DEEP SEA ELECTRONICS

DSE8620 MKII

Configuration Suite PC Software Manual

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DSE8620 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.

TABLE OF CONTENTS

Section Page

1 INTRODUCTION

NOTE: The DSE8620 MKII module is convertible to DSE8610 MKII from the module's front panel by accessing its Application Menu. For further details and instructions on how to access the Application Menu on the DSE8620 MKII module, refer to DSE Publication: *057-301 DSE8620 MKII Operators manual* which is found on our website: *www.deepseaelectronics.com*

NOTE: When the DSE8620 MKII module is converted to a DSE8610 MKII, refer to DSE Publication: *057-238 DSE8610 MKII Software manual* which is found on our website: *www.deepseaelectronics.com* for the module configuration.

This document details the use of the *DSE Configuration Suite PC Software* with the DSE8620 MKII module, which is part of the DSEGenset® range of products.

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

This is not a *controlled document.* DSE do not automatically inform on updates. Any future updates of this document are included on the DSE website at www.deepseaelectronics.com

The *DSE Configuration Suite PC Software* allows the DSE8620 MKII module to be connected to a PC via USB A to USB B cable (USB printer cable). Once connected, the software allows easy, controlled access to various operating parameters within the module which can then be viewed and edited as required.

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

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

1.1 CLARIFICATION OF NOTATION

Clarification of notation used within this publication.

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

1.2 GLOSSARY OF TERMS

Term	Description
DSE8xxx MKII	All modules in the DSE8xxx MKII range.
DSE8600 MKII, DSE86xx MKII	All modules in the DSE86xx MKII range.
DSE8620 MKII	DSE8620 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 current.
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.
DM2	Diagnostic Message 2 A DTC that was previously active on the engine ECU and has been stored in the ECU's 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.
ECU/ECM	Engine Control Unit/Management An electronic device that monitors engine parameters and regulates the fuelling.

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Term	Description
FMI	Failure Mode Indicator A part of DTC that indicates the type of failure, e.g. high, low, open circuit etc.
Fuel Tank Bund	An external tank used to collect fuel that may leak or overflow from the fuel tank. This tank may also be integral to the main fuel tank. A level switch is usually located within the Bund to indicate the presence of the leak or overflow condition. May be called Retention Tank in some locales.
GSM	Global System for Mobile communications. Cell phone technology used in most of the World.
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
LCD	Liquid Crystal Display The green flat-panel display on the fascia of the module.
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 CAN 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.

1.3 BIBLIOGRAPHY

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

1.3.1 INSTALLATION INSTRUCTIONS

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

DSE Part	Description
053-032	DSE2548 LED Expansion Annunciator Installation Instructions
053-033	DSE2130 Input Expansion Installation Instructions
053-034	DSE2157 Output Expansion Installation Instructions
053-049	DSE9xxx Battery Charger Installation Instructions
053-125	DSE2131 Ratio-metric Input Expansion Installation Instructions
053-126	DSE2133 RTD/Thermocouple Input Expansion Installation Instructions
053-134	DSE2152 Ratio-metric Output Expansion Installation Instructions
053-147	DSE9460 & DSE9461 Battery Charger Installation Instructions
053-185	DSE9473 & DSE9483 Battery Charger Installation Instructions
053-182	DSE8610 MKII Installation Instructions
053-183	DSE8620 MKII Installation Instructions
053-184	DSE8660 MKII Installation Instructions

1.3.2 MANUALS

Product manuals are obtained from the DSE website: www.deepseaelectronics.com or by contacting DSE technical support: support@deepseaelectronics.com.

DSE Part	Description
N/A	DSEGencomm (MODBUS protocol for DSE controllers)
057-004	Electronic Engines and DSE Wiring Guide
057-082	DSE2130 Input Expansion Operator Manual
057-083	DSE2157 Output Expansion Operator Manual
057-084	DSE2548 Annunciator Expansion Operator Manual
057-085	DSE9xxx Battery Charger Operator Manual
057-139	DSE2131 Ratio-metric Input Expansion Manual
057-140	DSE2133 RTD/Thermocouple Expansion Manual
057-141	DSE2152 Ratio-metric Output Expansion Manual
057-151	DSE Configuration Suite PC Software Installation & Operation Manual
057-175	PLC Programming Guide For DSE Controllers
057-176	DSE9460 & DSE9461 Battery Charger Operator Manual
057-220	Options for Communications with DSE Controllers
057-238	DSE8610 MKII Software Manual
057-254	DSE8610 MKII Operator Manual
057-257	DSE8660 MKII Software Manual
057-259	DSE8660 MKII Operator Manual
057-301	DSE8620 MKII Operator Manual

