



# **DEEP SEA ELECTRONICS**

## **DSE335 Configuration Suite PC Software**

### **Manual**

(Applicable to module version 4.2 and upwards)

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**DSE335 Configuration Suite PC Software Manual**

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**Amendments List**

| <b>Amd. No.</b> | <b>Comments</b>   |
|-----------------|---|
| 1               | Initial release   |
| 2               | Added updates to Breaker Scheme C, Closed Transition operation. |
| 3               | Updated for v4.7 features. Manually updated to latest standard  |

Typeface: The typeface used in this document is *Arial*. Care must be taken not to mistake the upper case letter I with the numeral 1. The numeral 1 has a top serif to avoid this confusion.

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# 1 INTRODUCTION

 **NOTE:** This manual details the configuration of the DSE335 module version 4.2 and later, part of the DSEATS® range of products. A separate document covers the configuration of DSE335 modules with firmware version prior to version 4.2.

This document details the use of the *DSE Configuration Suite PC Software* with the DSE8610 MKII module, which is part of the DSEATS® range of products.

The manual forms part of the product and should be kept for the entire life of the product. If the product is passed or supplied to another party, ensure that this document is passed to them for reference purposes.

This is not a *controlled document*. DSE do not automatically inform on updates. Any future updates of this document are included on the DSE website at [www.deepseaelectronics.com](http://www.deepseaelectronics.com)

The *DSE Configuration Suite PC Software* allows the DSE8610 MKII module to be connected to a PC via USB A to USB B cable (USB printer cable). Once connected, the software allows easy, controlled access to various operating parameters within the module which can then be viewed and edited as required.

The *DSE Configuration Suite PC Software* must only be used by competent, qualified personnel, as changes to the operation of the module may have safety implications on the panel / generating set to which it is fitted. Access to critical operational sequences and settings for use by qualified engineers, may be barred by a security code set by the generator provider.

The information contained in this manual must be read in conjunction with the information contained in the appropriate module documentation. This manual only details which settings are available and how they may be used. Separate manuals deal with the operation of the individual module and its ancillaries, refer to section entitled *Bibliography* elsewhere in this document for further information.

## 1.1 CLARIFICATION OF NOTATION

Clarification of notation used within this publication.

|   |   |
|---|---|
|  <b>NOTE:</b>    | Highlights an essential element of a procedure to ensure correctness.   |
|  <b>CAUTION!</b> | Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment. |
|  <b>WARNING!</b> | Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly. |

## 1.2 GLOSSARY OF TERMS

| Term   | Description   |
|--------|---|
| DSE3xx | All modules in the DSE3xx ATS range.  |
| CT     | Current Transformer<br>An electrical device that takes a large AC current and scales it down by a fixed ratio to a smaller current.   |
| BMS    | Building Management System<br>A digital/computer based control system for a building's infrastructure.  |
| GSM    | Global System for Mobile communications. Cell phone technology used in most of the World.   |
| HMI    | Human Machine Interface<br>A device that provides a control and visualisation interface between a human and a process or machine.   |
| IDMT   | Inverse Definite Minimum Time   |
| IEEE   | Institute of Electrical and Electronics Engineers   |
| LED    | Light Emitting Diode  |
| MSC    | Multi-Set Communication   |
| SCADA  | Supervisory Control And Data Acquisition<br>A system that operates with coded signals over communication channels to provide control and monitoring of remote equipment                     |
| SCR    | Selective Catalytic Reduction<br>A process that uses DEF with the aid of a catalyst to convert nitric oxide and nitrogen dioxide into nitrogen and water to reduce engine exhaust emission. |
| SIM    | Subscriber Identity Module.<br>The small card supplied by the GSM/CDMA provider that is inserted into the cell phone, GSM modem or DSEGateway device to give GSM/GPRS connection.           |
| SMS    | Short Message Service<br>The text messaging service of mobile/cell phones.  |

## 1.3 BIBLIOGRAPHY

This document refers to, and is referred by the following DSE publications which are obtained from the DSE website: [www.deepseaelectronics.com](http://www.deepseaelectronics.com) or by contacting DSE technical support: [support@deepseaelectronics.com](mailto:support@deepseaelectronics.com).

### 1.3.1 INSTALLATION INSTRUCTIONS

Installation instructions are supplied with the product in the box and are intended as a 'quick start' guide only.

| DSE Part | Description   |
|----------|---|
| 053-136  | DSE335 Installation Instructions                            |
| 053-033  | DSE2130 Input Expansion Installation Instructions           |
| 053-034  | DSE2157 Output Expansion Installation Instructions          |
| 053-032  | DSE2548 LED Expansion Annunciator Installation Instructions |
| 053-049  | DSE9xxx Battery Charger Installation Instructions           |
| 053-147  | DSE9460 & DSE9461 Battery Charger Installation Instructions |
| 053-185  | DSE9473 & DSE9483 Battery Charger Installation Instructions |

### 1.3.2 MANUALS

Product manuals are obtained from the DSE website: [www.deepseaelectronics.com](http://www.deepseaelectronics.com) or by contacting DSE technical support: [support@deepseaelectronics.com](mailto:support@deepseaelectronics.com).

| DSE Part | Description   |
|----------|---|
| 057-151  | DSE Configuration Suite PC Software Installation & Operation Manual |
| 057-233  | DSE335 Operator Manual  |
| 057-157  | DSE335 Configuration Suite PC Software Manual – prior to v4.2       |
| 057-082  | DSE2130 Input Expansion Operator Manual                             |
| 057-083  | DSE2157 Output Expansion Operator Manual                            |
| 057-084  | DSE2548 Annunciator Expansion Operator Manual                       |
| 057-085  | DSE9xxx Battery Charger Operator Manual                             |
| 057-151  | DSE Configuration Suite PC Software Installation & Operation Manual |
| 057-175  | PLC Programming Guide For DSE Controllers                           |
| 057-176  | DSE9460 & DSE9461 Battery Charger Operator Manual                   |
| N/A      | DSEGencomm (MODBUS protocol for DSE controllers)                    |

### 1.3.3 TRAINING GUIDES

Training guides are provided as 'hand-out' sheets on specific subjects during training sessions and contain specific information regarding to that subject.

| DSE Part | Description                                |
|----------|--|
| 056-005  | Using CTs With DSE Products                |
| 056-017  | OC Configuration Interfacing               |
| 056-018  | Negative Phase Sequence                    |
| 056-019  | Earth Fault Protection                     |
| 056-021  | Mains Decoupling                           |
| 056-022  | Switchgear Control                         |
| 056-024  | GSM Modem                                  |
| 056-026  | kVA, kW, kvar and Power Factor             |
| 056-030  | Module PIN Codes                           |
| 056-036  | DSE Module Expansion                       |
| 056-047  | Out of Sync and Failed To Close            |
| 056-051  | Sending DSEGencomm Control Keys            |
| 056-053  | Recommended Modems                         |
| 056-069  | Firmware Update                            |
| 056-075  | Adding Language Files                      |
| 056-076  | Reading DSEGencomm Alarms                  |
| 056-079  | Reading DSEGencomm Status                  |
| 056-080  | MODBUS                                     |
| 056-091  | Equipotential Earth Bonding                |
| 056-092  | Best Practices for Wiring Restive Sensors  |
| 056-097  | USB Earth Loops and Isolation              |
| 056-099  | Digital Output to Digital Input Connection |
| 056-116  | Underspeed and Overspeed                   |

### 1.3.4 THIRD PARTY DOCUMENTS

The following third party documents are also referred to:

| Reference          | Description   |
|--------------------|---|
| ISBN 1-55937-879-4 | IEEE Std C37.2-1996 IEEE Standard Electrical Power System Device Function Numbers and Contact Designations. Institute of Electrical and Electronics Engineers Inc |
| ISBN 0-7506-1147-2 | Diesel generator handbook. L.L.J. Mahon   |
| ISBN 0-9625949-3-8 | On-Site Power Generation. EGSA Education Committee.   |

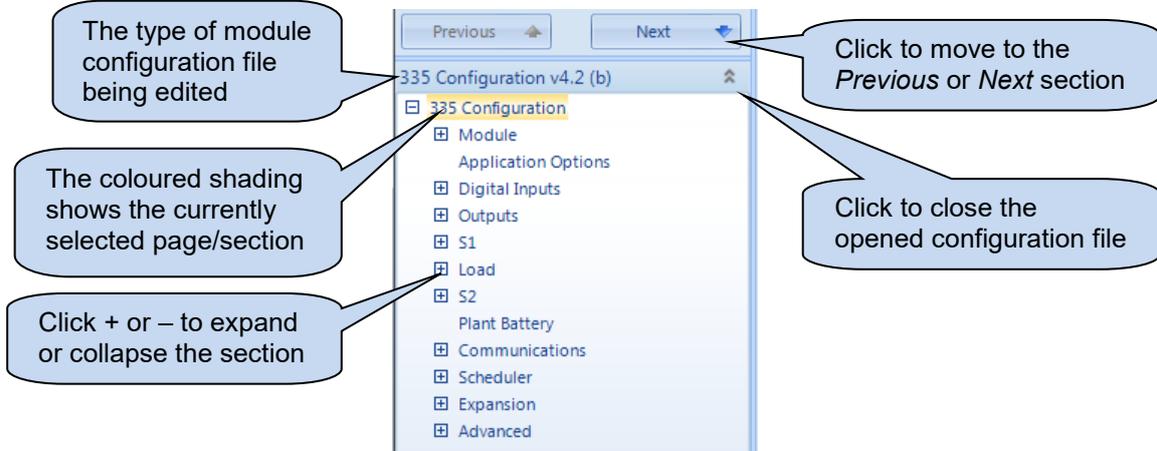
## 1.4 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

For information in regards to installing and using the *DSE Configuration Suite PC Software*, refer to DSE publication: **057-151 DSE Configuration Suite PC Software Installation & Operation Manual** which is found on the DSE website: [www.deepseaelectronics.com](http://www.deepseaelectronics.com)

## 2 EDITING THE CONFIGURATION

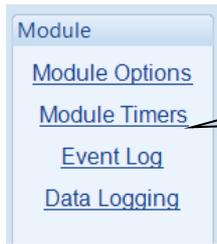
The software is broken down into separate sections to provide simple navigation whilst editing the module's configuration to suit a particular application.

### 2.1 SCREEN LAYOUT



## 2.2 MODULE

The *Module* section allows the user to edit options related to the module itself and is subdivided into smaller sections.



Click to view / edit the section

### 2.2.1 MODULE OPTIONS

Allows the user to select the function of the modules user configurable LED indicators. For details of possible selections, please see section entitled *Output Sources*

| LED Indicators |          |     |     |
|----------------|----------|-----|-----|
| 1              | Not Used | Lit | Red |
| 2              | Not Used | Lit | Red |
| 3              | Not Used | Lit | Red |
| 4              | Not Used | Lit | Red |

- Lamp Test at Power-Up
- Power up in Auto
- Transfer by buttons
- Support Right-To-Left Languages in Module Strings
- Enable Backlight Power Saving Mode
- Display source summary screens
- Disable Stop Mode

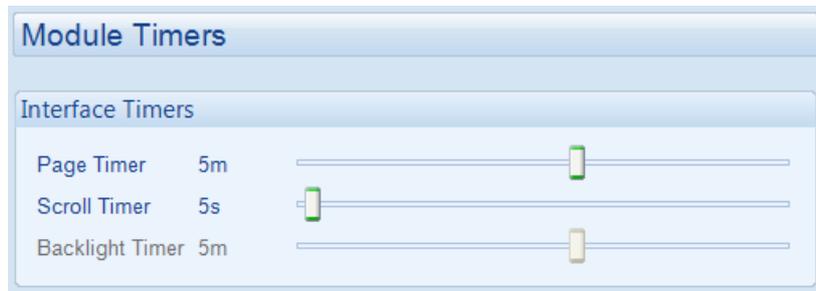
Free entry boxes to allow the user to give the configuration file a description. Typically this is used to enter the job number, customer name, engineers name etc.

Allows the user to create logo and text insert cards

Parameters are described overleaf...

| Parameter                                      | Description  |
|--|--|
| Lamp test at power up                          | <input type="checkbox"/> = Lamp test at power up is disabled.<br><input checked="" type="checkbox"/> = All module lamps illuminate when power is first applied.  |
| Power Up in Auto                               | <input type="checkbox"/> = The module enters START INHIBIT mode when DC power is applied.<br><input checked="" type="checkbox"/> = The module enters AUTO mode when DC power is applied.   |
| Transfer by buttons                            | <input type="checkbox"/> = Fascia load control buttons are disabled.<br><input checked="" type="checkbox"/> = Fascia load control buttons are enabled when the module is in Manual Mode.   |
| Support right-Left Languages in Module Strings | Determines the direction of text input where supported (i.e. configurable input text)<br><input type="checkbox"/> = Left to right language support<br><input checked="" type="checkbox"/> = Right to left language support   |
| Enable Backlight Power Saving Mode             | <input type="checkbox"/> = The LCD Backlight stays On at all times.<br><input checked="" type="checkbox"/> = DC power saving mode by turning off the LCD Backlight when the module is not operated for the duration of the <i>Backlight Timer</i> .  |
| Display Source Summary Screens                 | <input type="checkbox"/> = Source Summary Screens are not shown on the module display<br><input checked="" type="checkbox"/> = Additional screens for the two sources are shown the module display.  |
| Disable Stop Mode                              | <input type="checkbox"/> = Pressing the Stop Button changes the operating mode to <i>Stop</i> mode (therefore removing the <i>S2 Start and Run</i> output).<br><input checked="" type="checkbox"/> = Pressing the Stop Button does not change the operating mode to <i>Stop</i> mode (the <i>S2 Start and Run</i> output remains active).<br>This allows the user to select the <i>Stop</i> button to enter the FPE and clear alarms without changing the Modules Operating Mode |

## 2.2.2 MODULE TIMERS



| Parameter       | Description  |
|-----------------|--|
| Page Timer      | The amount of time before the module reverts to show the <i>Status</i> page when it is left unattended |
| Scroll Timer    | The amount of time for automatic scroll between parameters on a selected page.                         |
| Backlight Timer | When the module is not operated for the duration of the Backlight Timer, the LCD backlight turns off   |

### 2.2.3 EVENT LOG

The event log is configured to allow users to select which events are stored.

| Parameter                  | Description  |
|----------------------------|--|
| Power Up                   | <input type="checkbox"/> = Power up events are not logged in the module's event log<br><input checked="" type="checkbox"/> = Power up events are logged when the DC Supply is applied to the module or whenever the module is rebooted |
| S1 Return                  | <input type="checkbox"/> = The S1 Return events are not logged in the module's event log<br><input checked="" type="checkbox"/> = Logs the S1 Return events  |
| S1 Fail                    | <input type="checkbox"/> = The S1 Fail events are not logged in the module's event log<br><input checked="" type="checkbox"/> = Logs the S1 Failure events   |
| S2 Return                  | <input type="checkbox"/> = The S2 Return events are not logged in the module's event log<br><input checked="" type="checkbox"/> = Logs the S2 Return events  |
| S2 Fail                    | <input type="checkbox"/> = The S2 Fail events are not logged in the module's event log<br><input checked="" type="checkbox"/> = Logs the S2 Failure events   |
| Electrical Trip Alarms     | <input type="checkbox"/> = The Electrical Trip Alarms are not logged in the module's event log<br><input checked="" type="checkbox"/> = Logs the Electrical Trip alarms  |
| Latched Warnings           | <input type="checkbox"/> = The Latched Warning Alarms are not logged in the module's event log<br><input checked="" type="checkbox"/> = Logs the Latched Warning Alarms  |
| Unlatched Warnings         | <input type="checkbox"/> = The Unlatched Warning Alarms are not logged in the module's event log<br><input checked="" type="checkbox"/> = Logs the Unlatched Warning Alarms  |
| Breaker Auxiliary Failures | <input type="checkbox"/> = The Breaker Auxiliary Failures are not logged in the module's event log<br><input checked="" type="checkbox"/> = Logs the Breaker Auxiliary Failures  |

### 2.2.4 DATA LOGGING

## 2.3 APPLICATION OPTIONS

### Application Options

Application Options

Breaker Type

Check Sync

Return to Programmed Transition

Elevator Post Transfer

Breaker Close Transition  *Please read the manual before enabling*

Inhibit Retransfer to S1

### Transfer Timers

|               |       |                       |
|---------------|-------|-----------------------|
| Fail to Close | 250ms | <input type="range"/> |
| Paralleling   | 100ms | <input type="range"/> |
| Fail To Open  | 250ms | <input type="range"/> |

### S1

Identity

Source Type

Source Priority

Phase Display

### S2

Identity

Source Type

Source Priority

Phase Display

Parameters are detailed overleaf...

| Parameter                       | Description   |
|---------------------------------|---|
| Breaker Type                    | See overleaf for description of the <i>Breaker Type</i> .   |
| Check Sync                      | This option is only available when <i>Scheme B</i> is selected. See overleaf for description of the <i>Check Sync</i> options<br><input type="checkbox"/> = None check sync operation<br><input checked="" type="checkbox"/> = During load transfer, the module only closes its breaker within the check sync window. See overleaf for description of the <i>Check Sync</i> options.  |
| Return to programmed transition | This option is only available when <i>Check Sync</i> is enabled. See overleaf for description of the <i>Check Sync</i> options<br><input type="checkbox"/> = Normal operation<br><input checked="" type="checkbox"/> = During load transfer if the <i>check sync</i> of the supplies does not occur within two minutes, a 'break' or 'open transition' transfer occurs.   |
| Elevator Post Transfer          | <input type="checkbox"/> = Normal operation<br><input checked="" type="checkbox"/> = Any configurable output set to <i>elevator control</i> remains active for the duration of the <i>elevator delay</i> after a load transfer has taken place.   |
| Breaker Close Transition        | This option is only available when <i>Scheme C</i> is selected. See overleaf for description of the <i>Scheme C</i> options<br><input type="checkbox"/> = Break before make operation<br><input checked="" type="checkbox"/> = During load transfer, the module only closes its breaker within the check sync window. See overleaf for description of the <i>Check Sync</i> options.  |
| Inhibit Retransfer to S1        | <input type="checkbox"/> = When the S1 supply is reinstated after a failure, the re-transfer back to S1 takes place.<br><input checked="" type="checkbox"/> = This prevents the load being transferred back to the S1 supply, even in the event of the S2 supply failing.   |
| Fail to Close                   | This option is only available when <i>Scheme C</i> and <i>Breaker Close Transition</i> are selected. See overleaf for description of the <i>Scheme C</i> options<br>When the <i>Close S1</i> or <i>Close S2</i> output is activated, if the configured <i>S1 Closed Auxiliary</i> or <i>S2 Closed Auxiliary</i> digital input respectively do not become active within the <i>Fail To Close</i> timer, the alarm is activated |
| Paralleling                     | This option is only available when <i>Scheme C</i> and <i>Breaker Close Transition</i> are selected. See overleaf for description of the <i>Scheme C</i> options<br>This timer dictates how long the two supplies are closed in parallel for during the <i>Close Transition</i> .   |
| Fail to Open                    | This option is only available when <i>Scheme C</i> and <i>Breaker Close Transition</i> are selected. See overleaf for description of the <i>Scheme C</i> options<br>When the <i>Close S1</i> or <i>Close S2</i> output is de-activated, if the configured <i>S1 Closed Auxiliary</i> or <i>S2 Closed Auxiliary</i> digital input respectively do not deactivate within the <i>Fail To Open</i> timer, the alarm is activated  |
| S1 Identity                     | Enter a text string to identify the module's S1 source.   |
| S1 Source Type                  | Select the function of the module's S1 sensing terminals:<br><b>Mains</b><br><b>Generator</b>   |
| S1 Source Priority              | Select the S1 priority<br>Available options to choose from:<br><b>Priority</b><br><b>Standby</b>  |
| S1 Phase Display                | Choose which phase voltage to show on the module display  |
| S2 Identity                     | Enter a text string to identify the module's S2 source.   |
| S2 Source Type                  | Select the function of the module's S2 sensing terminals:<br><b>Mains</b><br><b>Generator</b>   |
| S2 Source Priority              | Select the S2 priority<br>Available options to choose from:<br><b>Priority</b><br><b>Standby</b>  |
| S2 Phase Display                | Choose which phase voltage to show on the module display  |

### 2.3.1 BREAKER SCHEME A

Breaker scheme A is suitable for contactors or ACBs.

