DEEP SEA ELECTRONICS

DSE8660 MKII

Configuration Suite PC Software Manual

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DSE8660 MKII Configuration Suite PC Software Manual

Amendments since last publication

Amd. No.	Comments
1	Initial Release

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

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1 INTRODUCTION

The **DSE Configuration Suite PC Software** allows the DSE86xx MKII modules to be connected to a PC via USB A –USB B cable. Once connected the various operating parameters within the module are viewed or edited as required by the engineer. This software allows easy controlled access to these values.

This manual details the configuration of the DSE8660 MKII controller.
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 / mains source 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 mains 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. A separate manual deals with the operation of the individual module (See section entitled *Bibliography* elsewhere in this document).

1.1 BIBLIOGRAPHY

This document refers to, and is referred by the following DSE publications which are obtained from the DSE website: www.deepseaplc.com or by contacting DSE technical support: support@deepseaplc.com.

1.1.1 INSTALLATION INSTRUCTIONS

DSE Part	Description
053-082	DSE8660 MKII Installation Instructions Sheet

1.1.2 MANUALS

DSE Part	Description
057-151	DSE Configuration Suite PC Software Installation & Operation Manual
057-004	Electronic Engines and DSE wiring
057-045	DSE Guide to Synchronising and Load Sharing Part1
057-046	DSE Guide to Synchronising and Load Sharing Part2
057-047	DSE Load Share Design and Commissioning Guide
057-284	DSE8660 MKII Operator Manual
057-082	DSE2130 input expansion manual
057-139	DSE2131 input expansion manual
057-140	DSE2133 input expansion manual
057-141	DSE2152 input expansion manual
057-083	DSE2157 input expansion manual
057-084	DSE2548 input expansion manual

1.1.3 OTHER

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. Published by Institute of Electrical and Electronics Engineers Inc

1.1.4 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.**

1.1.5 GLOSSARY OF TERMS

Term	Description
DSE8xxx MKII	All modules in the DSE8xxx MKII range.
DSE8600 MKII, DSE86xx MKII	All modules in the DSE86xx MKII range.
DSE8660 MKII	DSE8660 MKII module/controller
AVR	Automatic Voltage Regulator
CAN	Controller Area Network Vehicle standard to allow digital devices to communicate to one another.
CDMA	Code Division Multiple Access. Cell phone access used in small number of world areas including parts of the USA and Australia.
CT	Current Transformer An electrical device that takes a large AC current and scales it down by a fixed ratio to a smaller scale.
VT	Voltage Transformer Voltage transformer used for High Voltage sensing
BMS	Building Management System A digital/computer based control system for a building's infrastructure.
DEF	Diesel Exhaust Fluid (AdBlue) A liquid used as a consumable in the SCR process to lower nitric oxide and nitrogen dioxide concentration in engine exhaust emissions.
DM1	Diagnostic Message 1 A DTC that is currently active on the engine ECU (ECM).
DM2	Diagnostic Message 2 A DTC that was previously active on the engine ECU (ECM) and has been stored in the ECU's (ECM) internal memory.
DPF	Diesel Particulate Filter A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas.
DPTC	Diesel Particulate Temperature Controlled Filter A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas which is temperature controlled.
DTC	Diagnostic Trouble Code The name for the entire fault code sent by an engine ECU (ECM).
ECU/ECM	Engine Control Unit/Management An electronic device that monitors engine parameters and regulates the fuelling.
FMI	Failure Mode Indicator A part of DTC that indicates the type of failure, e.g. high, low, open circuit etc.
GSM	Global System for Mobile communications. Cell phone technology used in most of the World.

Continued over page…

Term	Description
HEST	High Exhaust System Temperature Initiates when DPF filter is full in conjunction with an extra fuel injector in the exhaust system to burn off accumulated diesel particulate matter or soot.
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
OC	Occurrence Count A part of DTC that indicates the number of times that failure has occurred.
PGN	Parameter Group Number A CANbus address for a set of parameters that relate to the same topic and share the same transmission rate.
PLC	Programmable Logic Controller A programmable digital device used to create logic for a specific purpose.
R.O.C.O.F.	Rate Of Change Of Frequency
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.
SPN	Suspect Parameter Number A part of DTC that indicates what the failure is, e.g. oil pressure, coolant temperature, turbo pressure etc.

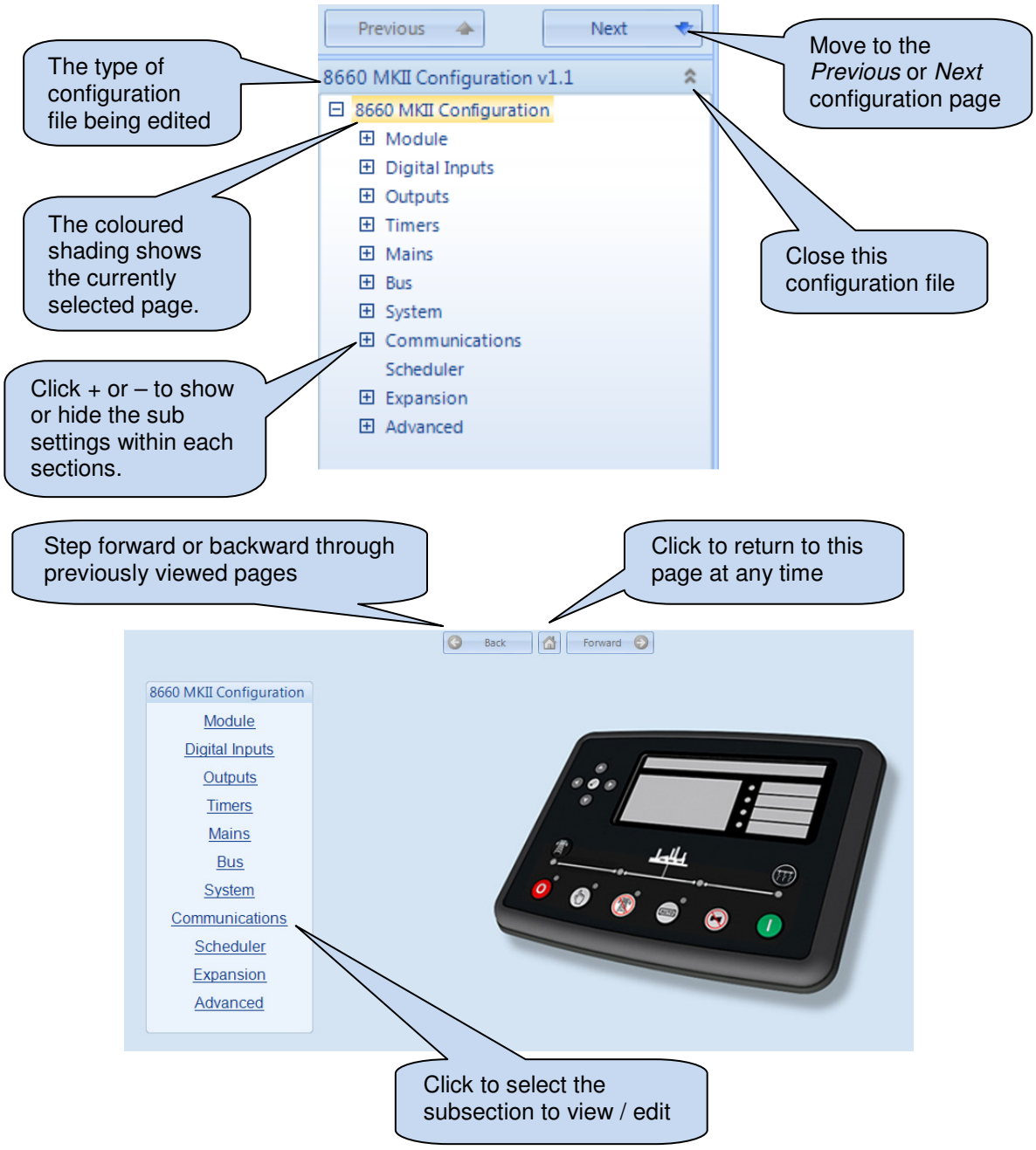
1.2 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

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

2 EDITING THE CONFIGURATION

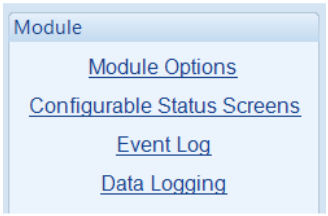
This menu allows the user to edit the configuration, to change the function of Inputs, Outputs and LED's, system timers and level settings to suit a particular application.

2.1 SCREEN LAYOUT

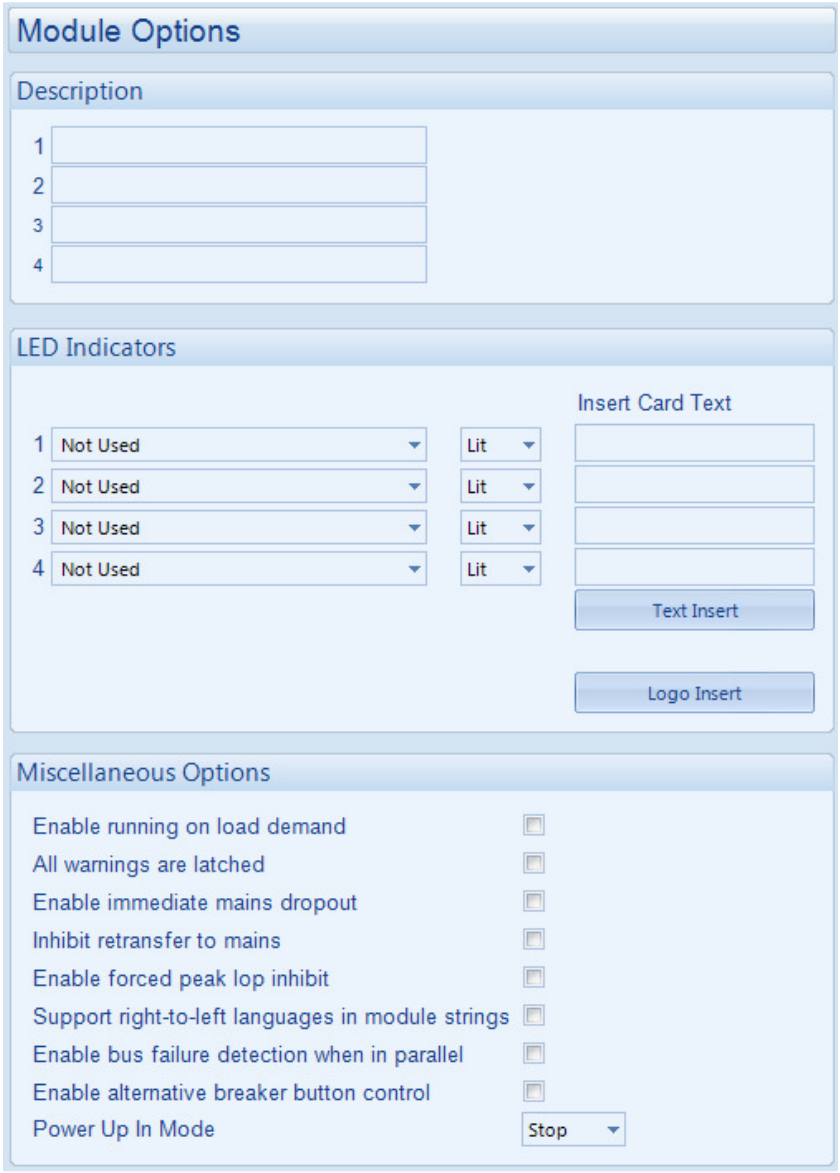


2.2 MODULE

The module section is subdivided into smaller sections.
Select the required section with the mouse.
This section allows the user to change the options related to the module itself.



2.2.1 MODULE OPTIONS



Parameters are detailed overleaf…

2.2.1.1 DESCRIPTION

Parameter	Description
Description	Free entry boxes to allow the user to give the configuration file a description. Typically used to enter the job number, customer name, engineers name etc. This text is not shown on the module display and is only seen in the configuration file.

2.2.1.2 LED INDICATORS

Parameter	Description
Function	Allows the user to select the function of the modules user configurable LED indicators. For details of possible selections, please see section entitled *Output sources* elsewhere in this document.
Insert Card Text	Enter a custom text to print on the text insert
Text Insert	Allows the user to print the text insert cards
Logo Insert	Allows the user to choose and print an image for the logo insert

2.2.1.3 MISCELLANEOUS OPTIONS

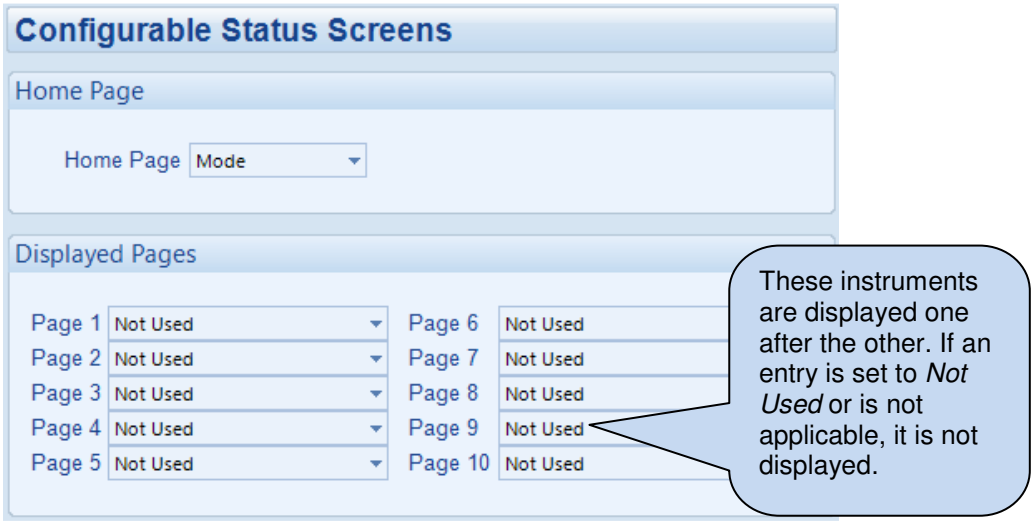
Parameter	Description
Enable running on load demand IEEE 37.2 - 44 Unit sequence starting	☐ = The load demand scheme is not active when the generators are running. ☑ = The load demand start up and shut down scheme is activated when two or more generators are running in parallel.
All warnings are latched	☐ = Normal Operation, the warnings and pre-alarms automatically reset once the triggering condition has cleared. ☑ = Warnings and pre-alarms latch when triggered. Resetting the alarm is performed by either an external reset applied to one of the inputs or, the 'Stop/Reset' pushbutton operated (once the triggering condition has been cleared).
Enable Immediate Mains Dropout	☐ = Normal Operation, in the event of a mains failure the module attempts to maintain the supply to the load for the incoming AC mains supply until the generator is available to go on load. In the event of a generator failure the module does default back to the incoming AC mains supply. This provides a 'fail-safe' system, ensuring that in the event of a system failure the load is still fed from the AC mains supply. ☑ = As soon as the module detects a mains failure the mains contactor or breaker relay is opened to remove the supply from the load. This is to prevent damage to the load in case of a single-phase failure; especially useful if the load is a 3-phase motor or pump. The supply to the load is then fed from the gen-set once it is available. In the event of a generator failure, the module opens the generator relay and remove the supply to the load until either the mains supply is restored or the generator is restarted.
Inhibit Retransfer To Mains IEEE 37.2 - 3 Checking or interlocking relay	☐ = When the mains supply is reinstated after a failure, the re-transfer back to mains takes place. ☑ = This prevents the load being transferred back to the mains supply, even in the event of the generators failing. This is used in peak lopping systems where the cost of using the mains to supply the load is so prohibitive that the customer does not want to transfer back to the mains supply.

Parameters are continued overleaf…

Parameter	Description
Enable Forced Peak Lop Inhibit IEEE 37.2 - 3 Checking or interlocking relay	This function is applicable only to systems with more than one DSE8660 MKII controller. The description below discusses a two controller system, named 1 and 2. ☑ = If the DSE8660 MKII (1) is in *Manual Mode* using the generator sets to peak lop a mains supply and another DSE8660 MKII (2) requests the generators to power its load following a mains failure, the DSE8660 MKII (1) relinquishes the generators to the other DSE8660 MKII (2) ☐ = The DSE8660 MKII (1) continues to use the generator sets regardless of requests by other DSE8660 MKII controllers for usage of the generators. **NOTE: This option only has effect in *Manual Mode*.** **If the DSE8660 MKII using the generators for Peak Lopping is in *Auto Mode*, then requests from another DSE8660 MKII for the generators following a mains failure always is granted and the peak lopping operation is suspended.**
Support Right-To-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 Bus Failure Detection when in Parallel	☐ = The Bus Failure is not detected. ☑ = Monitors the MSC link to check that there are generators on the bus and not a case of the bus is live from the mains.
Enable Alternative Breaker Button Control	Controls the operation of the fascia mounted breaker control buttons (*Manual Mode* only) ☐ = Normal operation. Only a transfer is possible. ☑ = Alternative operation. If a supply is on load and that supply's breaker button is pressed, the breaker opens. Pressing the button again closes the button. Pressing the 'other' button when a supply is on load causes a transfer to the 'other' supply (if available).
Power Up In Mode	Select the mode that the module enters when DC power is applied. Available modes to select from: *Auto, Manual, Stop, Test*.

2.2.2 CONFIGURABLE STATUS SCREENS

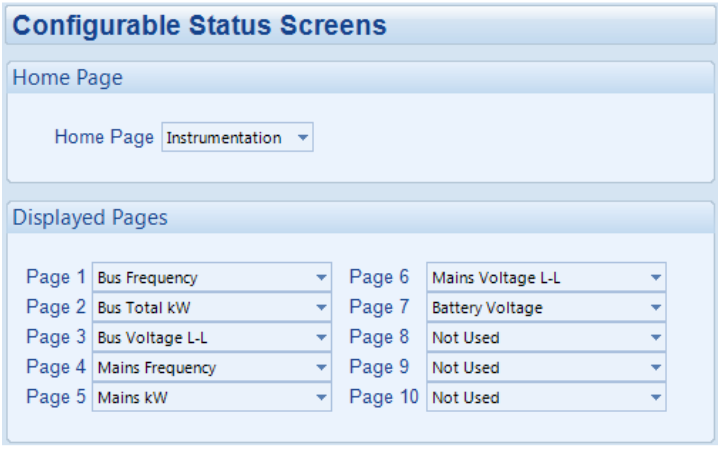
Configurable Status Screens allow the operator to design the default screen to match the requirements of the application.



Setting	Description
Home Page	***Mode:*** When no navigation buttons are pressed for the duration of the *Page* Timer, the module's display reverts back to show the control mode state. ***Instrumentation:*** When no navigation buttons are pressed for the duration of the *Page* Timer, the module's display scrolls through the *Displayed Pages,* the mode page is not displayed automatically but still accessed by manually pressing the navigation buttons.
Displayed Pages	When the *Home Page* is set to *Instrumentation* and no navigation buttons are pressed for the duration of the *Page Timer*, the module's display scrolls through the configured *Displayed Pages*. Each of the configured *Displayed Pages* remains on the display for the duration of the *Scroll Timer*. This is useful when a set of parameters is more important for the operator to constantly monitor.

Example

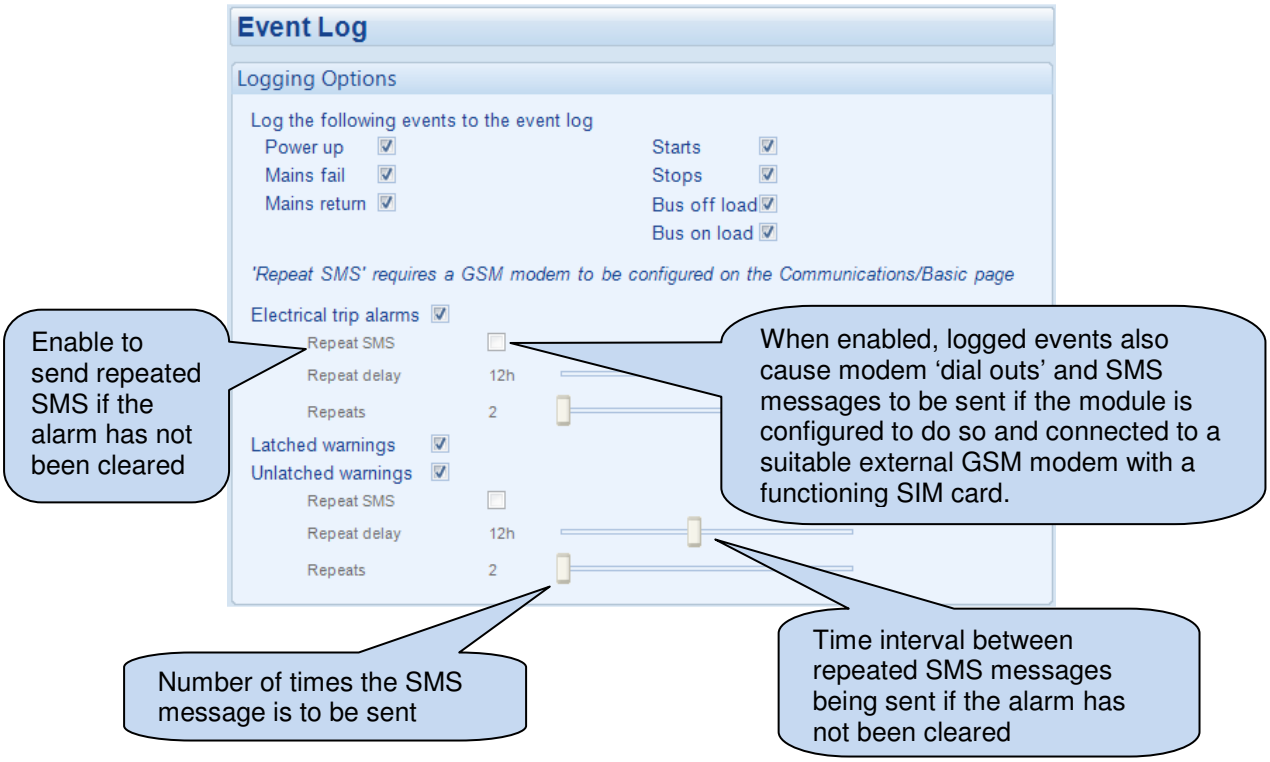
In the example below, the home page is configured to scroll through the configured parameters. Depending on the application, the system designer selects the instrumentation parameters that are most important to constantly show on the module.



2.2.3 EVENT LOG

2.2.3.1 LOGGING OPTIONS

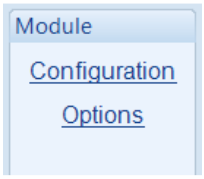
The event log is configured to allow users to select which events are stored.



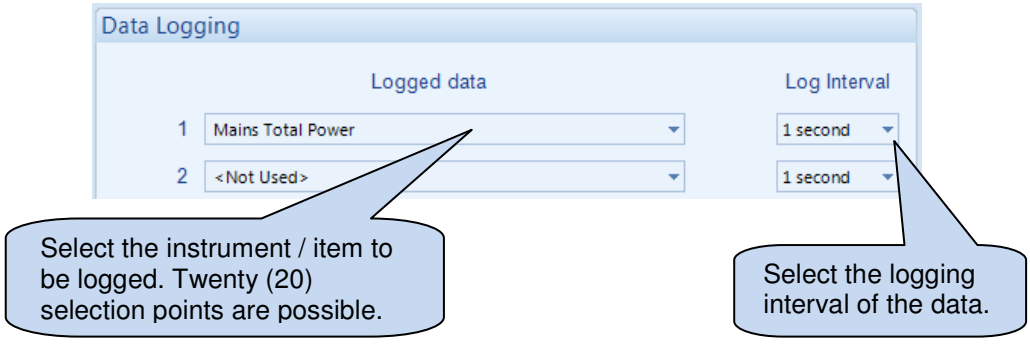
Parameter	Description
Power Up	☐ = Power up events are not logged in the module's event log ☑ = Power up events are logged when the DC Supply is applied to the module or whenever the module is rebooted
Mains Fail	☐ = Mains fail events are not logged in the module's event log ☑ = Mains fail events are logged when the mains source fails
Mains Return	☐ = Mains return events are not logged in the module's event log ☑ = Mains return events are logged when the mains source is back
Starts	☐ = Starts events are not logged in the module's event log ☑ = Starts events are logged when a set starts
Stops	☐ = Stops events are not logged in the module's event log ☑ = Stops events are logged when a set is stopped
Bus Off Load	☐ = Bus Off Load events are not logged in the module's event log ☑ = Bus Off Load events are logged when a set or more is running in Off Load mode
Bus On Load	☐ = Bus On Load events are not logged in the module's event log ☑ = Bus On Load events are logged when a set or more is running in On Load mode
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

2.2.4 DATA LOGGING

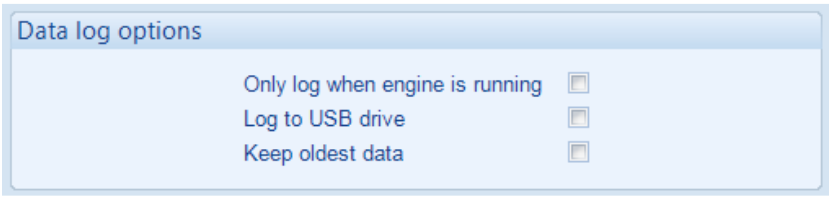
The Data Logging page is subdivided into smaller sections.
Select the required section with the mouse.



2.2.4.1 CONFIGURATION



2.2.4.2 OPTIONS

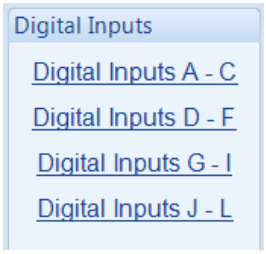


Setting	Description
Only Log When Engine Is Running	☐ = The module logs data regardless of engine running state. ☑ = The module only logs data when the engine is running.
Log to USB drive	☐ = The module logs data to the modules internal memory. ☑ = The module logs data to an external USB device connect to the USB host socket on the module.
Keep Oldest Data	☐ = When the logging memory is full, the module overwrites the oldest data first with the new data. ☑ = When the logging memory is full, the module stops recording new data.

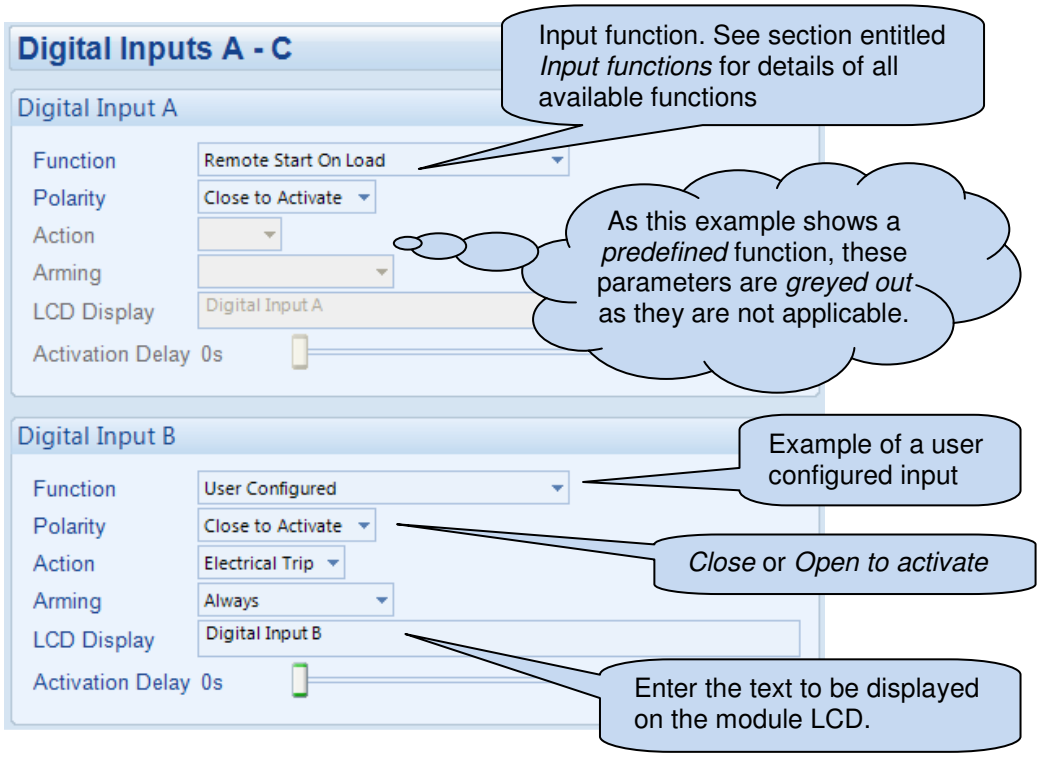
2.3 INPUTS

2.3.1 DIGITAL INPUT CONFIGURATION

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



2.3.1.1 DIGITAL INPUTS



Parameters are detailed overleaf**...**

Parameter	Description
Function	Select the input function to activate when the relevant terminal is energised. See section entitled *Input functions* for details of all available functions
Polarity	Select the digital input polarity: ***Close to Activate:*** the input function is activated when the relevant terminal is connected. ***Open to Activate:*** the input function is activated when the relevant terminal is disconnected.
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Arming	Select when the input becomes active: ***Active From Parallel:*** The input state is only monitored when mains and bus are in parallel ***Always:*** The input state is always monitored ***Never:*** The input is disabled
Activation Delay	This is used to give a delay on acceptance of the input. Useful for liquid level switches or to mask short term operations of the external switch device.

2.3.2 INPUT FUNCTIONS

Where a digital input is NOT configured as “user configured”, a selection is made from a list of predefined functions. The selections are as follows:

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
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 the generator.
Alternative Language Select	This input is used to instruct the module to display the alternative Language instead of the default module display language.
Auto Restore Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	In the event of a remote start/mains failure, the generator is instructed to start and take load. On removal of the remote start signal/mains return the module continues to run the generator 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 mains 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 the generator in the event of a remote start/mains out of limits condition occurring. If this input is active and a remote start signal/mains failure occurs the module does not give a start command to the generator. If this input signal is then removed, the controller operates as if a remote start/mains failure has occurred, starting and loading the generator. This function is used to give an **‘AND’** function so that a generator is only called to start if the mains fails and another condition exists which requires the generator to run. If the ‘Auto start Inhibit’ signal becomes active once more it is ignored until the module has returned the mains supply on load and shutdown. This input does not prevent starting of the engine in *Manual* or *Test Modes*.
Auxiliary Mains 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 mains supply or some aspect of the incoming mains 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 mains supply has fallen outside of limits, the generator is instructed to start and take the load. Removal of the input signal causes the module to act if the mains has returned to within limits providing that the mains sensing also indicates that the mains is within limits.
Bus Closed Auxiliary IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide feedback to allow the DSE8660 MKII to give true indication of the contactor or circuit breaker switching status. It should be connected to the generator bus load switching device auxiliary contact.

Function	Description
Bus Load Inhibit IEEE 37.2 - 3 Checking or interlocking relay	This input is used to prevent the DSE8660 MKII from loading the generator bus. If the generator is already on load, activating this input causes the DSE8660 MKII to unload the generator bus. Removing the input allows the bus to be loaded again. **NOTE: This input only operates to control the generator bus load switching device if the DSE8660 MKII load switching logic is attempting to load the generator. It does not control the generator-switching device when the mains supply is on load.**
Clear Mains Decoupling Alarms	This input is used to reset the module following a Mains Decoupling Alarm (ROCOF, vector shift, Mains Voltage Alarm, Mains Frequency Alarm). The input must switch from inactive to active to reset the trip, it is not to be left permanently active.
EJP1	For the French EJP (Effacement Jours de Pointe) tariff system. This input is functionally identical to *Remote Start Off Load.* When this input is active, operation is similar to the 'Remote Start on load' function except that the generator is not instructed to take the load. This function is also used where an engine only run is required e.g. for exercise.
EJP2	For the French EJP (Effacement Jours de Pointe) tariff system. This input is functionally identical to *Remote Start On Load.* In *Auto Mode*, the module performs the start sequence and transfers load to the generator. In *Manual Mode*, the load is transferred to the generator if the engine is already running, however in *Manual Mode*, this input does not generate start/stop requests of the engine.
External Panel Lock	**NOTE: External control sources (i.e. Simulate Start Button) are not affected by the external panel lock input and continue to operate normally.** This input is used to provide security to the installation. When 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*).
Inhibit Retransfer To Mains IEEE 37.2 - 3 Checking Or Interlocking Relay	When active, this input prevents the load being transferred back to the mains supply, even in the event of the generators failing. This is used in peak lopping systems where the cost of using the mains to supply the load is so prohibitive that the customer does not want to transfer back to the mains supply.
Inhibit Scheduled Run IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide a mean of disabling a scheduled run.
Inhibit SMS Remote Start	This input is used to provide a means of disabling remote starts by SMS
Keep Control Of 8610s	This input is used to keep control over the DSE8610 MKII modules and not let another DSE8660 MKII or 8680 have control.
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 LEDs illuminate.