1.3.3 TRAINING GUIDES

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

DSE Part	Description
056-001	Four Steps To Synchronising
056-005	Using CTs With DSE Products
056-006	Introduction to Comms
056-010	Over Current Protection
056-011	MSC Link
056-013	Load Demand Scheme
056-018	Negative Phase Sequence
056-019	Earth Fault Protection
056-020	Loss Of Excitation
056-021	Mains Decoupling
056-022	Breaker Control
056-023	Adding New CAN Files
056-024	GSM Modem
056-026	kW, kvar, kVA and pf.
056-029	Smoke Limiting
056-030	Module PIN Codes
056-033	Synchronising Requirements
056-036	Expansion Modules
056-043	Sync Process
056-045	PLC as Load Demand Controller
056-047	Out of Sync and Failed To Close
056-051	Sending DSEGencomm Control Keys
056-053	Recommended Modems
056-054	DSE xx10 In Fixed Export
056-055	Alternate Configurations
056-057	SW1 & SW2
056-069	Firmware Update
056-071	DSE8610 Auto Test Manual
056-072	Dead Bus Synchronising
056-075	Adding Language Files
056-076	Reading DSEGencomm Alarms
056-079	Reading DSEGencomm Status
056-080	MODBUS
056-081	Screen Heaters
056-082	Override Gencomm PLC Example
056-084	Synchronising & Loadsharing
056-086	G59
056-089	DSE86xx MKI to DSE86xx MKII Conversion
056-091	Equipotential Earth Bonding
056-092	Best Practices for Wiring Restive Sensors
056-094	MSC Compatibility
056-095	Remote Start Input Functions
056-097	USB Earth Loop and Isolation
056-098	DSE86xx MKII and John Deere iT4
056-099	Digital Output to Digital Input Connection
056-118	Configurable CAN

1.3.4 THIRD PARTY DOCUMENTS

The following third party documents are also referred to:

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

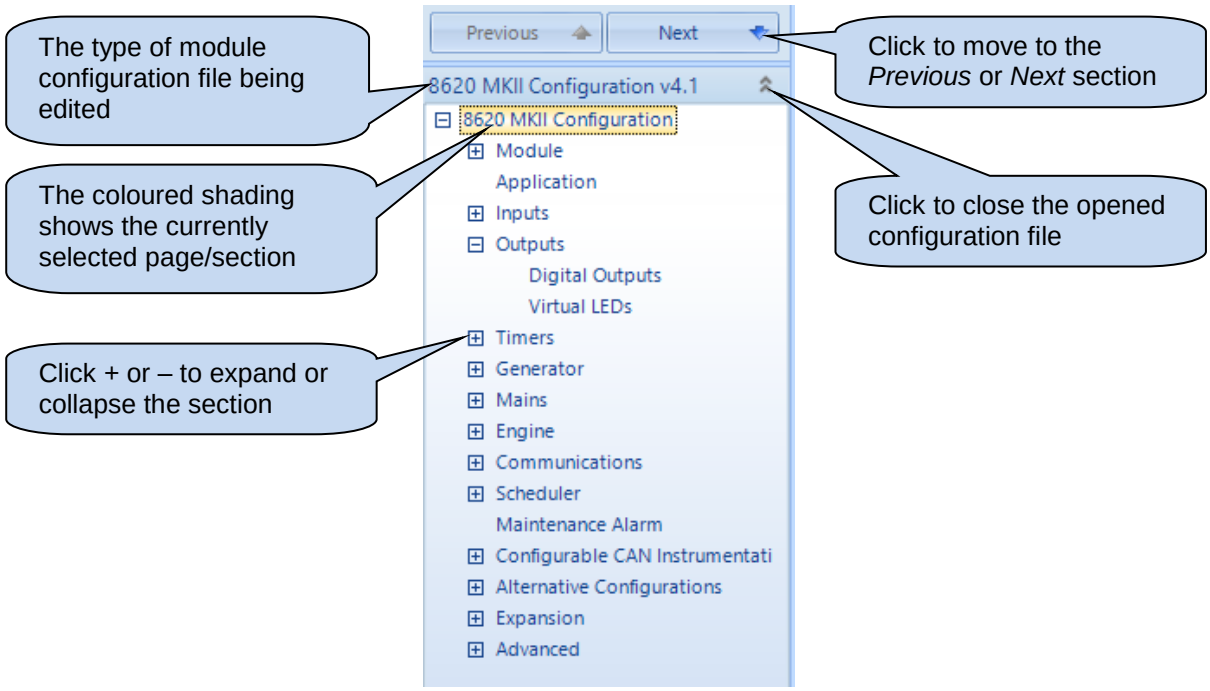
1.4 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

