that is applied before the alarm deactivates.	
Auxiliary Temperature High Threshold*	Auxiliary Temperature High alarm is activated if the auxiliary temperature is above this value.	DCTools: Alarms > Alarm Configuration
Auxiliary Temperature High Hysteresis*	The hysteresis that is applied before the alarm deactivates.	
In Discharge Alarm Condition	Set to indicate when In Discharge alarm will activate - <i>Always</i> or <i>Only While AC Present</i> .	
In Discharge Alarm Threshold	In Discharge alarm is activated if the battery current is above this percentage of the battery capacity.	

\* See Auxiliary Temperature Disconnect on page [31](#).

## System Overload Alarm

The System Overload alarm activates if the total system load exceeds a percentage of the installed rectifier capacity for a specified period. This indicates that additional rectifiers need to be installed. This is useful at sites where there is ongoing installation of additional load equipment.

### ► To enable System Overload

- In DCTools go to: *Alarms > Alarm States*. Enable and configure *System Overload* alarm. See System Alarm Configuration on page [34](#).
- Go to: *Alarms > Alarm Configuration*. Configure the *System Overload* alarm parameters. See details on page [36](#).

### Information

The following information is available about System Overload.

Parameter	Description	Where to find:
System Power	The output power of the system as a percentage of the total nominal power the system is capable of supplying.	SC100: Analogs DCTools: Analog Inputs



**Configuration**

Set the following parameters.

Parameter	Description	Where to find:
System Overload alarm parameters	See System Alarm Configuration on page <a href="#">34</a> .	DCTools: Alarms > Alarm States
System Overload Threshold	The System Overload alarm activates if the load is above this threshold continuously for the <i>System Overload Recognition Period</i> . Measured as a percentage of total rectifier capacity.	
System Overload Recognition Period	The System Overload alarm activates if the load is above the threshold continuously for this time. It is normally set to several hours so that the alarm does not operate during a normal battery recharge.	
System Overload Type	<p>The System Overload alarm can be based on either <i>Total Capacity</i> or <i>Redundancy</i>.</p> <p>If the system overload type is based on <i>Total Capacity</i> then the alarm will trigger when the load is above the <i>System Overload Threshold</i> for the <i>System Overload Recognition Period</i>.</p> <p>If the system overload type is <i>Redundancy</i> then the alarm will trigger when the load is above the total current capacity of the system minus the current capacity of the largest rectifier, for the <i>System Overload Recognition Period</i>.</p> <p> <i>An alarm will always activate if the system overload type is set to Redundancy when there is only one rectifier installed.</i></p>	DCTools: Alarms > Alarm Configuration

**Batteries**

The following information is available about the batteries connected to the dc power system.

Parameter	Description	Where to find:
Battery Charge State	<ul style="list-style-type: none"> <li>• <b>Charge</b> - the battery current is above the <i>Battery State Threshold</i>.</li> <li>• <b>Discharge</b> - the battery current is below <math>-1 * \text{Battery State Threshold}</math>.</li> <li>• <b>Floating</b> - the battery current is between <math>\pm \text{Battery State Threshold}</math>.</li> <li>• <b>Unavailable</b> - the battery current is not available.</li> </ul> <p> <i>See SC100 or DCTools displays ??? or N/A on page <a href="#">57</a>.</i></p>	DCTools: Batteries
Battery Temperature	The temperature measured by the battery temperature sensor.	
Ah Discharged	<p>The current level of battery discharge.</p> <p> <i>See also Reset Battery State on page <a href="#">20</a>.</i></p>	

## Batteries Configuration

The following battery parameters must be configured.

Parameter	Description	Where to find:
Cells Per String	The number of 2V cells per battery string (for example: 24 in a 48V nominal system).	DCTools: Batteries
Battery Capacity	Set to the rated 10 hour capacity of the installed battery strings.	
Battery State Threshold	Used to determine the <i>Battery Charge State</i> . See <i>Battery Charge State</i> on page <a href="#">36</a> .	DCTools: Alarms > Alarm Configuration

## Battery Time Remaining

The SC100 obtains characterization data from periodic battery discharges, to a specified end voltage.

During a battery discharge, the SC100 uses this characterization data to calculate an estimated time until the battery will reach the specified end voltage.

- ☐ If a battery disconnect LVD is fitted then the end voltage will usually be the voltage at which the LVD disconnects the battery.
- ☐ Battery Time Remaining is designed for a constant power load. The accuracy of the time remaining calculation will be reduced if the dc power system is connected to a predominantly resistive (constant current) load.
- ☐ The time remaining calculation will not be correct if a non-essential load is disconnected during the battery discharge.

The following information is available about *Battery Time Remaining*.

Parameter	Description	Where to find:
Battery Time Remaining*	During a battery discharge, this is the estimated time until the battery voltage will be equal to the <i>End Voltage</i> , at the present battery current. <i>Time Remaining</i> will be re-calculated if the load current varies during discharge (for example, when a load disconnect LVD operates).	SC100: Menu > Controls > Batt Time Remaining DCTools: Batteries
Estimated State of Charge (SOC)*	The estimated charge left in the battery (Ah).	




- ☐ \*Values of *Battery Time Remaining* and *SOC* are only available during a discharge and if the battery has been characterized. The values will be N/A when the Battery Charge State is Floating or Charge, or if the battery has not been characterized. See *Battery Characterization* on page [37](#).

## Battery Characterization

*Battery Characterization* is a controlled battery discharge that provides data for the SC100 to estimate the *Battery Time Remaining* during any subsequent battery discharge. The data is displayed in the *Battery Characterization Table*.


**Information**


The following information is available about *Battery Characterization*.

Parameter	Description	Where to find:
State	<p><b>Locked Out:</b> A characterization cannot start. See <i>Lock Out Remaining</i> (below).</p> <p><b>Inoperative:</b> Battery characterization data is not loaded, <i>End Voltage</i> is below the characterization end point, or the bus voltage or battery current is unavailable.</p> <p><b>Inactive:</b> <i>Battery Charge State</i> is <i>Floating</i> or <i>Charge</i> .   See <i>Battery Charge State</i> on page <a href="#">36</a>.</p> <p><b>Active:</b> The battery is being characterized.</p>	
Maximum Remaining Time	<p>The maximum time to the end of the currently active <i>Battery Characterization</i>.</p> <p> <i>This value is not available for the initial characterization.</i></p>	DCTools: Control Process > Battery Characterization
Lockout Remaining	The time remaining until a <i>Battery Characterization</i> can be started (after the last ac power fail). Set by the <i>Lockout</i> period.	
Count Down	<p>The time to the start of the next scheduled <i>Battery Characterization</i>.</p> <p> <i>This value is N/A when a characterization is in progress or Battery Characterization is Disabled.</i></p>	
Offset Voltage	The adjustment to the bus voltage being applied due to the <i>Battery Characterization</i> . While a <i>Battery Characterization</i> is running, the rectifiers are turned down to force the battery to carry the load.	


**Initial Characterization**

Use the following procedure to characterize a battery for the first time.

-  *This will provide the most accurate characterization data. However, if the characterization data from a battery of the same size and type is available, then this can be added to the Battery Characterization Table manually. The following characterization is then not required.*



- It will take at least 10 hours to characterize a battery.
- During a *Battery Characterization* the bus voltage will gradually reduce to the battery end voltage. Ensure that this will not affect the operation of any equipment connected to the dc power system.

