

SM65 Supervisory Module Handbook

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Scope

This guide covers the configuration, operation and replacement of SM65 supervisory modules installed in an Eaton DC power system.

- ☐ *Some features require SM65 v4 or later software. To check software version refer to Viewing Software Version on page [13](#).*

This guide does not cover the following:

- Initial installation of an SM65 supervisory module, except the installation of external alarm and digital inputs cabling.
- Installation and configuration of other Eaton products. For details, refer to the relevant guide listed under Related Information on page [ii](#).
- Detailed instructions for setting up *DCTools/PowerManagerII*, except for the *DCTools/PowerManagerII* communications settings on page [33](#).
- Detailed instructions for setting up user alarms and configuring individual parameters in the SM65. There are brief explanations of SM65 alarms on page [49](#) and control functions on page [51](#).
- Supervisory module upgrades such as from SM60 to SM65 and SM50 to SM65. These are covered in application notes AN0054 and AN0055 respectively. To receive these application notes refer to Worldwide Support on page [65](#).

Audience

This guide is intended for use by:

- DC power system 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
- DC power system 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
- SiteSure Installation and Configuration Guide – IPN 997-00012-19
- CellSure Installation Guide – IPN 997-00012-20
- Network Power Solutions Installation Guide - IPN 997-00012-33
- Data-Voice-Video Power Solutions Installation Guide – IPN 997-00012-42

Reporting Problems with this Guide

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

Eaton DC Product Marketing Communications

EMAIL: DCMarketingNZ@eaton.com

For Further Information and Technical Assistance

For further information and technical assistance see Worldwide Support on page [65](#).

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Overview

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SM65 Supervisory Module

The SM65 supervisory module is an advanced control and monitoring solution for Eaton DC power systems with up to 126 Network Power Rectifiers (NPR type) or 24 Access Power Rectifiers (APR/APU type). It provides a full suite of advanced communications options, including built-in Ethernet interface, Web server and SNMP agent.

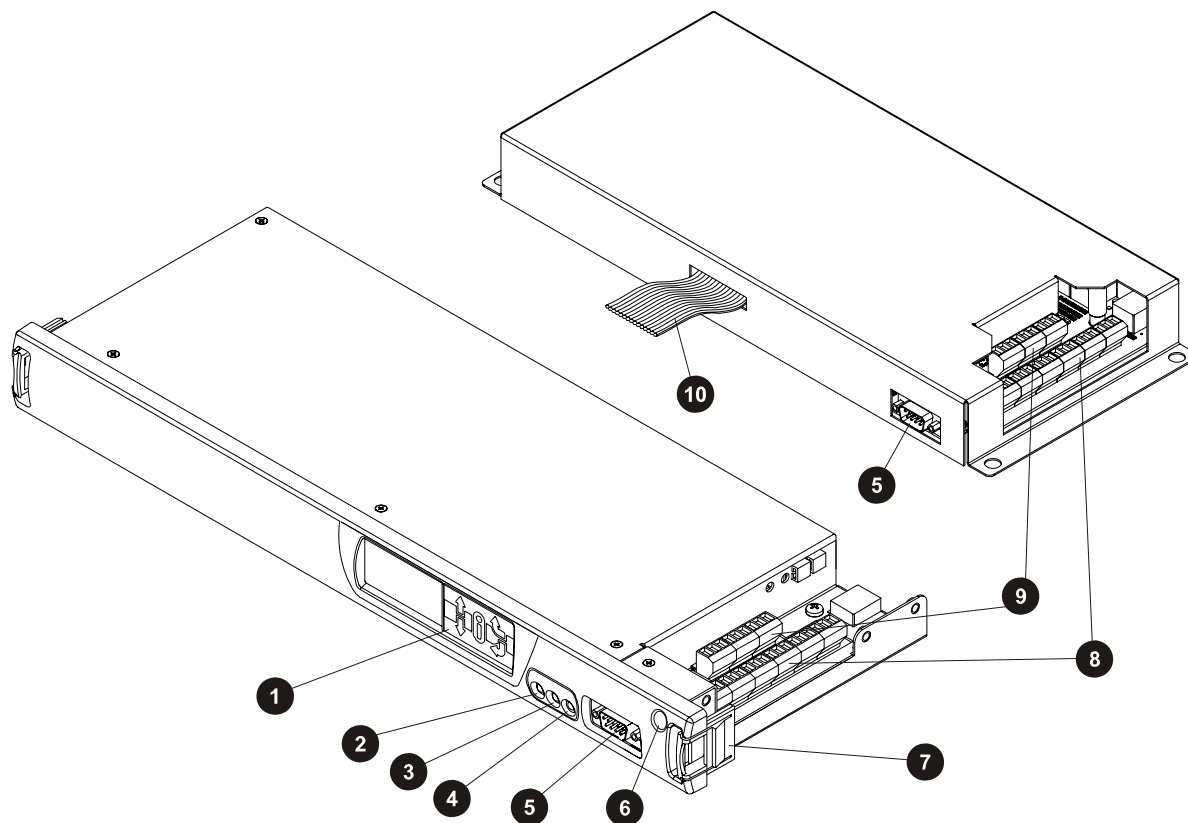
The SM65 is available either as a 1U high, 19-inch rack mount module with integrated keypad and LCD display, or as a panel mount module with separate keypad and LCD display.

The SM65 is fully configurable with all system operating parameters stored in a configuration file. Only minimal on-site configuration file changes are required, before an SM65-based power system is ready for operation. Configuration file changes can be made with the keypad, with a PC connected to the RS232 serial interface, or remotely from a PC with the DCTools or PowerManagerII software.

The SM65 has an onboard audible indicator and two alarm LEDs. Alarms may be mapped to the user-configurable alarm relays to activate an external fault indication monitoring system. Alternatively, the SM65 can communicate alarms and status information remotely by SNMP traps, using the DCTools or PowerManagerII software. Refer to Communications Options on page 30 for further information.

The SM65 also supports the optional add-on SiteSure input/output expansion modules (see details on page 27) and CellSure battery management modules (see details on page 24).

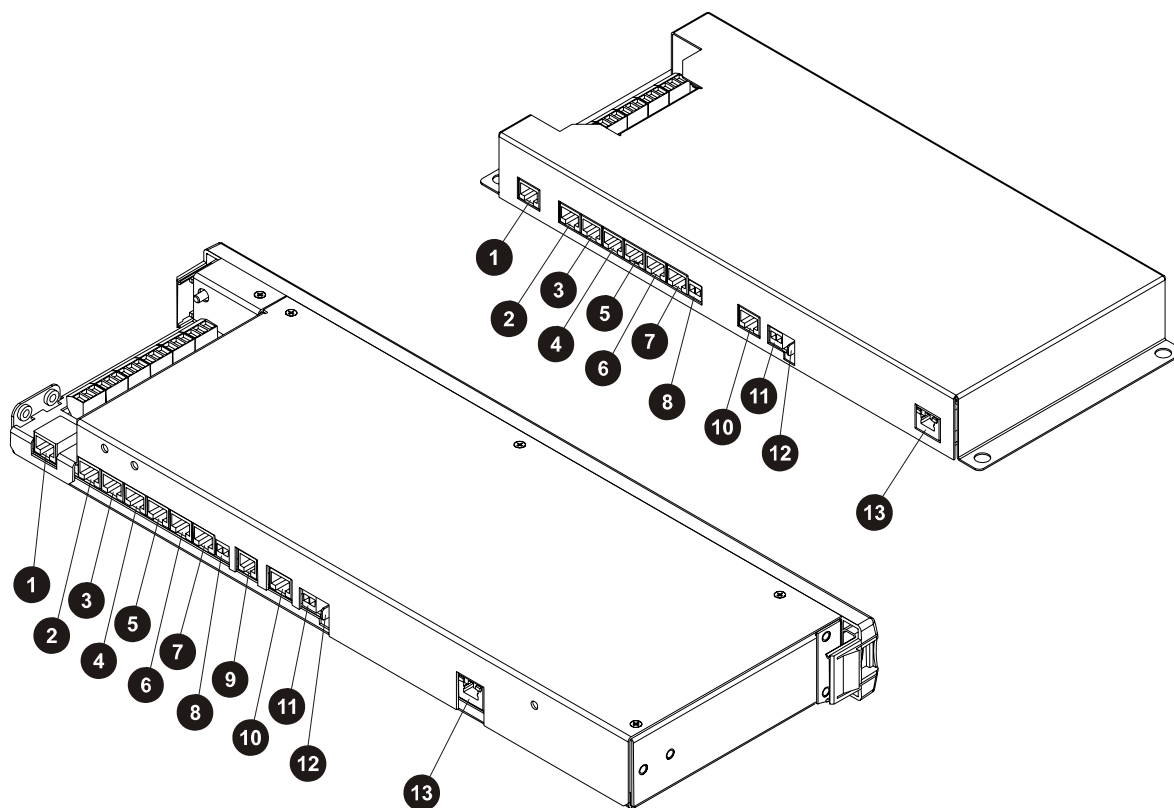
Panel Mount Version




Rack Mount Version

- ① Display and keypad. Further details on page [8](#).
- ② Power On LED (green)
- ③ Non-urgent Alarm LED (yellow)
- ④ Urgent/Critical Alarm LED (red)
- ⑤ Front RS232 Serial Interface (XS1)
- ⑥ Locking Screw
- ⑦ Latch (for use with slider magazine option only)
- ⑧ User-configurable Alarm Relay (RLY1 to RLY6) connectors
- ⑨ User Digital Input connectors
- ⑩ Ribbon cable to separate display and keypad. Further details on page [8](#).

Rear Views



- ① Rear RS232 Serial Interface (XS1A)
- ② Fuse/MCB DC Distribution Interface (XS2)
- ③ AC Distribution Interface (XS3)
- ④ LVD2 Interface (XS4)
- ⑤ LVD1 Interface (XS5)
- ⑥ Three Current Sense Inputs (XS6)
- ⑦ Two Temperature Sense Inputs (XS7)
- ⑧ Bus Voltage Sense Input (XS9)
- ⑨ Not used (not fitted on panel mount version)
- ⑩ Rack Communications Interface (XS11)
- ⑪ Power Input (XS8)
- ⑫ Functional Earth (XS10) - connected to DC power system earth
- ⑬ Ethernet interface and LEDs (XS31)

 For connector pin-outs see details on page [59](#).

Mounting Options

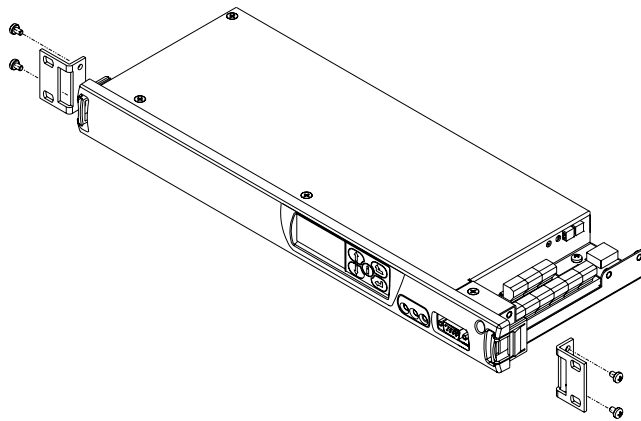


Caution

- If the SM65 is installed in a closed or multi-unit assembly ensure that the ambient temperature is less than 70°C [158°F].
- Ensure that the airflow is not restricted.
- Ensure that the weight of the SM65 is adequately and evenly supported.
- Take note of the maximum DC input current stated in the SM65 product datasheet.
- Ensure that reliable earthing is maintained. Carefully check earth continuity from the branch circuit to the SM65.

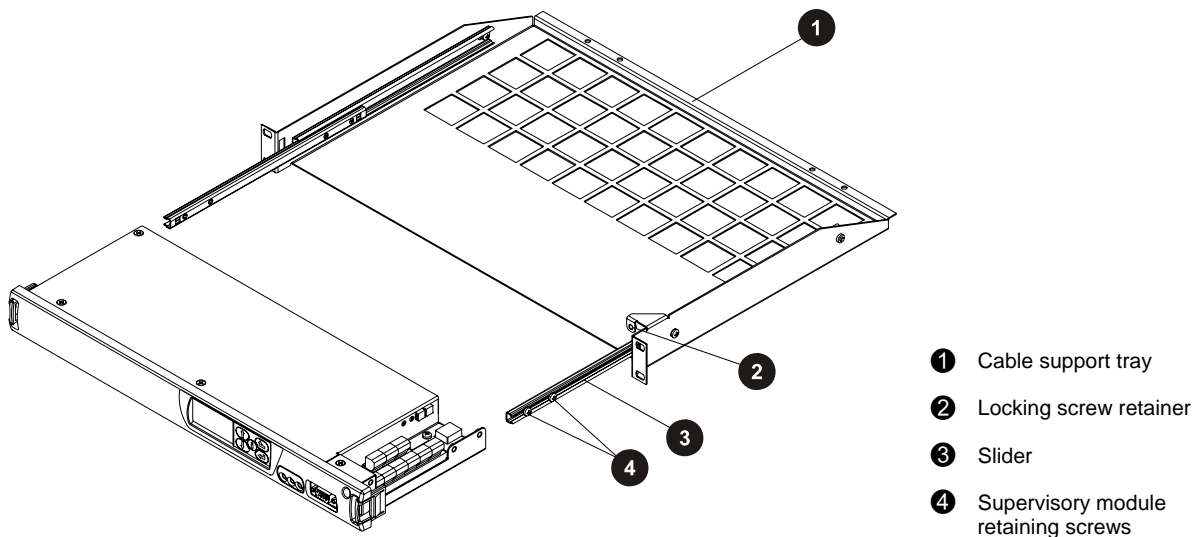
Rack-mounted version (standard option)

Standard mounting brackets and screws are used to mount the SM65 supervisory module in either a 19-inch (SM60MTG-A00) or 23-inch (SM60MTG-A02) rack. Support the cable loom as appropriate when this mounting option is used.