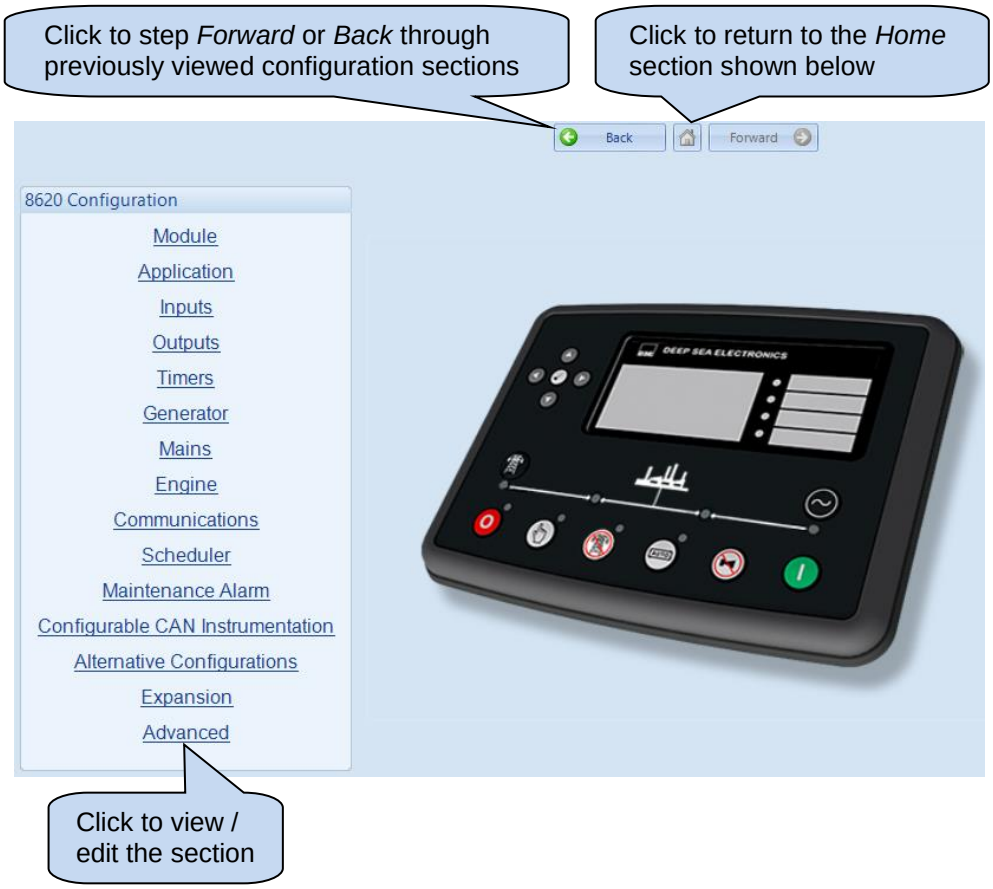
For information in regards to installing and using the *DSE Configuration Suite PC Software,* refer to DSE publication: ***057-151 DSE Configuration Suite PC Software Installation & Operation Manual*** which is found on the DSE website: www.deepseaelectronics.com

2 EDITING THE CONFIGURATION

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

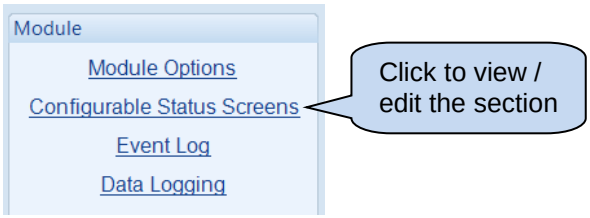
2.1 SCREEN LAYOUT





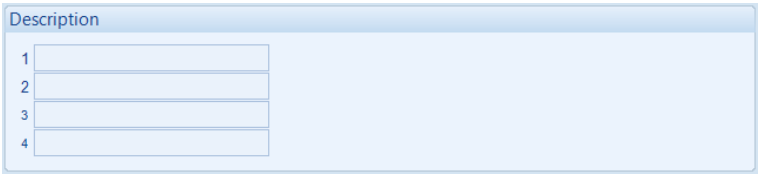
2.2 MODULE

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



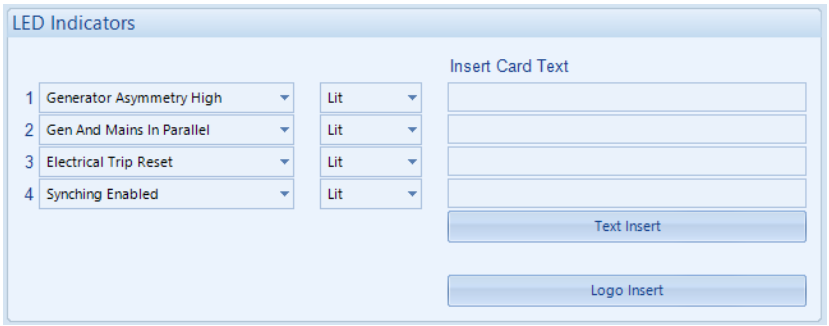
2.2.1 MODULE OPTIONS

Description



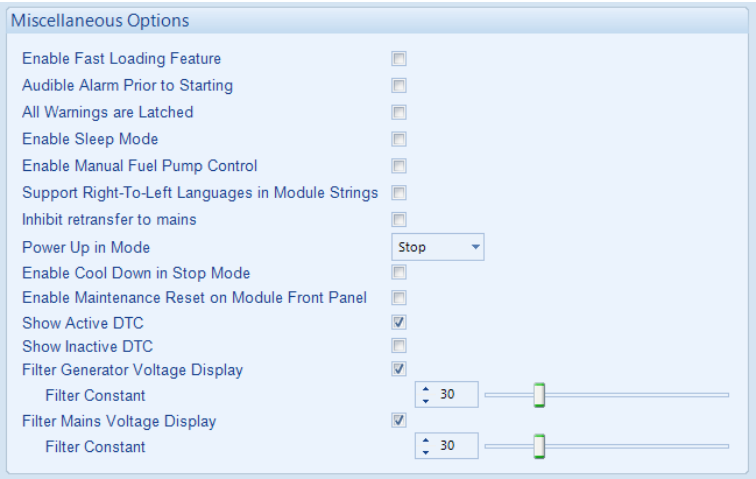
Parameter	Description
Description	Four free entry boxes to allow the user to give the configuration file a description. Typically used to enter the job number, customer name, engine information etc. This text is not shown on the module's display and is only seen in the configuration file.