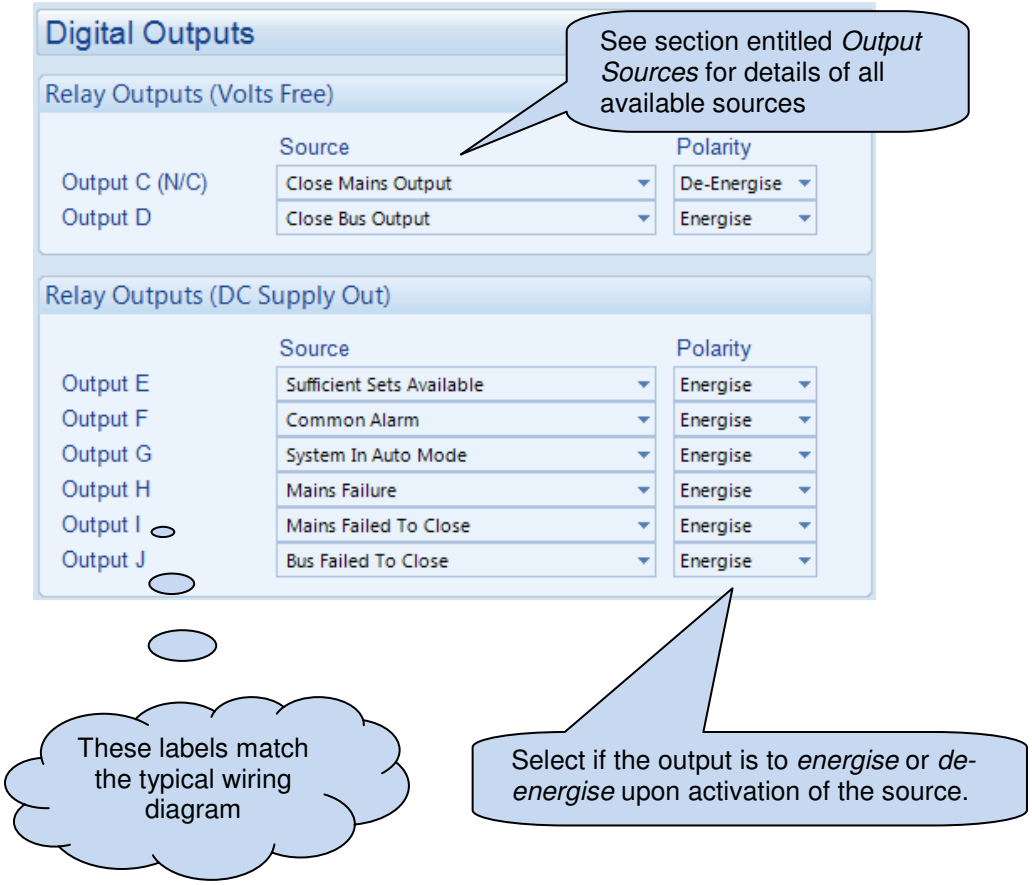
Function	Description
Mains Closed Auxiliary IEEE 37.2 - 3 Checking or interlocking relay	This input is used to provide feedback to allow the DSE8600 to give true indication of the contactor or circuit breaker switching status. It should be connected to the mains load switching device auxiliary contact. Incorrect application of this signal does not trigger an alarm condition, it is used solely for indication of the breaker status.
Mains Load Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to prevent the DSE8600 from loading the mains supply. If the mains supply is already on load activating this input causes the DSE8600 to unload the mains supply. Removing the input allows the mains to be loaded again. **NOTE: This input only operates to control the mains switching device if the DSE8600 load switching logic is attempting to load the mains. It does <u>not</u> control the mains switching device when the generator is on load.**
Manual Restore Contact	This input is used to manually allow back-sync to the mains without removing the *Auto-Restore Inhibit* input.
MSC Alarms Inhibit	**NOTE: For further details on MSC alarms, refer to the DSE Guide to Synchronising and Load Sharing.** This input is used to prevent MSC alarms. It is particularly useful when a set is being removed from duty for maintenance.
Paralleling Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to prevent the generator from running in parallel with the Bus/Mains supply. This is used on the DSE8660 MKII modules to prevent the generator and mains from being paralleled and force a clean break transfer. If the input becomes active while in parallel then the transfer is completed and paralleling ends.
Remote Start Dead Bus Synchronising	**NOTE: For further details, please refer to the section titled Dead Bus Synchronising elsewhere in this document.** When Dead Bus Synchronising is configured, this input is used to start the set in Dead Bus Synchronising scheme.
Remote Start In Island Mode	When in *Auto Mode*, the module performs the start sequence and transfer the load to the generator. The mains breaker is left open and the generator(s) is (are) to run in island mode. In *Manual Mode*, the load is transferred to the generator if the engine is already running, however in *Manual Mode*; this input does not generate start/stop requests of the engine.
Remote Start Off Load	If this input is active, operation is similar to the 'Remote Start on load' function except that the generator 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 transfer load to the generator. In *Manual Mode*, the load is transferred to the generator if the engine is already running, however in *Manual Mode*, this input does not generate start/stop requests of the engine.

Function	Description
Simulate Auto Button	**NOTE: If a call to start is present when *Auto Mode* is entered, the starting sequence begins. Call to Start comes from a number of sources depending upon module type and configuration and includes (but is not limited to) : Remote start input present, Mains failure, Scheduled run, Auxiliary mains failure input present, Telemetry start signal from remote locations.** This input mimic's the operation of the 'Auto' button and is used to provide a remotely located *Auto Mode* push button.
Simulate Lamp Test / Alarm Mute Button	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. The input also serves a second function, in that it also provides a mute signal to silence the audible alarm. The input is recognised by the module as though it was the Push button on the module itself being operated.
Simulate Mains 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 mains supply.
Simulate Manual Button	This input mimic's the operation of the 'Manual' button and is used to provide a remotely located *Manual Mode* push button.
Simulate Start Button	This input mimic's the operation of the 'Start' button and is used to provide a remotely located start push button.
Simulate Stop Button	This input mimic's the operation of the 'Stop' button and is used to provide a remotely located stop/reset push button.
Simulate Test On Load Button	This input mimics the operation of the 'Test' button and is used to provide a remotely located Test on load mode push button.
Stop and Panel Lock	Combined function input that instructs the module to enter *Stop Mode* and also perform the *Panel Lock* function. Once the input is active, the module does not respond to operation of the mode select or start buttons. 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*).
Transfer To Bus / Open Mains IEEE 37.2 - 52 AC Circuit Breaker	This input is used to transfer the load to the bus when running in *Manual Mode.* Once synchronised the bus/mains are paralleled. The second press of the button (or expiry of the parallel run timer) then causes the bus to take full load and open the mains contactor.
Transfer to Mains / Open Bus IEEE 37.2 - 52 AC Circuit Breaker	This input is used to transfer the load to the mains supply when running in *Manual Mode* or provide the 'Open Generator' signal in a non AMF Module.)

2.4 OUTPUTS

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

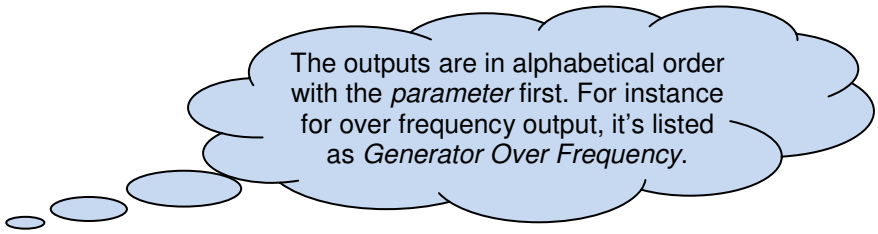
2.4.1 DIGITAL OUTPUTS



2.4.1.1 OUTPUT SOURCES

The list of output sources available for configuration of the module digital outputs are configured by typing in the output source or by using the drop down menu.

Under the scope of IEEE 37.2, *function numbers is also used to represent functions in microprocessor devices and software programs*. Where the DSE output functions is 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)	
8660 Controls 8610s	Active when the DSE8660 MKII module is currently in control of the generator sets (controlled by the DSE8610 MKII controller(s))	
Alarm Mute	Active when the configured *Alarm Mute* digital input is active	
Alarm Reset	Active when the configured *Alarm Reset* digital input is active	
Alternative Language Selected	Active when the configured *Alternative Language Select* digital input is active	
Audible Alarm IEEE 37.2 – 74 Alarm Relay	Use this output to activate an external sounder or external alarm indicator. Operation of the Mute pushbutton resets this output once activated	Inactive if no alarm condition is active or if the Mute pushbutton was pressed
Auto Restore Inhibit	Active when the *Auto Restore Inhibit* digital input is active.	
Auto Start Inhibit	Active when the *Auto-Start Inhibit* function is active	
Auxiliary Mains Failure	Active when the *Auxiliary Mains Fail* input function is active	
Battery High Voltage IEEE 37.2 – 59 DC Overvoltage 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 Undervoltage Relay	This output indicates that a Battery Under Voltage alarm has occurred.	Inactive when battery voltage is not Low
Bus And Mains In Parallel	This output is active whenever the bus and mains are in parallel.	
Bus Asymmetry High IEEE 37.2 – 59 Overvoltage Relay	Active when the Bus Asymmetry Alarm is active	
Bus Closed Auxiliary	Active when the *Bus closed auxiliary* input is active	
Bus Failed To Close IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the Bus contactor or breaker. It is only used if the module is configured to use 'Bus Closed Auxiliary' feedback.	
Bus Failed To Open IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the Bus contactor or breaker. It is only used if the module is configured to use 'Bus Closed Auxiliary' feedback.	
Bus Live	This output indicates that a voltage has been detected on the bus. Once the voltage on the bus is detected above the "Dead bus relay setting", it is no longer considered a 'dead-bus' and the generator needs to synchronise in order to get onto the bus.	

Output Source	Activates…	Is Not Active….
Bus Negative Sequence Voltage High IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the Bus Negative Sequence Voltage Alarm is active	
Bus Not Live	This output indicates that the generator bus remains 'dead' after closing the generator load breaker.	
Bus Phase Rotation Alarm	This output indicates that the module has detected a phase sequence error on the bus.	
Bus Positive Sequence Voltage Low IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the Bus Positive Sequence Alarm is active	
Bus Zero Sequence Voltage High IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the Bus Zero Sequence Alarm is active	
Calling For Scheduled Run	Active during a *Scheduled Run* request from the inbuilt *Scheduler*.	
Check Sync IEEE 37.2 – 25 Synchronising Or Synchronising Check Relay	Indicates that the internal check synchroscope has determined that the supplies are in sync.	
Clear Mains Decoupling	Active when the *Clear Mains Decoupling Alarms* digital input is active.	
Close Bus Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the 8600 module selects the bus to be on load this control source is active.	Inactive whenever the bus is not required to be on load
Close Bus Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8600 module selects the bus 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 Mains Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8600 module selects the mains to be on load this control source is active.	The output is inactive whenever the mains is not required to be on load
Close Mains Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8600 module selects the mains to be on load this control source is active for the duration of the Breaker Close Pulse timer, after which it becomes inactive again.	
Closed To Mains State	Active when the status of the mains breaker is closed.	
Combined Mains Failure	Active when the mains supply is out of limits OR the input for Auxiliary Mains Failure is active	
Combined Remote Start Request	Indicates that a remote start request is 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 Mains Decoupling Alarm	Indicates 1 or more of the decoupling alarm have activated	

Output Source	Activates…	Is Not Active….
Common Warning	Active when one or more *Warning* alarms are active	The output is inactive when no warning alarms are present
Data Logging Active	Active when data is being logged	Inactive when: • Data logging is disabled • The engine is at rest and the option *Only Log When Engine Is Running* is enabled • The internal memory of the module becomes full and the option *Keep Oldest Data* is enabled
DC Power On	Active when DC power is supplied to the module	
Dead Bus Synchronise Enabled	Active when Dead Bus Synchronising is enabled.	
Dead Bus Synchronise In Progress	Active when the set is running dead bus synchronising.	
Digital Input A, B, C, D, E, F, G H, I, J, K & L	Active when the relevant digital input is active	
EJP1 / EJP2	Active when an input configured for *EJP1* or *EJP2* is active	
Fail to Synchronise IEEE 37.2 - 48 Incomplete Sequence Relay	Becomes active if the module fails to synchronise after the *fail to sync* timer.	
Inhibit Retransfer To Mains	Indicates when mains fails,Gens fails and mains not enough capacity to take load inhibit retransfer.	
Inhibit Scheduled run	Active when the Inhibit Scheduled run input is active	
Inhibit SMS Start	Active when the input Inhibit SMS Start input is active	
Insufficient Capacity Available	Indicates that during parallel operation, it has been determined that the set(s) is(are) not capable of providing the power that they have been configured to deliver.	
Interlock Override	Comes on just before and just after the gen-set goes into parallel enabling an output for a mechanical or electrical interlock	
Keep Control Of 8610s	Output active when an input is set for keep control of 8610's and the unit has control of the token.	
Lamp Test	Active when the lamp test is activated by a digital input or by pressing the *Mute/Lamp Test* control button	
Mains Asymmetry High IEEE 37.2 – 59 Overvoltage Relay	Active when the Mains Asymmetry Alarm is active	
Mains Closed Aux	Active when the *Mains closed auxiliary* input is active	
Mains Decoupling High Frequency	This output indicates that the mains decoupling high frequency alarm has been triggered.	
Mains Decoupling High Voltage	This output indicates that the mains decoupling high voltage alarm has been triggered.	
Mains Decoupling Low Frequency	This output indicates that the mains decoupling low frequency alarm has been triggered.	
Mains Decoupling Low Voltage	This output indicates that the mains decoupling low voltage alarm has been triggered.	
Mains Failed To Close	This output indicates the mains breaker failed to close	
Mains Failed To Open	This output indicates the mains breaker failed to open	
Mains Failure IEEE 37.2 - 81 Frequency Relay IEEE 37.2 – 27AC Under Voltage Relay IEEE 37.2 – 59AC Over Voltage Relay	The output indicates that one or more of the module's sources of determining mains failure is active. The output is inactive when the mains supply is healthy	

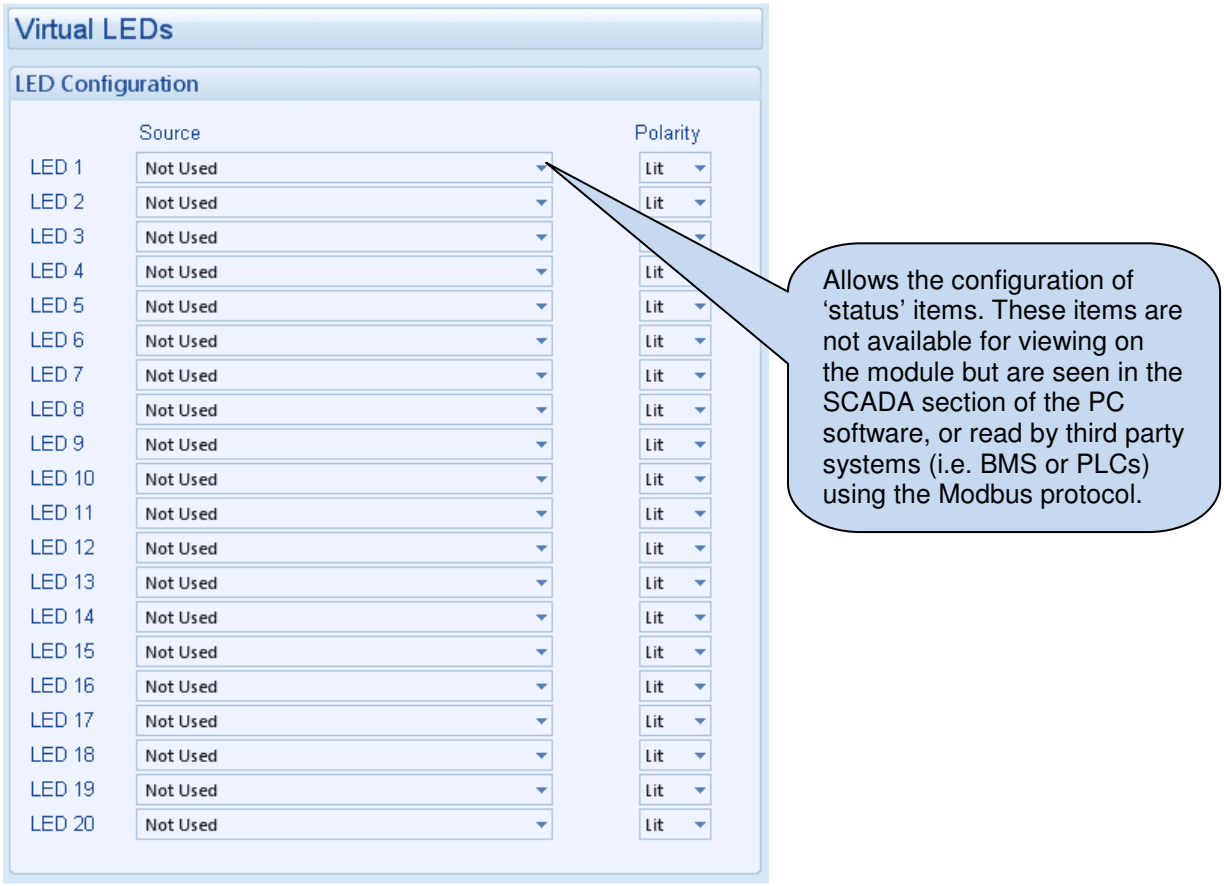
Output Source	Activates…	Is Not Active….
Mains High Frequency IEEE 37.2 - 81 Frequency Relay	Active when the mains frequency exceeds the *High Frequency* setting	
Mains High Voltage IEEE 37.2 – 59AC Overvoltage Relay	Active when the mains voltage exceeds the *High Voltage* setting	
Mains Load Inhibited	Active when the *Mains Load Inhibit* digital input is active	
Mains Low Frequency IEEE 37.2 - 81 Frequency Relay	Active when the mains frequency falls below the *Low Frequency* setting	
Mains Low Voltage IEEE 37.2 – 27AC Under Voltage Relay	Active when the mains voltage falls below the *Low Voltage* setting	
Mains Negative Sequence Voltage High IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the Mains Negative Sequence Voltage Alarm is active	
Mains Phase Rotation Alarm IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the mains phase rotation alarm is active	
Mains Positive Sequence Voltage Low IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the Mains Positive Sequence Alarm is active	
Mains ROCOF	Indicates that the ROCOF protection (when in parallel with mains) has triggered.	
Mains Vector Shift	Indicates that the Vector Shift protection (when in parallel with mains) has triggered.	
Mains Zero Sequence Voltage High IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the Mains Zero Sequence Alarm is active	
Minimum Sets Not Reached	Indicates that the number of sets connected on the MultiSet Comms (MSC) Link is lower than the *Minimum sets required* setting	
MSC Data Error	Indicates bad data transfer in the MultiSet Comms (MSC) Link	
MSC Failure	Active when the *MSC Failure* alarm is active	
MSC ID Error	Active when the *MSC ID Error* alarm is active	
MSC Too Few Sets	Indicates that the number of sets connected on the MultiSet Comms (MSC) Link is lower than the *Minimum sets required* setting.	
Mute / Lamp test button pressed	This output indicates that the alarm mute / Lamp test push button is being operated. Once the button is released, the output becomes inactive.	
No Loading Command	This output indicates that the module is not calling for the generator load switch to be closed. When the module closes the generator load switch, this output becomes inactive.	
Open Bus Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8660 MKII module selects the bus to be off load this control source is active.	Inactive whenever the bus is required to be on load
Open Bus Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8600 module selects the bus to be off load this control source is active for the duration of the Breaker Open Pulse timer, after which it becomes inactive again.	

Output Source	Activates…	Is Not Active….
Open Mains Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8660 MKII module selects the mains to be off load this control source is active.	The output is inactive whenever the mains is required to be on load
Open Mains Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8660 MKII module selects the mains to be off load this control source is active for the duration of the Breaker Open Pulse timer, after which it becomes inactive again.	
Out of Sync	Indicates that the *out of sync* alarm has been triggered.	
Out of Sync Bus	Indicates that the Bus supply were out of limits and *Out of Sync* alarm was triggered when both supply breakers were closed.	
Out of Sync Mains	Indicates that the Mains supply was out of limits and *Out of Sync* alarm was triggered when both supply breakers were closed.	
Panel locked	This output indicates that the module '*Panel Lock*' is active. If the 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 barred while system lock is active*).	
Panel locked by digital input	This output indicates that a digital input that has been configured as '*Panel Lock*' is active. If the 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 barred while system lock is active*). Refer to the '*Edit Inputs*' section of this manual for details.	
Panel locked by telemetry	This output indicates that remote '*Panel Lock*' via telemetry is active. If the Panel lock is active, the module does not respond to operation of the Mode select or start buttons. This allows the module to be controller remotely without local interference. The operation of the module is not affected and the local operator is still able to view the various instrumentation pages etc. (*Front panel configuration access is barred while system lock is active*).	
Parallel Inhibit	Active when the *Parallel Inhibit* digital input is active.	
PLC Output Flag 1-100	Active when the *PLC Flag* is active	
Remote Control 1-10	A series of output sources that are controlled by remote control in the SCADA section of the software, used to control external circuits.	
Remote Start From Digital Input	Active when any configured *Remote Start* digital input is active.	
Remote Start In Island Mode	This output indicates that a digital input that has been configured as '*Remote Start in island mode*' is active. This output could be used to pass the start signal on to elsewhere in the control system.	
Remote start Off Load	Active when the *Remote Start Off Load* input is active	
Remote Start OnLoad	Active when the *Remote Start On Load* input is active	
Remote Start Over MSC	Indicates that the controller has received a remote start on load signal from the 8860 via the MSC link.	
Return delay in progress	This output source is active to indicate that the return timer is running.	
Simulate Auto Button	Active when the *Simulate Auto Button* digital input is active	
Simulate Mains Available	Active when the *Simulate Mains Available* digital input is active.	
Simulate Start Button	Active when a digital input configured to *Simulate Start Button* is active	

Output Source	Activates… Is Not Active….
Simulate Stop Button	Active when the *Simulate Stop Button* digital input is active
Simulate Test On Load Button	Active when the *Simulate Test On Load Button* digital input is active.
Simulate Transfer To Generator Button	Active when the *Simulate Transfer To Generator Button* digital input is active.
Simulate Transfer To Mains Button	Active when the *Simulate Transfer To Mains Button* digital input is active.
SMS Remote Start In Island Mode	Indicates that a remote start in island mode request was received by SMS
SMS Remote Start Off Load	Active when the set receives an SMS message to start and run off load
SMS Remote Start On Load	Active when the set receives an SMS message to start and run load
Stop and Panel lock	Active when the *Stop And Panel Lock* digital input is active
Stop Button Pressed	This output indicates that the stop pushbutton is being operated. Once the button is released, the output becomes inactive.
Sufficient Sets Available	This output indicates that there are sufficient sets available on the bus.
Synching Enabled	This output indicates that the synchronisation feature has been enabled.
System healthy	This output indicates that the module is in *Auto Mode* and there are no alarms present.
System in Auto Mode	Active when *Auto Mode* is selected
System in Manual Mode	Active when *Manual Mode* is selected
System in Stop Mode	Active when *Stop Mode* is selected
System in Test Mode	Active when the module is in *Test Mode*.
Telemetry Active	Active when the communication port is live and for a short time after transmission stops. Used as a relay or LED source.
Telemetry Data Active	Active when data is being transmitted. This output changes continuously state (flash) upon data transfer. Normally used as an LED source rather than a relay source as the signal flashes repeatedly. For a similar source more suited to drive a relay, see *Telemetry Active*.
Telemetry Start in Auto Mode	Active when a start request is received via telemetry.
Trip Bus in Parallel	This output indicates that the DSE8660 MKII has been forced to remove the generators from its load to pass control of the generators over to another DSE8660 MKII that has detected a mains failure. This only occurs if the *Enable forced 'peak lop inhibit'* has been selected on the 'misc' tab.
Waiting For Manual Restore IEEE 37.2 – 3 Checking or Interlocking Relay	Becomes active when the generator is on load and the mains 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 mains supply.

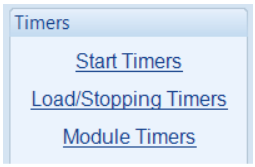
2.4.2 VIRTUAL LEDS

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

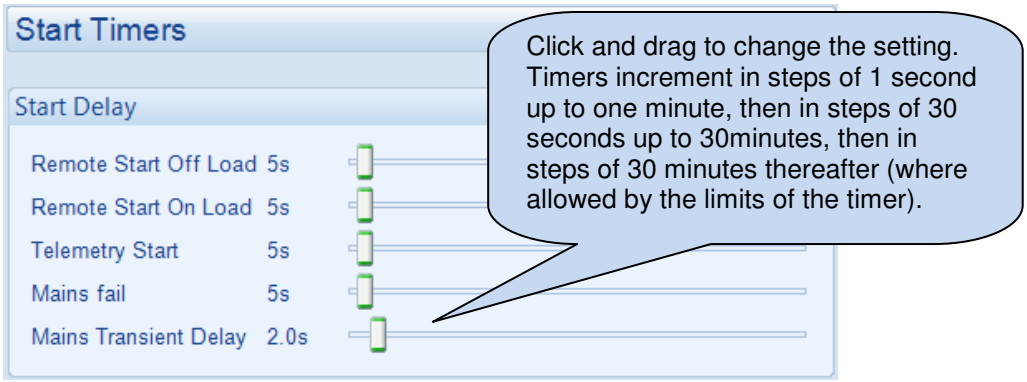


2.5 TIMERS

Many timers are associated with alarms. Where this occurs, the timer for the alarm is located on the same page as the alarm setting. Timers not associated with an alarm are located on the timers page. The *Timers* page is subdivided into smaller sections. Select the required section with the mouse.

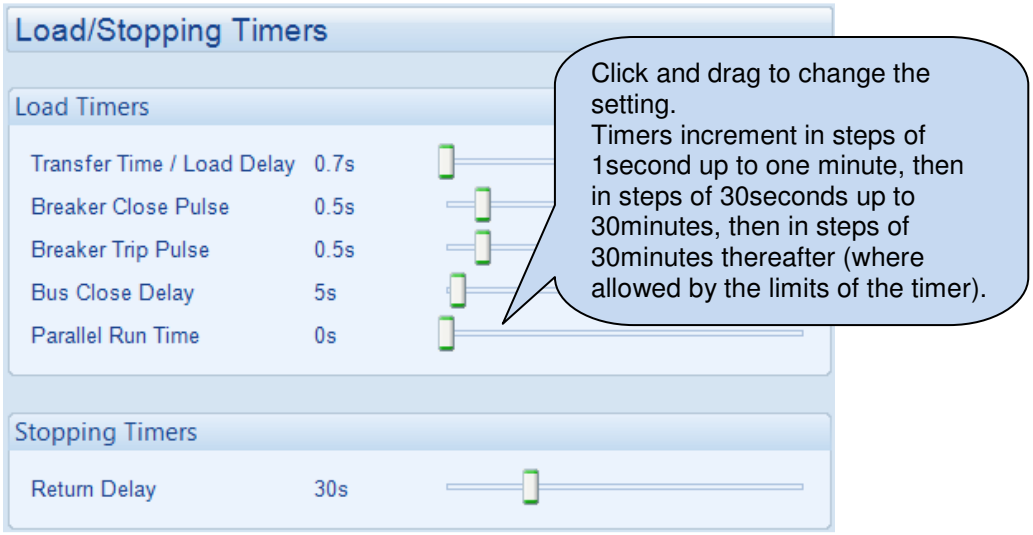


2.5.1 START TIMERS



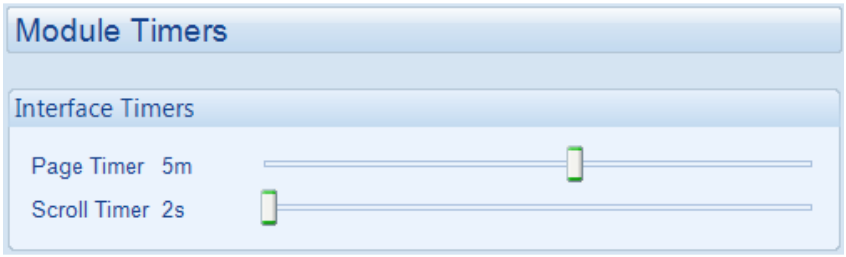
Timer	Description
Remote Start Off Load	The amount of time delay before starting the generators in *Auto Mode*. This timer is activated upon the *Remote Start Off Load* command being issued. Typically this timer is applied to prevent starting upon fleeting start signals.
Remote Start On Load	The amount of time delay before starting the generators in *Auto Mode*. This timer is activated upon the *Remote Start On Load* command being issued. Typically this timer is applied to prevent starting upon fleeting start signals.
Telemetry Start	The amount of time delay before starting the generators in *Auto Mode*. This timer is activated upon a *Remote Start* command being received from a Modbus master. Typically this timer is applied to prevent starting upon fleeting start signals.
Mains Fail	The amount of time delay before starting the generators in *Auto Mode*. This timer is activated upon a mains failure. Typically this timer is applied to prevent starting upon short term mains failure.
Mains Transient Delay	Used to delay the detection of mains failure. This is normally used to prevent short term transients or *brownout* conditions from being classified as a Mains Failure and opening the breaker.

2.5.2 LOAD / STOPPING TIMERS



Timer	Description
Transfer Time / Load Delay	The time between one load switch opening and the other closing. Used during transfer to and from the bus.
Breaker Close Pulse	The amount of time that *Breaker Close Pulse* signal is present when the request to close the load switch is given.
Breaker Trip Pulse	The amount of time that *Breaker Open Pulse* signal is present when the request to open the load switch is given.
Bus Close Delay	When a Mains Failure happens the delay time before the bus breaker closes. This is used to allow the bus voltage/frequency to stabilise before taking load.
Parallel Run Time	This timer dictates how long the generator(s) runs in parallel with the mains supply before ramping down.
Return Delay	A delay, used in *Auto Mode* (AUTO) only, that allows a short term removal of the request to stop the set before action is taken. This is usually used to ensure the set remains on load before accepting that the remote start request has been removed.