- 1 Check that all battery strings are connected and any LVD contactors are connected.
  -  *During a battery characterization, LVD contactor disconnection is inhibited. If any LVD contactor is configured to connect during a battery discharge then set it to Manual Connect to prevent operation during the battery characterization.*


- 2 Check that all battery strings are fully charged.
  - When a battery is fully charged, the Battery Charge State will be Float and Ah Discharged will be zero. See Batteries on page [36](#).
- 3 Check that all battery parameters are set to the correct values. See Batteries Configuration on page [37](#).
- 4 Check that the load current is at least 2% of the C10 capacity of the batteries (*Battery Capacity*) and 150% of the *Battery State Threshold*. See Batteries Configuration on page [37](#).
  - If the load current is less than 10% of the C10 capacity of the batteries, then Battery Characterization will take longer than 10 hours.
- 5 In DCTools go to: *Control Processes > Battery Characterization*. Set the following parameters:
 

Battery Characterization	
Enable:	Enabled
End Voltage:	Set to the voltage per cell when the battery is regarded as fully discharged.
	In general, use the same value as for the <i>LVD Disconnect Voltage</i> (see <i>LVD Configuration</i> on page <a href="#">29</a> ). <i>End Voltage</i> must be at least 0.02V/Cell above the <i>Minimum System Voltage</i> per cell.
	<input type="checkbox"/> The <i>Minimum System Voltage</i> is viewable in DCTools at <i>Control Processes &gt; Voltage Control</i> . It is not configurable.
- 1 Enable *Battery Current Limit* (see details on page [15](#)).
- 2 Click *Battery Characterize Start* to start a characterization. A *Characterizing Battery* alarm and an *In Discharge* alarm will be displayed. The *Maximum Remaining Time* field will show the approximate time to the end of the characterization (initially the value will be N/A).
  - If the "Battery Characterize Start" button is inactive in DCTools, then check all configuration settings. The hover text will indicate why the characterization cannot start.
  - The characterization process will take approximately 10 hours, depending on the load current and battery condition. During characterization the rectifier output voltage is varied to maintain a constant power discharge.
- 3 When the characterization has finished successfully:
  - the *Characterization* state will change to *Enabled (But Battery Not Charged)*
  - the *Battery Characterization Table* will show the characterization data (percentage capacity against cell voltage).
  - the rectifiers will return to float voltage and the battery will start to recharge. If required, start a manual Equalize (see details on page [18](#)) to reduce the battery recharge time.
  - If the characterization was not successful a *Battery Characterization Fail* or a *Battery Characterization Error* alarm will be active. See *Alarm Descriptions* on page [63](#).
- 4 Restore any changed LVD operation back to the original settings. If no longer required, disable *Battery Current Limit*.


During any subsequent battery discharge the SC100 will display an estimate of the *Battery Time Remaining* and the *State of Charge (SOC)*. See *Battery Time Remaining* on page [37](#).

## Scheduled Battery Characterization

Use the following procedure to schedule regular *Battery Characterization* discharges.

 Each *Battery Characterization* discharge will update the characterization data and ensure the *Battery Time Remaining* value is as accurate as possible.

- 1 Check that all battery parameters are set to the correct values. See *Batteries Configuration* on page [37](#).
- 2 Enable *Battery Current Limit* (see details on page [15](#)).
- 3 Check that the load current is at least 2% of the C10 capacity of the batteries (*Battery Capacity*) and 150% of the *Battery State Threshold*. See *Batteries Configuration* on page [37](#).
 


 If the load current is less than 10% of the C10 capacity of the batteries, then *Battery Characterization* will take longer than 10 hours.
- 4 In DCTools go to: *Control Processes > Battery Characterization*. Set the following parameters:

### Battery Characterization

Enable: Enabled

End Voltage: Set to the voltage per cell when the battery is regarded as fully discharged.

In general, use the same value as for the *LVD Disconnect Voltage* (see *LVD Configuration* on page [29](#)). *End Voltage* must be at least 0.02V/Cell above the *Minimum System Voltage* per cell.

 The *Minimum System Voltage* is viewable in DCTools at *Control Processes > Voltage Control*. It is not configurable.


Interval: Set to the required interval between scheduled characterizations (at least 90 days to avoid excessive battery cycling). Or, set to zero if only manual characterizations are required.

Lockout: Set to the period when a characterization will be inhibited, after an ac supply failure.

During any subsequent battery discharge the SC100 will display an estimate of the *Battery Time Remaining* and the *State of Charge* (SOC). See *Battery Time Remaining* on page [37](#).

## Input/Output (I/O)

The following section describes the I/O functions available with a single IOBGP I/O board.

 Additional *SiteSure-3G* input/output (I/O) modules or IOBGP I/O boards cannot be connected to the SC100.

## Analog System Values

The SC100 provides the following system analog values.

Parameter	Description	Where to find:
Bus Voltage	The system bus voltage from the bus voltage sensor. If the bus voltage sensor has failed, the system bus voltage is determined from the rectifier output voltages.	
Load Current	The total current drawn by all loads. The controller uses the sum of any current inputs mapped as load shunts. If no input is mapped and a battery current is available, the load current is calculated as <i>Rectifier Current - Battery Current</i> , otherwise it is unavailable.	
Battery Current	The total current flowing to/from the batteries. The controller uses the sum of any current inputs mapped as battery shunts. If no input is mapped and a load current is available, the battery current is calculated as <i>Rectifier Current - Load Current</i> , otherwise it is unavailable. If positive, the battery is being charged.	
Battery Temperature	The temperature measured by the battery temperature sensor.	SC100: Status Menu
Auxiliary Temperature	The temperature measured by the auxiliary temperature sensor (if connected).	DCTools: Analog Inputs
Rectifier Current	The total current output by all rectifiers. The controller uses the sum of any current inputs mapped as rectifier shunts. If there are no rectifier shunts but there are battery and load shunts, the rectifier current is calculated as <i>Battery Current + Load Current</i> . Otherwise the <i>Sum of Reported Rectifier Currents</i> is displayed.	
Load Power	The output power of the system.	
System Power	The output power of the system as a percentage of the total nominal power of the available rectifiers (does not include any shutdown rectifiers).	
AC Voltage	The average of the ac voltage measured by all rectifiers.	
Phase 1/2/3	The average of the ac voltage measured by the rectifiers allocated to each phase. See AC Phase Voltages on page <a href="#">27</a> .	
Sum of Reported Rectifier Currents	The sum of the output currents reported by all registered rectifiers.	DCTools: Analog Inputs

## System States

The SC100 monitors the following system states to provide an overview of the dc power system's operation.

Name	Description	Where to find:
ACD Fan Fail	Indicates the state of the ACD Fan Fail alarm input (only used in systems with ac distribution fans).	
MOV Fail	Indicates the state of the ac input surge protection device alarm (only used in systems with MOV surge protection).	DCTools: Digital Inputs
Load Fuse Fail	Indicates the state of the Load Fuse Fail alarm input.	
Battery Fuse Fail	Indicates the state of the Battery Fuse Fail alarm input.	


A value of *Unavailable* indicates that the System State is not configured for this dc power system.

## Digital Inputs

The input/output (I/O) board is fitted with a number of configurable digital inputs (DI) which can monitor external voltage-free relay contacts or switches. See Input/Output Board on page [2](#) for details.

### ► To configure a digital input

- 1 In DCTools go to *Digital Inputs*. Expand the *Digital Inputs* table.
- 2 Select a Digital Input.
- 3 Configure the following parameters to suit the application.

 To change a setting, double-click and select from drop down list or edit the text.