**NOTE:** S1 Closed Auxiliary and S2 Closed Auxiliary inputs do not affect the operation of the load switching in Breaker Scheme A

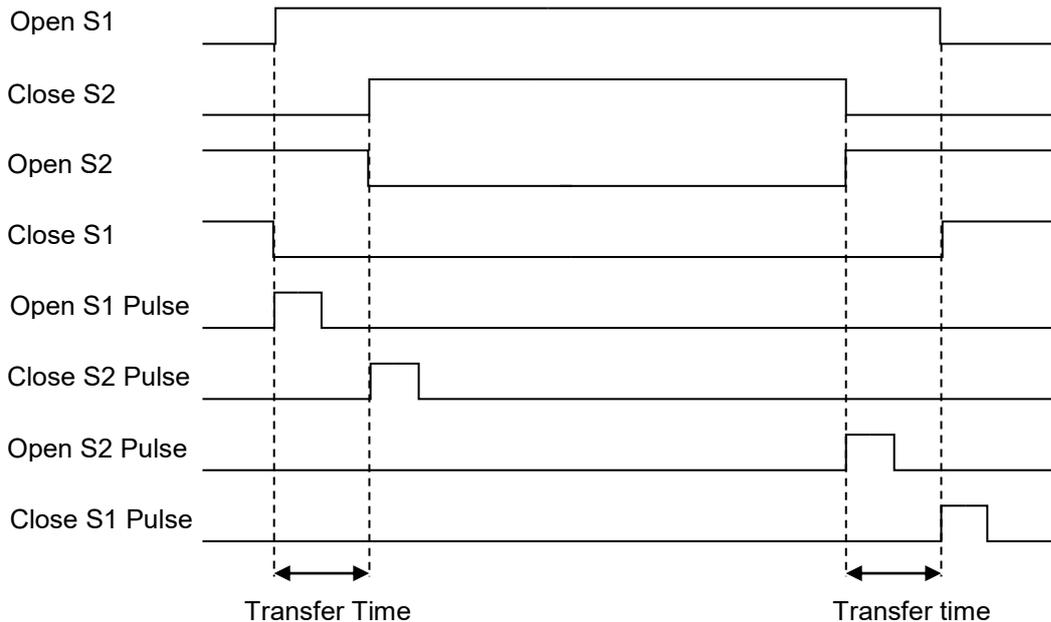
#### 2.3.1.1 S1 / S2 LOAD INHIBIT

Activation of an input configured to *S1 Load Inhibit* or *S2 Load Inhibit* inputs cause the corresponding breaker to be opened immediately. No other change in function occurs. When the input is deactivated the breaker is closed again if appropriate.

#### 2.3.1.2 S1 AND S2 LOAD INHIBIT

If an input configured to *S1 and S2 Load Inhibit* is activated, outputs set to Open S1 and Open S2 energise, and inputs configured to Close S1 and Close S2 de-energise. Open S1 Pulse and Open S2 Pulse outputs only energise if the corresponding supply was on load before application of the *S1 and S2 Load Inhibit* input. When the *S1 and S2 Load Inhibit* input is deactivated the load is returned to the supply that was disconnected, providing that supply is healthy.

#### 2.3.1.3 TIMING DIAGRAM



### 2.3.2 BREAKER SCHEME B

Breaker Scheme B is intended only for use with certain designs of transfer switch. For example, rotary transfer switches with very short changeover time.

This scheme is only suitable for breakers which require pulse signals for opening and closing.

#### 2.3.2.1 CHECK SYNC IS DISABLED

##### TRANSFERRING TO S1

To open the S1 breaker the *Open S1* output energises, it then de-energises when the *S1 Closed Auxiliary* indicates it has successfully opened, or after 1s whichever occurs first.

When the 'S1 Closed Auxiliary' indicates the S1 breaker has opened, the *transfer timer* begins.

When the *transfer timer* expires, the module attempts to close the S2 breaker by energising the *Open S1* and *Close S2* outputs simultaneously, it then de-energises these outputs when the *S1 Closed Auxiliary* input indicates it has successfully closed, or after 1s whichever occurs first.

##### TRANSFERRING TO S2

To open the S2 breaker the *Open S2* output energises, it then de-energises when the *S2 Closed Auxiliary* indicates it has successfully opened, or after 1s whichever occurs first.

When the 'S2 Closed Auxiliary' indicates the S2 breaker has opened, the *transfer timer* begins.

When the *transfer timer* expires, the module attempts to close the S1 breaker by energising the *Open S2* and *Close S1* outputs simultaneously, it then de-energises these outputs when the *S1 Closed Auxiliary* input indicates it has successfully closed, or after 1s whichever occurs first

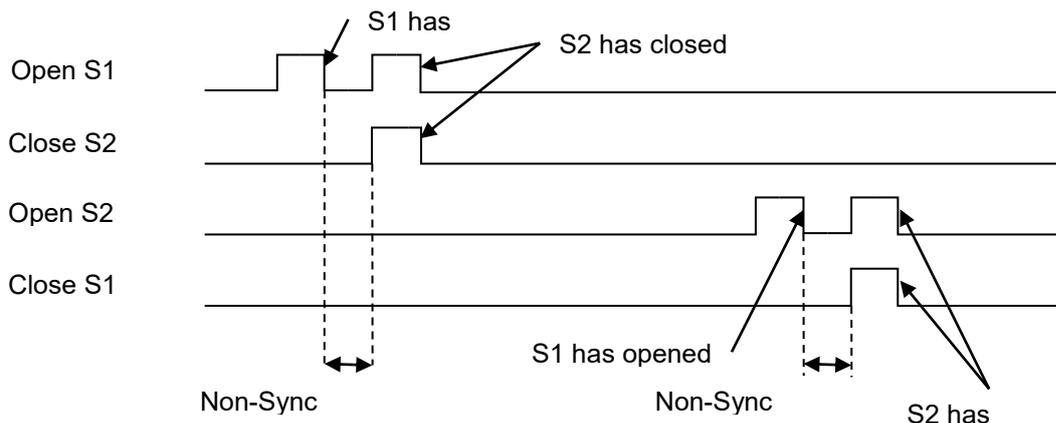
#### S1 AND S2 LOAD INHIBIT INPUT

When the *S1 and S2 Load Inhibit* input is activated while S2 is closed the *Open S2* output energises, it then de-energises when the *S2 Closed Auxiliary* input indicates that it has successfully opened, or after 1s whichever occurs first.

When the *S1 and S2 Load Inhibit* input is activated while S1 is closed the *Open S1* output energises, it then de-energises when the *S1 Closed Auxiliary* input indicates that it has successfully opened, or after 1s whichever occurs first.

When the *S1 and S2 Load Inhibit* input is deactivated the load is returned to the supply that was disconnected, providing that supply is healthy.

#### TIMING DIAGRAM



### 2.3.2.2 CHECK SYNC IS ENABLED

**NOTE :** The module waits indefinitely for synchronisation unless the 'Return to programmed transition' function is active in which case after 2 minutes it performs a non-sync transfer as described in the previous section.

**NOTE:** The transfer time is ignored during a check-sync but is used if the transfer fails and it performs a non-sync transfer.

#### TRANSFER TO S2

When the module is about to transfer from S1 to S2 it activates the check sync function. When the S1 and S2 supplies are within the phase and frequency window the module energises the *Open S1* and *Close S2* outputs simultaneously. These outputs are de-energised when the *S2 Closed Auxiliary* input indicates it has successfully closed, or after 1s whichever occurs first.

#### TRANSFER TO S1

When the module is about to transfer from S2 to S1 it activates the check sync function. When the S1 and S2 supplies are within the phase and frequency window the module energises the *Open S2* and *Close S1* outputs simultaneously. These outputs are de-energised when the *S1 Closed Auxiliary* input indicates it has successfully closed, or after 1s whichever occurs first.

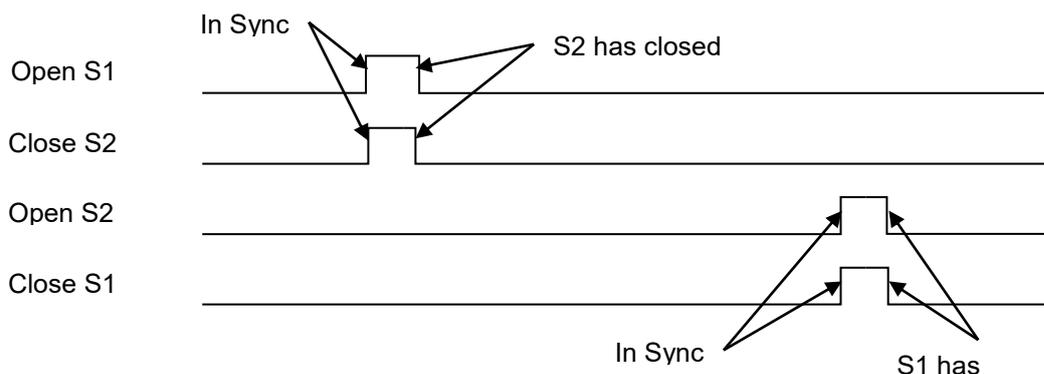
#### S1 AND S2 LOAD INHIBIT

When the *S1 and S2 Load Inhibit* input is activated while the S2 is closed the *Open S2* output energises, it then de-energises when the *S2 Closed Auxiliary* input indicates that it has successfully opened, or after 1s whichever occurs first.

When the *S1 and S2 Load Inhibit* input is activated while the S1 is closed the *Open S1* output energises, it then de-energises when the *S1 Closed Auxiliary* input indicates that it has successfully opened, or after 1s whichever occurs first.

When the *S1 and S2 Load Inhibit* input is deactivated the load is returned to the supply that was disconnected, providing that supply is healthy.

#### TIMING DIAGRAM



### 2.3.3 BREAKER SCHEME C

Breaker scheme C supports open transition, open transition with check-sync and closed transition with check-sync.

#### 2.3.3.1 CHECK SYNC & BREAKER CLOSE TRANSITION DISABLED

##### S1 / S2 LOAD INHIBIT

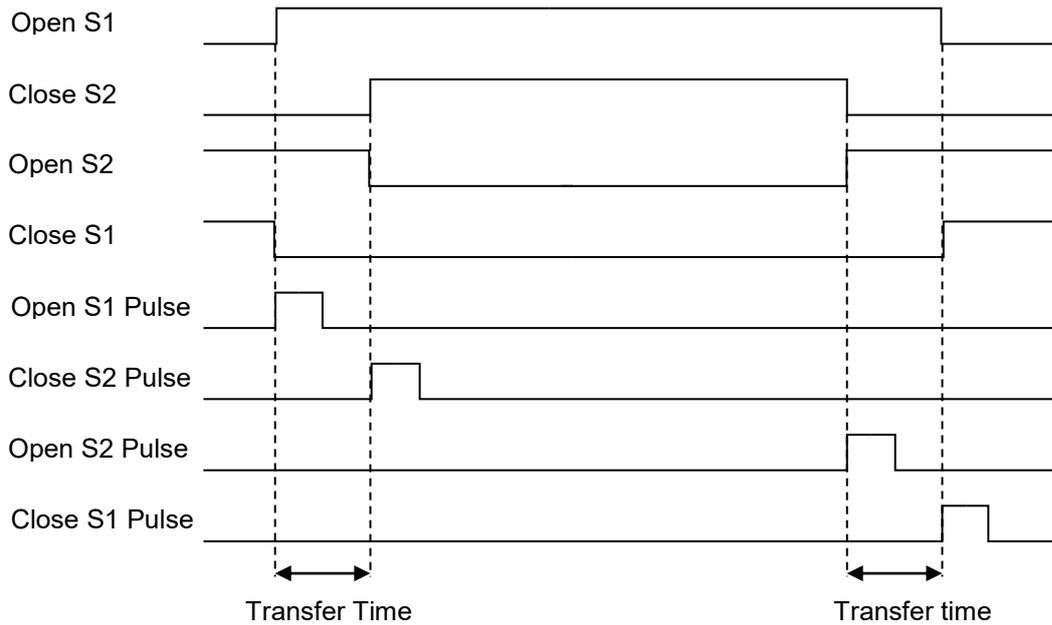
Activation of an input configured to *S1 Load Inhibit* or *S2 Load Inhibit* inputs cause the corresponding breaker to be opened immediately. No other change in function occurs. When the input is deactivated the breaker is closed again if appropriate.

##### S1 AND S2 LOAD INHIBIT

If an input configured to *S1 and S2 Load Inhibit* is activated, outputs set to Open S1 and Open S2 energise, and inputs configured to Close S1 and Close S2 de-energise. Open S1 Pulse and Open S2 Pulse outputs only energise if the corresponding supply was on load before application of the *S1 and S2 Load Inhibit* input.

When the *S1 and S2 Load Inhibit* input is deactivated the load is returned to the supply that was disconnected, providing that supply is healthy.

#### TIMING DIAGRAM



### 2.3.3.2 CHECK SYNC IS ENABLED

 **NOTE :** The module waits indefinitely for synchronisation unless the 'Return to programmed transition' function is active in which case after 2 minutes it performs a non-sync transfer as described in the previous section.

 **NOTE:** The transfer time is ignored during a check-sync but is used if the transfer fails and it performs a non-sync transfer.

#### TRANSFER TO S2

When the module is about to transfer from S1 to S2 it activates the check sync function. When the S1 and S2 supplies are within the phase and frequency window the module energises the *Open S1* and *Close S2* outputs simultaneously. The *Close S2 Output Pulse* is de-energised when the *S2 Closed Auxiliary* input indicates the source has successfully closed, or after 1s whichever occurs first.

#### TRANSFER TO S1

When the module is about to transfer from S2 to S1 it activates the check sync function. When the S1 and S2 supplies are within the phase and frequency window the module energises the *Open S2* and *Close S1* outputs simultaneously. The *Close S1 Output Pulse* is de-energised when the *S1 Closed Auxiliary* input indicates the source has successfully closed, or after 1s whichever occurs first.

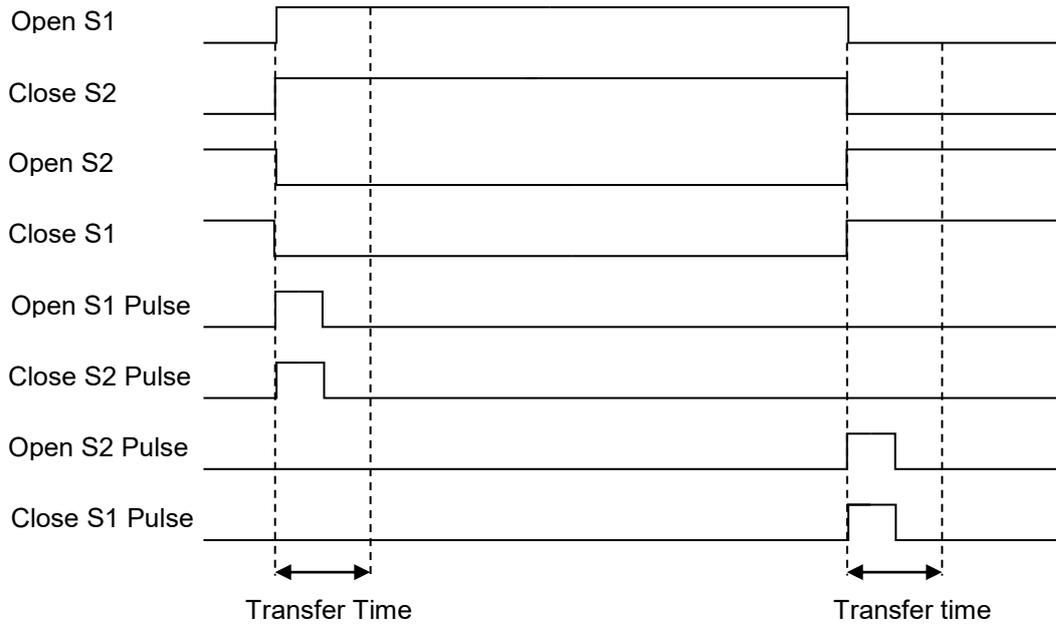
#### S1 AND S2 LOAD INHIBIT

When the *S1 and S2 Load Inhibit* input is activated while the S2 is closed the *Open S2* output energises, it then de-energises when the *S2 Closed Auxiliary* input indicates that it has successfully opened, or after 1s whichever occurs first.

When the *S1 and S2 Load Inhibit* input is activated while the S1 is closed the *Open S1* output energises, it then de-energises when the *S1 Closed Auxiliary* input indicates that it has successfully opened, or after 1s whichever occurs first.

When the *S1 and S2 Load Inhibit* input is deactivated the load is returned to the supply that was disconnected, providing that supply is healthy.

**TIMING DIAGRAM**



## BREAKER CLOSE TRANSITION IS ENABLED

 **NOTE: When Breaker Close Transition is enabled, the module performs a sync transfer without the need for enabling the Check Sync feature.**

### TRANSFER TO S2

When the module is about to transfer from S1 to S2 it activates the check sync function.

When the S1 and S2 supplies are within the phase and frequency window, the module energises the *Close S2* output and checks for the *S2 Closed Auxiliary* input activating. If the *S2 Closed Auxiliary* activates within the *Fail to Close* time, the *Paralleling* timer begins. If the *S2 Closed Auxiliary* does not activate within the *Fail to Close* time, the *Open S2* output is activated and the *S2 Fail to Close* alarm activates.

At the end of the *Paralleling* timer, the module de-energises the *Close S1* output and checks for the *S1 Closed Auxiliary* input de-activating. If the *S1 Closed Auxiliary* does not de-activate within the *Fail to Open* time, the *Open S1* and *Open S2* outputs are activated and the *S1 Fail to Open* alarm activates.

### TRANSFER TO S1

When the module is about to transfer from S2 to S1 it activates the check sync function.

When the S1 and S2 supplies are within the phase and frequency window, the module energises the *Close S1* output and checks for the *S1 Closed Auxiliary* input activating. If the *S1 Closed Auxiliary* activates within the *Fail to Close* time, the *Paralleling* timer begins. If the *S1 Closed Auxiliary* does not activate within the *Fail to Close* time, the *Open S1* output is activated and the *S1 Fail to Close* alarm activates.

At the end of the *Paralleling* timer, the module de-energises the *Close S2* output and checks for the *S2 Closed Auxiliary* input de-activating. If the *S2 Closed Auxiliary* does not de-activate within the *Fail to Open* time, the *Open S1* and *Open S2* outputs are activated and the *S2 Fail to Open* alarm activates.