LCD Indicators



Parameter	Description
Function	Allows the user to assign an output source to an indicator shown on the LCD. For details of possible selections, see section entitled *Output Sources* elsewhere in this document.
Polarity	Lit: When the output source is true, the LCD indicator activates. Unlit: When the output source is true, the LCD indicator de-activates.
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	Allow the user to choose and print an image for the logo insert

Miscellaneous Options



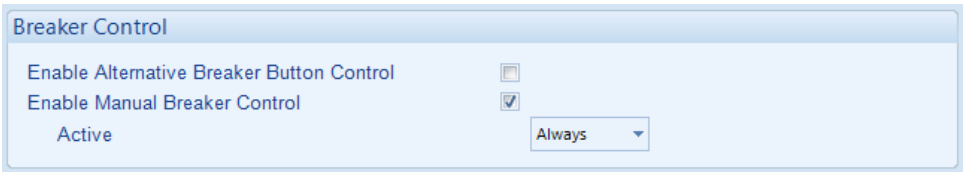
Parameter	Description
Enable Fast Loading	**NOTE: Enabling Fast Loading is only recommended where steps have been taken to ensure rapid start up of the engine is possible. (For example when fitted with engine heaters, electronic governors etc.)** ☐ = The *Fast Loading* is disabled. The module observes the *Safety on Delay* timer in full to allow the generator plenty of time to reach operating *Oil Pressure, Coolant Temperature, Engine Speed, Loading Voltage and Loading Frequency.* ☑ = The *Fast Loading* is enabled. The module terminates the *Safety on Delay* timer once the generator has attained the *Loading Voltage* and *Loading Frequency*. This feature is useful if the generator is to be used in critical application as it allows it to start and go on load in the shortest possible time.
Audible Alarm Prior to Starting	☐ = The *Audible Alarm Prior to Starting* is disabled. ☑ = The *Audible Alarm Prior to Starting* is enabled. The module gives an audible warning during the *Pre-Heat Timer* to indicate the generator is about to start. This is often a site's specification requirement of AUTO mode operation.
All Warnings Are Latched	☐ = The *All Warnings Are Latched* is disabled. The module automatically resets the warning and pre-alarms once the triggering condition has been cleared. ☑ = The *All Warnings Are Latched* is enabled. The module does not automatically reset the warning and pre-alarms. Resetting the alarm is performed by either activating a digital input configured for *Alarm Reset* or, pressing the ***Stop/Reset Mode*** button once the triggering condition has been cleared.
Enable Sleep Mode	☐ = The *Sleep Mode* is disabled. ☑ = The *Sleep Mode* is enabled. The module goes into a low current mode when it is left in the ***Stop/Reset Mode*** for the duration of the *Sleep Timer* if the communication ports or data logging facility are not active. Press any button on the module's facia to take it out of *Sleep Mode.*

Parameter	Description
Enable Manual Fuel Pump Control	**⚠ CAUTION! It is possible to overfill the fuel tank when using the Manual Fuel Pump Control feature. Care must be taken to ensure the correct volume of fuel is transferred.** ☐ **=** The *Manual Fuel Pump Control* is disabled. ☑ **=** The *Manual Fuel Pump Control* is enabled. To manually control the fuel pump, press the ***Tick*** ✓ button when viewing the *Fuel Level* instrument on the module's display.
Support Right-To-Left Languages in Module Strings	☐ **=** The *Support Right-To-Left Languages in Module Strings* is disabled. The module displays user configured strings in the order left to right. ☑ **=** The *Support Right-To-Left Languages in Module Strings* is enabled. The module displays user configured strings in the order right to left.
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, ONLY in the event of the generator failure. 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.
Power Up in Mode	Select the mode which the module enters once DC power is applied. ***Auto:*** The module powers up in the ***Auto Mode*** AUTO. ***Manual:*** The module powers up in the ***Manual Mode*** ☝. ***Stop:*** The module powers up in the ***Stop/Reset Mode*** O.
Enable Cool Down in Stop Mode	☐ **=** The *Cool Down in Stop Mode* is disabled. Pressing the ***Stop/Reset Mode*** O button instructs the module to immediately open the generator's switchgear and stop the generator. ☑ **=** The *Cool Down in Stop Mode* is disabled. Pressing the ***Stop/Reset Mode*** O button instructs the module to immediately open the generator's switchgear and instructs the generator to run for the duration of the *Cooling* time. Pressing the ***Stop/Reset Mode*** O button again results in the generator stopping immediately.
Enable Maintenance Reset on Module Front Panel	☐ **=** The *Maintenance Reset on Module Front Panel* is disabled. The maintenance alarms are only reset using a digital input configured for *Maintenance Alarm Reset* or the *SCADA* section of the *DSE Configuration Suite*. ☑ **=** The *Maintenance Reset on Module Front Panel* is enabled. The maintenance alarms are resettable by pressing and holding the ***Stop/Reset Mode*** O button when viewing the specific *Maintenance* instrument on the module's display.