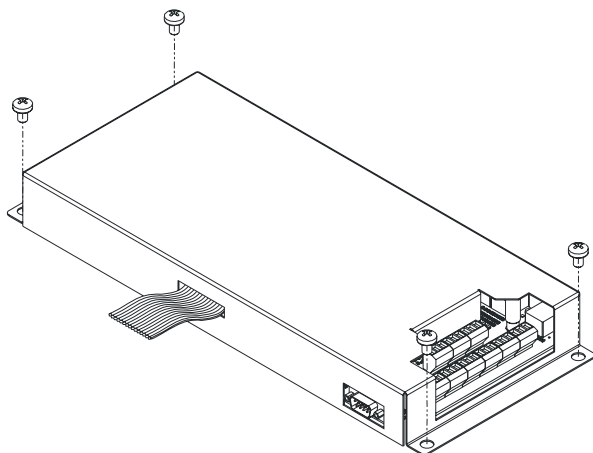
Rack-mounted version (slider magazine option)

An optional slider magazine (SM60MTG-A01) with integrated cable support tray can be used for mounting the SM65 supervisory module. This mounting option provides easy access to the rear interface connections and supports the cable loom.



Panel-mounted version

The SM65PM model is designed to mount on the back of a rack-power system door. A separate LCD display and keypad (see details on page 8) is normally mounted on the front of the door.

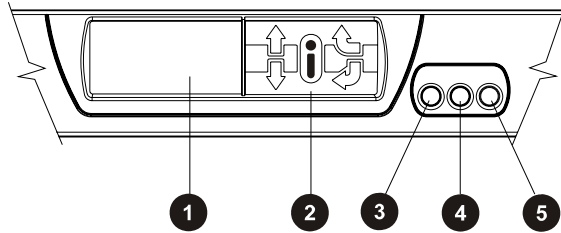


Overview

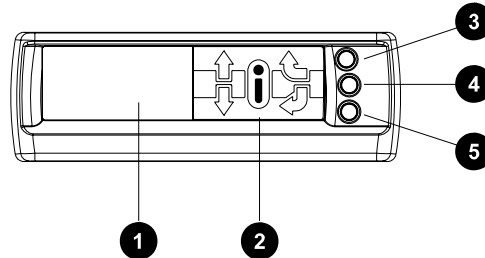
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Keypad and Display

Rack Mount Version



Panel Mount Version



- ① Backlit LCD Display
- ② Keypad
- ③ Power On LED (green) – indicates that the SM65 is powered
- ④ Non-urgent Alarm LED (yellow) – indicates one or more active Non-urgent alarms
- ⑤ Urgent/Critical Alarm LED (red) – indicates one or more active Urgent/Critical alarms



Scroll: Press to scroll through lists and menus and to increase or decrease configuration file values.



Information: Press to view status messages and a list of active alarms in Status View Mode.



Enter: Press to go to Configuration Mode and Edit Mode, save configuration file changes, clear alarms or toggle relay states.



Escape: Press to go to Main Display Mode or cancel configuration file changes.

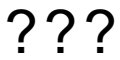
Display indicators



Urgent/Critical alarm.



Non-urgent alarm.




The system value cannot be displayed, because of a failed, disconnected or unconfigured sensor.




Press a scroll key to view further display items.

Audible indicator

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

► To stop the audible indicator (when an alarm is active)

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

Display time-out

If no keys are pressed for a predetermined time interval the SM65 display goes back to the default screen (total rectifier current).








The display time-out intervals are:

- Edit Mode – no time out
- All other display modes – 2 minutes


Changing the display contrast

The display contrast can be adjusted from 0 (lowest contrast) to 63 (highest contrast).

► To change the display contrast



- 1 Press  to enter Configuration Mode.
- 2 Press  to scroll down to Display Contrast.
- 3 Press  to enter Edit Mode.
- 4 Press  or  to change the display contrast as appropriate. (Contrast changes are immediately visible.)
- 5 Press  to save the new value.
- 6 Press  to return to Main Display Mode.

Keypad Access Security

 Requires SM65 version 3 or later.

This feature prevents accidental or unauthorized changes to settings from the SM65 keypad.

► To enable Keypad Access Control

- 1 In DCTools go to Configuration > Communications.
- 2 Set *UI Access* to *Protected*.
- 3 Click *Apply Changes*.
- 4 Now, to make changes to settings from the SM65 keypad first press  and  together for more than 10 seconds.
- 5 To remove Keypad Access Control set *UI Access* to *Unprotected*.

About Display Modes



The SM65 menu structure has four display modes:

- **Main Display Mode** – for viewing system values
- **Status View Mode** – for viewing system statuses as well as viewing and clearing alarms
- **Configuration Mode** – for viewing settings of configurable parameters
- **Edit Mode** – for editing the configurable parameters in Configuration Mode


For easy reference see the supervisory module menu structure on the inside front and back covers.

Changing display modes

► To enter a display mode



- From Main Display Mode, press  to enter Status View Mode and Alarm Mode.
- From Main Display Mode, press  to enter Configuration Mode and Edit Mode.




► To exit a display mode

- Press  to return from any mode to Main Display Mode.

Scrolling within a display mode

► To scroll within a display mode

- Press  to scroll up within a display mode.
- Press  to scroll down within a display mode.

 To scroll through a display mode faster, hold down  or 

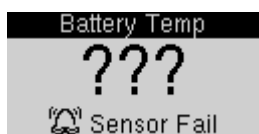
Using Edit mode

For details about Edit Mode refer to Viewing and Editing Configuration File Parameters on page [13](#).

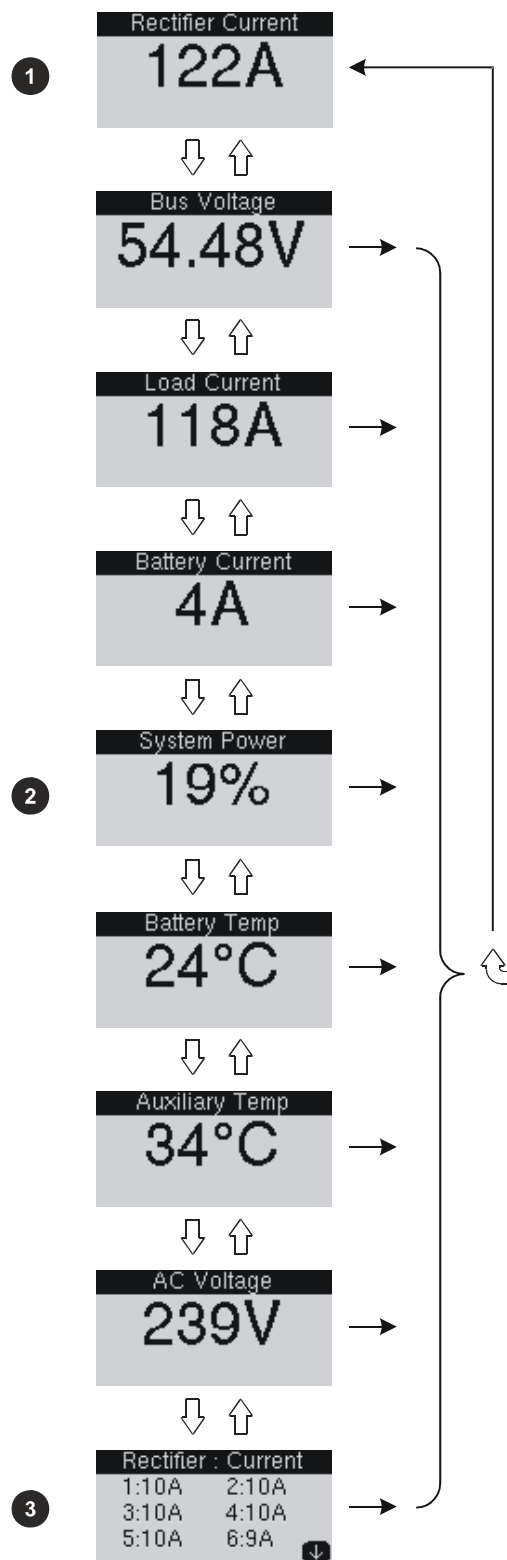
Viewing System Values (Main Display Mode)

System values (as at right) can be viewed in Main Display Mode.

If a system value is not available (for example, because of an incorrectly configured or disconnected battery temperature sensor), the following is displayed.



Refer to SM65 Keypad and Display on page 8 for details about the other display indicators.




- 1 Total rectifier current (default display)
- 2 Rectifier output power as a percentage of total available power
- 3 Individual rectifier currents. Only six individual rectifier currents are displayed at once. If more than six rectifiers are installed, press ↑ or ↓ to scroll through the list.

Viewing Alarms and System Status Messages (Status View Mode)

Status View Mode displays alarm and status messages.

 indicates an Urgent/Critical alarm

 indicates a Non-urgent alarm

Refer to SM65 Keypad and Display on page [8](#) for details about the other display indicators.

Rules for displaying alarms and system status





- Active alarms are always displayed before status messages.
- Urgent/Critical alarms are always displayed before Non-urgent alarms.
- Alarms with their severity set to **None** are not displayed.


Important note about Rectifier (Rect) Comms Lost alarm

If a rectifier is removed, a *Rect Comms Lost* alarm is displayed after 10 seconds. If this alarm is cleared within the configurable *Alarm Recognition Time* (default is 10 seconds) an external alarm will not be generated.



 *Rects Comms Lost is remotely displayed as Multiple Rectifier Comms Lost.*







► To view and clear alarms

- 1 From Main Display Mode, press  to enter Status View Mode.
- 2 Press  to scroll through the list of alarms.
- 3 Press  to clear the alarms. (Only three alarms can be cleared – Rect Comms Lost, Rects Comms Lost and Battery Test Fail.)
- 4 Press  to return to Main Display Mode.






 *See Alarm Descriptions on page [49](#) for a comprehensive list of alarms (that can be displayed in Status View Mode).*

► To view alarm additional text (Requires SM65 v4 or later)

- 1 From Main Display Mode, press  to enter Status View Mode.
- 2 Press  to view additional text for the first alarm.





 *Press  or  to scroll the text if it is too large to fit on one screen.*
- 3 Press  to view additional text for the next alarm(s).
- 4 Press  to return to Status View Mode.
- 5 Press  to return to Main Display Mode.

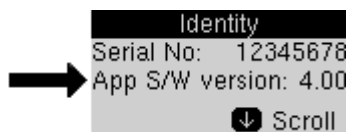
► **To view system status messages**


- 1 Press  to enter Status View Mode.
If there are active alarms, press  to scroll to the bottom of the alarm list. The control status list is displayed after the last alarm.
- 2 Press  or  to scroll through the list of status messages.
- 3 Press  to return to Main Display Mode.

Viewing Software Version

► **To view the SM65 software version using the keypad**

- 1 Press  to enter Status View Mode.
 *If there are active alarms, press  to scroll to the bottom of the alarm list. The control status list is displayed after the last alarm.*
- 2 Press  to scroll to the **Identity** screen to view the software version of the SM65.



- 3 Press  to return to Main Display Mode.

► **To view the SM65 software version using DCTools**










- 1 Start *DCTools* (refer to the Communications Options on page [30](#)).
- 2 From the *DCTools* System Summary (Home) screen, go to *Configuration > Identity*.

Viewing and Editing Configuration File Parameters

Configuration Mode displays only those configuration file parameters that are most likely to be changed on-site. These parameters can be changed in Edit Mode.

For viewing and editing all other configuration file parameters a laptop computer or remote access is required. See Communications Options on page [30](#) for details.

► **To view and edit a configuration file parameter**

- 1 From Main Display Mode, press  to enter Configuration Mode.
- 2 Press  to scroll down to the required parameter.
- 3 Press  to enter Edit Mode.
 *If access to Edit Mode is not available then see Keypad Access Security on page [10](#).*
- 4 Press either  or  to change the value as appropriate.
- 5 Press  to save the new value and return to Configuration Mode, or
- 6 Press  to cancel the change and return to Configuration Mode.
- 7 Press  to return to Main Display Mode.

Activating the Relay Test Function and Toggling the Relay States

The Relay Test function can be used to test the relay configuration and wiring to a remote location.

► **To activate the Relay Test function and toggle the relay states using DCTools**

- 1 Ensure that the SM65 is powered and connected to *DCTools* (refer to the Communications Options on page [30](#)).
- 2 From the *DCTools* System Summary (Home) screen, click the Relays hotlink at the top of the screen. The **Relay Table** screen is then displayed.
- 3 Set the Relay Test Duration as required.
- 4 To change the state of a relay, double-click on the Test State for that relay, then click and select the new test state from the popup list.
- 5 Click on the *Apply Changes* button. The selected relay state will be toggled for 10 seconds (the default *Relay Test Duration* which is configurable in *DCTools*), before returning to its original configured state.

► **To activate the Relay Test function and toggle the relay states using the keypad**

- 1 From the Main Display Mode, press to enter Configuration Mode.
- 2 Press to scroll down to Relay Test.
- 3 Press to enter Relay Test Mode.
- 4 Press either or to select a relay.
- 5 Press to toggle the state (active or inactive) of the selected relay (relay must be *Enabled*). The selected relay state will be toggled for 10 seconds (the default Relay Test Duration, which is configurable in *DCTools*), before returning to its original configured state.

If the state of a relay has been set to disabled, its state cannot be toggled.