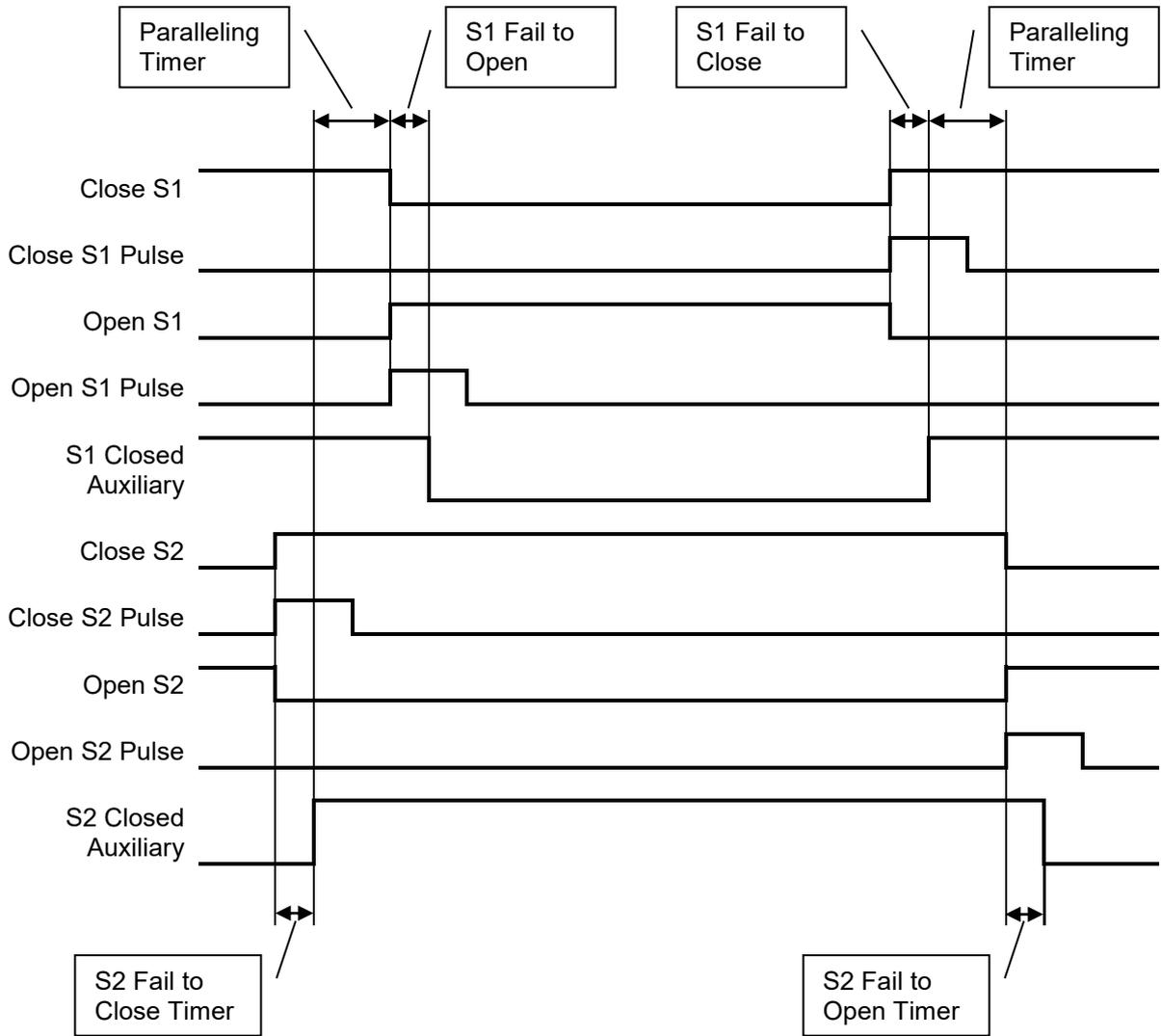
### S1 AND S2 LOAD INHIBIT

When the *S1 and S2 Load Inhibit* input is activated while the S2 is closed the *Open S2* output energises, it then de-energises when the *S2 Closed Auxiliary* input indicates that it has successfully opened, or after 1s whichever occurs first.

When the *S1 and S2 Load Inhibit* input is activated while the S1 is closed the *Open S1* output energises, it then de-energises when the *S1 Closed Auxiliary* input indicates that it has successfully opened, or after 1s whichever occurs first.

When the *S1 and S2 Load Inhibit* input is de-energised the load is returned to the supply that was disconnected, providing that supply is healthy.

**TIMING DIAGRAM**



## 2.4 DIGITAL INPUTS

The *Digital Inputs* section is subdivided into smaller sections. Select the required section with the mouse.

- Digital Inputs
- [Digital Inputs A - C](#)
- [Digital Inputs D - F](#)
- [Digital Inputs G - I](#)
- [Digital Inputs J - L](#)

**NOTE:** The module's digital inputs are configured as either negative or positive switching in groups of three, this is determined in the modules configuration.

The screenshot shows the configuration interface for digital inputs, divided into sections for the input group and individual inputs A, B, and C. Callouts provide detailed explanations for various settings:

- Input Group:** A callout points to the 'Digital Inputs A - C' section header.
- Close Configuration:** A callout points to the 'Close to Ground' dropdown menu, explaining that it configures the input group to either 'Close to Ground (-ve DC Supply)' or 'Close to Supply (+ve DC supply)'.
- Digital Input A:**
  - Function:** Set to 'User Configured'.
  - Polarity:** Set to 'Close to Activate'.
  - Action:** Set to 'Warning'. A callout explains that this selects the type of alarm required, with details in the 'Alarm Types' section.
  - Arming:** Set to 'Always'. A callout explains that this configures if the input is active or not active.
  - LCD Display:** Set to 'Sample Text'. A callout explains that this is the text displayed on the module screen when the alarm is triggered.
  - Activation Delay:** Set to 5s. A callout explains that this is used to give a delay on acceptance of the input, useful for liquid level switches or to mask short term operations of the external switch device.
- Digital Input B:**
  - Function:** Set to 'Auxiliary S1 Fail'.
  - Polarity:** Set to 'Close to Activate'.
  - Action, Arming, LCD Display, and Activation Delay:** These parameters are greyed out because the function is predefined.
- Digital Input C:**
  - Function:** Set to 'Alarm Mute'. A callout explains that this is the input function, with details in the 'Input Functions' section.
  - Polarity:** Set to 'Close to Activate'. A callout explains that this is 'Close or Open To Activate'.
  - Action, Arming, LCD Display, and Activation Delay:** These parameters are greyed out because the function is predefined.

A thought bubble at the bottom explains: "As this example shows a predefined function, these parameters are greyed out as they are not applicable."

### 2.4.1 INPUT FUNCTIONS

Under the scope of IEEE 37.2, *function numbers are also used to represent functions in microprocessor devices and software programs*. Where the DSE input functions are represented by IEEE 37.2, the function number is listed below.

| Function   | Description  |
|--|--|
| Not used   | The input is disabled  |
| Alarm Mute   | This input is used to silence the audible alarm from an external source, such as a remote mute switch.   |
| Alarm Reset  | This input is used to reset any latched alarms from a remote location. It is also used to clear any latched warnings which may have occurred (if configured) without having to stop/unload S2.   |
| Auto Restore Inhibit<br>IEEE 37.2 - 3 Checking Or Interlocking Relay | In the event of a remote start/S1 failure, S2 is instructed to start and take load. On removal of the remote start signal/S1 return the module continues to run S2 on load until the <i>Auto Restore Inhibit</i> input is removed. This input allows the controller to be fitted as part of a system where the restoration to S1 is controlled remotely or by an automated system.   |
| Auto start Inhibit<br>IEEE 37.2 - 3 Checking Or Interlocking Relay   | This input is used to provide an over-ride function to prevent the controller from starting S2 in the event of a remote start/S1 out of limits condition occurring. If this input is active and a remote start signal/S1 failure occurs the module does not give a start command to the S2. If this input signal is then removed, the controller operates as if a remote start/S1 failure has occurred, starting and loading S2. This function is used to give an ' <b>AND</b> ' function so that S2 is only called to start if S1 fails and another condition exists which requires S2 to run. If the 'Auto start Inhibit' signal becomes active once more it is ignored until the module has returned the S1 supply on load and shutdown.<br>This input does not prevent starting of the engine in MANUAL or TEST modes. |
| Auxiliary S1 Fail  | The module monitors the incoming single or three phase supply for Over voltage, Under Voltage, Over Frequency or Under frequency. It may be required to monitor a different S1 supply or some aspect of the incoming S1 not monitored by the controller. If the devices providing this additional monitoring are connected to operate this input, the controller operates as if the incoming S1 supply has fallen outside of limits, S2 is instructed to start and take the load. Removal of the input signal causes the module to act if S1 has returned to within limits providing that the S1 sensing also indicates that the S1 is within limits.  |
| Auxiliary S1 Ready   | Allows an external device (such as the engine control module) to instruct the controller that S1 is healthy and available to take load. The controller then monitors the voltage and frequency to check they are within acceptable limits before performing the load transfer function.  |
| Auxiliary S2 Fail  | The module monitors the incoming single or three phase supply for Over voltage, Under Voltage, Over Frequency or Under frequency. It may be required to monitor a different S2 supply or some aspect of the incoming S2 not monitored by the controller. If the devices providing this additional monitoring are connected to operate this input, the controller operates as if the incoming S2 supply has fallen outside of limits, S1 is instructed to start and take the load. Removal of the input signal causes the module to act if S2 has returned to within limits providing that the S2 sensing also indicates that the S2 is within limits.  |

Parameter descriptions are continued overleaf...

*Editing the Configuration*

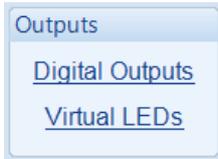
| Function   | Description  |
|--|--|
| Auxiliary S2 Ready   | Allows an external device (such as the engine control module) to instruct the controller that S1 is healthy and available to take load. The controller then monitors the voltage and frequency to check they are within acceptable limits before performing the load transfer function.  |
| External Panel Lock  | This input is used to provide security to the installation. If the External Panel lock input is active, the module does not respond to operation of the Mode select or start buttons. This allows the module to be placed into a specific mode (such as Auto) and then secured. The operation of the module is not affected and the operator is still able to view the various instrumentation pages etc. ( <i>Front panel configuration access is still possible while the system lock is active</i> ). |
| Force Transfer To S1   | Activating this input causes the module to open S2 and transfer the load to S1 disregarding the status of S1.<br>When S1 is not available, the load remains off until the supply is back within limits.  |
| Force Transfer To S2   | Activating this input causes the module to open S1 and transfer the load to S2 disregarding the status of S2.<br>When S2 is not available, the load remains off until the supply is back within limits.  |
| Inhibit Scheduled Run<br>IEEE 37.2 - 3 Checking Or Interlocking Relay  | This input is used to provide a means of disabling a scheduled run.  |
| Lamp Test  | This input is used to provide a test facility for the front panel indicators fitted to the module. When the input is activated all LED's illuminate.   |
| Open / Close S1<br>IEEE 37.2 - 52 AC Circuit Breaker                   | Allows connection of an external signal to control open and closing of the S1 load switch device.  |
| Open / Close S2<br>IEEE 37.2 - 52 AC Circuit Breaker                   | Allows connection of an external signal to control open and closing of the S2 load switch device.  |
| Remote Start off load  | If this input is active, operation is similar to the 'Remote Start on load' function except that S2 is not instructed to take the load. This function is used where an engine only run is required e.g. for exercise.  |
| Remote Start on load   | When in auto mode, the module performs the start sequence and transfers load to S2.<br>In Manual mode, the load is transferred to S2 if the supply is already healthy, however in manual mode, this input does not generate start/stop requests of S2.   |
| Reset Breaker Alarms   | This input is used to reset any of the <i>Fail to Open</i> or <i>Fail to Close</i> alarms when using <i>Breaker Scheme C</i> without pressing the <i>Stop Button</i> .   |
| S1 and S2 Load Inhibit<br>IEEE 37.2 - 3 Checking Or Interlocking Relay | This input is used to prevent the module from loading the S1 and S2 supplies. If the S1 or S2 supply is already on load activating this input causes the module to unload that supply. Removing the input allows the supply to be loaded again.  |

Parameter descriptions are continued overleaf...

| Function  | Description   |
|---|---|
| S1 Closed Auxiliary<br>IEEE 37.2 - 3 Checking Or Interlocking Relay<br>(Breaker Scheme B) | <p>This input is used to provide feedback to allow the controller to give true indication of the contactor or circuit breaker switching status. It must be connected to the S1 load switching device auxiliary contact.</p> <p>In 'Breaker Scheme A', Incorrect application of this signal does not trigger an alarm condition, it is used solely for indication of the breaker status.</p> <p>In 'Breaker Scheme B' this feedback is used for internal interlocking of the breaker outputs.</p> <p>In 'Breaker Scheme C' this feedback is used for ensuring a closed transition has occurred within the <i>Breaker Close Transition</i> timer.</p> |
| S1 Load Inhibit<br>IEEE 37.2 - 52 AC Circuit Breaker                                      | <p>This input is used to prevent the controller from loading S1. If S1 is already on load, activating this input causes the controller to unload S1. Removing the input allows S1 to be loaded again.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>▲NOTE: This input only operates to control the S1 switching device if the module's load switching logic is attempting to load S1. It does not control the S1 switching device when the S2 supply is on load.</b></p> </div>  |
| S2 Closed Auxiliary<br>IEEE 37.2 - 3 Checking Or Interlocking Relay<br>(Breaker Scheme B) | <p>This input is used to provide feedback to allow the controller to give true indication of the contactor or circuit breaker switching status. It must be connected to the S2 load switching device auxiliary contact.</p> <p>In 'Breaker Scheme A', Incorrect application of this signal does not trigger an alarm condition, it is used solely for indication of the breaker status.</p> <p>In 'Breaker Scheme B' this feedback is used for internal interlocking of the breaker outputs.</p> <p>In 'Breaker Scheme C' this feedback is used for ensuring a closed transition has occurred within the <i>Breaker Close Transition</i> timer.</p> |
| S2 Load Inhibit<br>IEEE 37.2 - 52 AC Circuit Breaker                                      | <p>This input is used to prevent the controller from loading S2. If S2 is already on load, activating this input causes the controller to unload S2. Removing the input allows S2 to be loaded again.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>▲NOTE: This input only operates to control the S2 switching device if the module's load switching logic is attempting to load S2. It does not control the S2 switching device when the S1 supply is on load.</b></p> </div>  |
| Simulate S1 Available   | <p>This function is provided to override the module's internal monitoring function. If this input is active, the module does not respond to the state of the incoming AC S1 supply and behaves as if the supply is healthy.</p>   |
| Simulate S2 Available   | <p>This function is provided to override the module's internal monitoring function. If this input is active, the module does not respond to the state of the incoming AC S2 supply and behaves as if the supply is healthy.</p>   |
| Transfer To S1  | <p>Activating this input causes the module to open S2 and transfer the load to S1, only when S1 is available.</p> <p>When S1 is not available, S2 remains on load until S1 is back within limits.</p>   |
| Transfer To S2  | <p>Activating this input causes the module to open S1 and transfer the load to S2, only when S2 is available.</p> <p>When S2 is not available, S1 remains on load until S2 is back within limits.</p>   |

## 2.5 OUTPUTS

The *Outputs* section is subdivided into smaller sections. Select the required section with the mouse



### 2.5.1 DIGITAL OUTPUTS

The screenshot shows the 'Digital Outputs' configuration interface. It is divided into 'Relay Outputs (Volt Free)' and 'FET Outputs' sections. The 'Relay Outputs' section has a table with columns for 'Source' and 'Polarity'. The 'System In Auto Mode' source is selected, and its dropdown menu is open, showing various system states. Callouts provide instructions on how to use these dropdowns and how the source labels relate to wiring diagrams.

| Output         | Source               | Polarity    |
|----------------|----------------------|-------------|
| Output A (N/C) | Close S1 Output      | De-Energise |
| Output B (N/O) | Close S2 Output      | Energise    |
| Output C (C/O) | Open S1 Output Pulse | Energise    |
| Output D (C/O) | Open S2 Output Pulse | Energise    |
| Output E (N/C) | System In Auto Mode  | Not Used    |
| Output F (N/O) | Not Used             | Not Used    |

**Relay Outputs (Volt Free)**

**FET Outputs**

**System In Auto Mode** dropdown menu items:

- Not Used
- Audible Alarm
- Battery High Voltage
- Battery Low Voltage
- Common Warning
- Control
- Status
- Cooling Down
- Return Delay In Progress
- Scheduled Run
- Start and Run S2
- Start Delay In Progress
- System In Auto Mode
- System In Manual Mode
- System In Prohibit Return Mode
- System In Start Inhibit Mode
- System In Test Off-Load Mode
- System In Test On-Load Mode
- Waiting For Manual Restore
- Warming Up

**Digital Inputs** dropdown menu items:

- Digital Inputs
- Operation
- PLC Flag
- S1
- S2

**Callouts:**

- "Select what the output is to be used to control" (points to the Source dropdown)
- "Select if the relay is to energise or de-energise upon activation of the source" (points to the Polarity dropdown)
- "The output sources are sorted into groups or searched for by typing part of the name into the source box." (points to the System In Auto Mode dropdown)
- "These labels match the typical wiring diagram" (points to the output labels)

The list of output sources available for configuration of the module outputs is listed in the section entitled *Output Sources*.

### 2.5.2 VIRTUAL LEDS

**Virtual LEDs**

**LED Configuration**

| LED    | Source                         | Polarity |
|--------|--------------------------------|----------|
| LED 1  | Close S1 Output                | Lit      |
| LED 2  | Close S2 Output                | Lit      |
| LED 3  | S1 Failure Unlatched           | Lit      |
| LED 4  | mode                           | Lit      |
| LED 5  | System In Auto Mode            | Lit      |
| LED 6  | System In Manual Mode          | Lit      |
| LED 7  | System In Prohibit Return Mode | Lit      |
| LED 8  | System In Start Inhibit Mode   | Lit      |
| LED 9  | System In Test Off-Load Mode   | Lit      |
| LED 10 | System In Test On-Load Mode    | Lit      |
| LED 11 | Not Used                       | Lit      |
| LED 12 | Not Used                       | Lit      |
| LED 13 | Not Used                       | Lit      |
| LED 14 | Not Used                       | Lit      |
| LED 15 | Not Used                       | Lit      |
| LED 16 | Not Used                       | Lit      |
| LED 17 | Not Used                       | Lit      |
| LED 18 | Not Used                       | Lit      |
| LED 19 | Not Used                       | Lit      |
| LED 20 | Not Used                       | Lit      |

Allows configuration of 'status' items. These items are not available for viewing on the module itself but is seen in the SCADA section of the PC software, or read by third party systems (ie BMS or PLCs) using the Modbus protocol.

Select if the LED is to *active or de-active the LED* upon activation of the source

The output sources are sorted into groups or is searched for by typing its name into the source box.

The list of output sources available for configuration of the module outputs is listed in the section entitled *Output Sources*.

### 2.5.3 OUTPUT SOURCES

The list of output sources available for configuration of the module relay outputs also applies to the LED configuration and expansion relay outputs.

Under the scope of IEEE 37.2, function numbers are also used to represent functions in microprocessor devices and software programs. Where the DSE output functions are represented by IEEE 37.2, the function number is listed below.

| Output Source  | Activates...  | Is Not Active....  |
|--|---|--|
| Not Used   | The output does not change state (Unused)   |  |
| Alarm Mute   | Active when a configured <i>Alarm Mute</i> digital input is active  |  |
| Alarm Reset  | Active when a configured <i>Alarm Reset</i> digital input is active   |  |
| Audible Alarm<br>IEEE 37.2 – 74 Alarm Relay                  | This output indicates that the internal sounder is operating to allow it to feed an external sounder. Operation of the Mute pushbutton resets this output once activated.   | Inactive if the internal sounder is not operating.               |
| Auto Restore Inhibit   | Active when the <i>Auto-Restore Inhibit</i> function is active.   |  |
| Auto Start Inhibit   | Active when the <i>Auto-Start Inhibit</i> function is active.   |  |
| Auxiliary S1 Fail  | Active when a configured <i>Auxiliary S1 Fail</i> digital input is active   |  |
| Auxiliary S1 Ready   | Active when a configured <i>Auxiliary S1 Ready</i> digital input is active  |  |
| Auxiliary S2 Fail  | Active when a configured <i>Auxiliary S2 Fail</i> digital input is active   |  |
| Auxiliary S2 Ready   | Active when a configured <i>Auxiliary S2 Ready</i> digital input is active  |  |
| Battery High Voltage<br>IEEE 37.2 – 59 DC Over Voltage Relay | This output indicates that a Battery Over voltage alarm has occurred.   | Inactive when battery voltage is not High                        |
| Battery Low Voltage<br>IEEE 37.2 – 27 DC Under Voltage Relay | This output indicates that a Battery Under Voltage alarm has occurred.  | Inactive when battery voltage is not Low                         |
| Breaker Alarm Reset  | Active when a configured <i>Breaker Alarm Reset</i> digital input is active   |  |
| Close S1 Output<br>IEEE 37.2 – 52 AC Circuit Breaker         | Used to control the load switching device. Whenever the module selects S1 to be on load, this control source is active.   | The output is inactive whenever S1 is not required to be on load |
| Close S1 Output Pulse<br>IEEE 37.2 – 52 AC Circuit Breaker   | Used to control the load switching device. Whenever the module selects S1 to be on load this control source is active for the duration of the Breaker Close Pulse timer, after which it becomes inactive again.                   |  |
| Close S2 Output<br>IEEE 37.2 – 52 AC Circuit Breaker         | Used to control the load switching device. Whenever the module selects S2 to be on load this control source is active.  | The output is inactive whenever S2 is not required to be on load |
| Close S2 Output Pulse<br>IEEE 37.2 – 52 AC Circuit Breaker   | Used to control the load switching device. Whenever the module selects to be on load this control source is active for the duration of the Breaker Close Pulse timer, after which it becomes inactive again.                      |  |
| Close to N Output<br>IEEE 37.2 – 52 AC Circuit Breaker       | Used to control the load switching device. Whenever the module selects S1 and S2 to not supply the load this control source is active.  | The output is inactive when S1 or S2 are required to be on load  |
| Close to N Output Pulse<br>IEEE 37.2 – 52 AC Circuit Breaker | Used to control the load switching device. Whenever the module selects ATS to be in the neutral position, this control source is active for the duration of the Breaker Close Pulse timer, after which it becomes inactive again. |  |
| Close Transition in Progress                                 | Active only when a closed transition is in progress. The output goes inactive after the transfer is complete.   |  |

Parameter descriptions are continued overleaf...