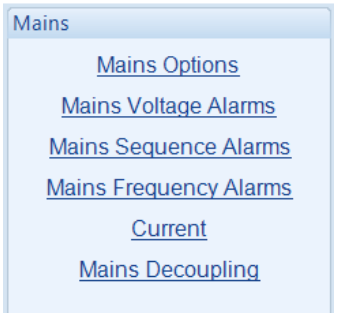
2.5.3 MODULE TIMERS



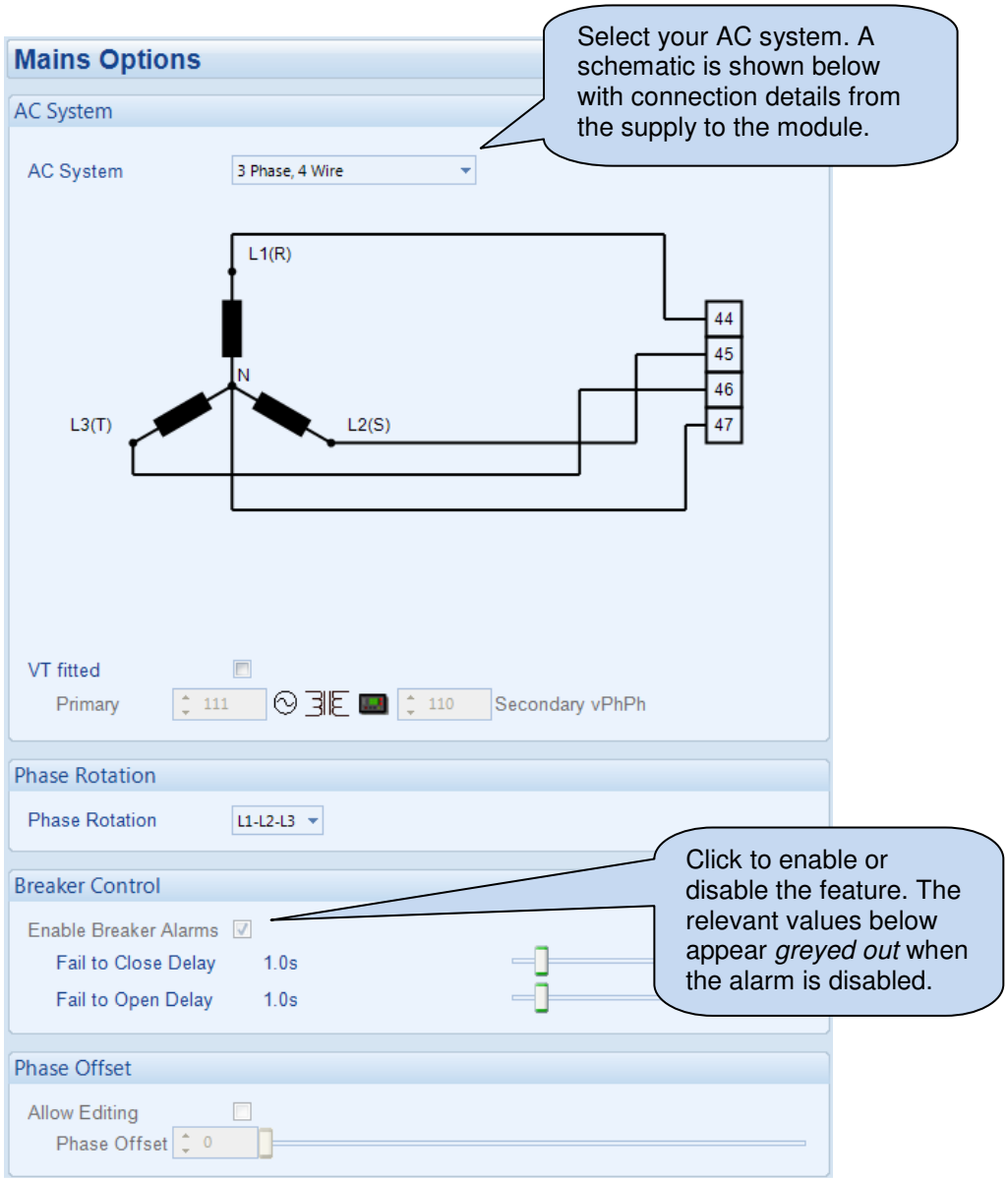
Timer	Description
LCD Page timer	If the module is left unattended for the duration of the *LCD Page Timer* it reverts to show the *Status* page.
LCD Scroll Timer	The scroll time between parameters on a selected page

2.6 MAINS

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



2.6.1 MAINS OPTIONS



These parameters are described overleaf...

Parameter	Description
AC System	**NOTE: For further information on the wiring for the different topologies, please refer to DSE Publication: 057-284 DSE8660 MKII Operator manual.** Select the AC system topology from the list: ***2 Phase, 3 Wire L1 - L2*** ***2 Phase, 3 Wire L1 – L3*** ***3 Phase, 3 Wire*** ***3 Phase, 4 Wire*** ***3 Phase, 4 Wire Delta L1-N-L2*** ***3 Phase, 4 Wire Delta L1-N-L3*** ***3 Phase, 4 Wire Delta L2-N-L3*** ***Single Phase, 2 Wire*** ***Single Phase, 3 Wire L1 – L2*** ***Single Phase, 3 Wire L1 – L3***
VT Fitted	☐ = The voltage sensing to the controller is direct from the mains supply ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the mains voltage to be within the controller voltage specifications. 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).

2.6.1.1 MAINS PHASE ROTATION

Parameter	Description
Mains Phase Rotation IEEE 37.2 – 47 Phase Sequence Relay	☐ = Mains phase rotation is not checked. ☑ = An electrical trip alarm is generated when the measured phase rotation is not as configured.

2.6.1.2 BREAKER CONTROL

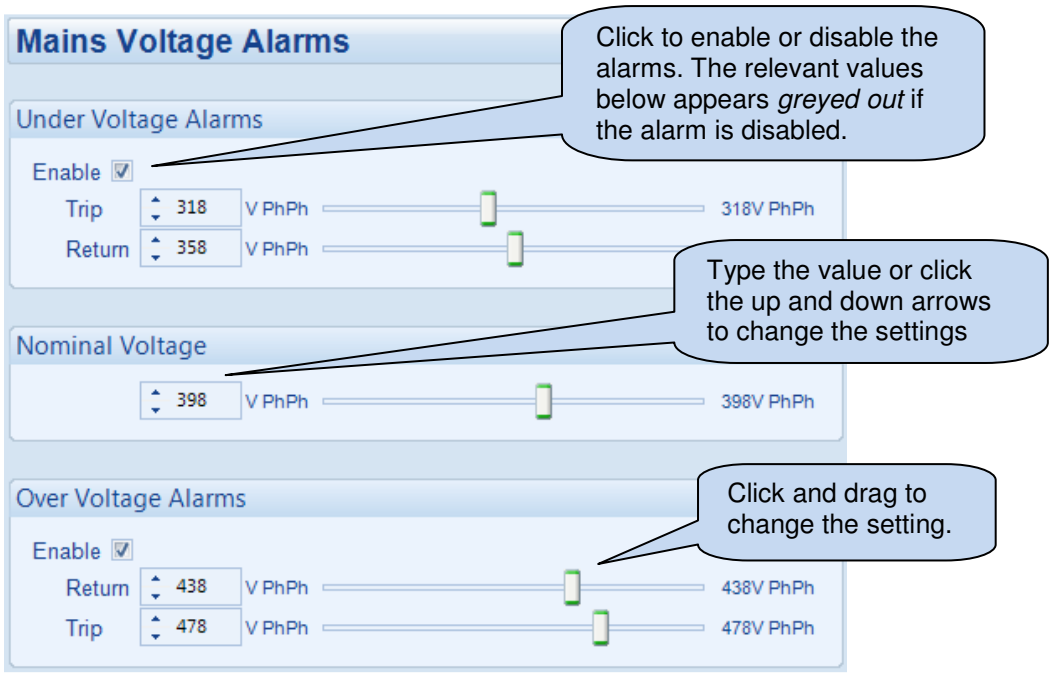
Parameter	Description
Enable Breaker Alarms	☐ = Alarm is disabled ☑ = The *Mains Breaker Alarms* are enabled.
Fail To Close Delay	When the *Close Mains* output is activated, if the configured *Mains Closed Auxiliary* digital input does not become active within the *Mains Fail To Close Delay* timer, the alarm is activated
Fail To Open Delay	When the *Open Mains* output is activated, if the configured *Mains Closed Auxiliary* digital input does not become inactive within the *Mains Fail To Open Delay* timer, the alarm is activated

2.6.1.3 PHASE OFFSET

This parameter is greyed out if *VT Fitted* is not enabled.

Parameter	Description
Allow Editing	☐ = *Phase Offset* disabled ☑ = The *Phase Offset* is enabled.
Phase Offset	Set the phase angle between the VT primary and secondary

2.6.2 MAINS VOLTAGE



2.6.2.1 UNDER VOLTAGE ALARMS

Parameter	Description
Mains Under Voltage Alarm IEEE 37.2 - 27AC Undervoltage Relay	☐ = Mains Under Volts does NOT give an alarm ☑ = The module detects a Mains Failure when the mains supply voltage falls below the configured *Under Volts Alarm Trip* value for longer than the *Mains Transient Delay*. The *Undervolts Alarm Trip* value is adjustable to suit user requirements.

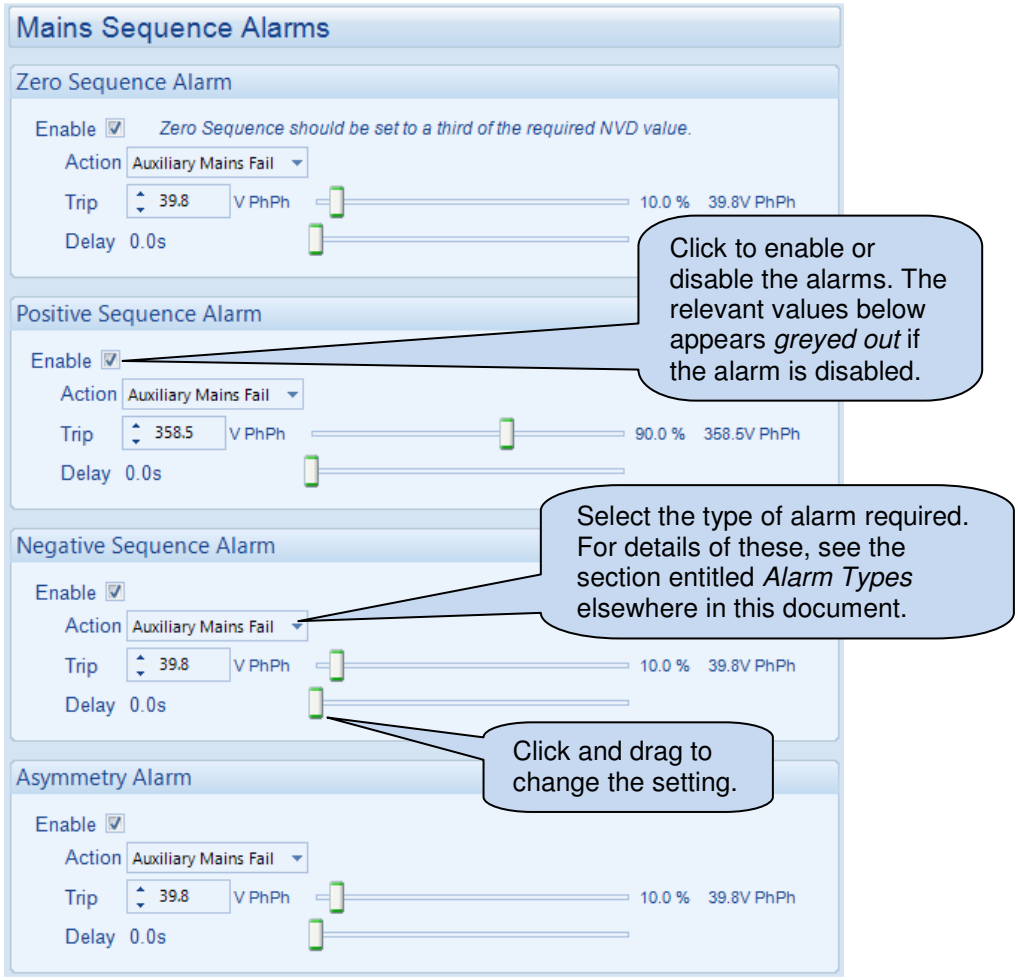
2.6.2.2 NOMINAL VOLTAGE

Parameter	Description
Nominal Voltage	This is used to calculate the percentage of Electrical Trips by the voltage alarm limits. It is also used when the Bus and Mains VTs have different ratios, to synchronise the voltage of both supplies.

2.6.2.3 OVER VOLTAGE ALARMS

Parameter	Description
Mains Over Voltage IEEE 37.2 – 59 AC Overvoltage Relay	☐ = Alarm is disabled ☑ = The module detects a Mains Failure when the mains supply voltage rises above the configured *Over Volts Alarm Trip* value for longer than the *Mains Transient Delay*. The *Overvolts Alarm Trip* value is adjustable to suit user requirements.

2.6.3 MAINS SEQUENCE ALARMS



2.6.3.1 ZERO SEQUENCE ALARM

Parameter	Description
Zero Sequence Alarm IEEE 37.2 – 47H Phase-Sequence Or Phase Balance Voltage Relay	**⚠NOTE: The Zero Sequence Alarm must be set to a third of the required Neutral Voltage Displacement (NVD) value. This is because the summation of the three Zero Sequence vector components is equal to the NVD value.** This is also known as Neutral Voltage Displacement. ☐ = Alarm is disabled ☑ = The alarm activates when the difference in potential between the Earth and the calculated Neutral position of a 3 wire delta exceeds the configured *Zero Sequence Alarm Trip* level for the configured *Delay* time.
Action	Select the type of alarm required from the list: ***Auxiliary Mains Fail*** ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

2.6.3.2 POSITIVE SEQUENCE ALARM

Parameter	Description
Positive Sequence Alarm IEEE 37.2 – 47L Phase-Sequence Or Phase Balance Voltage Relay	☐ = Alarm is disabled ☑ = The alarm activates when the *Positive Sequence* voltage falls below the configured *Positive Sequence Alarm Trip* level for the configured *Delay* time.
Action	Select the type of alarm required from the list: ***Auxiliary Mains Fail*** ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

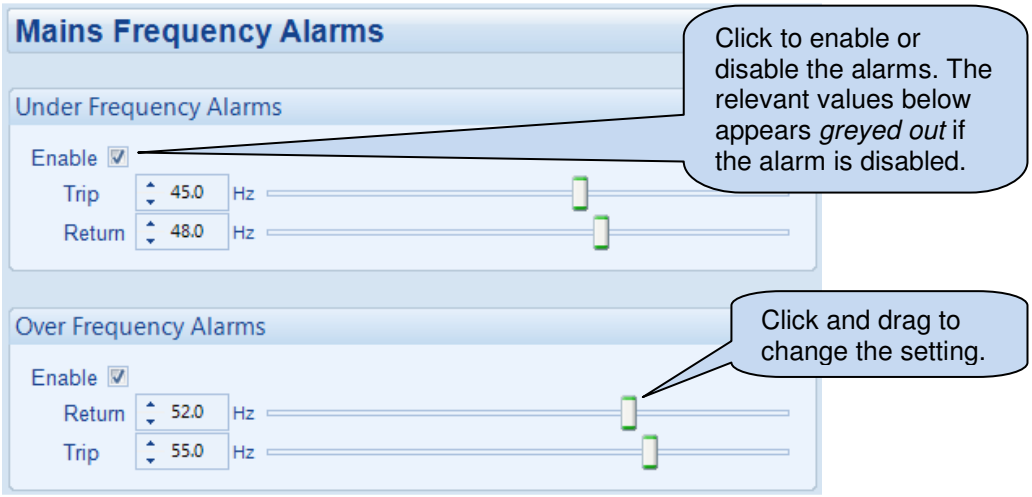
2.6.3.3 NEGATIVE SEQUENCE ALARM

Parameter	Description
Negative Sequence Alarm IEEE 37.2 – 47H Phase-Sequence Or Phase Balance Voltage Relay	☐ = Alarm is disabled ☑ = The alarm activates when the *Negative Sequence* voltage exceeds the configured *Negative Sequence Alarm* level for the configured *Delay* time.
Action	Select the type of alarm required from the list: ***Auxiliary Mains Fail*** ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

2.6.3.4 ASYMMETRY ALARM

Parameter	Description
Asymmetry Alarm IEEE 37.2 – 59 Overvoltage Relay	☐ = Alarm is disabled ☑ = The alarm activates when the voltage between any two phases exceeds the configured *Asymmetry Alarm Trip* level for the configured *Delay time*. **For example :** L1=230, L2=235, L3=226 Asymmetry is *largest value – smallest value* = 235 – 226 = 9V
Action	Select the type of alarm required from the list: ***Auxiliary Mains Fail*** ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

2.6.4 MAINS FREQUENCY



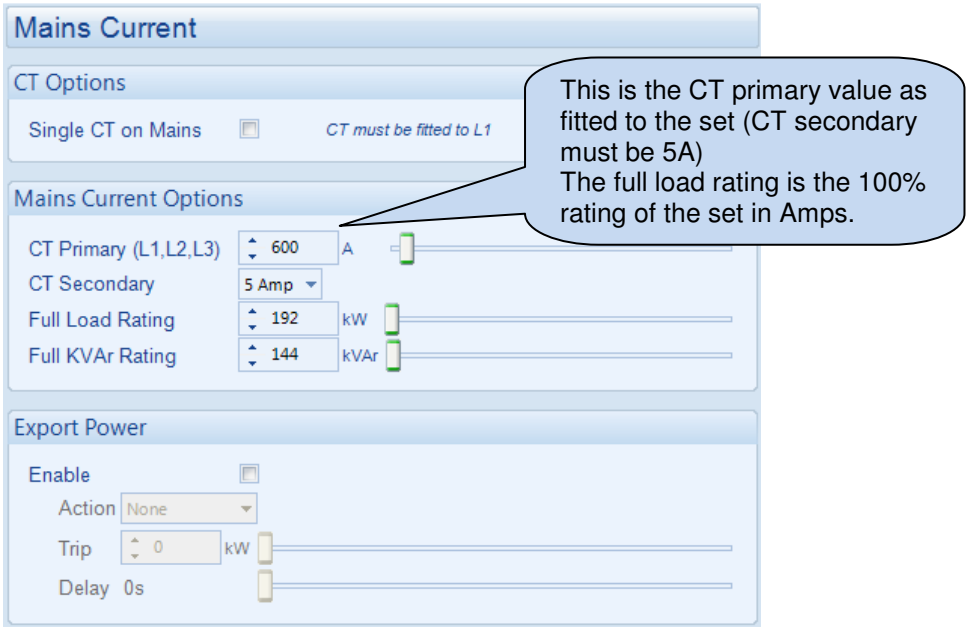
2.6.4.1 UNDER FREQUENCY ALARMS

Parameter	Description
Mains Under Frequency Alarm IEEE 37.2 -81 Frequency Relay	☐ = Mains Under Frequency does NOT give an alarm ☑ = The module detects a Mains Failure when the mains supply frequency falls below the configured *Under Frequency Alarm Trip* value for longer than the *Mains Transient Delay*. The *Underfrequency Alarm Trip* value is adjustable to suit user requirements.

2.6.4.2 OVER FREQUENCY ALARMS

Parameter	Description
Mains Over Frequency IEEE 37.2 -81 Frequency Relay	☐ = Alarm is disabled ☑ = The module detects a Mains Failure when the mains supply frequency rises above the configured *Over Frequency Alarm Trip* value for longer than the *Mains Transient Delay*. The *Over Frequency Alarm Trip* value is adjustable to suit user requirements.

2.6.5 MAINS CURRENT



2.6.5.1 CT OPTIONS

Parameter	Description
Single CT on Mains	☐ = Mains CT disabled ☑ = Mains CT enabled. Only one CT for measuring mains current. The system assumes a balanced kw & kvar load and all phases mirror L1

2.6.5.2 MAINS CURRENT OPTIONS

Parameter	Description
CT Primary	Primary rating of the three phase Current Transformers
CT Secondary	Secondary rating of the Current Transformers
Full Load Rating Full kVAr Rating	Full load rating (100% rating) of the mains supply The kW and kvar rating must be correctly set. The values set here are the kW and kvar, NOT the kVA or Power Factor! These values are used for many functions including *Mains Power* and *Load Share* functions.

2.6.5.3 EXPORT POWER

Parameter	Description
Export Power	☐ = The DSE8660 MKII does not monitor the export kilowatt. ☑ = DSE8660 MKII Measures power exported to the mains supply and provides an alarm condition if the *Export Power* value is exceeded by the *Trip* value for the configured *Delay* time.
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***None*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

2.6.6 MAINS DECOUPLING

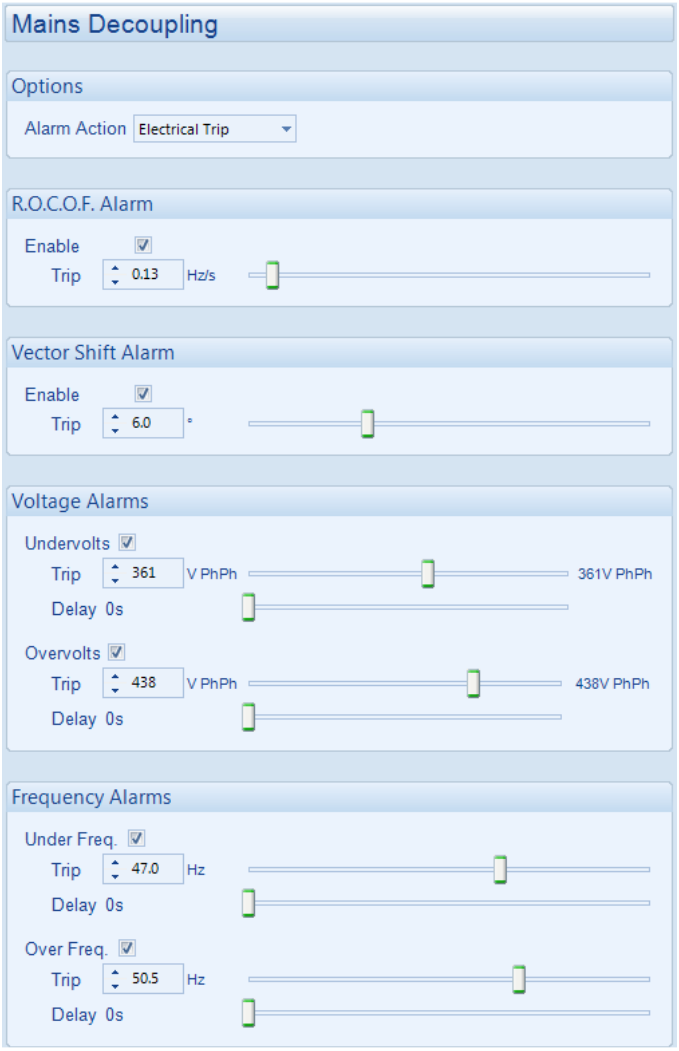
DSE8660 MKII module includes “Mains decoupling” detection to be used with generating sets paralleling with the mains (utility) supply.

When the generator set is in parallel with the mains supply it is important that failure of the mains is detected as soon as possible otherwise problems arise. It is not possible to simply monitor the mains voltage and frequency as the sensing of this is now being fed by the generator itself!

Because of this and other possible dangerous situations, the power supply companies impose regulations when generators are in parallel. This is to detect mains failure during parallel operation and to remove the generator from the grid in this situation.

Failure to detect and act upon loss of mains supply when in parallel leads to the following effects:

- The generator feeds the site load and attempts to feed the load of the grid. Depending upon the generator size and the location of the network fault, this causes problems to the generator in terms of capacity and stability.
- If the generator is able to supply the load, Engineers working on the supposedly dead network would be in fact working on live cables, supplied by the generator set. This is potentially fatal.
- If the mains supply is reconnected when the generator is still connected to the grid, the network must be connected to a generator not synchronised with it, with damaging results (mechanical failure, rotating diode failure, overloaded cables, pole slip etc)



Parameters detailed overleaf...

2.6.6.1 MAINS DECOUPLING OPTIONS

Parameter	Description
Action	Select the type of alarm required from the list: ***Auxiliary Mains Fail*** – Opens the mains load switch and allows the bus to continue providing power to the load. ***Electrical Trip*** – The bus load switch is opened and the set are allowed to perform a cooling run before being stopped. ***Warning*** – Audible alarm is generated. Breakers are not opened. For details of these, see the section entitled *Alarm Types* elsewhere in this document.

2.6.6.2 R.O.C.O.F. ALARM

Parameter	Description
R.O.C.O.F. IEEE 37.2 – 81R Frequency Relay	☐ = R.O.C.O.F. alarm is disabled. ☑ = The alarm activates when the Rate of Change of Frequency (R.O.C.O.F.) is greater than the configured settings of the R.O.C.O.F. alarm. R.O.C.O.F. detection of 'mains failure when in parallel' relies upon the relative steady state of the utility power grid frequency. Normally supplied by a myriad of large power generating stations, the frequency cannot normally change quickly over a short period of time. A failure of the utility supply usually leads to sudden increase or decrease in the kw load of the generators and a subsequent drop or rise in it's frequency. This is detected by the R.O.C.O.F. alarm.

2.6.6.3 VECTOR SHIFT

Parameter	Description
Vector Shift IEEE 37.2 – 78 Phase-Angle Measuring Relay	☐ = Vector Shift alarm is disabled. ☑ = The alarm activates when the Vector Shift in one or more of the monitored phases of the waveform has been measured greater than the configured settings of the Vector Shift alarm. Vector Shift detection of 'mains failure when in parallel' relies upon the relative steady state of the utility power grid. When the utility supply fails, the resulting change in load of the generators leads to a jump in the phase of the bus. If this jump is greater than the setting of the Vector Shift Alarm, the trip is generated.

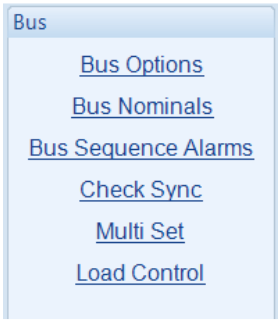
2.6.6.4 VOLTAGE AND FREQUENCY ALARMS

Under/Over voltage and Under/Over frequency detection relies on the premise that the generator voltage/frequency drifts more when not in parallel, than it does when it is in parallel with the mains supply. This may not be true if the generator is only lightly loaded upon the failure of the mains supply.
These settings are used to enable and set the levels at which mains failure is detected when in parallel with the generator set.

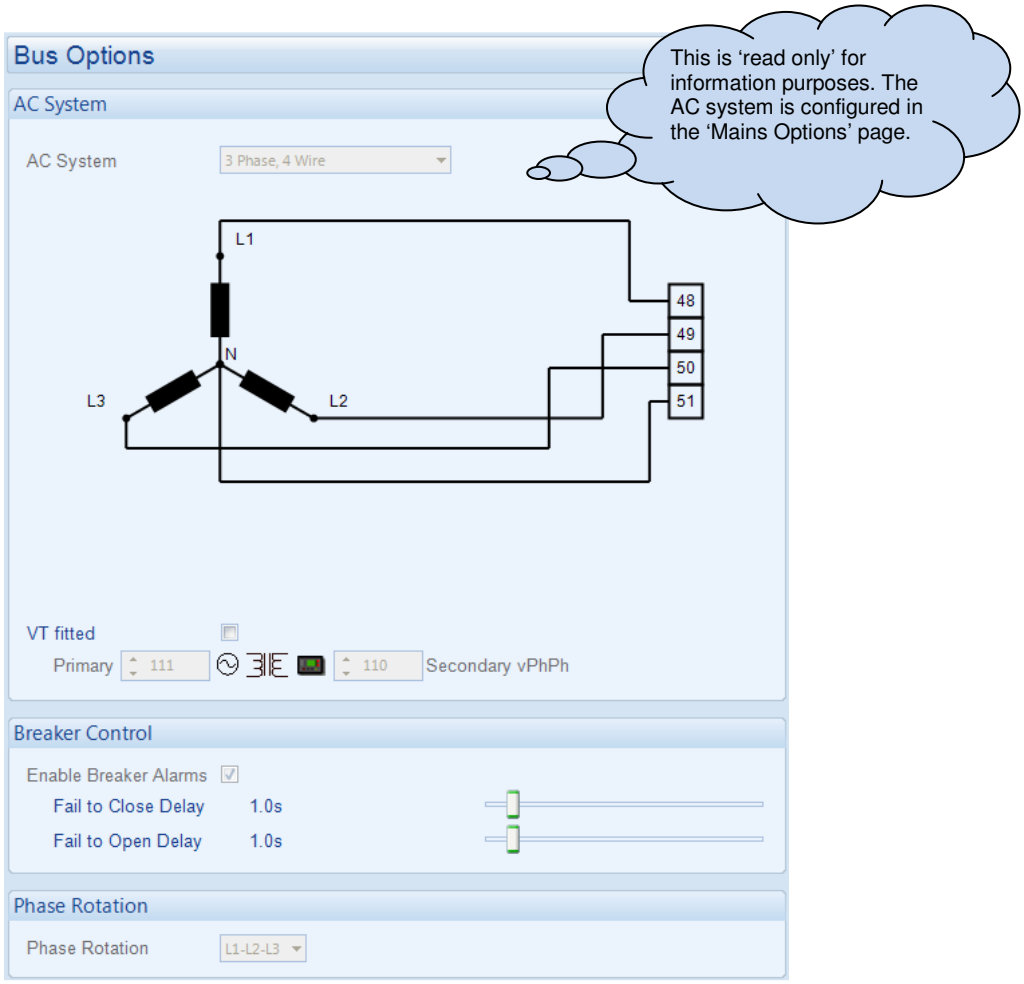
Parameter	Description
Mains Decoupling Under Voltage IEEE 37.2 - 27AC Undervoltage Relay	☐ = Alarm is disabled ☑ = Mains Decoupling Under Volts gives an alarm in the event of the mains supply falling below the configured *Undervolts Trip* level for longer than the *configured Delay* when both mains and bus supplies are in parallel.
Mains Decoupling Over Voltage IEEE 37.2 – 59 AC Overvoltage Relay	☐ = Alarm is disabled ☑ = Mains Decoupling Over Volts gives an alarm in the event of the mains supply rising above the configured *Overvolts Trip* level for longer than the configured *Delay* when both mains and bus supplies are in parallel.
Mains Decoupling Under Frequency IEEE 37.2 -81 Frequency Relay	☐ = Alarm is disabled ☑ = Mains Decoupling Under Frequency gives an alarm in the event of the mains supply falling below the configured *Under Freq. Trip* level for longer than the *configured Delay* when both mains and bus supplies are in parallel.
Mains Decoupling Over Frequency IEEE 37.2 -81 Frequency Relay	☐ = Alarm is disabled ☑ = Mains Decoupling Over Frequency gives an alarm in the event of the mains supply rising above the configured *Over Freq. Trip* level for longer than the configured *Delay* when both mains and bus supplies are in parallel.

2.7 BUS

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



2.7.1 BUS OPTIONS

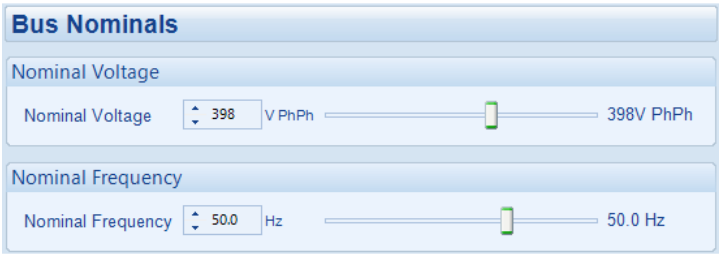


Parameter	Description
VT Fitted	☐ = The voltage sensing to the controller is direct from the bus ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the bus voltage to be within the controller voltage specifications. By entering the *Primary* and *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).

2.7.1.1 BREAKER CONTROL

Parameter	Description
Enable Breaker Alarms	☐ = Alarm is disabled ☑ = The *Bus Breaker Alarms* are enabled.
Fail To Close Delay	When the *Close Bus* output is activated, if the configured *Bus Closed Auxiliary* digital input does not become active within the *Bus Fail To Close Delay* timer, the alarm is activated
Fail To Open Delay	When the *Open Bus* output is activated, if the configured *Bus Closed Auxiliary* digital input does not become inactive within the *Bus Fail To Open Delay* timer, the alarm is activated

2.7.2 BUS NOMINALS



2.7.2.1 NOMINAL VOLTAGE

Parameter	Description
Nominal Voltage	This is used to calculate the percentage of Electrical Trips by the voltage alarm limits. It is also used when the Bus and Mains VTs have different ratios, to synchronise the voltage of both supplies.

2.7.2.2 NOMINAL FREQUENCY

Parameter	Description
Nominal Frequency	This is used to calculate the percentage of Electrical Trips by the frequency alarm limits.