- 6 Press to return to Configuration Mode. (All relays return to their configured states.)

The display time-out interval in Relay Test mode is 2 minutes.










LVD Test

The LVD Test function allows the LVD contactors to be manually connected or disconnected from *DCTools* or the keypad.

► To activate the LVD Test function using *DCTools*


- 1 Start *DCTools* (refer to the Communications Options on page [30](#)).
- 2 From the *DCTools* System Summary (Home) screen, go to *LVD*.
- 3 Click on *LVD1* or *LVD2* as required.
- 4 Click on the *Front Panel LVD Test* button.
- 5 Click the *Apply Changes* button.


► To activate the LVD Test function using the keypad

- 1 Press  to go to Status View Mode.
- 2 Press  until the display shows LVD1 Test. If required, press  again to access LVD2 Test.
- 3 Press  to edit the LVD state.
- 4 Press  to confirm the change.
- 5 Press   to connect/disconnect the LVD as required.
- 6 Press  to go to Status View Mode.
- 7 Press  to go to Main Display Mode.





Rectifier Restart

This function temporarily restarts rectifiers that have either been shutdown automatically by Load-based Rectifier Shutdown (LBRS) (see details on page [52](#)), or manually shutdown from *DCTools* or *PowerManagerII*.

Rectifiers shutdown will have the  (red) alarm LED on. Therefore, use this function to restart all rectifiers to identify a faulty rectifier.

 *Load-based Rectifier Shutdown will continue to operate and some rectifiers will shut down again after a period, depending on the LBRS configuration parameters. Rectifiers that were previously shutdown manually will remain operating.*

► To restart shutdown rectifiers using the SM65 keypad

- 1 Press  to go to Status View Mode.
- 2 Press  until the display shows **Auto Rect Shutdown**
- 3 Press  to restart all shutdown rectifiers.
- 4 Press  to go to Main Display Mode.

► **To restart shutdown rectifiers using DCTools**

- 1 Start *DCTools* (refer to the Communications Options on page [30](#)).
- 2 From the *DCTools* System Summary (Home) screen, go to Rectifiers.
- 3 Click on the *Restart ALL Rectifiers* button.
- 4 Click the *Apply Changes* button.

Manual Start Equalize

This function starts the Equalize control function (see details on page [52](#)), if conditions allow.



SM65 version 4.04 or later:

If there is an AC supply fail then Equalize will have the state Pending. Equalize will then start when AC power is restored (unless Fast Charge is enabled then Equalize will start when the Fast Charge is completed).

Use Reset Battery State to cancel a Pending Equalize. See details on page [17](#).

Equalize will be active for the configured *Duration* or until it is stopped manually.

► **To manually start Equalize using the SM65 keypad**

- 1 Press to go to Status View Mode.
- 2 Press until the display shows **Next Equalize ...** or **Manual Equalize Can Start**.




*If the display shows **Equalize Disabled** then Equalize must be Enabled before it can be started. Go to Configuration Mode to Enable.*

- 3 Press to start Equalize.
- 4 Equalize will operate for the configured *Duration* or press to stop Equalize.

► **To manually start Equalize using DCTools**



- 1 Start *DCTools* (refer to the Communications Options on page [30](#)).
- 2 Go to *Voltage Control > Equalize*.
- 3 Click on *Start* (Equalize must be *Enabled*).
- 4 Click *Apply Changes*.
- 5 Equalize will operate for the configured *Duration* or click on *Stop* then *Apply Changes* to stop Equalize.


Reset Battery State

 Requires SM65 version 4.04 or later.

This function cancels any Fast Charge or Equalize control function that is *Pending*, and sets the Ah Discharged counter to zero.

► **To Reset Battery State using the SM65 keypad**

- 1 Press  to go to Status View Mode.
- 2 Press  until the display shows **Reset Battery State**.

 *Reset Battery State will only be displayed if there is a pending Fast Charge or Equalize.*

- 3 Press  to start Reset Battery State.

Overview


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Installing External Alarm and User Digital Inputs Cabling

About alarm relays and user digital inputs

Alarm Relays

Alarms may be mapped to a relay which, when energized or de-energized, activates an external device. Six user-configurable relays (RLY1 to RLY6) are available on the SM65 supervisory module. RLY6 is used for MONITOR OK but other alarms can be mapped to this relay if required.

 To receive application notes refer to Worldwide Support on page [65](#).

The alarm relays specifications are:

- Contact Arrangement : One changeover contact per relay
- Maximum Switching Voltage : 60V DC or 30V AC
- Maximum Switching Current : 500mA
- Maximum Continuous Current : 500mA
- Maximum Power Rating : 30W (DC Voltage) or 15 VA (AC Voltage)
- Maximum Wire Size : 1.5mm²
- Isolation : Relay connections are isolated to 500 V DC from all other circuitry, ground (earth) and system common.

User Digital Inputs

The SM65 supervisory module can monitor up to six user digital inputs. Switching devices (such as relays, switches, or opto-isolators) can be connected to the SM65 using the screw terminals labeled DI1 to DI6.

The user digital inputs are specified as follows:

- Input Impedance : 47 k Ω pull-up resistor to +5 V.
(Referenced to Monitor 0V = system LIVE bus)
- Maximum Wire Size : 1.5 mm²

All wiring to the user digital inputs must be isolated from earth (ground). The SM65 supervisory module will not operate correctly if any user digital inputs are earthed (grounded).

Connecting alarm relay and user digital inputs cabling

Step 1 - Gain access to the cable ducting inside the rack

Remove the appropriate panel(s) from the rack to gain access to the cable ducting inside the rack.

Step 2 - Withdraw the SM65 from the rack (rack mount versions only)

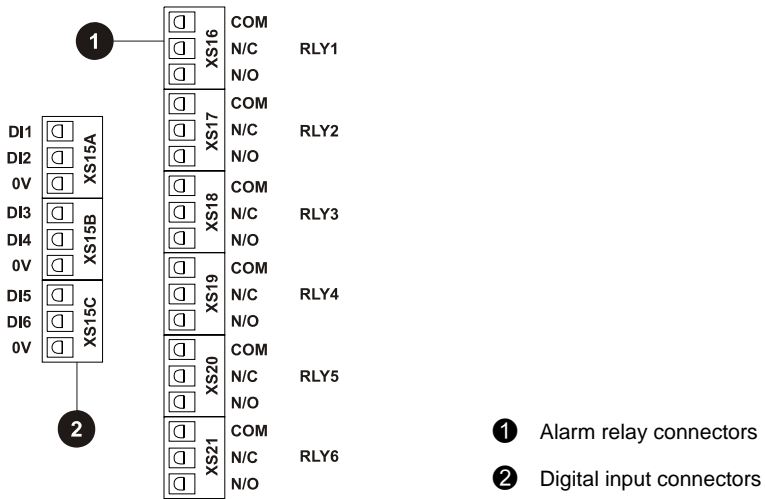
See Replacing an SM65 on page 40 for details.

Step 3 - Route the cabling through the rack

- 1 Pass the external alarm/user digital inputs cabling through the top or bottom of the rack.
- 2 Route the cabling through the existing cable ducting (located inside the rack) to the SM65. See diagrams on page 2 for location of alarm relay / user digital input connectors.

Step 4 - Terminate the cabling at the SM65

- 1 Terminate the cabling at the connectors on the SM65, as in the following diagram.
- 2 Tie the cabling to the cable tie points and/or the existing wiring loom.



Step 5 - Check the integrity of the external alarm/user digital inputs cabling

- 1 Visually check for cable damage.
- 2 Check the continuity of the cabling.
- 3 Test the insulation of the cabling.

Step 6 - Test the alarms at the remote location



Use the Relay Test Function on page [14](#) and refer to the Commissioning section of the relevant Eaton DC Power System Installation Guide.

Procedure complete

Setting Up User Alarms

Use *DCTools* to set up user alarm configurations. Only limited setup can be done from the keypad.

► To set up user alarms using *DCTools*:

- 1 From the *DCTools* System Summary (Home) screen, click the [Digitals](#) hotlink. The **Digital Input Table** screen is then displayed.
- 2 Type the assigned alarm name into the *Name* column for that user alarm. Assigned alarm names (up to 15 characters long) are displayed on the LCD display.
- 3 Set the active state of a Digital Input (Closed or Open). Double-click on the *Active State* for that user alarm, then click and select the new active state from the popup list.
- 4 Go to the **Alarms Table** to set the severity of the user alarm (Disabled, Event, Non-urgent, Urgent/Critical, Critical). Double-click on the *Severity* for that user alarm, then click and select the new severity from the popup list.
- 5 If required, map the alarm to an alarm relay (using Relay Mapping A or B) or two different alarm relays (using Relay Mapping A and B). Double-click on *Relay Mapping A* or *B* for that user alarm. Then click and select the relay number from the popup list.
- 6 If required, enter additional text (Requires SM65 v4 or later). Double-click in the *Additional Text* field.
 - This text can provide further information about the alarm, or action to take when the alarm is active. The additional text can be viewed from DCTools, the SM65 LCD display, and in an SNMP trap (if enabled).*
- 7 If a relay is used (in step 5) set the active state of the relay (Energized or De-energized). Go to the **Relay Table** and double-click on the *Active State* for that relay. Then click and select the new active state from the popup list.

*If Battery Current Limit parameter **Engine Run** is enabled, then the User Digital Input and User Alarm number (as specified by the Engine Run Digital Input number) will not be available. (The default Engine Run Digital Input number is 1.)*

*If Equalize parameter **Enable External Input** is enabled, then User Digital Input 2 and User Alarm 2 will not be available.*

*If Battery Test parameter **Enable External Input** is enabled, then User Digital Input 3 and User Alarm 3 will not be available.*

Synchronizing the SM65 Real-Time Clock

The SM65 features a battery-backed real-time clock for accurate date-time stamping of all alarms and control functions. Battery back-up ensures that the date and time is kept while the SM65 is not powered.

If required, the time can be synchronized to the internal time of a PC or laptop.

- ☐ *PC real-time clocks are not always accurate. Ensure the time on the PC is correct before synchronizing.
If PowerManagerII is used you can set PowerManagerII to automatically synchronize SM65 real-time clocks.*

► To synchronize the SM65 real-time clock using *DCTools*

- 1 Ensure that the SM65 is powered and connected to *DCTools*. (For details refer to Communications Options on page [30](#).)
- 2 From the *DCTools* System Summary (Home) screen, click Configuration then Identity to display the **System Identification** view.
- 3 Under **Time Synchronization**, click the **Synchronize** button to synchronize the real-time clock.

- ☐ *The SM65 stores the time internally in UTC (Coordinated Universal Time, equivalent to GMT) format. *DCTools* converts local PC time to/from UTC for the SM65.*

External AC Metering Option

The SM65 supervisory module (v2.00 or later software) supports AC metering and associated alarms.

A Carlo Gavazzi WM4-96 Universal Utility Meter and Moxa NPort DF-311 Device Server are required. See application note AN0063 for implementation details.

- ☐ *To receive application notes refer to Worldwide Support on page [65](#).*

Language Options





The SM65 supervisory module language default is English. Text on the LCD display and web pages (see details on page [35](#)) can be shown in other languages by loading the appropriate Translation Upgrade File (SM65-xx.icp) into the SM65.

Contact Eaton for available Translation Upgrade Files (refer to Worldwide Support on page [65](#)).

► **To convert the SM65 display/web page language:**

- 1 Obtain the appropriate Translation Upgrade File (sm-xx.icp) from Eaton.
- 2 Save the file.
- 3 Connect to the SM65 via an Ethernet connection. Refer to Communications Options on page [30](#).
- 4 Open a web browser and browse to the SM65 IP address.
- 5 Go to the *Software Upgrade* page.
- 6 Click on *Browse* and select the Translation Upgrade File.
- 7 Click on *Send* to add the language.

► **To select the new language:**

- Press  to go to the *Rectifier Current* (default) screen in Main Display Mode.
- Press .
- Press  to bring the required language to the top of the display.
- Press  to select the language.



The SM65 can hold multiple language files and any of these can be selected to change the LCD display language. However, the web page language can only be changed by loading a Translation Upgrade File.

Interfacing the SM65 with CellSure

Interfacing the SM65 with a *CellSure* battery management system allows:

- *DCTools* and *PowerManagerII* to communicate with up to four *CellSure Battery Controllers* (CBC) via the SM65. The SM65 acts as an Ethernet interface using the S3P Passthrough protocol.
 - Requires SM65 with v4 or later software. SM65 with v2/3 software can support one CBC. See [Viewing Software Version on page 13](#).
- three *CellSure* related alarms (CBC Comms Failed, CBC Urgent and CBC Non Urgent) to be mapped to alarm relays, or sent as SNMP traps to up to eight different SNMP trap receivers.
- all internal *CellSure* alarms to be displayed as urgent or non-urgent status messages on the SM65 display and in *DCTools* or *PowerManagerII*.
- the SM65 to use the average string temperature (measured by the *CellSure* battery temperature sensor) instead of its own battery temperature input.

Before a CBC can communicate through an SM65 over an IP network with *DCTools* or *PowerManagerII*, the following setup is required.