Editing the Configuration

| Output Source   | Activates...  | Is Not Active...   |
|---|---|--|
| Common Alarm  | Active when one or more alarms (of any type) are active   | The output is inactive when no alarms are present  |
| Common Electrical Trip                                    | Active when one or more <i>Electrical Trip</i> alarms are active  | The output is inactive when no shutdown alarms are present   |
| Common warning<br>IEEE 37.2 – 74 Alarm Relay              | Active when one or more warning alarms are active   | The output is inactive when no warning alarms are present  |
| Cooling Down  | Active when the Cooling timer is in progress  | The output is inactive at all other times  |
| Digital Input A – L                                       | Active when the digital input is active   | Inactive when : <ul style="list-style-type: none"> <li>the input is not active</li> <li>the input is active but conditioned by activation delay or arming requirements.</li> </ul> |
| Elevator Control  | Active during the <i>elevator delay</i> time before a load transfer takes place and remains active for the duration of the <i>elevator delay</i> after a transfer takes place (when <i>elevator post transfer</i> is enabled. | Inactive at all other times  |
| External Panel Lock                                       | Active when the module's panel lock function is active.   |  |
| Fail to Start   | Active when the S2 is configured as generator and no voltage or frequency is measured for S2 within the <i>Start Delay</i> timer.   |  |
| Fail to Stop  | Active when the S2 is configured as generator and the generator fails to stop within the <i>Fail to Stop Delay</i> timer.   |  |
| Force Transfer to S1                                      | Active when the <i>Force Transfer To S1</i> digital input is active.  |  |
| Force Transfer to S2                                      | Active when the <i>Force Transfer To S2</i> digital input is active.  |  |
| Inhibit Scheduled Run                                     | Active when the <i>Inhibit Scheduled Run</i> digital input is active.   |  |
| Lamp Test   | Active when the <i>Lamp Test</i> digital input is active or the Mute/Lamp Test push button is pressed.  |  |
| Load Shedding Control (1-5)                               | Becomes active when the engine kW exceeds Load Shedding Control Trip Setting.   | Inactive when the engine kW returns to below the Load Shedding Control Return setting.   |
| Loading Frequency Not Reached                             | Active when S2 has failed to reach the loading frequency after the ' <i>Safety on Delay</i> ' timer.  |  |
| Loading Voltage Note Reached                              | Active when S2 has failed to reach the loading voltage after the ' <i>Safety on Delay</i> ' timer.  |  |
| Open S1 Output<br>IEEE 37.2 – 52 ac circuit breaker       | Used to control the load switching device. Whenever the module selects S1 to be off load this control source is active.   | The output is inactive whenever S1 is required to be on load   |
| Open S1 Output Pulse<br>IEEE 37.2 – 52 ac circuit breaker | Used to control the load switching device. Whenever the module selects S1 to be off load this control source is active for the duration of the Breaker Open Pulse timer, after which it becomes inactive again.               |  |
| Open S2 Output<br>IEEE 37.2 – 52 ac circuit breaker       | Used to control the load switching device. Whenever the module selects S2 to be off load this control source is active.   | Inactive whenever S2 is required to be on load   |
| Open S2 Output Pulse<br>IEEE 37.2 – 52 ac circuit breaker | Used to control the load switching device. Whenever the module selects S2 to be off load this control source is active for the duration of the Breaker Open Pulse timer, after which it becomes inactive again.               |  |
| Open/Close S1   | Active when a configured <i>Open/Close S1</i> digital input is active   |  |
| Open/Close S2   | Active when a configured <i>Open/Close S2</i> digital input is active   |  |

Parameter descriptions are continued overleaf...

*Editing the Configuration*

| <b>Output Source</b>      | <b>Activates...</b>   | <b>Is Not Active...</b> |
|---------------------------|---|-------------------------|
| PLC Output Flag 1-20      | Active when the PLC Output Flag (1-20) becomes active.  |                         |
| Remote Control 1-10       | Active when the corresponding <i>Remote Control</i> is active   |                         |
| Remote Start Off Load     | Active when the <i>Remote Start Off Load</i> input function is active   |                         |
| Remote Start On Load      | Active when the <i>Remote Start On Load</i> input function is active  |                         |
| Return Delay in Progress  | Indicates that S2 is on load, and S1 is available, during the <i>return delay</i> timers.   |                         |
| S1 and S2 Closed          | Active when the <i>S1 and S2 Closed Auxiliary</i> inputs are active at the same time, indicating the two supplies are closed in parallel.             |                         |
| S1 and S2 Load Inhibit    | Active when a configured <i>S1 and S2 Load Inhibit</i> digital input is active  |                         |
| S1 and S2 Open            | Active when the <i>S1 and S2 Closed Auxiliary</i> inputs are not active at the same time.   |                         |
| S1 Available              | Active when the S1 supply is available and within limits  |                         |
| S1 Breaker Auxiliary Fail | Active when a configured <i>S1 Breaker Auxiliary Fail</i> digital input is active   |                         |
| S1 Closed                 | Active when the <i>Close S1</i> output function is active   |                         |
| S1 Closed Auxiliary       | Active when a configured <i>S1 Closed Auxiliary</i> digital input is active   |                         |
| S1 Fail to Close          | Active when the <i>Close S1</i> output has activated but the <i>S1 Closed Auxiliary</i> input has not activated within the <i>Fail to Close</i> time. |                         |
| S1 Fail to Open           | Active when the <i>OpenS1</i> output has activated but the <i>S1 Closed Auxiliary</i> input has not de-activated within the <i>Fail to Open</i> time. |                         |
| S1 Failure Latched        | Activates when the S1 failure alarm is active. Reset by digital input configured to <i>Alarm Reset</i>  |                         |
| S1 Failure Unlatched      | Activates when the S1 failure alarm is active. Reset automatically when S1 becomes available  |                         |
| S1 High Frequency         | Becomes active if S1's frequency goes higher than the configured trip setting.  |                         |
| S1 High Voltage           | Becomes active if S1's voltage goes higher than the configured trip setting.  |                         |
| S1 In Limits              | Activates when S1 becomes available and is within configured limits.  |                         |
| S1 Load Inhibit           | Active when the <i>S1 Load Inhibit</i> digital input is active.   |                         |
| S1 Load Inhibited         | Indicates that an input configured to <i>S1 Load Inhibit</i> is active, preventing the supply from taking load.                                       |                         |
| S1 Low Frequency          | Becomes active if S1's frequency goes lower than the configured trip setting.   |                         |
| S1 Low Voltage            | Becomes active if S1's voltage goes lower than the configured trip setting.   |                         |
| S1 Phase Rotation Alarm   | Active when the <i>S1 Phase Rotation Alarm</i> is active.   |                         |
| S1 Ready                  | Active when a configured <i>S1 Ready</i> digital input is active  |                         |
| S1 Transient Delay        | Active during the <i>Transient Delay</i> time when S1 is not within limits  |                         |
| S2 Available              | Active when the S2 supply is available and within limits  |                         |
| S2 Breaker Auxiliary Fail | Active when a configured <i>S2 Breaker Auxiliary Fail</i> digital input is active   |                         |
| S2 Closed                 | Active when the <i>Close S2</i> output function is active   |                         |
| S2 Closed Auxiliary       | Active when a configured <i>S2 Closed Auxiliary</i> digital input is active   |                         |
| S2 Fail to Close          | Active when the <i>Close S2</i> output has activated but the <i>S2 Closed Auxiliary</i> input has not activated within the <i>Fail to Close</i> time. |                         |
| S2 Fail to Open           | Active when the <i>OpenS2</i> output has activated but the <i>S2 Closed Auxiliary</i> input has not de-activated within the <i>Fail to Open</i> time. |                         |
| S2 Failure Latched        | Activates when the S2 failure alarm is active. Reset by digital input configured to <i>Alarm Reset</i>  |                         |
| S2 Failure Unlatched      | Activates when the S2 failure alarm is active. Reset automatically when S2 becomes available  |                         |

Parameter descriptions are continued overleaf...

*Editing the Configuration*

| <b>Output Source</b>           | <b>Activates...</b>   | <b>Is Not Active...</b> |
|--------------------------------|---|-------------------------|
| S2 Gen High Frequency          | When S2 is configured to <i>Gen</i> , this output becomes active if S2's frequency goes above the configured trip setting.                            |                         |
| S2 Gen Low Frequency           | When S2 is configured to <i>Gen</i> , this output becomes active if S2's frequency falls below the configured trip setting.                           |                         |
| S2 Gen High Voltage            | When S2 is configured to <i>Gen</i> , this output becomes active if S2's voltage goes above the configured trip setting.                              |                         |
| S2 Gen Low Voltage             | When S2 is configured to <i>Gen</i> , this output becomes active if S2's voltage falls below the configured trip setting.                             |                         |
| S2 In Limits                   | Activates when the S2 becomes available, is within configured limits and the <i>Auxiliary S2 Ready</i> input is active.                               |                         |
| S2 Load Inhibit                | Indicates that an input configured to <i>S2 Load Inhibit</i> is active, preventing the supply from taking load.                                       |                         |
| S2 Load Inhibited              | Indicates that an input configured to <i>S2 Load Inhibit</i> is active, preventing the supply from taking load.                                       |                         |
| S2 Mains High Frequency        | When S2 is configured to <i>Mains</i> , this output becomes active if S2's frequency goes above the configured trip setting.                          |                         |
| S2 Mains High Voltage          | When S2 is configured to <i>Mains</i> , this output becomes active if S2's voltage goes above the configured trip setting.                            |                         |
| S2 Mains Low Frequency         | When S2 is configured to <i>Mains</i> , this output becomes active if S2's frequency falls below the configured trip setting.                         |                         |
| S2 Mains Low Voltage           | When S2 is configured to <i>Mains</i> , this output becomes active if S2's voltage falls below the configured trip setting.                           |                         |
| S2 Phase Rotation Alarm        | Active when the <i>S2 Phase Rotation Alarm</i> is active.   |                         |
| S2 Ready                       | Activates when S2 becomes available and both the warming and cooldown time are not active. Ignores alarm conditions and the <i>S2 transient delay</i> |                         |
| S2 Start and Run               | Active when the controller has requested for S2 to start and run.   |                         |
| S2 Transient Delay             | Active during the <i>Transient Delay</i> time when S1 is not within limits  |                         |
| Scheduled Run                  | Active when the controller is requesting the set to run under control of the inbuilt <i>Scheduler</i> .   |                         |
| Scheduled Do Not Transfer      | Active when a configured <i>Do Not Transfer</i> scheduler event is active.  |                         |
| Scheduled Event In Progress    | Active when any configured scheduler event is active.   |                         |
| Scheduled Start S1 Off-load    | Active when a configured <i>S1 Start Off Load</i> scheduler event is active.  |                         |
| Scheduled Start S2 Off-load    | Active when a configured <i>S2 Start Off Load</i> scheduler event is active.  |                         |
| Scheduled Transfer to S1       | Active when a configured <i>Transfer To S1</i> scheduler event is active.   |                         |
| Scheduled Transfer to S2       | Active when a configured <i>Transfer To S2</i> scheduler event is active.   |                         |
| Simulated S1 Available         | Active when the <i>Simulated S1 Available</i> digital input is active.  |                         |
| Simulated S2 Available         | Active when the <i>Simulated S2 Available</i> digital input is active.  |                         |
| Start Delay in Progress        | Active when the controller is in the <i>start delay</i> timer, after which the set is called to start.  |                         |
| System in Auto Mode            | Active when unit is in Auto mode  |                         |
| System in Manual Mode          | Active when unit is in Manual mode  |                         |
| System in Prohibit Return Mode | Active when unit is in Prohibit Return Mode   |                         |
| System in Stop Mode            | Active when unit is in Stop Mode  |                         |
| System in Test Off-Load Mode   | Active when unit is in Test Off-Load Mode   |                         |
| System in Test On-Load Mode    | Active when unit is in Test On-Load Mode  |                         |

Parameter descriptions are continued overleaf...

*Editing the Configuration*

| <b>Output Source</b>       | <b>Activates...</b>  | <b>Is Not Active...</b> |
|----------------------------|--|-------------------------|
| Transfer To S1             | Active when the <i>Transfer to S1</i> digital input is active  |                         |
| Transfer To S2             | Active when the <i>Transfer to S2</i> digital input is active  |                         |
| Waiting For Manual Restore | Becomes active when S2 is on load and the S1 supply is healthy but an input configured to Manual Restore is active.<br>This is used to signal to an operator that action is required before the set transfers back to the S1 supply. |                         |
| Waiting For S1             | Active when the controller has requested for S1 to start and is waiting for it to become available.  |                         |
| Waiting For S2             | Active when the controller has requested for S2 to start and is waiting for it to become available.  |                         |
| Warming Up                 | Active when S2 is running off load, during the warming timer, before taking load.  |                         |

## 2.6 S1

The S1 section is subdivided into smaller sections. Select the required section with the mouse.



### 2.6.1 S1 OPTIONS

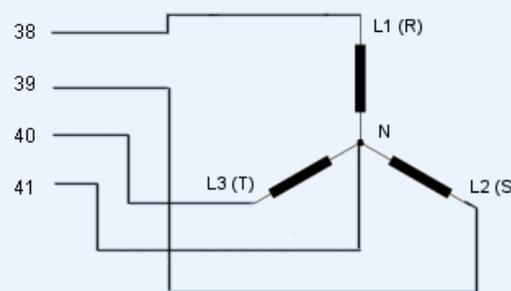
#### S1 Options

**S1 Options**

Open When S2 Available

Immediate S1 Dropout

AC System 3 Phase, 4 Wire



VT fitted

Primary 111 110 Secondary

| Parameter              | Description  |
|------------------------|--|
| Open When S2 Available | <p><b>▲ NOTE: Active when S1 source is set to <i>Standby</i>. For further details see section entitled <i>Application Options</i> elsewhere in this document</b></p> <hr/> <p><b>▲ NOTE: S1/S2 Closed Auxiliary must be configured to enable this Parameter. For further details, see section entitled <i>Digital Inputs</i> elsewhere in this document.</b></p> <p><input type="checkbox"/> = The S1 breaker can be requested to open regardless if S2 is available. This is useful when using DC controlled opening signals.</p> <p><input checked="" type="checkbox"/> = The S1 breaker is only requested to open when S2 is available. This is required when S1's breaker's opening signals are supplied by S2's supply.</p> |
| Immediate S1 Dropout   | <p><b>▲ NOTE: This feature cannot be enabled when <i>Open When S2 Available</i> is enabled.</b></p> <p><input type="checkbox"/> = Upon S1 failure, the S1 Breaker remains closed until a transfer to S2 is initiated.</p> <p><input checked="" type="checkbox"/> = Upon S1 failure, the S1 Breaker opens immediately.</p>  |
| AC System              | This defines the topology of the alternator/source and the connections to the DSE module sensing terminals.  |

| Parameter | Description  |
|-----------|--|
| VT Fitted | <input type="checkbox"/> = The voltage sensing to the controller is direct from the alternator<br><input checked="" type="checkbox"/> = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs)<br>This is used to step down the generated voltage to be within the controller voltage specification.<br>By entering the Primary and Secondary voltages of the transformer, the controller displays the Primary voltage rather than the actual measured voltage.<br><br>This is typically used to interface the DSE module to high voltage systems (ie 11kV) but also used on systems such as 600V ph-ph. |

### 2.6.2 S1 TIMERS

**S1 Timers**

**Transfer Timers**

Start Delay 30s

Return Delay 5s

Transient Delay 2.0s

Click and drag to change the setting.  
 Timers increment in steps of 1second up to one minute, then in steps of 30seconds up to 30minutes, then in steps of 30minutes thereafter (where allowed by the limits of the timer).

| Timer           | Description   |
|-----------------|---|
| Start Delay     | Used to give a delay before starting in AUTO mode. This timer is activated upon the respective start command being issued. Typically this timer is applied to prevent starting upon fleeting remote start signals or short term S2 failures.        |
| Return Delay    | A delay, used in auto mode only, that allows for short term removal of the request to unload the supply before action is taken. This is usually used to ensure the supply remains on load before accepting that the start request has been removed. |
| Transient Delay | Used to delay the detection of S1 failure. This is normally used to prevent short term transients or brownout conditions from being classified as a S1 Failure and opening the breaker.   |

2.6.3 S1 ALARMS

### S1 Alarms

#### Voltage Alarms

Under Voltage

Trip  V PhN

Return  V PhN

Over Voltage

Return  V PhN

Trip  V PhN

#### Frequency Alarms

Under Frequency

Trip  Hz

Return  Hz

Over Frequency

Return  Hz

Trip  Hz

#### Phase Rotation Detection

Enable

Phase Rotation

Action

| Alarm  | Description  |
|--|--|
| Under Voltage<br>IEEE 37.2 – 27 AC<br>Undervoltage Relay | <input type="checkbox"/> = S1 Under Voltage detection is disabled<br><input checked="" type="checkbox"/> = S1 Under Voltage gives an alarm in the event of the mains voltage falling below the configured <i>Under Voltage Trip</i> value. The <i>Under Voltage Trip</i> value is adjustable to suit the application. The alarm is reset and the S1 is considered within limits when the S1 voltage rises above the configured <i>Under Voltage Return</i> level.            |
| Over Voltage<br>IEEE 37.2 – 59 AC<br>Overvoltage Relay   | <input type="checkbox"/> = S1 Over Voltage detection is disabled<br><input checked="" type="checkbox"/> = S1 Over Voltage gives an alarm in the event of the S1 voltage rising above the configured <i>Over Voltage Trip</i> value. The <i>Over Voltage Trip</i> value is adjustable to suit the application. The alarm is reset and the S1 is considered within limits when the S1 voltage falls below the configured <i>Over Voltage Return</i> level.                     |
| Under Frequency<br>IEEE 37.2 – 81 Frequency<br>Relay     | <input type="checkbox"/> = S1 Under Frequency detection is disabled<br><input checked="" type="checkbox"/> = S1 Under Frequency gives an alarm in the event of the S1 frequency falling below the configured <i>Under Frequency Trip</i> value. The <i>Under Frequency Trip</i> value is adjustable to suit the application. The alarm is reset and the S1 is considered within limits when the S1 frequency rises above the configured <i>Under Frequency Return</i> level. |
| Over Frequency<br>IEEE 37.2 – 81 Frequency<br>Relay      | <input type="checkbox"/> = S1 Over Frequency detection is disabled<br><input checked="" type="checkbox"/> = S1 Over Frequency gives an alarm in the event of the S1 frequency rising above the configured <i>Over Frequency Trip</i> value. The <i>Over Frequency Trip</i> value is adjustable to suit the application. The alarm is reset and the S1 is considered within limits when the S1 frequency falls below the configured <i>Over Frequency Return</i> level.       |

Editing the Configuration

| Alarm   | Description  |
|---|--|
| Phase Rotation<br>Detection<br>IEEE 37.2 – 47 Phase<br>Sequence Relay | <input type="checkbox"/> = The phase rotation is not checked<br><input checked="" type="checkbox"/> = An Electrical Trip alarm is generated when the phase rotation of S1 supply is not matching the configured <i>Phase Rotation</i> setting. |

## 2.7 LOAD

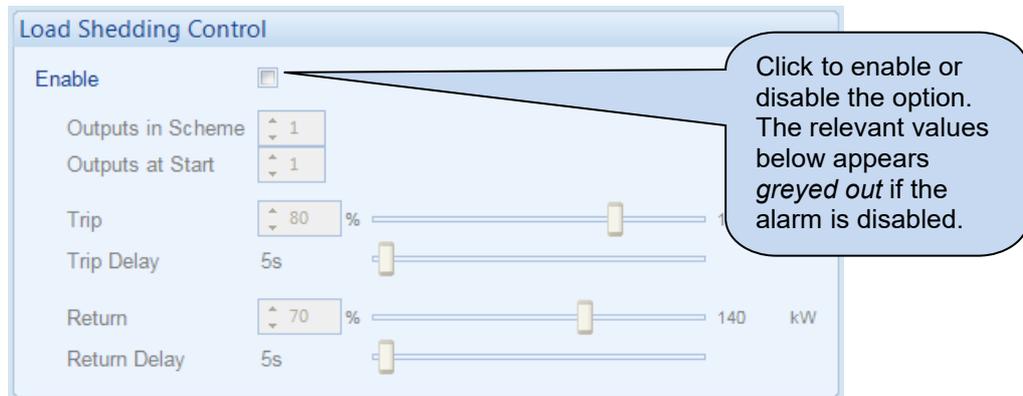
The *Load* section is subdivided into smaller sections. Select the required section with the mouse.