Parameter	Setting
Name	Type the name of the input.
Function	Set to <i>User Defined</i> .
Severity	Set to <i>Disabled</i> if no alarm indication is required when the Digital Input is active. Or, set to the required alarm priority.
Digital Output Mapping A	If required, select a relay that will be operated when the Digital Input is active.
Digital Output Mapping B	If required, select a second relay that will be operated when the DI is active.
Active State	Select the state of the input that will activate the Digital Input.
Group	Set to 0 unless using Groups in PowerManagerII. See PowerManagerII online help for details.

## Digital Outputs

The input/output (I/O) board is fitted with a number of digital outputs (relays) which can control external equipment or alarm systems. See Input/Output Board on page [2](#) for details. Digital outputs are operated by a mapping from a digital input (see details on page [42](#)) or a system alarm (see details on page [34](#)).

► **To test a digital output**

- In DCTools go to *Digital Outputs*:
  - Expand the *Digital Outputs* table.
  - In the *Test State* column select *Relay Active* or *Relay Inactive*.
  - The corresponding digital output will go to the selected state for the *Test Duration* period (default: 10s), or until another *Test State* is selected.
- Or, use the SC100 keypad to go to *Menu > Controls > Digital Output Test > Activate*.
  - Select the required Digital Output (1-6).
  - Press *Toggle* to change the state of the digital output.
  - The corresponding digital output will go to the selected state for the *Test Duration* period (default: 10s), or until *Toggle* is pressed again.

► **To set the state of a digital output**

- In DCTools or PowerManagerII (SiteManager) go to *Digital Outputs*:
  - Expand the *Digital Outputs* table.
  - In the *Remote Control State* column select *Active* or *Inactive*.
    - If Inactive is selected the digital output will still be activated by any digital input, analog input, or system alarm mapped to it.*
  - The corresponding digital output will go to the selected state until another *Remote Control State* is selected.

► **To configure a digital output**

- 1 In DCTools go to *Digital Outputs*. Expand the *Digital Outputs* table.
- 2 Select a Digital Output\*.
- 3 Configure the following parameters to suit the application.
  - To change a setting, double-click and select from drop down list or edit the text.*

Parameter	Setting
Test State	Set to <i>Test Disabled</i> .
Remote Control State	Set to <i>Inactive</i> .
Name	Type the name of the output.
Active State	Select the state of the output when the Digital Output is active*.
Group	Set to 0 unless using Groups in PowerManagerII. See PowerManagerII online help for details.

- \* Digital Output 6 is also used as the Monitor Fail alarm relay. It will de-energize if the I/O board loses power or loses communication with the SC100.

## Data Logging

The SC100 has the following data logging functions.

### Event Log

The SC100 maintains an Event Log in non-volatile memory. The Event Log records up to 100 system events (oldest events are over-written). See System Event Types on page 71 for a description of event log entries.

► **To view and save the Event Log**

- In DCTools go to: *Event Log*.
- Wait for the log entries to download from the SC100.
- If required, click *Save to File ...* to save the log to a file (type a file name, select a file type, and browse to a location to save the file).

► **To clear all entries from the Event Log**

- In DCTools go to: *Event Log*.
- Click *Clear Log*.

## PC Log

The PC Log allows a continuous streaming of system data (Bus Voltage, Load Current, Battery Current, Battery Temperature, Rectifier Current, Load Power, System Power) from the SC100 directly into a specified file.

► **To configure and activate the PC Log**

- 1 In DCTools go to *PC Log*.
- 2 At *File Name*, click on the button to type a file name, select a file type, and browse to a location to save the file.
- 3 Select the required interval between log entries (from 5s to 60 minutes).
- 4 Click on *Start* to begin the log.
- 5 Click on *Stop* to end the log.

## Backup and Restore

The configuration file settings in the SC100 can be saved to (Backup) or loaded from (Restore) a PC/laptop using DCTools.

Backup and Restore can be used to:

- Load a standard (master) configuration file into an SC100 for customization.
- Copy a customized configuration file from one SC100 to others (at similar sites).
- Save a copy of a customized configuration file. This is recommended in case the SC100 has to be replaced.

► **To use DCTools for Backup and Restore**

- 1 Connect to the SC100 with DCTools. See Communications Options on page [48](#).
- 2 In DCTools go to *File > ICE Backup/Restore* and follow the prompts.



*The saved file does not include site specific settings including Site Identity, IP Address, S3P Address, battery characterization data.*





## Overview

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PSTN Modem Communications	<a href="#">49</a>
GSM Modem Communications	<a href="#">51</a>
Serial Communications (RS232) Security	<a href="#">53</a>

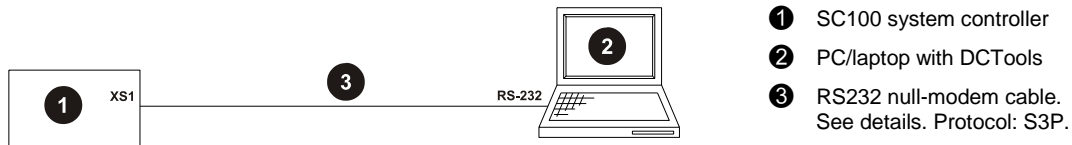
## Communications Options

The SC100 system controller has a standard RS232 serial interface (XS1) for communication with a local or remote PC or laptop. See the diagram on page 2 for location of the connector.

The standard communications options for an SC100 system controller are described in the following sections. For other communications options contact your Eaton dc product supplier or see Worldwide Support on page 75.

## Direct RS232 Communications

### Connections



### DCTools Communications Setup

#### ► To connect to the SC100 with DCTools:


- 1 Install *DCTools* on the PC/laptop.
- 2 Double-click the *DCTools* icon to open the *Connection Manager* window.
- 3 Go to *Connection > New* to open a new connection dialog box.
- 4 Enter:

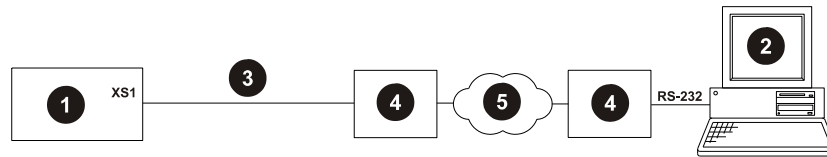
Connection Name: <as required>  
 Comms Enabled: True  
 Protocol: S3P  
 Connect Using: Select the RS232 COM port  
 S3P Address: 0

- 5 Press OK. *DCTools* will now connect to the SC100.
- 6 See System Operation on page 13 for details of the SC100 control and monitoring functions available via *DCTools*.  
 For help using *DCTools* press F1.
- 7 If required, access to the SC100 via *DCTools* can be password controlled. See Write Access Password on page 53.

## PSTN Modem Communications


### Connections

 The PC modem may be external to the PC (as shown) or internal.



- ❶ SC100 system controller
- ❷ PC/laptop with PowerManagerII and/or DCTools.
- ❸ RS232 modem cable (straight-thru). If access to XS1 is restricted use a DB9 ribbon cable extension (Farnell part number 869-6411).
- ❹ PSTN modem
- ❺ PSTN network.

### SC100 Setup

 Not all modems are suitable. If your modem does not operate correctly check the modem setup string. Contact your Eaton dc product supplier or Eaton for further assistance. See Worldwide Support on page [75](#).