2.7.3 BUS SEQUENCE ALARMS

These parameters are described overleaf...

2.7.3.1 ZERO SEQUENCE ALARM

Parameter	Description
Zero Sequence Alarm IEEE 37.2 – 47H Phase-Sequence Or Phase Balance Voltage Relay	This is also known as Neutral Voltage Displacement. ☐ = Alarm is disabled ☑ = The alarm activates when the difference in potential between the Earth and the calculated Neutral position of a 3 wire delta exceeds the configured *Zero Sequence Alarm Trip* level for the configured *Delay* time.
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

2.7.3.2 POSITIVE SEQUENCE ALARM

Parameter	Description
Positive Sequence Alarm IEEE 37.2 – 47L Phase-Sequence Or Phase Balance Voltage Relay	☐ = Alarm is disabled ☑ = The alarm activates when the *Positive Sequence* voltage falls below the configured *Positive Sequence Alarm Trip* level for the configured *Delay* time.
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

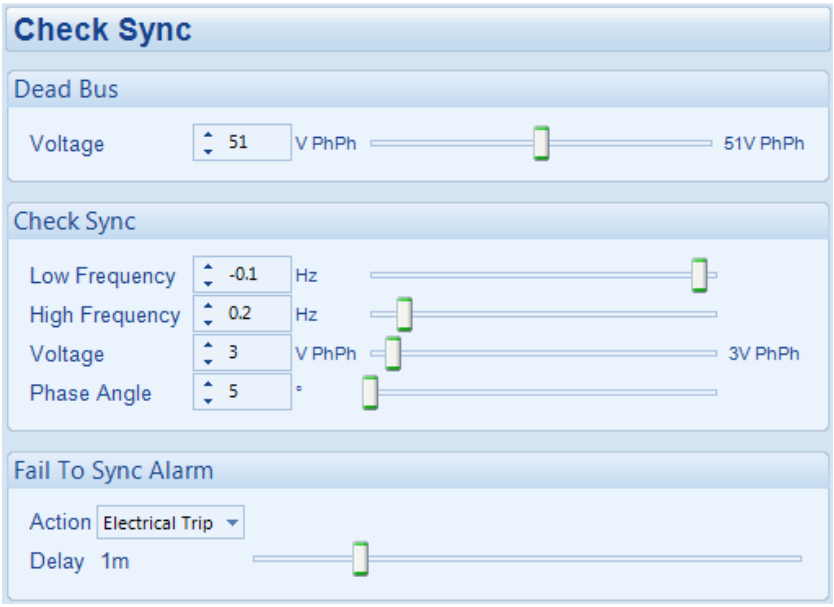
2.7.3.3 NEGATIVE SEQUENCE ALARM

Parameter	Description
Negative Sequence Alarm IEEE 37.2 – 47H Phase-Sequence Or Phase Balance Voltage Relay	☐ = Alarm is disabled ☑ = The alarm activates when the Negative Sequence voltage exceeds the configured *Negative Sequence Alarm* level for the configured *Delay* time.
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

2.7.3.4 ASYMMETRY ALARM

Parameter	Description
Asymmetry Alarm IEEE 37.2 – 59 Overvoltage Relay	☐ = Alarm is disabled ☑ = The alarm activates when the voltage between any two phases exceeds the configured *Asymmetry Alarm Trip* level for the configured *Delay time*. **For example :** L1=230, L2=235, L3=226 Asymmetry is *largest value – smallest value* = 235 – 226 = 9V
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

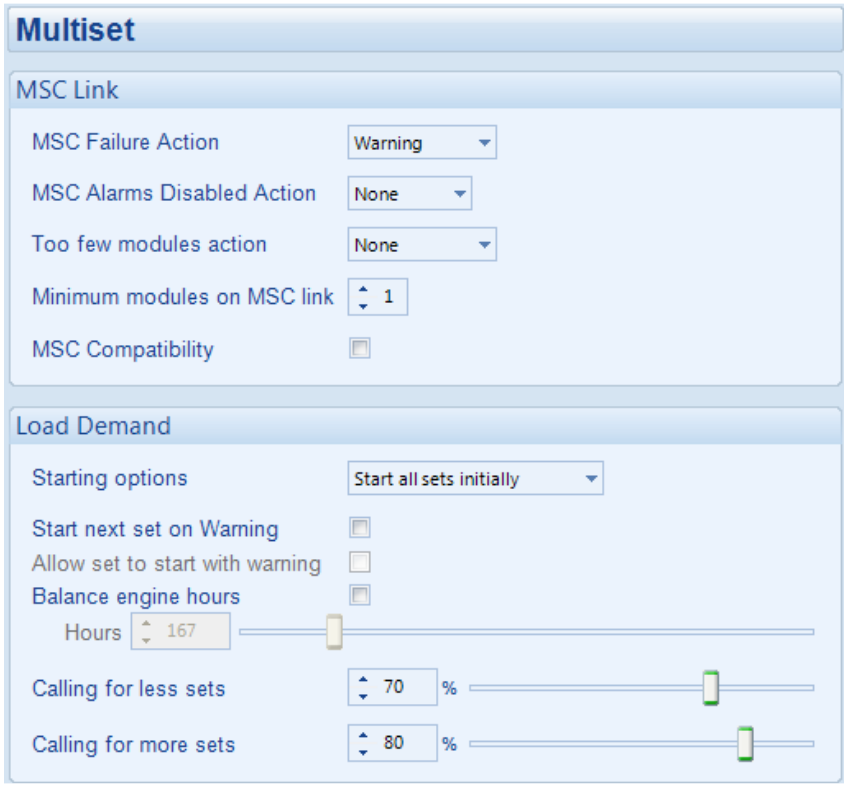
2.7.4 CHECK SYNC



Parameter	Description
Dead Bus	The bus is measured when it is to be synchronised with the mains. If the bus is measured to be below the *Dead Bus Voltage*, the bus is assumed to be 'dead' and the bus breaker is closed. If the bus is measured to be above the *Dead Bus Voltage*, the DSE8660 MKII synchronises the bus to the mains before both breakers are closed..
Check Sync	During the synchronising process, the controller adjusts the frequency of the bus to closely match the mains. Typically the bus is adjusted to be 0.1 Hz faster than the mains. This causes the phase of the two supplies to change continuously. Before the breaker is closed, the following conditions must be met: • The difference between the two supplies frequencies must be between the *Check Sync Low Frequency* and *Check Sync High Frequency* • The difference between the two supplies voltages must be equal to or below the *Check Sync Voltage* • The phase of the two supplies must be equal to or below the *Check Sync Phase Angle*
Fail to sync Alarm	When the synchronising process continues longer than the *Fail to Sync Alarm Delay*, the alarm is triggered. This occurs when changes in the load are making the bus control difficult due to changes in voltage and frequency. ***Electrical Trip**:* The synchronisation is stopped. ***Indication:*** The bus continues to synchronise and no alarm is raised. This is used for internal use, such as in the *PLC Logic* or *Virtual Leds*. ***Warning**:* The controller continues to synchronise with a Warning alarm.

2.7.5 MULTISET

NOTE: The MSC Link Alarms are disabled by a digital input configured to *MSC Alarms Inhibit* if required.



These parameters are described overleaf...

2.7.5.1 MULTISET

Parameter	Description
MSC Failure Action	Action upon MSC Link Failure: ***Electrical Trip**:* The bus breaker is opened immediately and the stopping sequence is initiated. ***Indication:*** The bus continues to run and no alarm is raised. This is used for internal use, such as in the *PLC Logic* or *Virtual Leds*. ***Warning**:* The sets on the bus continue to run and a warning alarm is activated.
MSC Alarms Disabled Action	Action to take when the MSC alarm is disabled by a digital input: ***None**:* Alarm is disabled. ***Indication:*** The sets on the bus continue to run and no alarm is raised. This is used for internal use, such as in the *PLC Logic* or *Virtual Leds*. ***Warning**:* The sets on the bus continue to run and a warning alarm is activated.
Too Few Modules Action	Action to take when the number of modules active on the MSC link is lower than the *Minimum Modules on MSC link* setting ***None**:* Alarm is disabled. ***Electrical Trip**:* The breakers are opened immediately and the stopping sequence is initiated. ***Indication:*** The sets on the bus continue to run and no alarm is raised. This is used for internal use, such as in the *PLC Logic* or *Virtual Leds*. ***Warning**:* The sets on the bus continue to run and a warning alarm is activated.
Minimum Modules On MSC Link	Set the minimum number of modules on the MSC before the *Too Few Modules* alarm is activated.

2.7.5.2 LOAD DEMAND

NOTE: Only applicable in Mains mode when in parallel.

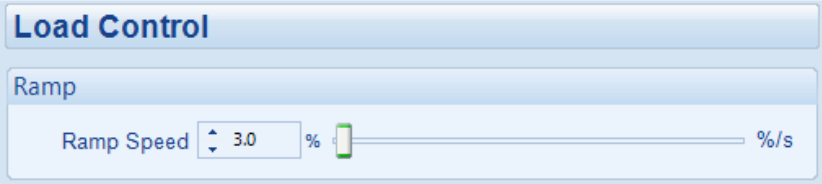
Item	Function
Starting Options	**NOTE: Used to configure how the load demand scheme operates upon start-up when the *Running On Load Demand* is enabled, configurable in the *Miscelaneous Options* section.** ***Start all sets initially:*** Upon activation of the load demand scheme, all sets in the system start up and parallel onto the generator bus. Then they stop / start according to load demands. This option is particularly recommended in Multiset mains standby applications where the load is likely to be greater than the capacity of a single set. ***Start sets as load requires:*** Upon activation of the load demand scheme, only one set starts initially. Other sets in the system are only started according to demand. This option is recommended for mutual standby systems where the load is likely to be less than the capacity of a single set.

Item	Function
Balance Engine Hours	Used in a Multiset system so that the engine's priority changes according to the amount of usage of the sets. For instance in a two sets system. Set 1 has logged 100 running hours Set 2 has logged 20 running hours Balance engine hours are configured to 75 hours. As Set 2 has logged 80 hours less than Set 1. As this is greater than the configured 75 hours, Set 2 is the highest priority set. If all sets are within the configured Balance Engine Hours value, then the set Priority Number (See SCADA | Maintenance page) is followed.
Start Next Set on Warning	Whenever a warning occurs, a start command is issued over the MSC link to start the next highest priority set.
Allow Set to Start with Warning	☐ = If the MSC calls to start another set, generators having warning alarm remain at rest, only generators with no warning alarm is started according to their priority number. ☑ = Allows a stationary generator with a warning alarm to start if requested.
Calling For Less Sets	**NOTE: The module calculates the load levels left on the remaining sets if it needs to remove a set. This prevents the system from reaching a point where the load is such that one set starts and stops repeatedly. As a result, the system does not take action when the % on each generator is slightly below the setting for less sets, but instead the level needs to fall much lower until the excess set is called to stop.** **NOTE: It is recommended that each set in the system have the same value configured for this parameter.** **NOTE: When the module assumes that the load is at the bottom of the ramp the breaker opens.** The load level at which the DSE controller decides that generating set capacity is reduced by dropping sets off the bus. Once the load is below this level, the lowest priority set in the sequence (determined using the Genset Run Priority) begins its stop delay timer. Once this has expired, the set ramps off the load and stops. When the load level rises above this set point during the stop delay timer, then the timer is cancelled and the set continues to supply power to the load. This allows for short term drops in load, without decreasing supply capacity, only for it to be increased again a short while later.

Continued overleaf...

Item	Function
Calling For More Sets	**NOTE: It is recommended that each set in the system has the same value configured for this parameter.** The load level at which the DSE controller decides that additional generating set capacity is required to supply power to the load. Once this load level is exceeded, the next highest priority set in the sequence (determined using the Genset Run Priority) begins its start delay timer. Once this has expired, the set runs up, synchronises and takes load. When the set fails to become available, it communicates this using the MultiSet Communications Link which signals the next generating set in the sequence to take its place. The starting sequence is terminated when the load level drops below the *Load level for more sets to run* while the start delay timer is in progress. This allows for short term increases in load.

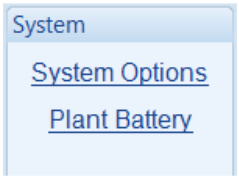
2.7.6 LOAD CONTROL



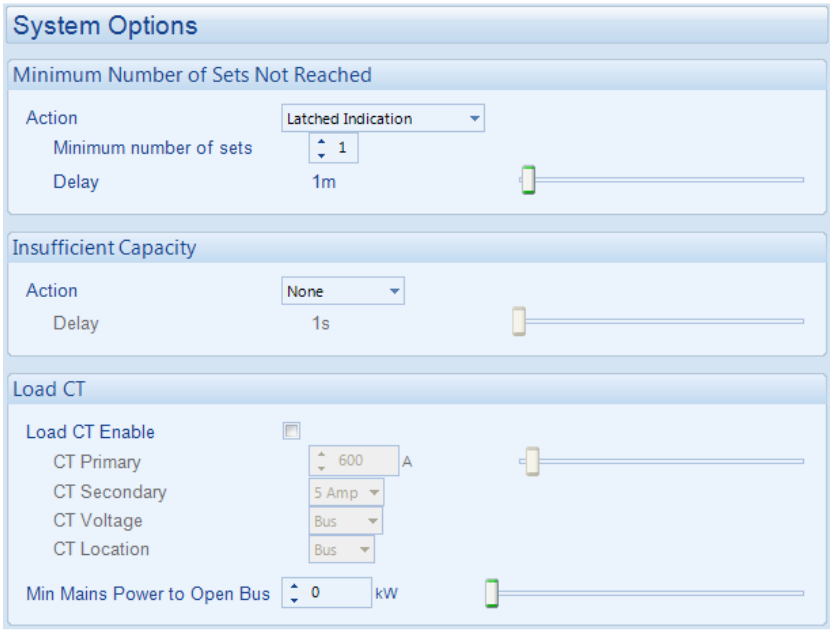
Item	Function
Ramp Speed	The rate at which the bus generators is ramped onto and off the load.

2.8 SYSTEM

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



2.8.1 SYSTEM OPTIONS



2.8.1.1 MINIMUM NUMBER OF SETS NOT REACHED

Item	Function
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Latched Indication*** ***Warning Always Latched*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Minimum Number of Sets	Determine minimum number of sets to close the bus breaker and the action taken if the minimum number of sets are not closed onto the bus in the required *delay* time. Once the bus breaker is closed the *Load Demand* calls for more or less sets.
Delay	Set the activation delay timer

2.8.1.2 INSUFFICIENT CAPACITY

Item	Function
Action	Action to take when peak lopping (mains mode) if the set(s) are producing 100% power and this is not enough power to peak lop at the configured level. Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***None*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Delay	Set the activation delay timer

2.8.1.3 LOAD CT

NOTE: Further information about the Load CT is detailed in DSE publication: 056-007 Advantages of Load CT which is found on our website: www.deepseaplc.com

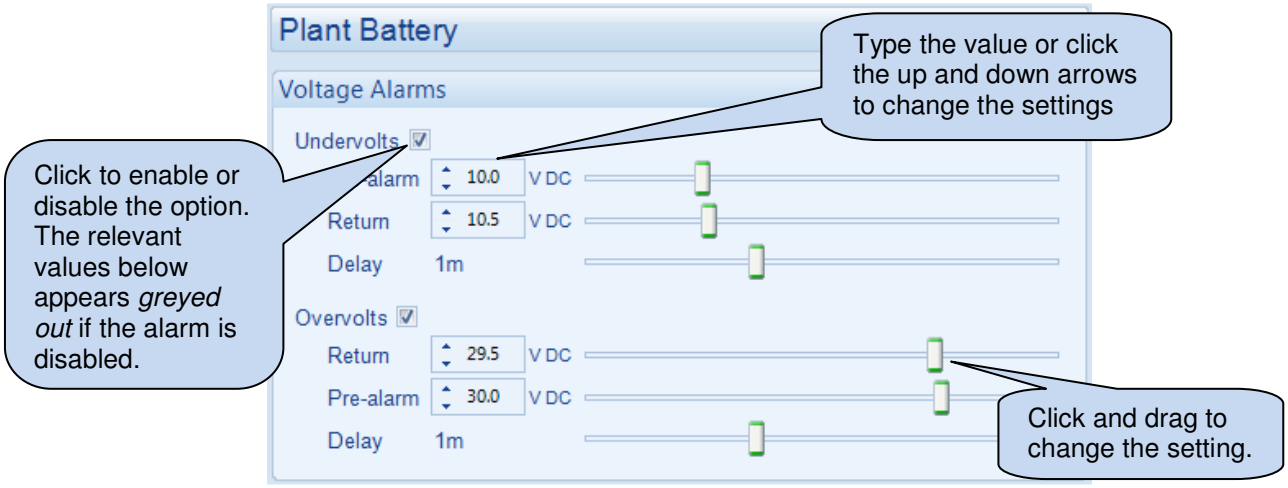
The load C.T. is only required when there is more than one Mains Controller (DSE8660 MKII) on the same system.

With the load C.T. fitted, the Mains Controller transfers the right amount of load to the grid before disconnecting the generators. This prevents the generators being 'shock loaded'.

Without the load C.T., the Mains Controller does not know how much load to transfer to the grid when other Controllers are still in island mode. This results in the Mains Controller transferring a pre determined amount of load before disconnecting the generators from the grid. This amount is configured by the *Min Mains Power to Open Bus* setting.
Hence, there is either too much load, or not enough load transferred, and the generators are 'shock loaded' as they are disconnected from the grid.

Parameter	Description
Load CT Enable	☐ = Load CT disabled ☑ = Load CT enabled. Only one CT for measuring load current. The system assumes a balanced kw & kvar load and all phases mirror L1
CT Primary	Primary rating of the three phase Current Transformers
CT Secondary	Secondary rating of the Current Transformers
CT Voltage	This is used to derive the power by multiplying the current by the relevant voltage. Useful when the system is combined Low and High voltages. Available voltage sensing to select from: Bus, Mains.
CT Location	Indicate where the L1 CT is located. Bus = Single CT located on the Bus L1 phase. Load = Single located on the Load L1 phase.
Min Mains Power to Open Bus	This parameter is used when the Load CT is not enabled. When both Mains and generator(s) bus supplies are in parallel, the bus opens

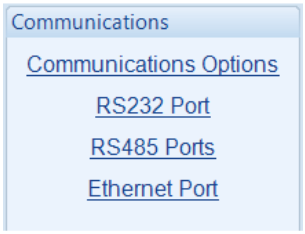
2.8.2 PLANT BATTERY



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.

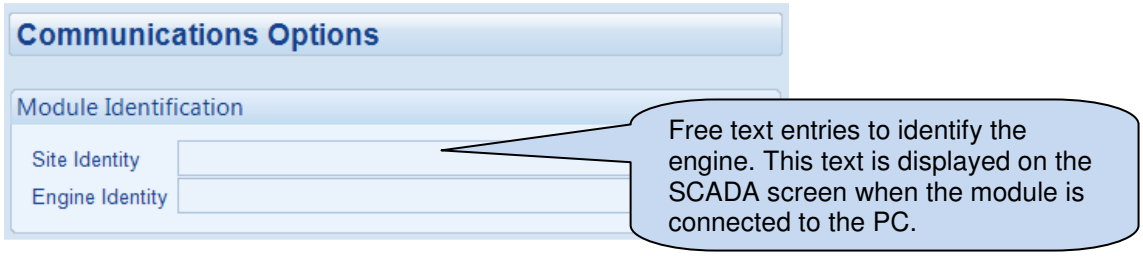
2.9 COMMUNICATIONS

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



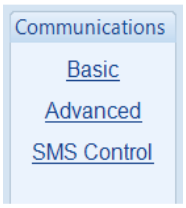
2.9.1 COMMUNICATION OPTIONS

Provides a means of giving the controller an identity. This is used in the SCADA section to allow the operator to see the site name and engine identity that it is currently connected to. This feature is used when a remote module is connected over modem or Ethernet.

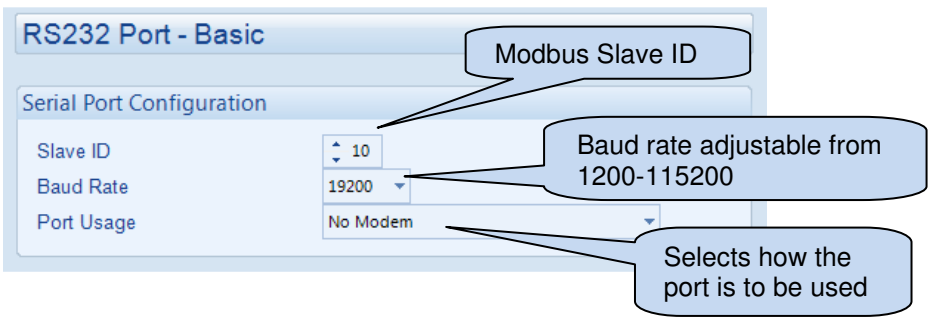


2.9.2 RS232 PORT

The *RS232 Port* section is subdivided into smaller sections.
Select the required section with the mouse.



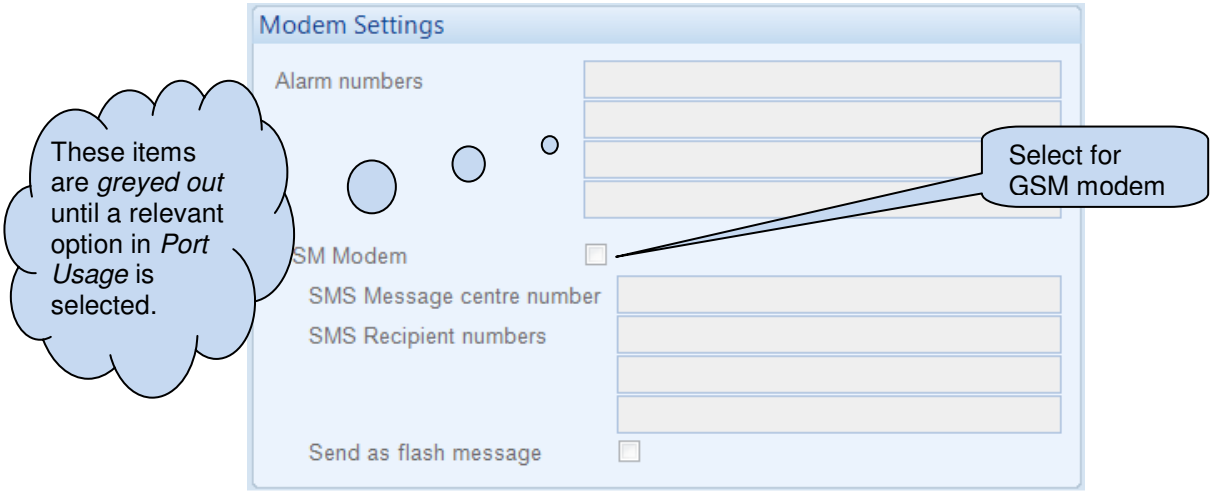
2.9.2.1 BASIC



Serial port configuration

Parameter	Description
Port usage	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 from a PC only. ***Incoming And Outgoing Modem:*** RS232 port connected to modem used to accept incoming calls from a PC and also make calls upon events. ***Outgoing Modem Alarms:*** RS232 port connected to modem, used to make calls upon events.
Cyclic	When multiple *Alarm Numbers* are configured, the module attempts to dial each number. When the dial out call fails to one of the configured numbers, the module completes the cycle and re-attempts to call those numbers for the configured number of *Retries*.
Sequence	When multiple *Alarm Numbers* are configured, the module attempts to dial each number. When the dial out call fails to one of the configured numbers, the module attempts to call that number for the configured number of *Retries*, before it carries on to the next number.

Modem settings



Parameter	Description
Alarm Number	The phone number that the module dials upon an event. This number must be connected to a PC modem on a PC running the DSE Configuration Suite Software. Leave this field empty when dial-out to a PC is not required.
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 Number	The Message centre used to send SMS messages. This number is obtained from the GSM operator.
SMS Recipient Numbers	Numbers of the cell phones to send SMS messages to. Leave blank if SMS function is not required.

Recommended modems

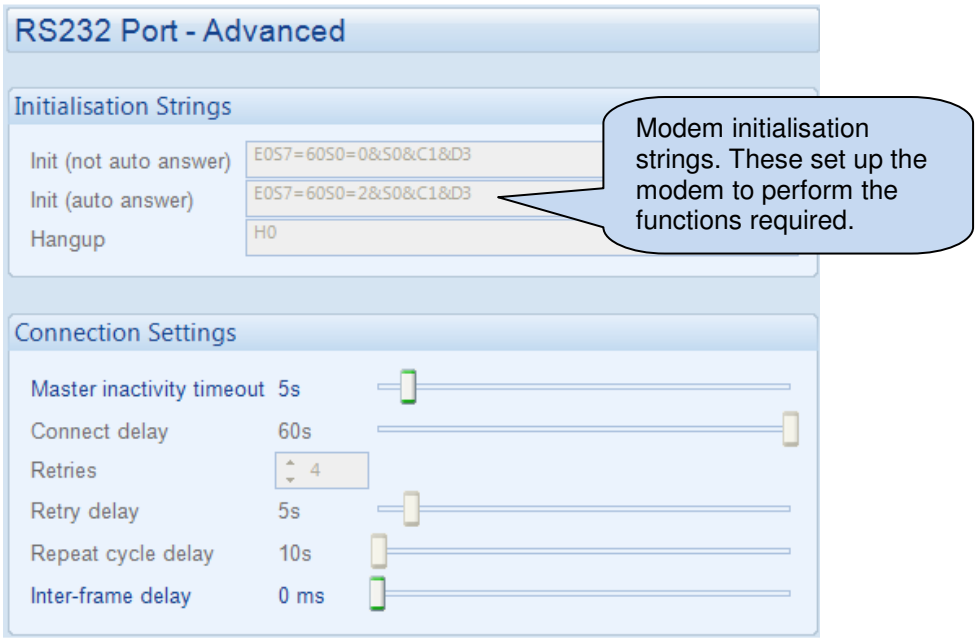
DSE stock and supply the following recommended modems:

GSM modem

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

Description	DSE Part Number
The GSM Modem is supplied with power supply cable, RS232 connection cable and GSM antenna. Suitable for GSM operating on 900/1800 MHz bands.	0830-001-01
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 DSE module.	

2.9.2.2 ADVANCED



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 DSE module *initialises* (resets) the modem.

Factory set initialisation strings

Parameter	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

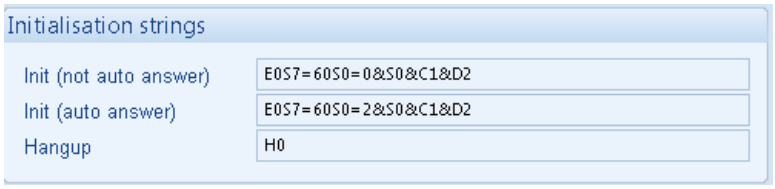
The modem connected to the DSE controller usually makes dialling noises and 'squeal' in the initial stages of making a data call. To control this noise, add the following command to the end of the initialisation string:

Parameter	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 of use for troubleshooting)

Sierra/Wavecom Fastrak Supreme GSM Modem initialisation strings

When connected to the Wavecom Fastrak Supreme GSM modem, the initialisation strings must be altered by changing the factory set &D3 to &D2.

Parameter	Description
&D2 (required for Sierra/Wavecom Fastrak Supreme)	Hang up on DTR-drop
&D3 (DSE module 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, contact your modem supplier for further advice.

2.9.2.3 CONNECTION SETTINGS

Parameter	Description
Master Inactivity Timeout	The module monitors by default the USB port for communications. When activity is detected on the RS232 port, the module monitors the 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 needs to 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 the cycle repeats when dialing out calls to multiple *Alarm Numbers* fails.
Inter-Frame Delay	It is to add a delay before the DSE module responds to the Master device. It is useful when the DSE module is too fast for the Master device.

2.9.3 TROUBLESHOOTING MODEM COMMUNICATIONS

2.9.3.1 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 DSE 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; 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>

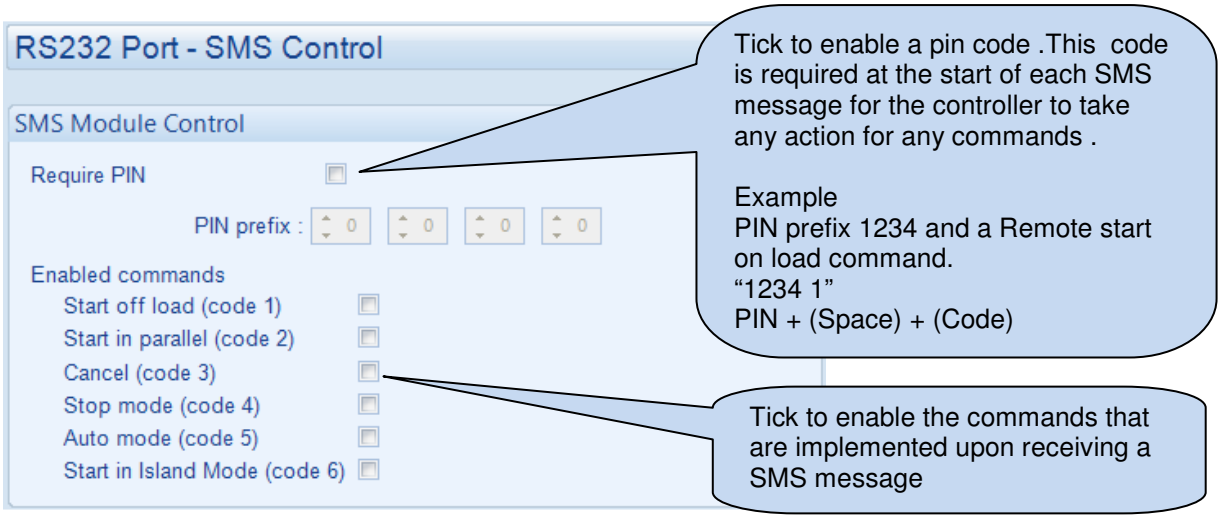
This saves the new setting in the modem. Power is now removed. The next time power is applied, the modem starts with the new settings (Baud rate = 9600), suitable to communicate with the DSE module.

2.9.3.2 GSM MODEM CONNECTION

Most GSM modems have a *Status* LED. The Wavecom Fastrack Supreme 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.

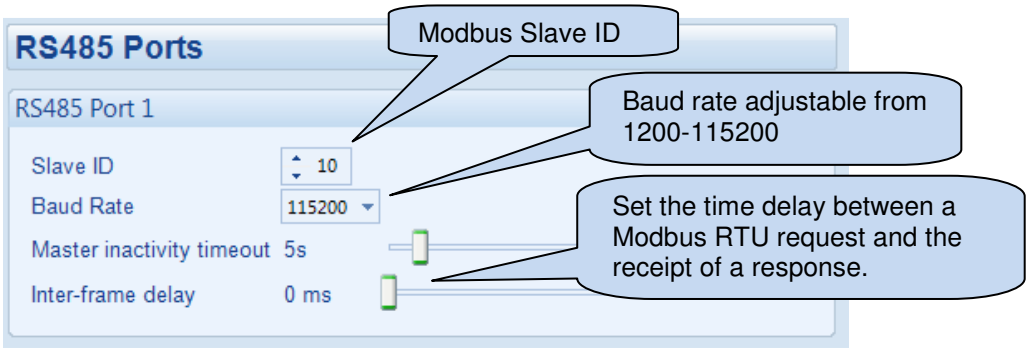
2.9.4 SMS MODULE CONTROL



The SMS commands listed below.

Parameter	Code	Description
Start Off Load	1	When in *Auto Mode*, the module performs the start sequence but the engine is not instructed to take the load. This function is used where an engine only run is required e.g. for exercise.
Start in Parallel	2	When in *Auto Mode*, the module starts the set(s) on the bus and parallels with the mains.
Start On Load		When in *Auto Mode*, the module performs the start sequence and transfer load to the engine.
Cancel	3	This cancels the SMS Start Off load or SMS Start On Load.
Stop Mode	4	This mimics the operation of the 'Stop' button and is used to provide a remote SMS stop command.
Auto Mode	5	This input mimics the operation of the "AUTO" button
Start in Island Mode	6	When in *Auto Mode*, the module starts the set(s) on the bus and transfers the load to the bus.

