DEEP SEA ELECTRONICS

DSE335 Configuration Suite PC Software Manual

(Applicable to module version 4.2 and upwards)

Document Number: 057-237

Author: Fady Atallah

Deep Sea Electronics Ltd.
Highfield House
Hunmanby
North Yorkshire
YO14 0PH
England

Sales Tel: +44 (0) 1723 890099

E-mail: sales@deepseaelectronics.com
Website: www.deepseaelectronics.com

DSE335 Configuration Suite PC Software Manual

Amendments List

Amd. No.	Comments
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.

TABLE OF CONTENTS

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

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.

NOTE:	**Highlights an essential element of a procedure to ensure correctness.**
CAUTION!	**Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.**
WARNING!	**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 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 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 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 A system that operates with coded signals over communication channels to provide control and monitoring of remote equipment
SCR	Selective Catalytic Reduction 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. 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 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 or by contacting DSE technical support: 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 or by contacting DSE technical support: 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.

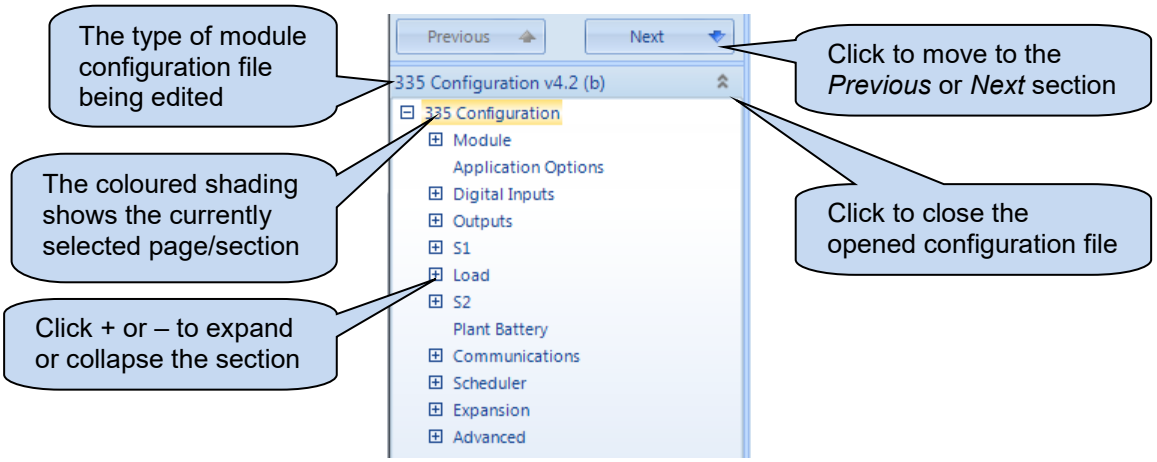
1.4 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

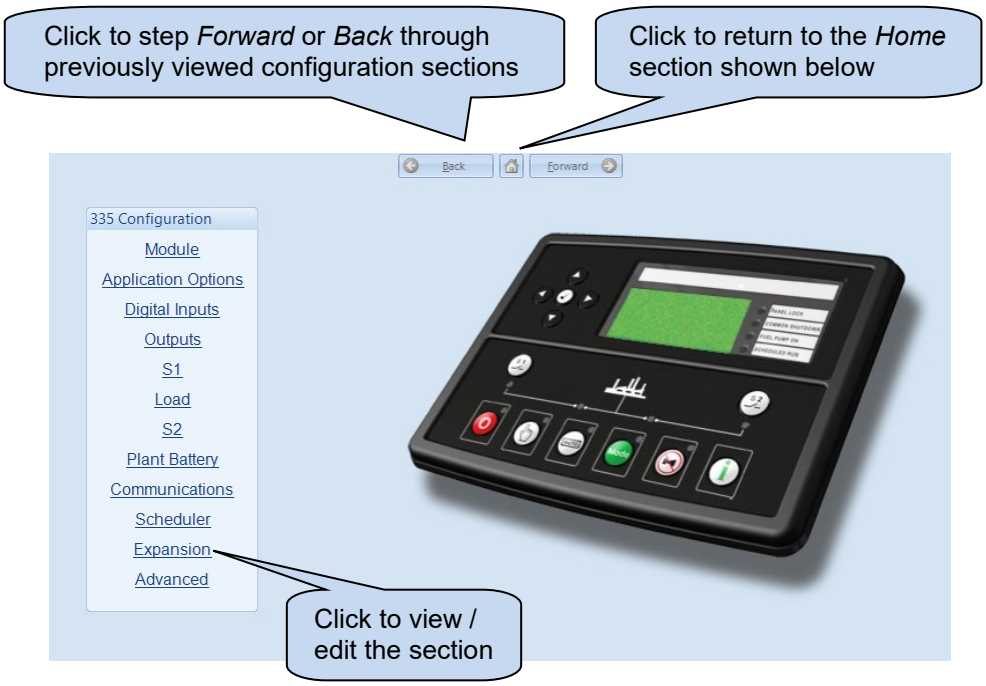
For information in regards to installing and using the *DSE Configuration Suite PC Software,* refer to DSE publication: ***057-151 DSE Configuration Suite PC Software Installation & Operation Manual*** which is found on the DSE website: www.deepseaelectronics.com

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

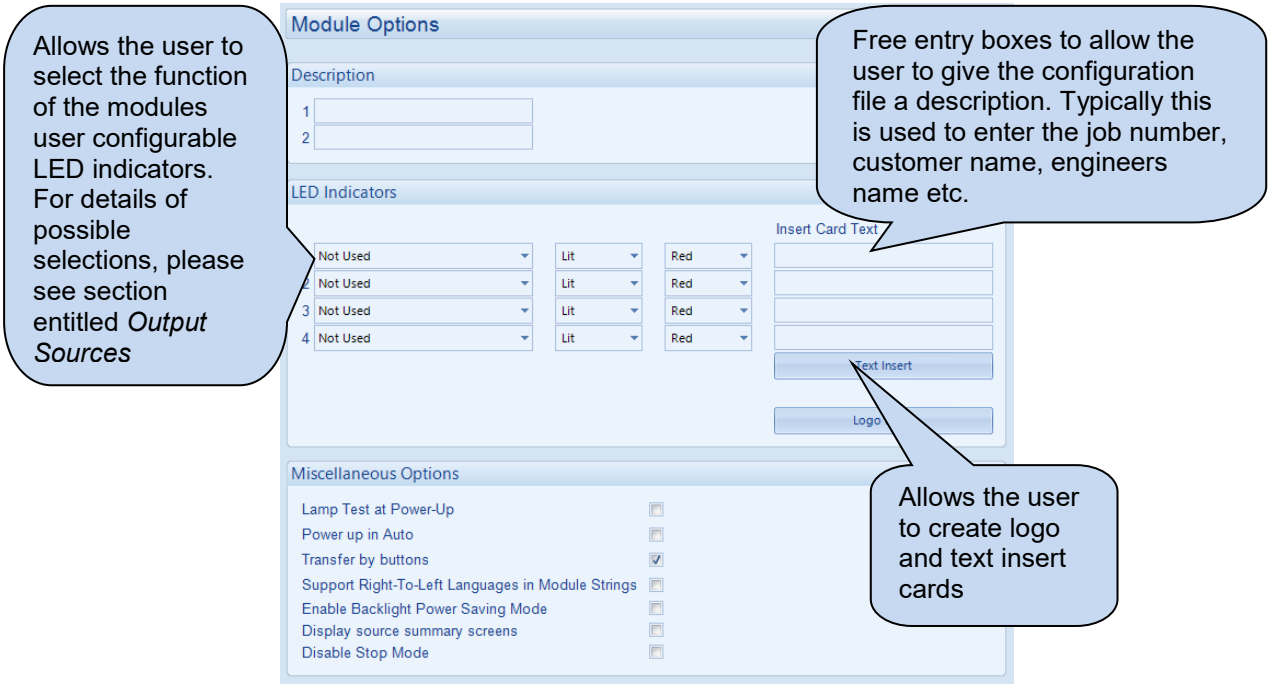




2.2 MODULE

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

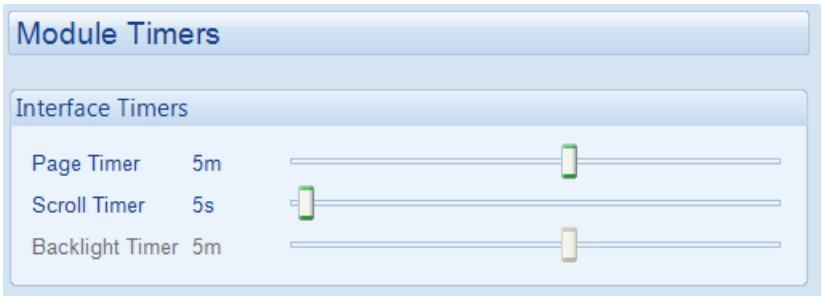
2.2.1 MODULE OPTIONS



Parameters are described overleaf…

Parameter	Description
Lamp test at power up	☐ = Lamp test at power up is disabled. ☑ = All module lamps illuminate when power is first applied.
Power Up in Auto	☐ = The module enters START INHIBIT mode when DC power is applied. ☑ = The module enters AUTO mode when DC power is applied.
Transfer by buttons	☐ = Fascia load control buttons are disabled. ☑ = 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) ☐ = Left to right language support ☑ = Right to left language support
Enable Backlight Power Saving Mode	☐ = The LCD Backlight stays On at all times. ☑ = DC power saving mode by turning off the LCD Backlight when the module is not operated for the duration of the *Backlight Timer*.
Display Source Summary Screens	☐ = Source Summary Screens are not shown on the module display ☑ = Additional screens for the two sources are shown the module display.
Disable Stop Mode	☐ = Pressing the Stop Button changes the operating mode to *Stop* mode (therefore removing the *S2 Start and Run* output). ☑ = Pressing the Stop Button does not change the operating mode to *Stop* mode (the *S2 Start and Run* output remains active). This allows the user to select the *Stop* button to enter the FPE and clear alarms without changing the Modules Operating Mode

2.2.2 MODULE TIMERS



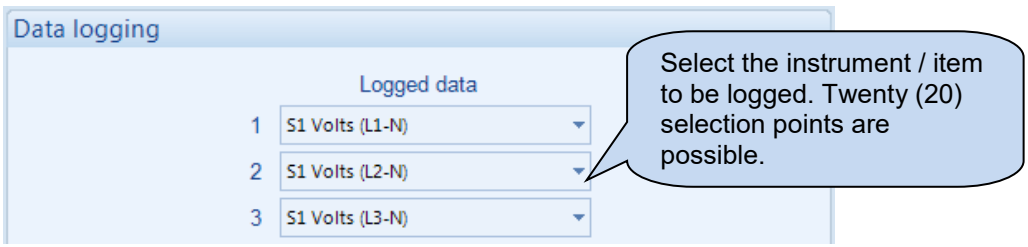
Parameter	Description
Page Timer	The amount of time before the module reverts to show the *Status* page when it is left unattended
Scroll Timer	The amount of time for automatic scroll between parameters on a selected page.
Backlight Timer	When the module is not operated for the duration of the Backlight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

2.2.3 EVENT LOG

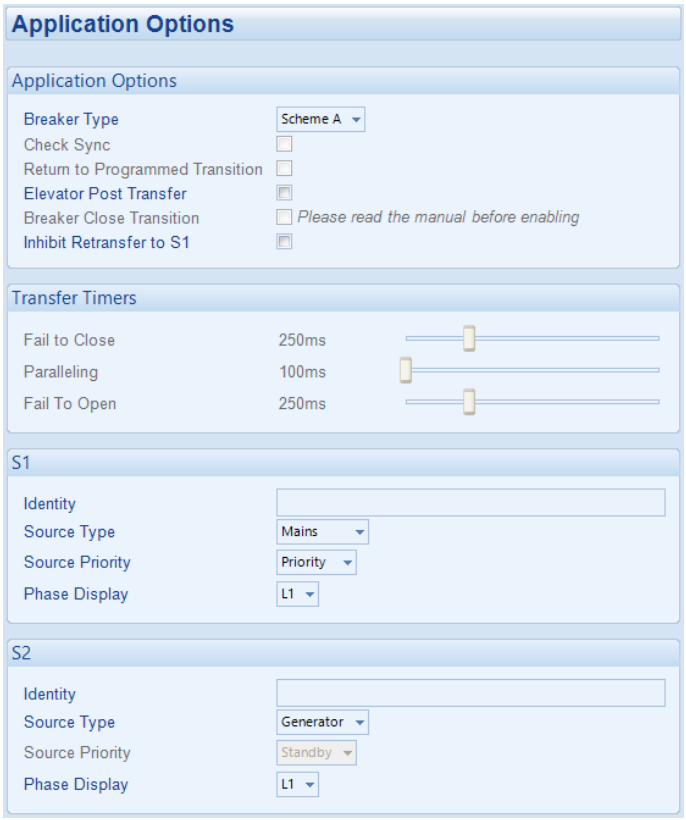
The event log is configured to allow users to select which events are stored.

Parameter	Description
Power Up	☐ = Power up events are not logged in the module's event log ☑ = Power up events are logged when the DC Supply is applied to the module or whenever the module is rebooted
S1 Return	☐ = The S1 Return events are not logged in the module's event log ☑ = Logs the S1 Return events
S1 Fail	☐ = The S1 Fail events are not logged in the module's event log ☑ = Logs the S1 Failure events
S2 Return	☐ = The S2 Return events are not logged in the module's event log ☑ = Logs the S2 Return events
S2 Fail	☐ = The S2 Fail events are not logged in the module's event log ☑ = Logs the S2 Failure events
Electrical Trip Alarms	☐ = The Electrical Trip Alarms are not logged in the module's event log ☑ = Logs the Electrical Trip alarms
Latched Warnings	☐ = The Latched Warning Alarms are not logged in the module's event log ☑ = Logs the Latched Warning Alarms
Unlatched Warnings	☐ = The Unlatched Warning Alarms are not logged in the module's event log ☑ = Logs the Unlatched Warning Alarms
Breaker Auxiliary Failures	☐ = The Breaker Auxiliary Failures are not logged in the module's event log ☑ = Logs the Breaker Auxiliary Failures

2.2.4 DATA LOGGING



2.3 APPLICATION OPTIONS



Parameters are detailed overleaf…

Parameter	Description
Breaker Type	See overleaf for description of the *Breaker Type*.
Check Sync	This option is only available when *Scheme B* is selected. See overleaf for description of the *Check Sync* options ☐ = None check sync operation ☑ = During load transfer, the module only closes its breaker within the check sync window. See overleaf for description of the *Check Sync* options.
Return to programmed transition	This option is only available when *Check Sync* is enabled. See overleaf for description of the *Check Sync* options ☐ = Normal operation ☑ = During load transfer if the *check sync* of the supplies does not occur within two minutes, a 'break' or 'open transition' transfer occurs.
Elevator Post Transfer	☐ = Normal operation ☑ = Any configurable output set to *elevator control* remains active for the duration of the *elevator delay* after a load transfer has taken place.
Breaker Close Transition	This option is only available when *Scheme C* is selected. See overleaf for description of the *Scheme C* options ☐ = Break before make operation ☑ = During load transfer, the module only closes its breaker within the check sync window. See overleaf for description of the *Check Sync* options.
Inhibit Retransfer to S1	☐ = When the S1 supply is reinstated after a failure, the re-transfer back to S1 takes place. ☑ = 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 *Scheme C* and *Breaker Close Transition* are selected. See overleaf for description of the *Scheme C* options When the *Close S1* or *Close S2* output is activated, if the configured *S1 Closed Auxiliary* or *S2 Closed Auxiliary* digital input respectively do not become active within the *Fail To Close* timer, the alarm is activated
Paralleling	This option is only available when *Scheme C* and *Breaker Close Transition* are selected. See overleaf for description of the *Scheme C* options This timer dictates how long the two supplies are closed in parallel for during the *Close Transition*.
Fail to Open	This option is only available when *Scheme C* and *Breaker Close Transition* are selected. See overleaf for description of the *Scheme C* options When the *Close S1* or *Close S2* output is de-activated, if the configured *S1 Closed Auxiliary* or *S2 Closed Auxiliary* digital input respectively do not de-activate within the *Fail To Open* 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: ***Mains*** ***Generator***
S1 Source Priority	Select the S1 priority Available options to choose from: ***Priority*** ***Standby***
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: ***Mains*** ***Generator***
S2 Source Priority	Select the S2 priority Available options to choose from: ***Priority*** ***Standby***
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

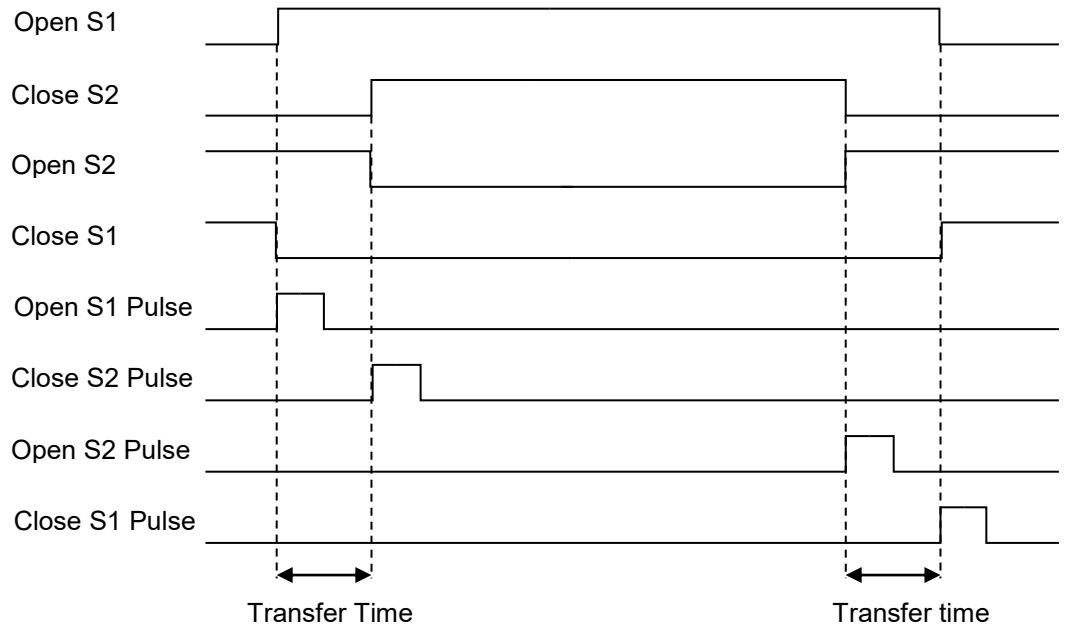
2.3.1.1 S1 / S2 LOAD INHIBIT

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

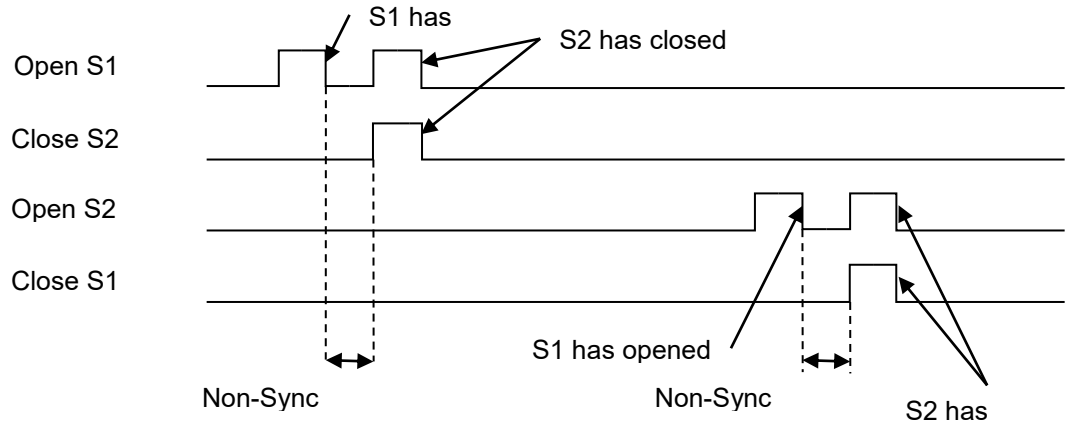
S1 AND S2 LOAD INHIBIT INPUT

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.