#### ► To enable modem communications

- 1 Connect to the SC100 with *DCTools* (see details on page [9](#)).
- 2 Go to *Communications*.
- 3 Click on + to expand **Modem**. Configure the following settings:

Enable Modem:	Enabled
Modem Power Reset:	Optional. If this is enabled, then the SC100 will attempt to reset a non-operating modem by turning its power supply off and on using digital output 2.
Modem Set Up String:	The string sent to the modem on reset. The modem AT command should not be included as it is automatically sent. The Auto-Answer Rings parameter is also sent, so it does not need to be included here. For complete details of appropriate commands, consult your modem documentation.
Modem Auto Answer Rings:	Number of rings before an incoming call is answered. Setting this parameter to zero disables incoming calls (the modem can still be used for alarm reporting).

- 4 If the SC100 is to report alarms to PowerManagerII then click on + to expand **PowerManager Callback**. Configure the following settings:

Alarm Report:	Select the type of event(s) that will initiate the dial-out process.
Report Maximum Retries:	Set to the number of times the SC100 is to try to connect with a remote modem, if the first attempt fails. After this number of retries the SC100 will try the next number in the Dial Out Numbers table. <input type="checkbox"/> <i>Dialing will stop if none of the numbers in the Dial Out Number Table connect.</i>
Report Retry Interval:	Set to the required interval between retries.
Dial Out Number(s):	Type the telephone number(s) to be called. <input type="checkbox"/> <i>Consult the modem documentation for appropriate dial modifiers.</i>

### DCTools or PowerManagerII Communications Setup

► **To connect to the SC100 with DCTools or PowerManagerII:**

- 1 If not already installed, install the PC modem (hardware and software) according to the manufacturer's instructions.
- 2 Install *DCTools/PowerManagerII* on the PC/laptop.
- 3 Double-click the *DCTools/PowerManagerII* icon to open the *Connection Manager* window.
- 4 Go to *Connection > New* to open a new connection dialog box.
- 5 Enter:

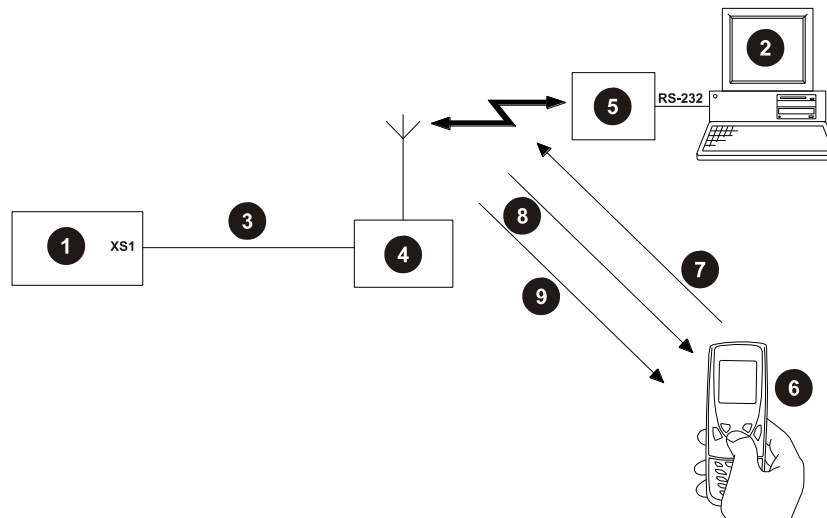
Connection Name:	<as required>
Comms Enabled:	True
Protocol:	S3P
Connect Using:	Select the COM port used by the modem (if external) or the modem name.
S3P Address:	0 (0 = Broadcast, 1-65279 = individual address)
Phone Number:	The number of the PSTN line used by the modem.
Modem Logon:	Clear if a logon script is not required for the modem. Select if a logon script is required. Click <i>Logon Script</i> to define. For more details, see <i>DCTools/PowerManagerII</i> online help (press F1).

- 6 Press OK. *DCTools/PowerManagerII* will now connect to the SC100.
- 7 See System Operation on page 13 for details of the SC100 control and monitoring functions available via *DCTools*.  
 For help using *DCTools* press F1.
- 8 If required, access to the SC100 via *DCTools* or *PowerManagerII* can be password controlled. See Write Access Password on page 53.

## GSM Modem Communications

### Connections

The PC modem may be external to the PC (as shown) or internal.



- |  |                                   |
|--|-----------------------------------|
| 1 SC100 system controller  | <b>Optional:</b>                  |
| 2 PC/laptop with PowerManagerII and/or DCTools.  | 6 SMS text capable GSM cell phone |
| 3 RS232 modem cable (straight-thru). If access to XS1 is restricted use a DB9 ribbon cable extension (Farnell part number 869-6411). | 7 SMS text message "P" or "p"     |
| 4 GSM modem  | 8 Power status text messages      |
| 5 Modem  | 9 Alarm text messages             |

### SC100 Setup

Not all modems are suitable. If your modem does not operate correctly check the modem setup string. Contact your Eaton dc product supplier or Eaton for further assistance. See Worldwide Support on page 75.

#### ► To enable modem communications

- 1 Connect to the SC100 with *DCTools* (see details on page 9).
- 2 Go to *Communications*.
- 3 Click on + to expand **Modem**. Configure the following settings:

Enable Modem:	Enabled
Modem Power Reset:	Optional. If this is enabled, then the SC100 will attempt to reset a non-operating modem by turning its power supply off and on using digital output 2.
Modem Set Up String:	The string sent to the modem on reset.

The modem AT command should not be included as it is automatically sent. The Auto-Answer Rings parameter is also sent, so it does not need to be included here. For complete details of appropriate commands, consult your modem documentation.

Modem Auto Answer Rings: Number of rings before an incoming call is answered. Setting this parameter to zero disables incoming calls (the modem can still be used for alarm reporting).

- 4 If the SC100 is to report alarms to PowerManagerII then click on + to expand **PowerManager Callback**. Configure the following settings:

- Alarm Report: Select the type of event(s) that will initiate the dial-out process.
- Report Maximum Retries: Set to the number of times the SC100 is to try to connect with a remote modem, if the first attempt fails. After this number of retries the SC100 will try the next number in the Dial Out Numbers table.  
 *Dialing will stop if none of the numbers in the Dial Out Number Table connect.*
- Report Retry Interval: Set to the required interval between retries.
- Dial Out Number(s): Type the telephone number(s) to be called.  
 *Consult the modem documentation for appropriate dial modifiers.*

### DCTools or PowerManagerII Communications Setup

► **To connect to the SC100 with DCTools or PowerManagerII:**

- 1 If not already installed, install the PC modem (hardware and software) according to the manufacturer's instructions.
- 2 Install *DCTools/PowerManagerII* on the PC/laptop.
- 3 Double-click the *DCTools/PowerManagerII* icon to open the *Connection Manager* window.
- 4 Go to *Connection > New* to open a new connection dialog box.
- 5 Enter:

- Connection Name: <as required>
- Comms Enabled: True
- Protocol: S3P
- Connect Using: Select the COM port used by the modem (if external) or the modem name.
- S3P Address: 0 (0 = Broadcast, 1-65279 = individual address)
- Phone Number: The number of the PSTN line used by the modem.
- Modem Logon: Clear if a logon script is not required for the modem. Select if a logon script is required. Click *Logon Script* to define. For more details, see *DCTools/PowerManagerII* online help (press F1).

- 6 Press OK. *DCTools/PowerManagerII* will now connect to the SC100.
- 7 See System Operation on page [13](#) for details of the SC100 control and monitoring functions available via *DCTools*.  
 For help using *DCTools* press F1.
- 8 If required, access to the SC100 via *DCTools* or *PowerManagerII* can be password controlled. See Write Access Password on page [53](#).