### 2.7.1 LOAD CURRENT

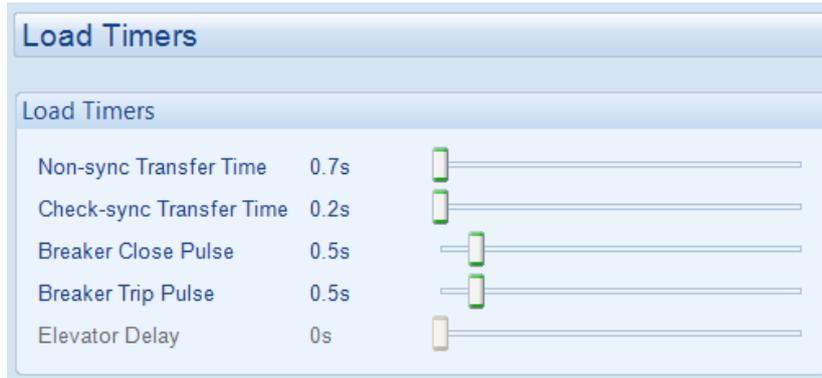


| Timer            | Description  |
|------------------|--|
| CT Primary       | Primary rating of the Current Transformers         |
| CT Secondary     | Secondary rating of the Current Transformers       |
| Full Load Rating | Full load rating (100% rating) of the load current |
| Max kW Rating    | Full load rating (100% rating) of the load kW      |



| Setting                    | Description   |
|----------------------------|---|
| Enable                     | Provides control of configurable outputs set to <i>Load Shedding Control</i> .<br><input type="checkbox"/> = Load Shedding Control is disabled.<br><input checked="" type="checkbox"/> = The module monitors the load and control any outputs configured to Load Shedding Control (1-5) |
| Outputs in Scheme          | The number of outputs (max 5) that is included in the function.   |
| Outputs at Start           | The number of outputs configured to <i>Load Shedding Control 1-5</i> that is energised when the set is required to take load. The <i>Transfer Delay / Load Delay</i> timer begins. At the end of this timer, the load switch is closed – S2 is placed on load.                          |
| Trip / Trip Delay          | When the load level is above the <i>Trip</i> setting for the duration of the <i>Trip Delay</i> , then the 'next' output configured to <i>Load Shedding Control</i> is activated (max 5)   |
| Return / Return Delay      | When the load level is below the <i>Return</i> setting for the duration of the <i>Return Delay</i> , then the 'highest numbered' output configured to <i>Load Shedding Control</i> is de-activated and the timer is reset.  |
| Transfer Time / Load Delay | The time between closing the <i>Load Shedding Control</i> outputs ( <i>Outputs at Start</i> ) and closing the load switching device.  |

## 2.7.2 LOAD TIMERS



| Timer                    | Description   |
|--------------------------|---|
| Non-sync Transfer Time   | The time between one supply's load switch being opened and the other supply's load switch being closed. Used to give time for the load switches to move to their correct positions and to prevent the mechanical interlock from "jamming".<br>This timer is also used to give a 'dead time' to ensure that any machinery stops fully after removal of the supply, before applying the new supply to the equipment (for instance directly driven AC motors). |
| Check-Sync Transfer Time | The time allowed for the <i>Sync Transfer</i> to be completed. If the two supplies do not come in sync during this time, the module reverts to perform a <i>Non-Sync Transfer</i> .   |
| Breaker close pulse      | The amount of time that <i>Breaker Close Pulse</i> signals are present when the request to close a breaker is given.  |
| Breaker Trip pulse       | The amount of time that <i>Breaker Open Pulse</i> signals are present when the request to open a breaker is given.  |
| Elevator Delay           | Use to delay the <i>Elevator Control</i> output before and after load transfer takes place. See section entitled <i>Application</i> for details of <i>Elevator Control</i> .  |

## 2.8 S2

The S2 section is subdivided into smaller sections. Select the required section with the mouse.



### 2.8.1 S2 OPTIONS

| Parameter              | Description   |
|------------------------|---|
| Open When S1 Available | <p><b>▲ NOTE:</b> Tick box shown for read only purpose. To configure the tick box see section entitled <i>S1 Options</i> elsewhere in this document.</p> <p><b>▲ NOTE:</b> Active when S2 source is set to <i>Standby</i>. For further details see section entitled <i>Application Options</i> elsewhere in this document</p> <p><input type="checkbox"/> = The S2 breaker can be requested to open regardless if S1 is available. This is useful when using DC controlled opening signals.</p> <p><input checked="" type="checkbox"/> = The S2 breaker is only requested to open when S1 is available. This is required when S2's breaker's opening signals are supplied by S1's supply.</p> |
| Immediate S2 Dropout   | <p><b>▲ NOTE:</b> This feature is not enabled when <i>Open When S1 Available</i> is enabled or when S2 is set to <i>Standby</i>. For further details see section entitled <i>Application Options</i> elsewhere in this document.</p> <p><input type="checkbox"/> = Upon S2 failure, the S2 Breaker remains closed until a transfer to S1 is initiated.</p> <p><input checked="" type="checkbox"/> = Upon S2 failure, the S2 Breaker opens immediately.</p>  |
| AC System              | This defines the topology of the alternator/source and the connections to the DSE module sensing terminals.   |

| Parameter | Description  |
|-----------|--|
| VT Fitted | <input type="checkbox"/> = The voltage sensing to the controller is direct from the alternator<br><input checked="" type="checkbox"/> = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs)<br>This is used to step down the generated voltage to be within the controller voltage specification.<br>By entering the Primary and Secondary voltages of the transformer, the controller displays the Primary voltage rather than the actual measured voltage.<br><br>This is typically used to interface the DSE module to high voltage systems (ie 11kV) but also used on systems such as 600V ph-ph. |

### 2.8.2 S2 TIMERS

| Timer              | Description   |
|--------------------|---|
| Start Delay        | Used to give a delay before starting in AUTO mode. This timer is activated upon the respective start command being issued. Typically this timer is applied to prevent starting upon fleeting remote start signals or short term S2 failures.        |
| Return Delay       | A delay, used in auto mode only, that allows for short term removal of the request to unload the supply before action is taken. This is usually used to ensure the supply remains on load before accepting that the start request has been removed. |
| Transient Delay    | Used to delay the detection of S1 failure. This is normally used to prevent short term transients or brownout conditions from being classified as a S1 Failure and opening the breaker.   |
| Warming Up Time    | The amount of time that the set runs BEFORE being allowed to take load. This is used to warm the engine to prevent excessive wear.  |
| Fail Delay         | The module instructs that S2 is to start and waits for the period of this timer for S2 to become available. If it is not available when the timer expires, the <i>S2 failure</i> alarm is triggered.  |
| Cooling time       | The amount of time that the set runs OFF LOAD before being stopped. This is to allow the set to cool down and is particularly important for engines with turbo chargers.  |
| Fail to Stop Delay | <input type="checkbox"/> = Alarm is disabled<br><input checked="" type="checkbox"/> = If the supply is called to stop and is still running after the configurable <i>Fail to Stop</i> delay time expires, a <i>Fail to Stop</i> alarm is generated. |

2.8.3 S2 ALARMS

### S2 Alarms

#### Voltage Alarms

Under Voltage

Trip  V PhN

Loading Voltage  V PhN

Over Voltage

Trip  V PhN

#### Frequency Alarms

Under Frequency

Trip  Hz

Loading Frequency  Hz

Over Frequency

Trip  Hz

#### Phase Rotation Alarm

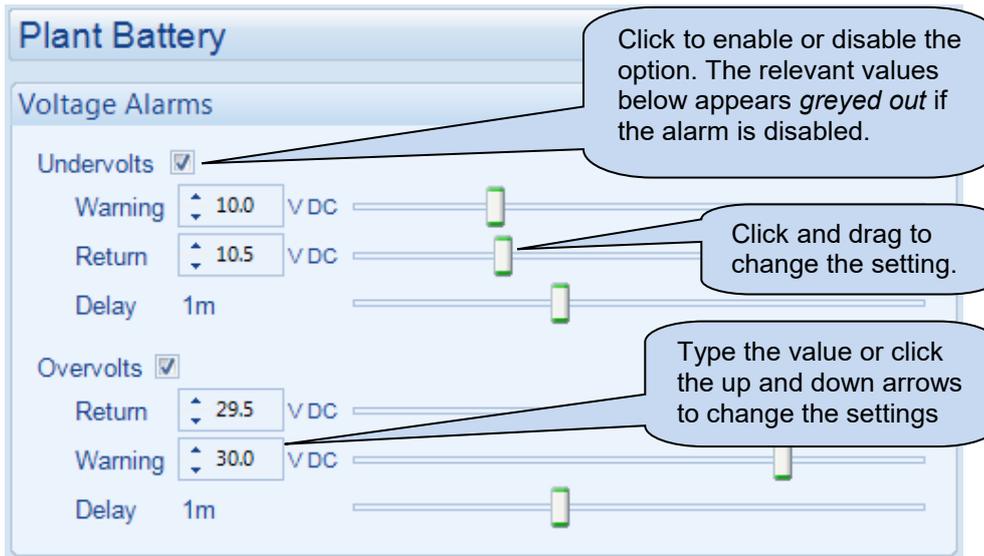
Enable

Phase Rotation

Action

| Alarm   | Description  |
|---|--|
| Under Voltage<br>IEEE 37.2 – 27 AC<br>Undervoltage Relay              | <input type="checkbox"/> = S2 Under Voltage detection is disabled<br><input checked="" type="checkbox"/> = S2 Under Voltage gives an alarm in the event of the mains voltage falling below the configured <i>Under Voltage Trip</i> value. The <i>Under Voltage Trip</i> value is adjustable to suit the application. The alarm is reset and the S2 is considered within limits when the S2 voltage rises above the configured <i>Under Voltage Return</i> level.            |
| Over Voltage<br>IEEE 37.2 – 59 AC<br>Overvoltage Relay                | <input type="checkbox"/> = S2 Over Voltage detection is disabled<br><input checked="" type="checkbox"/> = S2 Over Voltage gives an alarm in the event of the S2 voltage rising above the configured <i>Over Voltage Trip</i> value. The <i>Over Voltage Trip</i> value is adjustable to suit the application. The alarm is reset and the S2 is considered within limits when the S2 voltage falls below the configured <i>Over Voltage Return</i> level.                     |
| Under Frequency<br>IEEE 37.2 – 81 Frequency<br>Relay                  | <input type="checkbox"/> = S2 Under Frequency detection is disabled<br><input checked="" type="checkbox"/> = S2 Under Frequency gives an alarm in the event of the S2 frequency falling below the configured <i>Under Frequency Trip</i> value. The <i>Under Frequency Trip</i> value is adjustable to suit the application. The alarm is reset and the S2 is considered within limits when the S2 frequency rises above the configured <i>Under Frequency Return</i> level. |
| Over Frequency<br>IEEE 37.2 – 81 Frequency<br>Relay                   | <input type="checkbox"/> = S2 Over Frequency detection is disabled<br><input checked="" type="checkbox"/> = S2 Over Frequency gives an alarm in the event of the S2 frequency rising above the configured <i>Over Frequency Trip</i> value. The <i>Over Frequency Trip</i> value is adjustable to suit the application. The alarm is reset and the S2 is considered within limits when the S2 frequency falls below the configured <i>Over Frequency Return</i> level.       |
| Phase Rotation<br>Detection<br>IEEE 37.2 – 47 Phase<br>Sequence Relay | <input type="checkbox"/> = The phase rotation is not checked<br><input checked="" type="checkbox"/> = An Electrical Trip alarm is generated when the phase rotation of S2 supply is not matching the configured <i>Phase Rotation</i> setting.   |

## 2.9 PLANT BATTERY



| Parameter  | Description  |
|--|--|
| Plant Battery Undervolts<br>IEEE 37.2 -27 DC<br>Undervoltage Relay | The alarm activates when the battery voltage drops below the configured <i>Pre-Alarm</i> level for the configured <i>Delay</i> time. When the battery voltage rises above the configured <i>Return</i> level, the alarm is de-activated. |
| Plant Battery Overvolts<br>IEEE 37.2 -59 DC<br>Overvoltage Relay   | The alarm activates when the battery voltage rises above the configured <i>Pre-Alarm</i> level for the configured <i>Delay</i> time. When the battery voltage drops below the configured <i>Return</i> level, the alarm is de-activated. |

## 2.10 COMMUNICATIONS

The module includes an RS232 port for connection to a modem and an RS485 ports for connection to another device. The protocol used is Modbus RTU.

The *Communications* page is subdivided into smaller sections. Select the required section with the mouse.



### 2.10.1 BASIC

The screenshot shows the 'Basic' configuration page with several sections and callouts:

- Module Identification:** Contains 'Site identity' and 'ATS identity' text input fields. A callout explains: "Free text entries to identify the module. This text is displayed on the SCADA screen when the module is connected to the PC."
- Serial Port Configuration:** Contains 'Slave ID' (spin box with value 10), 'Baud Rate' (dropdown with value 19200), and 'Port Usage' (dropdown with value 'No Modem'). Callouts include: "Modbus Slave" pointing to the Slave ID field; "Baud rate adjustable from 1200-115200" pointing to the Baud Rate dropdown; and "Selects how the port is to be used" pointing to the Port Usage dropdown.
- Modem Settings:** Contains 'Alarm numbers' (greyed-out text input fields), 'GSM Modem' (checkbox), 'SMS Message centre number' (greyed-out text input field), and 'SMS Recipient numbers' (greyed-out text input fields). Callouts include: "These items are greyed out until a relevant option in Port Usage is selected." pointing to the greyed-out fields; and "Click to enable or disable a GSM modem. The relevant features below appears greyed out if the GSM modem is disabled." pointing to the GSM Modem checkbox.

### 2.10.1.1 SERIAL PORT CONFIGURATION

| Timer      | Description   |
|------------|---|
| Port usage | <p>Only one of the two serial ports is used at any one time (RS232 or RS485)<br/>                     The options are :</p> <p><b>No Modem</b> – RS232 ports is used for direct RS232 connection to PLC, BMS etc</p> <p><b>Incoming modem calls</b> – RS232 port connected to modem, used to accept incoming calls only.</p> <p><b>Incoming and outgoing modem (Sequence)</b> – RS232 port connected to modem used to accept incoming calls and also make calls upon shutdown alarms.</p> <p><b>Outgoing modem alarms (Sequence)</b> - RS232 port connected to modem, used to make calls upon shutdown alarms.</p> <p><b>Incoming and outgoing modem (Cyclic)</b> – RS232 port connected to modem used to accept incoming calls and also make calls upon shutdown alarms.</p> <p><b>Outgoing modem alarms (Cyclic)</b> - RS232 port connected to modem, used to make calls upon shutdown alarms.</p> <p><b>RS485</b> – The RS485 port is active. This is often used to connect to PLC's, building management systems and other third party equipment.</p> |

### 2.10.1.2 MODEM SETTINGS

| Timer                    | Description  |
|--------------------------|--|
| Alarm Number             | The phone number that the module dials upon an alarm condition. This number must be connected to a PC modem on a PC running the Configuration Suite Software.  |
| GSM Modem                | <input type="checkbox"/> = The connected modem is a fixed line telephone modem<br><input checked="" type="checkbox"/> = The connected modem is a GSM (cellular) modem. The GSM signal strength meter and GSM operator are shown on the module display. |
| SMS Message Centre Modem | The Message centre used to send SMS messages. This number is usually stored on the SIM card and need not be entered here.<br>A number is only needed here if it is not stored on the SIM card.   |
| SMS Recipient Numbers    | Numbers of the cell phones to send SMS messages to.<br>Leave blank if SMS function is not required.  |

### 2.10.1.3 RECOMMENDED MODEMS

DSE stock and supply the following recommended modems:

#### PSTN (FIXED LINE) MODEM

| Description                               | DSE Part Number |
|---|-----------------|
| Multitech ZBA Global Modem                | 020-252         |
| Modem Localisation kit for Europe         | 020-253         |
| Modem Localisation kit for Iceland/Sweden | 020-254         |
| Modem Localisation kit for New Zealand    | 020-264         |
| Modem Localisation kit for Netherlands    | 020-265         |
| Modem Localisation kit for USA            | 020-286         |

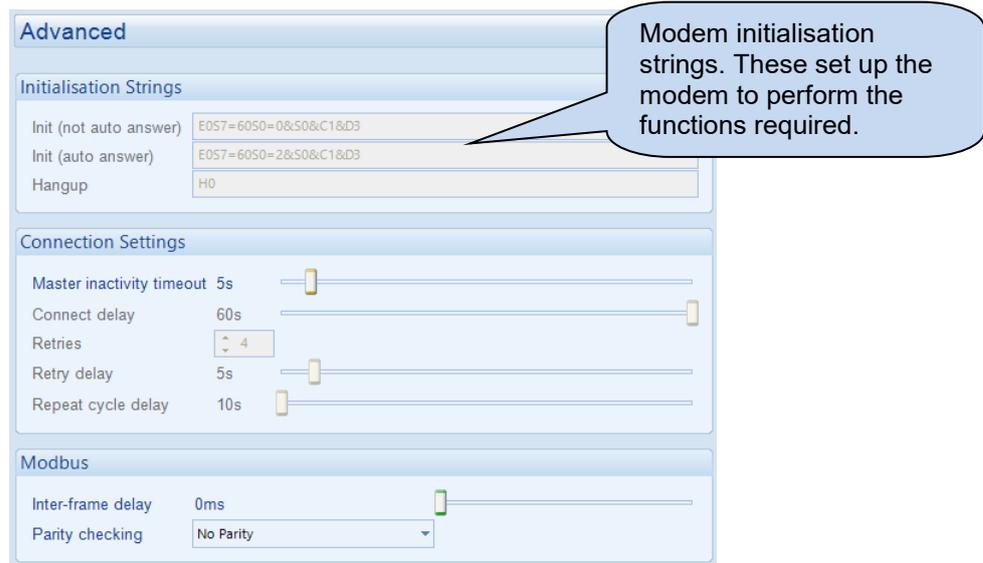
Other Localisation Kits are obtained from [www.multitech.com](http://www.multitech.com)

#### GSM MODEM

DSE do not stock or supply SIM cards for the modem, these must be obtained from your local GSM provider.

| Description  | DSE Part Number |
|--|-----------------|
| <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">  <b>NOTE: This modem is supplied ready configured to operate with the DSE module. When purchasing from a third party, the modem is not configured to communicate with the module.</b> </div> <p>Sierra Fastrack Xtend GSM Modem supplied with power supply cable, RS232 connection cable and GSM antenna. Suitable for GSM operating on 900/1800 MHz bands.</p> | 0830-001-01     |

## 2.10.2 ADVANCED



The screenshot shows the 'Advanced' configuration page. It is divided into three main sections:

- Initialisation Strings:** Contains three text input fields:
  - Init (not auto answer): E0S7=60S0=0&&S0&&C1&D3
  - Init (auto answer): E0S7=60S0=2&&S0&&C1&D3
  - Hangup: H0
- Connection Settings:** Contains several sliders and a dropdown:
  - Master inactivity timeout: 5s (slider)
  - Connect delay: 60s (slider)
  - Retries: 4 (dropdown)
  - Retry delay: 5s (slider)
  - Repeat cycle delay: 10s (slider)
- Modbus:** Contains two settings:
  - Inter-frame delay: 0ms (slider)
  - Parity checking: No Parity (dropdown)

A callout bubble points to the 'Init (not auto answer)' field with the text: "Modem initialisation strings. These set up the modem to perform the functions required."