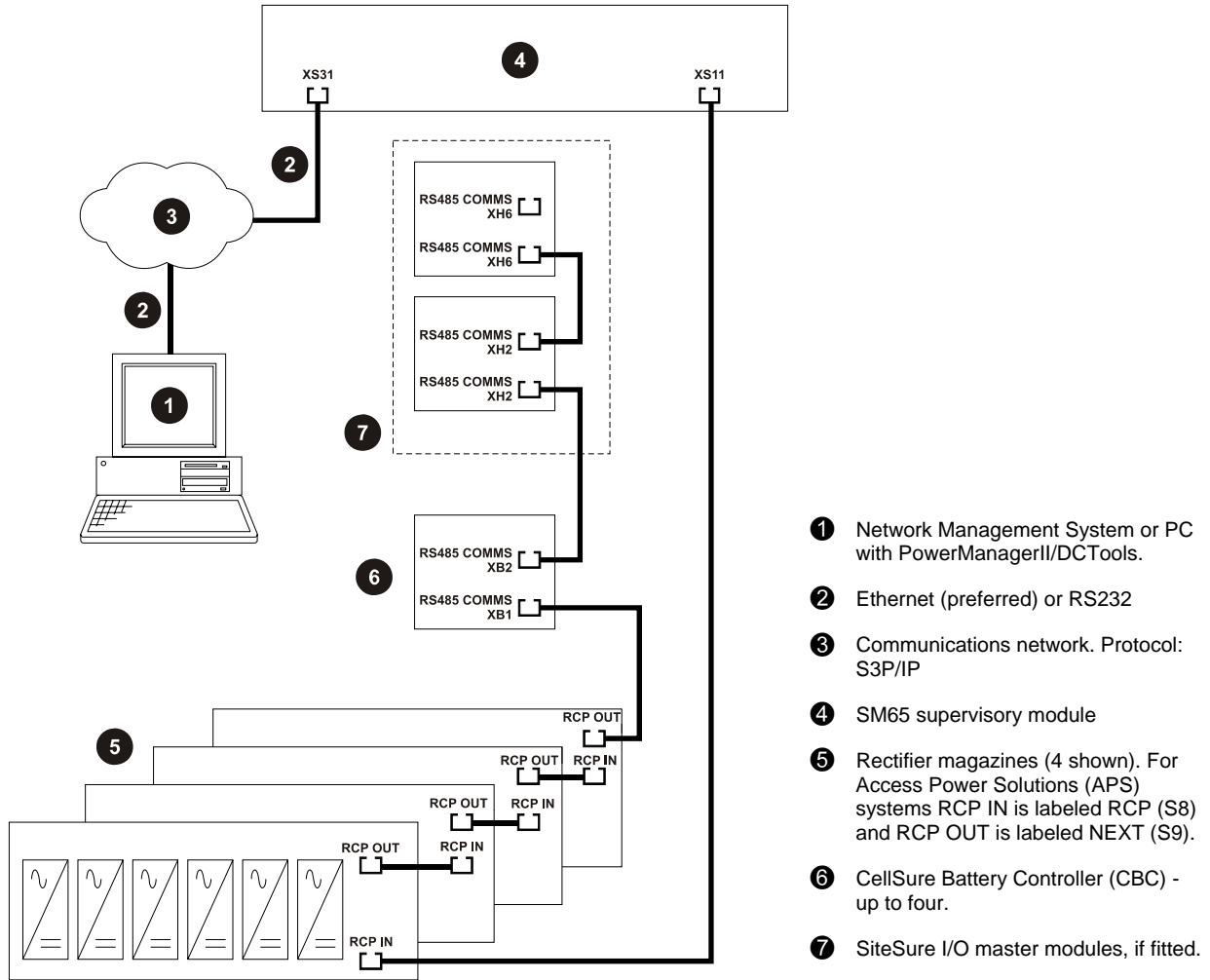
For CellSure installation and configuration details refer to the CellSure Installation Guide. See Related Information on page [ii](#).

Step 1 - Connect the CBC to the SM65



Connect the CBC(s) to the rack communications port (XS11) of the SM65 supervisory module (see diagram on page 2 for location) as shown in the following diagram.

 A (9V DC, 400 mA) power supply output is available from this port. Depending on the load demand from the rack communications bus, an Auxiliary Power Module (APM) may be required to boost the available power of the rack communications bus. (See application note AN0020 to determine whether additional power on the rack communications bus is required.)



Step 2 - Setup first (or only) CBC



- 1 Connect a null modem cable from the RS232 port of the CBC to the serial port of the PC.
- 2 From the *DCTools* CellSure Battery Monitoring System Summary (Home) screen, go to *Configuration > Communications* and check the following settings:
 - RCP address: 150 (default)
 - Baud Rate Port RS485: B 19200 Baud
 - Protocol Port RS485: Rcp

Step 3 - Setup additional CBCs (if fitted)



As required, repeat the previous step for the second, third and fourth CBCs, except set the RCP addresses to 151, 152 and 153 respectively.

Step 4 - Configure the SM65 to operate with CellSure



- 1 From the *DCTools* System Summary (Home) screen, go *Configuration > External I/O* to display the External Input/Output Communications view.
- 2 Scroll down to CellSure Battery Controller (CBC) and set **Fitted** to *True*.
- 3 From the *DCTools* System Summary (Home) screen, go to *CBC* to display the CellSure Battery Controller (CBC) Summary view.
- 4 Set **Number of CBCs** as appropriate.
- 5 To allow the SM65 to use the average string temperature from the *CellSure* battery temperature sensor (instead of its own battery temperature input) click next to **Batt Temp Source** and select *CBC Average* from the list.

Step 5 - Configure the DCTools / PowerManagerII communications settings



Create a new connection for CellSure in DCTools and/or PowerManagerII with the following settings. Then check that DCTools or PowerManagerII communicates correctly.

Comms Enabled	:	True
Protocol	:	S3P Passthrough
Connect Using	:	Local Network
S3P Address	:	1:150 (Note 1)
Server IP Address	:	Enter the SM65 IP Address
Server Port	:	14000
Telnet	:	Cleared

Notes:

- 1 The format is: (SM65 S3P Address : CBC RCP Address). Change the CBC RCP address as required (150 - 153). Refer to Steps 2-3 for further information.
- 2 DCTools can not connect to multiple CBCs simultaneously. To connect to a second CBC, close the connection to the first and create a new connection to the second CBC.

Interfacing the SM65 with SiteSure

SiteSure is a suite of add-on modules to provide control and monitoring of a wide range of external devices. It uses the communications capability of an Eaton DC power system to monitor and control security, air conditioning, engine alternators and other building services, or sense DC currents for load metering. *SiteSure* modules can be added as required to provide the number of inputs and outputs needed for a particular application.

Four *SiteSure* modules are available:

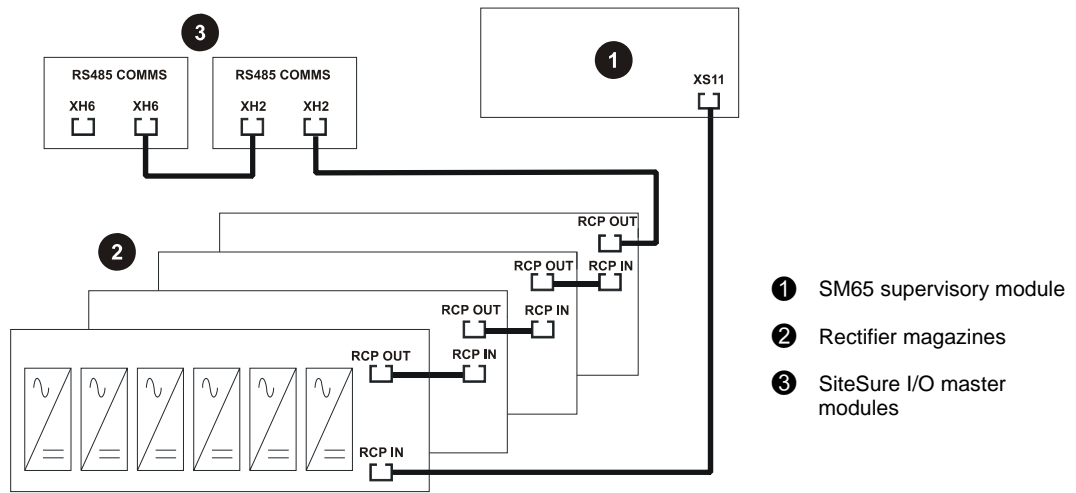
- **SiteSureGP** – collects site-specific status information via configurable analog and digital inputs
- **SiteSureDI** – provides additional configurable digital inputs
- **SiteSureDO** – provides configurable relay outputs for local control or alarm indication
- **Current Input Module (IOM-CS)** – provides configurable current sensor inputs

► **To interface SiteSure modules to an SM65:**

- 1 Connect the *SiteSure* master modules (SiteSureGP and IOM-CS) as shown in the following diagram.
- 2 Use *DCTools* ([Configuration](#) > [External I/O](#)) to check the *SiteSure* master module addresses.
- 3 If more than one *SiteSure* master module is to be connected then change the addresses as follows:
 - Connect one module at a time to the SM65.
 - Double-click in the **Change module number to:** column to set the new module number.
- 4 Configure the external analog inputs, digital inputs and digital outputs.



For *SiteSure* installation and configuration details refer to the *SiteSure Installation and Configuration Guide*. See [Related Information](#) on page [ii](#).



Overview

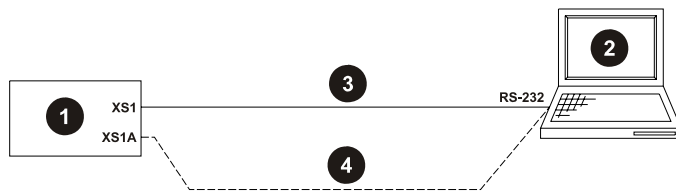
Topic	Page
Communications Options	30
Setting up Modem Communications	31
Setting up SMS Text Messaging (Requires SM65 v4 or later)	32
DCTools and PowerManagerII Setup	33
Ethernet Setup	33
Setting Up SNMP Traps	34
Accessing the SM65 Web Pages	35
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Communications Options

The standard communications options for SM65 supervisory modules are shown below. For other communications options refer to Worldwide Support on page 65.

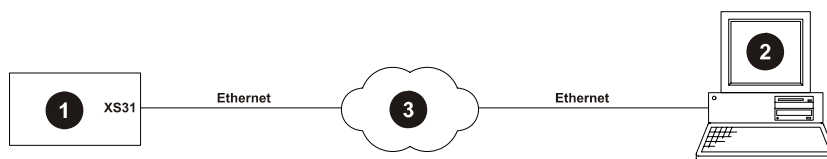
See diagrams on page 2 for locations of the RS232 and Ethernet connectors.

Direct Connection



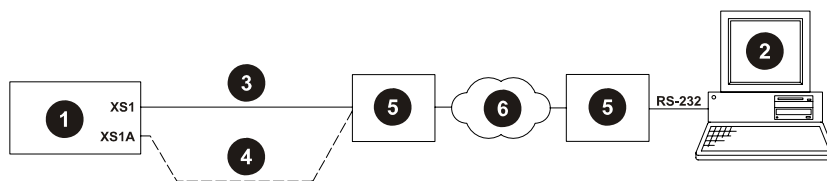
- ❶ SM65 supervisory module
- ❷ PC/laptop with PowerManagerII and/or DCTools. See setup details on page 33.
- ❸ RS232 null modem cable (protocol: S3P)
- ❹ SM30 RS232 comms cable (P/N 410-00226-93A)

Ethernet



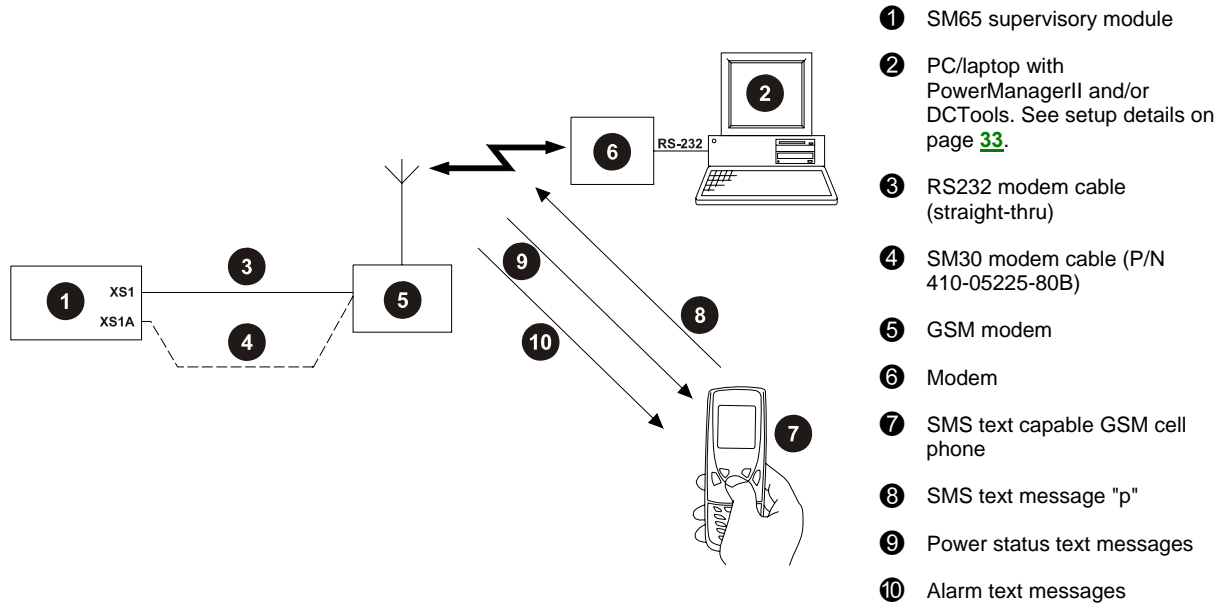
- ❶ SM65 supervisory module
- ❷ PC/laptop with PowerManagerII and/or DCTools (see setup details on page 33), or web browser (see details on page 35), or Network Management System using SNMP (see details on page 34).
- ❸ Communications network. Protocol: S3P/IP. See Ethernet Setup on page 33.