### SMS Text Messaging Setup (if required)

- For additional information see Application Note AN0112. To receive application notes see Worldwide Support on page [75](#).

#### ► To enable SMS alarm messages

- 1 Connect to the SC100 with *DCTools*.
- 2 Go to *Configuration > Communications*.
- 3 Click on  to expand **SMS**.
- 4 For each cellphone to receive SMS alarm messages set the *Phone Number* and other details as required.

#### ► To check the dc power system status using SMS

- 1 From any cellphone write a SMS (text) message starting with "P" or "p" (any following characters are ignored).
- 2 Send the message to the SC100 GSM modem telephone number.

The SC100 will reply with a dc power system status message. This will include: Number of active alarms, bus voltage, load current, ac voltage, battery current, battery temperature, battery time remaining (if available).

## Serial Communications (RS232) Security

### Write Access Password

The Write Access Password prevents unauthorized changes to the SC100 configuration (using *DCTools* or *PowerManagerII*).

- When a Write Access Password is set serial communications access to the SC100 (using *DCTools* or *PowerManagerII*) is read only. The password must be entered before any setting can be changed.
- If a Write Access Password is lost, clear it from the SC100 keypad and type a new password in *DCTools*.


#### ► To set a Write Access Password

- 1 Connect to the SC100 with *DCTools* (see details on page [48](#)).
- 2 Go to *Configuration > Communications*
- 3 Type a password into the *Write Access Password* field.  
 Passwords are case sensitive, maximum 32 characters.
- 4 Click the *Apply Changes* button.

► **To clear or change a Write Access Password**

- 1 Connect to the SC100 with DCTools (see details on page [48](#)).
- 2 Go to *Configuration > Communications*
- 3 Type a new password into the *Write Access Password* field or leave the field blank for no password control.
- 4 Click the *Apply Changes* button.
- 5 DCTools only: Type the old password.

► **To clear a Write Access Password from the SC100**

- 1 Use SC100 keypad to go to *Menu > Configuration > Controller > Edit > Serial Port Access*.
  - 2 Select *Clear*.
-  *The password is now permanently cleared. If required, reset the password with DCTools.*

## Overview



- The dc power system contains hazardous voltages and hazardous energy levels. Before undertaking any maintenance task refer to the Warnings in the dc power system installation guide.
- If a maintenance task must be performed on a "live" system then take all necessary precautions to avoid short-circuits or disconnection of the load equipment, and follow any "live-working" instructions applicable to the site.
- Only perform the maintenance tasks described in the Maintenance chapter. All other tasks are classified as Servicing. Servicing must only be performed according to specific instructions and only by personnel authorized by Eaton. This includes disassembly and/or servicing of any modules.
- For further information on Servicing contact your local Eaton dc product supplier, or refer to the contact details on page [75](#).

<b>Topic</b>	<b>Page</b>
Troubleshooting	<a href="#">56</a>
Replacing the System Controller or I/O Board	<a href="#">59</a>

## Troubleshooting

Use the table to troubleshoot minor installation and operational problems. For additional assistance see contact details on page [75](#). Return items for replacement or repair with a completed Equipment Incident Report on page [73](#).

Problem	Possible Cause	Required Action
SC100 displays a dc power system alarm message.		See Alarm Descriptions on page <a href="#">63</a> .
SC100 LCD is blank and green Power On LED is off.	RXP/power cable is disconnected from the SC100.	Connect cable from connector YS11 to the dc power system voltage feed module (see Connections on page <a href="#">4</a> ). Wait for start-up to complete.
	The ac supply is off and the batteries are not connected because the Low Voltage Disconnect (LVD) has disconnected.	None. The power system including the SC100 will return to normal operation when the ac supply is within its specified voltage range.
	Faulty Voltage Feed Module (VFM) or faulty SC100.	Replace faulty unit.
SC100 LCD is blank and green Power On LED is on.	SC100 is in start-up mode	Wait for start-up to complete. See Starting the SC100 on page <a href="#">6</a> .
	Faulty SC100	Replace faulty SC100.
SC100 Red LED or Yellow LED is on.	An alarm is active.	Check the type of alarm on the LCD or with <i>DCTools</i> or <i>PowerManagerII</i> . See Alarm Descriptions on page <a href="#">63</a> .
Unable to change settings from SC100 keypad.	A previous setting change is still being updated.	Wait a short time, and then try again.
	Keypad access is set to <i>Protected</i> .	See Keypad Access Security on page <a href="#">8</a> .
Rectifier does not shutdown when LBRS is enabled.	Load Based Rectifier Shutdown is not available with APR48-3G, EPR48-3G, APR24-3G and CR48-3G rectifiers.	See Load Based Rectifier Shutdown on page <a href="#">24</a> .
Monitor OK relay (RLY6) is de-energized.	An active alarm, digital input or analog input is mapped to this relay.	Check relay mapping. See Digital Outputs on page <a href="#">42</a> .
	Problem with power or communications to I/O board.	Check all connections (see Connections on page <a href="#">4</a> ).
	SC100 or I/O board software corrupt or hardware fault.	Replace faulty unit.
Incorrect battery or load current readings.	Bus voltage sense polarity is incorrect.	Check the bus voltage sense polarity and correct if necessary.
	Incorrectly configured shunt inputs.	Check shunt mapping and gain is correct.
	Current is within the <i>Battery State Threshold</i> . See details on page <a href="#">37</a> .	None, normal operation.

Problem	Possible Cause	Required Action
SC100 or DCTools displays ??? or N/A	Failed, disconnected or unconfigured sensor.	Replace, connect or configure sensor.
	Faulty or disconnected voltage feed module.	Replace or connect voltage feed module.
SC100 displays <b>Config Error</b>	Missing or invalid configuration file.	Either: Load a valid configuration file into the SC100. See Backup and Restore on page <a href="#">44</a> , or Change one or more configuration settings using the SC100 keypad or DCTools.
	Incorrect rectifier voltage, because installed rectifiers have different output voltages.	Check that all rectifiers are of the same type and replace as necessary.
DCTools connection problem ( <i>Target Failed to Respond</i> error)	Connection problem	Refer to following communications problems.
Modem/RS232 communications problem.	Incorrect, disconnected or faulty cable.	Check an RS232 straight-thru cable is plugged into XS1 and the modem. Replace faulty cable.
	Access to RS232 connector XS1 is restricted.	Use a DB9 ribbon cable extension (Farnell part number 869-6411).
	Incorrect communications settings.	See PSTN Modem Communications on page <a href="#">49</a> or GSM Modem Communications on page <a href="#">51</a> .
	Incorrect modem setup string.	Refer to the AT command section in the modem's manual.
	Modem not powered or other modem problem.	Refer to the modem's manual.
	Incompatible modem.	Contact your Eaton dc product supplier or Eaton for advice. See Worldwide Support on page <a href="#">75</a> .
	Password required to change settings.	See Write Access Password on page <a href="#">53</a> .
I/O board Power/Comms OK LED is off	I/O board is not powered or faulty.	Check connection to YH3 on I/O board. See Connections on page <a href="#">4</a> . Replace I/O board if faulty.
I/O board Power/Comms OK LED is flashing.	I/O board is responding to an <i>Identify</i> command from the SC100.	None, this is normal operation. See details.
LVD Status LED(s) (on I/O board) are on.	LVD contactor is energized.	None, this is normal operation.
LVD Status LED(s) are off (I/O board Power On LED is on).	LVD contactor is de-energized.	None, this is normal operation.