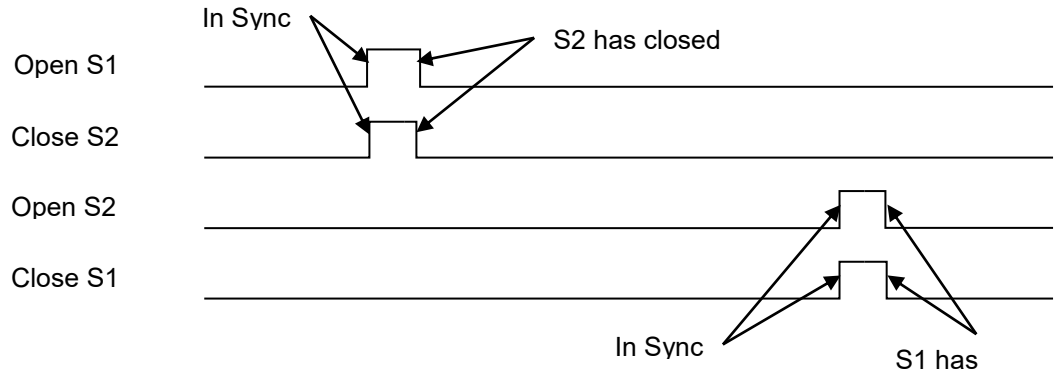
S1 AND S2 LOAD INHIBIT

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

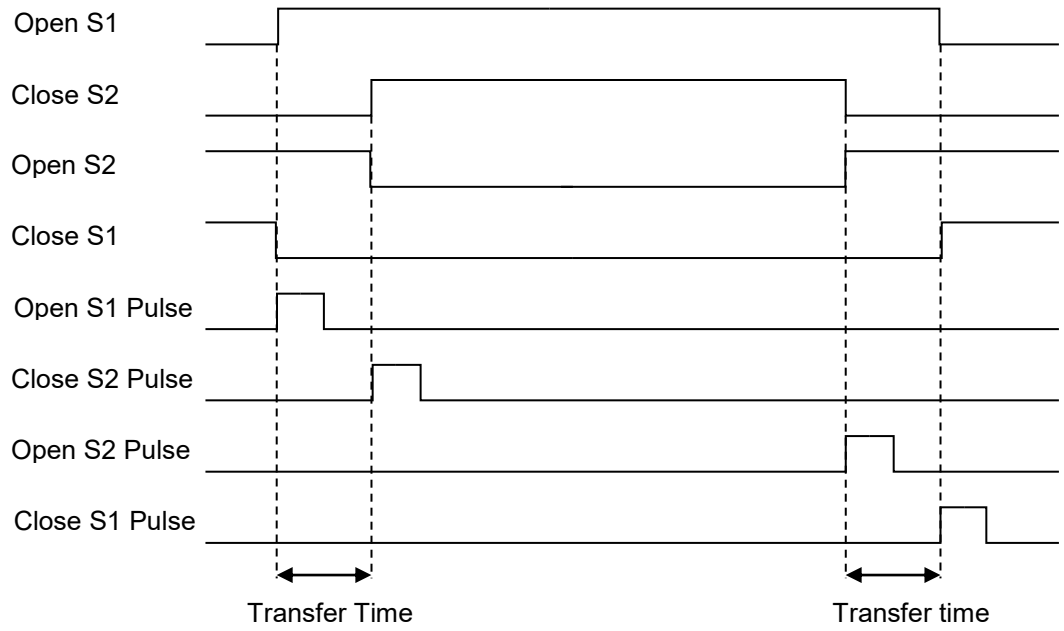
S1 / S2 LOAD INHIBIT

Activation of an input configured to *S1 Load Inhibit* or *S2* L*oad 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.

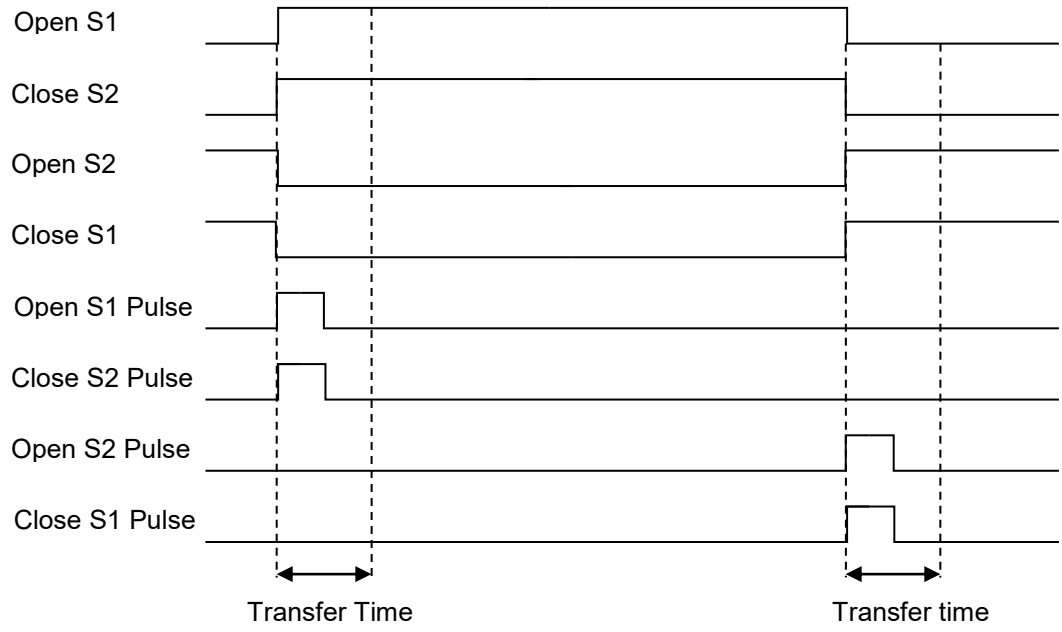
TRANSFER TO S1

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

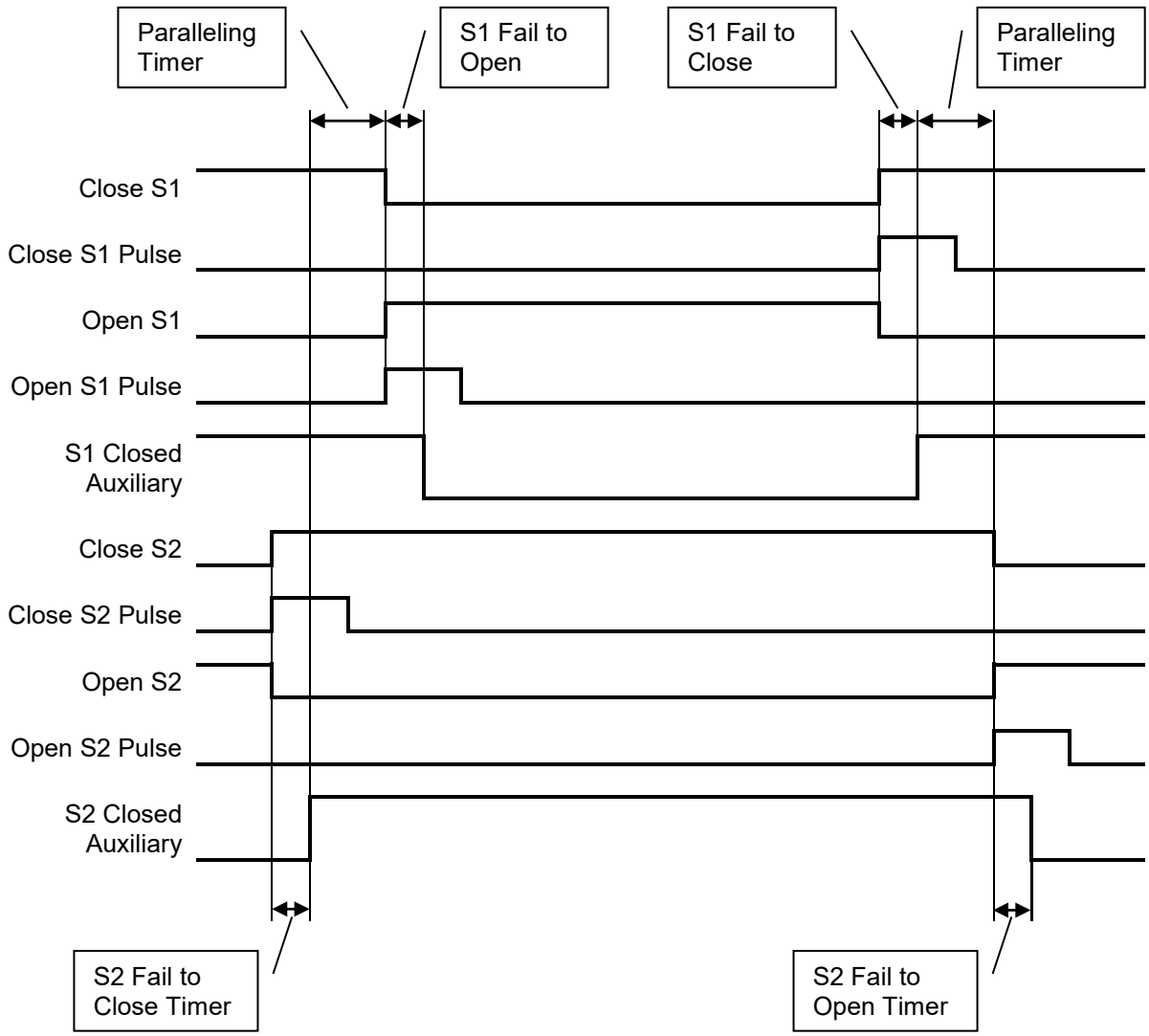
When the module is about to transfer from S2 to S1 it activates the check sync function.
When the S1 and S2 supplies are within the phase and frequency window, the module energises the *Close S1* output and checks for the *S1 Closed Auxiliary* input activating. If the *S1 Closed Auxiliary* activates 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

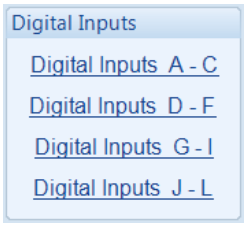
When the *S1 and S2 Load Inhibit* input is activated while the S2 is closed the *Open S2* output energises, it then de-energises when the *S2 Closed Auxiliary* input indicates that it has successfully opened, or after 1s whichever occurs first.
When the *S1 and S2 Load Inhibit* input is activated while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

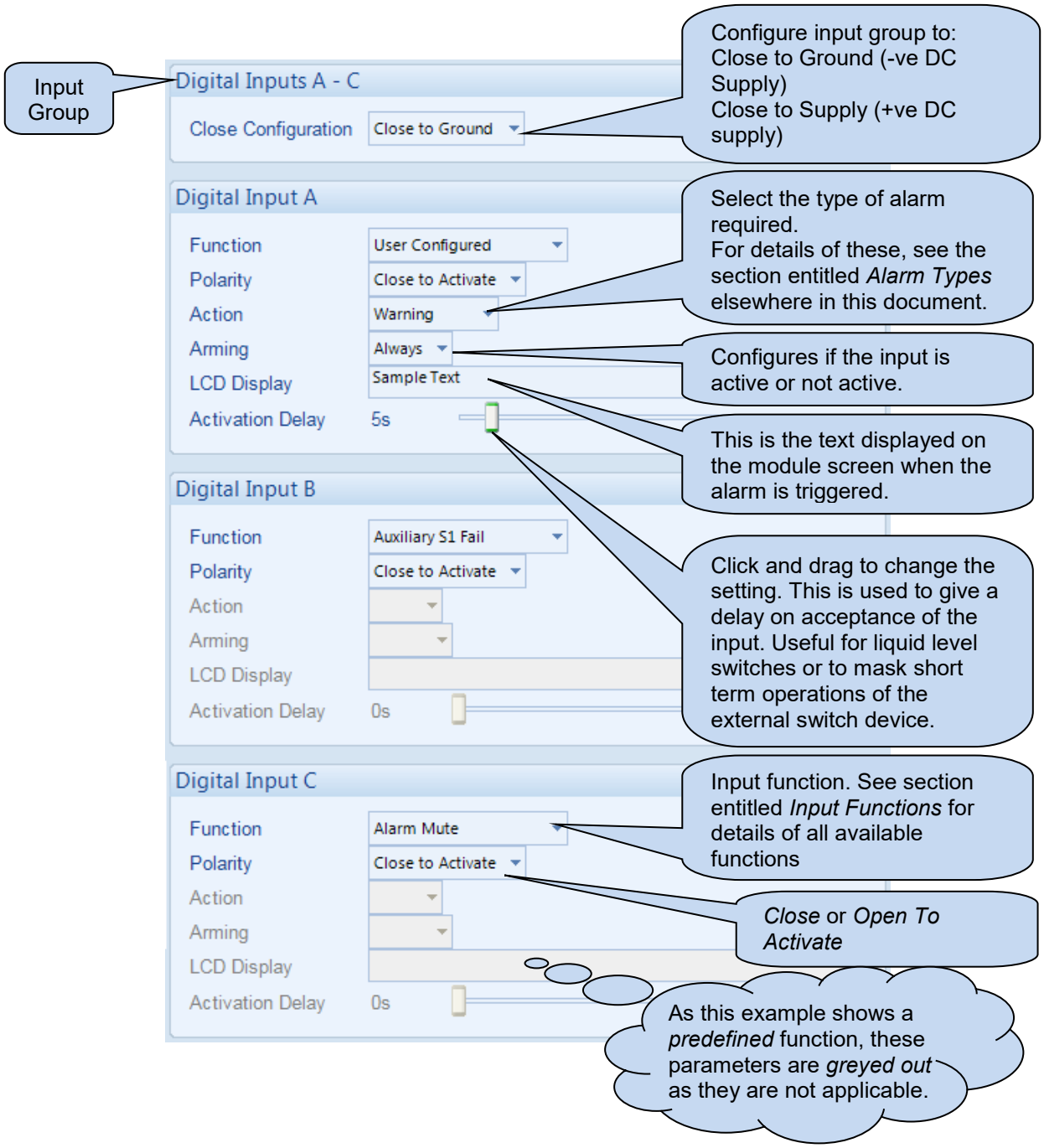


2.4 DIGITAL INPUTS

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



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.



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 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 *Auto Restore Inhibit* 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 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 **'AND'** 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. 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…

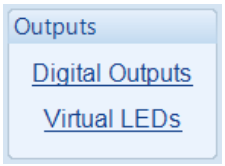
Function	Description
Auxiliary S2 Ready	Allows an external device (such as the engine control module) to instruct the controller that S1 is healthy and available to take load. The controller then monitors the voltage and frequency to check they are within acceptable limits before performing the load 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. (*Front panel configuration access is still possible while the system lock is active*).
Force Transfer To S1	Activating this input causes the module to open S2 and transfer the load to S1 disregarding the status of S1. 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. When S2 is not available, the load remains off until the supply is back within limits.
Inhibit Scheduled Run 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 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 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. 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 *Fail to Open* or *Fail to Close* alarms when using *Breaker Scheme C* without pressing the *Stop Button.*
S1 and S2 Load Inhibit 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…

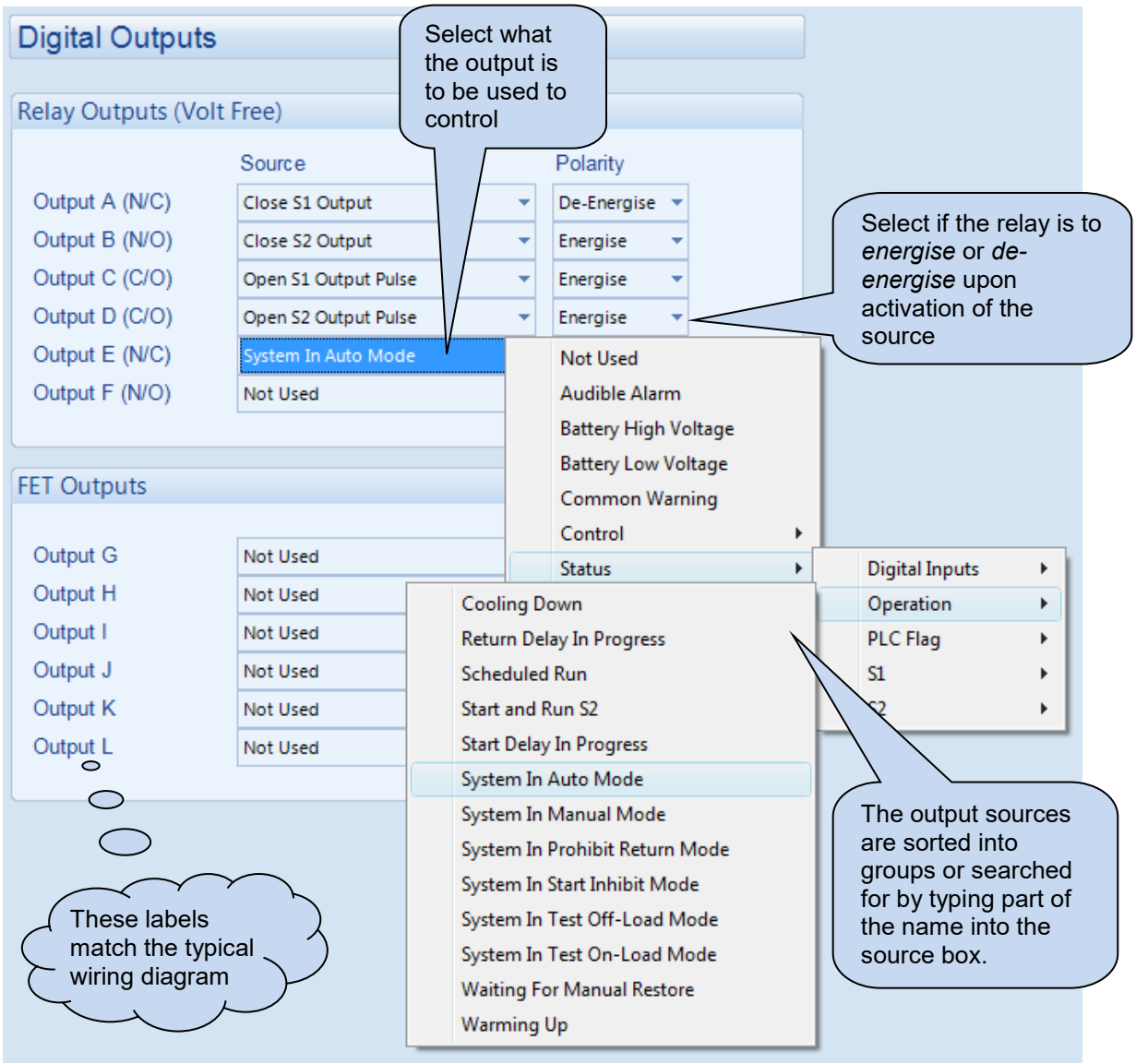
Function	Description
S1 Closed Auxiliary IEEE 37.2 - 3 Checking Or Interlocking Relay (Breaker Scheme B)	This input is used to provide feedback to allow the controller to give true indication of the contactor or circuit breaker switching status. It must be connected to the S1 load switching device auxiliary contact. 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. In 'Breaker Scheme B' this feedback is used for internal interlocking of the breaker outputs. In 'Breaker Scheme C' this feedback is used for ensuring a closed transition has occurred within the *Breaker Close Transition* timer.
S1 Load Inhibit IEEE 37.2 - 52 AC Circuit Breaker	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. **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.**
S2 Closed Auxiliary IEEE 37.2 - 3 Checking Or Interlocking Relay (Breaker Scheme B)	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. 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. In 'Breaker Scheme B' this feedback is used for internal interlocking of the breaker outputs. In 'Breaker Scheme C' this feedback is used for ensuring a closed transition has occurred within the *Breaker Close Transition* timer.
S2 Load Inhibit IEEE 37.2 - 52 AC Circuit Breaker	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. **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.**
Simulate S1 Available	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.
Simulate S2 Available	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.
Transfer To S1	Activating this input causes the module to open S2 and transfer the load to S1, only when S1 is available. When S1 is not available, S2 remains on load until S1 is back within limits.
Transfer To S2	Activating this input causes the module to open S1 and transfer the load to S2, only when S2 is available. When S2 is not available, S1 remains on load until S2 is back within limits.