Parameter descriptions are continued overleaf…

Parameter	Description
Show Active DTC	**NOTE: Show Active DTC is only available when the module is configured to communicate to an engine's ECU/ECM over CANbus.** ☐ **=** The *Show Active DTC* is disabled. The module does not display DM1 fault codes that are active on the engine ECU/ECM. ☑ **=** The *Show Active DTC* is enabled. The module displays DM1 fault codes that are active on the engine ECU/ECM.
Show Inactive DTC	**NOTE: Show Inactive DTC is only available when the module is configured to communicate to an engine's ECU/ECM over CANbus.** ☐ **=** The *Show Inactive DTC* is disabled. The module does not display the historical log of DM2 fault codes from the engine ECU/ECM. ☑ **=** The *Show Inactive DTC* is enabled. The module displays the historical log of DM2 fault codes from the engine ECU/ECM.
Filter Generator Voltage Display	**NOTE: The generator voltage is only filtered on the module's display and not on the SCADA or any other remote monitoring device.** ☐ **=** The *Filter Generator Voltage Display* is disabled. The rate at which the generator voltage instruments are refreshed is fast in order to display all voltage fluctuations. ☑ **=** The *Filter Generator Voltage Display* is enabled. The rate at which the generator voltage instruments are refreshed is configurable based on the *Filter Constant. A* larger *Filter Constant* leads to a slower refresh rate, filtering out the fluctuations on the generator voltage instruments.
Filter Mains Voltage Display	**NOTE: The mains voltage is only filtered on the module's display and not on the SCADA or any other remote monitoring device.** ☐ **=** The *Filter Mains Voltage Display* is disabled. The rate at which the mains voltage instruments are refreshed is fast in order to display all voltage fluctuations. ☑ **=** The *Filter Mains Voltage Display* is enabled. The rate at which the mains voltage instruments are refreshed is configurable based on the *Filter Constant. A* larger *Filter Constant* leads to a slower refresh rate, filtering out the fluctuations on the mains voltage instruments.

Breaker Control

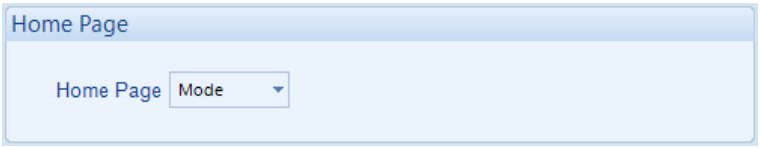


Parameter	Description
Enable Alternative Breaker Control Button	**NOTE: For more detailed information on the *Alternative Breaker Control Button* operation, refer to DSE Publication: *057-301 DSE8620 MKII Operator Manual.***
	☐ **=** The *Alternative Breaker Control Button* is disabled. Pressing the ***Transfer to Mains*** or ***Transfer to Generator*** buttons requests a transfer of load to the respective supply, if it is available. ☑ **=** The *Alternative Breaker Control Button* is enabled. Pressing the ***Transfer to Mains*** or ***Transfer to Generator*** buttons requests the respective switchgear to open or close, causing a transfer of load to occur if required, if the supply is available.
Enable Manual Breaker Control	☐ **=** The *Manual Breaker Control* is disabled. When the module is in the ***Manual Mode***, activation of any automatic on load request (such as *Remote Start on Load* or *Mains Failure*) causes the generator switchgear to close. ☑ **=** The *Manual Breaker Control* is enabled. When the module is in the ***Manual Mode***,only the following load requests cause the generator switchgear to close: • Pressing the ***Transfer to Generator*** button. • Activating a digital input configured for *Transfer to Generator / Open Mains* The *Manual Breaker Control* is activated: ***Always:*** *Manual Breaker Control* is always active. ***On Input:*** *Manual Breaker Control* is only active when a digital input configured for *Manual Breaker Mode* is active.

2.2.2 DISPLAY CONFIGURATION

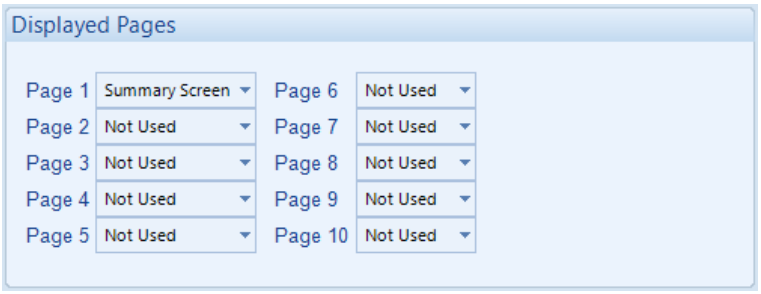
Configurable Status Screens allow the operator to design the default screen to match the requirements of the application.

Home Page



Parameter	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 Page*. The *Configurable Status Screens* are not displayed automatically but is still accessible by manually pressing the ***Navigation*** buttons. ***Instrumentation:*** When no ***Navigation*** buttons are pressed for the duration of the *Page Timer*, the module's display scrolls through the *Configurable Status Screens.* Each of the *Configurable Status Screens* remains on the display for the duration of the *Scroll Timer*. The *Control Mode* page is not displayed automatically but is still accessible by manually pressing the ***Navigation*** buttons.

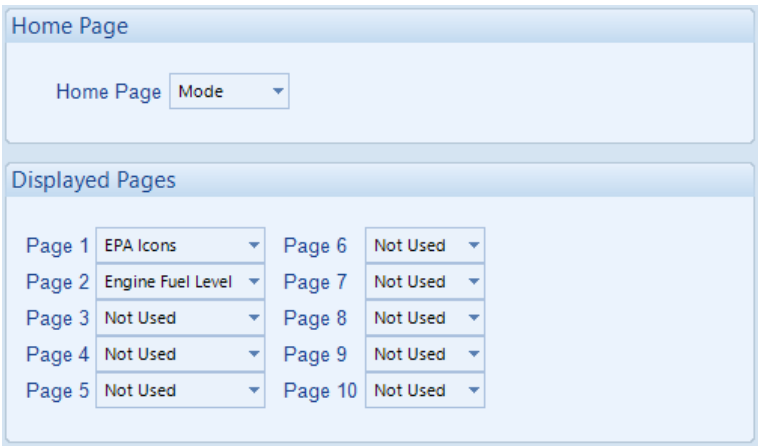
Displayed Pages



Parameter	Description
Page 1 to 10	Select the instrumentation parameter that is to be displayed for the specific *Configurable Status Screen.*