Problem	Possible Cause	Required Action
LVD Status LED(s) flashing.	The contactor is in the wrong state (SC100 internal state does not match signal from contactor auxiliary switch).	Check the electrical and mechanical operation of the contactor and auxiliary switch. Check all wiring and connectors. See Connections on page <a href="#">4</a> .
	LVD Type setting is incorrect.	Check LVD Type setting.
LVD contactor(s) not operating.	LVD settings incorrect.	Use <i>DCTools</i> to check LVD is enabled and set to correct values. Check that the LVD manual control is set to AUTO. See details on page <a href="#">29</a> .
	LVD contactor is disconnected.	Check that the LVD control and dc power cables are connected. See details on page <a href="#">4</a> .
System has no dc output (rectifiers are on).	Load fuse or circuit breaker open.	Check for open fuse or circuit breaker.
	LVD contactor has disconnected the load.	Use <i>DCTools</i> to check LVD is enabled and set to correct values. (LVD status LED on the I/O board is on when contactor is energized.) Check that the I/O board is connected (Power LED is on). Check that the LVD control and power cables connections on page <a href="#">4</a> . Check the connections from the load bus to the LVD.
System has no battery input	Battery circuit breaker or fuse open.	Check for open battery circuit breaker or fuse.
	LVD has disconnected the battery because ac supply is off and the battery is fully discharged.	None. The battery will be automatically reconnected when the ac supply is restored.
	LVD contactor is open.	Use <i>DCTools</i> to check LVD is enabled and set to correct values. (LVD status LED on the I/O board is on when contactor is energized.) Check that the I/O board is connected (Power LED is on). Check that the LVD control and power cables are connected. See Connections on page <a href="#">4</a> . Check the connections from the battery bus to the LVD.

## ***Replacing the System Controller or I/O Board***

The SC100 system controller or the I/O board can be replaced without switching off the dc power system and disconnecting the equipment it powers.

The specific procedures depend on the system configuration. Refer to the dc power system Installation and Operation Guide.



## SC100 system controller

### Communications


RS232	Interface: Connector:	RS232 (DTE) DB9M
External modem options	Type: Operation:	PSTN or GSM Dial in/Dial out on alarm

## IOBGP-00, -01 I/O Board

The following specifications apply to a single IOBGP-00, -01 I/O board connected to the SC100 system controller.

### Digital Outputs/Alarm Relays (IOBGP)

Number of Digital Outputs/Relays	6*
Contact Arrangement	One changeover contact per relay
Contact Rating	0.1A @ 60V dc maximum
Connectors	Screwless terminal blocks
Wire Size	0.5 - 2.0mm <sup>2</sup> [20 - 14 AWG]
Isolation	Relay connections are isolated to 500V dc from all other circuitry, earth and system common.

 \* Digital Output 6 is also used as the Monitor Fail alarm relay. It will de-energize if the I/O board loses power or loses communication with the SC100.

### Digital Inputs (IOBGP)

Number of Digital Inputs	6
Connectors	Screwless terminal blocks
Wire Size	0.5 - 2.0mm <sup>2</sup> [20 - 14 AWG]
Input Types	Voltage-free switch or relay contacts only
Input Range	Live Bus to Live Bus + 5V
Input Common	Same bus as used for current shunts (Live bus is standard)
Input Protection	Protected against damage from short circuit to live or common bus

**Temperature Sense Inputs (IOBGP)**

Number of Temperature Sense Inputs	2 <i>One only connected as standard. Second input available (requires additional temperature sensor).</i>
Range	2.53V to 3.43V (-20 to +70°C [-4 to +158°F])
Resolution	< 0.01V (< 1°C [1.8°F])
Accuracy	±1°C [1.8°F] at 25°C [77°F], ±2°C [3.6°F] over rated temperature range
Maximum Cable Length	20m (65 feet)
Connector	RJ45

**Current Sense Inputs (IOBGP)**

Number of Current Sense Inputs	3
Range	-50 to +50mV
Resolution	<50µV
Accuracy	±0.5% at 25°C [77°F], ±1% over rated temperature range
Connector	RJ45

**Bus Voltage Sense Input (IOBGP)**

Number of Bus Voltage Sense Inputs	1
Range	-60V to +60V
Resolution	30mV
Accuracy	±0.5% at 25°C [77°F], ±1% over rated temperature range
Connector	MTA156 (2-way)

**Low Voltage Disconnect (IOBGP)**

Number of contactor connections	2
Number of LVD channels	2
Contactor Type	Normally Open (NO) or Normally Closed (NC)*, with or without auxiliary contacts. * For NC contactor operation the SC100 and IOBGP must be powered from the battery side of the LVD.
Contactor Coil Voltage (nominal)	With auxiliary contacts: 12V, 24V or 48V Without auxiliary contacts: Equal to nominal system voltage
Maximum Hold-in Current	1.2A (per contactor)
Connector	MTA156 (4-way)

# Alarm Descriptions

<b>AC Fail</b>	All rectifiers report ac supply failure or a digital input with <i>Function</i> set to "AC Fail" is active.
<b>AC High</b>	The <i>AC Voltage</i> is above the <i>AC High Threshold</i> . See System Alarms on page <a href="#">31</a> .
<b>AC Low</b>	The <i>AC Voltage</i> is below the <i>AC Low Threshold</i> . See System Alarms on page <a href="#">31</a> .
<b>AC Phase Rectifier Missing</b>	A rectifier assigned to an ac phase (see details on page <a href="#">27</a> ) is not registered.
<b>ACD Fan Fail</b>	The ac distribution cooling system or fan controller has failed (indicated by an active digital input with <i>Function</i> set to "ACD Fan Fail").
<b>All Rectifiers Shut Down</b>	All rectifiers have been shutdown by the SC100.
<b>Aux. Temp Sensor Fail</b>	The Auxiliary Temperature sensing system is faulty, or the I/O board mapping is incorrect.
<b>Aux. Temperature High</b>	The Auxiliary Temperature sensor is at a temperature above the Auxiliary Temperature High Threshold.
<b>Aux. Temperature Low</b>	The Auxiliary Temperature sensor is at a temperature below the Auxiliary Temperature Low Threshold.
<b>Battery Characterization Error</b>	The percentage deviation between the calculated values and the configured values of battery characterization is more than 20%. See Battery Characterization on page <a href="#">37</a> .
<b>Battery Characterization Fail</b>	The Battery Characterization process has stopped because either: <ul style="list-style-type: none"> <li>• the battery current is unstable, or</li> <li>• the Battery Fuse Fail alarm is active, or</li> <li>• more than one rectifier has failed, or</li> <li>• the bus voltage or the battery current cannot be measured.</li> </ul> See Battery Characterization on page <a href="#">37</a> .
<b>Battery Charge Over-current</b>	The battery charge current is above (Battery Charge Over Current Threshold * Battery capacity) or 2A, which ever is greater.
<b>Battery Current Limit</b>	Battery Current Limit (BCL) is active. See Battery Current Limit on page <a href="#">15</a> .
<b>Battery Fuse Fail</b>	A battery fuse has blown or a battery circuit breaker has operated (indicated by an active digital input with <i>Function</i> "Battery Fuse Fail").  <div style="border: 1px solid black; padding: 2px; display: inline-block;"> <span style="font-size: 0.8em;">***</span> <i>LBRS is automatically suspended if the Battery Fuse Fail alarm is active.</i> </div>
<b>Battery Temperature High</b>	The analog input with <i>Function</i> set to "Battery Temperature" has a value above the <i>Battery Temperature High Threshold</i> .  This alarm indicates either thermal runaway of the batteries or that the batteries are operating at a temperature that may cause reduced battery life.
<b>Battery Temperature Low</b>	The analog input with <i>Function</i> set to "Battery Temperature" has a value below the <i>Battery Temperature Low Threshold</i> .  This alarm indicates a risk to the standby power system battery as lower temperatures reduce the battery capacity.
<b>Battery Test</b>	The Battery Test control process is active. See Battery Test on page <a href="#">16</a> .
<b>Battery Test Fail</b>	The batteries do not have the required capacity or are not fully charged. See Battery Test on page <a href="#">16</a> .