2.5 OUTPUTS

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

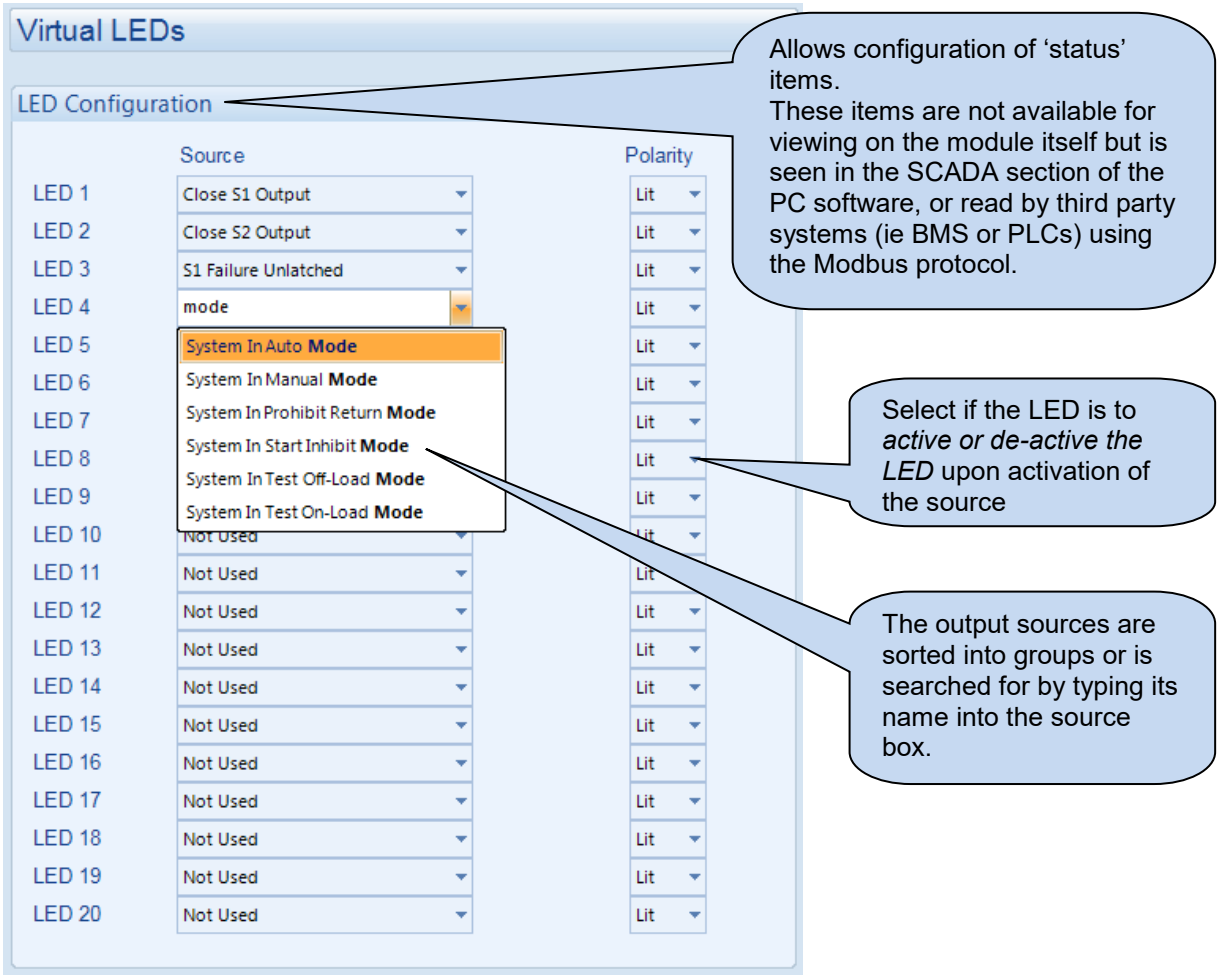


2.5.1 DIGITAL OUTPUTS



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



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 *Alarm Mute* digital input is active	
Alarm Reset	Active when a configured *Alarm Reset* digital input is active	
Audible Alarm 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 *Auto-Restore Inhibit* function is active.	
Auto Start Inhibit	Active when the *Auto-Start Inhibit* function is active.	
Auxiliary S1 Fail	Active when a configured *Auxiliary S1 Fail* digital input is active	
Auxiliary S1 Ready	Active when a configured *Auxiliary S1 Ready* digital input is active	
Auxiliary S2 Fail	Active when a configured *Auxiliary S2 Fail* digital input is active	
Auxiliary S2 Ready	Active when a configured *Auxiliary S2 Ready* digital input is active	
Battery High Voltage 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 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 *Breaker Alarm Reset* digital input is active	
Close S1 Output 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 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 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 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 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 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…

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 *Electrical Trip* alarms are active	The output is inactive when no shutdown alarms are present
Common warning 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 : • the input is not active • the input is active but conditioned by activation delay or arming requirements.
Elevator Control	Active during the *elevator delay* time before a load transfer takes place and remains active for the duration of the *elevator delay* after a transfer takes place (when *elevator post transfer* 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 *Start Delay* timer.	
Fail to Stop	Active when the *S2* is configured as generator and the generator fails to stop within the *Fail to Stop Delay* timer.	
Force Transfer to S1	Active when the *Force Transfer To S1* digital input is active.	
Force Transfer to S2	Active when the *Force Transfer To S2* digital input is active.	
Inhibit Scheduled Run	Active when the *Inhibit Scheduled Run* digital input is active.	
Lamp Test	Active when the *Lamp Test* 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 '*Safety on Delay*' timer.	
Loading Voltage Note Reached	Active when S2 has failed to reach the loading voltage after the '*Safety on Delay*' timer.	
Open S1 Output 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 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 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 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 *Open/Close S1* digital input is active	
Open/Close S2	Active when a configured *Open/Close S2* digital input is active	

Parameter descriptions are continued overleaf…

Output Source	Activates… Is Not Active….
PLC Output Flag 1-20	Active when the PLC Output Flag (1-20) becomes active.
Remote Control 1-10	Active when the corresponding *Remote Control* is active
Remote Start Off Load	Active when the *Remote Start Off Load* input function is active
Remote Start On Load	Active when the *Remote Start On Load* input function is active
Return Delay in Progress	Indicates that S2 is on load, and S1 is available, during the *return delay* timers.
S1 and S2 Closed	Active when the *S1 and S2 Closed Auxiliary* inputs are active at the same time, indicating the two supplies are closed in parallel.
S1 and S2 Load Inhibit	Active when a configured *S1 and S2 Load Inhibit* digital input is active
S1 and S2 Open	Active when the *S1 and S2 Closed Auxiliary* 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 *S1 Breaker Auxiliary Fail* digital input is active
S1 Closed	Active when the *Close S1* output function is active
S1 Closed Auxiliary	Active when a configured *S1 Closed Auxiliary* digital input is active
S1 Fail to Close	Active when the *Close S1* output has activated but the *S1 Closed Auxiliary* input has not activated within the *Fail to Close* time.
S1 Fail to Open	Active when the *OpenS1* output has activated but the *S1 Closed Auxiliary* input has not de-activated within the *Fail to Open* time.
S1 Failure Latched	Activates when the S1 failure alarm is active. Reset by digital input configured to *Alarm Reset*
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 *S1 Load Inhibit* digital input is active.
S1 Load Inhibited	Indicates that an input configured to *S1 Load Inhibit* 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 *S1 Phase Rotation Alarm* is active.
S1 Ready	Active when a configured *S1 Ready* digital input is active
S1 Transient Delay	Active during the *Transient Delay* time when S1 is not within limits
S2 Available	Active when the S1 supply is available and within limits
S2 Breaker Auxiliary Fail	Active when a configured *S2 Breaker Auxiliary Fail* digital input is active
S2 Closed	Active when the *Close S2* output function is active
S2 Closed Auxiliary	Active when a configured *S2 Closed Auxiliary* digital input is active
S2 Fail to Close	Active when the *Close S2* output has activated but the *S2 Closed Auxiliary* input has not activated within the *Fail to Close* time.
S2 Fail to Open	Active when the *OpenS2* output has activated but the *S2 Closed Auxiliary* input has not de-activated within the *Fail to Open* time.
S2 Failure Latched	Activates when the S2 failure alarm is active. Reset by digital input configured to *Alarm Reset*
S2 Failure Unlatched	Activates when the S2 failure alarm is active. Reset automatically when S1 becomes available

Parameter descriptions are continued overleaf…

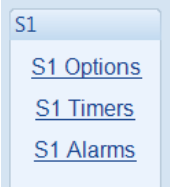
Output Source	Activates… Is Not Active….
S2 Gen High Frequency	When S2 is configured to *Gen,* this output becomes active if S2's frequency goes above the configured trip setting.
S2 Gen Low Frequency	When S2 is configured to *Gen,* this output becomes active if S2's frequency falls below the configured trip setting.
S2 Gen High Voltage	When S2 is configured to *Gen,* this output becomes active if S2's voltage goes above the configured trip setting.
S2 Gen Low Voltage	When S2 is configured to *Gen,* 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 *Auxiliary S2 Ready* input is active.
S2 Load Inhibit	Indicates that an input configured to *S2 Load Inhibit* is active, preventing the supply from taking load.
S2 Load Inhibited	Indicates that an input configured to *S2 Load Inhibit* is active, preventing the supply from taking load.
S2 Mains High Frequency	When S2 is configured to *Mains,* this output becomes active if S2's frequency goes above the configured trip setting.
S2 Mains High Voltage	When S2 is configured to *Mains,* this output becomes active if S2's voltage goes above the configured trip setting.
S2 Mains Low Frequency	When S2 is configured to *Mains,* this output becomes active if S2's frequency falls below the configured trip setting.
S2 Mains Low Voltage	When S2 is configured to *Mains,* this output becomes active if S2's voltage falls below the configured trip setting.
S2 Phase Rotation Alarm	Active when the *S2 Phase Rotation Alarm* is active.
S2 Ready	Activates when S2 becomes available and both the warming and cooldown time are not active. Ignores alarm conditions and the *S2 transient delay*
S2 Start and Run	Active when the controller has requested for S2 to start and run.
S2 Transient Delay	Active during the *Transient Delay* time when S1 is not within limits
Scheduled Run	Active when the controller is requesting the set to run under control of the inbuilt *Scheduler*.
Scheduled Do Not Transfer	Active when a configured *Do Not Transfer* 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 *S1 Start Off Load* scheduler event is active.
Scheduled Start S2 Off-load	Active when a configured *S2 Start Off Load* scheduler event is active.
Scheduled Transfer to S1	Active when a configured *Transfer To S1* scheduler event is active.
Scheduled Transfer to S2	Active when a configured *Transfer To S2* scheduler event is active.
Simulated S1 Available	Active when the *Simulated S1 Available* digital input is active.
Simulated S2 Available	Active when the *Simulated S2 Available* digital input is active.
Start Delay in Progress	Active when the controller is in the *start delay* 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…

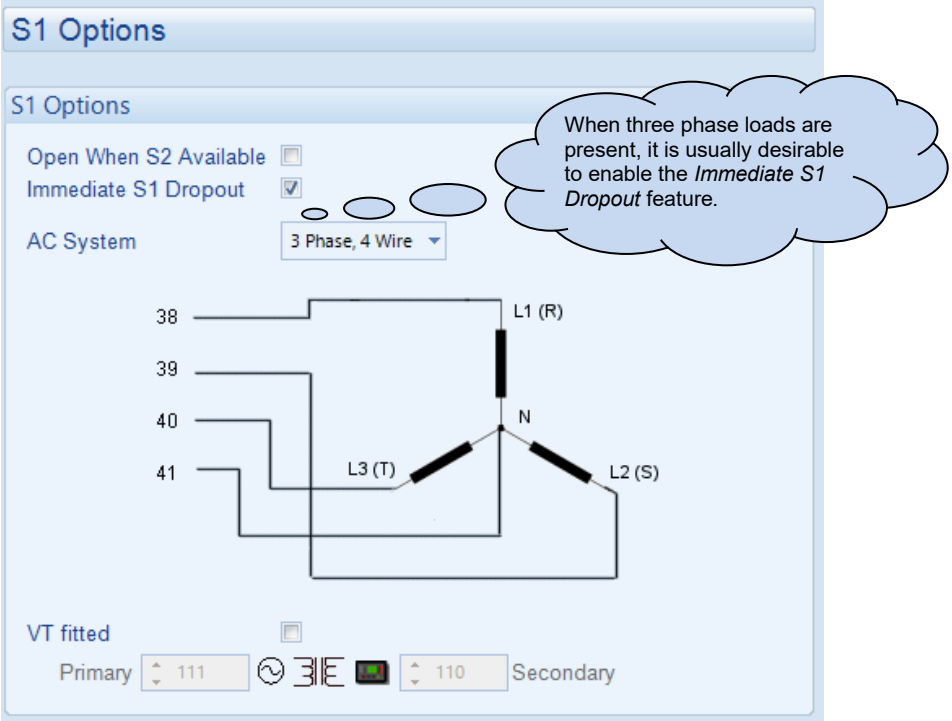
Output Source	Activates… Is Not Active….
Transfer To S1	Active when the *Transfer to S1* digital input is active
Transfer To S2	Active when the *Transfer to S2* digital input is active
Waiting For Manual Restore	Becomes active when S2 is on load and the S1 supply is healthy but an input configured to Manual Restore is active. 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.



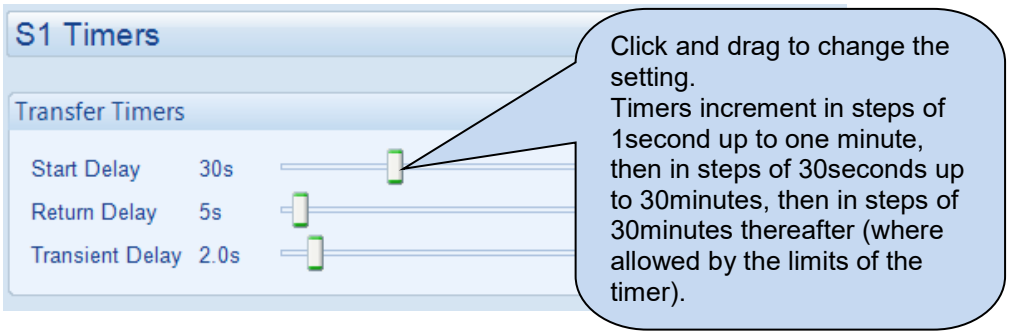
2.6.1 S1 OPTIONS



Parameter	Description
Open When S2 Available	**NOTE: Active when S1 source is set to *Standby.* For further details see section entitled *Application Options* elsewhere in this document**
	NOTE: S1/S2 Closed Auxiliary must be configured to enable this Parameter. For further details, see section entitled *Digital Inputs* elsewhere in this document.
	☐ = The S1 breaker can be requested to open regardless if S2 is available. This is useful when using DC controlled opening signals. ☑ = 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.
Immediate S1 Dropout	**NOTE: This feature cannot be enabled when *Open When S2 Available* is enabled.**
	☐ = Upon S1 failure, the S1 Breaker remains closed until a transfer to S2 is initiated. ☑ = Upon S1 failure, the S1 Breaker opens immediately.
AC System	This defines the topology of the alternator/source and the connections to the DSE module sensing terminals.

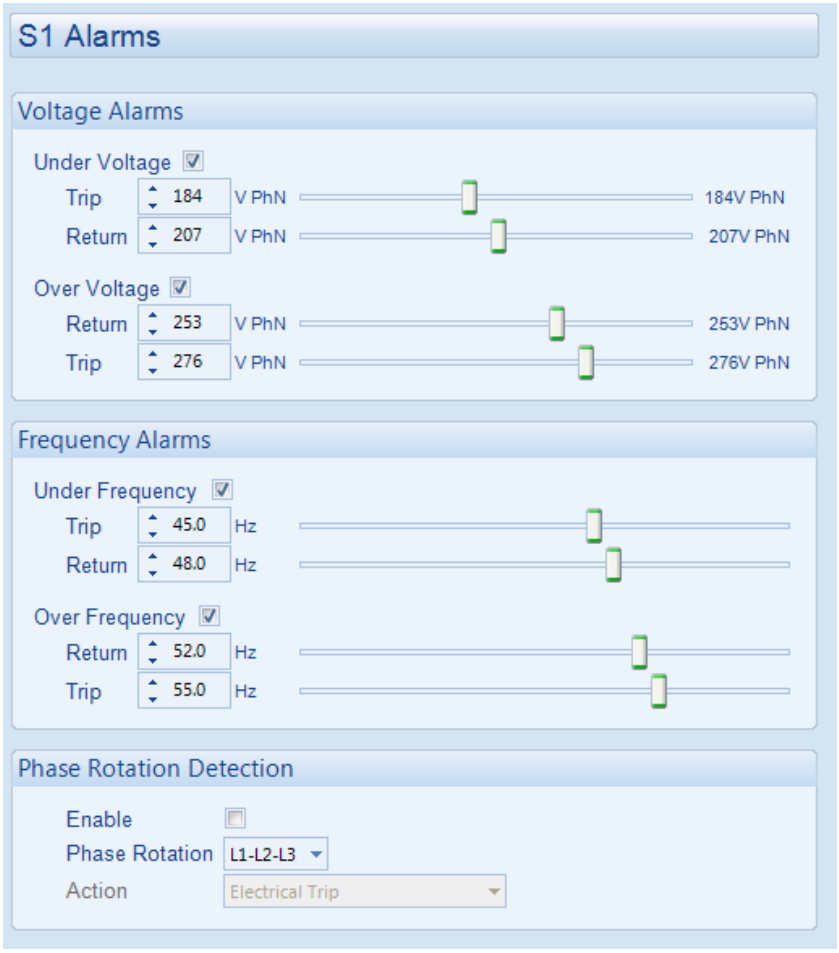
Parameter	Description
VT Fitted	☐ = The voltage sensing to the controller is direct from the alternator ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the generated voltage to be within the controller voltage specification. By entering the Primary and Secondary voltages of the transformer, the controller displays the Primary voltage rather than the actual measured voltage. 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



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

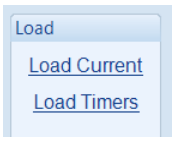


Alarm	Description
Under Voltage IEEE 37.2 – 27 AC Undervoltage Relay	☐ = S1 Under Voltage detection is disabled ☑ = S1 Under Voltage gives an alarm in the event of the mains voltage falling below the configured *Under Voltage Trip* value. The *Under Voltage Trip* value is adjustable to suit the application. The alarm is reset and the S1 is considered within limits when the S1 voltage rises above the configured *Under Voltage Return* level.
Over Voltage IEEE 37.2 – 59 AC Overvoltage Relay	☐ = S1 Over Voltage detection is disabled ☑ = S1 Over Voltage gives an alarm in the event of the S1 voltage rising above the configured *Over Voltage Trip* value. The *Over Voltage Trip* 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 *Over Voltage Return* level.
Under Frequency IEEE 37.2 – 81 Frequency Relay	☐ = S1 Under Frequency detection is disabled ☑ = S1 Under Frequency gives an alarm in the event of the S1 frequency falling below the configured *Under Frequency Trip* value. The *Under Frequency Trip* 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 *Under Frequency Return* level.
Over Frequency IEEE 37.2 – 81 Frequency Relay	☐ = S1 Over Frequency detection is disabled ☑ = S1 Over Frequency gives an alarm in the event of the S1 frequency rising above the configured *Over Frequency Trip* value. The *Over Frequency Trip* 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 *Over Frequency Return* level.

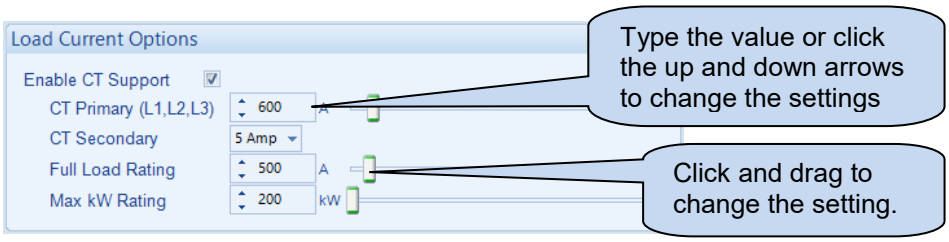
Alarm	Description
Phase Rotation Detection IEEE 37.2 – 47 Phase Sequence Relay	☐ = The phase rotation is not checked ☑ = An Electrical Trip alarm is generated when the phase rotation of S1 supply is not matching the configurerd *Phase Rotation* setting.

2.7 LOAD

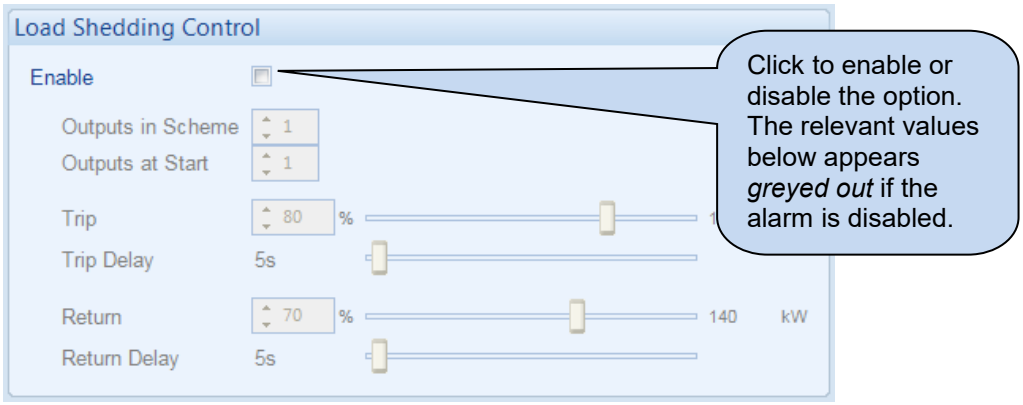
The *Load* section is subdivided into smaller sections. Select the required section with the mouse.



2.7.1 LOAD CURRENT

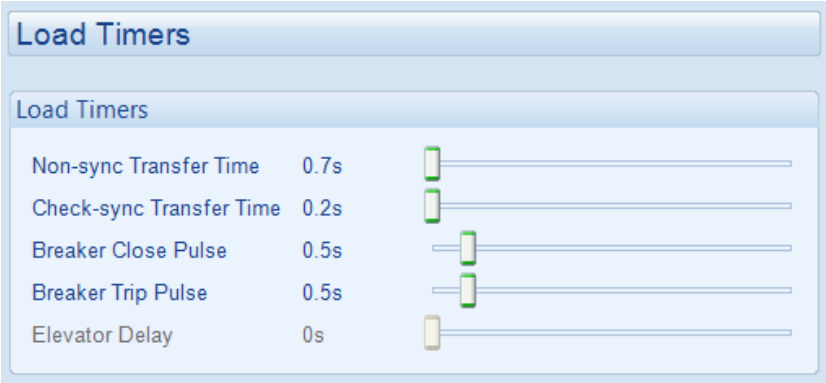


Timer	Description
CT Primary	Primary rating of the Current Transformers
CT Secondary	Secondary rating of the Current Transformers
Full Load Rating	Full load rating (100% rating) of the load current
Max kW Rating	Full load rating (100% rating) of the load kW



Setting	Description
Enable	Provides control of configurable outputs set to *Load Shedding Control*. ☐ = Load Shedding Control is disabled. ☑ = 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 *Load Shedding Control 1-5* that is energised when the set is required to take load. The *Transfer Delay / Load Delay* 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 *Trip* setting for the duration of the *Trip Delay*, then the 'next' output configured to *Load Shedding Control* is activated (max 5)
Return / Return Delay	When the load level is below the *Return* setting for the duration of the *Return Delay*, then the 'highest numbered' output configured to *Load Shedding Control* is de-activated and the timer is reset.
Transfer Time / Load Delay	The time between closing the *Load Shedding Control* outputs (*Outputs at Start)* and closing the load switching device.