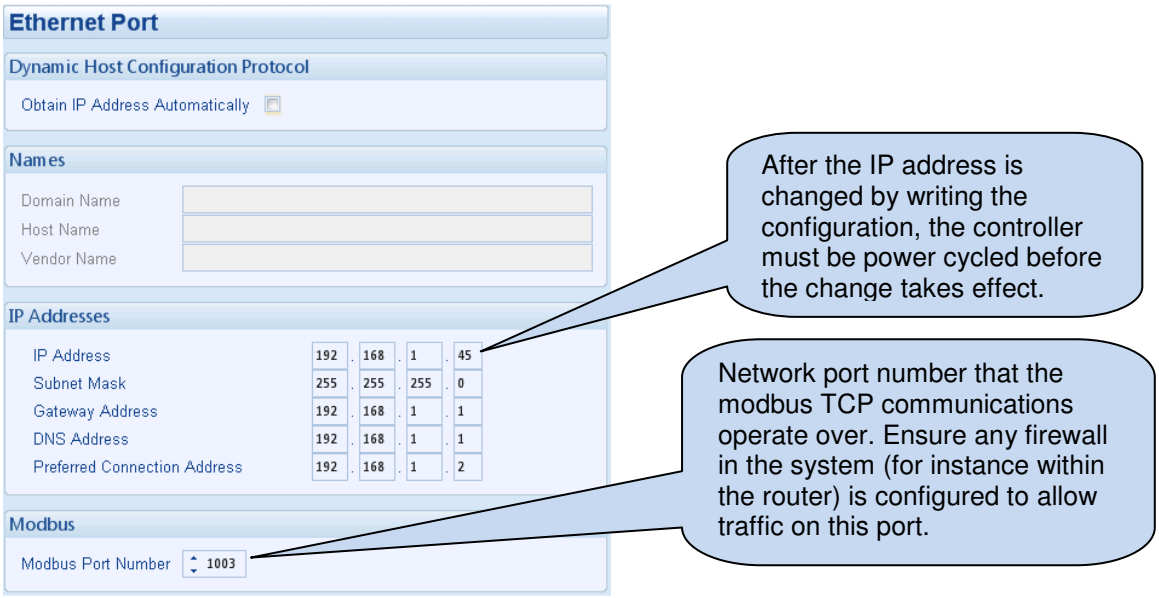
2.9.5 RS485 PORT



Timer	Description
Master Inactivity Timeout	The module monitors by default the USB port for communications. When activity is detected on the RS485 port, the module monitors the 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 needs to be set longer than the time between modbus polls from the master.

2.9.6 ETHERNET PORT

NOTE: Consult the network administrator of the host network before changing these settings.
Incorrect settings cause network errors in the existing local area network. These settings must only be changed by qualified network administrators.



Firewall configuration for internet access

As modem/routers differ enormously in their configuration, it is not possible for DSE to give a complete guide to their use with the DSE module. However it is possible to give a description of the requirements in generic terms. For details of how to achieve the connection to your modem/router you are referred to the supplier of your modem/router equipment.

The DSE module makes its data available to a configurable TCP port number.
You must configure your modem/router to allow inbound traffic on this port. For more information you are referred to your WAN interface device (modem/router) manufacturer.

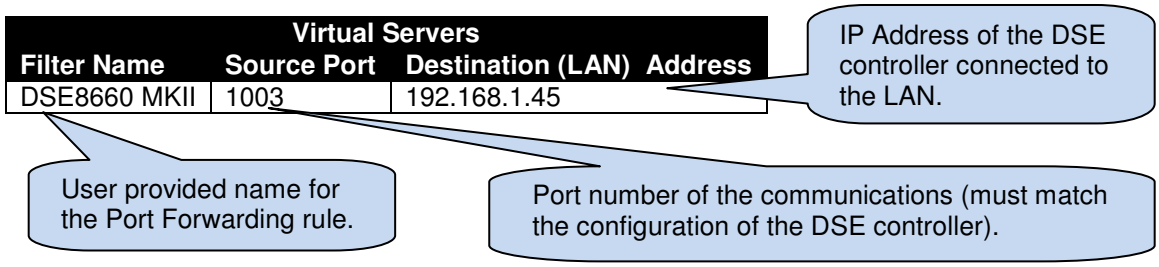
Incoming traffic (virtual server)

Network Address and Port Translation (NAPT) allows a single device, such as the modem/router gateway, to act as an agent between the Internet (or "public external network") and a local (or "internal private") network. This means that only a single, unique IP address is required to represent an entire group of computers.

For our DSE module application, this means that the WAN IP address of the modem/router is the IP address we need to access the site from an external (internet) location.

When requests reach the modem/router, we want this passed to a ‘virtual server’ for handling, in our case this is the DSE module.

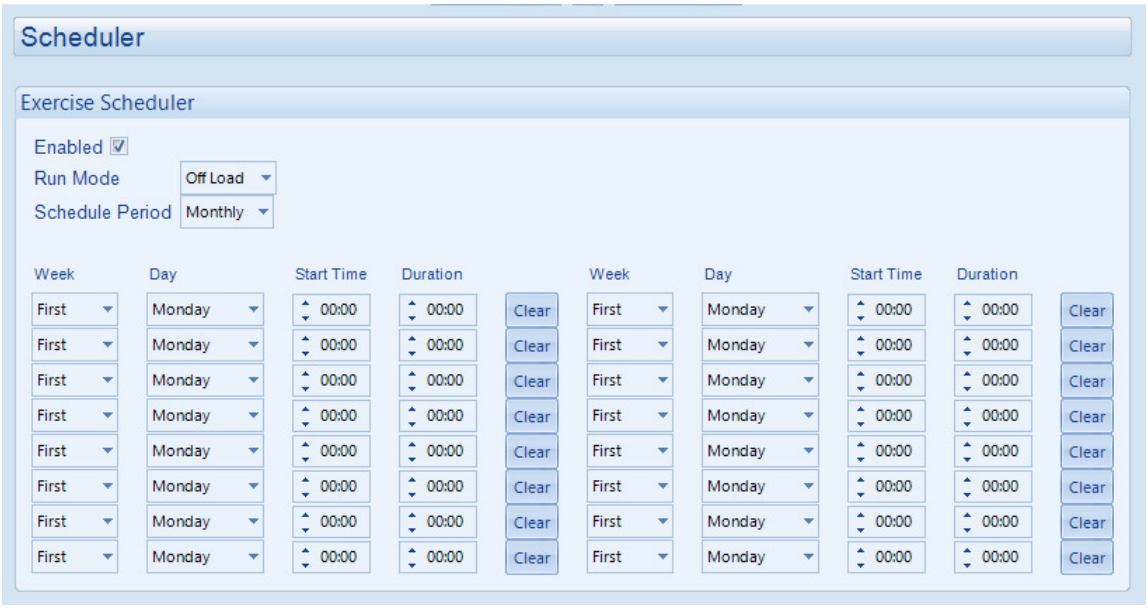
Example:



Result : Traffic arriving from the WAN (internet) on port 1003 is automatically sent to IP address 192.168.1.45 on the LAN (DSE module) for handling.

2.10 SCHEDULER

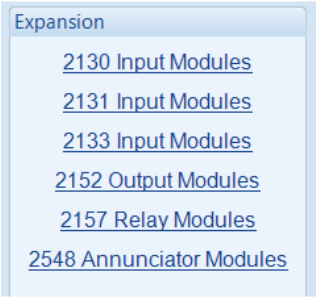
The scheduler is used to automatically start the engine(s) at a configured day and time and run for the configured duration of hours.
The engine(s) are made to run *Island*, *Off Load, or Parallel* depending upon the configuration :



Function	Description
Enabled	☐ = Scheduled runs are disabled ☑ = Scheduled runs are enabled
Run Mode	*Island*: The module runs the generator(s) in island mode, bus breaker closed and mains breaker opened. *Off Load*: The module runs the generator(s) on schedule without closing their breakers or the bus breaker. *Parallel*: In *Bus Mode*, the module starts the generators and closes the generator(s) bus breaker to provide the configured amount of power. In *Mains Mode*, the module starts the generators and closes the generator(s) bus breaker for peak lopping.
Schedule Period	Determines the repeat interval for the scheduled run. *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
Week	**NOTE: 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
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

2.11 EXPANSION

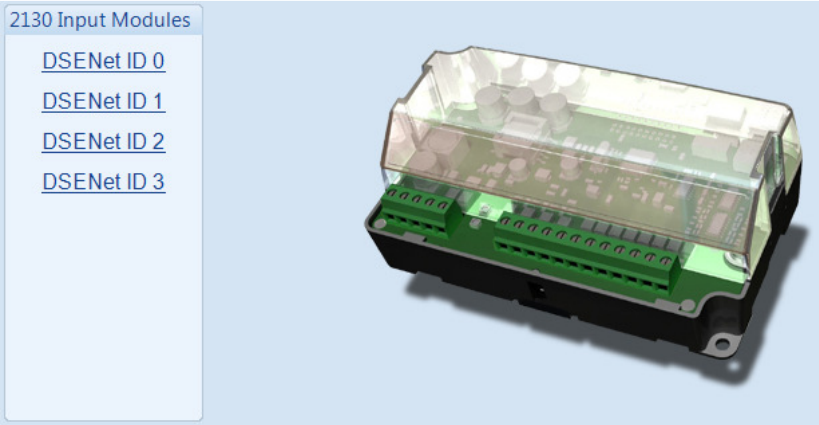
The *Expansion* page is subdivided into smaller sections.
Select the required section with the mouse.



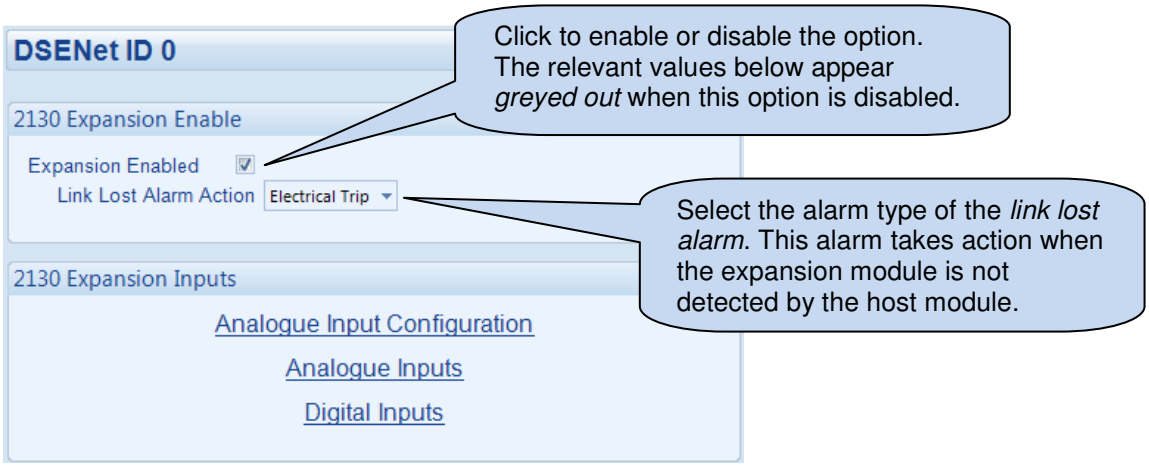
See overleaf for description of the different expansion modules.

2.11.1 2130 INPUT MODULES

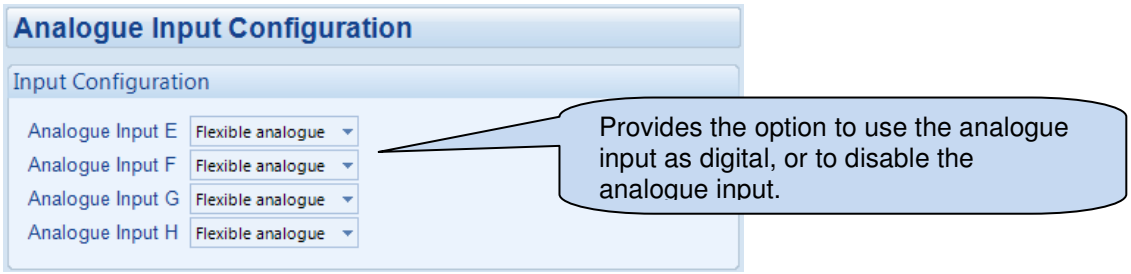
Select the desired DSENet ID of the input expansion to configure.



The following is then shown:

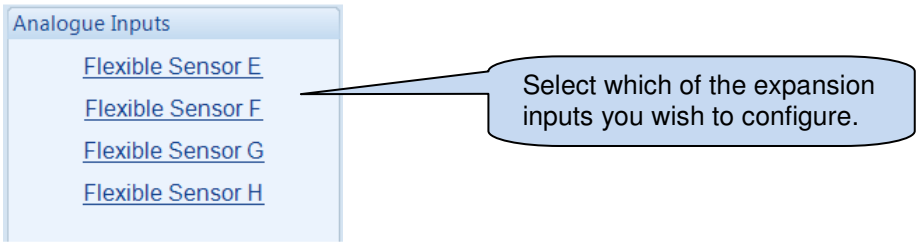


2.11.1.1 ANALOGUE INPUT CONFIGURATION (E-H)



Parameter	Description
Analogue Input	Select the sensor type from a pre-defined list: ***Digital input:*** The input is configured as digital input ***Flexible analogue:*** The input is configured as flexible analogue input ***Not used:*** The input is not used

2.11.1.2 ANALOGUE INPUTS



2.11.1.3 FLEXIBLE SENSOR (E-H)

Used as an Analogue Input

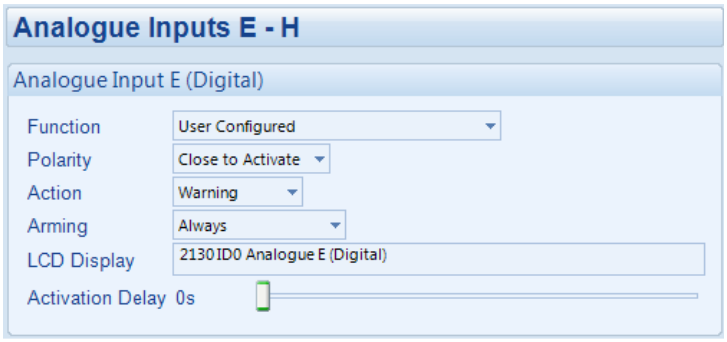
Parameters are detailed overleaf…

Parameter	Description

Sensor Type	Select the sensor type from a pre-defined list: ***Pressure:*** The input is configured as a pressure sensor ***Percentage:*** The input is configured as a percentage sensor ***Termperature:*** The input is configured as a temperature sensor
Sensor Name	Enter the *Sensor Name*, this text is shown on the module display when a sensor alarm activates or to view the sensor by its name in the scada.
Input Type	Select the sensor type and curve from a pre-defined list or create a user-defined curve
Alarm Arming	Select when the input becomes active: ***From Safety On:*** The state of the input is monitored from the end of the *Safety On Delay* timer ***From Starting:*** The state of the input is only monitored from engaging the crank
Low Alarm Enable	☐ = The Alarm is disabled. ☑ = The *Low Alarm* is active when the measured quantity drops below the *Low Alarm* setting.
Low Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☑ = The *Low Pre-Alarm* is active when the measured quantity drops below the *Low Pre-Alarm* setting. The *Low Pre-Alarm* is automatically reset when the measured quantity rises above the configured *Low Pre-Alarm Return* level.
Low Alarm String	Enter the *Sensor Low Alarm Name*, this text is shown on the module display when the sensor low alarm activates.
High Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☑ = The *High Pre-Alarm* is active when the measured quantity rises above the *High Pre-Alarm* setting. The *High Pre-Alarm* is automatically reset when the measured quantity falls below the configured *High Pre-Alarm Return* level.
High Alarm Enable	☐ = The Alarm is disabled. ☑ = The *High Alarm* is active when the measured quantity rises above the *High Alarm* setting.
High Alarm String	Enter the *Sensor High Alarm Name*, this text is shown on the module display when the sensor high alarm activates.

Used as a Digital Input

(Go to the Analogue Inputs E – H from Digital Inputs subsection when the analogue input is configured as digital).

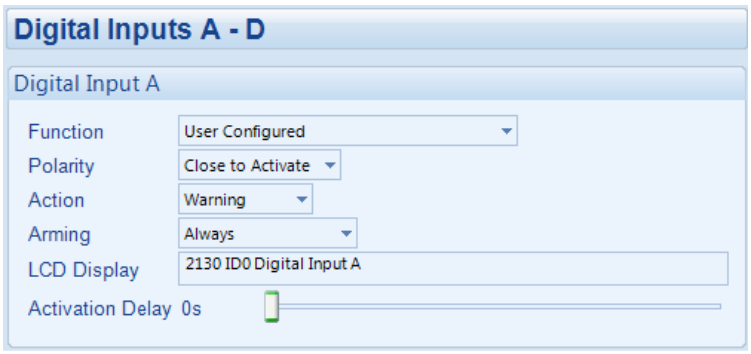


Parameters are detailed overleaf…

Parameter	Description

Funtion	Select the input function to activate when the relevant terminal is energised. See section entitled *Input functions* for details of all available functions
Polarity	Select the digital input polarity: ***Close to Activate:*** the input function is activated when the relevant terminal is connected. ***Open to Activate:*** the input function is activated when the relevant terminal is disconnected.
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Arming	Select when the input becomes active: ***Active From Parallel:*** The input state is only monitored when mains and bus are in parallel ***Always:*** The input state is always monitored ***Never:*** The input is disabled
LCD Display	Enter the input name, this text is shown on the module display when a sensor alarm activates and on the scada when the input's state is to be monitored.
Activation Delay	This is used to give a delay on acceptance of the input. Useful for liquid level switches or to mask short term operations of the external switch device.

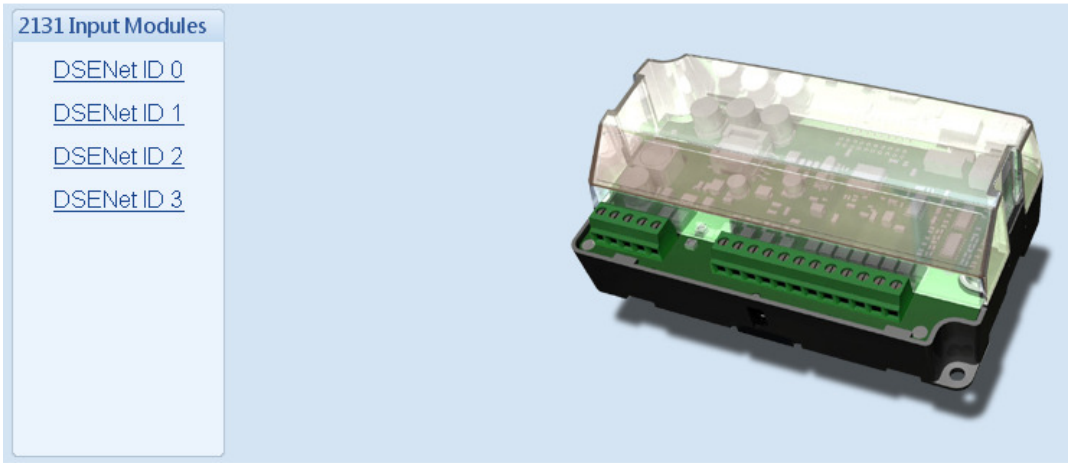
2.11.1.4 DIGITAL INPUTS (A-D)



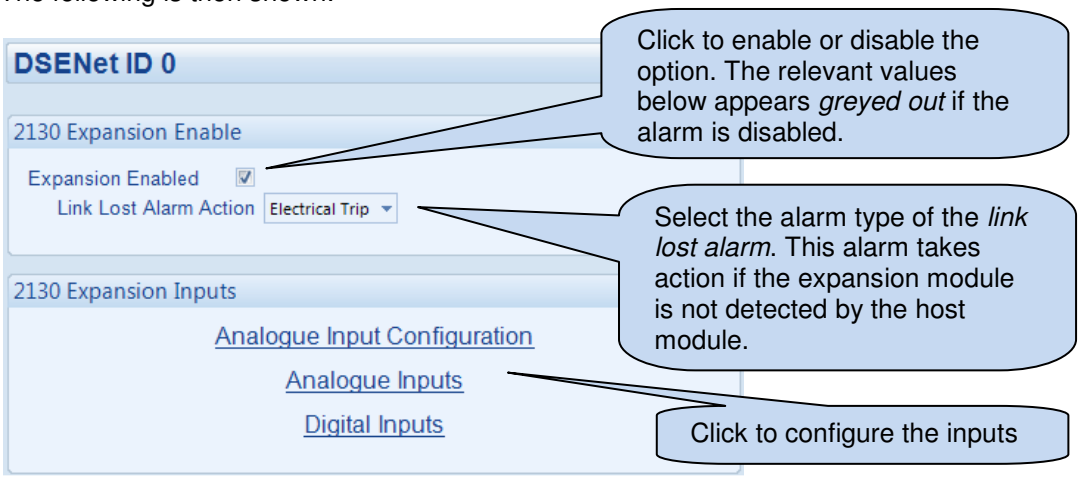
Refer to previous section for parameters details.

2.11.2 DSE2131 RATIOMETRIC EXPANSION INPUT MODULE

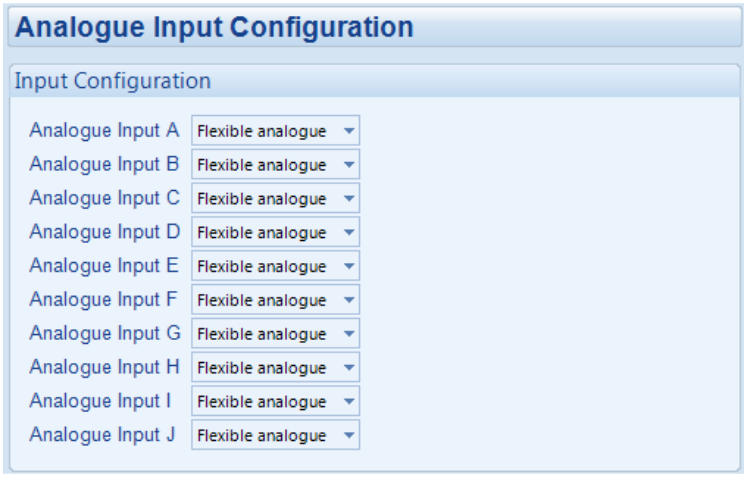
Select the desired DSENet ID of the input expansion to configure. The ID of the expansion input module is set by rotary decimal switch accessible under the removable cover of the device.



The following is then shown:



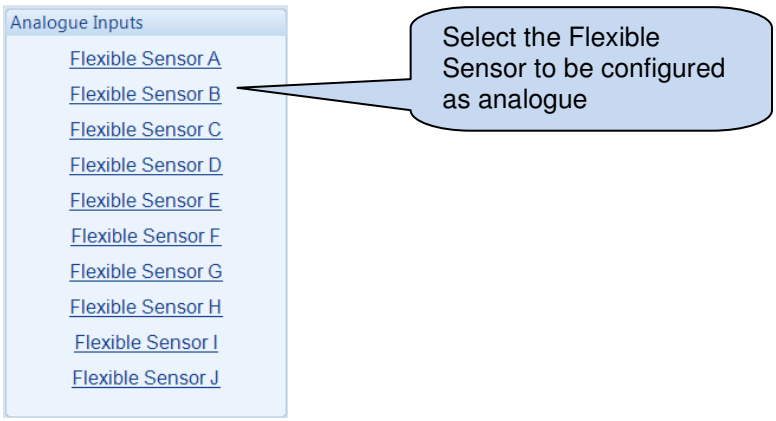
2.11.2.1 ANALOGUE INPUT CONFIGURATION



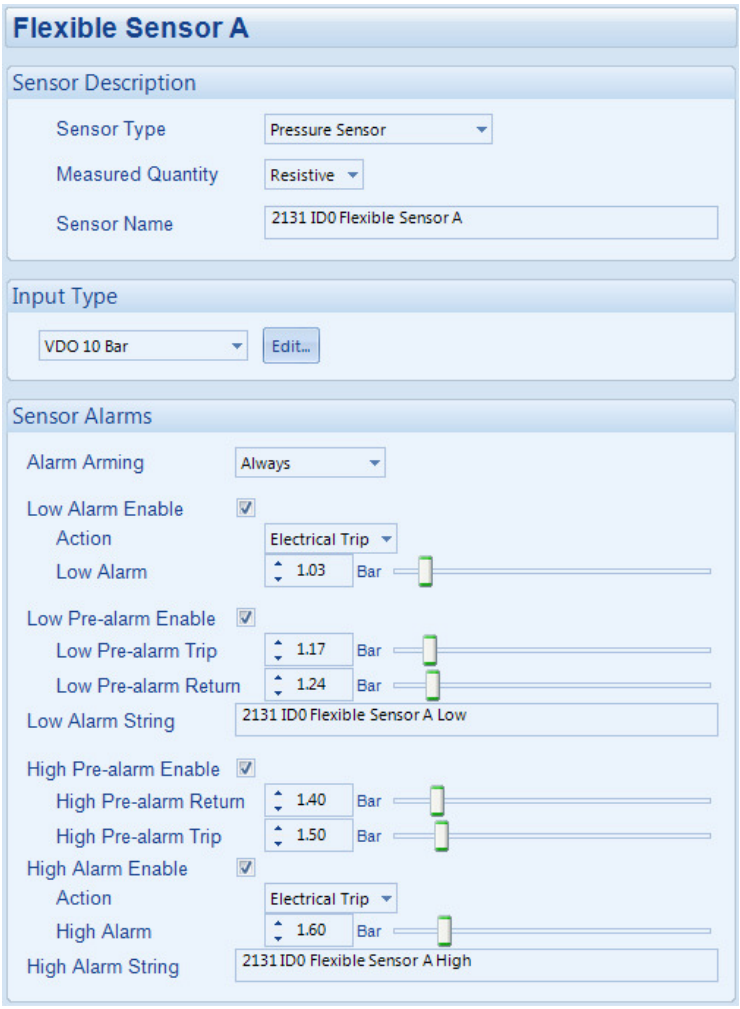
Parameters detailed overleaf...

Parameter	Description
Analogue Input	Select the sensor type from a pre-defined list: ***Digital input:*** The input is configured as digital input ***Flexible analogue:*** The input is configured as flexible analogue input ***Not used:*** The input is not used

2.11.2.2 ANALOGUE INPUTS



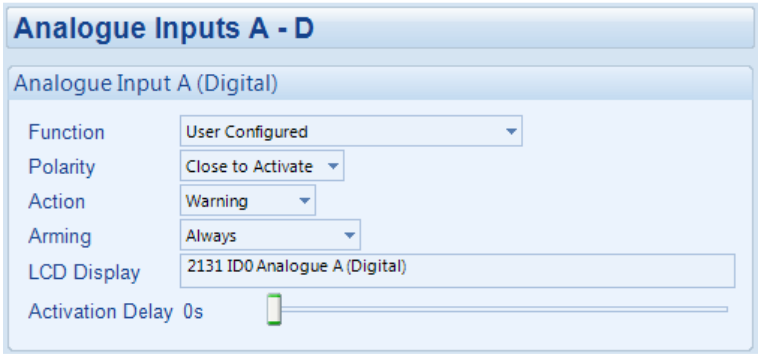
Then configure the flexible sensor.



Parameters detailed overleaf...

Parameter	Description
Sensor Type	Select the sensor type from a pre-defined list: ***Pressure:*** The input is configured as a pressure sensor ***Percentage:*** The input is configured as a percentage sensor ***Termperature:*** The input is configured as a temperature sensor ***Wide Termperature:*** The input is configured as a wide range temperature sensor
Measured Quantity	Select the sensor signal type from a pre-defined list: ***Current:*** for sensors with maximum range of 0 mA to 20 mA ***Resistive:*** for sensors with maximum range of 0 Ω to 480 Ω ***Voltage:*** for sensors with maximum range of 0 V to 10 V
Sensor Name	Enter the *Sensor Name*, this text is shown on the module display when a sensor alarm activates or to view the sensor by its name in the scada
Input Type	Select the sensor type and curve from a pre-defined list or create a user-defined curve
Alarm Arming	Select when the input becomes active: ***Always:*** The input state is always monitored ***From Safety On:*** The state of the input is monitored from the end of the *Safety On Delay* timer ***From Starting:*** The state of the input is only monitored from engaging the crank
Low Alarm Enable	☐ = The Alarm is disabled. ☑ = The *Low Alarm* is active when the measured quantity drops below the *Low Alarm* setting.
Low Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☑ = The *Low Pre-Alarm* is active when the measured quantity drops below the *Low Pre-Alarm* setting. The *Low Pre-Alarm* is automatically reset when the measured quantity rises above the configured *Low Pre-Alarm Return* level.
Low Alarm String	Enter the *Sensor Low Alarm Name*, this text is shown on the module display when the sensor low alarm activates.
High Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☑ = The *High Pre-Alarm* is active when the measured quantity rises above the *High Pre-Alarm* setting. The *High Pre-Alarm* is automatically reset when the measured quantity falls below the configured *High Pre-Alarm Return* level.
High Alarm Enable	☐ = The Alarm is disabled. ☑ = The *High Alarm* is active when the measured quantity rises above the *High Alarm* setting.
High Alarm String	Enter the *Sensor High Alarm Name*, this text is shown on the module display when the sensor high alarm activates.

When the analogue input type is selected as digital, go to the Digital Inputs subsection to configure the relevant input.

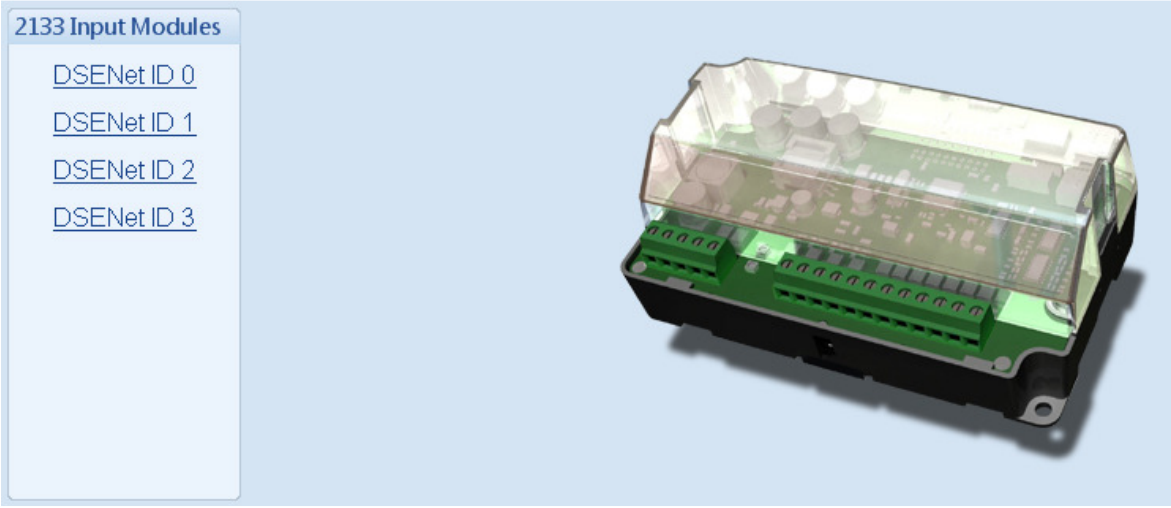


Parameters detailed overleaf...