### 2.10.2.1 INITIALISATION STRINGS

The initialisation strings are commands that are sent to the modem upon powering up the DSE module and additionally at regular intervals subsequently, whenever the module *initialises* (resets) the modem.

#### FACTORY SET INITIALISATION STRINGS

| Setting                                      | Description                             |
|--|---|
| E0   | Echo off                                |
| S7=60  | Wait for carrier time 60s               |
| S0=0 (not auto answer)<br>S0=2 (auto answer) | Do not answer<br>Answer after two rings |
| &S0  | DSR always on                           |
| &C1  | DCD is active if modem is online        |
| &D3  | Reset (ATZ) on DTR-drop                 |
| H0   | Hang up (disconnect)                    |

#### SILENT OPERATION

The modem connected to the module usually makes dialling noises and 'squeal' in the initial stages of making a data call. To control this noise, add the following command to the end of the initialisation string :

| Setting | Description  |
|---------|--|
| M0      | Silent operation   |
| M1      | Sounds during the initial stages of making a data call   |
| M2      | Sounds always when connected (not recommended for normal use but is also of use for troubleshooting) |

## MULTITECH ZBA GLOBAL MODEM INITIALISATION STRINGS

The factory settings for the initialisation strings are suited to the Multitech ZBA Global Modem :

| Initialisation strings |                      |
|------------------------|----------------------|
| Init (not auto answer) | E057=6050=0&S0&C1&D3 |
| Init (auto answer)     | E057=6050=2&S0&C1&D3 |
| Hangup                 | H0                   |

## SIERRA FASTRACK XTEND GSM MODEM INITIALISATION STRINGS

When connected to the Sierra Fastrack Xtend GSM modem, the initialisation strings must be altered by changing the factory set &D3 to &D2.

| Setting                                     | Description         |
|---|---------------------|
| &D2<br>(required for Sierra Fastrack Xtend) | Hang up on DTR-drop |
| &D3<br>( factory settings)                  | Reset on DTR-drop   |

| Initialisation strings |                      |
|------------------------|----------------------|
| Init (not auto answer) | E057=6050=0&S0&C1&D2 |
| Init (auto answer)     | E057=6050=2&S0&C1&D2 |
| Hangup                 | H0                   |

## OTHER MODEMS

When using modems not recommended by DSE first try either of the options shown above. If problems are still encountered, you must contact your modem supplier for further advice.

### 2.10.2.2 CONNECTION SETTINGS

| Timer                     | Description   |
|---------------------------|---|
| Master inactivity timeout | The module <i>looks</i> by default at the USB port for communications. When activity is detected on the RS232 or RS485 port, the module <i>switches</i> to look at the relevant port for further data. If no data activity is detected on the port for the duration of the <i>master inactivity timer</i> , it reverts to looking at the USB port.<br>This must be set longer than the time between modbus polls from the master. |
| Connect delay             | The amount of time that is allowed to elapse between the alarm being registered and the controller dialling out with the fault.   |
| Retries                   | The number of times the module attempts to contact the remote PC by modem.  |
| Retry delay               | The amount of time between retries.   |
| Repeat cycle delay        | The amount of time between cycles.  |

### 2.10.2.3 MODBUS

| Parameter         | Description   |
|-------------------|---|
| Inter-frame Delay | Set the time delay between the DSE module receiving a MODBUS RTU request and the DSE module's response. |
| Parity Checking   | Set the Modbus string Parity  |

## 2.10.3 TROUBLESHOOTING MODEM COMMUNICATIONS

### 2.10.3.1 MODEM COMMUNICATION SPEED SETTING

First ensure the modem is set to communication with the DSE module at 9600 baud – Modems supplied by DSE are factory adjusted to operate with the module. Only modems purchased from a third party may require adjustment.

To change the modems RS232 baud rate you need a command line terminal program (Hyperterminal by Microsoft is a good solution). Operation of this terminal program is not supported by DSE, you must contact your terminal program supplier.

Connect the modem RS232 port to your PCs RS232 port. You may need an additional card in your PC to provide this facility.

Use Hyperterminal (or similar) to connect to the modem at its current baud rate. You may need to contact your modem supplier to obtain this detail. If this is not possible, use 'trial and error' methods. Select a baud rate, attempt connection, press <ENTER> a few times. If the modem responds with **OK** then you are connected at the correct baud rate. Any other response (including nothing) means you are not connected so select another baud rate.

When connected. enter the following command:

**AT+IPR=9600** and press <ENTER>

This sets the modem to 9600 baud.

Close the Hyperterminal connection (**do not** remove power from the modem) then open a new connection to the modem at 9600 baud.

Enter the following command:

**AT&W** and press <ENTER>

This saves the new setting in the modem. Power is now safe to be removed. The next time power is applied, the modem starts with the new settings (Baud rate = 9600), suitable to communicate with the module.

### 2.10.3.2 GSM MODEM CONNECTION

Most GSM modems have a *Status* LED. The Sierra Fastrack Xtend modem as recommended and supplied by DSE has a RED Status LED, operating as follows.

| LED STATE                                     | Description   |
|---|---|
| Off   | Modem is not powered                                    |
| On Continuous                                 | Not connected to GSM network                            |
| Flashing Slow (approx once every two seconds) | Connected to GSM network                                |
| Flashing Fast (approx twice per second)       | Connected to GSM network data transmission in progress. |

### 2.10.3.3 SERIAL PORT INSTRUMENT DISPLAY

The following section is an excerpt from the operator manual (DSE Publication 057-158) and details the *Serial Port* instrument, used for monitoring operation of the module serial port.

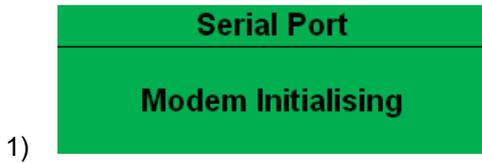
**NOTE:** Factory Default settings are for the RS232 port to be enabled (no modem connected), operating at 19200 baud, modbus slave address 10.

#### Example 1 – Module connected to a RS232 telephone modem.

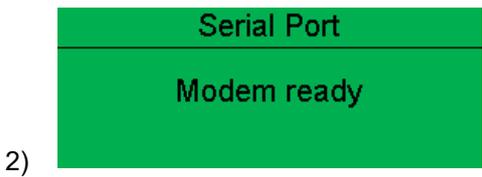
| Serial Port |             |
|-------------|-------------|
| Baud        | <b>9600</b> |
| SlaveID     | <b>10</b>   |
| Modem       |             |

Indicates that a modem is configured. Shows 'RS232' if no modem is configured or 'RS485' if the RS485 port is selected

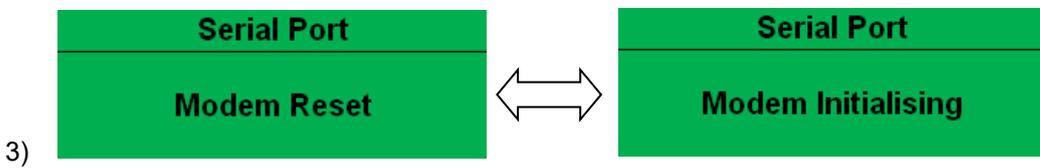
#### Modem Setup Sequence



If the Modem and the module communicate successfully :



In case of communication failure between the modem and module, the modem is automatically reset and initialisation is attempted once more :



In the case of a module that is unable to communicate with the modem, the display continuously cycles between 'Modem Reset' and 'Modem Initialising' as the module resets the modem and attempts to communicate with it again. This continues until correct communication is established with the modem.

In this instance, you must check connections and verify the modem operation.

#### Example 2 – Module connected to a modem.

| Serial Port |             |
|-------------|-------------|
| Baud        | <b>9600</b> |
| SlaveID     | <b>10</b>   |
| Modem       |             |

**Example 3 – Modem status of a GSM modem**

Currently connected GSM operator and signal

| Serial Port |             |
|-------------|-------------|
| Operator    | Orange      |
| Signal      | Modem Ready |

**Example 4 - Module RS485 port configured for connection to a modbus master.**

| Serial Port |       |
|-------------|-------|
| Baud        | 19200 |
| SlaveID     | 1     |
| RS485       |       |

## 2.11 SCHEDULER

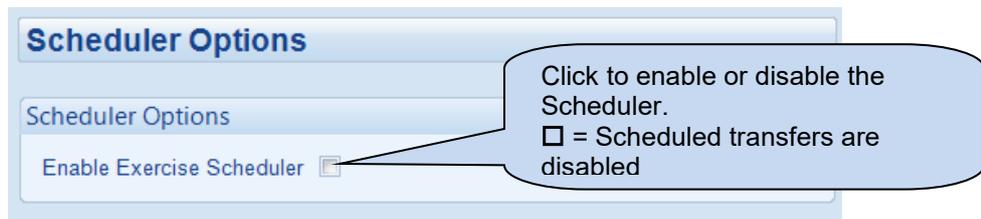
The scheduler is used to automatically start S2 on a configured day and time and run for the set duration.

The S2 supply made to run *on load* or *off load* depending upon the configuration:



The scheduler allows for the configuration of two different banks, this offers the possibility of having monthly scheduled events or weekly events. See overleaf for more information on *Monthly* and *Weekly* events.

### 2.11.1 SCHEDULER OPTIONS

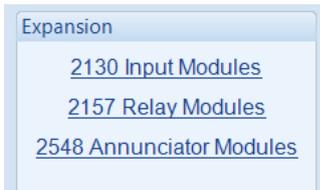


2.11.2 BANK 1

| Function        | Description   |
|-----------------|---|
| Schedule Period | <p>Determines the repeat interval for the scheduler bank.</p> <p><i>Weekly</i>: Provides the ability to select certain days of the week when the scheduler is needed</p> <p><i>Monthly</i>: Provides the ability to select the weeks of the month when the scheduler is needed</p> <p>In case both <i>Monthly</i> and <i>Weekly</i> scheduled run intervals are required, two <i>Banks</i> are provided.</p>  |
| Week            | <p><b>The option is available when the <i>Schedule Period</i> is configured as <i>Monthly</i>.</b></p> <p>Select the number of the week the schedule is required in each month.</p>   |
| Day             | Specify the day of week the scheduled run takes place   |
| Transfer Mode   | <p>Determines the transfer action when the scheduled event occurs.</p> <p><i>Do Not Transfer</i>: the existing supply remains on load and the transfer is inhibited even when this supply fails</p> <p><i>Off Load</i>: the <i>Target</i> supply is taken forced off load. If the other supply is available this then supplies the load</p> <p><i>Transfer</i>: the load is transferred to the <i>Target</i> supply. If the <i>Target</i> does not become available, the load remains on the existing supply.</p> |
| Target          | Choose the <i>Target</i> supply for the <i>Transfer Mode</i> action.  |
| Start Time      | Determines at what time of day the scheduled run starts   |
| Duration        | Determines the duration of time for the scheduled run   |
| Clear           | Resets the values for the <i>Week</i> , <i>Day</i> , <i>Start Time</i> and <i>Duration</i> to defaults  |

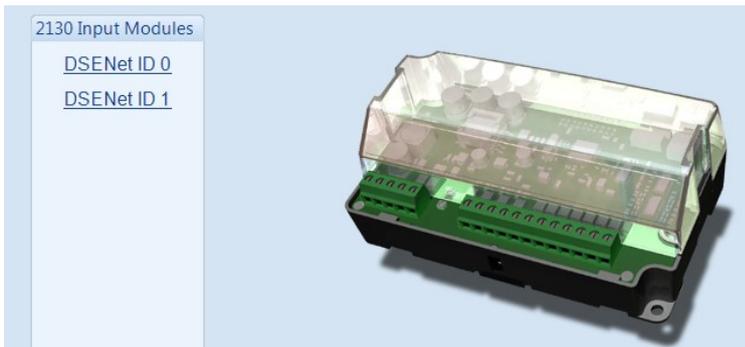
## 2.12 EXPANSION

The *Expansion* page is subdivided into smaller sections. Select the required section with the mouse.

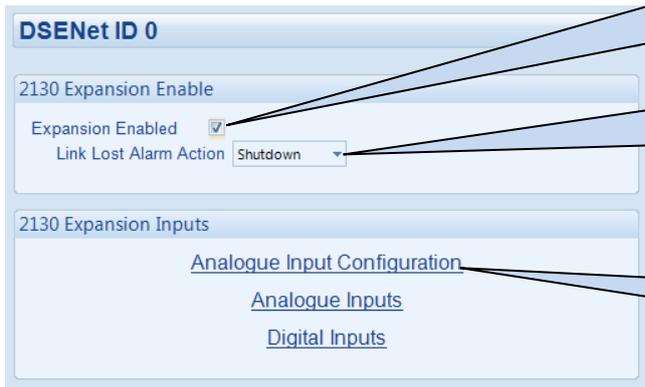


### 2.12.1 DSE2130 INPUT MODULES

Select the DSENet ID of the input expansion you wish to configure. The ID of the expansion input module is set by rotary decimal switch accessible under the removable cover of the device.



The following is then shown:



Click to enable or disable the option. The relevant values below appears *greyed out* if the alarm is disabled.

Select the alarm type of the *link lost alarm*. This alarm takes action if the expansion module is not detected by the host module.

Select which of the expansion inputs you wish to configure.

### 2.12.1.1 DIGITAL INPUTS (A-D)

The screenshot shows the configuration interface for 'Digital Input A'. The settings are as follows:

| Setting          | Value                    |
|------------------|--------------------------|
| Function         | User Configured          |
| Polarity         | Close to Activate        |
| Action           | Shutdown                 |
| Arming           | Never                    |
| LCD Display      | 2130 ID0 Digital Input A |
| Activation Delay | 0s                       |

Callout 1 (Function): Select the required function of the input and whether it is *open* or *close to activate*.

Callout 2 (Action): Select the required alarm type of the input and when it is active.

Callout 3 (LCD Display): Type the text that is to appear on the module's display when the alarm is active.

Callout 4 (Activation Delay): Gives a delay upon activation of the input to allow the input to be used as a level switch

### 2.12.1.2 ANALOGUE INPUTS (E-H)

#### Configured as an Analogue Input

**Flexible Sensor E**

Sensor Description

Sensor Type: Pressure Sensor

Sensor Name: Flexible Sensor

Input Type: VDO 10 Bar

Alarm Arming: Always

Low Alarm Enable:  Action: Shutdown Low Alarm: 1.03 Bar

Low Pre-alarm Enable:  Low Pre-alarm Trip: 1.17 Bar Low Pre-alarm Return: 1.24 Bar

High Pre-alarm Enable:  High Pre-alarm Return: 1.40 Bar High Pre-alarm Trip: 1.50 Bar

High Alarm Enable:  Action: Shutdown High Alarm: 1.60 Bar

Callouts:

- Edit the sensor curve if required.
- Click and drag to change the setting.
- Click to enable or disable the option. The relevant values below appears *greyed out* if the alarm is disabled.
- Type the value or click the up and down arrows to change the settings.

#### Configured as a Digital Input

**Analogue Inputs E - H**

Analogue Input E (Digital)

Function: User Configured

Polarity: Close to Activate

Action: Shutdown

Arming: Never

LCD Display: 2130 ID0 Digital Input E

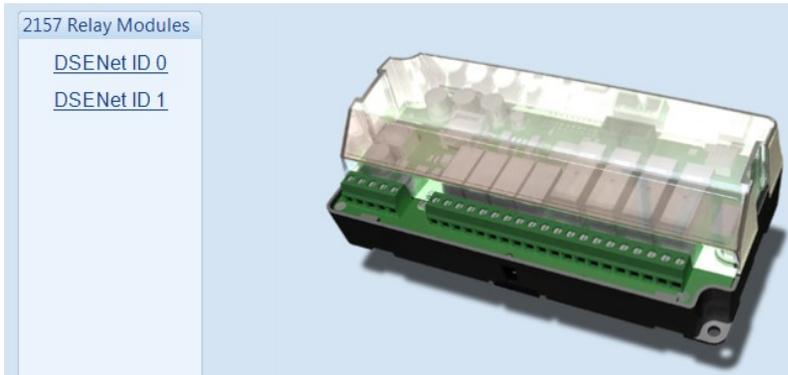
Activation Delay: 0s

Callouts:

- Select the required function of the input and whether it is *open* or *close to activate*.
- Select the required alarm type of the input and when it is active.
- Type the text that is to appear on the module's display when the alarm is active.
- Gives a delay upon activation of the input to allow the input to be used as a liquid level switch for example.

## 2.12.2 DSE2157 RELAY MODULES

Select the DSENet ID of the relay expansion you wish to configure. The ID of the relay board is set by rotary decimal switch accessible under the removable cover of the device.



The following is then shown:

**DSENet ID 0**

2157 Enable

Expansion Enabled

Link Lost Alarm Action Shutdown

Relay Outputs (Normally Open)

|   | Source              | Polarity |
|---|---------------------|----------|
| A | Audible Alarm       | Energise |
| B | System In Auto Mode | Energise |
| C | Not Used            | Energise |
| D | Not Used            | Energise |

Relay Outputs (Changeover)

|   | Source   | Polarity |
|---|----------|----------|
| E | Not Used | Energise |
| F | Not Used | Energise |
| G | Not Used | Energise |
| H | Not Used | Energise |

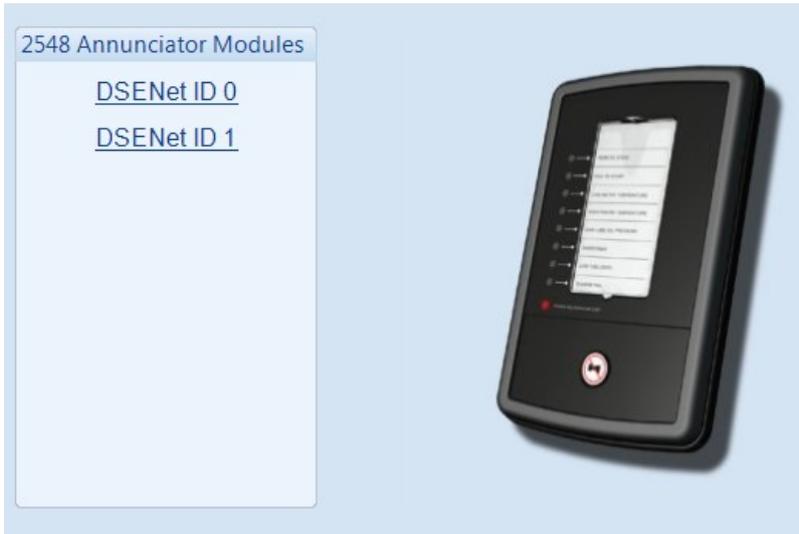
Click to enable or disable the option. The relevant values below appears *greyed out* if the alarm is disabled.