2.7.2 LOAD TIMERS

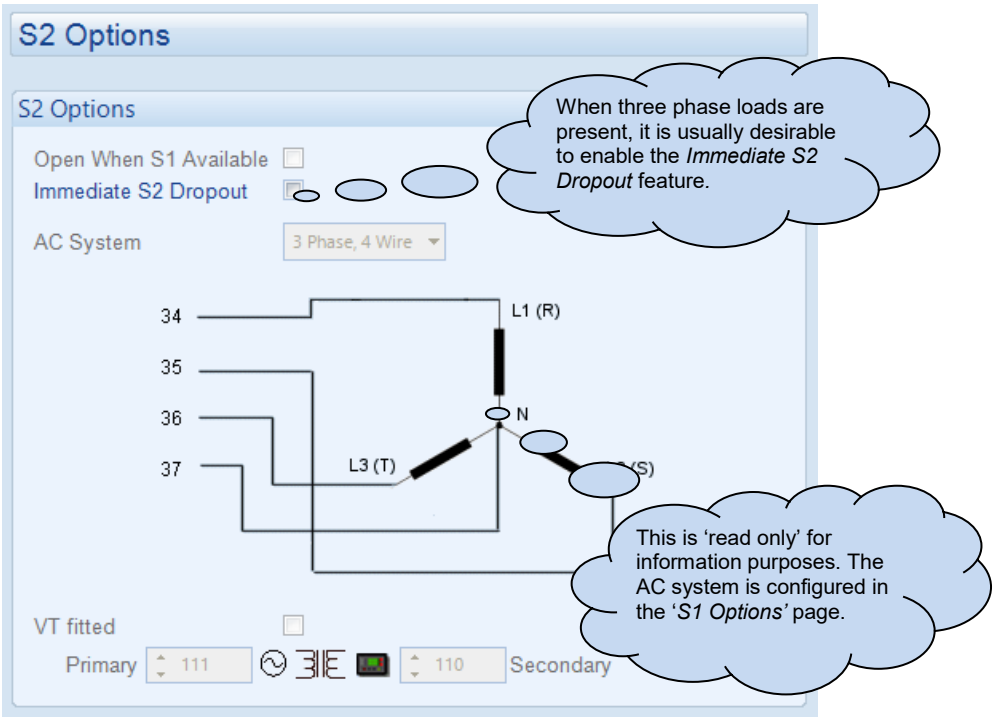


Timer	Description
Non-sync Transfer Time	The time between one supply's load switch being opened and the other supply's load switch being closed. Used to give time for the load switches to move to their correct positions and to prevent the mechanical interlock from "jamming". This timer is also used to 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 *Sync Transfer* to be completed. If the two supplies do not come in sync during this time, the module reverts to perform a *Non-Sync Transfer*.
Breaker close pulse	The amount of time that *Breaker Close Pulse* signals are present when the request to close a breaker is given.
Breaker Trip pulse	The amount of time that *Breaker Open Pulse* signals are present when the request to open a breaker is given.
Elevator Delay	Use to delay the *Elevator Control* output before and after load transfer takes place. See section entitled *Application* for details of *Elevator Control*.

2.8 S2

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

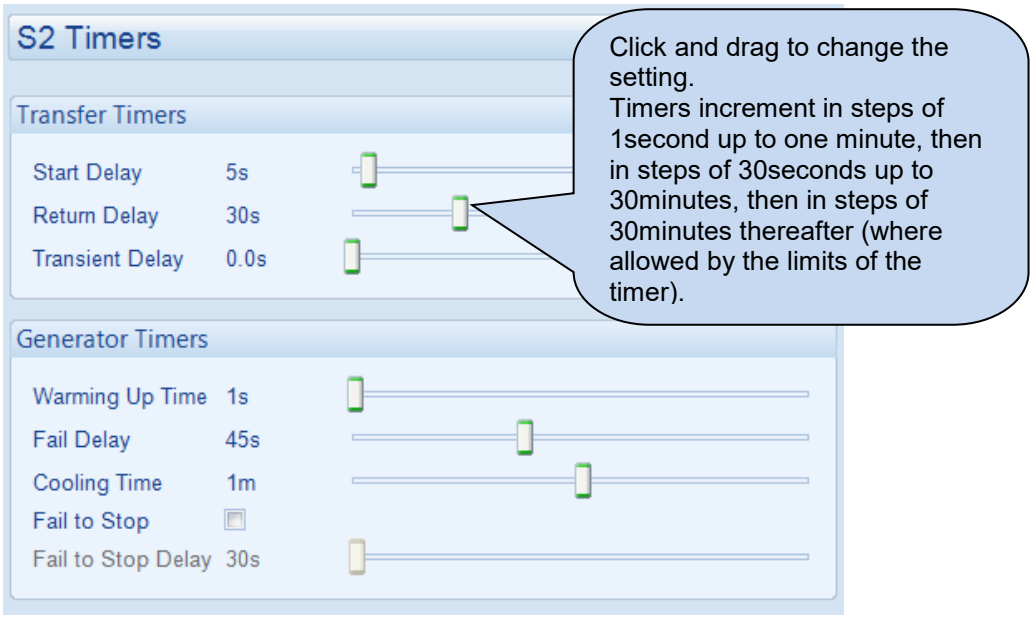
2.8.1 S2 OPTIONS



Parameter	Description
Open When S1 Available	**NOTE: Tick box shown for read only purpose. To configure the tick box see section entitled *S1 Options* elsewhere in this document.**
	NOTE: Active when S2 source is set to *Standby.* For further details see section entitled *Application Options* elsewhere in this document
	☐ = The S2 breaker can be requested to open regardless if S1 is available. This is useful when using DC controlled opening signals. ☑ = 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.
Immediate S2 Dropout	**NOTE: This feature is not enabled when *Open When S1 Available* is enabled or when S2 is set to *Standby*. For further details see section entitled *Application Options* elsewhere in this document.**
	☐ = Upon S2 failure, the S2 Breaker remains closed until a transfer to S1 is initiated. ☑ = Upon S2 failure, the S2 Breaker opens immediately.
AC System	This defines the topology of the alternator/source and the connections to the DSE module sensing terminals.

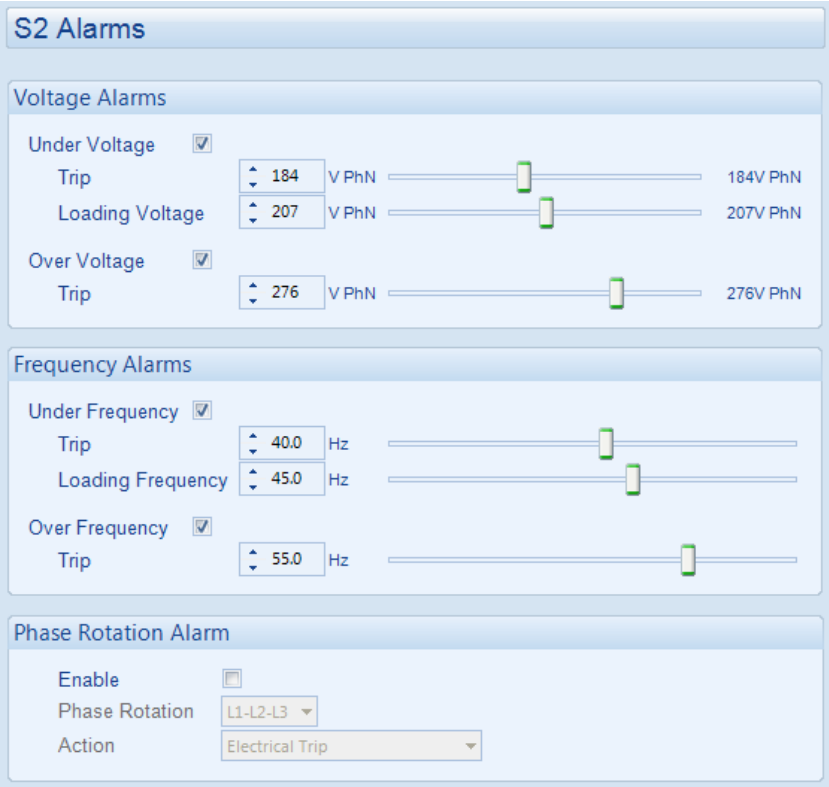
Parameter	Description
VT Fitted	☐ = The voltage sensing to the controller is direct from the alternator ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the generated voltage to be within the controller voltage specification. By entering the Primary and Secondary voltages of the transformer, the controller displays the Primary voltage rather than the actual measured voltage. 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



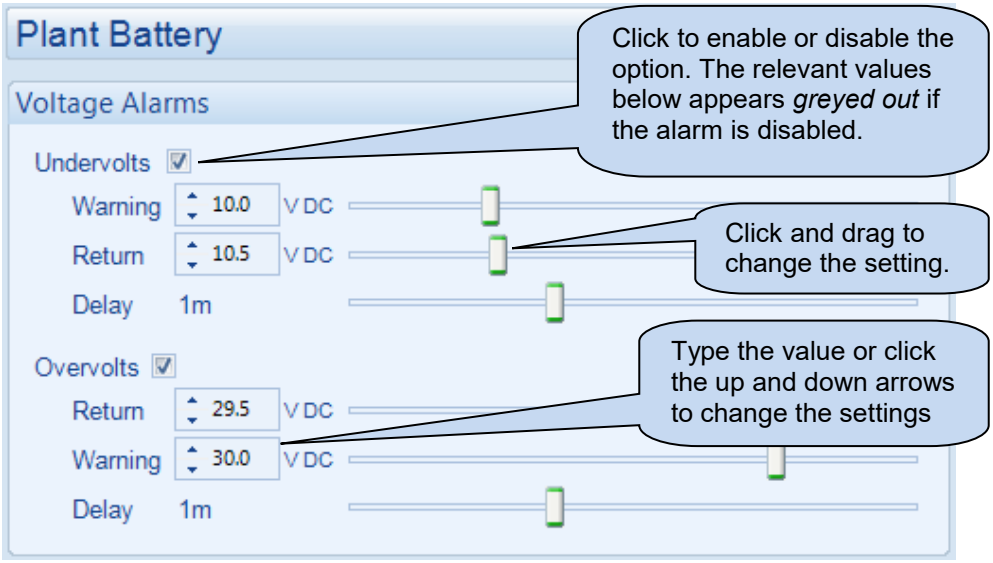
Timer	Description
Start Delay	Used to give a delay before starting in AUTO mode. This timer is activated upon the respective start command being issued. Typically this timer is applied to prevent starting upon fleeting remote start signals or short term S2 failures.
Return Delay	A delay, used in auto 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 *S2 failure* 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	☐ = Alarm is disabled ☑ = If the supply is called to stop and is still running after the configurable *Fail to Stop* delay time expires, a *Fail to Stop* alarm is generated.

2.8.3 S2 ALARMS



Alarm	Description
Under Voltage IEEE 37.2 – 27 AC Undervoltage Relay	☐ = S2 Under Voltage detection is disabled ☑ = S2 Under Voltage gives an alarm in the event of the mains voltage falling below the configured *Under Voltage Trip* value. The *Under Voltage Trip* 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 *Under Voltage Return* level.
Over Voltage IEEE 37.2 – 59 AC Overvoltage Relay	☐ = S2 Over Voltage detection is disabled ☑ = S2 Over Voltage gives an alarm in the event of the S2 voltage rising above the configured *Over Voltage Trip* value. The *Over Voltage Trip* 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 *Over Voltage Return* level.
Under Frequency IEEE 37.2 – 81 Frequency Relay	☐ = S2 Under Frequency detection is disabled ☑ = S2 Under Frequency gives an alarm in the event of the S2 frequency falling below the configured *Under Frequency Trip* value. The *Under Frequency Trip* 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 *Under Frequency Return* level.
Over Frequency IEEE 37.2 – 81 Frequency Relay	☐ = S2 Over Frequency detection is disabled ☑ = S2 Over Frequency gives an alarm in the event of the S2 frequency rising above the configured *Over Frequency Trip* value. The *Over Frequency Trip* 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 *Over Frequency Return* level.
Phase Rotation Detection IEEE 37.2 – 47 Phase Sequence Relay	☐ = The phase rotation is not checked ☑ = An Electrical Trip alarm is generated when the phase rotation of S2 supply is not matching the configured *Phase Rotation* setting.

2.9 PLANT BATTERY



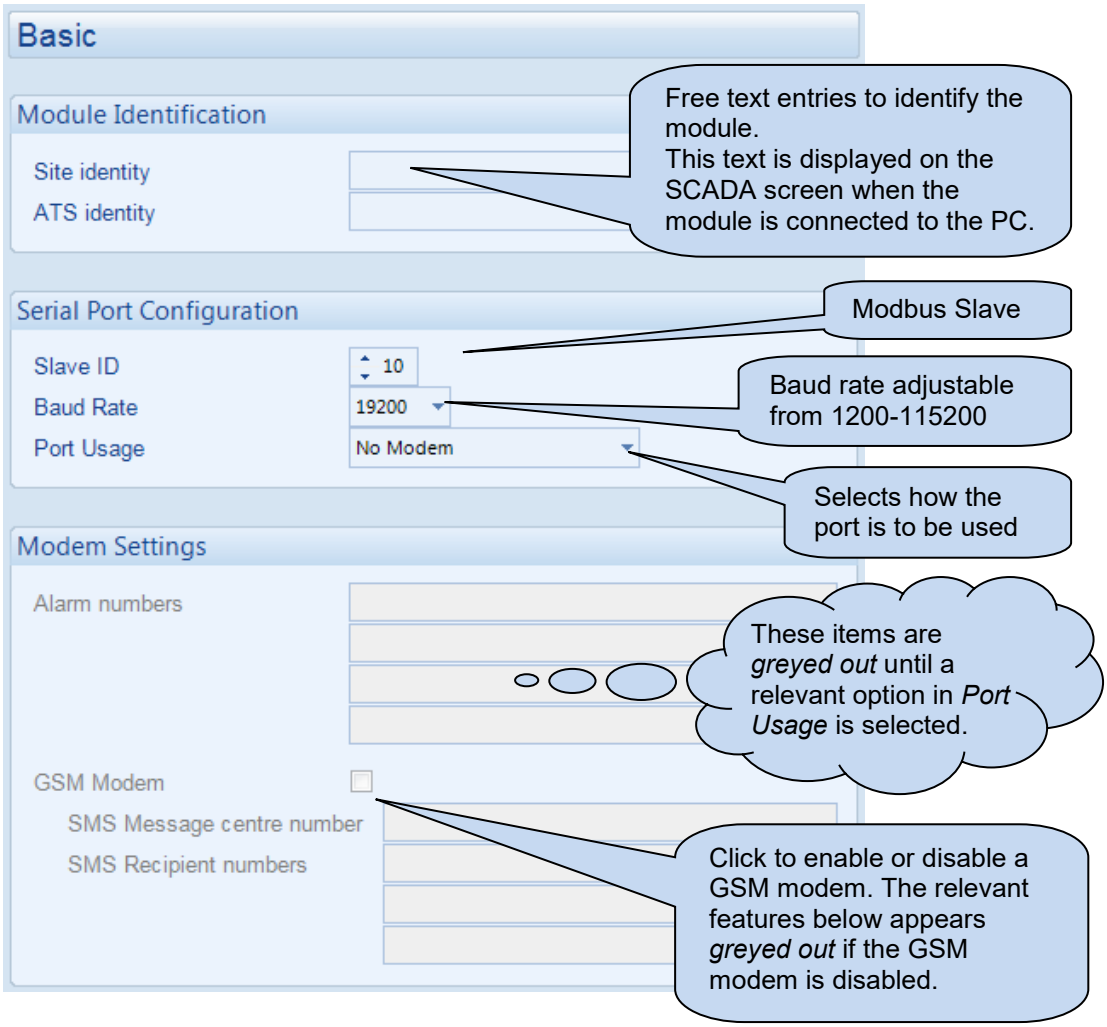
Parameter	Description
Plant Battery Undervolts IEEE 37.2 -27 DC Undervoltage Relay	The alarm activates when the battery voltage drops below the configured *Pre-Alarm* level for the configured *Delay* time. When the battery voltage rises above the configured *Return* level, the alarm is de-activated.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



2.10.1.1 SERIAL PORT CONFIGURATION

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

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	☐ = The connected modem is a fixed line telephone modem ☑ = 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. 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. 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

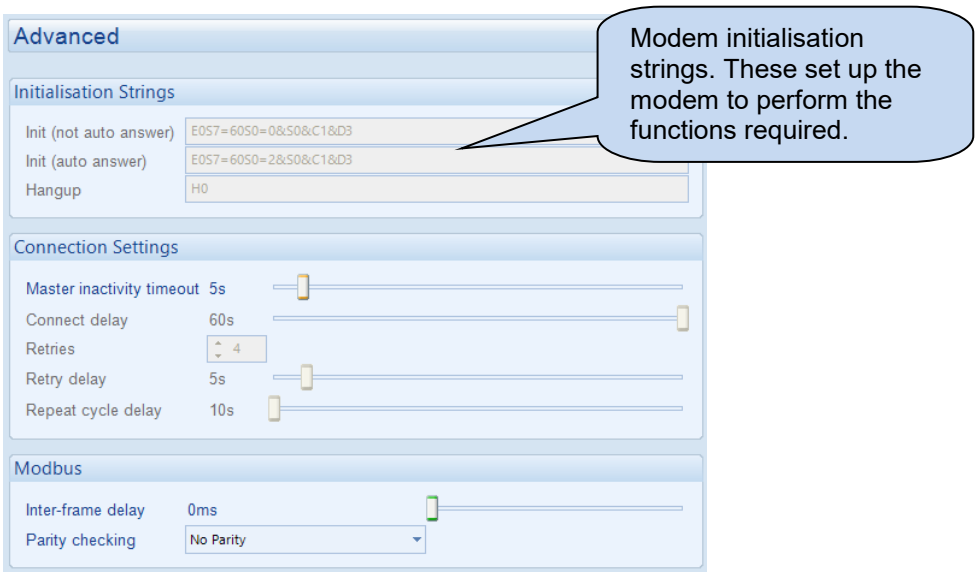
Other Localisation Kits are obtained from www.multitech.com

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
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. 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.	0830-001-01

2.10.2 ADVANCED



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) S0=2 (auto answer)	Do not answer 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)

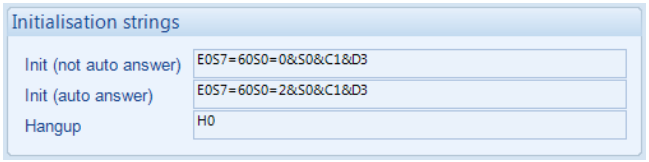
SILENT OPERATION

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

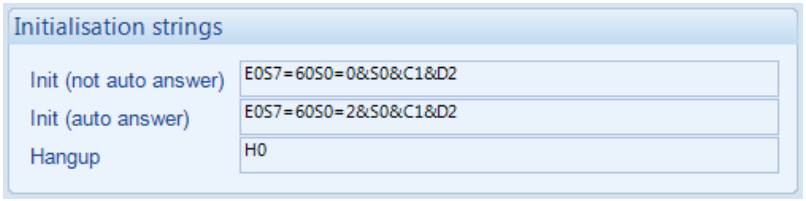
The factory settings for the initialisation strings are suited to the Multitech ZBA Global Modem :



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 (required for Sierra Fastrack Xtend)	Hang up on DTR-drop
&D3 (factory settings)	Reset on DTR-drop



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 *looks* by default at the USB port for communications. When activity is detected on the RS232 or RS485 port, the module *switches* to look at the relevant port for further data. If no data activity is detected on the port for the duration of the *master inactivity timer*, it reverts to looking at the USB port. 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.

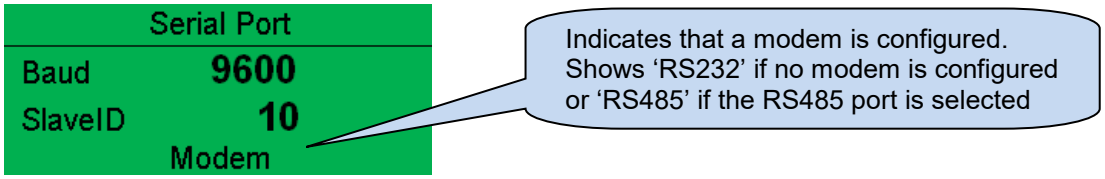
LED STATE	Description
Off	Modem is not powered
On Continuous	Not connected to GSM network
Flashing Slow (approx once every two seconds)	Connected to GSM network
Flashing Fast (approx twice per second)	Connected to GSM network data transmission in progress.

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.