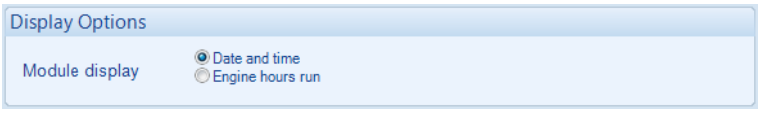
Example

In the example below, the *Home Page* is configured to *Instrumentation* so will scroll through the *Configurable Status Screens*. Depending on the application, the system designer selects the instrumentation parameters that are most important to constantly show on the module.



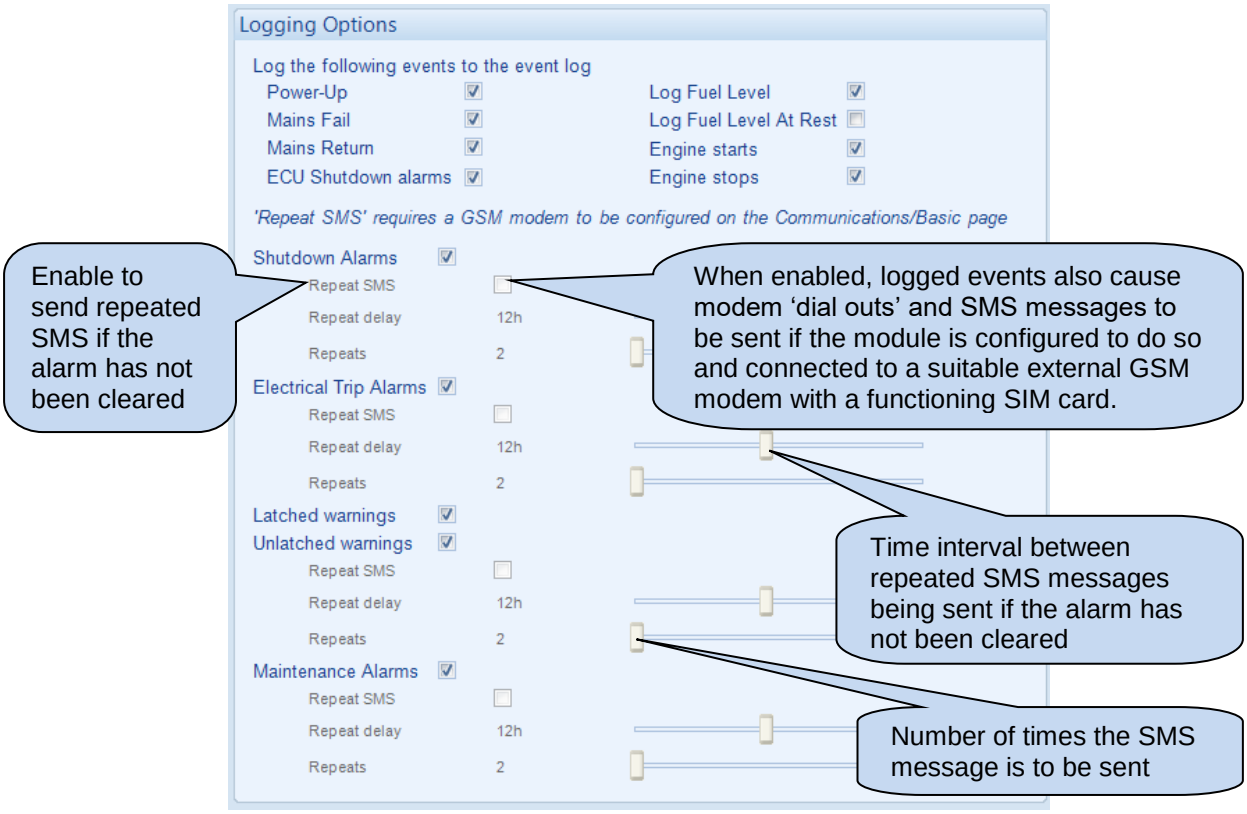
2.2.3 EVENT LOG

Display Options



Parameter	Description
Module Display	⊙ ***Date and Time*** **=** The module displays what the *Date and Time* was when the *Event* was logged. ⊙ ***Engine Hours Run*** **=** The module displays what the *Engine Hours* was when the *Event* was logged.