PSTN Modem



- ❶ SM65 supervisory module
- ❷ PC/laptop with PowerManagerII and/or DCTools. See setup details on page 33.
- ❸ RS232 modem cable (straight-thru)
- ❹ SM30 modem cable (P/N 410-05727-46A for DB9 modem connector, P/N 410-05723-63B for DB25 modem connector)
- ❺ PSTN modem
- ❻ PSTN network. Protocol: S3P

GSM Modem (Requires SM65 v4 or later)



- For implementation details see *Setting up SMS Text Messaging* on page 32 and *Application Note AN0024*. To receive application notes refer to *Worldwide Support* on page 65.
- Modem connections allow dial-in from DCTools/PowerManagerII. Dial-out on alarm is only available with SM65 v4 software or later. See *Viewing Software Version* on page 13.

Setting up Modem Communications


For communications to PowerManagerII use a GSM (cellular) or PSTN (fixed line) modem. Refer to *Communications Options* on page 30.

- Not all modems are suitable. If your modem does not operate correctly check the modem setup string. Contact Eaton for further assistance. Refer to *Worldwide Support* on page 65.


► **To enable modem communications**

- 1 Connect to the SM65 with *DCTools* (refer to *Communications Options* on page 30).
- 2 Go to *Configuration > Communications*.
- 3 Click on to expand **Modem**.
- 4 Set **Enable Modem** to *Enabled*.
- 5 If the SM65 is to report alarms to PowerManagerII then set **Alarm Report** to *Enabled*.
 - Requires SM65 with v4 software or later. See *Viewing Software Version* on page 13.
- 6 Enter the telephone numbers the SM65 is to dial when an alarm is active.
 - The SM65 will first dial number 1. If the call fails it will try again after **Modem Retry Interval** for the number of times set by **Modem Maximum Retries**. If the retries fail the SM65 will try the next number on the list, and repeat for all numbers.

Setting up SMS Text Messaging (Requires SM65 v4 or later)

 For additional information see Application Note AN0024. To receive application notes refer to Worldwide Support on page [65](#).

▶ **To enable SMS alarm messages**

- 1 Connect the SM65 to a GSM modem (refer to Communications Options on page [30](#)).
- 2 Connect to the SM65 with *DCTools*.
- 3 Go to *Configuration > Communications*.
- 4 Click on  to expand **SMS**.
- 5 For each cellphone to receive SMS alarm messages set the telephone number and level. *Name* is optional.


▶ **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 SM65 GSM modem telephone number.
- 3 The SM65 will reply with a DC power system status message.

DCTools and PowerManagerII Setup

For the chosen communications option (see diagrams on page 30) configure the communications settings in either *DCTools* or *PowerManagerII* according to the following table.

Then check that *DCTools* / *PowerManagerII* communicates correctly.

 *DCTools* is available at www.powerquality.eaton.com/downloads

Properties	Direct Connection	Ethernet	Modem
Comms Enabled	True	True	True
Protocol	S3P	S3P	S3P
Connect Using	COM1	Ethernet	Select a COM port
S3P Address	0 (Note 1)	0 (Note 1)	0 (Note 1)
Phone Number	-	-	User specific
Modem Logon	-	-	(Note 2)
Server IP Address	-	192.168.33.60 (Note 3)	-
Server Port	-	14000 (Note 3)	-
Telnet	-	Cleared (Note 4)	-

Note 1: 0 = Broadcast, 1-65279 = individual address

Note 2: Clear if a logon script is not required for the modem.
Select if a logon script is required. Click the **Logon Script** button to define.
For more details, see *DCTools* / *PowerManagerII* online help (press F1).

Note 3: Allocated by network supervisor

Note 4: Some Ethernet interfaces (such as routers) may require this to be set.


Ethernet Setup

Before an SM65 supervisory module can communicate over a TCP/IP network with *DCTools* or *PowerManagerII*, the SM65 must be set up for Ethernet communications.

Use *DCTools* or the keypad to configure the SM65 for Ethernet communications.

► To configure an SM65 for Ethernet communications from *DCTools*

- 1 From the *DCTools* System Summary (Home) screen, click Configuration then Communications to display the **Communications** view.
- 2 Under Ethernet, enter the assigned IP address, subnet mask and gateway address assigned by the network administrator.

 The network administrator must assign a unique IP address to each SM65 to be connected to the TCP/IP network.

Setting Up SNMP Traps

The SM65 supervisory module can be configured to send alarms as SNMP traps to up to eight different SNMP trap receivers on a Network Management System (NMS).

► To send alarms as SNMP traps

- 1 Set up Ethernet Communications (see details on page 33).
- 2 In *DCTools* go to *Configuration > Communications > SNMP*.
- 3 Do not change the default settings of *SNMP Read Community* (public) and *SNMP Write Community* (private), unless requested by the network administrator.
- 4 Set the sysObjectID of a Power System, if required. This is a unique Object Identifier that allows a network management system to identify the type of device (in this case a power system) on the network.

Objects are named in the iso.org.dod.internet.private.enterprises (1.3.6.1.4.1) sub-tree for enterprise-specific objects. The default Object Identifier for an SM65-based DC power system is: 1.3.6.1.4.1.1918.2.12

A network administrator can specify a new Object Identifier within the (1.3.6.1.4.1) sub-tree, if required.

Do not enter the sub-tree integers 1.3.6.1.4.1 into the System Object ID field.

- 5 Set *Trap Version* to SNMP V1, V2, V3 as required.
- 6 Set *Trap Format* to *Eaton* or *X.733* as appropriate (Requires SM65 v4 or later).

"Eaton" format uses different trap numbers according to the alarm source. X.733 format uses a single trap number for all alarm sources.
- 7 Configure *Trap Repeat* and *Trap Repeat Rate* as appropriate.
- 8 For each SNMP trap receiver, configure the following parameters.

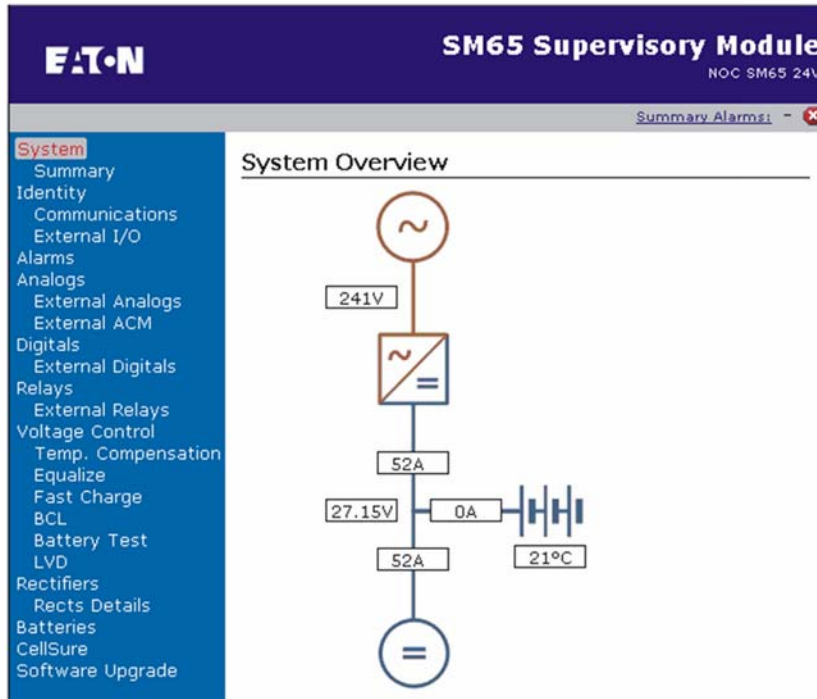
Parameter Configuration Guidelines

Parameter	Configuration Guidelines
Name	Enter the name of the SNMP trap receiver (20 characters maximum).
Level	SNMP Trap Level – controls reporting of specific events for each receiver: <ul style="list-style-type: none"> • Select All Events And Alarms to receive events and Critical, Urgent and Non-urgent alarms. (Typically events are status messages such as Equalize Active.) • Select Urgent And Non Urgent Alarms to receive Critical, Urgent and Non-urgent alarms. • Select Urgent Alarms Only to receive only Critical and Urgent alarms. • Select Critical Alarms Only to receive only Critical alarms (Requires SM65 v4 or later). • Select Disabled to temporarily disable notifications to the receiver.
IP Address	IP address of the trap receiver assigned by the network administrator.
Port	The default setting is 162. Do not change this setting, unless requested by the network administrator.
Trap Community	A form of password. Use public , unless the network administrator has assigned a new password.
Mode	Select: <ul style="list-style-type: none"> • Normal Traps for sending traps to any network management system, except <i>PowerManagerII</i> • Acknowledged Summary Trap for sending traps to <i>PowerManagerII</i> only

Accessing the SM65 Web Pages

When connected to an IP network, an SM65-based DC power system can be monitored through a standard web browser.

To access the SM65 web pages, type the IP address of the SM65 into the address bar of the web browser to display the System Overview page.



Remote Access Password

The remote access password prevents unauthorized changes to the SM65 configuration via the RS232 serial port or the Ethernet port.

- When a remote access password is set the access to the SM65 is read only. The password must be entered before any setting can be changed.
- If a remote access password is lost then it must be cleared from the SM65 keypad to re-enable remote access. If required, a new password can then be set from DCTools.





► To set a remote access password:


- 1 Connect to the SM65 with DCTools (see details on page [30](#)).
- 2 Go to *Configuration > Communications*
- 3 Type a password into the *Remote Access Password* field.
 - Passwords are case sensitive.
- 4 Click the *Apply Changes* button.

► **To clear or change a remote access password:**

- 1 Connect to the SM65 with DCTools (see details on page [30](#)).
- 2 Go to *Configuration > Communications*
- 3 Type a new password into the *Remote Access Password* field or leave the field blank for no password control.
- 4 Click the *Apply Changes* button.
- 5 Enter the old password.

► **To clear a remote access password from the SM65 keypad:**

- 1 From the Main Display Mode, press  to enter Configuration Mode.
- 2 Press  to scroll down to Serial Password.
- 3 Press  to clear the password.
- 4 Press  to return to Main Display Mode.




 *The password is now permanently cleared. If required, the password must be reset via DCTools.*

Overview

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Replacing the Real-time Clock Battery	48

Troubleshooting

Use the table to troubleshoot minor installation and operational problems. For additional assistance see contact details on page [65](#). Return items for replacement or repair with a copy of the Equipment Incident Report on page [63](#).

Problem	Possible Cause	Required Action
A configuration setting cannot be changed from the keypad.	Access Control is set to <i>Protected</i> .	See details on page 10 .
SM65 LCD display is blank.	Ribbon cable to display and keypad module is disconnected (panel mount modules only).	Reconnect ribbon cable. Wait 10 seconds for operation.
	Faulty display module	Replace faulty unit.
SM65 Green  Power On LED off.	SM65 not powered.	Check SM65 power connections.
	The AC supply is off and the batteries are not connected because of the Low Voltage Disconnect (LVD) unit tripped.	None. The power system including the SM65 will return to normal operation when the AC supply is within its specified voltage range.
	Faulty Voltage feed Module (VFM) or faulty SM65	Replace faulty unit.
SM65 Red  LED or Yellow  LED on	Urgent/Critical or Non-Urgent Alarm	Check the type of alarm on the LCD display or with <i>DCTools</i> or <i>PowerManagerII</i> . Refer to the Alarm Descriptions on page 49 .
Monitor OK relay (RLY6) is de-energized	An active alarm is mapped to this relay	Check alarm relay mapping (see details on page 22).
	SM65 software corrupt or hardware fault.	Replace faulty unit.
Incorrect battery or load current readings.	Bus voltage sense polarity incorrect.	Measure the bus voltage sense and correct if necessary.
SM65 displays ???	Failed, disconnected or unconfigured sensor.	Replace, connect or configure sensor.
Serial communications problem.	Incorrect, disconnected or faulty cable	Check a null modem cable is plugged into the correct PC port. Replace faulty cable.
	Incorrect communications settings	See <i>DCTools</i> / <i>PowerManagerII</i> Setup on page 33 .
Modem communications does not work	Incorrect modem setup string	Refer to the modem's AT command manual.
	Incompatible modem	Contact your Eaton DC product supplier or Eaton for advice. Refer to Worldwide Support on page 65 .

Problem	Possible Cause	Required Action
Ethernet communications problem.	Disconnected or faulty cable	Check cable connections. Replace faulty cable.
	Ethernet link is not active	On the Ethernet connector (XS31) check: Left hand LED is continuously lit to show link is active. Right hand LED flashes to show traffic is reaching the SM65. See diagrams on page 2 for position of the Ethernet connector.
	Incorrect communications settings	See DCTools / PowerManagerII Setup on page 33.
Real-time clock is incorrect	Real-time clock time needs to be set.	See Synchronizing the SM65 Real-Time Clock on page 23.
	Real-time clock battery is dead.	See Replacing the Real-time Clock Battery on page 48.
SM65 displays Config Error	Missing or invalid configuration file	Download configuration file into the SM65. Refer to Replacing an SM65 on page 40 for details.
	Incorrect rectifier voltage, because installed rectifiers have different output voltages.	Check that all rectifiers are of the same type and replace as necessary.
	Number of cells per battery entered in SM65 configuration file does not match the rectifier output voltage.	Check the number of cells entered in the configuration file and the voltage of the rectifiers.
SM65 displays a DC power system alarm message.		Refer to Alarm Descriptions on page 49.
SM65 does not recognize R5848 3-phase rectifiers.	Rectifier configuration parameter <i>High AC Threshold</i> is set to 280V (default setting for 1-phase rectifiers).	Use DCTools to set <i>High AC Threshold</i> to 485V or higher.