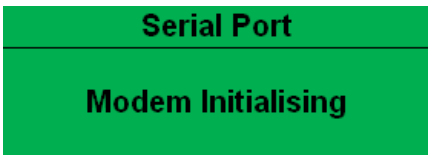
NOTE: Factory Default settings are for the RS232 port to be enabled (no modem connected), operating at 19200 baud, modbus slave address 10.

Example 1 – Module connected to a RS232 telephone modem.



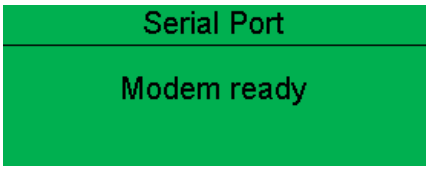
Modem Setup Sequence

1)



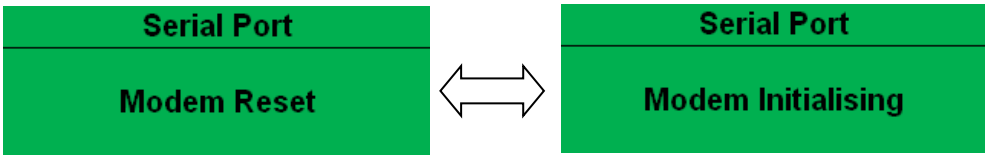
If the Modem and the module communicate successfully :

2)



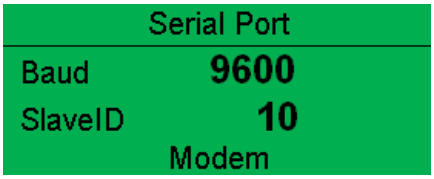
In case of communication failure between the modem and module, the modem is automatically reset and initialisation is attempted once more :

3)

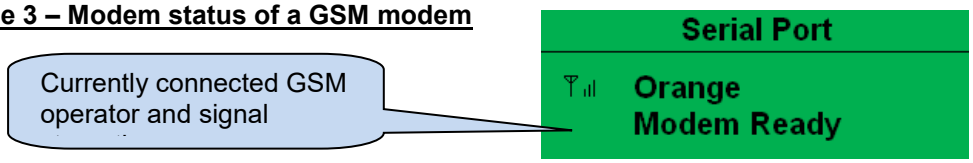


In the case of a module that is unable to communicate with the modem, the display continuously cycles between 'Modem Reset' and 'Modem Initialising' as the module resets the modem and attempts to communicate with it again. This continues until correct communication is established with the modem.
In this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

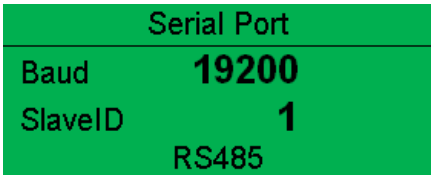
Example 2 – Module connected to a modem.



Example 3 – Modem status of a GSM modem

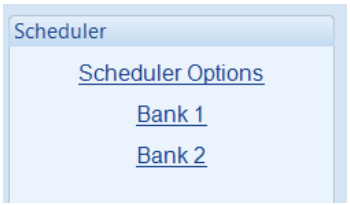


Example 4 - Module RS485 port configured for connection to a modbus master.



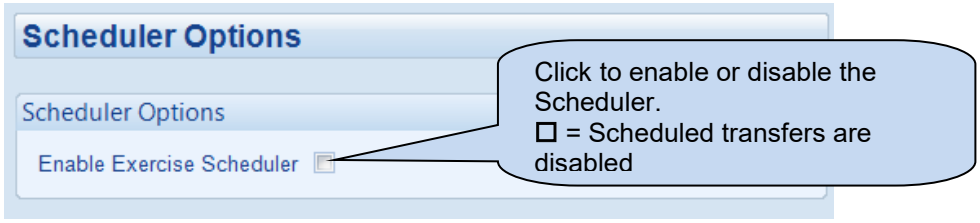
2.11 SCHEDULER

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:

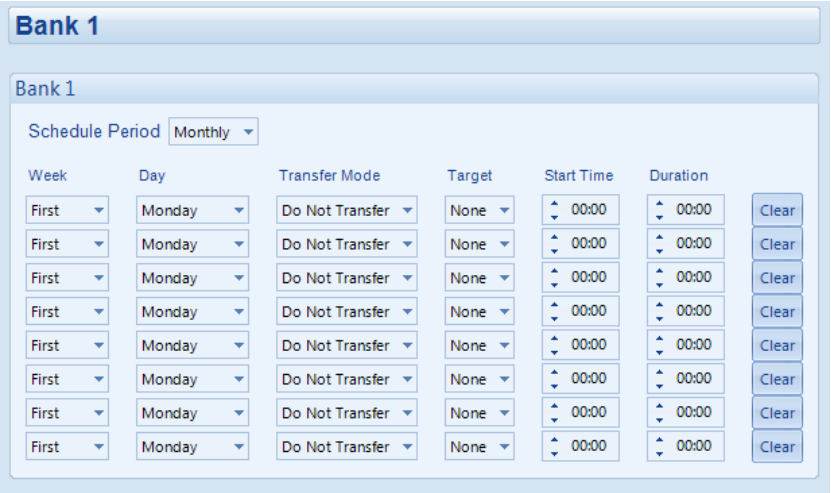


The scheduler allows for the configuration of two different banks, this offers the possibility of having monthly scheduled events or weekly events. See overleaf for more information on *Monthly* and *Weekly* events.

2.11.1 SCHEDULER OPTIONS



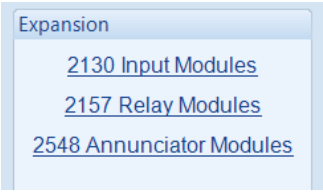
2.11.2 BANK 1



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

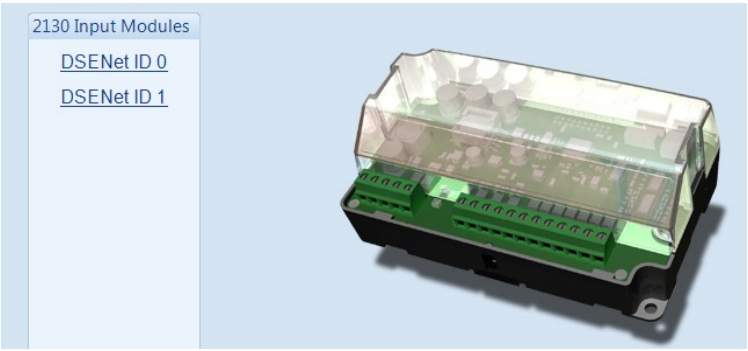
2.12 EXPANSION

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

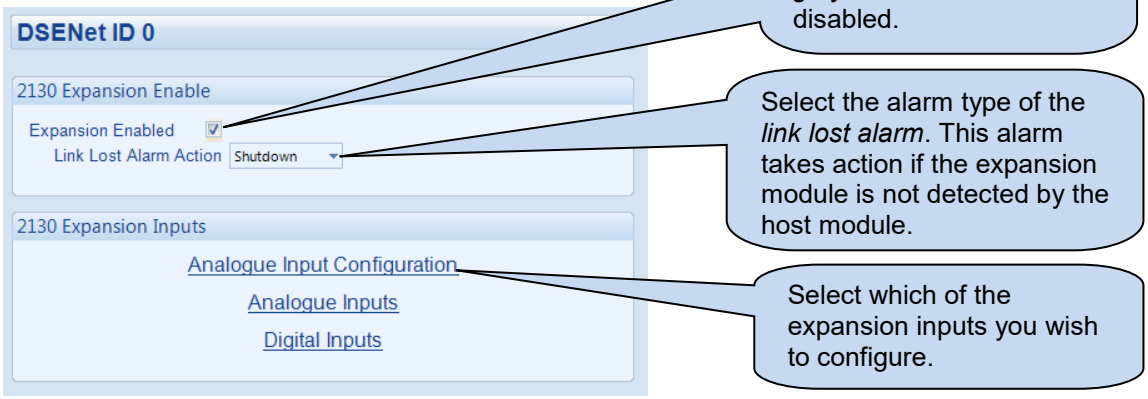


2.12.1 DSE2130 INPUT MODULES

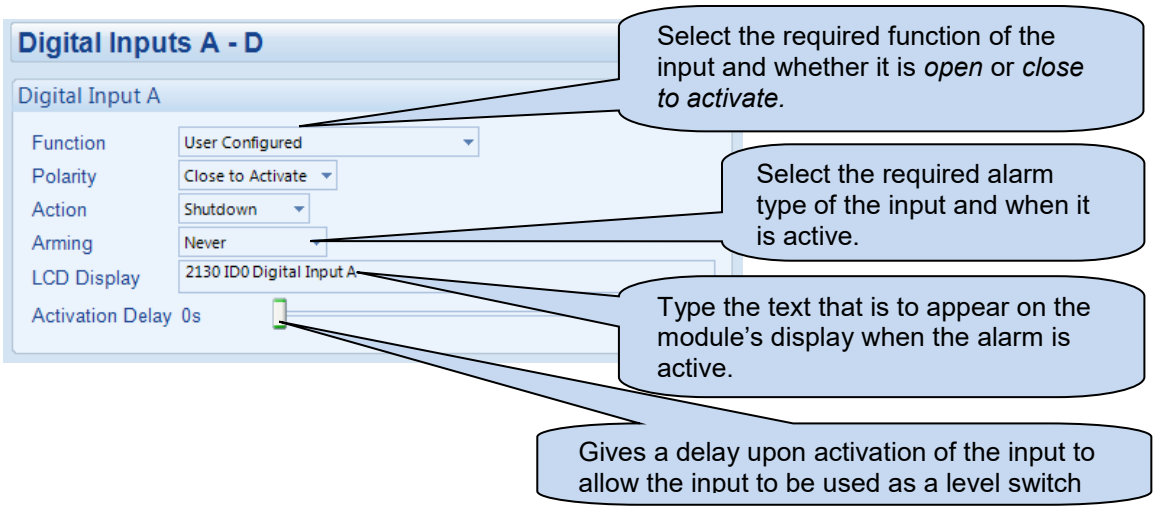
Select the DSENet ID of the input expansion you wish to configure. The ID of the expansion input module is set by rotary decimal switch accessible under the removable cover of the device.



The following is then shown:

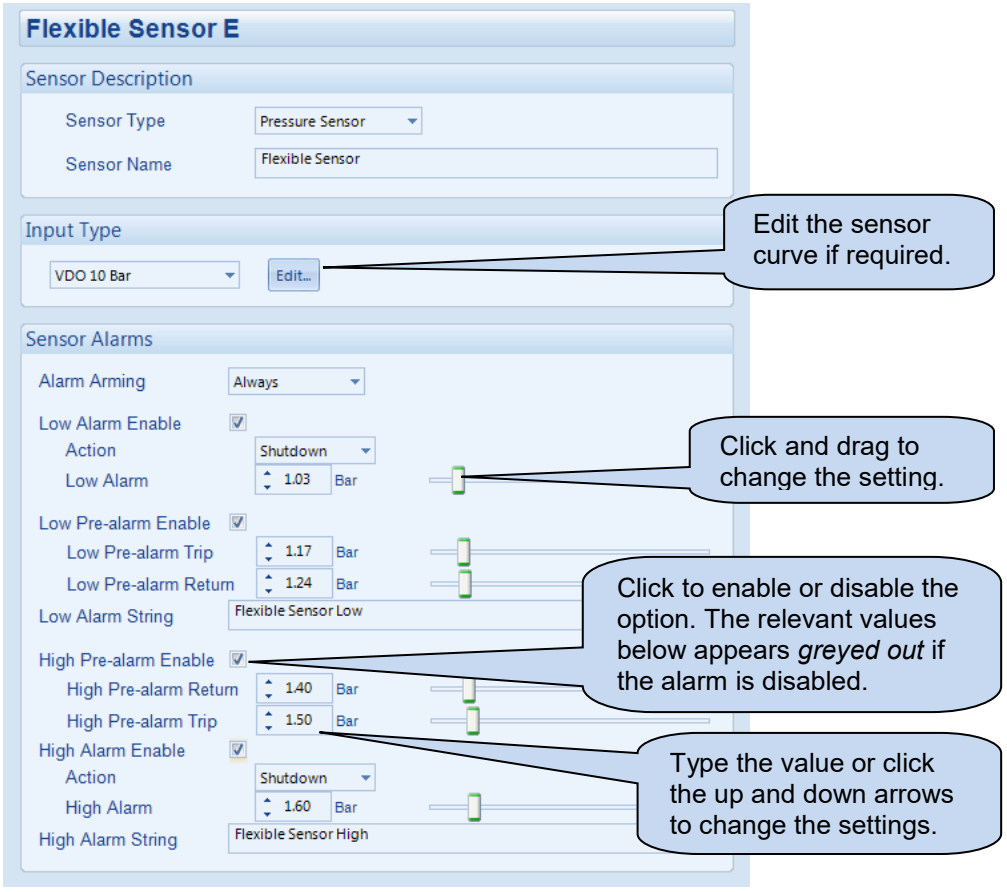


2.12.1.1 DIGITAL INPUTS (A-D)

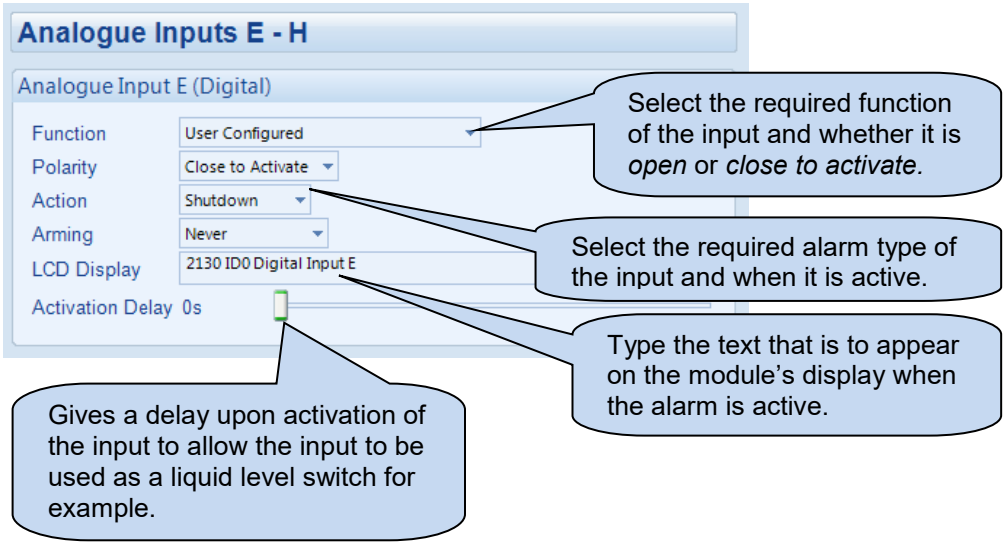


2.12.1.2 ANALOGUE INPUTS (E-H)

Configured as an Analogue Input

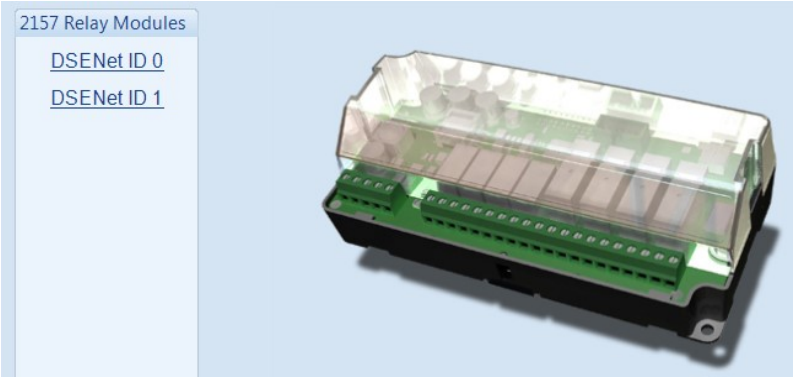


Configured as a Digital Input

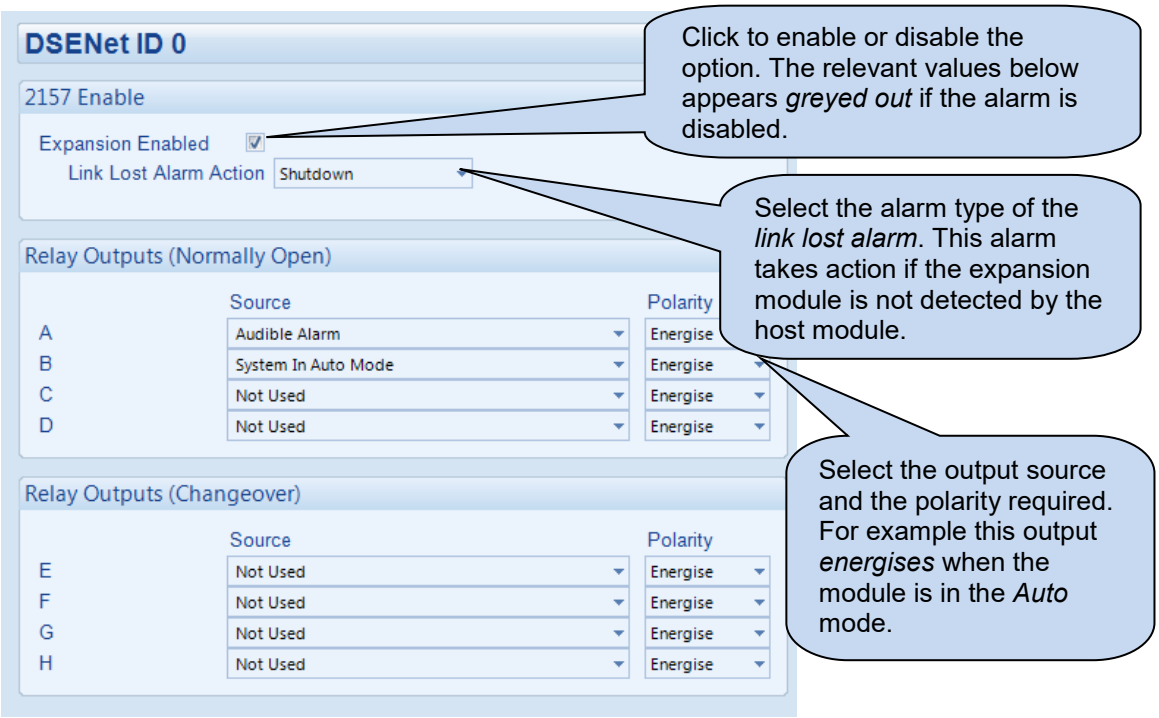


2.12.2 DSE2157 RELAY MODULES

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.



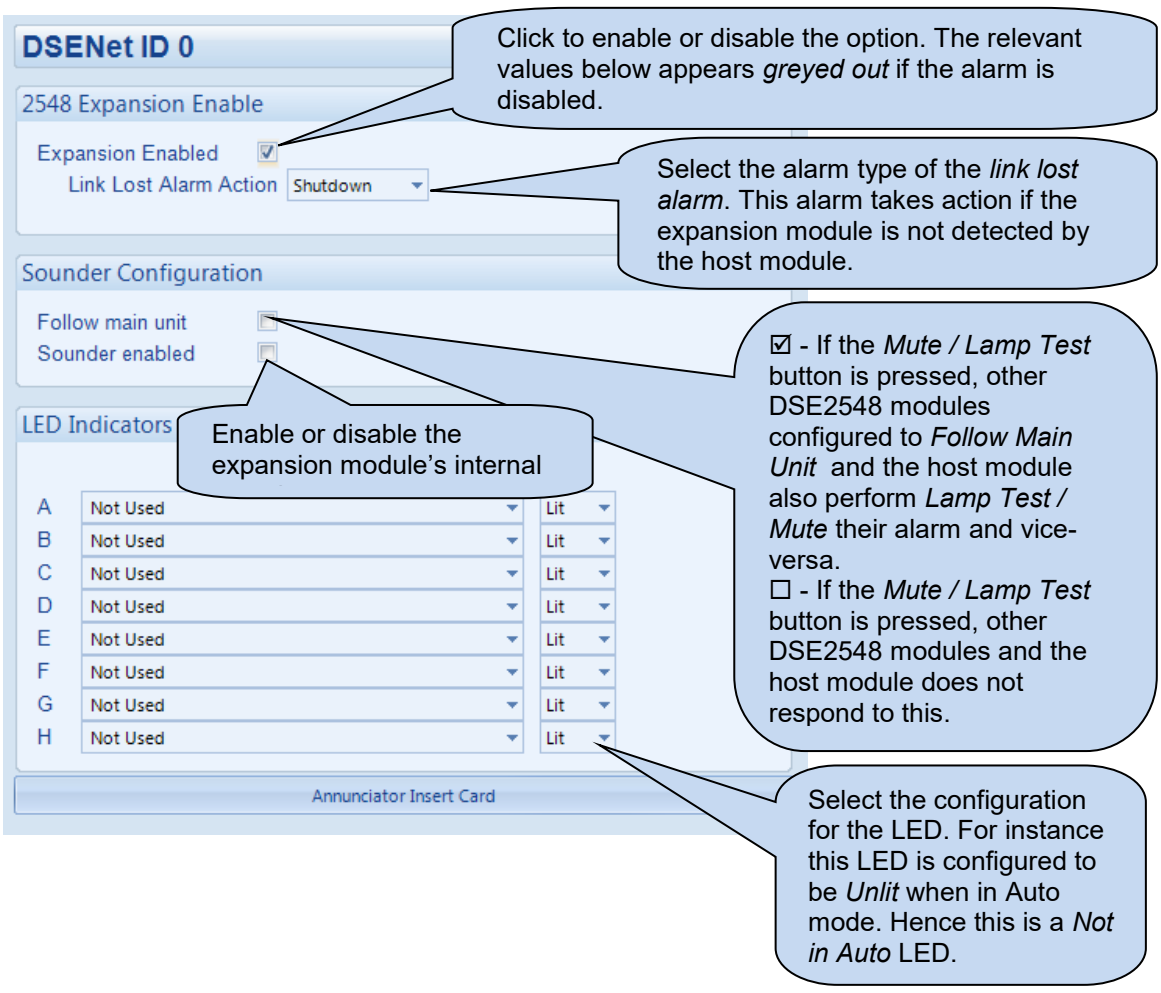
The following is then shown:



2.12.3 DSE2548 LED EXPANSION

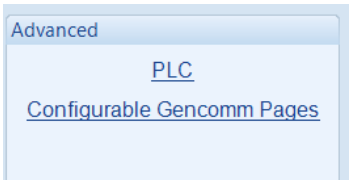
Select the DSENet ID of the LED expansion you wish to configure. The ID of the Annunciator is set by rotary decimal switch accessible on the back of the device.