Select the alarm type of the *link lost alarm*. This alarm takes action if the expansion module is not detected by the host module.

Select the output source and the polarity required. For example this output *energises* when the module is in the *Auto* mode.

### 2.12.3 DSE2548 LED EXPANSION

Select the DSENet ID of the LED expansion you wish to configure. The ID of the Annunciator is set by rotary decimal switch accessible on the back of the device.



The following is then shown:

**DSENet ID 0**

2548 Expansion Enable

Expansion Enabled

Link Lost Alarm Action Shutdown

**Sounder Configuration**

Follow main unit

Sounder enabled

**LED Indicators**

|   |          |     |
|---|----------|-----|
| A | Not Used | Lit |
| B | Not Used | Lit |
| C | Not Used | Lit |
| D | Not Used | Lit |
| E | Not Used | Lit |
| F | Not Used | Lit |
| G | Not Used | Lit |
| H | Not Used | Lit |

Annunciator Insert Card

Click to enable or disable the option. The relevant values below appears *greyed out* if the alarm is disabled.

Select the alarm type of the *link lost alarm*. This alarm takes action if the expansion module is not detected by the host module.

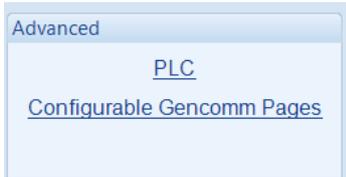
Enable or disable the expansion module's internal

- If the *Mute / Lamp Test* button is pressed, other DSE2548 modules configured to *Follow Main Unit* and the host module also perform *Lamp Test / Mute* their alarm and vice-versa.  
 - If the *Mute / Lamp Test* button is pressed, other DSE2548 modules and the host module does not respond to this.

Select the configuration for the LED. For instance this LED is configured to be *Unlit* when in Auto mode. Hence this is a *Not in Auto* LED.

## 2.13 ADVANCED

The *Advanced* page is subdivided into smaller sections. Select the required section with the mouse.



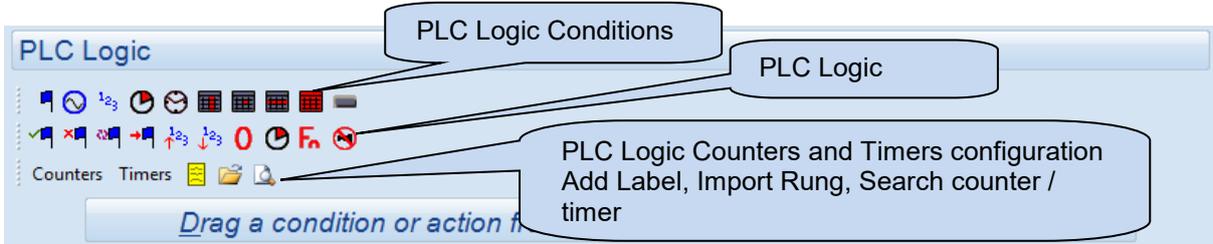
### 2.13.1 PLC

The *PLC Logic* adds comprehensive PLC functionality to the DSE controller. This is an advanced section, used entirely at your own risk.

#### 2.13.1.1 PLC LOGIC

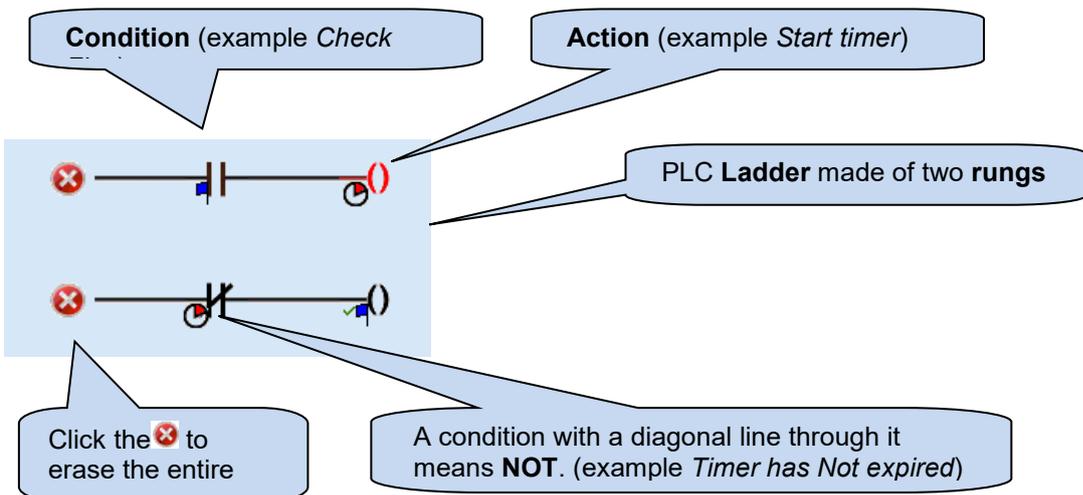
**NOTE:** For further details and instructions on PLC Logic and PLC Functions, refer to DSE Publication: *057-175 PLC Programming Guide* which is found on our website: [www.deepseapl.com](http://www.deepseapl.com)

The PLC Logic adds comprehensive PLC functionality to the DSE controller. This is an advanced section, used entirely at your own risk.



In PLC logic, the *ladder* of logic is made up of a series of *rungs*. The ladder is the complete PLC *program*. This program may perform a single task, or multiple tasks. Each rung contains a number of *conditions* and *actions*.

For instance if the conditions in the rung are met, the action takes place.



### 2.13.1.2 PLC FUNCTIONS

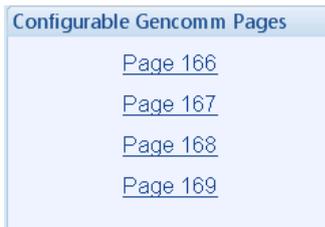
**NOTE:** For further details and instructions on PLC Logic and PLC Functions, refer to DSE Publication: *057-175 PLC Programming Guide* which is found on our website: [www.deepseapl.com](http://www.deepseapl.com)

PLC Functions allow the PLC logic to create alarm conditions or drive 'virtual inputs' on the controller. A PLC function is configured in the same way as a module digital input.

The screenshot displays a configuration window titled "PLC Functions 1-4". It contains two sections, "Function 1" and "Function 2", each with a set of configuration options:

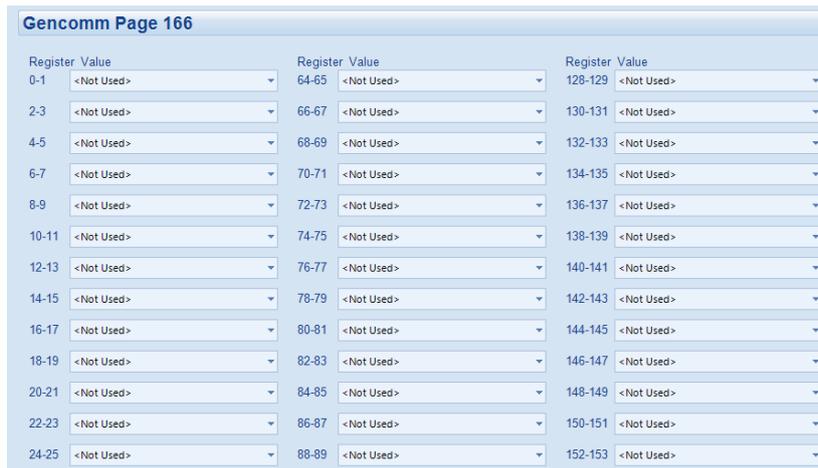
- Function 1:**
  - Function: User Configured (dropdown)
  - Polarity: Close to Activate (dropdown)
  - Action: Warning (dropdown)
  - Arming: Always (dropdown)
  - LCD Display: (empty text field)
  - Activation Delay: 0s (slider)
- Function 2:**
  - Function: User Configured (dropdown)
  - Polarity: Close to Activate (dropdown)
  - Action: Warning (dropdown)
  - Arming: Always (dropdown)
  - LCD Display: (empty text field)
  - Activation Delay: 0s (slider)

### 2.13.2 CONFIGURABLE GENCOMM PAGES



For advanced Modbus users of the controller, configurable Gencomm pages are available. The intention is to allow the user to create personal collections of data in subsequent registers to minimise the number of modbus reads required by the master, and hence speed up data collection.

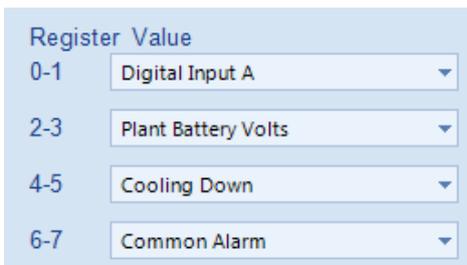
All configurable Gencomm registers are 32-bit unsigned format.



The configurable modbus pages are:

| Page | Hex address | Decimal address |
|------|-------------|-----------------|
| 166  | A600        | 42496           |
| 167  | A700        | 42752           |
| 168  | A800        | 43008           |
| 169  | A900        | 43264           |

#### Example of Gencomm page configuration:



The register address is obtained from the formula:  
 $register\_address = page\_number * 256 + register\_offset$

To read the *Plant Battery Volts* from the above register, the Modbus master device needs to read the data in two registers and then combine the data from the Most Significant Bit and the Least Significant Bit.

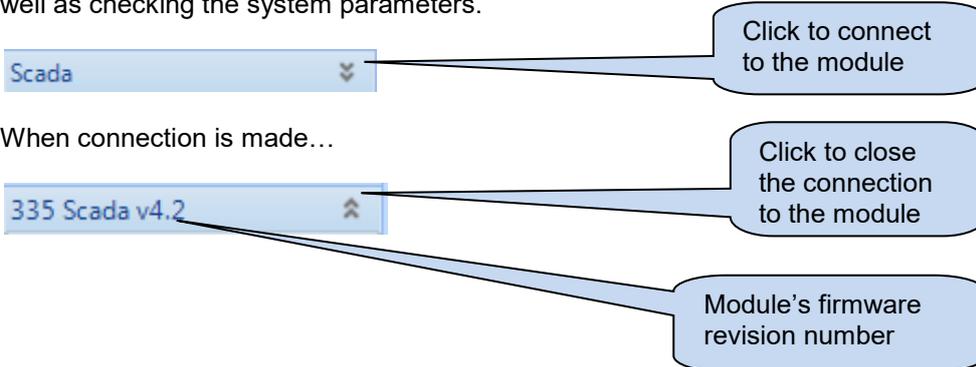
MSB address in Decimal =  $(166 * 256) + 2 = 42498$

LSB address in Decimal =  $(166 * 256) + 3 = 42499$

### 3 SCADA

SCADA stands for **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition and is provided both as a service tool and also as a means of monitoring and control.

As a service tool, the SCADA pages is to check the operation of the controller's inputs and outputs as well as checking the system parameters.



When connection is made...

The SCADA page is subdivided into smaller sections. Select the required section with the mouse.



### 3.1 ATS IDENTITY

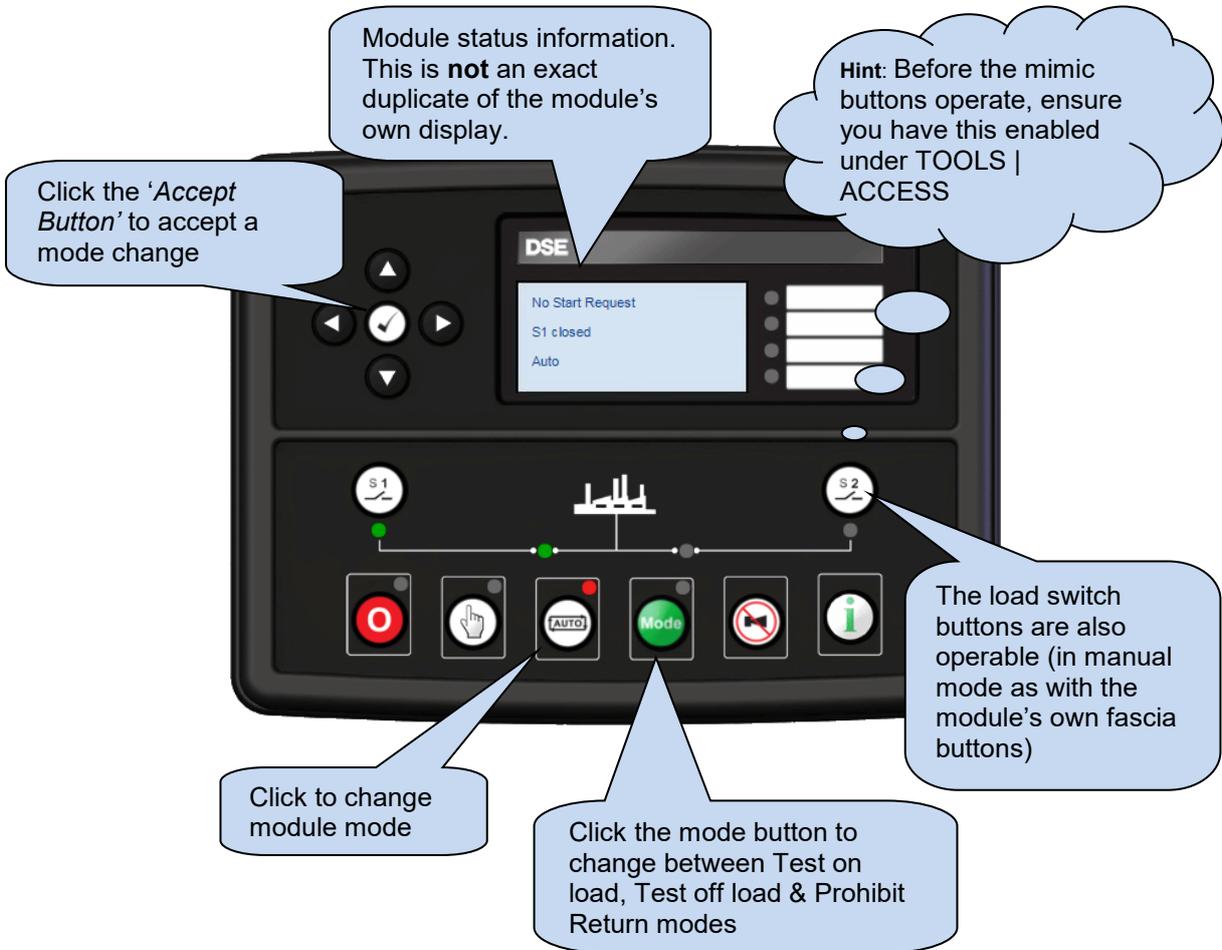
Shows the module's current settings for *Site Identity*, *ATS Identity*, *S1 Identity* and *S2 Identity*.

|                          |
|--------------------------|
| <b>ATS Identity</b>      |
| <b>Site Identity</b>     |
| Deep Sea Electronics PLC |
| <b>ATS Identity</b>      |
| DSE335 ATS Panel         |
| <b>S1 Identity</b>       |
| Source 1                 |
| <b>S2 Identity</b>       |
| Source 2                 |

### 3.2 MIMIC

This screen provides a mimic of the control module and allows the operator to change the control mode of the module.

Only the mode control and load switch buttons are operational in the mimic display. The menu navigation buttons are inoperable.



### 3.3 LANGUAGES

**Languages**

Current Module Language  
English

To upload: <No suitable language files>

Upload Now

Current language in the module

Select *new* language

Click to send the new language to the module

During language upload, the progress is shown. Total transfer time is less than one minute.  
During this process:

- DO NOT DISCONNECT THE USB LEAD
- DO NOT TURN OFF YOUR PC

### 3.4 DIGITAL INPUTS

**Digital Inputs**

Digital Inputs

|                        | Active | Open / Closed |
|------------------------|--------|---------------|
| A Auxiliary S1 Fail    | ●      | ⚡             |
| B Auto Restore Inhibit | ●      | ⚡             |
| C Auto Start Inhibit   | ●      | ⚡             |
| D S1 Closed Auxiliary  | ●      | ⚡             |
| E S2 Closed Auxiliary  | ●      | ⚡             |
| F S1 Load Inhibit      | ●      | ⚡             |
| G S2 Load Inhibit      | ●      | ⚡             |
| H Lamp Test            | ●      | ⚡             |
| I Digital Input I      | ●      | ⚡             |
| J Digital Input J      | ●      | ⚡             |
| K Auxiliary S2 Ready   | ●      | ⚡             |
| L Digital Input L      | ●      | ⚡             |

Shows if the input channel is active or not. This input is *open* but is active. The input is configured to be *open to activate*

State of the input (open or closed to battery negative or positive)

### 3.5 DIGITAL OUTPUTS

#### Digital Outputs

##### Relay Outputs (Volt Free)

|                           | Active                               | Open / Closed |
|---------------------------|--------------------------------------|---------------|
| A (N/C) Close S1 Output   | <span style="color: green;">●</span> |               |
| B (N/O) Close S2 Output   | <span style="color: green;">●</span> |               |
| C (C/O) PLC output flag 1 | <span style="color: green;">●</span> |               |
| D (C/O) PLC output flag 2 | <span style="color: green;">●</span> |               |
| E (N/C) Start and Run S2  | <span style="color: green;">●</span> |               |
| F (N/O) Audible Alarm     | <span style="color: green;">●</span> |               |

##### FET Outputs

|                        | Active                               | Open / Closed |
|------------------------|--------------------------------------|---------------|
| G Battery High Voltage | <span style="color: green;">●</span> |               |
| H Battery Low Voltage  | <span style="color: green;">●</span> |               |
| I Common Warning       | <span style="color: green;">●</span> |               |
| J Flexible Sensing     | <span style="color: green;">●</span> |               |
| K S1 Failure L         | <span style="color: green;">●</span> |               |
| L Not Used             | <span style="color: green;">●</span> |               |

Shows if the output channel is active or not. This output is *Close* but is active. The output is configured to be *Close S1 Output de-energise*. As relay is normally closed (N/C) and the *Close S1* source is present, the output is *activated* to *close* the N/C relay.

State of the output (open or closed)

### 3.6 VIRTUAL LEDS

Shows the state of the *virtual LEDs*. These LEDs are not fitted to the module or expansion modules, they are not physical LEDs. They are provided show status and appear only in the SCADA section of the configuration suite, or is read by third party PLC or Building Management Systems (for example) using the modbus RTU protocol.

**Virtual LEDs**

LED Status

| LED Number | Configuration | Active                |
|------------|---------------|-----------------------|
| LED 1      | Audible Alarm | Active (Green)        |
| LED 2      | Not Used      | Inactive (Dark Green) |
| LED 3      | Not Used      | Inactive (Dark Green) |
| LED 4      | Not Used      | Inactive (Dark Green) |
| LED 5      | Not Used      | Inactive (Dark Green) |
| LED 6      | Not Used      | Inactive (Dark Green) |
| LED 7      | Not Used      | Inactive (Dark Green) |
| LED 8      | Not Used      | Inactive (Dark Green) |
| LED 9      | Not Used      | Inactive (Dark Green) |
| LED 10     | Not Used      | Inactive (Dark Green) |
| LED 11     | Not Used      | Inactive (Dark Green) |
| LED 12     | Not Used      | Inactive (Dark Green) |
| LED 13     | Not Used      | Inactive (Dark Green) |
| LED 14     | Not Used      | Inactive (Dark Green) |
| LED 15     | Not Used      | Inactive (Dark Green) |
| LED 16     | Not Used      | Inactive (Dark Green) |
| LED 17     | Not Used      | Inactive (Dark Green) |
| LED 18     | Not Used      | Inactive (Dark Green) |
| LED 19     | Not Used      | Inactive (Dark Green) |
| LED 20     | Not Used      | Inactive (Dark Green) |

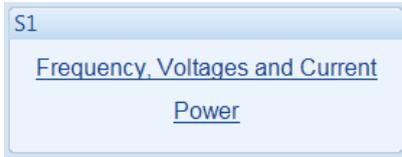
Active

Shows if the Virtual LED is active or not

Shows what the Virtual LED is configured for (shows the LED number if not configured)

### 3.7 S1 & S2

The *S1* and *S2* pages are subdivided into smaller sections. Select the required section with the mouse.