Logging Options



Parameter descriptions are continued overleaf…

Parameter	Description
Power-Up	☐ = *Power-Up* events are not logged. ☑ = *Power-Up* events are logged when the DC Supply is applied to the module.
Mains Fail 	☐ = *Mains Fail* events are not logged. ☑ = *Mains Fail* events are logged when the mains voltage/frequency rise above/falls below the configured trip levels for the duration of the *Mains Transient Delay* timer.
Mains Return 	☐ = *Mains Return* events are not logged. ☑ = *Mains Return* events are logged when the mains voltage/frequency falls below/rise above the configured return levels for the duration of the *Mains Transient Delay* timer.
ECU Shutdown Alarms	**NOTE: *ECU Shutdown Alarms* is only available when the module is configured to communicate to an engine's ECU/ECM over CANbus.** ☐ = *ECU/ECM Shutdown Alarms* are not logged. ☑ = *ECU/ECM Shutdown Alarms* are logged when generated by the engine ECU/ECM.
Log Fuel Level	☐ = *Fuel Monitoring* events are not logged when the generator running. Fuel level alarms are still logged if the appropriate alarm category is logged. ☑ = *Fuel Monitoring* events are logged when the generator is running.
Log Fuel Level at Rest	☐ = *Fuel Monitoring* events are not logged when the generator is at rest. Fuel level alarms are still logged if the appropriate alarm category is logged. ☑ = *Fuel Monitoring* events are logged when the generator is at rest.
Engine Starts	☐ = *Engine Start* events are not logged. ☑ = *Engine Start* events are logged when the generator successfully crank disconnects.
Engine Stops	☐ = *Engine Stop* events are not logged. ☑ = *Engine Stop* events are when the *Stopping Timer* ceases.
Shutdown Alarms	☐ = *Shutdown Alarms* are not logged. ☑ = *Shutdown Alarms* are logged when the moment they activate.
Electrical Trip Alarms	☐ = *Electrical Trip Alarms* are not logged. ☑ = *Electrical Trip Alarms* are logged when the moment they activate.
Latched Warnings	☐ = *Latched Warnings Alarms* are not logged. ☑ = *Latched Warnings Alarms* are logged when the moment they activate.
Unlatched Warnings	☐ = *Unlatched Warnings Alarms* are not logged. ☑ = *Unlatched Warnings Alarms* are logged when the moment they activate.
Maintenance Alarms	☐ = *Maintenance Alarms* are not logged. ☑ = *Maintenance Alarms* are logged when the moment they activate.

2.2.4 DATA LOGGING

NOTE: The DSE module contains one Data Logging file for both the DSE8610 MKII and DSE8620 MKII software applications. The logged data is maintained and is accessible after the software application is changed. For further information about the DSE8610 MKII & DSE8620 MKII Software Application selection on the DSE module, refer to DSE Publication: 057-301 DSE8620 MKII Operators Manual which is found on our website: www.deepseaelectronics.com

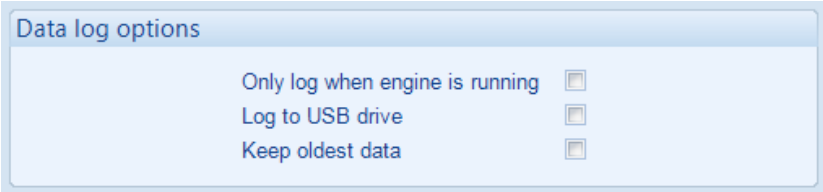
The *Data Logging* section is subdivided into smaller sections.
Select the required section with the mouse.

The *Data Logging* is viewed using the *Data Log Viewer* application, which is accessed from the DSE Configuration Suite PC Software under the *Tools* menu.

2.2.4.1 CONFIGURATION

Parameter	Description
Logged Data	Select the instrument required to be logged
Log Interval	Select the logging interval of the data

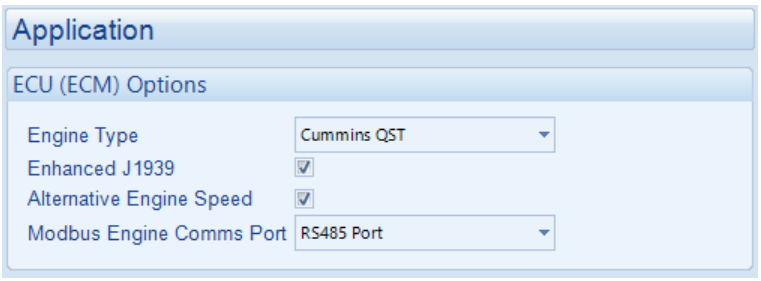
2.2.4.2 OPTIONS



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 APPLICATION

ECU (ECM Options)



NOTE: For further details and instructions on ECU (ECM) options and connections, refer to DSE Publication: *057-004 Electronic Engines and DSE Controllers* which are found on our website: *www.deepseaelectronics.com*

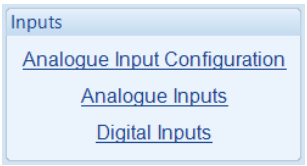
Parameter	Description
Engine Type	Select the appropriate engine type ***Conventional Engine:*** Select this for a traditional (non-electronic) engine, either Energise to Run or Energise to Stop. ***Conventional Gas Engine:*** Select this for a traditional (non-electronic) engine and require Gas engine functionality. This enables control of configurable outputs for *Gas Choke and Gas Ignition* and instructs the module to follow the gas engine timers. ***Other Engines:*** The list of supported CAN (or MODBUS) engines is constantly updated, check the DSE website at www.deepseaelectronics.com for the latest version of Configuration Suite software.