The following is then shown:



2.13 ADVANCED

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



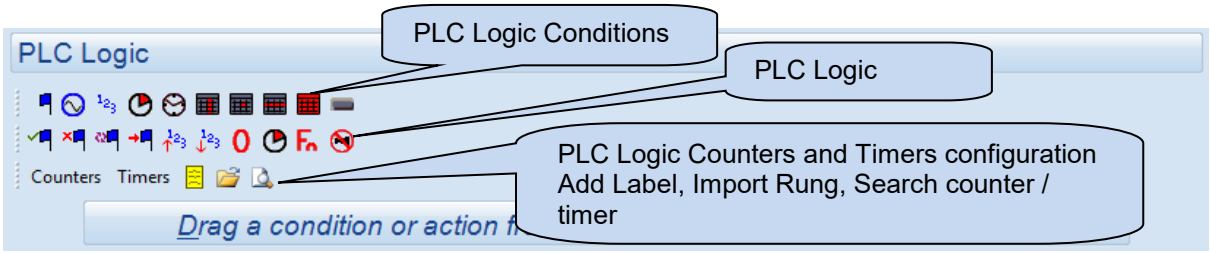
2.13.1 PLC

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

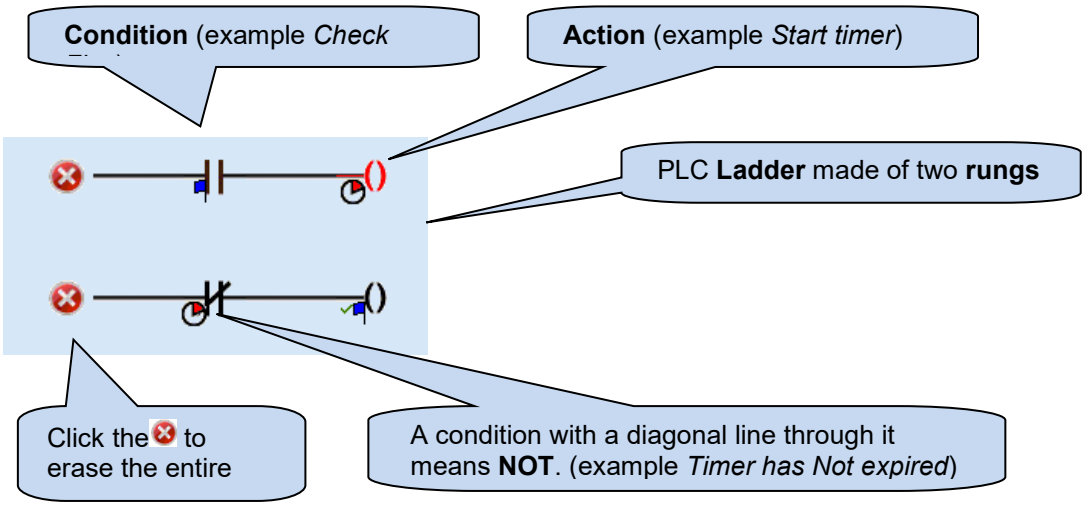
NOTE: For further details and instructions on PLC Logic and PLC Functions, refer to DSE Publication: *057-175 PLC Programming Guide* which is found on our website: *www.deepseaplc.com*

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*.

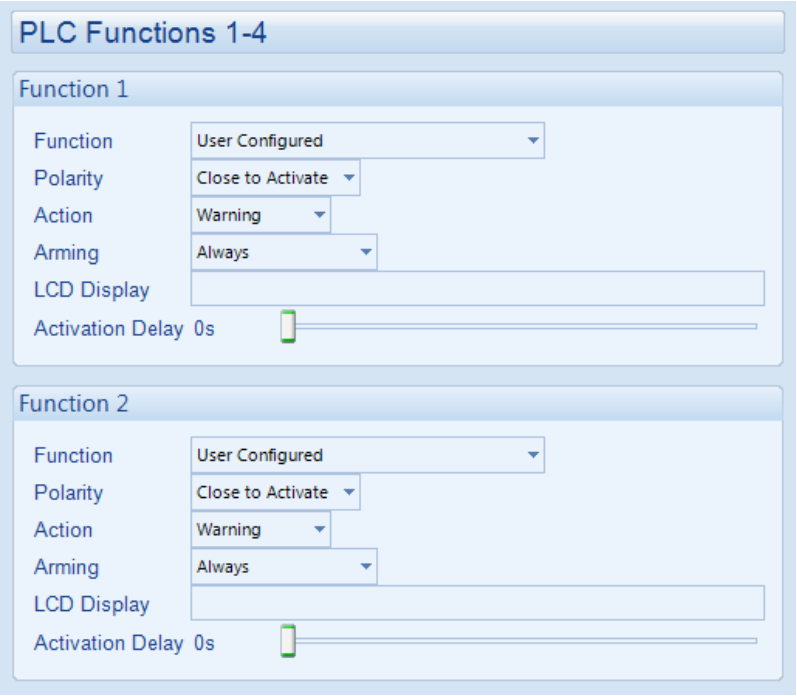
For instance if the conditions in the rung are met, the action takes place.



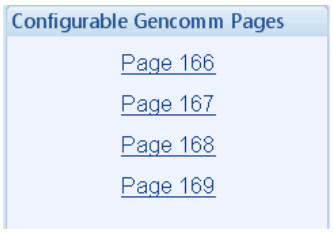
2.13.1.2 PLC FUNCTIONS

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.deepseaplc.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.

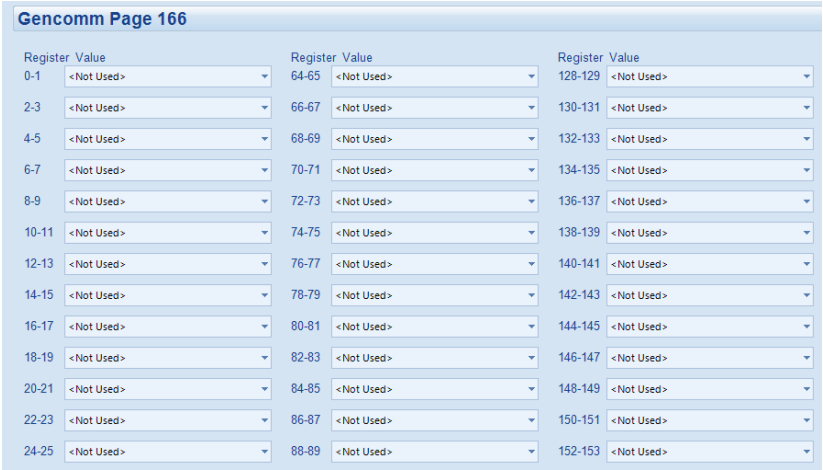


2.13.2 CONFIGURABLE GENCOMM PAGES



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.

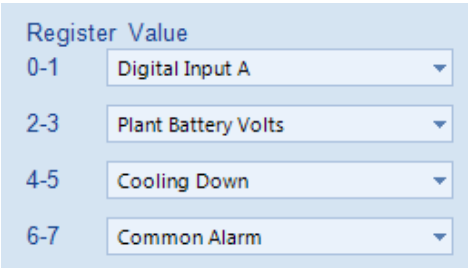
All configurable Gencomm registers are 32-bit unsigned format.



The configurable modbus pages are:

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

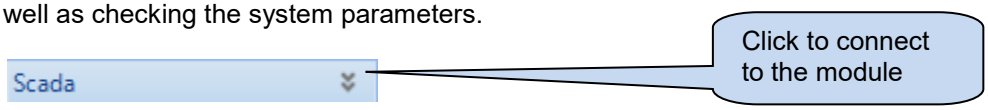
Example of Gencomm page configuration:



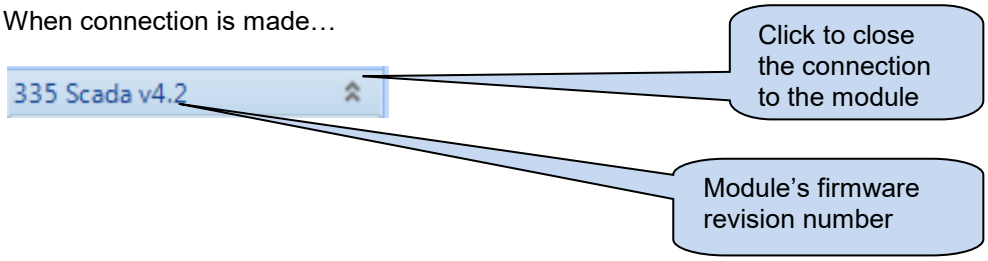
The register address is obtained from the formula:
register_address=page_number*256+register_offset.
To read the *Plant Battery Volts* from the above register, the Modbus master device needs to read the data in two registers and then combine the data from the Most Signficant Bit and the Least Significant Bit.
MSB address in Decimal = (166 * 256) + 2 = 42498
LSB address in Decimal = (166 * 256) + 3 = 42499

3 SCADA

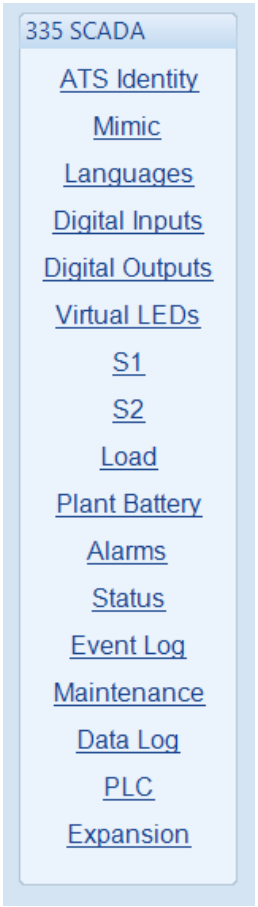
SCADA stands for **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition and is provided both as a service tool and also as a means of monitoring and control.
As a service tool, the SCADA pages is to check the operation of the controller's inputs and outputs as well as checking the system parameters.



When connection is made…

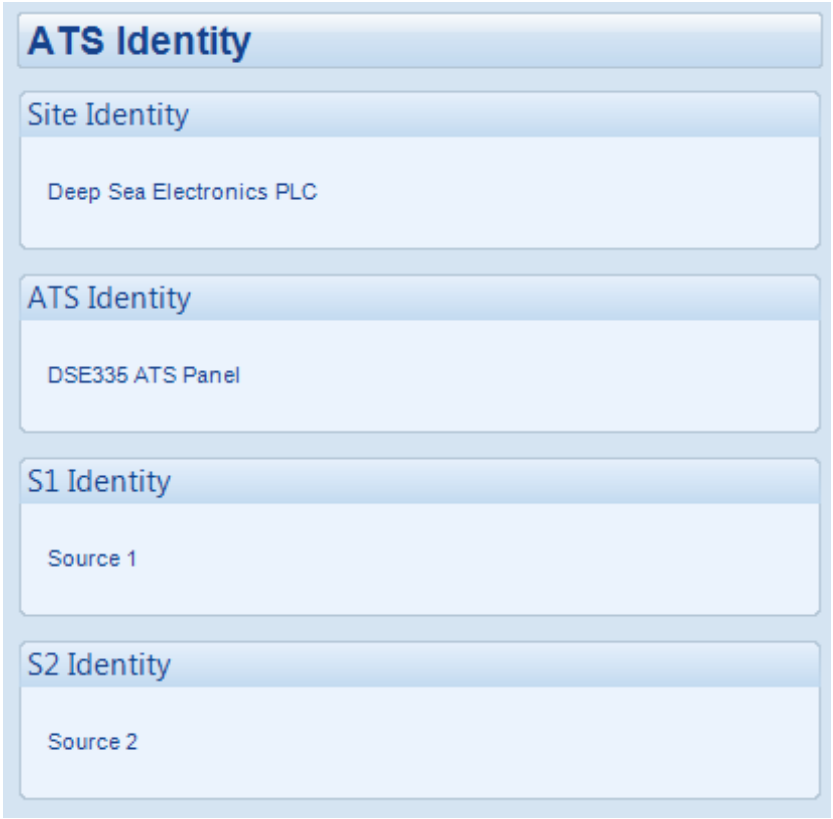


The *SCADA* page is subdivided into smaller sections.
Select the required section with the mouse.



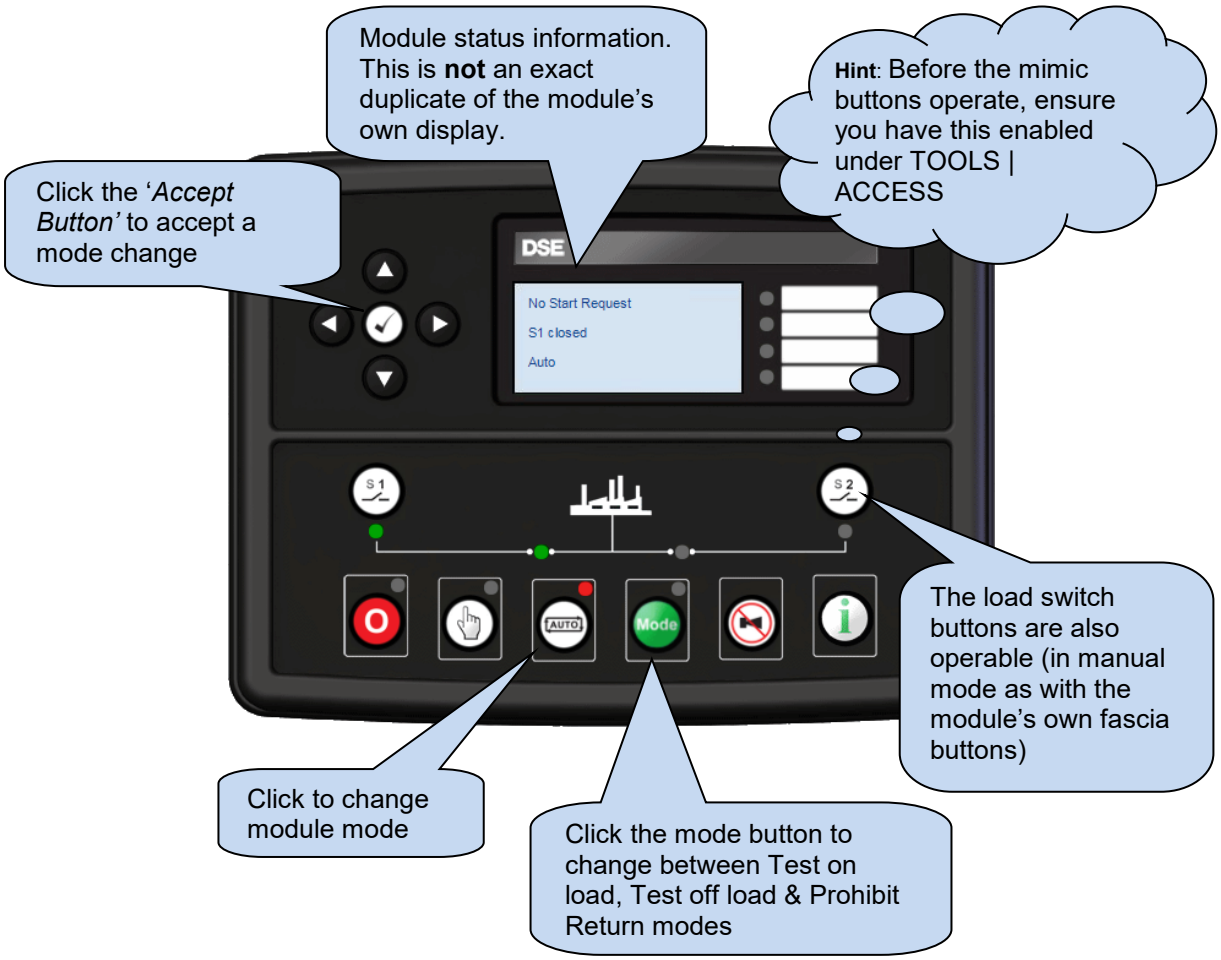
3.1 ATS IDENTITY

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

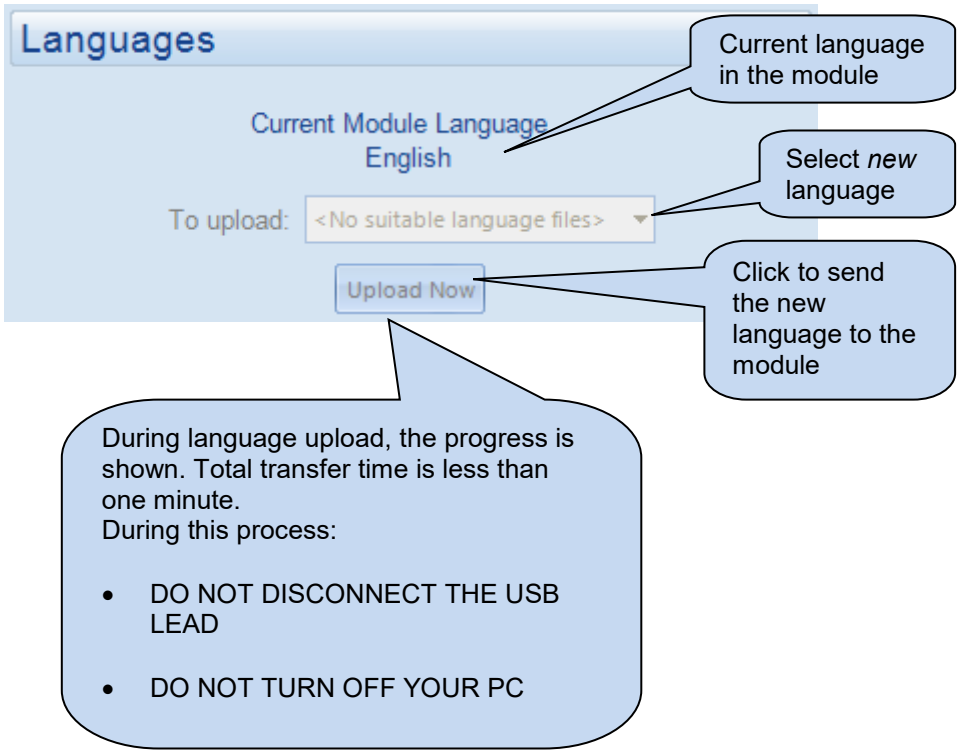


3.2 MIMIC

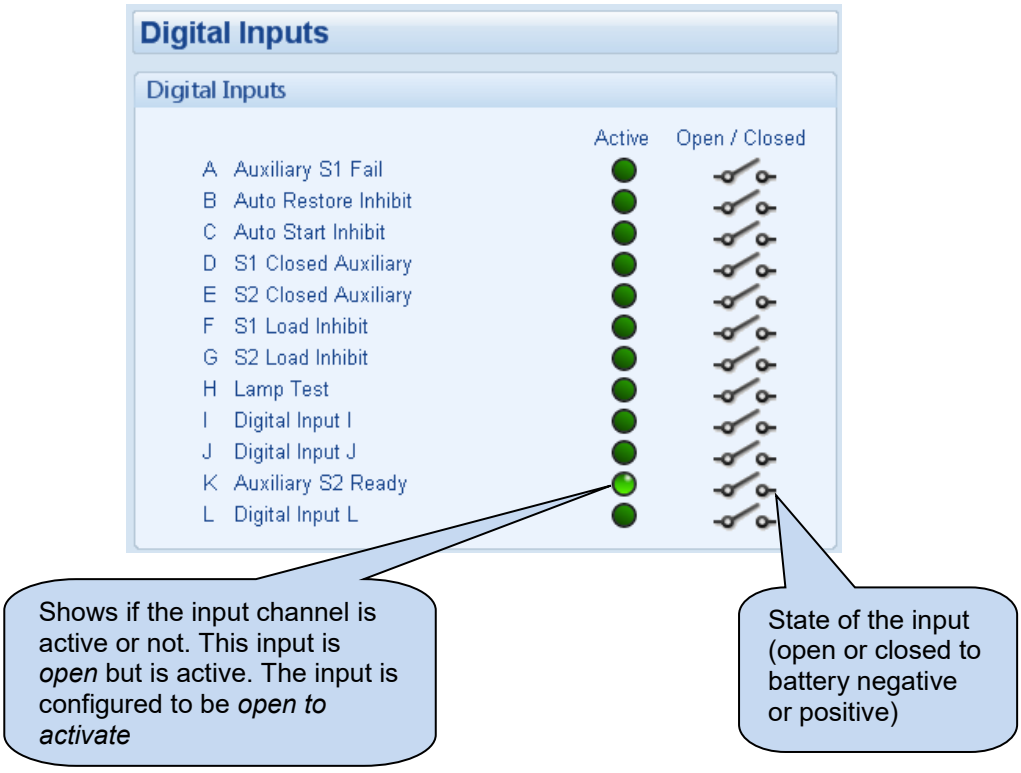
This screen provides a mimic of the control module and allows the operator to change the control mode of the module.
Only the mode control and load switch buttons are operational in the mimic display. The menu navigation buttons are inoperable.