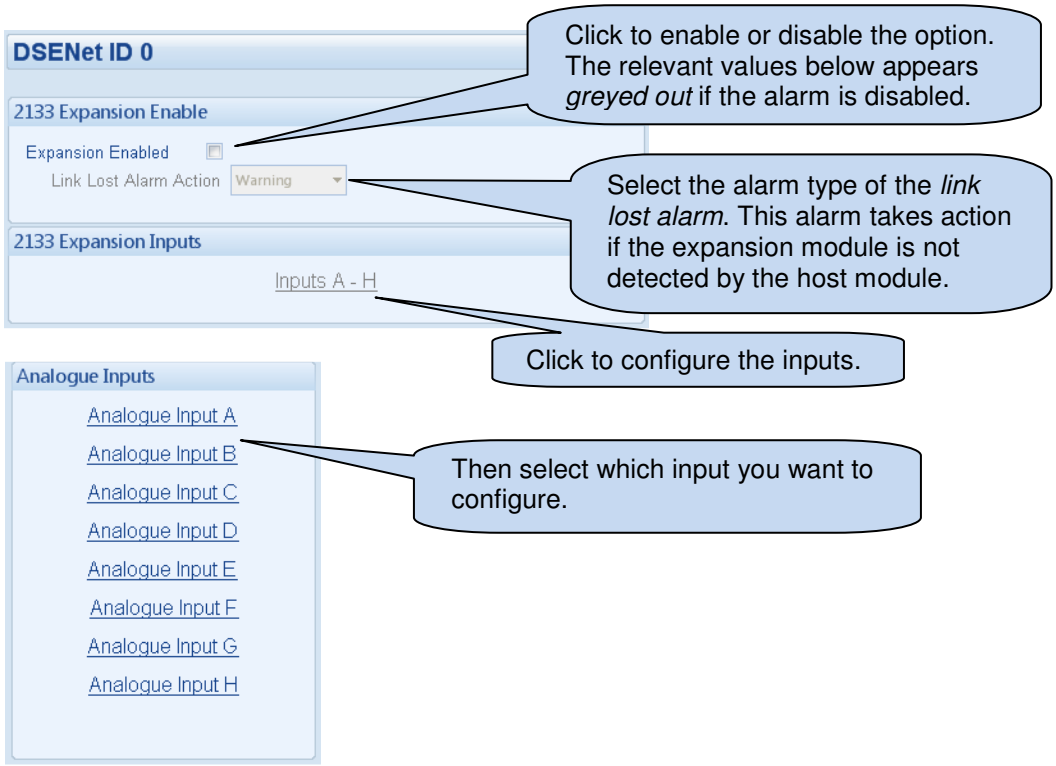
Parameter	Description
Funtion	Select the input function to activate when the relevant terminal is energised. See section entitled *Input functions* for details of all available functions
Polarity	Select the digital input polarity: ***Close to Activate:*** the input function is activated when the relevant terminal is connected. ***Open to Activate:*** the input function is activated when the relevant terminal is disconnected.
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Arming	Select when the input becomes active: ***Active From Parallel:*** The input state is only monitored when mains and bus are in parallel ***Always:*** The input state is always monitored ***Never:*** The input is disabled
LCD Display	Enter the input name, this text is shown on the module display when a sensor alarm activates and on the scada when the input's state is to be monitored.
Activation Delay	This is used to give a delay on acceptance of the input. Useful for liquid level switches or to mask short term operations of the external switch device.

2.11.3 DSE2133 RTD / THERMOCOUPLE INPUT MODULE

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



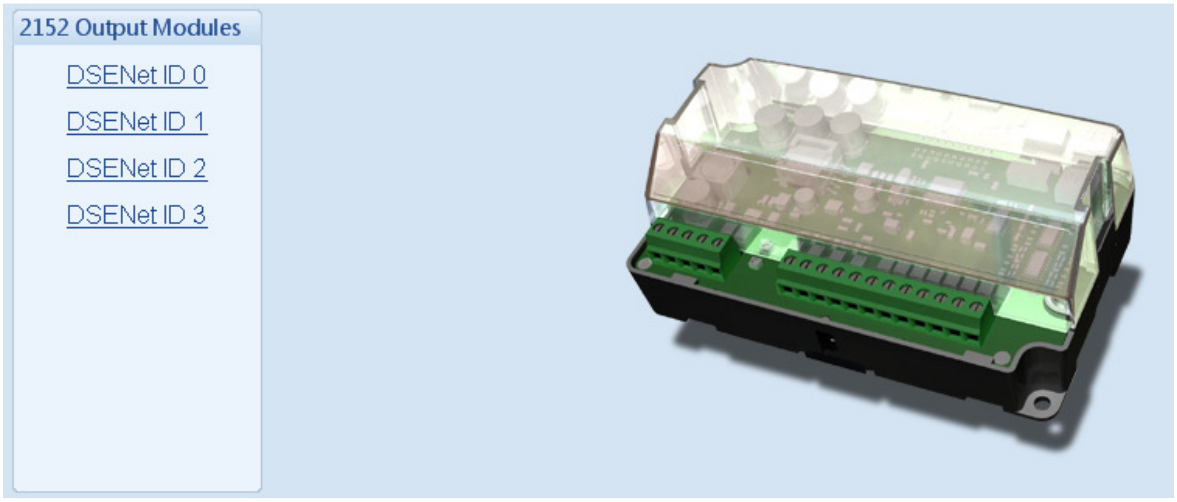
The following is then shown:



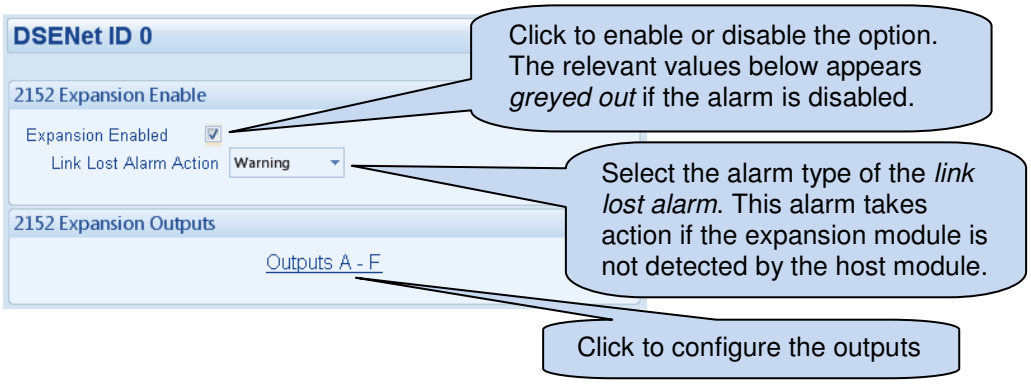
Parameter	Description
Sensor Type	Select the sensor type from a pre-defined list: ***Termperature:*** The input is configured as a temperature sensor ***Wide Termperature:*** The input is configured as a wide range temperature sensor
Sensor Name	Enter the *Sensor Name*, this text is shown on the module display when a sensor alarm activates or to view the sensor by its name in the scada
Input Type	Select the sensor type from the list: Type J, Type K, 2 Wire PT100, and 3 Wire Pt100
Alarm Arming	Select when the input becomes active: ***Always:*** The input state is always monitored ***From Safety On:*** The state of the input is monitored from the end of the *Safety On Delay* timer ***From Starting:*** The state of the input is only monitored from engaging the crank
Low Alarm Enable	☐ = The Alarm is disabled. ☑ = The *Low Alarm* is active when the measured quantity drops below the *Low Alarm* setting.
Low Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☑ = The *Low Pre-Alarm* is active when the measured quantity drops below the *Low Pre-Alarm* setting. The *Low Pre-Alarm* is automatically reset when the measured quantity rises above the configured *Low Pre-Alarm Return* level.
Low Alarm String	Enter the *Sensor Low Alarm Name*, this text is shown on the module display when the sensor low alarm activates.
High Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☑ = The *High Pre-Alarm* is active when the measured quantity rises above the *High Pre-Alarm* setting. The *High Pre-Alarm* is automatically reset when the measured quantity falls below the configured *High Pre-Alarm Return* level.
High Alarm Enable	☐ = The Alarm is disabled. ☑ = The *High Alarm* is active when the measured quantity rises above the *High Alarm* setting.
High Alarm String	Enter the *Sensor High Alarm Name*, this text is shown on the module display when the sensor high alarm activates.

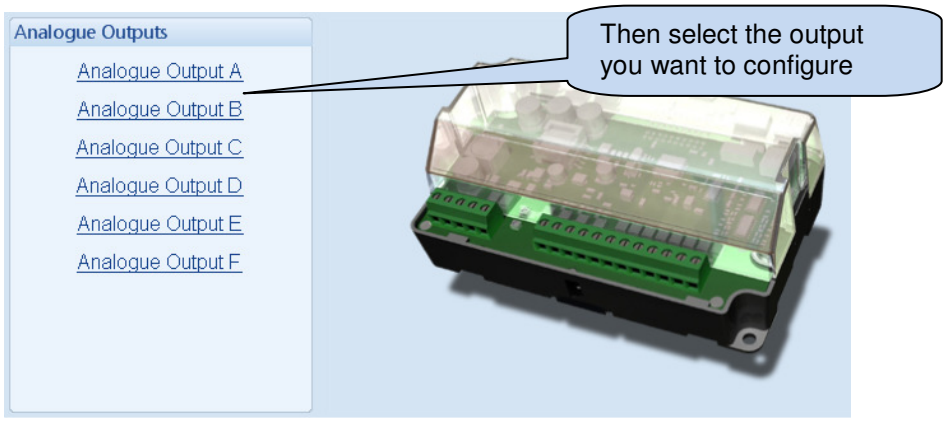
2.11.4 DSE2152 ANALOGUE OUTPUT MODULE

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



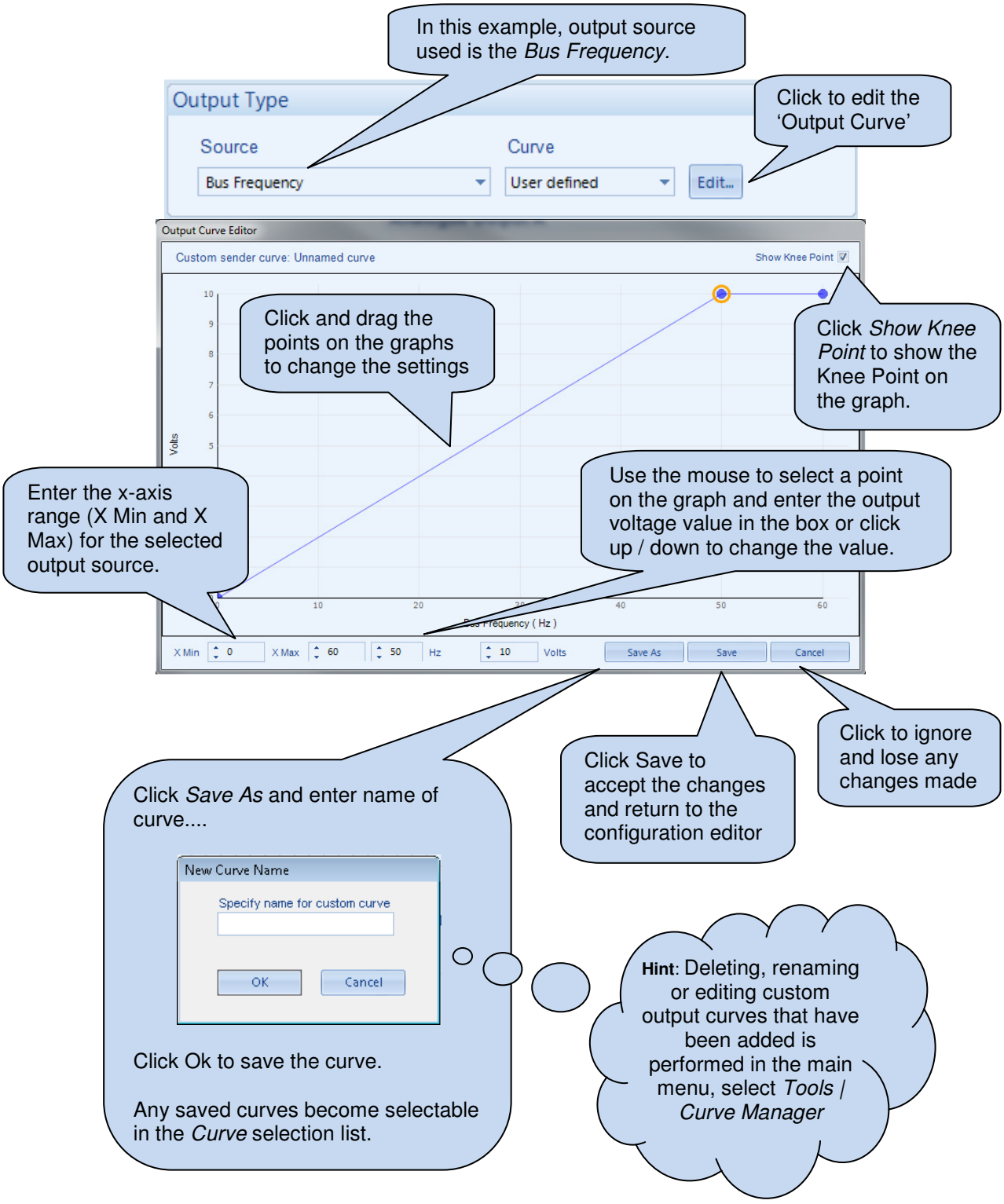
The following is then shown:





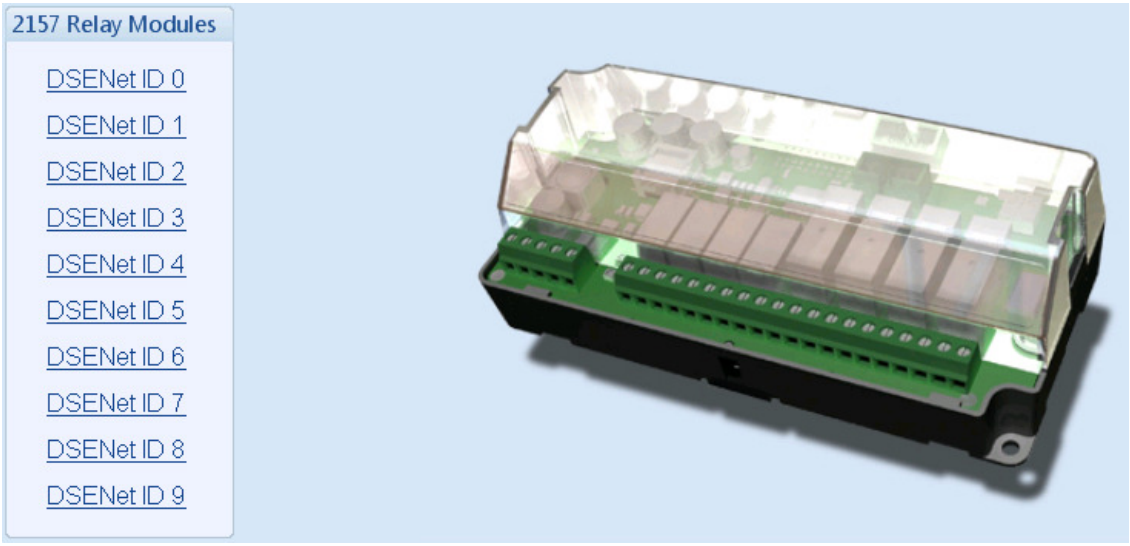
Parameter	Description
Channel Type	Select the required function of the output. Available channel types are 0-10V or 4-20mA.
Channel Name	Name the output appropriately.
Source	Select which measured parameter is to be used to drive the output channe.

2.11.4.1 EDITING THE OUTPUT CURVE

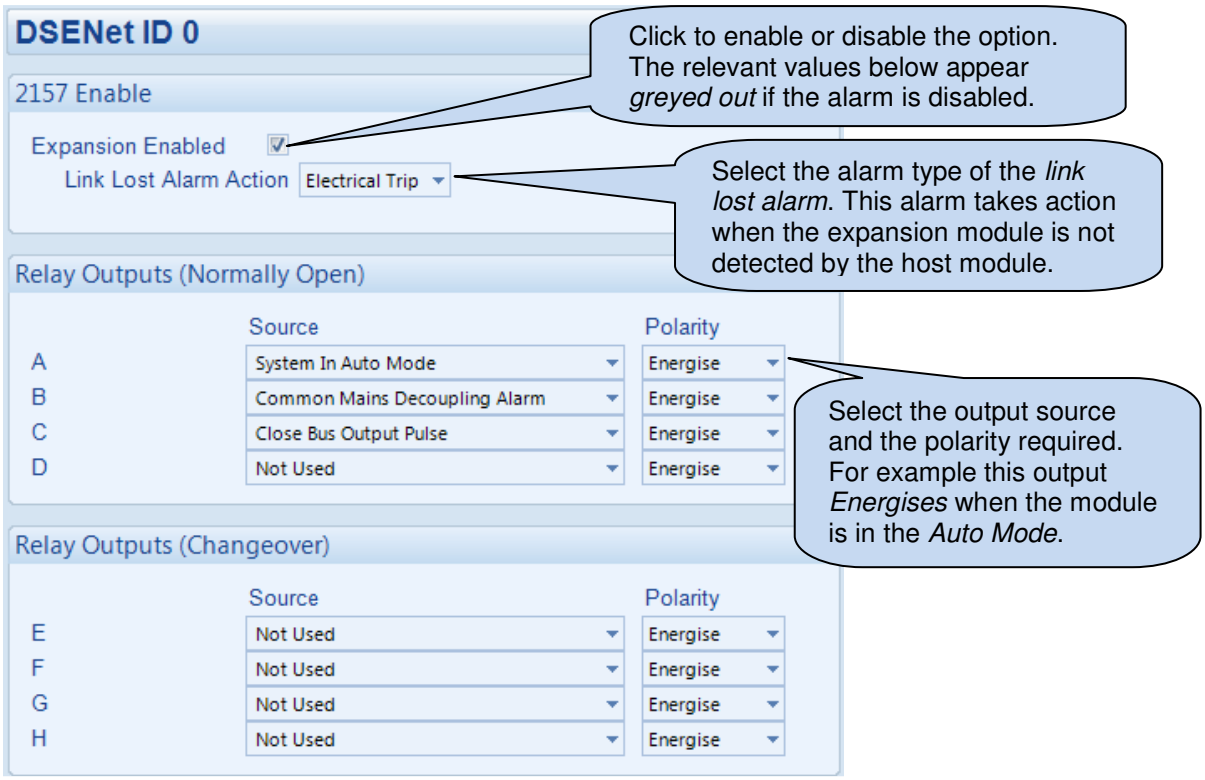


2.11.5 2157 RELAY MODULES

Select the desired DSENet ID of the relay expansion to configure.



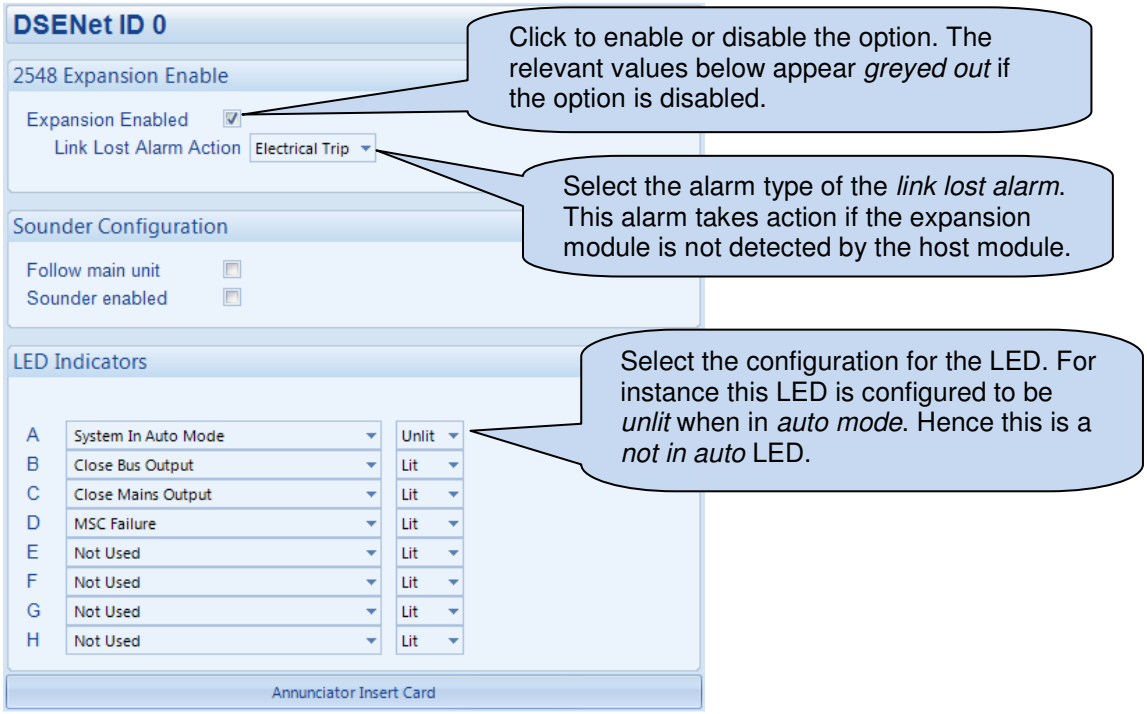
The following is then shown:



2.11.6 2548 LED EXPANSION

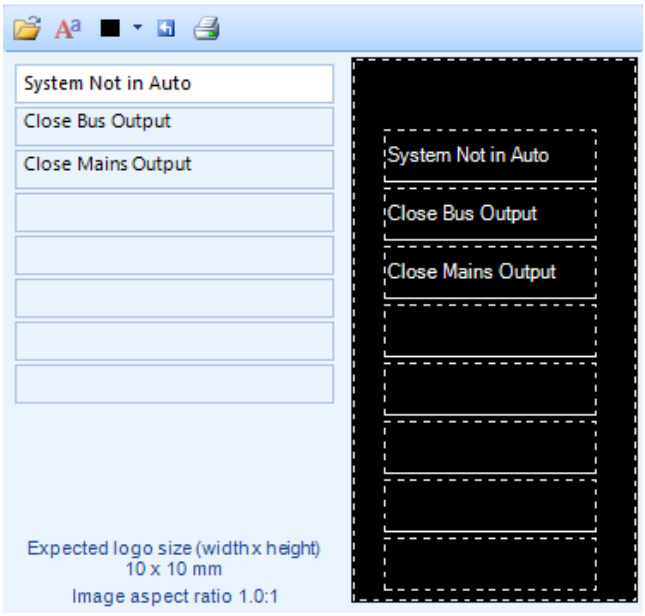
Select the desired DSENet ID of the LED expansion to configure.

The following is then shown:



Parameter	Description
Follow main unit	☐ = If the *mute / lamp test* button is pressed, other DSE2548 modules and the host module does not respond to this. ☑ = If the *mute / lamp test* button is pressed, other DSE2548 modules configured to *Follow main unit* and the host module also lamp test / mute their alarm and vice-versa.
Sounder enabled	☐ = Disable the expansion module's internal sounder. ☑ = Enable the expansion module's internal sounder.
Function	Allows the user to select functions from the host module's user configurable output functions for the LED indicators. For details of possible selections, please see section entitled *Output sources* elsewhere in this document.
Annunciator Insert Card	Opens the insert card print box

When the *Annunciator Insert Card* is pressed the following box appears for custom text print.

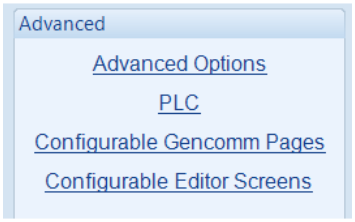


The toolbar commands are detailed overleaf.

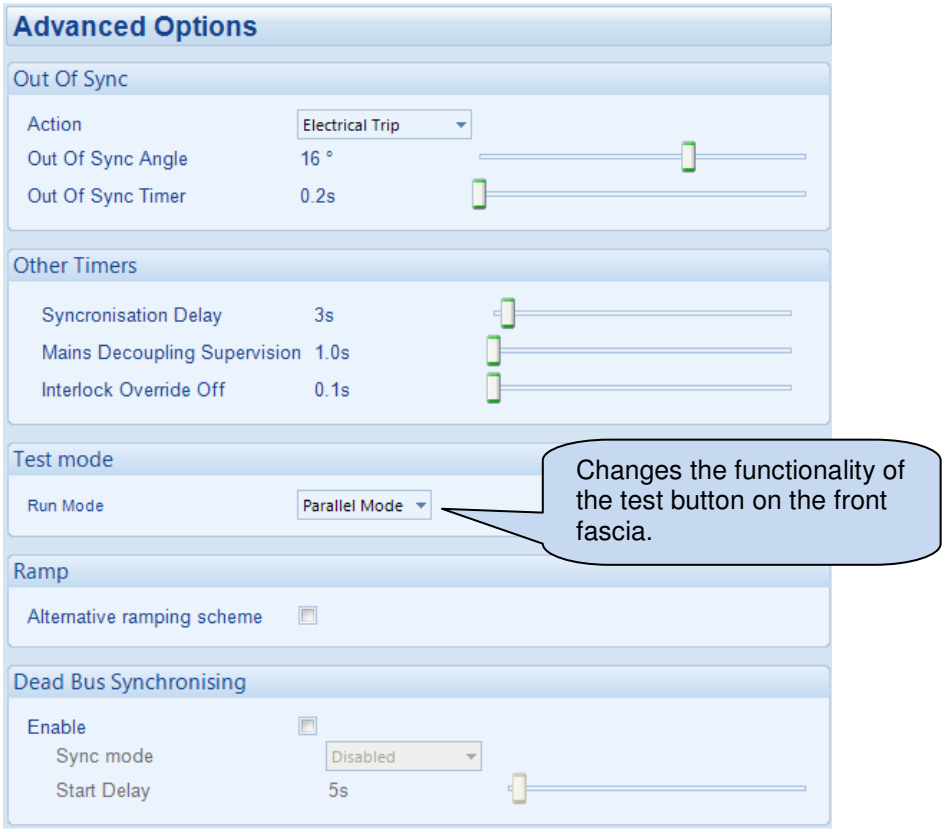
Parameter	Description
	Allows the user to choose and print an image for the logo insert
	Allows the user to change the text font
	Allows the user to change the background colour
	Allows the user to return the text font and background colour to default
	Allows the user to print the text insert card

2.12 ADVANCED

These settings are provided for *advanced* users only. Take care when changing these options and ensure you fully understand the consequences of any change made.



2.12.1 ADVANCED OPTIONS



Parameters are detailed overleaf…

2.12.1.1 OUT OF SYNC

NOTE: Refer to DSE publication: 056-047 Out of Sync and Failed to Close which is found on our website: www.deepseaplc.com for more information.

Options	Description
Action	Select the type of alarm required from the list: ***Auxiliary Mains Fail*** ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Out of Sync Angle	The DSE8660 MKII monitors the phase angle of both supplies mains and bus when they are in parallel, the alarm activates when the phase angle increases above the *Out of Sync Angle* for longer than the configured *Out of Sync Timer*.

During parallel operation, the phase of both supplies is monitored. Being in parallel means that this phase angle is zero degrees (0º).

If the angle exceeds the *Out of Sync Angle* for longer than the duration of the *Out of Sync Timer*, an electrical trip alarm is generated opening the bus breaker.

TROUBLESHOOTING

This sections describes the most common causes for an *Out of Sync* alarm:

- The *Bus Sensing* connections have not been made between the bus and the DSE module, or the bus sensing fuses have blown or have been removed.
- The load switching device does not close quickly enough. Ensure the breaker closes within 100mS of receiving the close signal.
- The *Out of Sync* timer is set too low. If you raise this timer away from the factory setting of 200mS (0.2s), ensure you understand why you are raising it!
- Something external has caused the breaker to open, or has prevented it from closing. Typical examples are external G59 relays and other equipment operating directly on the breaker to open it.
- The breaker wiring 'logic' may not be correct, causing the breaker to 'fire through', where it triggers the close mechanism, but the breaker doesn't actually mechanically close, it re-opens again.

2.12.1.2 OTHER TIMERS

Options	Description
Synchronisation Delay	Delays the synchronising process to allow the set to stabilise and power parasitic loads or transformers (for instance) before the synchronising process begins.
Mains Decoupling Supervision	Delays the activation of the inbuilt 8600 Mains Decoupling detection when bus and mains are in parallel. Upon closing into parallel, the timer is activated. After the timer has expired, the mains decoupling protection becomes live.
Interlock override off	Timer to delay the re-assertion of the interlock override. It activates when a breaker is opened. After the expiry of this timer the *Interlock Override* output fuction will be de-energised.

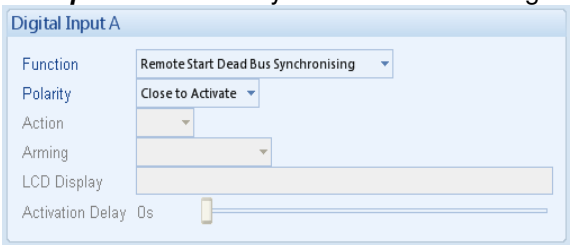
2.12.1.3 TEST MODE

Options	Description
Island Mode	When in *Test Mode*, the module performs the start sequence and transfer the load to the generator. The mains breaker is left open and the generator(s) is (are) to run in island mode.
Parallel Mode	When in *Test Mode*, the module performs the start sequence and synchronises the generators to the mains to allow parallel operation; peak lopping when set to Mains mode, or export from generators when in Bus mode.

2.12.1.4 RAMP

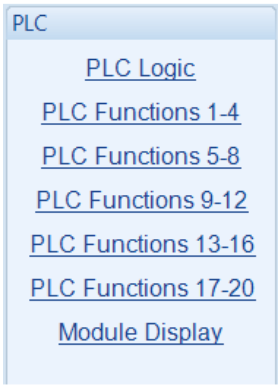
Options	Description
Alternative ramping scheme	☐ = In Bus mode, when the Mains returns, the bus ramps up to the parallel load level, then ramp off to the Mains. ☑ = In Bus mode, when the Mains returns, the bus ramps down from its actual load level, and load the Mains

2.12.1.5 DEAD BUS SYNCHRONISING

Options	Description
Enable	☐ = All synchronising is performed 'the traditional' way by achieving a slip frequency and waiting for the voltage, frequency and phase to be within configured windows ☑ = The Dead Bus Synchronising feature is activated as configured below.
Sync mode	***Always*** - Dead bus sync is always used when the generators are required to be on line and in the *Auto Mode* (Dead bus sync does not operate in *Manual Mode* in any circumstance). ***Disabled*** – The feature is not active ***On Input -*** Dead bus sync is used when a digital input is active :  ***On Mains Failure*** – The generators are started in dead bus sync whenever the mains failure occurs.
Start Delay	Time delay used at start up to ensure the start request is not simply a fleeting request.

2.12.2 PLC

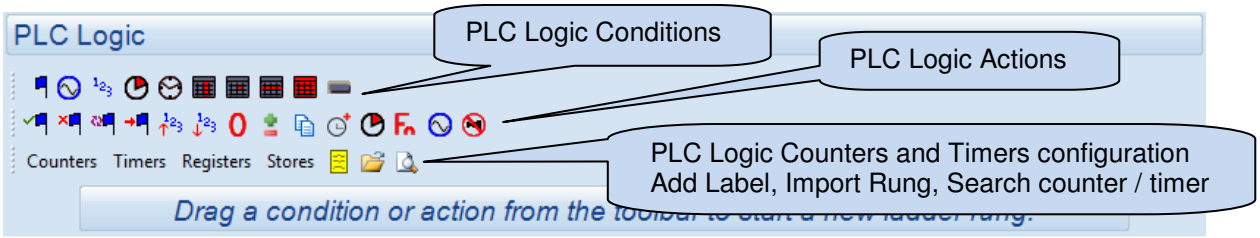
The *PLC* section is subdivided into smaller sub-sections.