Replacing an SM65

Replacing a panel mount SM65

Before you start, you need

- A PC with the *DCTools* software installed.
- A copy of the appropriate SM65 configuration file, which can be one of the following - the old configuration file, a backed-up configuration file or a modified default configuration file.
- A null modem cable.
- An anti-static wrist strap.

Step 1 - Set any LVD controllers to Manual Connect



To prevent an accidental operation of an LVD contactor (and disconnection of the battery or load equipment) set any LVD controllers to **Manual Connect**.



Refer to the DC power system Installation Guide for information on how to set the LVD Auto/Manual selector switch.

Step 2 - Disconnect all cables from the SM65



Label then disconnect all the cables from the SM65 including the ribbon cable to the keypad/display.

Step 3 - Remove the old SM65



- The panel mount version has an exposed printed circuit board. Wear an anti-static wrist strap connected to a suitable earth/ground to prevent any damage to electronic components from static electricity.

1 Remove the four nuts holding the SM65 to the panel/door.

2 Place the SM65 in an anti-static bag.



Do not remove the SM65 printed circuit board from the case.

Step 4 - Mount the new SM65



Place the SM65 on the four studs and tighten the nuts to hold the SM65 to the panel/door.

Step 5 - Connect the keypad/display ribbon cable



Step 6 - Power up the new SM65

- 1 Connect the power cable to the SM65 connector XS8.
- 2 Check that the green ① Power On LED is on. If not, consult Troubleshooting on page [38](#).

Step 7 - Download the appropriate configuration file into the new SM65

- 1 Connect a null modem cable from the front RS232 serial port of the SM65 to the serial port of the PC.
- 2 Start *DCTools*. If required, press F1 for *DCTools* online help.
- 3 On the **File** menu of *DCTools*, click **ICE Backup/Restore**. The Target Configuration Database Backup Wizard dialog is then displayed.
- 4 Select **Restore** then click **Next**.
- 5 Browse to the configuration file and click **Next**. Once the restore operation has been successfully completed, click **Finish**.
- 6 Check through the loaded configuration file in *DCTools* and make any required changes.
- 7 If you make any changes, save the configuration file with a new file name.

Step 8 - Connect the remaining cables to the SM65**Step 9 - Check that the new SM65 operates as intended**

- 1 Check all control functions, alarms and current measurement.
- 2 Check the power system identification parameters and communications settings.
- 3 Change the configuration file as required to ensure that the SM65 operates as intended.
- 4 Check that all rectifiers are communicating and that the SM65 has registered all rectifiers. This can be checked from the LCD display by viewing the individual rectifier currents in Main Display Mode. See supervisory module menu structure on inside front cover or Viewing System Values on page [11](#) for details.

Step 10 - Reset any LVD controllers to Auto



If any LVD controllers were set to **Manual Connect** in Step 1 then reset them to **Auto**.



Refer to the DC power system Installation Guide for information on how to set the LVD Auto/Manual selector switch.

Procedure complete

Replacing a standard bracket mounting SM65

Before you start, you need

- A PC with the *DCTools* software installed.
- A copy of the appropriate SM65 configuration file, which can be one of the following - the old configuration file, a backed-up configuration file or a modified default configuration file.
- A null modem cable.

Step 1 - Set any LVD controllers to Manual Connect

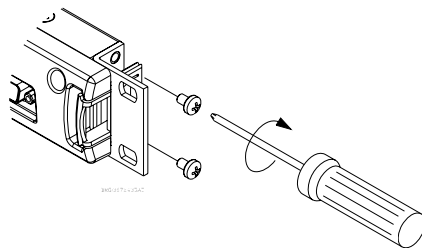


To prevent an accidental operation of an LVD contactor (and disconnection of the battery or load equipment) set any LVD controllers to **Manual Connect**.



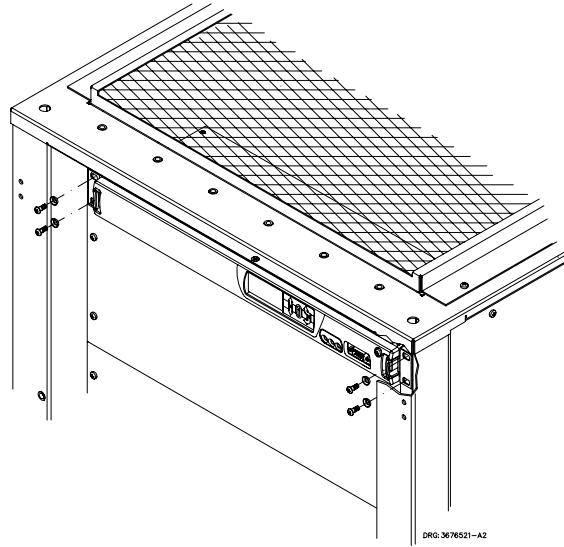
Refer to the DC power system Installation Guide for information on how to set the LVD Auto/Manual selector switch.

Step 2 - Attach the two mounting brackets to the SM65




Step 3 - Remove the old SM65 from the rack

- 1 Unscrew the old SM65 from the rack.



- 2 Pull the SM65 out of the rack to expose the cable connections at the side and rear.
- 3 Label then disconnect all the cables from the old SM65.

Step 4 - Power up the new SM65 then connect the remaining cables

- 1 Connect the power cable to the SM65 connector XS8.
- 2 Check that the green  Power On LED is on. If not, consult Troubleshooting on page [38](#).

Step 5 - Connect the remaining cables to the SM65**Step 6 - Screw the new SM65 into the rack**

Step 7 - Download the appropriate configuration file into the new SM65



- 1 Connect a null modem cable from the front RS232 serial port of the SM65 to the serial port of the PC.
- 2 Start *DCTools*. If required, press F1 for *DCTools* online help.
- 3 On the **File** menu of *DCTools*, click **ICE Backup/Restore**. The Target Configuration Database Backup Wizard dialog is then displayed.
- 4 Select **Restore** then click **Next**.
- 5 Browse to the configuration file and click **Next**. Once the restore operation has been successfully completed, click **Finish**.
- 6 Check through the loaded configuration file in *DCTools* and make any required changes.
- 7 If you make any changes, save the configuration file with a new file name.

Step 8 - Check that the new SM65 operates as intended



- 1 Check all control functions, alarms and current measurement.
- 2 Check the power system identification parameters and communications settings.
- 3 Change the configuration file as required to ensure that the SM65 operates as intended.
- 4 Check that all rectifiers are communicating and that the SM65 has registered all rectifiers. This can be checked from the LCD display by viewing the individual rectifier currents in Main Display Mode. See supervisory module menu structure on inside front cover or Viewing System Values on page [11](#) for details.

Step 9 - Reset any LVD controllers to Auto



If any LVD controllers were set to **Manual Connect** in Step 1 then reset them to **Auto**.



Refer to the DC power system Installation Guide for information on how to set the LVD Auto/Manual selector switch.

Procedure complete

Replacing an SM65 mounted in a slider magazine

Before you start, you need

- A PC with the *DCTools* software installed.
- A copy of the appropriate SM65 configuration file, which can be one of the following - the old configuration file, a backed-up configuration file or a modified default configuration file.
- A null modem cable.

Step 1 - Set any LVD controllers to Manual Connect



To prevent an accidental operation of an LVD contactor (and disconnection of the battery or load equipment) set any LVD controllers to **Manual Connect**.

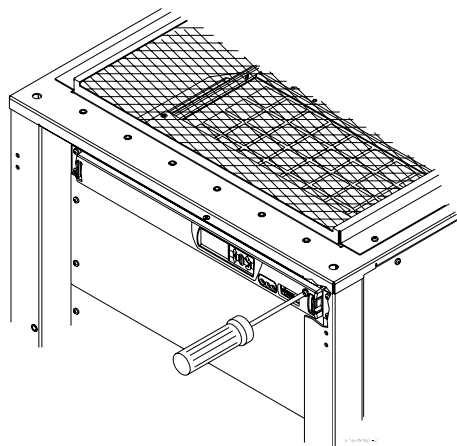


Refer to the DC power system Installation Guide for information on how to set the LVD Auto/Manual selector switch.

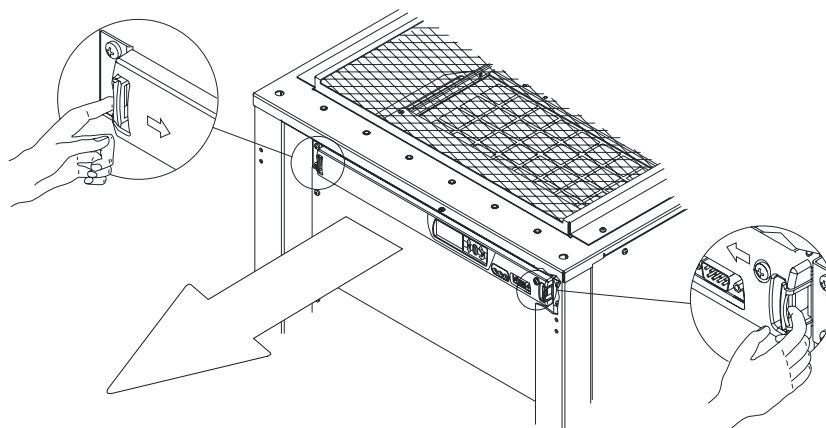
Step 2 - Withdraw the old SM65 from the rack



- 1 Loosen the locking screw.



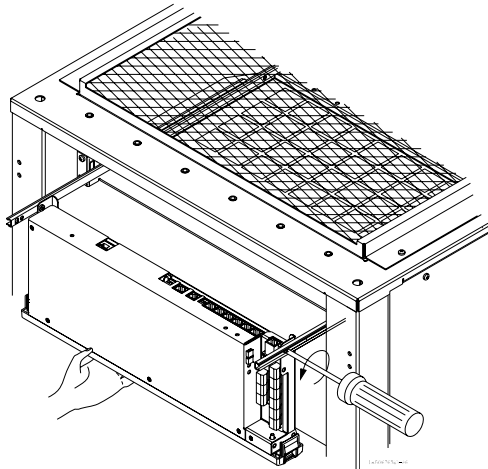
- 2 Press the two latches and pull the SM65 out.



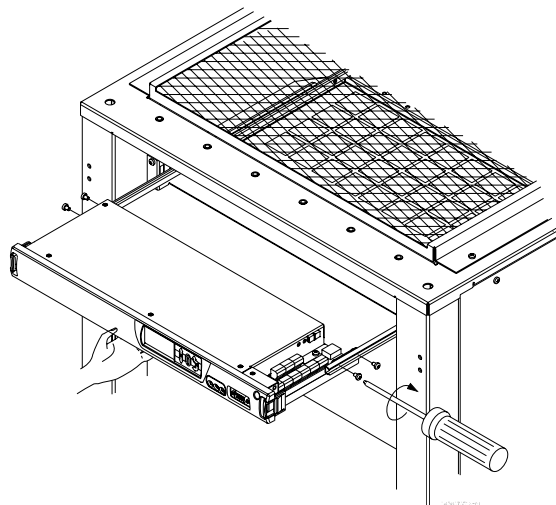
Step 3 - Remove the old SM65



- 1 Label then disconnect all the cables from the old SM65.
- 2 Unscrew the four screws that attach the SM65 to the sliders.




Step 4 - Attach the new SM65 to the sliders



Step 5 - Power up the new SM65



- 1 Connect the power cable to the SM65 connector XS8.
- 2 Check that the green  Power On LED is on. If not, consult Troubleshooting on page [38](#).

Step 6 - Download the appropriate configuration file into the new SM65

- 1 Connect a null modem cable from the front RS232 serial port of the SM65 to the serial port of the PC.
- 2 Start *DCTools*. If required, press F1 for *DCTools* online help.
- 3 On the **File** menu of *DCTools*, click **ICE Backup/Restore**. The Target Configuration Database Backup Wizard dialog is then displayed.
- 4 Select **Restore** then click **Next**.
- 5 Browse to the configuration file and click **Next**. Once the restore operation has been successfully completed, click **Finish**.
- 6 Check through the loaded configuration file in *DCTools* and make any required changes.
- 7 If you make any changes, save the configuration file with a new file name.

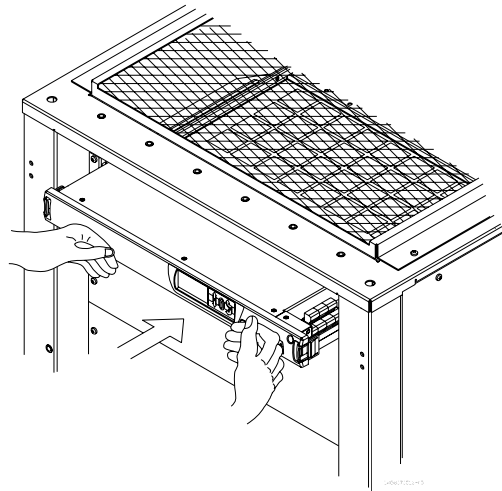
Step 7 - Connect the remaining cables to the SM65**Step 8 - Check that the new SM65 operates as intended**

- 1 Check all control functions, alarms and current measurement.
- 2 Check the power system identification parameters and communications settings.
- 3 Change the configuration file as required to ensure that the SM65 operates as intended.
- 4 Check that all rectifiers are communicating and that the SM65 has registered all rectifiers. This can be checked from the LCD display by viewing the individual rectifier currents in Main Display Mode. See supervisory module menu structure on inside front cover or Viewing System Values on page [11](#) for details.

Step 9 - Push in the SM65, until it latches closed and tighten the locking screw



- Keep fingers clear to avoid injury, as shown.