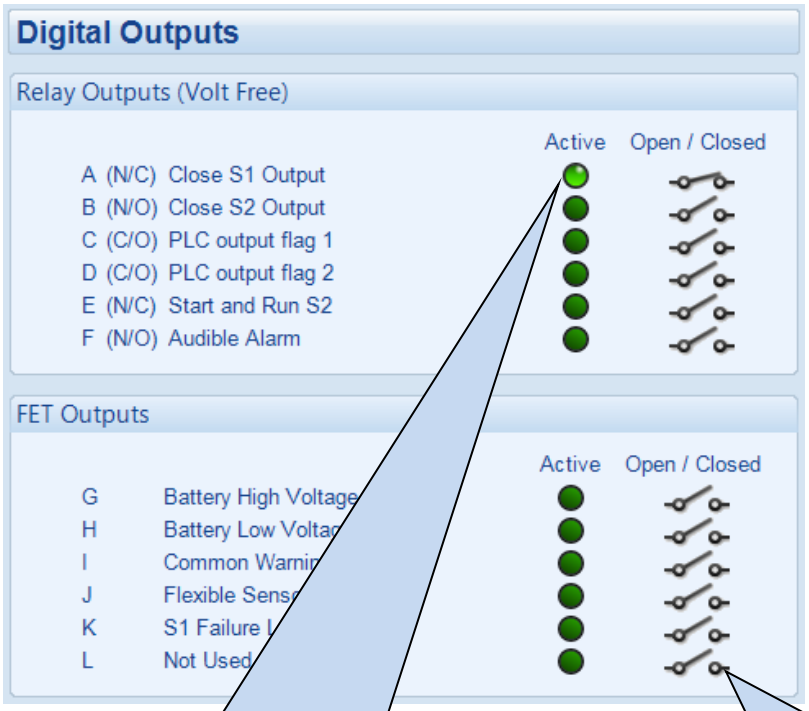
3.3 LANGUAGES



3.4 DIGITAL INPUTS



3.5 DIGITAL OUTPUTS

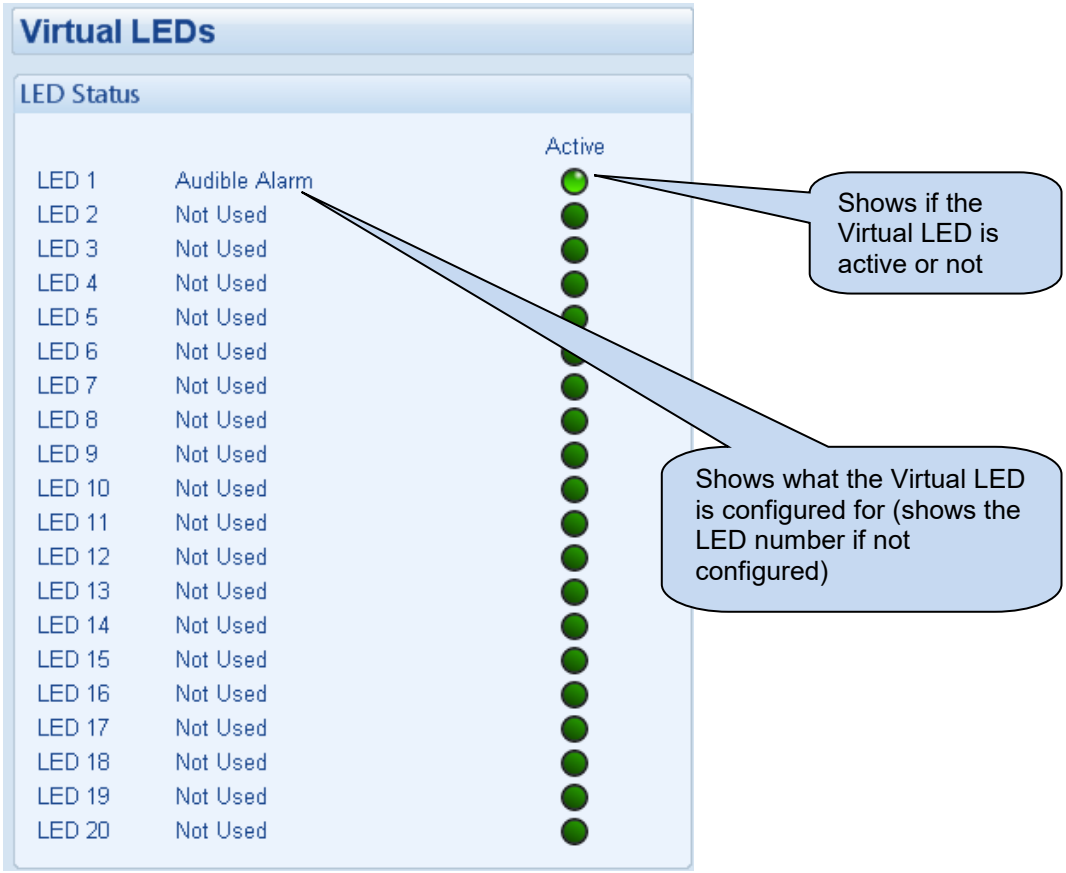


Shows if the output channel is active or not. This output is *Close* but is active. The output is configured to be *Close S1 Output de-energise.* As relay is normally closed (N/C) and the *Close S1* source is present, the output is *activated* to *close* the N/C relay.

State of the output (open or closed)

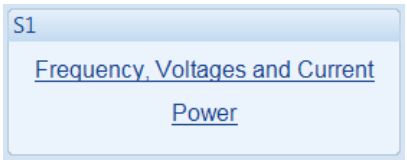
3.6 VIRTUAL LEDS

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.



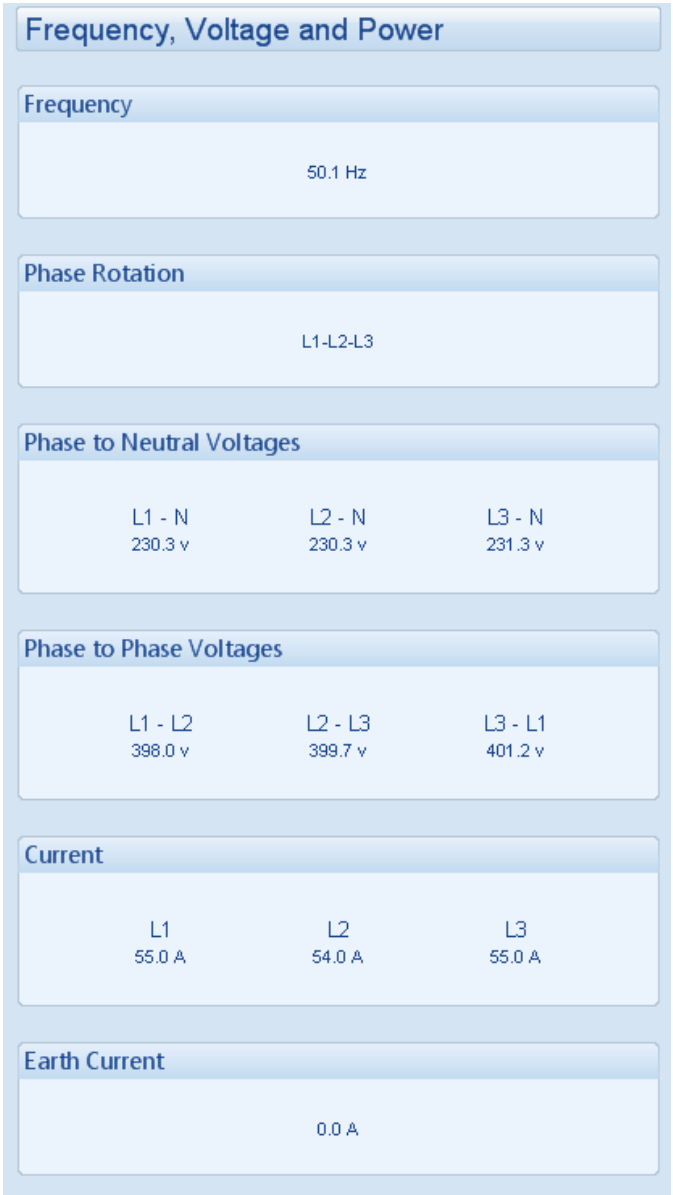
3.7 S1 & S2

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



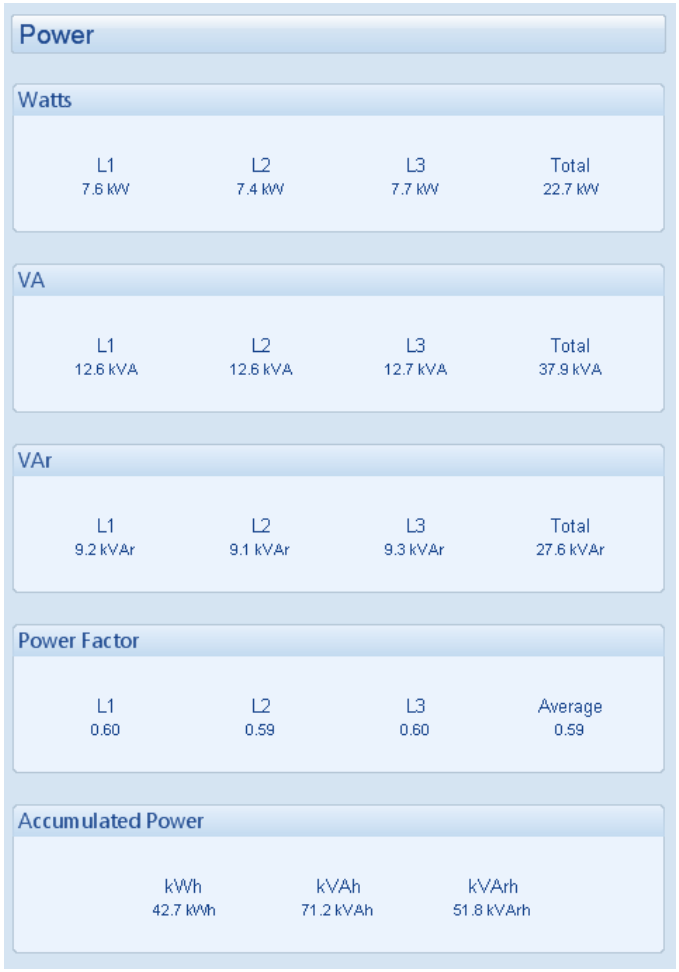
3.7.1 FREQUENCY, VOLTAGE AND CURRENT

Shows the modules measurements of the S1 or S2 supply.



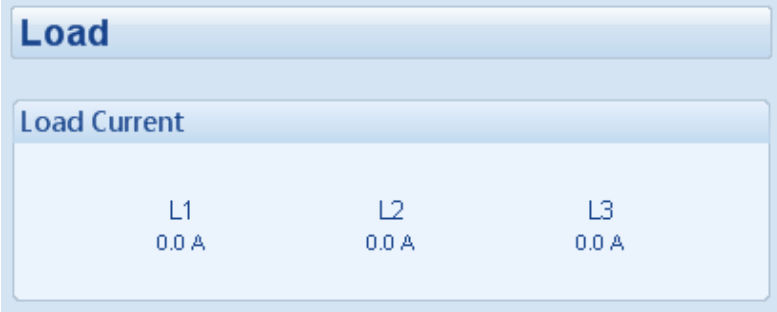
3.7.2 POWER

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



3.8 LOAD

Shows the measurement of the load current.

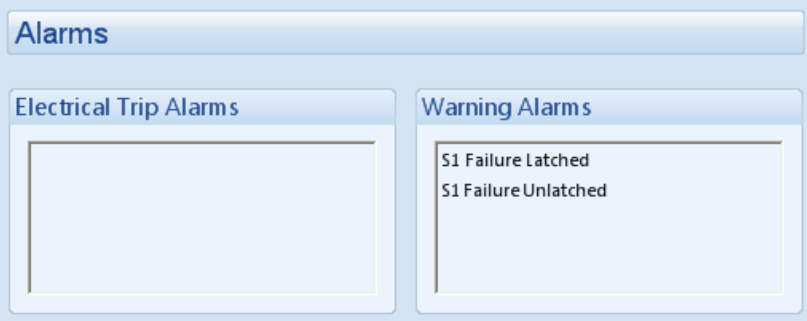


3.9 PLANT BATTERY

Shows the measurement of the plant battery

3.10 ALARMS

Shows any present alarm conditions.

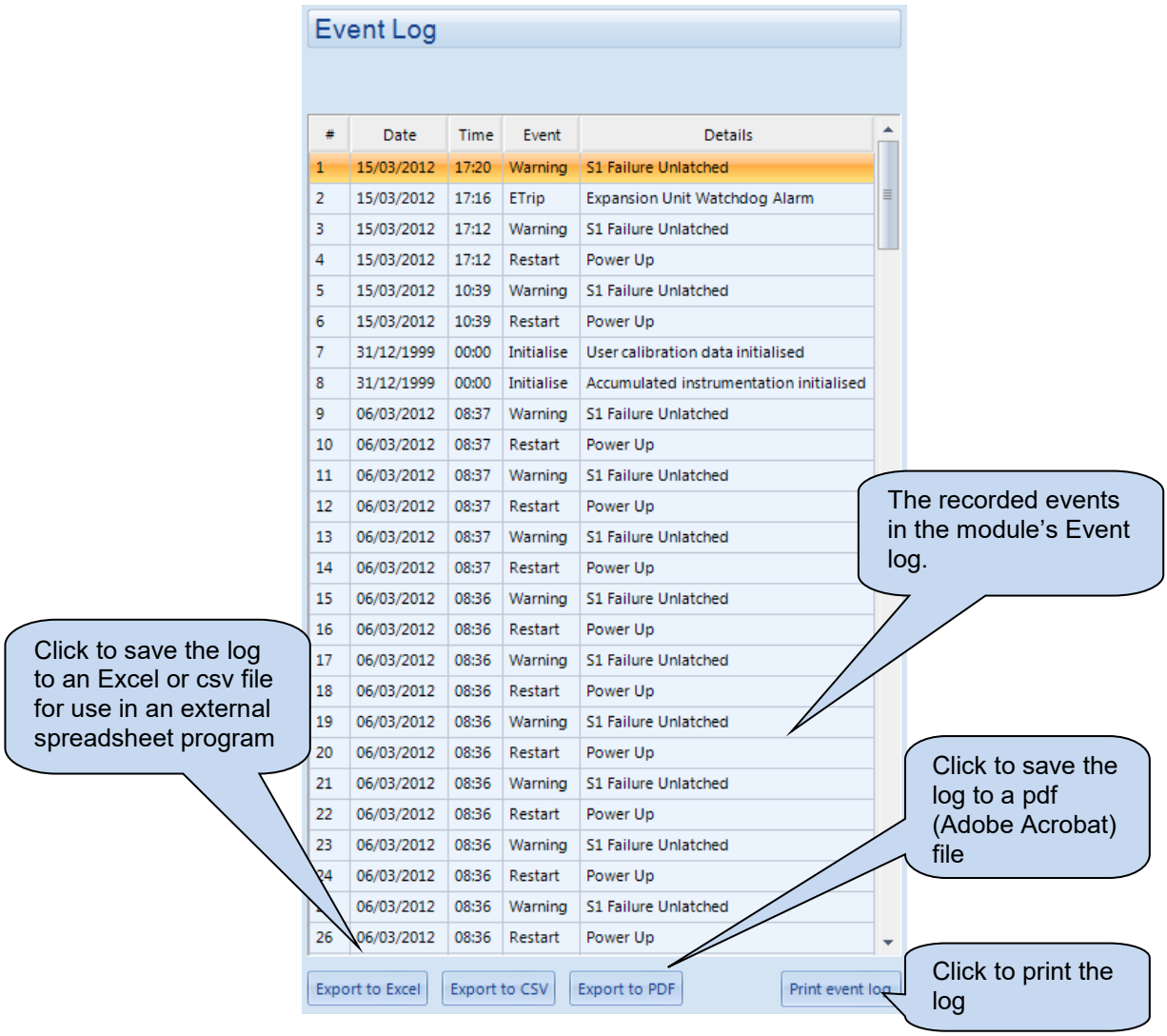


3.11 STATUS

Shows the module's current status.