2.12.2.1 PLC LOGIC

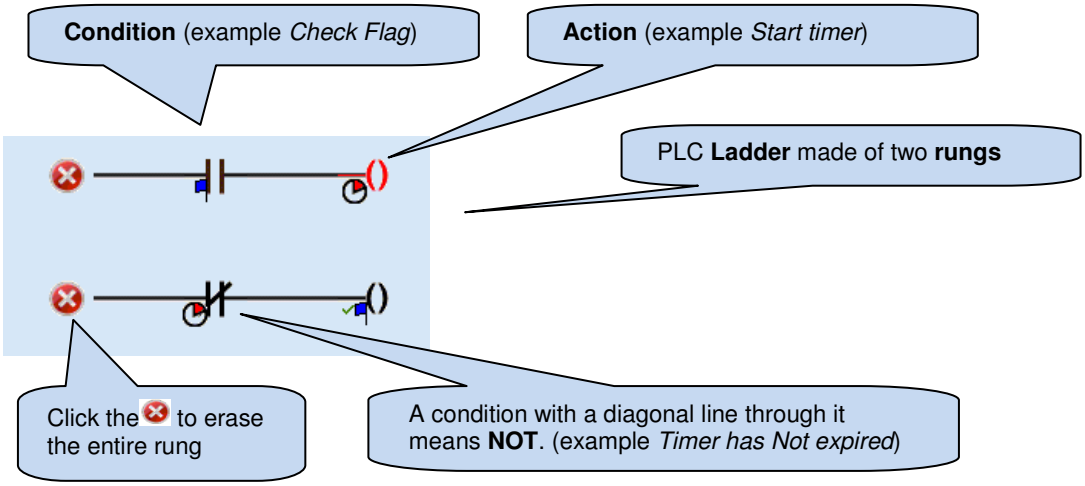
NOTE: For further details and instructions on PLC Logic and PLC Functions, refer to DSE Publication: *057-175 PLC Programming Guide* which is found on our website: *www.deepseaplc.com*

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*.

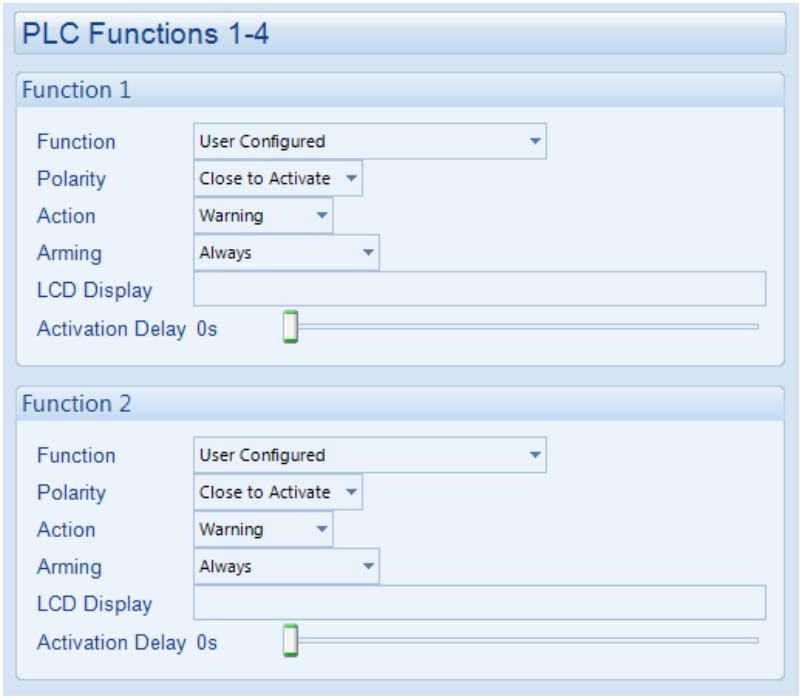
For instance if the conditions in the rung are met, the action takes place.



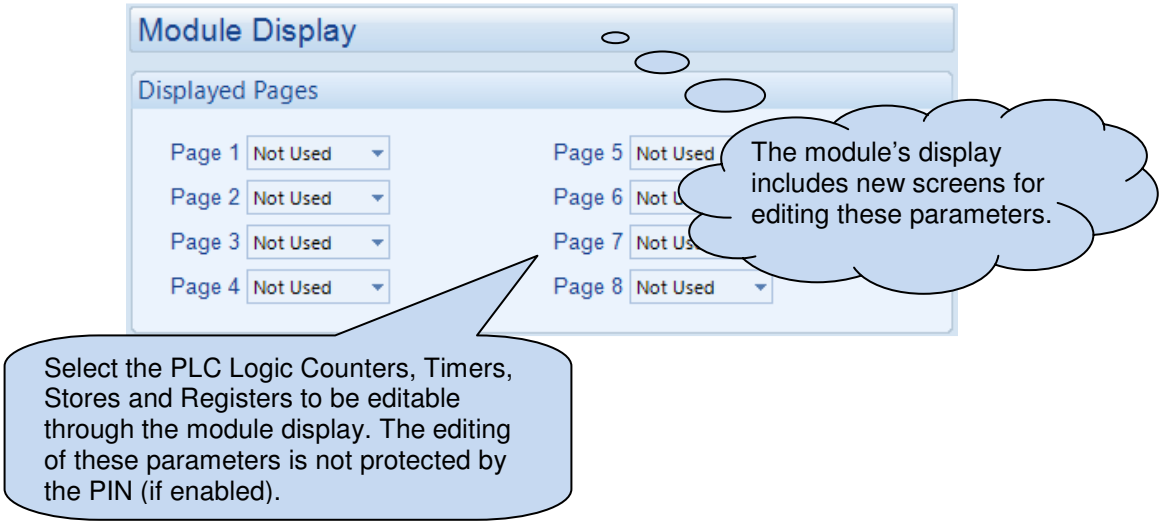
2.12.2.2 PLC FUNCTIONS

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*

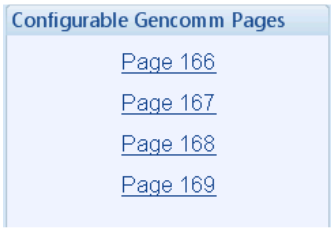
PLC Functions allow the PLC logic to create alarm conditions or drive 'virtual inputs' on the controller. A PLC function is configured in the same way as a module digital input.



2.12.2.3 MODULE DISPLAY

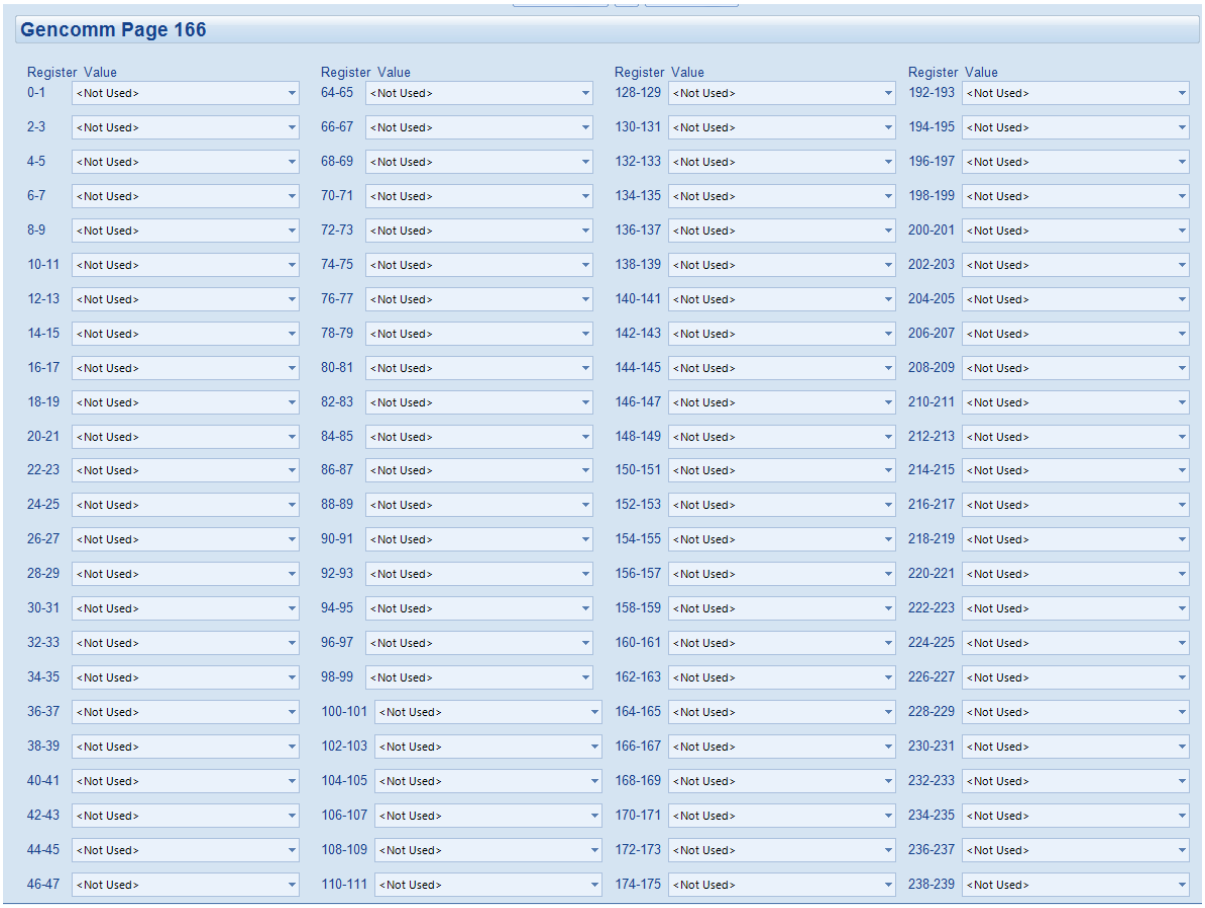


2.12.3 CONFIGURABLE GENCOMM PAGES



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.

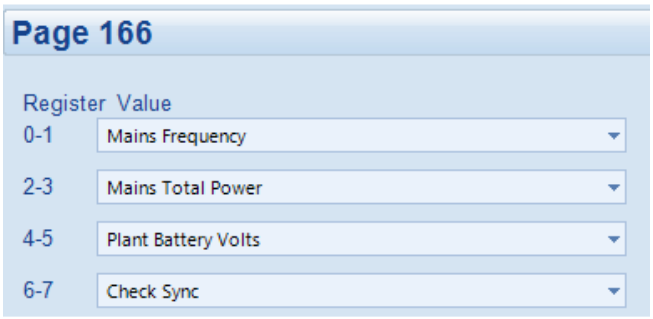
All configurable Gencomm registers are 32-bit unsigned format.



The configurable modbus pages are:

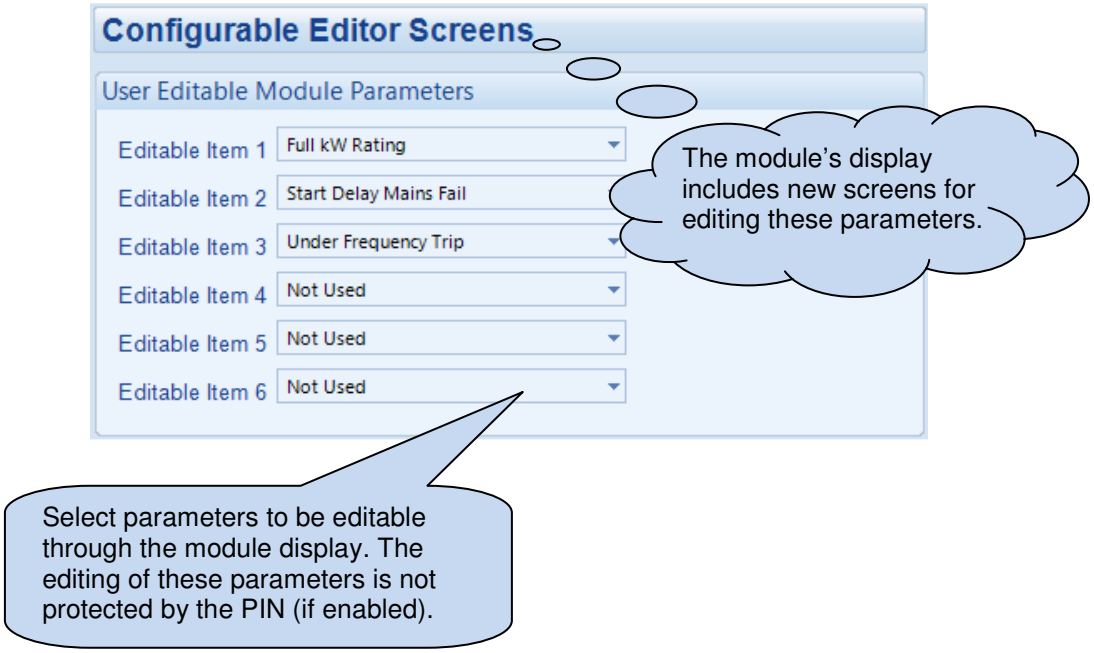
Page	Hex address	Decimal address
166	A600	42496
167	A700	42752
168	A800	43008
169	A900	43264

Example of Gencomm page configuration:



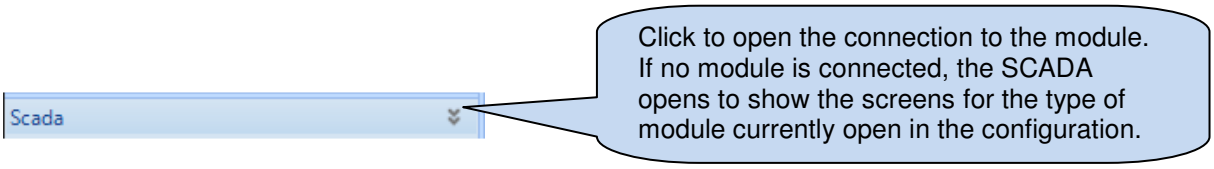
The register address is obtained from the formula:
register_address=page_number*256+register_offset.
To read the *Engine Speed* from the above register, the Modbus master device needs to read the data in two registers and then combine the data from the Most Signficant Bit and the Least Significant Bit.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

2.12.4 CONFIGURABLE EDITOR SCREENS

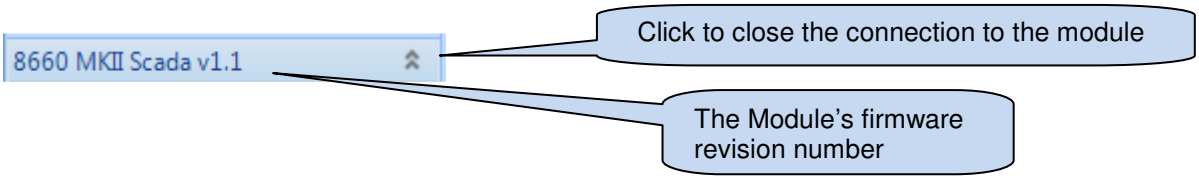


3 SCADA

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 / controlling the generator set.
As a service tool, the SCADA pages are to check the operation of the controller's inputs and outputs as well as checking the generators operating parameters.



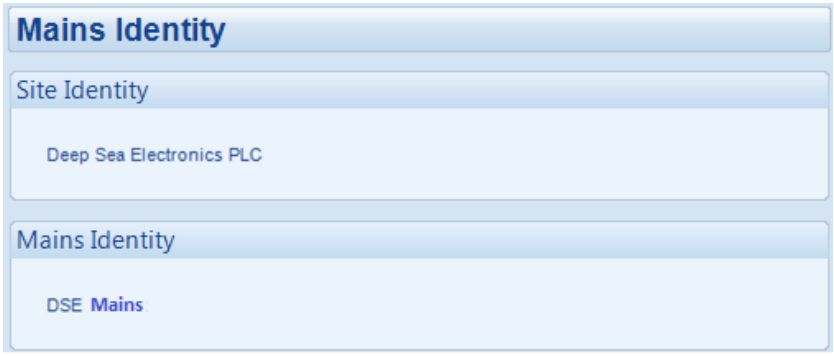
When connection is made…



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

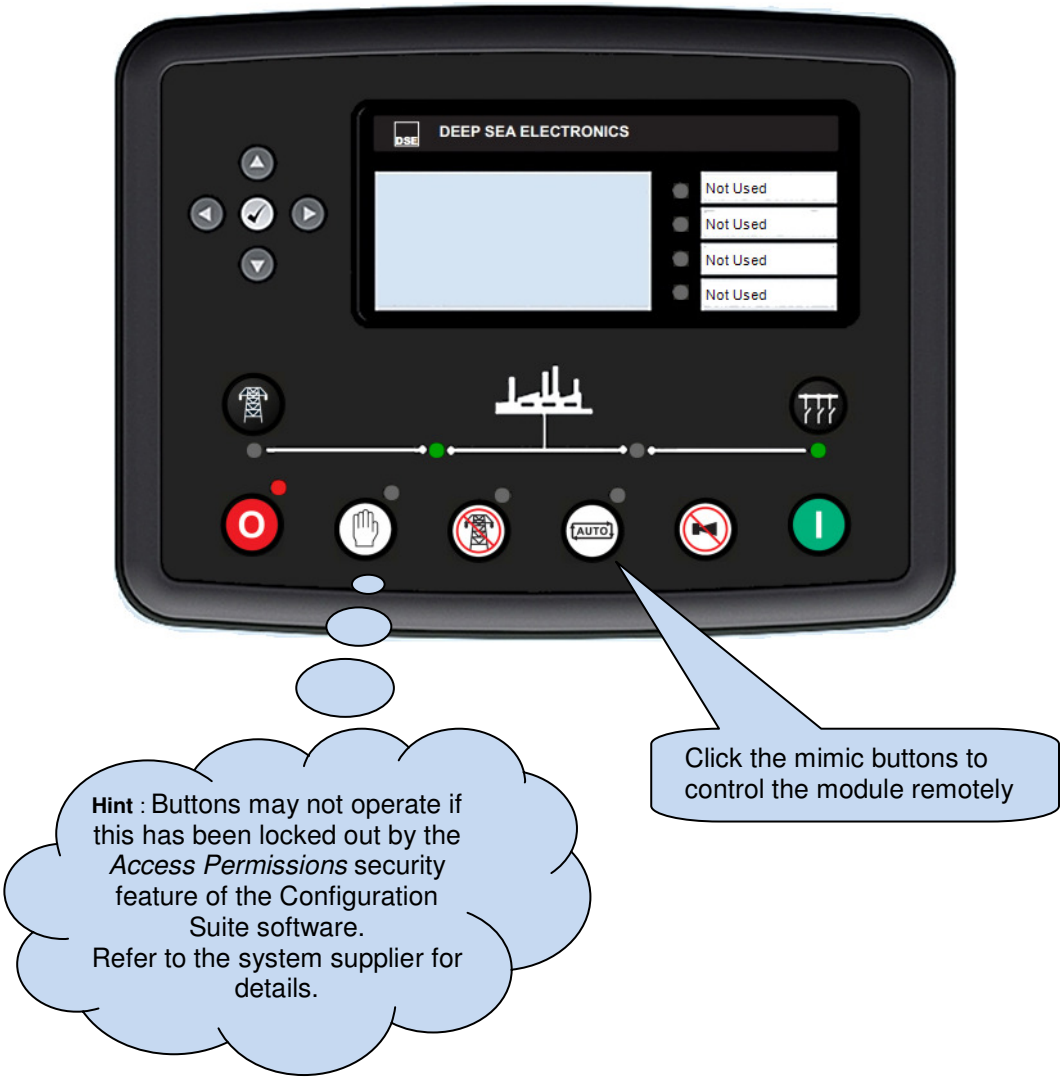
3.1 MAINS IDENTITY

Shows the module's current settings for *Site ID* and *Mains ID*

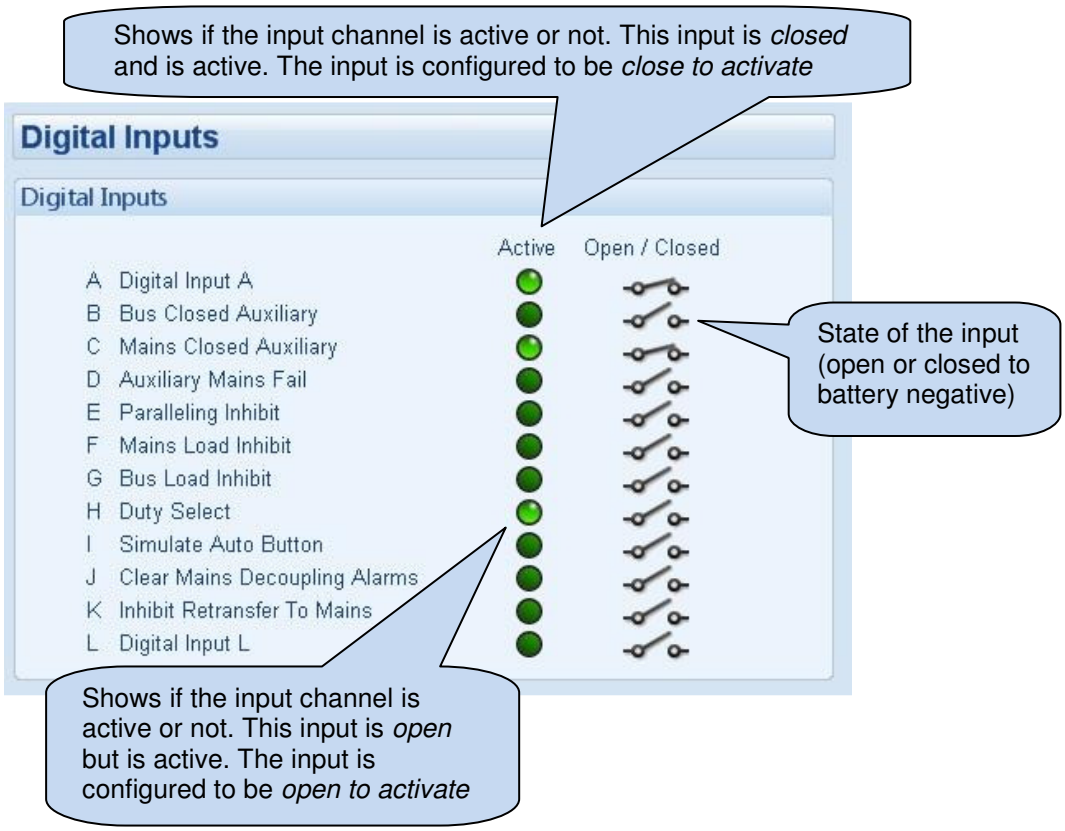


3.2 MIMIC

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



3.3 DIGITAL INPUTS



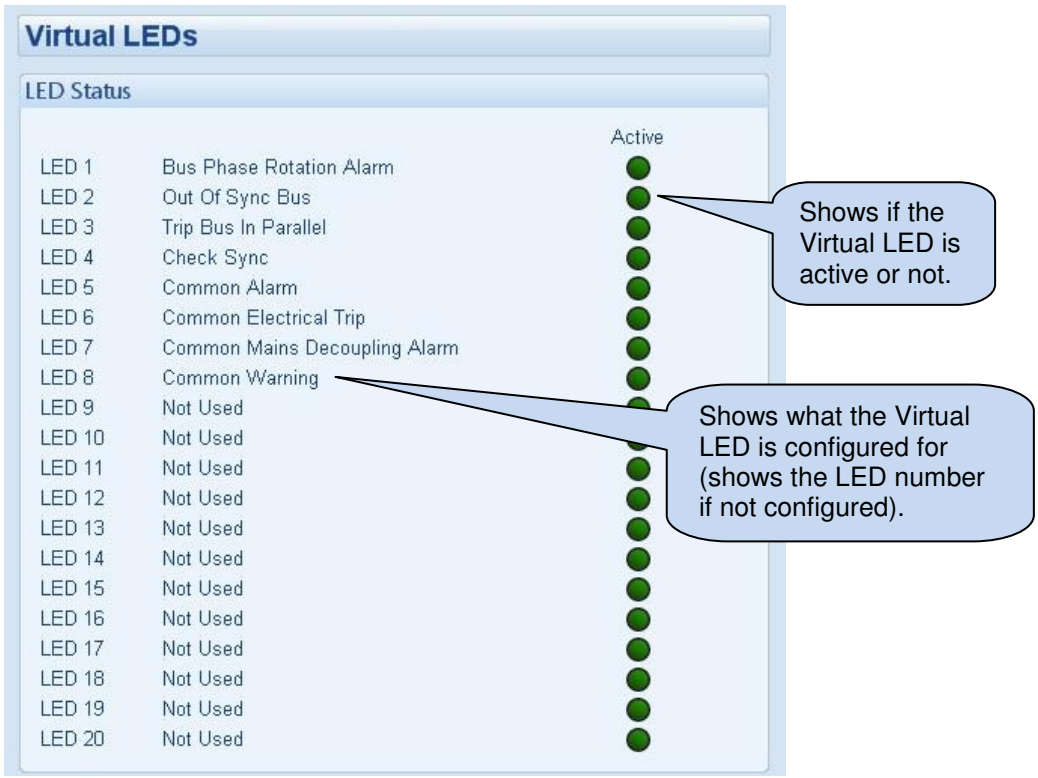
3.4 DIGITAL OUTPUTS

State of the output (open or closed)

Shows if the output channel is active or not. This output is *closed* and active. The output is configured to be *Bus Live energise.* As the relay is normally opened (N/O) and the Bus is live, the output is *activated*.

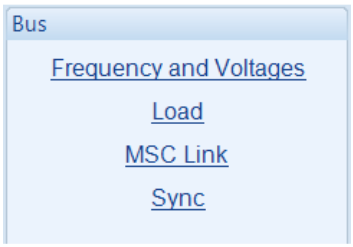
3.5 VIRTUAL LEDS

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 to show status and appear only in the SCADA section of the configuration suite, or read by third party PLC or Building Management Systems (for example) using the modbus RTU protocol.



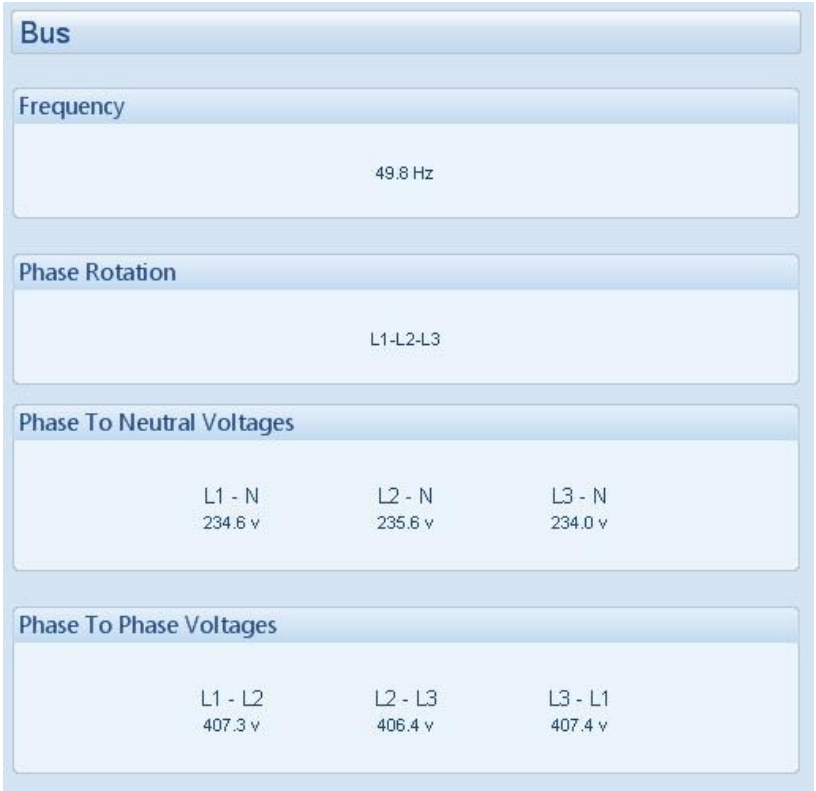
3.6 BUS

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



3.6.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the modules measurements of the bus supply.

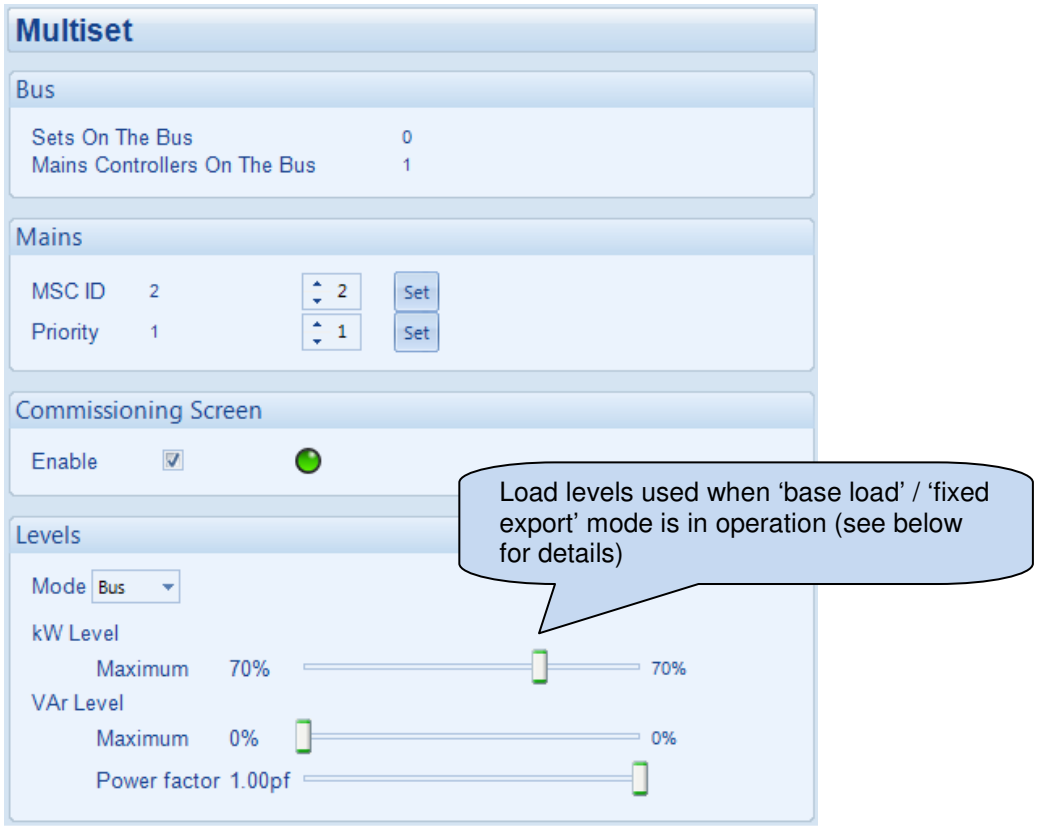


3.6.2 LOAD

Shows the module's measurements of the load.

3.6.3 MSC LINK

NOTE: These settings are not stored in the module configuration. They are stored in a different memory area and not transferred with the configuration. The *Backup Module* feature transfers both the configuration AND the settings of the MSC Link and the Sync page.



3.6.3.1 BUS

Parameter	Description
Sets On The Bus	Shows the number of generator modules currently connected to the MSC link.
Mains Controller On The Bus	Shows if number of mains controllers on the MSC Link.

3.6.3.2 MAINS

Parameter	Description
MSC ID	Set the MSC ID of the module over the MSC link. Each controller connected to the MSC link must have a unique ID. If all the controllers are powered up "one at a time", this DeviceID is automatically set. Powering them up together may result in "ID alarm". Manually setting the DeviceID here prevents this.
Priority	Set Priority used when multiple xx60's are in use.

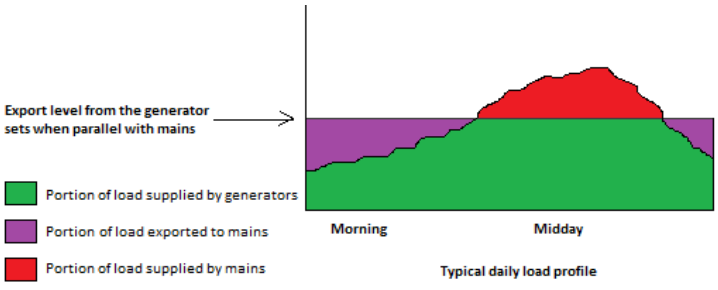
3.6.3.3 COMMISSIONING SCREEN

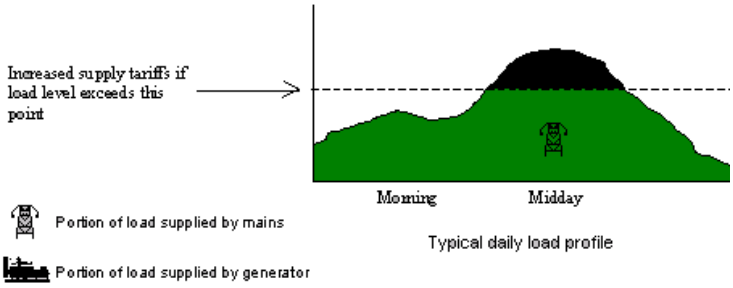
NOTE: For further details and instructions on Commissioning Screen, refer to DSE Publication: *057-284 DSE8660 MKII Operators Manual* which is found on our website: *www.deepseaplc.com*

Parameter	Description
Enable	☐ = Commissioning screens are not shown on the module display ☑ = The commissioning screens are shown at the bottom of the *Bus* section on the module display. These pages are useful for the commissioning and troubleshooting of a load share system.