Step 10 - Reset any LVD controllers to Auto



If any LVD controllers were set to **Manual Connect** in Step 1 then reset them to **Auto**.



Refer to the DC power system Installation Guide for information on how to set the LVD Auto/Manual selector switch.

Procedure complete

Replacing the Real-time Clock Battery



- Only service personnel should replace the real-time clock battery.
- There is a risk of explosion if the used battery is replaced by an incorrect type.
- Dispose of the used battery according to the battery manufacturer's instructions.

A 3.6V lithium battery provides power to the real-time clock when the SM65 is not powered from a DC power system. The real-time clock battery may need to be replaced because of its life span (approximately 11 years).

The battery can be replaced with a Tadiran TL-5902/s, or equivalent, 1/2 AA non-rechargeable lithium battery.

Alarm Descriptions

AC Fail	All rectifiers are reporting loss of AC power.
AC Frequency*	The frequency of the AC supply is outside the configurable AC frequency band, defined as: Nominal AC Frequency \pm AC Frequency Threshold
AC Phase1 (or 2 or 3)*	The AC voltage of Phase 1, 2 or 3 is outside the configurable AC phase voltage band, defined as: Nominal AC Voltage (V) \pm AC Fail Urgent Threshold (%)
AC Phase1 (or 2 or 3) Volt*	The AC voltage of Phase 1, 2 or 3 is outside the configurable AC phase voltage band, defined as: Nominal AC Voltage (V) \pm AC Fail Non Urgent Threshold (%)
ACD Fan Fail	The AC Distribution cooling system or fan controller has failed.
Aux Temp Fail	The auxiliary temperature sensor is incorrectly configured, disconnected, not fitted or faulty.
Batt Current Limit**	Battery Current Limit (BCL) is active.
Batt Fuse Fail	A battery fuse has blown or a battery MCB has operated.
Battery Test Active**	A Battery Test is active.
Batt Test Fail**	The batteries do not have the required capacity or are not fully charged.
Cabinet Fan Failed	A cabinet fan (connected to XS3 pin 2, when XS3 pin 2 function is set to Cabinet Fan Fail) has failed.
CBC Comms Failed	The CellSure Fitted configuration file item is enabled but the CellSure Battery Controller (CBC) is not fitted or not registered by the SM65.
CBC Fail	A CBC connected to the SM65 has failed.
CBC Non Urgent	Non-urgent CellSure alarm(s) active. Only occurs if CellSure is fitted. See Interfacing the SM65 with CellSure on page 24 for details.
CBC Urgent	Urgent CellSure alarm(s) active. Only occurs if CellSure is fitted. See Interfacing the SM65 with CellSure on page 24 for details.
Config Error	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. Refer to Troubleshooting on page 38 for more information.
Equalize Active**	The Equalize function is active.
Fast Charge Active**	The Fast Charge function is active.
Generator Fail	The Generator Start Alarm has been active for the Generator Start Alarm Recognition Period but the AC supply is still not present.
Generator Start	Uses the Fast Charge and/or Equalize control function to start a generator. The generator is started with the batteries partially discharged and switched off when the batteries are fully recharged.
High Aux Temp	The auxiliary temperature sensor is at a temperature above the high temperature set point.
High Batt Temp	The battery temperature sensor is at a temperature above the high temperature set point. This alarm indicates either thermal runaway of the batteries or that the batteries are operating at a temperature that may cause reduced battery life.
High Float	The float voltage is above its normal range.

High Load	The bus voltage is higher than the safe range for the load and/or battery.
In Discharge	The batteries are discharging.
Load Fuse Fail	A load fuse has blown or a load MCB has operated.
Low Aux Temp	The auxiliary temperature sensor is at a temperature below the low temperature set point.
Low Batt Temp	The battery temperature sensor is at a temperature below the low temperature set point. This alarm indicates a risk to the standby power system battery as lower temperatures reduce the battery capacity.
Low Float	The float voltage is below its normal range.
Low Load	The bus voltage is lower than the safe range for the load and/or battery.
LVD1 (or LVD2) Disconnect**	LVD1 (or LVD2) has disconnected the battery or load.
LVD1 (or LVD2) Fail**	LVD1 (or LVD2) is faulty.
LVD1 (or LVD2) Manual**	The selector switch of LVD1 (or LVD2) is set to MANUAL CONNECT or MANUAL DISCONNECT.
MOV Fail	One or more MOV cartridges have failed and must be replaced.
Multiple Rect Fail	Multiple rectifiers are faulty or their AC power has been removed without causing partial or total AC failure.
No Load	The total rectifier current is less than 2% of the maximum system output current or is less than 2A.
Partial AC Fail	More than 20% of rectifiers are reporting loss of AC power or loss of a phase.
Rect(s) Comms Lost	Normally this alarm indicates that one or more rectifiers have 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, you can reset it from the keypad before it triggers an external alarm.
Rect Current Limit	Rectifier(s) in current limit.
Rectifier Fail	A rectifier is faulty or its AC power has been removed without causing partial or total AC failure. Removal of some types of rectifiers (for example R2048) during routine maintenance will cause a Rectifier Fail alarm. Rectifier Fail alarm can be reset from the keypad before it triggers an external alarm.
Rect Over-Temp	Rectifier(s) operating in temperature turndown mode, because of high ambient temperature or low AC supply voltage.
Sensor Fail	The current, temperature or voltage sensing system is faulty.
SiteSure Missing	An external input or output is mapped in the configuration file but the SiteSure equipment is not operational or not installed. See Interfacing the SM65 with SiteSure on page 27 for details.
System Overload	The power system is operating close to its maximum capacity and more rectifiers are needed. The System Overload threshold is configurable.

* These alarms only occur if the external AC metering option is fitted. See details on page [23](#).

** Refer to the Control Function Descriptions on page [51](#) for further information on these control functions.

Active Voltage Control

Active Voltage Control (AVC) 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.

Enable AVC to prevent undercharging the batteries during high load demand.

- Active Voltage Control does **NOT** function during a Battery Test or if the battery current is negative.*

Battery Current Limit (BCL)

Battery Current Limit automatically limits the battery recharge current to:

- Prevent overcharging of the batteries in under-loaded systems
- Minimize gas release in VRLA batteries

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

Battery Current 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 engine-alternator (EA). This reduces the load on the EA and allows a smaller EA to be used.

- Engine Run Limit is activated by a signal from an AC standby engine-alternator.*

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 SM65 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 first 48 hours after an AC power outage.*
- If a Digital Input has the function "Start Battery Test" then a Battery Test will be started when the Digital Input is active.*

Current Share

Current Share ensures that the total output power of the power system is evenly shared between all rectifiers.

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 be started when the Digital Input is active.

SM65 version 4.04 or later: If Equalize cannot start at the scheduled time (for example when there is no AC supply) then its state will be Pending and it will start as soon as conditions allow.

Fast Charge

After an AC power outage, 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 power outages.

- 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 [51](#) for details.

Load Based Rectifier Shutdown

Load Based Rectifier Shutdown (LBRS) 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 total power consumption.

- Rectifiers shut down by LBRS will have the  (red) alarm LED on.
- Rectifiers shut down by LBRS can be temporarily restarted from the SM65 keypad or DCTools using the Rectifier Restart function. See details on page [15](#).
- LBRS is not compatible with APR48-3G or APR24-3G rectifiers.

Low Voltage Disconnect (LVD)

Eaton Low Voltage Disconnects (LVD) can be connected either as load or battery disconnect and 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 failure.

Eaton LVDs are normally wired as battery disconnect.

The SM65 supervisory module has two independent 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.

When LVD1 and LVD2 are enabled then LVD2 will not disconnect until after LVD1 has disconnected.

2 LVD2 Slave Mode: In this mode LVD2 Slave Mode is enabled and LVD2 will mirror the operation of LVD1.

3 AC Timer Mode: When AC Timer is enabled, 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.

Ensure the LVD reconnect voltage is set higher than the expected open-circuit recovery voltage of the discharged batteries.

The operation of LVD contactors can be tested from the SM65 keypad using the LVD Test function. See details on page [15](#).

Relay Test

Simulates an alarm at the SM65 by changing the state of a relay between active and inactive. Use the Relay Test function to test reception of alarms at a remote location. See details on page [14](#).

System Overload

See *System Overload* alarm in Alarm Descriptions on page [49](#).

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.

CellSure Status Messages

Battery Cap Low (Battery Capacity Low)	The battery capacity is below the set threshold limit.
Bat Res Chge Low (Battery Reserve Charge Low Discharge)	Only a limited amount of backup capacity remains for the entire battery system. A warning to find an alternative power source if required.
Bat Res Time Low (Battery Reserve Time Low Discharge)	Only a limited amount of backup time remains for the entire battery system. A warning to find an alternative power source if required.
Battery SOH Fail (Battery State of Health Fail)	The battery may need to be replaced.
Battery SOH Low (Battery State of Health Low)	The condition of the battery is poor and requires either a boost recharge or replacing.
Battery SOH Poor (Battery State of Health Poor)	A battery string is in poor condition and may need replacing soon.
Bloc Cap Low (Bloc Capacity Low)	The capacity of an individual monobloc is below the set threshold limit. Capacity alarms are generated after completing a valid discharge. A valid discharge is defined as a completed discharge within a specific discharge rate and temperature range down to or beyond a partial discharge depth (full discharge or partial discharge depth). The capacity is calculated according to the built-in algorithm. By detecting low capacity in blocs, these poor-performing blocs can be removed before healthy blocs are affected.
Bloc Disch End V (Bloc End Voltage Discharge)	A full discharge (down to the specified end voltage) has been completed.
Charge Volt Div (Bloc Voltage Divergence Charge)	The voltage of an individual monobloc differs significantly from the average monobloc voltage of that string for the alarm time limit set. Used to identify blocs that do not regain their expected charge. These blocs may not be healthy and may fail soon.
Dischge Volt Div (Bloc Voltage Divergence Discharge)	The voltage of an individual monobloc is significantly below the maximum monobloc voltage of that string. Used to identify blocs that drop away during a discharge, indicating reduced capacity of that monobloc and the need for replacement. Several of these alarms generated during a discharge may indicate replacement of the whole string.
Bloc Float V Div (Bloc Voltage Divergence Float)	The voltage of an individual monobloc differs significantly from the average monobloc voltage of that string for the alarm time limit set. Used to identify blocs that do not regain their expected charge while on float. After further discharges, this information is useful to determine which blocs need to be replaced.
Bloc V Failure (Bloc Voltage Failure)	A monobloc in a string has failed. Provides a warning before imminent loss of string communication occurs in C2M sensor modules.

High Bloc Float (Bloc Voltage High Float)	<p>This alarm is based on the absolute voltage of the individual blocs for the set alarm time. A high float voltage indicates stressed cells/blocs. To prevent excessive gas build-up, Cells/blocs should not be float charged at a high float voltage for too long.</p> <p>A cell/monobloc with a high float voltage does not always indicate that it is faulty. That cell/monobloc may be “pressurized” by another.</p>
Low Bloc Float (Bloc Voltage Low Float)	<p>This alarm is based on the absolute voltage of the individual blocs for the set alarm time. Low float is the opposite of high float. In this case, a cell/monobloc is being undercharged. Many cells/blocs fail if undercharged by a too low float voltage.</p>
Bloc SOH Fail (Bloc State of Health Fail)	<p>A warning that the monobloc may need to be replaced.</p>
Bloc SOH Low (Bloc State of Health Low)	<p>The condition of the blocs is poor or requires extended float charging or a boost recharge.</p>
Bloc SOH Poor (Bloc State of Health Poor)	<p>An early warning that a monobloc is in poor condition and may need replacing soon.</p>
CBC DB Corrupt	<p>System configuration or calibration database error.</p>
Slave Comms Flt	<p>CellSure Battery Controller (CBC) has lost communications with one or more slave sensor modules.</p>
CBC Slave HW Flt (Slave Hardware Fault)	<p>A slave sensor module reports invalid monobloc voltage / string temperature readings.</p>
String Cap Low (String Capacity Low)	<p>The capacity of a string is below the set threshold limit. Indicates that the capacity of a number of blocs in that string is low.</p>
Charge Crnt Div (String Current Divergence Charge)	<p>The individual string currents differ significantly for the alarm time limit set. String current divergence indicates state of charge or capacity imbalances between strings.</p>
Dischge Crnt Div (String Current Divergence Discharge)	<p>The individual string currents differ significantly for the alarm time limit set. Indicates state of charge or capacity imbalances between strings.</p>
Start of Float (String End of Charge)	<p>The string is float charging. This is determined by the fact that the string has been charging for longer than the time given by the Event Threshold and the string current does not exceed either the charge event threshold or discharge event threshold.</p>
Full Disch Comp (String Full Discharge Completed)	<p>A logged event to indicate that a full discharge has been completed. Used to maintain a history of full discharges.</p>
Part Disch Comp (String Partial Discharge Completed)	<p>A logged event to indicate that a partial discharge has been completed. Used to maintain a history of discharges.</p>
Str Res Chge Low (String Reserve Charge Low Discharge)	<p>Only a limited amount of backup capacity remains for this string. A warning to find an alternative power source if required.</p>
Str Res Time Low (String Reserve Time Low Discharge)	<p>Only a limited amount of backup time remains for this string. A warning to find an alternative power source if required.</p>
Start of Charge (String Start of Charge)	<p>The string is charging, if the string current exceeds the event threshold.</p>

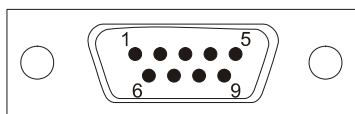
Start of Dischge (String Start of Discharge)	The string is discharging, if the string current exceeds the set threshold.
String SOH Fail (String State of Health Fail)	A warning that the string may need to be replaced.
String SOH Low (String State of Health Low)	The condition of the strings is poor or requires extended float charging or a boost recharge.
String SOH Poor (String State of Health Poor)	An early warning that a string is in poor condition and may need replacing soon.
Str Abs T High (String Temp High Absolute)	The temperature of the pilot cell in a string exceeds the set threshold and alarm time limits. The string and ambient temperatures should be similar when the batteries are on float. If the string temperature exceeds the normal operating temperature of the battery, the battery is being thermally stressed resulting in reduced life.
Str T High Charg (String Temp High Ambient Charge)	The string temperature exceeds the ambient temperature for the set threshold and alarm time limits. The alarm indicates that the temperature of the pilot cell in a string has increased significantly. This in turn indicates thermal run away or overcharged cells.
Str T High Float (String Temp High Ambient Float)	The string temperature exceeds the ambient temperature for the set threshold and alarm time limits. The alarm indicates that the temperature of the pilot cell in a string has increased significantly. This in turn indicates thermal run away or overcharged cells.