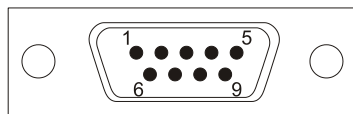
<b>Bus Voltage Sensor Fail</b>	The system bus voltage (as measured by the bus voltage sensor) is more than from 2.0V away from the corrected average rectifier output voltage. If the bus voltage sensor has failed, the system bus voltage is determined from the rectifier output voltages.
<b>Characterizing Battery</b>	The Battery Characterization control process is active. See Battery Characterization on page <a href="#">37</a> .
<b>Config Error</b>	Configuration file is missing or invalid, installed rectifiers have different nominal output voltages, or the number of cells in a battery string entered in the configuration file does not match the nominal rectifier output voltage. See Troubleshooting on page <a href="#">56</a> for more information.
<b>Current Sensor Fail</b>	The signal from a mapped current sensor is out of range.
<b>Equalize</b>	The Equalize control process is active. See Equalize on page <a href="#">18</a> .
<b>Fast Charge</b>	The Fast Charge control process is active. See Fast Charge on page <a href="#">19</a> .
<b>High Float</b>	The bus voltage is above its normal range (set by the <i>High Float Threshold</i> ).
<b>High Load</b>	The bus voltage is higher than the safe range for the load and/or battery (set by the <i>High Load Threshold</i> ).
<b>In Discharge</b>	The batteries are discharging (indicated by negative battery current).
<b>Load Fuse Fail</b>	A load fuse has blown or a load circuit breaker has operated (indicated by an active digital input with <i>Function</i> "Load Fuse Fail").
<b>Low Float</b>	The bus voltage is below its normal range (set by the <i>Low Float Threshold</i> ).
<b>Low Load</b>	The bus voltage is lower than the safe range for the load and/or battery (set by the <i>Low Load Threshold</i> ).
<b>LVD Characterization Error</b>	An LVD contactor must be characterized. See Low Voltage Disconnect on page <a href="#">29</a> .
<b>LVD Disconnected</b>	An LVD contactor has disconnected the battery or load. See Low Voltage Disconnect on page <a href="#">29</a> .
<b>LVD Fail</b>	An LVD contactor is faulty or the control cable from the I/O board is disconnected. See Low Voltage Disconnect on page <a href="#">29</a> .
<b>LVD Manual</b>	An LVD is set to MANUAL CONNECT or MANUAL DISCONNECT. See Low Voltage Disconnect on page <a href="#">29</a> .
<b>Missing Hardware</b>	The SC100 has lost communication with the I/O board.
<b>Monitor Fail</b>	The SC100 has an internal fault.
<b>MOV Fail</b>	One or more MOV cartridges have failed and must be replaced (indicated by an active digital input with <i>Function</i> set to "MOV Fail").
<b>Multiple Rectifier Comms Lost</b>	More than one rectifier has lost communications. See also Rectifier Comms Lost on page <a href="#">64</a> .
<b>Multiple Rectifier Fail</b>	Multiple rectifiers are faulty or their ac supply has failed without causing partial or total ac supply failure.
<b>Partial AC Fail</b>	A digital input with <i>Function</i> set to "Phase Fail" is active, or more than 20% of single-phase rectifiers are reporting ac supply failure, or all 3-phase rectifiers are reporting loss of the same phase.
<b>Rectifier Comms Lost</b>	Normally this alarm indicates that a rectifier has been removed during routine maintenance. However, faulty rectifier communications or losing the rectifier communications bus can also trigger this alarm. If removing multiple rectifiers triggers this alarm, reset it from the keypad before it triggers an external alarm.

<b>Rectifier Current Limit</b>	Rectifier(s) in current limit.
<b>Rectifier Fail</b>	A rectifier is faulty or its ac supply has failed without causing partial or total ac supply failure.
<b>Rectifier No Load</b>	The total rectifier current is less than 2% of the maximum system output current or is less than 2A.
<b>Rectifier Over Temperature</b>	Rectifier(s) operating in temperature turndown mode, because of high ambient temperature or low ac supply voltage.
<b>Sensor Fail</b>	The current, temperature or voltage sensing system is faulty, or the I/O board mapping is incorrect.
<b>Standby Mode</b>	The SC100 is on but inactive. Another system controller controls the dc power system. If the other system controller fails or is disconnected then the SC100 in Standby Mode will become active (after a short delay).
<b>System Overload</b>	The power system is operating close to its maximum capacity and more rectifiers are needed. The System Overload threshold is configurable. See System Overload Alarm on page <a href="#">35</a> .
<b>Temperature Sensor Fail</b>	The temperature sensing system is faulty, or the I/O board mapping is incorrect.
<b>Unknown Hardware</b>	The SC100 has detected an unknown type of device on the RXP bus. Contact your Eaton DC product supplier for advice.

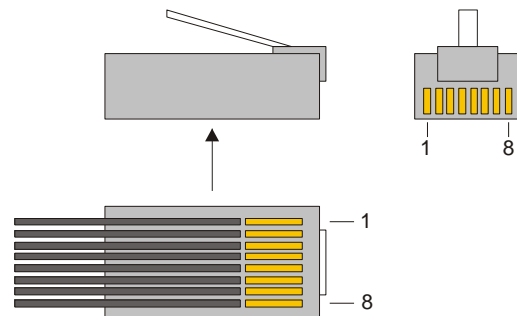


## System Controller Connector Pin-outs

Connector	Type	Purpose	Pin	Description
XS1	DB9M	RS232 Serial Interface	1	-
			2	RD (Receive Data)
			3	TD (Transmit Data)
			4	DTR (Data Terminal Ready)
			5	Common (Ground)
			6	-
			7	RTS (Request to Send)
			8	-
			9	-
YS11	RJ45	RXP System Communications	1	+24/48V (System bus voltage)
			2	+24/48V (System bus voltage)
			3	-
			4	RS485-A
			5	RS485-B
			6	-
			7	0V
			8	0V



RS232 D9M and RJ45 connector pin-outs



RJ45 plug pin-outs


## I/O Board (IOBGP-00, -01) Connector Pin-outs

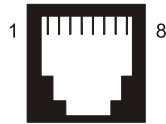
See input and output specifications on page [61](#).