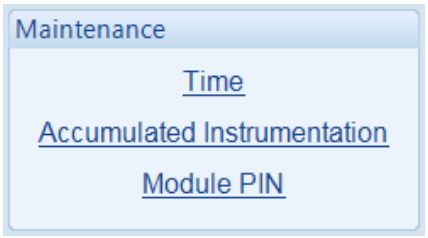
3.12 EVENT LOG

Shows the contents of the module's event log

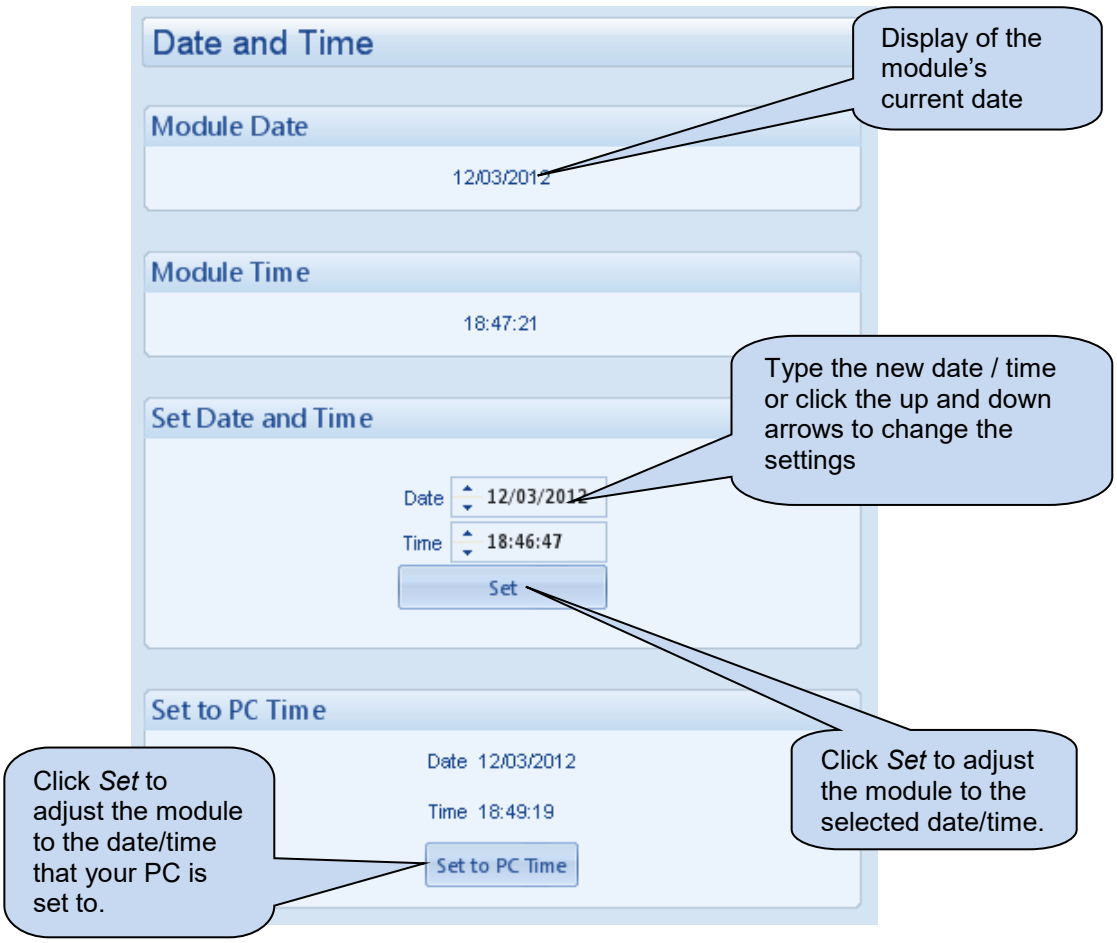


3.13 MAINTENANCE

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

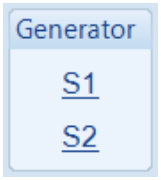


3.13.1 TIME

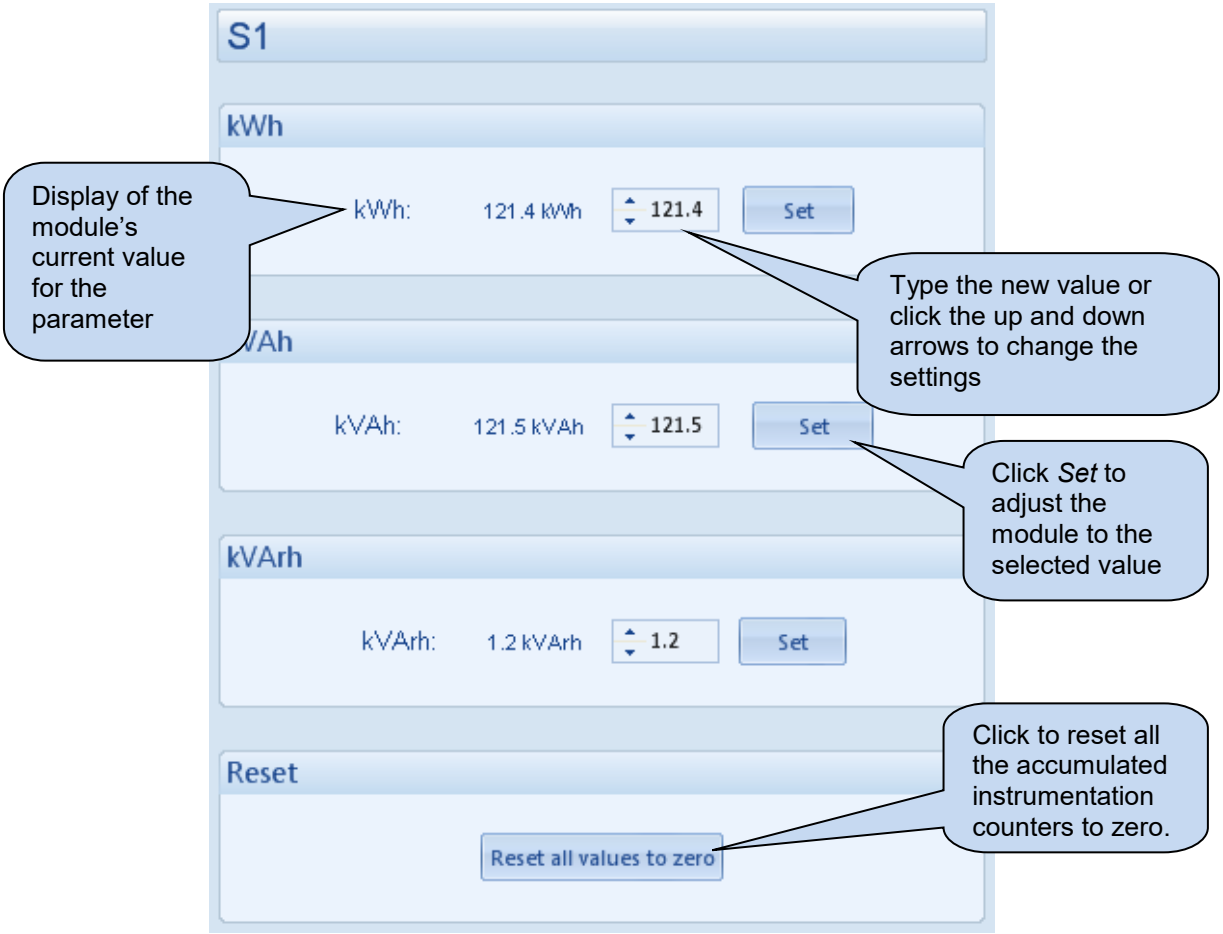


3.13.2 ACCUMULATED INSTRUMENTATION

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



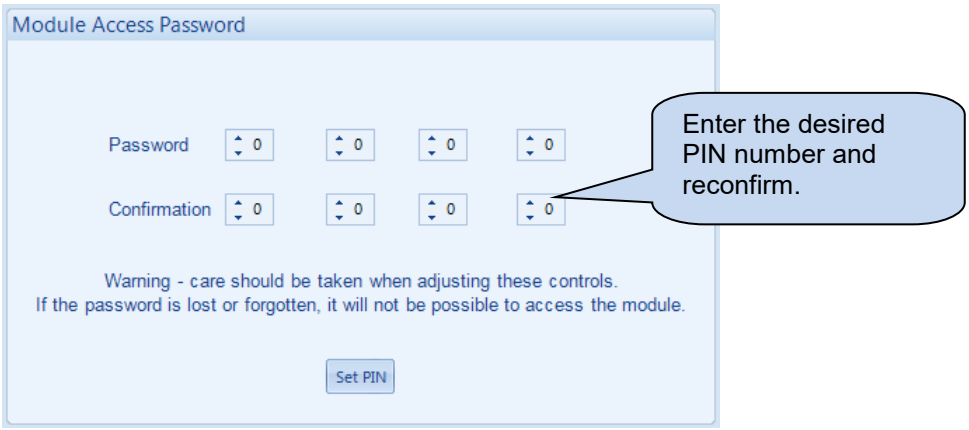
3.13.2.1 S1 & S2



3.13.3 MODULE PIN

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

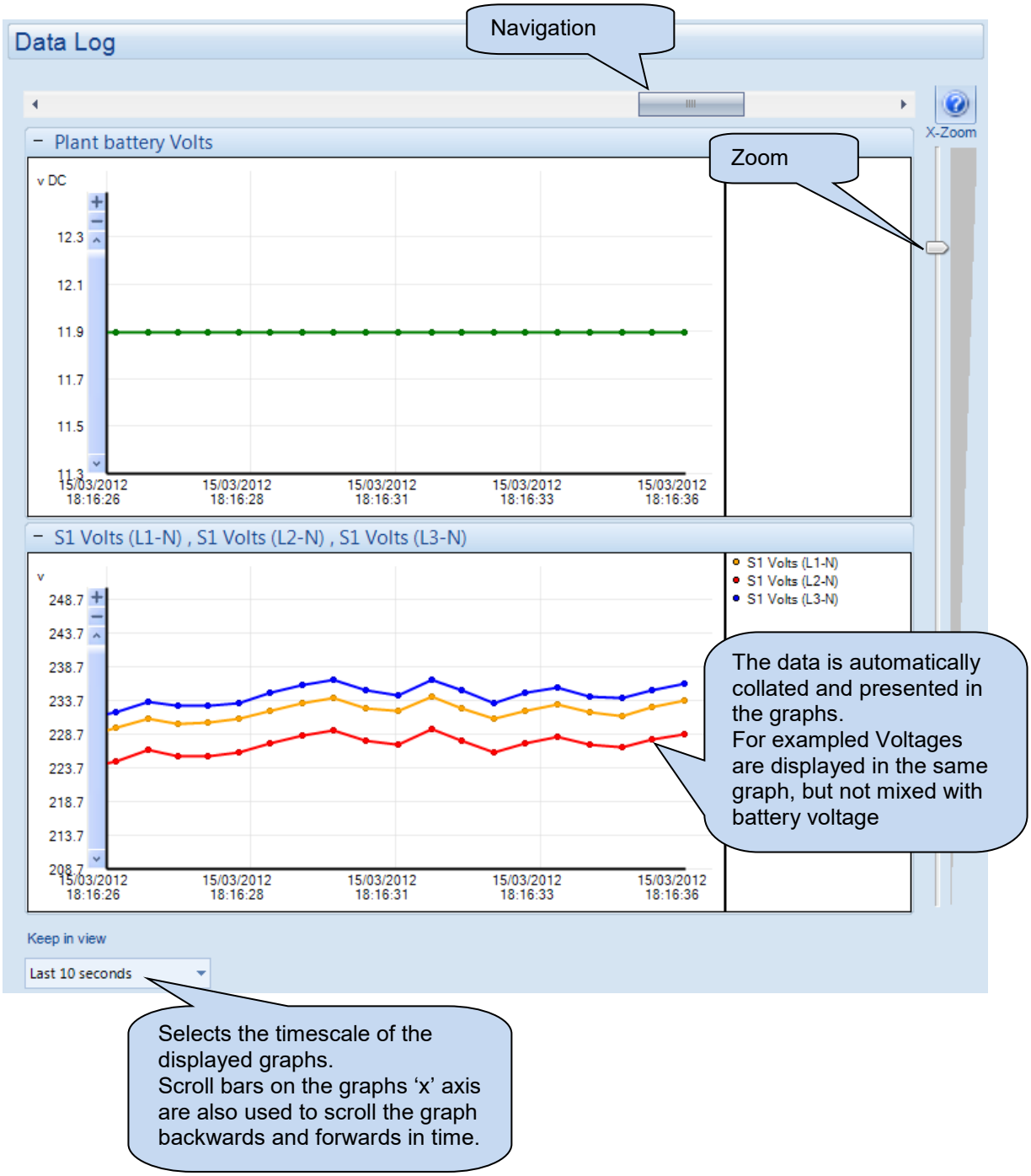
Allows a PIN (Personal Identification Number) to be set in the controller. This PIN must be entered to either access the front panel configuration editor or before a configuration file is sent to the controller from the PC software.



3.14 DATA LOGGING

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

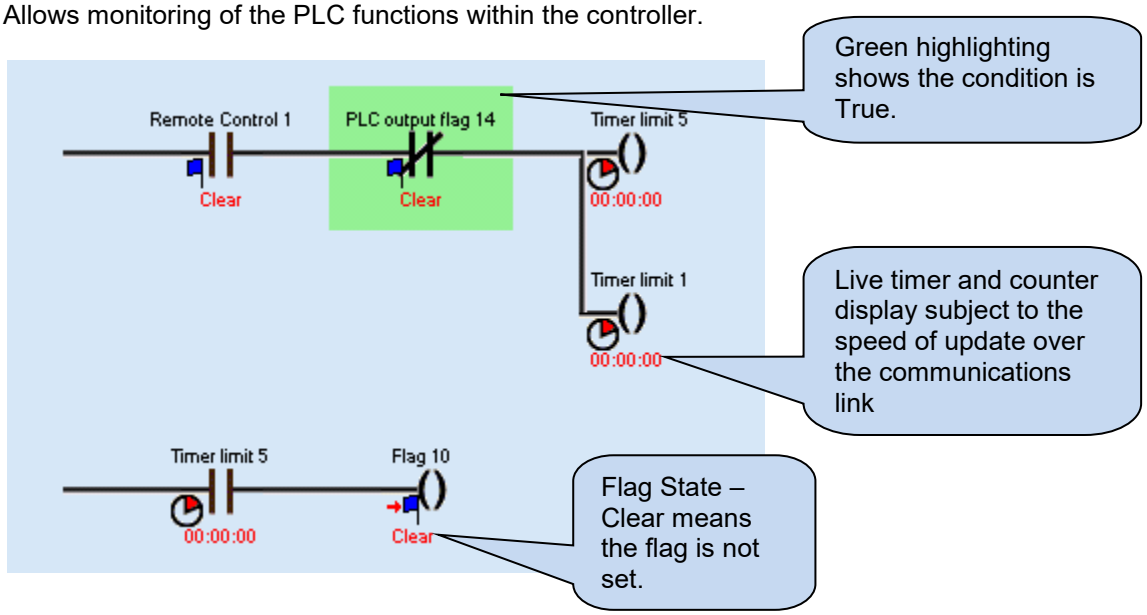
NOTE: Data logging is a 'live' function – Maximum 8hrs duration is shown so long as the PC is left connected to the controller.



3.15 PLC

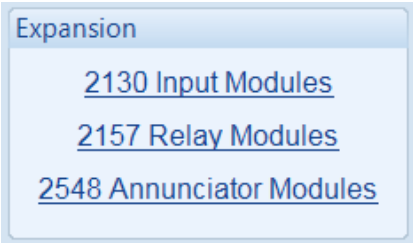
NOTE: For further details and instructions on PLC Logic and PLC Functions, refer to DSE Publication: *057-175 PLC Programming Guide* which is found on our website: *www.deepseaplc.com*

Allows monitoring of the PLC functions within the controller.

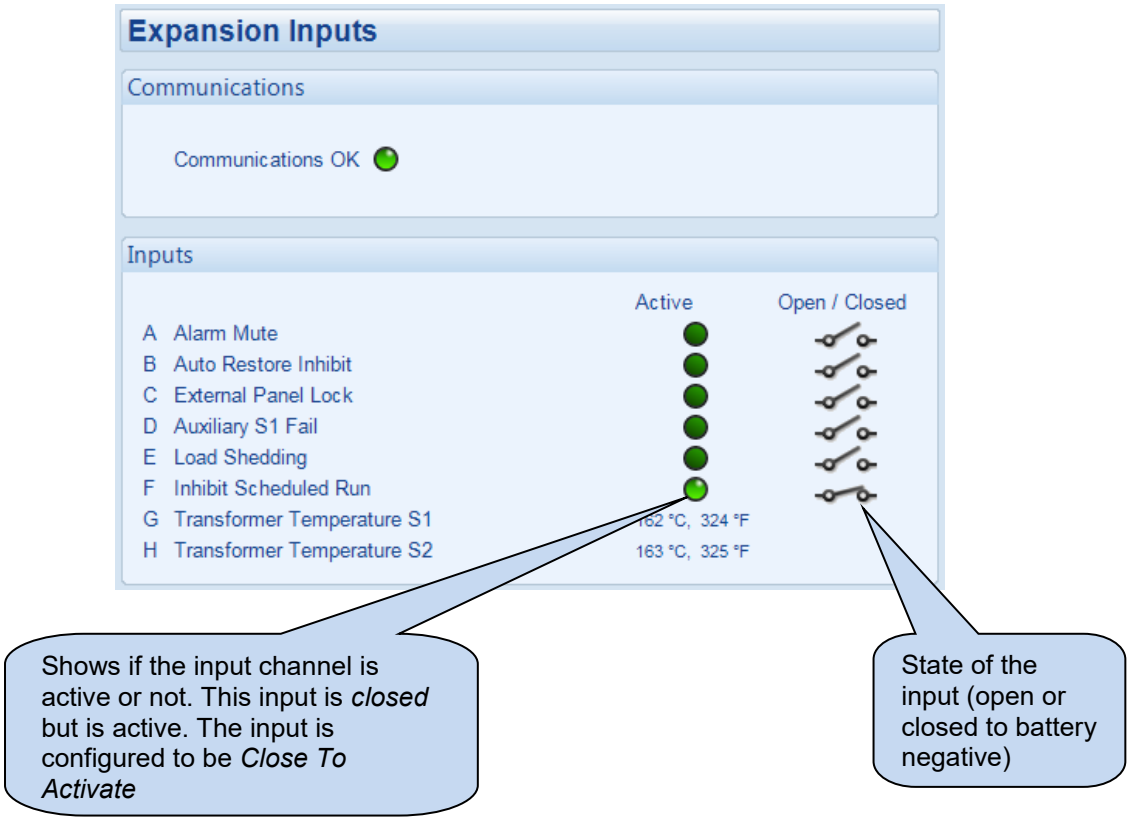


3.16 EXPANSION

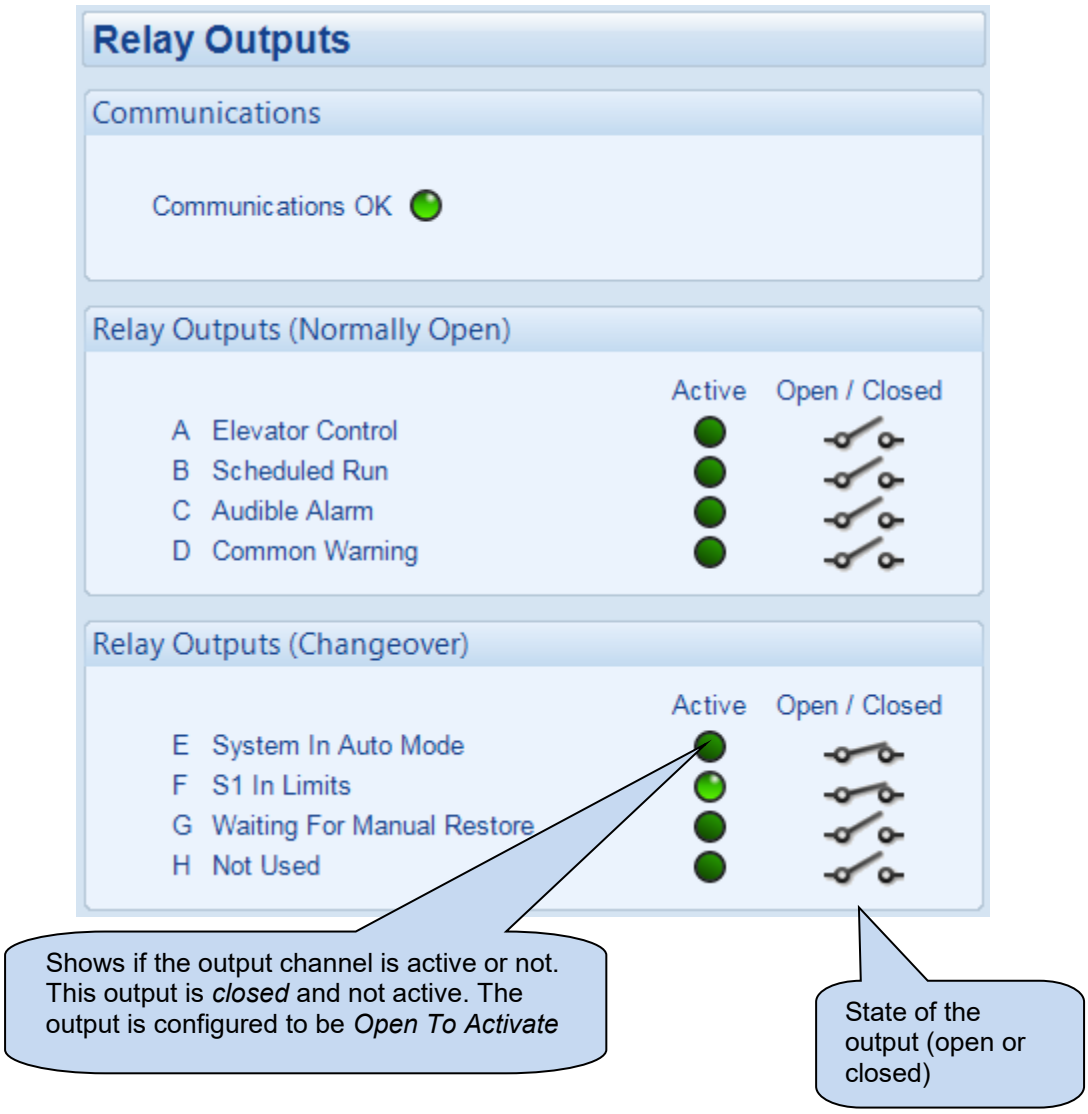
The *Expansion* page is subdivided into smaller sections.
Select the required section with the mouse.



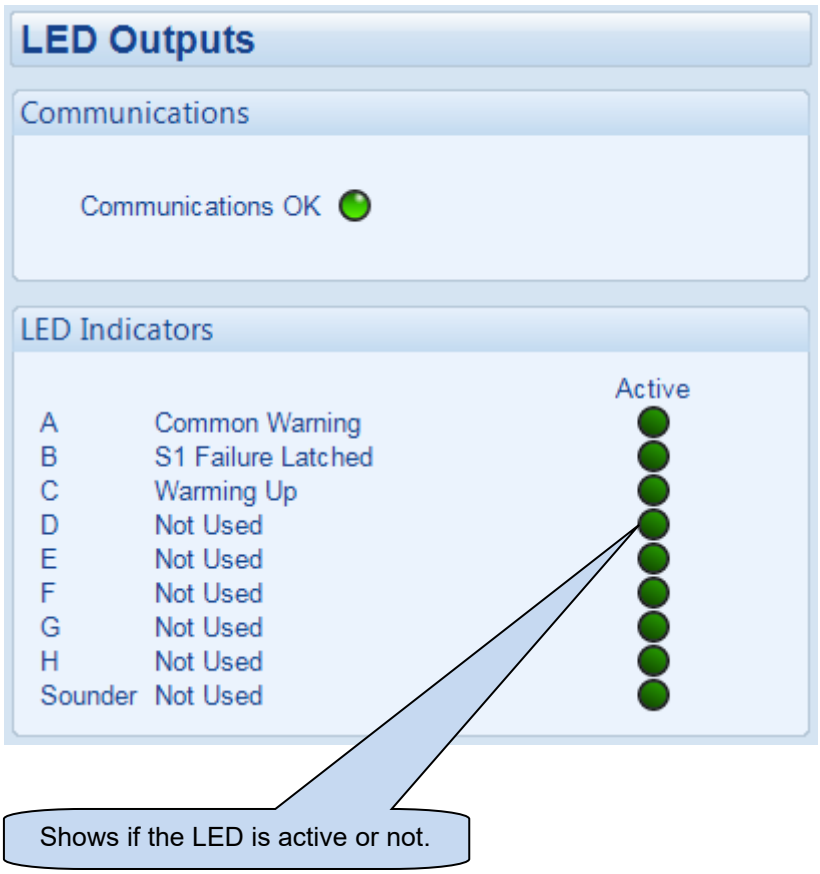
3.16.1 2130 INPUT MODULE



3.16.2 2157 OUTPUT MODULE



3.16.3 2548 LED MODULE



This Page Intentionally Blank

This Page Intentionally Blank