#### 3.7.1 FREQUENCY, VOLTAGE AND CURRENT

Shows the modules measurements of the S1 or S2 supply.

A screenshot of a monitoring page titled 'Frequency, Voltage and Power'. The page is divided into several sections, each with a title bar and a data display area. The data is as follows:

| Frequency, Voltage and Power |                    |                    |
|------------------------------|--------------------|--------------------|
| Frequency                    |                    |                    |
| 50.1 Hz                      |                    |                    |
| Phase Rotation               |                    |                    |
| L1-L2-L3                     |                    |                    |
| Phase to Neutral Voltages    |                    |                    |
| L1 - N<br>230.3 v            | L2 - N<br>230.3 v  | L3 - N<br>231.3 v  |
| Phase to Phase Voltages      |                    |                    |
| L1 - L2<br>398.0 v           | L2 - L3<br>399.7 v | L3 - L1<br>401.2 v |
| Current                      |                    |                    |
| L1<br>55.0 A                 | L2<br>54.0 A       | L3<br>55.0 A       |
| Earth Current                |                    |                    |
| 0.0 A                        |                    |                    |

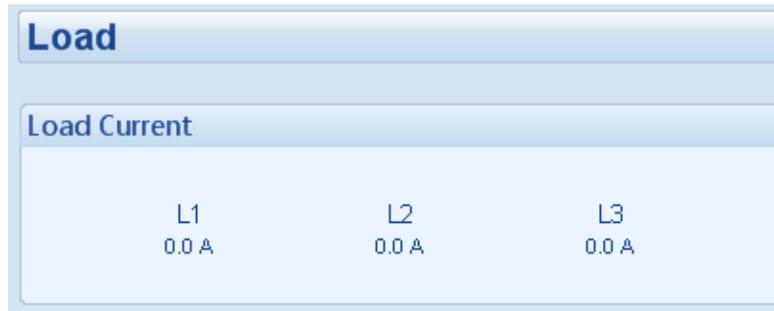
### 3.7.2 POWER

Shows the modules measurements of the S1 or S2 supply power.

| Power                    |           |            |           |
|--------------------------|-----------|------------|-----------|
| <b>Watts</b>             |           |            |           |
| L1                       | L2        | L3         | Total     |
| 7.6 kW                   | 7.4 kW    | 7.7 kW     | 22.7 kW   |
| <b>VA</b>                |           |            |           |
| L1                       | L2        | L3         | Total     |
| 12.6 kVA                 | 12.6 kVA  | 12.7 kVA   | 37.9 kVA  |
| <b>VAr</b>               |           |            |           |
| L1                       | L2        | L3         | Total     |
| 9.2 kVAr                 | 9.1 kVAr  | 9.3 kVAr   | 27.6 kVAr |
| <b>Power Factor</b>      |           |            |           |
| L1                       | L2        | L3         | Average   |
| 0.60                     | 0.59      | 0.60       | 0.59      |
| <b>Accumulated Power</b> |           |            |           |
| kWh                      | kVAh      | kVArh      |           |
| 42.7 kWh                 | 71.2 kVAh | 51.8 kVArh |           |

### 3.8 LOAD

Shows the measurement of the load current.



### 3.9 PLANT BATTERY

Shows the measurement of the plant battery



### 3.10 ALARMS

Shows any present alarm conditions.



### 3.11 STATUS

Shows the module's current status.

| Status               |                  |
|----------------------|------------------|
| S1 Supervisor State  | Software Version |
| Failed               | 4.2              |
| S1 Monitor State     | Module ID        |
| Failed               | 71733DFA0        |
| S2 Supervisor State  | Mode             |
| No Start Request     | Stop             |
| S2 Monitor State     |                  |
| Offline              |                  |
| Load Switching State |                  |
| S1 Closed            |                  |

### 3.12 EVENT LOG

Shows the contents of the module's event log

The screenshot shows the 'Event Log' window with a table of events. The table has columns for '#', 'Date', 'Time', 'Event', and 'Details'. The first row is highlighted in orange. Below the table are four buttons: 'Export to Excel', 'Export to CSV', 'Export to PDF', and 'Print event log'. Callouts provide instructions for each button.

| #  | Date       | Time  | Event      | Details                                 |
|----|------------|-------|------------|---|
| 1  | 15/03/2012 | 17:20 | Warning    | S1 Failure Unlatched                    |
| 2  | 15/03/2012 | 17:16 | ETrip      | Expansion Unit Watchdog Alarm           |
| 3  | 15/03/2012 | 17:12 | Warning    | S1 Failure Unlatched                    |
| 4  | 15/03/2012 | 17:12 | Restart    | Power Up                                |
| 5  | 15/03/2012 | 10:39 | Warning    | S1 Failure Unlatched                    |
| 6  | 15/03/2012 | 10:39 | Restart    | Power Up                                |
| 7  | 31/12/1999 | 00:00 | Initialise | User calibration data initialised       |
| 8  | 31/12/1999 | 00:00 | Initialise | Accumulated instrumentation initialised |
| 9  | 06/03/2012 | 08:37 | Warning    | S1 Failure Unlatched                    |
| 10 | 06/03/2012 | 08:37 | Restart    | Power Up                                |
| 11 | 06/03/2012 | 08:37 | Warning    | S1 Failure Unlatched                    |
| 12 | 06/03/2012 | 08:37 | Restart    | Power Up                                |
| 13 | 06/03/2012 | 08:37 | Warning    | S1 Failure Unlatched                    |
| 14 | 06/03/2012 | 08:37 | Restart    | Power Up                                |
| 15 | 06/03/2012 | 08:36 | Warning    | S1 Failure Unlatched                    |
| 16 | 06/03/2012 | 08:36 | Restart    | Power Up                                |
| 17 | 06/03/2012 | 08:36 | Warning    | S1 Failure Unlatched                    |
| 18 | 06/03/2012 | 08:36 | Restart    | Power Up                                |
| 19 | 06/03/2012 | 08:36 | Warning    | S1 Failure Unlatched                    |
| 20 | 06/03/2012 | 08:36 | Restart    | Power Up                                |
| 21 | 06/03/2012 | 08:36 | Warning    | S1 Failure Unlatched                    |
| 22 | 06/03/2012 | 08:36 | Restart    | Power Up                                |
| 23 | 06/03/2012 | 08:36 | Warning    | S1 Failure Unlatched                    |
| 24 | 06/03/2012 | 08:36 | Restart    | Power Up                                |
| 25 | 06/03/2012 | 08:36 | Warning    | S1 Failure Unlatched                    |
| 26 | 06/03/2012 | 08:36 | Restart    | Power Up                                |

Click to save the log to an Excel or csv file for use in an external spreadsheet program

The recorded events in the module's Event log.

Click to save the log to a pdf (Adobe Acrobat) file

Click to print the log

### 3.13 MAINTENANCE

The *Maintenance* page is subdivided into smaller sections. Select the required section with the mouse.



#### 3.13.1 TIME

**Date and Time**

Module Date: 12/03/2012

Module Time: 18:47:21

**Set Date and Time**

Date: 12/03/2012  
Time: 18:46:47  
Set

**Set to PC Time**

Date: 12/03/2012  
Time: 18:49:19  
Set to PC Time

Display of the module's current date

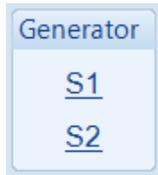
Type the new date / time or click the up and down arrows to change the settings

Click Set to adjust the module to the date/time that your PC is set to.

Click Set to adjust the module to the selected date/time.

### 3.13.2 ACCUMULATED INSTRUMENTATION

The *Accumulated Instrumentation* page is subdivided into smaller sections. Select the required section with the mouse.



#### 3.13.2.1 S1 & S2

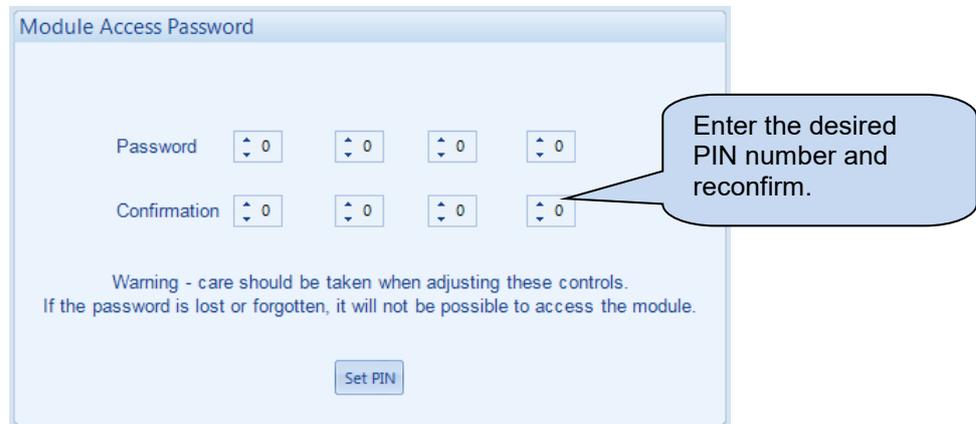
The screenshot shows the "S1" section of the accumulated instrumentation page. It contains four parameter rows: kWh, kVAh, kVArh, and a Reset section. Each row displays a current value, a numeric input field with up/down arrows, and a "Set" button. The Reset section contains a "Reset all values to zero" button. Callouts provide instructions: "Display of the module's current value for the parameter" points to the kWh value; "Type the new value or click the up and down arrows to change the settings" points to the kWh input field; "Click Set to adjust the module to the selected value" points to the kWh Set button; and "Click to reset all the accumulated instrumentation counters to zero." points to the Reset button.

| Parameter | Current Value | Input Value | Action                   |
|-----------|---------------|-------------|--------------------------|
| kWh       | 121.4 kWh     | 121.4       | Set                      |
| kVAh      | 121.5 kVAh    | 121.5       | Set                      |
| kVArh     | 1.2 kVArh     | 1.2         | Set                      |
| Reset     |               |             | Reset all values to zero |

### 3.13.3 MODULE PIN

**NOTE: If the PIN is lost or forgotten, it is not possible to access the module!**

Allows a PIN (Personal Identification Number) to be set in the controller. This PIN must be entered to either access the front panel configuration editor or before a configuration file is sent to the controller from the PC software.



Module Access Password

Password

Confirmation

Warning - care should be taken when adjusting these controls.  
If the password is lost or forgotten, it will not be possible to access the module.

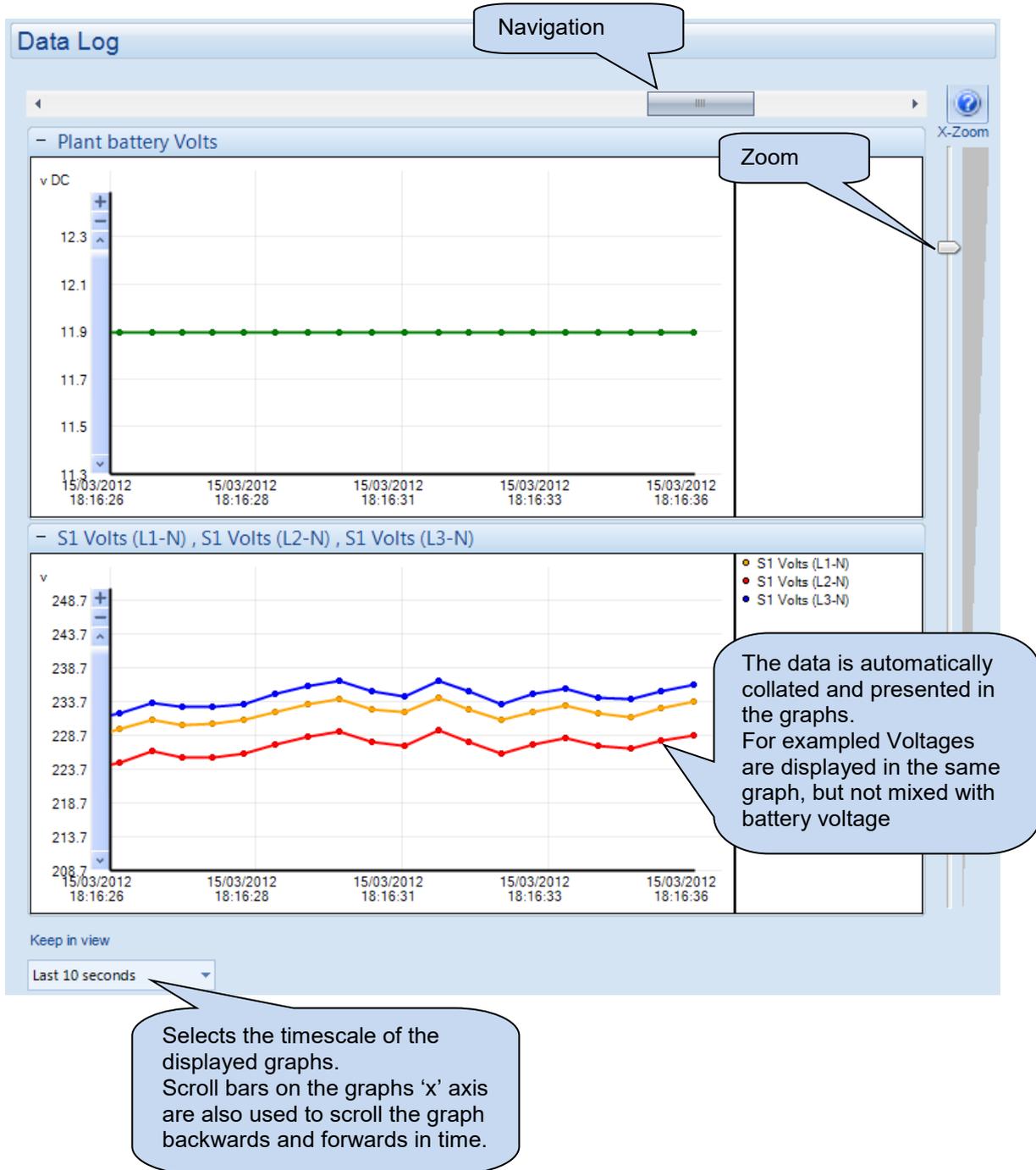
Set PIN

Enter the desired PIN number and reconfirm.

### 3.14 DATA LOGGING

Allows the user to view a live feed of the module's Data Log (if configured).

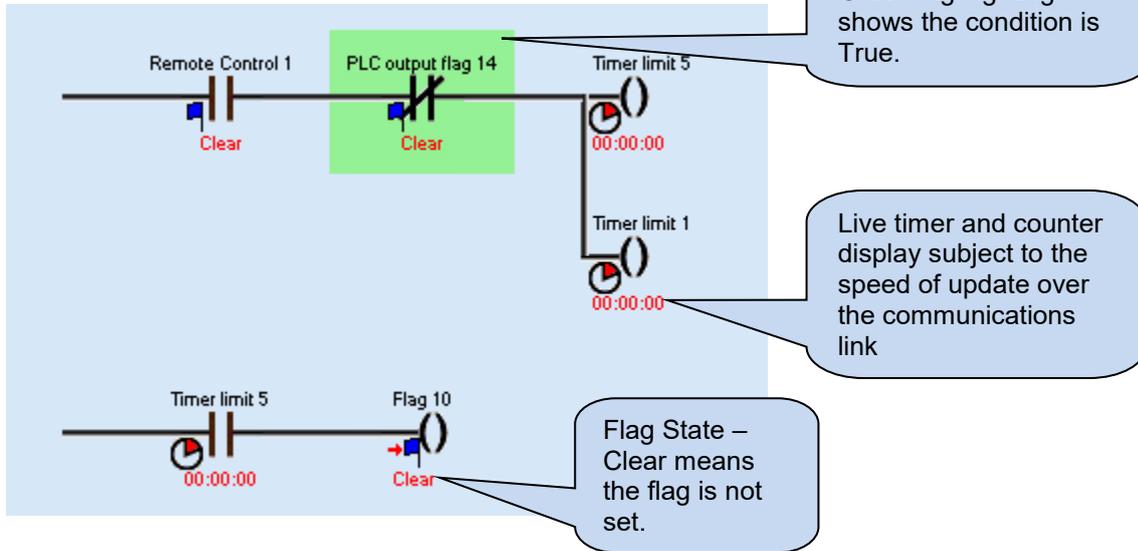
**NOTE:** Data logging is a 'live' function – Maximum 8hrs duration is shown so long as the PC is left connected to the controller.



### 3.15 PLC

**NOTE:** For further details and instructions on PLC Logic and PLC Functions, refer to DSE Publication: *057-175 PLC Programming Guide* which is found on our website: [www.deepseapl.com](http://www.deepseapl.com)

Allows monitoring of the PLC functions within the controller.



### 3.16 EXPANSION

The *Expansion* page is subdivided into smaller sections. Select the required section with the mouse.

Expansion

[2130 Input Modules](#)

[2157 Relay Modules](#)

[2548 Annunciator Modules](#)

#### 3.16.1 2130 INPUT MODULE

#### Expansion Inputs

Communications

Communications OK ●

Inputs

|                              | Active           | Open / Closed |
|------------------------------|------------------|---------------|
| A Alarm Mute                 | ●                |               |
| B Auto Restore Inhibit       | ●                |               |
| C External Panel Lock        | ●                |               |
| D Auxiliary S1 Fail          | ●                |               |
| E Load Shedding              | ●                |               |
| F Inhibit Scheduled Run      | ●                |               |
| G Transformer Temperature S1 | ● 162 °C, 324 °F |               |
| H Transformer Temperature S2 | ● 163 °C, 325 °F |               |

Shows if the input channel is active or not. This input is *closed* but is active. The input is configured to be *Close To Activate*

State of the input (open or closed to battery negative)

3.16.2 2157 OUTPUT MODULE

### Relay Outputs

#### Communications

Communications OK ●

#### Relay Outputs (Normally Open)

|                    | Active   | Open / Closed |
|--------------------|--|---------------|
| A Elevator Control | <span style="color: green; font-size: 1.2em;">●</span> |               |
| B Scheduled Run    | <span style="color: green; font-size: 1.2em;">●</span> |               |
| C Audible Alarm    | <span style="color: green; font-size: 1.2em;">●</span> |               |
| D Common Warning   | <span style="color: green; font-size: 1.2em;">●</span> |               |

#### Relay Outputs (Changeover)

|                              | Active   | Open / Closed |
|------------------------------|--|---------------|
| E System In Auto Mode        | <span style="color: green; font-size: 1.2em;">●</span> |               |
| F S1 In Limits               | <span style="color: green; font-size: 1.2em;">●</span> |               |
| G Waiting For Manual Restore | <span style="color: green; font-size: 1.2em;">●</span> |               |
| H Not Used                   | <span style="color: green; font-size: 1.2em;">●</span> |               |

Shows if the output channel is active or not. This output is *closed* and not active. The output is configured to be *Open To Activate*

State of the output (open or closed)

3.16.3 2548 LED MODULE

**LED Outputs**

Communications

Communications OK ●

**LED Indicators**

|         |                    | Active |
|---------|--------------------|--------|
| A       | Common Warning     | ●      |
| B       | S1 Failure Latched | ●      |
| C       | Warming Up         | ●      |
| D       | Not Used           | ●      |
| E       | Not Used           | ●      |
| F       | Not Used           | ●      |
| G       | Not Used           | ●      |
| H       | Not Used           | ●      |
| Sounder | Not Used           | ●      |

Shows if the LED is active or not.

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