Connector	Type	Purpose	Pin	Description
XH4	MTA 156	LVD 1 Interface	1	Coil -
			2	Coil +
			3	LVD 1 auxiliary switch
			4	Auxiliary switch common
XH5	MTA 156	LVD 2 Interface	1	Coil -
			2	Coil +
			3	LVD 2 auxiliary switch
			4	Auxiliary switch common
XH6	RJ45	Current Sense Inputs	1	Current Input 1 Common
			2	Current Input 1
			3	+12V out
			4	Current Input 2 Common
			5	Current Input 2
			6	0V out
			7	Current Input 3 Common
			8	Current Input 3
XH7	RJ45	Temperature Sense Inputs	1	-
			2	-
			3	-
			4	Temp Sense 1+
			5	Temp Sense 1-
			6	-
			7	Temp Sense 2+
			8	Temp Sense 2-
XH8	MTA 156	LVD Power	1	Bus live
			2	Common
XH9	MTA 156	Bus Voltage Sense Input	1	Controller reference (Live)
			2	Controller sense (Com)
XH12A	MTA 156	Not used with SC100	1	
			2	
			3	
			4	
XH15A		Digital inputs D1-D3	1	D1 input
			2	0V

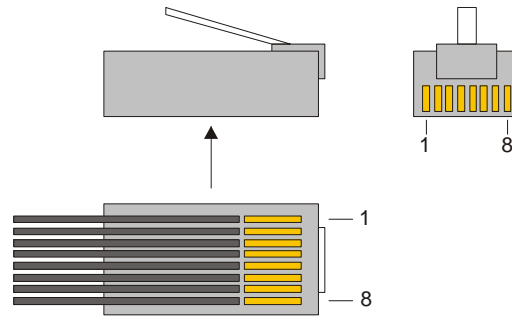
Connector	Type	Purpose	Pin	Description
			3	D2 input
			4	0V
			5	D3 input
			6	0V
XH15B		Digital inputs D4-D6	1	D4 input
			2	0V
			3	D5 input
			4	0V
			5	D6 input
			6	0V
XH16/XH17		Digital relay outputs 1-2	1	Relay 1 normally closed (NC)
			2	Relay 1 normally open (NO)
			3	Relay 1 Common (COM)
			4	Relay 2 normally closed (NC)
			5	Relay 2 normally open (NO)
			6	Relay 2 Common (COM)
XH18/XH19		Digital relay outputs 3-4	1	Relay 3 normally closed (NC)
			2	Relay 3 normally open (NO)
			3	Relay 3 Common (COM)
			4	Relay 4 normally closed (NC)
			5	Relay 4 normally open (NO)
			6	Relay 4 Common (COM)
XH20/XH21		Digital relay outputs 5-6*	1	Relay 5 normally closed (NC)
			2	Relay 5 normally open (NO)
			3	Relay 5 Common (COM)
			4	Relay 6 normally closed (NC)
			5	Relay 6 normally open (NO)
			6	Relay 6 Common (COM)
YH3	RJ45	DC power system digital inputs	1	Load Fuse Fail
			2	Battery Fuse Fail
			3	+12V out
			4	AC Distribution Fan Fail
			5	AC Distribution MOV Fail
			6	0V out (system live - protected)
			7	-
			8	System common - protected

Connector	Type	Purpose	Pin	Description
YH11	RJ45	RXP System Communications	1	+24/48V (System bus voltage)
			2	+24/48V (System bus voltage)
			3	-
			4	RS485-A
			5	RS485-B
			6	-
			7	0V
			8	0V

 \* Digital Output 6 is also used as the Monitor Fail alarm relay. It will de-energize if the I/O board loses power or loses communication with the SC100.



**RJ45 connector pin-outs**



**RJ45 plug pin-outs**

# System Event Types

Event Type	Description	Additional Event Information
AI High Activation	An analog input high threshold alarm has become active.	Analog input number.
AI High Deactivation	An analog input high threshold alarm has become inactive.	Analog input number.
AI Low Activation	An analog input low threshold alarm has become active.	Analog input number.
AI Low Deactivation	An analog input low threshold alarm has become inactive.	Analog input number.
Alarm Activation	An alarm has become active.	Alarm number.
Alarm Deactivation	An alarm has become inactive.	Alarm number.
Configuration Change	The configuration database was changed.	
DI Activation	A digital input alarm has become active.	Digital input number.
DI Deactivation	A digital input alarm has become inactive.	Digital input number.
DO Control Activation	A digital output has been manually activated.	Digital output number.
DO Control Deactivation	A digital output has been manually deactivated.	Digital output number.
Logs Cleared	The event and data logs have been cleared.	
Rectifier Restart	A rectifier was started manually. This excludes events where a rectifier starts due to Load-Based Rectifier Shutdown or after the removal of a fault condition.	
Rectifier Shutdown	A rectifier was shut down manually. This excludes events where a rectifier shuts down due to Load-Based Rectifier Shutdown or a fault condition.	
Start Up	Records when the controller started running.	





Powering Business Worldwide

# EQUIPMENT INCIDENT REPORT

Please enter as much information as you can. Send the completed form, together with the item for repair to your nearest authorized service agent. NOTE: Only one fault to be recorded per form.

For further information contact your local Eaton dc product supplier or Eaton (see contact details on page 75). Or email: CustomerServiceNZ@eaton.com

Date: \_\_\_\_\_

### Customer Information

Company: \_\_\_\_\_

Postal Address: \_\_\_\_\_

Return Address: \_\_\_\_\_  
(Not PO Box)

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_ Email: \_\_\_\_\_

Contact Name: \_\_\_\_\_

### Location of Failure

Product code: \_\_\_\_\_ Serial number: \_\_\_\_\_ Document number: \_\_\_\_\_

System type installed in: \_\_\_\_\_ Serial number: \_\_\_\_\_

Site name or location: \_\_\_\_\_

### Fault discovered

Delivery

Initial test

Unpacking

Operation after \_\_\_\_ years

Installation

Other \_\_\_\_\_

### Failure source

Design

Transportation

Manufacturing

Installation

Documentation

Handling

### Effect on system operation

None

Minor

Major

\_\_\_\_\_

### INFORMATION (fault details, circumstances, consequences, actions)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Internal use only.

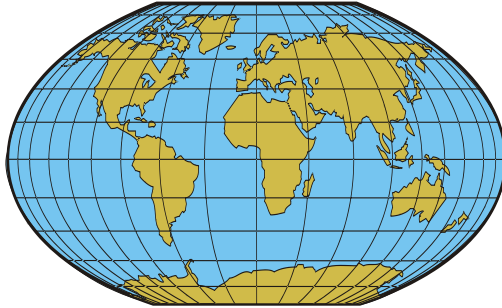
Reference No: \_\_\_\_\_ RMA: \_\_\_\_\_ NCR: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_



For product information and a complete listing of worldwide sales offices, visit Eaton's website at: [dcpower.eaton.com](http://dcpower.eaton.com) or email: [DCinfo@eaton.com](mailto:DCinfo@eaton.com)

For technical support contact either your local Eaton dc product representative, the closest office from the following list, telephone (+64) 3 343-7448, or email

[CustomerServiceNZ@eaton.com](mailto:CustomerServiceNZ@eaton.com)



<b>Australia:</b>	1300 877 359
<b>Canada:</b>	1-800-461-9166
<b>Central America:</b>	+52 55 9000 5252
<b>China:</b>	+86-571-8848-0166 +86-571-8848-0366
<b>Europe / Middle East / Africa:</b>	+44-1243-810-500
<b>Hong Kong / Korea / Japan:</b>	+852-2745-6682
<b>India:</b>	+91-11-4223-2325
<b>New Zealand</b>	0800 DC Power (0800 327-693)
<b>Singapore / South East Asia:</b>	+65 6825 1668
<b>South America:</b>	+54-11-4124-4000
<b>South Pacific:</b>	+64-3-343-7448
<b>Taiwan:</b>	+886-2-6600-6688 or free call 0800-038-168
<b>United States of America (Toll Free):</b>	1-800-843-9433 - option 2 - option 6



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