3.6.3.4 LEVELS

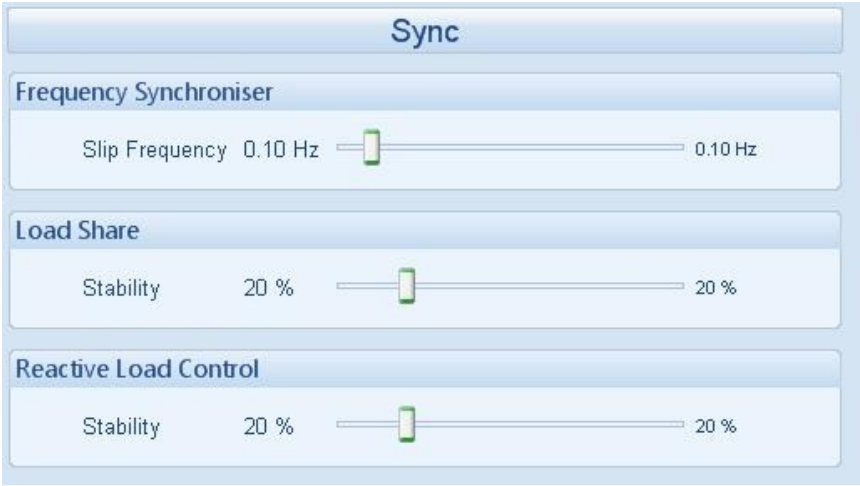
NOTE: For more information about the Bus / Mains Mode level settings and applications, refer to DSE Publication: *056-042 DSE8660 Bus mode or Mains mode* document which is found on our website: *www.deepseaplc.com*

Item	Function
Bus Mode	In this mode, the generator(s) are used to provide a **fixed** amount of active power (kW) when in parallel with the mains. With *Bus Mode*, care must be taken with the settings if export to the mains supply is to be avoided. For instance if the *Load parallel power* is set to 100kW and the site load is 75kW, the generator(s) will be exporting 25kW to the mains supply. This figure is a percentage of each generators capacity that is connected to the bus. Therefore, the actual kW varies depending on how many sets are on the bus. The 'load demand start up and shut down scheme' is **disabled** whilst running in parallel with the mains (utility). E.g. on a multi set system where each generator is rated at 500 kW and the Bus *kW level* was set to 50%, each set running would produce 250 kW of power.  Typical daily load profile **NOTE: If the load level is below this setting, then the generator exports power to the mains grid. The DSE8660 MKII internal mains protection is configured to disconnect the bus from the mains.**

Item	Function
Mains Mode	In this mode, the generator(s) are used to provide a **variable** amount of active power (kW), to maintain the mains import/export levels at the configured values. E.g. If the mains load level was set to 250 kW the bus would supply the difference between this figure and total connected load. If the load was lower than this figure then the bus comes off load and the generators performs a controlled stop. Therefore, this setting is also a start level when remote start on load is active.  **NOTE: The generators are never driven to more than 100% of their full load capability. This generates an *insufficient capacity* alarm.**
VAr Maximum Level	The amount of reactive power that the bus produces.
Power Factor Level	The power factor that the bus maintains. **NOTE: At low load levels, it may not be possible to maintain the power factor.**

3.6.4 SYNC

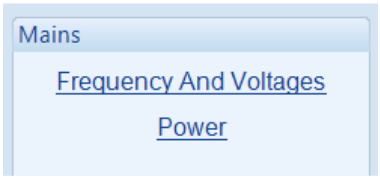
NOTE: These settings are not stored in the module configuration. They are stored in a different memory area and not transferred with the configuration. The *Backup Module* feature transfers both the configuration AND the settings of the MSC Link and the Sync page.



Item	Function
Slip frequency	The difference between mains frequency and the bus frequency. The DSE8660 MKII controller adjusts bus frequency until the frequency difference matches the slip frequency. The phase of the supplies are then drift in and out of synchronism at a rate of 1/slip-frequency times per second. I.e. for Slip frequency of 0.2Hz, the supplies are in phase once every five seconds.
Load Share Stability	In general, lower setting results in a slow kilowatt sharing process, but too high a setting may cause instability (hunting). If this occurs, lower the stability setting.
Reactive Load Stability	In general, lower setting results in a slow power kvar process, but too high a setting may cause instability (hunting). If this occurs, lower the stability setting.

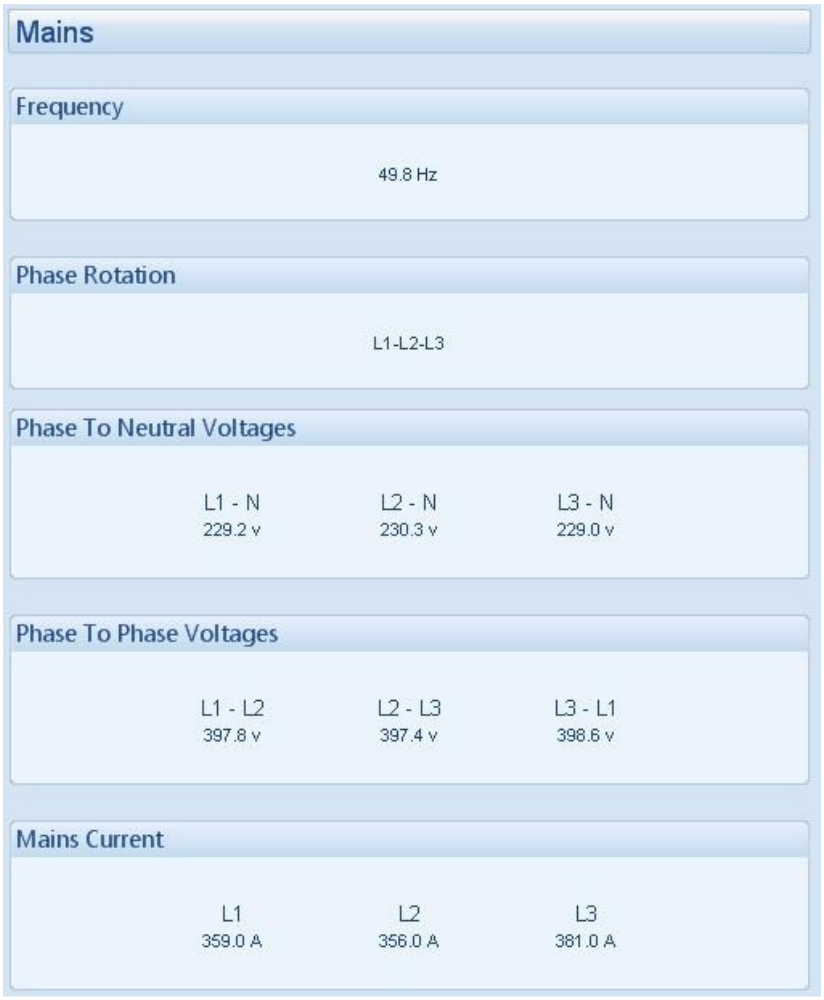
3.7 MAINS

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



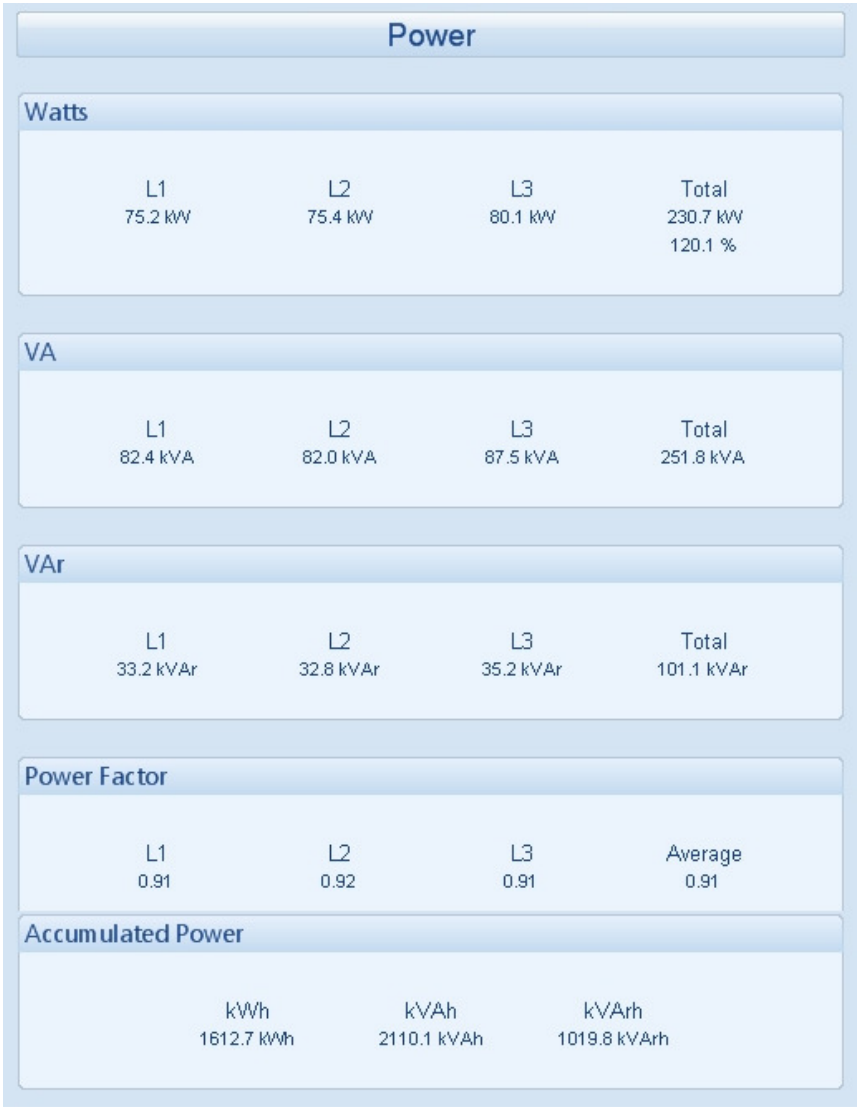
3.7.1 FREQUENCY AND VOLTAGES

Shows the modules measurements for the Mains supply.



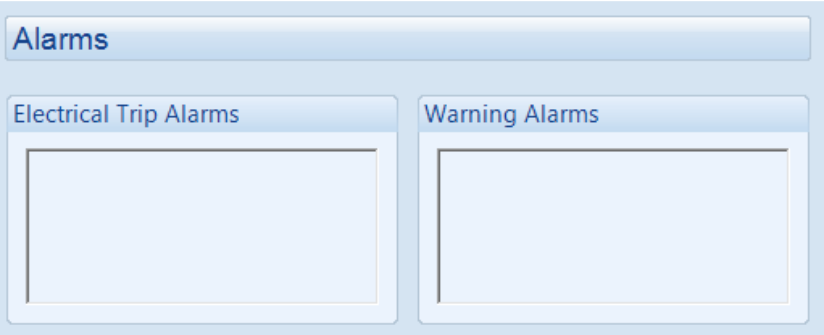
3.7.2 POWER

Shows the measurements for the mains power.



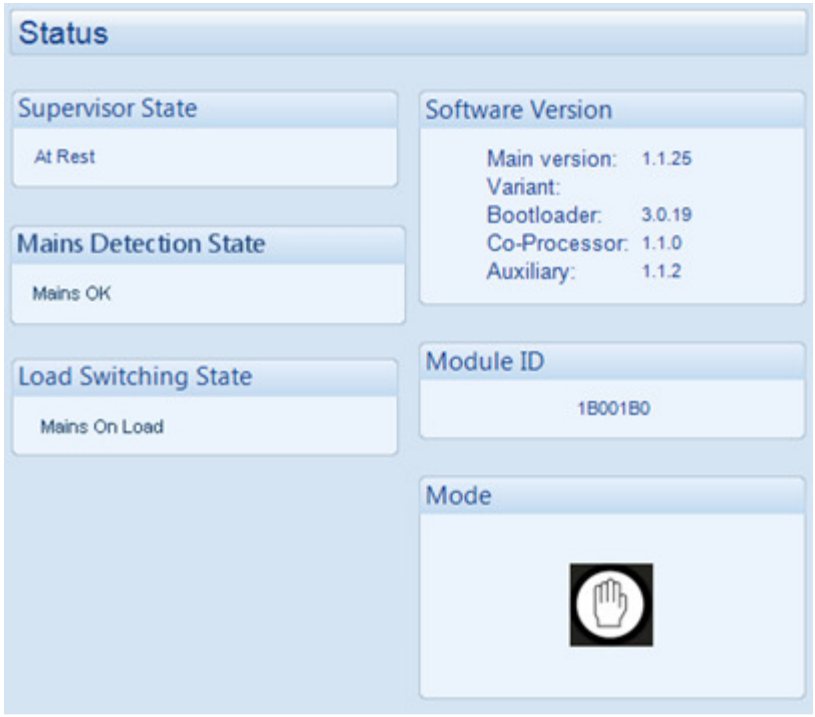
3.8 ALARMS

Shows any present alarm conditions.
For a description of the different alarm types, see the section entitled *Alarm Types* elsewhere in this manual.



3.9 STATUS

Shows the module's current status.



3.10 EVENT LOG

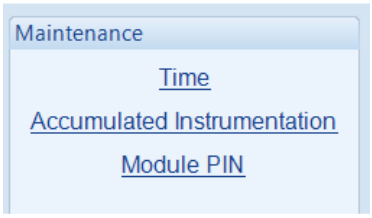
Shows the contents of the module's event log.

3.11 REMOTE CONTROL

The remote control section of the SCADA section is used for monitoring and control of module 'remote control' sources.
Any of the module outputs, expansion outputs, LED indicators, or remote Annunciator LEDs are to be configured to *Remote Control 1-10*. This output source is energised/de-energised by click the respective check box as shown below in the *Activate* column below.

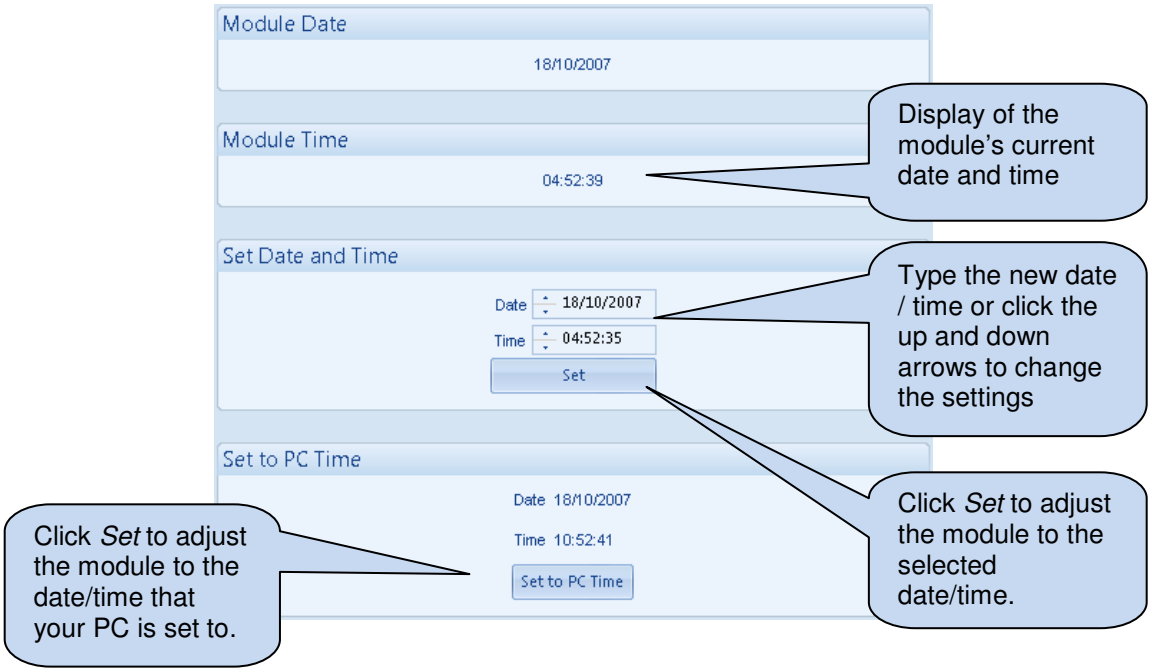
3.12 MAINTENANCE

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



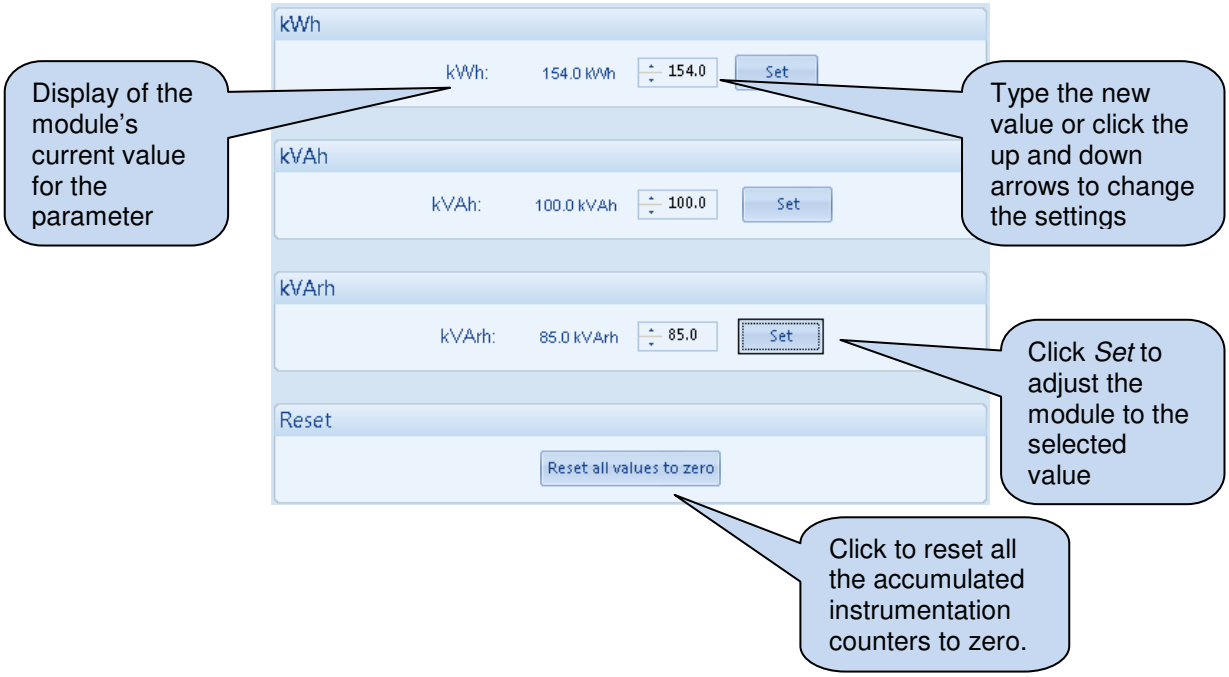
3.12.1 TIME

This section allows the day and time to be set and changed on the controller.



3.12.2 ACCUMULATED INSTRUMENTATION

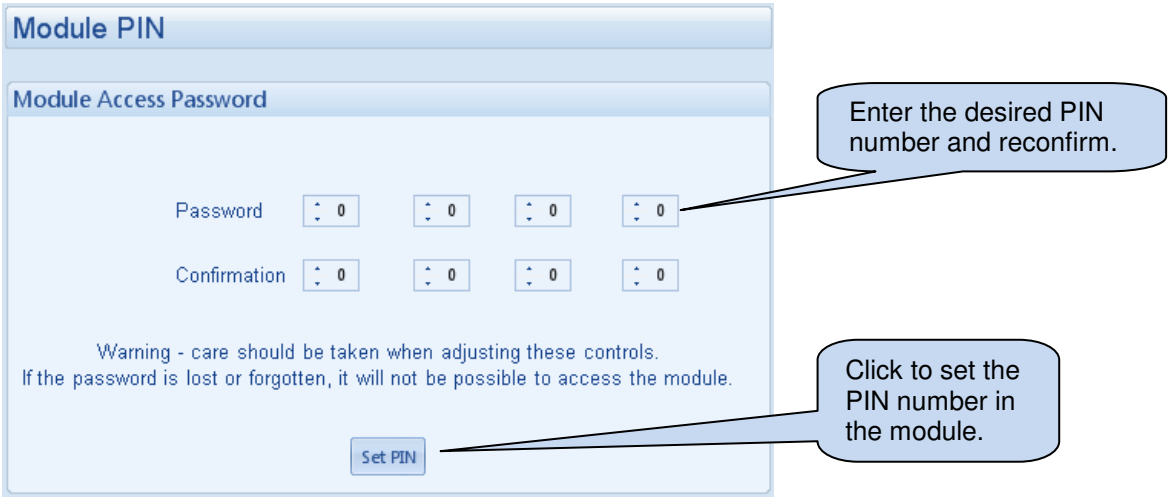
Allows the user to view or change the module's accumulated instrumentation.



3.12.3 MODULE PIN

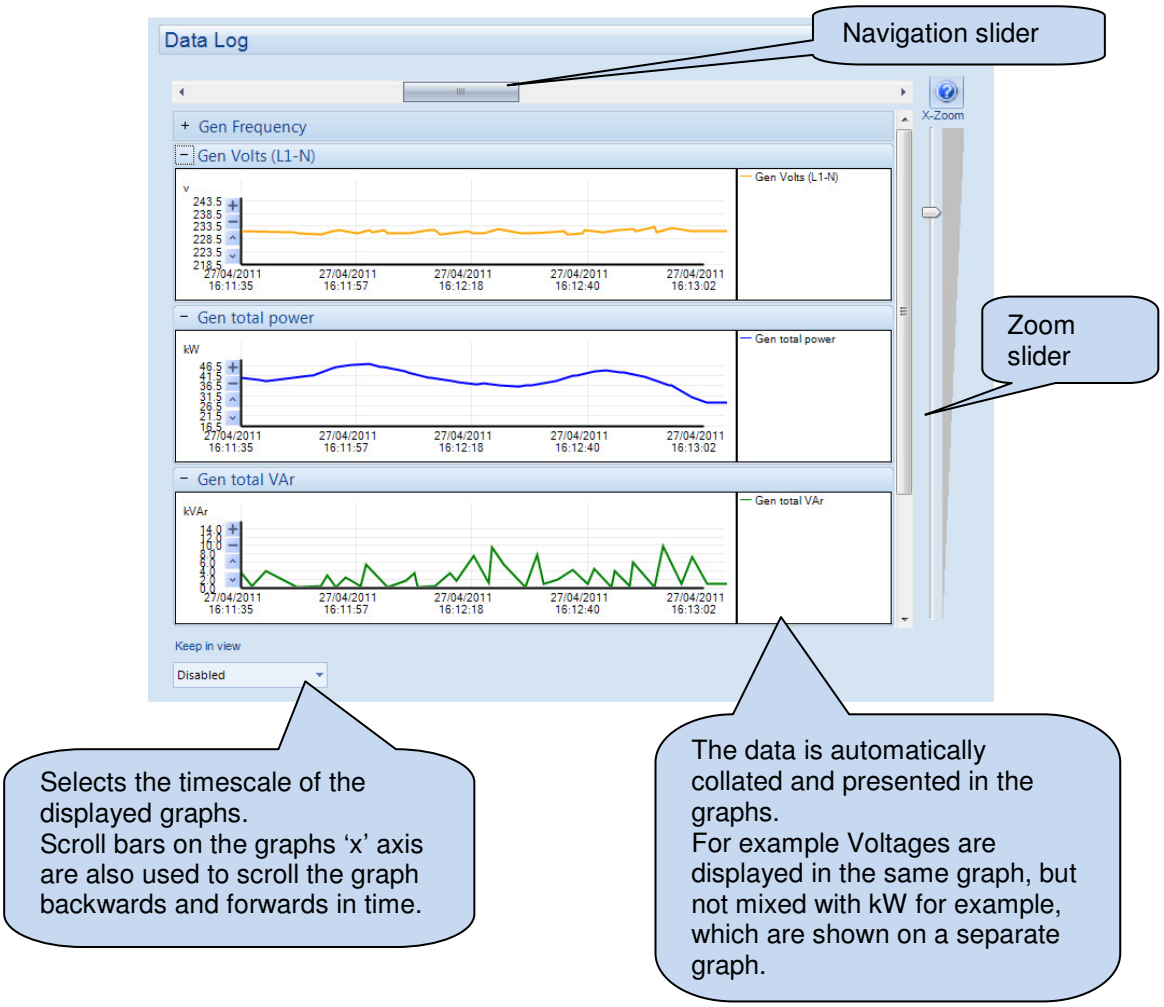
NOTE : If the PIN is lost or forgotten, it is not possible to access the module!

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



3.13 DATALOG

Allows viewing of the module datalog (if configured).



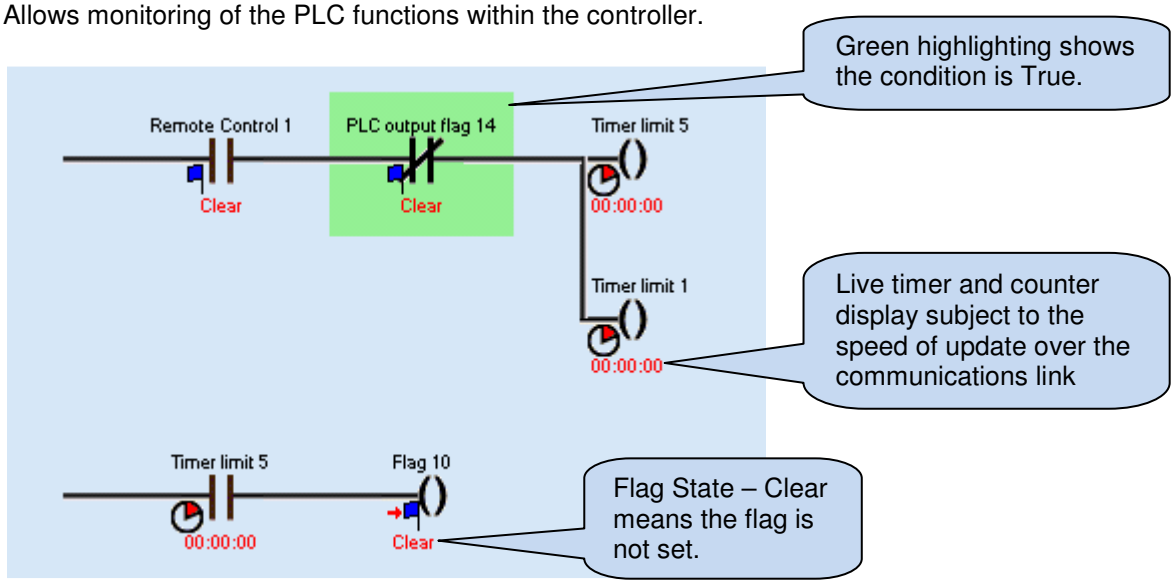
3.14 PLC

NOTE: For further details and instructions on PLC Logic and PLC Functions, refer to the DSE PLC PROGRAMMING GUIDE, document part number 057-175.

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

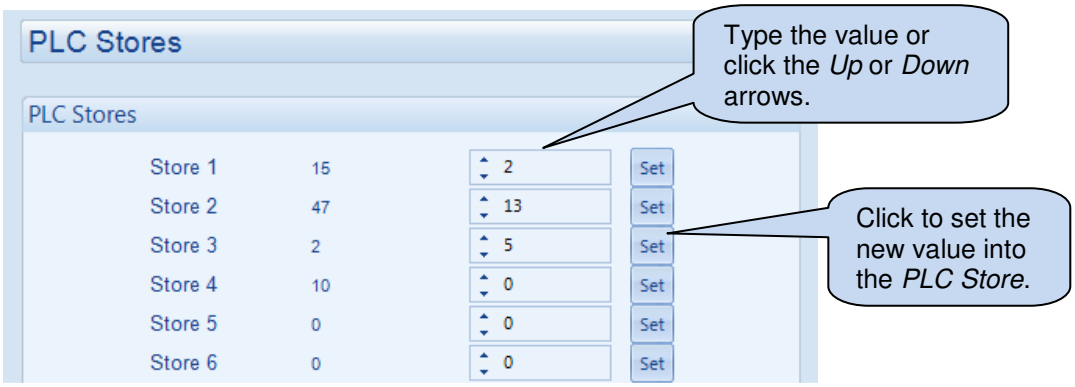
3.14.1 PLC LOGIC

Allows monitoring of the PLC functions within the controller.

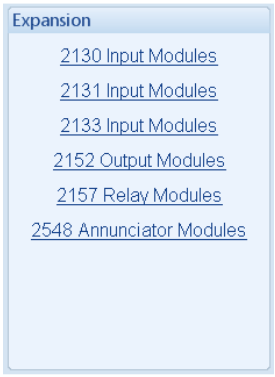


3.14.2 PLC SOTRES

Allows the editing and setting of PLC Stores values.

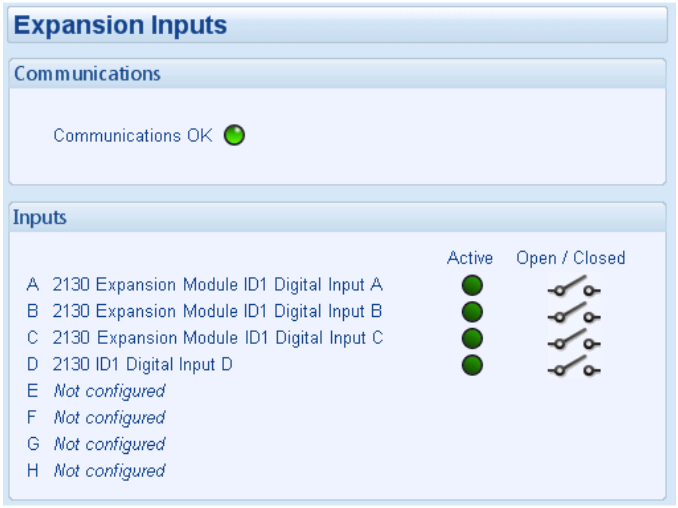


3.15 EXPANSION



Allows monitoring of the controller's expansion modules (when fitted)

For example:



4 ALARM TYPES

The protection included with the DSE control modules provides increasing levels of notification, depending upon the severity of the situation:

Alarm type	Description
Auxiliary Mains Fail	The controller operates as if the incoming mains supply has fallen outside of limits, the generator(s) are instructed to start and take the load. Deactivation of this alarm causes the module to act as the mains has returned to within limits providing that the mains sensing also indicates that the mains is within limits.
Indication	No audible alarm or common warning signal occurs. *Indication* alarms are only used to illuminate indicators or to activate outputs.
Latched Indication	The indication is latched.
Warning	Audible alarm and common alarm signal is generated. The set continues to run. *Warning alarms* are used to draw the operator's attention to a minor issue or to a problem that may escalate to an Electrical Trip Alarm if left untreated.
Electrical Trip	Audible alarm and common alarm signals are generated. The bus is taken off load and the cooling timer begins on the sets, after which the sets are stopped. *Electrical Trip alarms* are series issues that require the set to be taken off load. As the name implies, this is often electrical faults that occur 'after' the load switch. The set is allowed to cool before stopping.

5 ALARM ARMING

The protections on the DSE module are active during their configured *Alarm Arming* setting. The table below shows the timing segment for the different *Alarm Arming* options with regards to the generator status.

Timing Segment	Bus and Mains Open	Bus Available/ Bus On Load	Mains Available/ Mains On Load	Bus and Mains in Parallel
Active from Parallel				
Always				
Never				

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