Connector Pin-outs

Connector	Type	Purpose	Pin	Description
XS1	D9M	Front RS232 Serial Interface	1	-
			2	Rx
			3	Tx
			4	DTR (Connected to pin 7 internally)
			5	COM
			6	-
			7	RTS
			8	-
			9	-
XS1A	RJ45	Rear RS232 Serial Interface	1	RD (Receive Data)
			2	TD (Transmit Data)
			3	RTS (Request to Send)
			4	-
			5	Common (Ground)
			6	DTR (Data Terminal Ready)
			7	-
			8	-
XS2	RJ45	Fuse/MCB DC Distribution Interface	1	Load Fuse Fail
			2	Battery Fuse Fail
			3	+12V out
			4	-
			5	-
			6	0V out
			7	-
			8	-
XS3	RJ45	AC Distribution Interface	1	MOV Fail
			2	Mains Fail
			3	+ 12V out
			4	Fan Fail
			5	-
			6	0V out
			7	-
			8	-

Connector	Type	Purpose	Pin	Description
XS4	RJ45	LVD2 Interface	1	LVD fail input
			2	LVD Disconnect relay
			3	+12V out
			4	LVD Disconnect relay
			5	LVD Connect relay
			6	0V out
			7	LVD Connect relay
			8	LVD Manual
XS5	RJ45	LVD1 Interface	1	LVD fail input
			2	LVD Disconnect relay
			3	+12V out
			4	LVD Disconnect relay
			5	LVD Connect relay
			6	0V out
			7	LVD Connect relay
			8	Manual switch input
XS6	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
XS7	RJ45	Temperature Sense Inputs	1	-
			2	BC Fuse Fail
			3	+12V out
			4	Temp Sense 1+
			5	Temp Sense 1-
			6	0V out
			7	Temp Sense 2+
			8	Temp Sense 2-

Connector	Type	Purpose	Pin	Description
XS11	RJ45	Rack Communications	1	+9V
			2	+9V
			3	-
			4	A
			5	B
			6	-
			7	0V
			8	0V
XS31	RJ45	Ethernet Interface	1	Rx
			2	Rx
			3	Tx
			4	-
			5	-
			6	Tx
			7	-
			8	-



RS232 D9M connector pin-outs



RJ45 connector pin-outs

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 Eaton DC product supplier or Eaton Corporation, Telecommunications Power Solutions. Telephone: +64 3 343 7448, Fax: +64 3 343 7446. 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

<input type="checkbox"/> Delivery	<input type="checkbox"/> Unpacking	<input type="checkbox"/> Installation
<input type="checkbox"/> Initial test	<input type="checkbox"/> Operation after _____ years	<input type="checkbox"/> Other _____

Failure source

<input type="checkbox"/> Design	<input type="checkbox"/> Manufacturing	<input type="checkbox"/> Documentation
<input type="checkbox"/> Transportation	<input type="checkbox"/> Installation	<input type="checkbox"/> Handling
<input type="checkbox"/> _____		

Effect on system operation None Minor Major _____

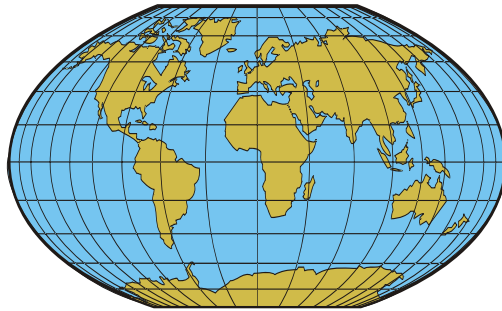
INFORMATION (fault details, circumstances, consequences, actions)

Internal use only.

Reference No: _____ RMA: _____ NCR: _____ Signature: _____ Date: _____

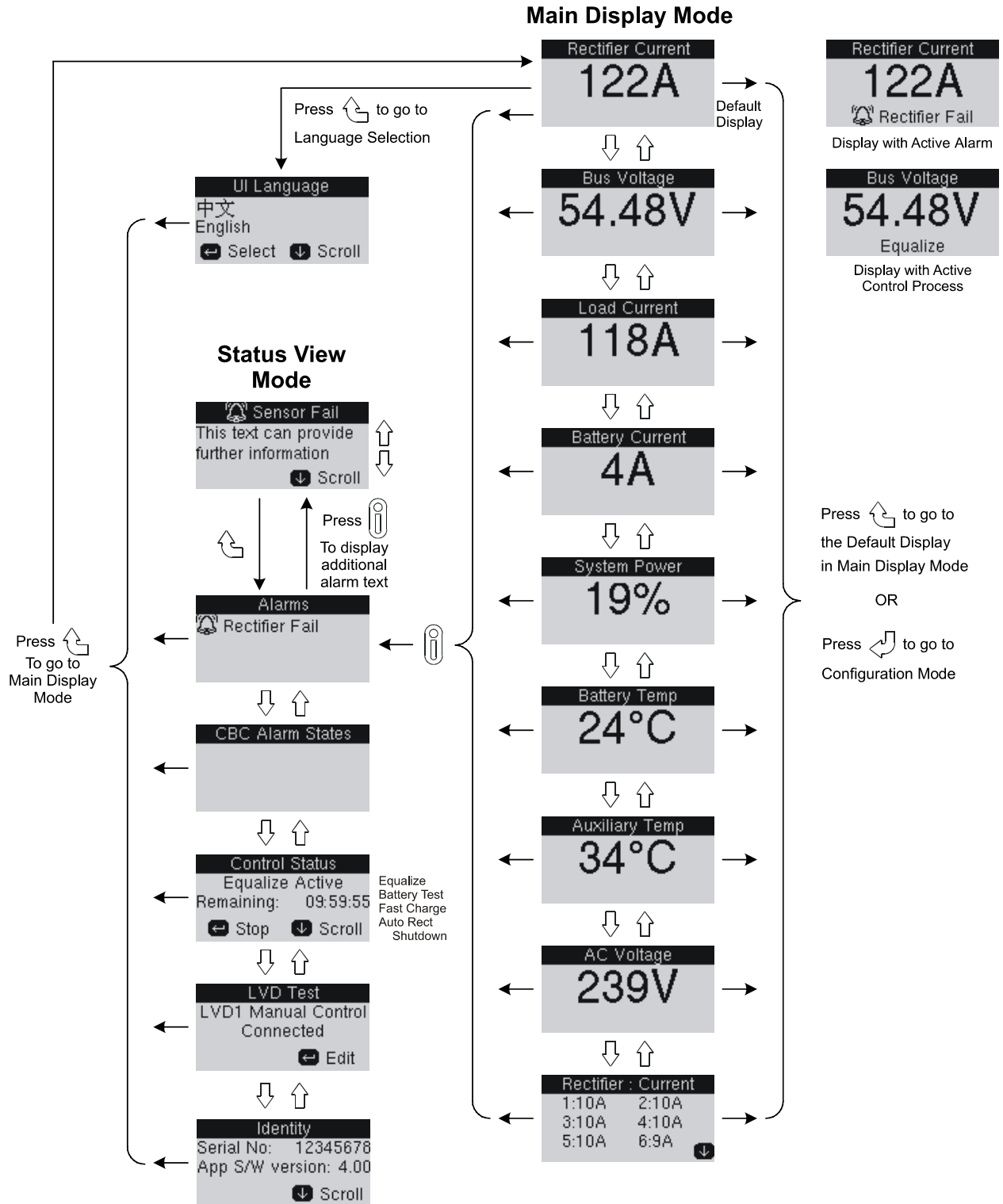
For product information and a complete listing of worldwide sales offices, visit Eaton's Eaton website at: www.eaton.com/telecompower or email: DCinfo@eaton.com

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



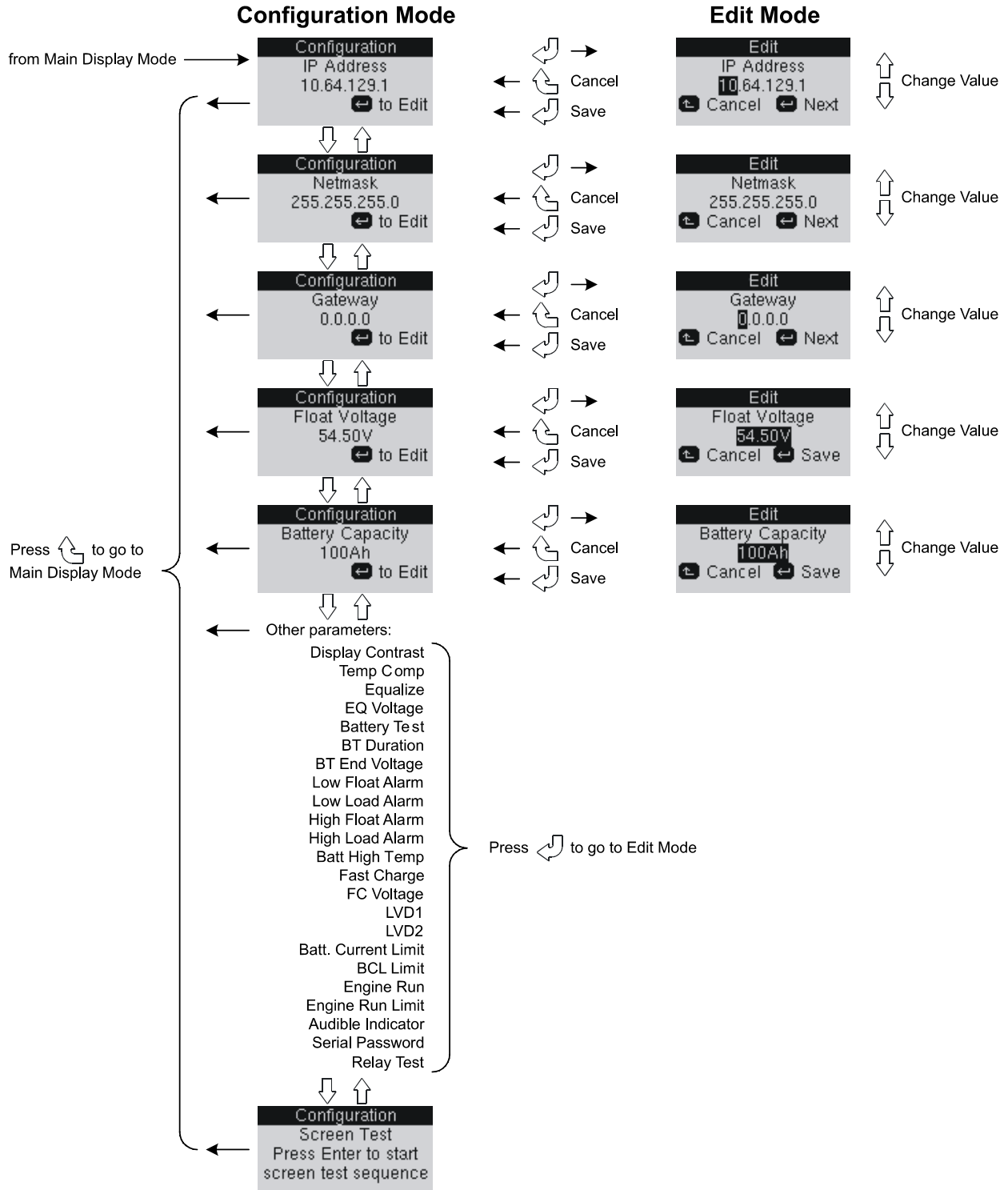
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Canada	1-800-461-9166
Central America	+52 55 9000 5252
China	+86-571-8848-0166
Europe / Middle East / Africa	+44-1243-810-500
Hong Kong / Korea / Japan	+852-2745-6682
India	+91-11-4223-2325
New Zealand	0800 DC Power (327-693)
Singapore / South East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

SM65 LCD Display Menu Structure



- Enter Key: go to Configuration Mode and Edit Mode, save configuration changes, clear alarms or toggle relay states
- Up Key: scroll up lists and menus and increase configuration values
- Information Key: View status messages and active alarms in Status View Mode
- Escape Key: go to Main Display Mode or cancel configuration changes
- Down Key: scroll down lists and menus and decrease configuration values
- Display Time-out: Edit Mode - no time-out
Other modes - 2 minutes

SM65 LCD Display Menu Structure



	Enter Key: go to Configuration Mode and Edit Mode, save configuration changes, clear alarms or toggle relay states		Up Key: scroll up lists and menus and increase configuration values		Information Key: View status messages and active alarms in Status View Mode
	Escape Key: go to Main Display Mode or cancel configuration changes		Down Key: scroll down lists and menus and decrease configuration values		Display Time-out: Edit Mode - no time-out Other modes - 2 minutes