Parameter descriptions are continued overleaf…

Parameter	Description
Enhanced J1939	☐ = The module reads 'Basic' instrumentation from the engine ECU (ECM) and display (where supported by the engine) : • Engine Speed • Oil Pressure • Engine Coolant Temperature • Hours Run ☑ = The module reads and display an 'Enhanced' instrumentation list (where supported by the engine) : • Engine Speed • Engine Speed Biasing (Subject to *ECM Speed Control* setting) • Oil Pressure • Engine Coolant Temperature • Hours Run • Engine Oil Temperature • Exhaust Temperature • Fuel Pressure • Total Fuel used • Fuel Consumption • Inlet Manifold Temperature • Coolant Pressure • Turbo Pressure • And more… Where an instrument is not supported by the engine ECU (ECM), the instrument is not displayed. DSE Reserve the right to change these lists in keeping with our policy of continual development.
Alternative Engine Speed	☐ = The engine is instructed to run at its *Nominal Speed* as configured by the Engine Manufacturer. ☑ = The engine is instructed to run at its *Alternative Speed* as configured by the Engine Manufacturer.
MODBUS Engine Comms Port	***RS485 Port:*** The modules RS485 port is used to communicate to the engine (when a MODBUS engine type is selected. ***DSENet Port:*** The modules DSENet port is used to communicate to the engine (when a MODBUS engine type is selected. This 'frees' the RS485 port in case connection to BMS or other RS485 compatible equipment is required.

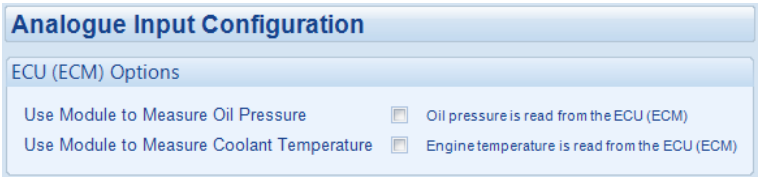
2.4 INPUTS

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



2.4.1 ANALOGUE INPUT CONFIGURATION

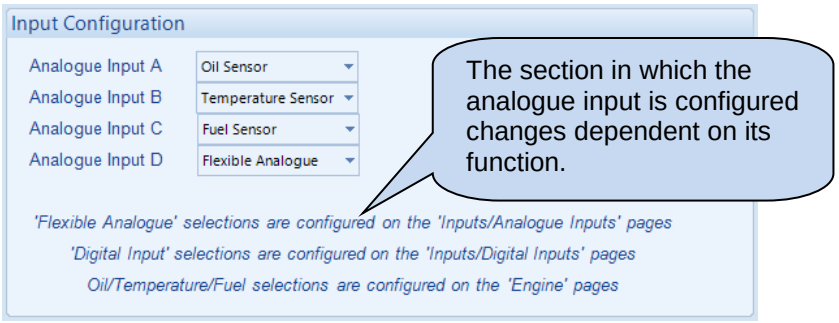
ECU (ECM) Options



Parameter	Description
Module To Measure Oil Pressure	(Available only when the module is configured for connection to a CAN engine.) ☐ = The measurements are taken from the ECU (ECM). ☑ = The module ignores the CAN measurement and uses the analogue sensor input.
Module To Measure Coolant Temperature	(Available only when the module is configured for connection to a CAN engine.) ☐ = The measurements are taken from the ECU. ☑ = The module ignores the CAN measurement and uses the analogue sensor input.

Parameter descriptions are continued overleaf…

Input Configuration

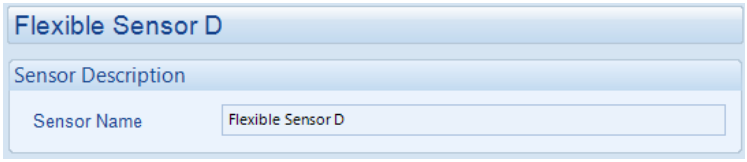


Parameter	Description
Analogue Input A	Select what the analogue input is to be used for: ***Not Used:*** The analogue input is disabled ***Digital Input:*** Configured on the *Inputs/Digital Inputs* pages ***Flexible Analogue:*** Configured on the *Inputs/Analogue Inputs* pages ***Oil Sensor:*** Configured on the Engine pages
Analogue Input B	Select what the analogue input is to be used for: ***Digital Input:*** Configured on the *Inputs/Digital Inputs* pages ***Flexible Analogue:*** Configured on the *Inputs/Analogue Inputs* pages ***Not Used:*** The input is disabled ***Temperature Sensor:*** Configured on the *Engine* pages
Analogue Input C	Select what the analogue input is to be used for: ***Digital Input:*** Configured on the *Inputs/Digital Inputs* pages ***Flexible Analogue:*** Configured on the *Inputs/Analogue Inputs* pages ***Fuel Sensor:*** Configured on the *Engine* pages ***Not Used:*** The input is disabled
Analogue Input D	Select what the analogue input is to be used for: ***Digital Input:*** Configured on the *Inputs/Digital Inputs* pages ***Flexible Analogue:*** Configured on the *Inputs/Analogue Inputs* pages ***Not Used:*** The input is disabled

2.4.2 ANALOGUE INPUTS

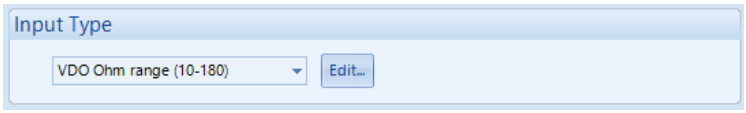
NOTE: An analogue input is only configurable as a flexible sensor if it has been configured as Flexible Analogue, refer to section entitled Analogue Input Configuration elsewhere in this document for further details.

Sensor Description



Parameter	Description
Sensor Name	Enter the *Sensor Name*, this text is shown on the module display when viewing the instrument.

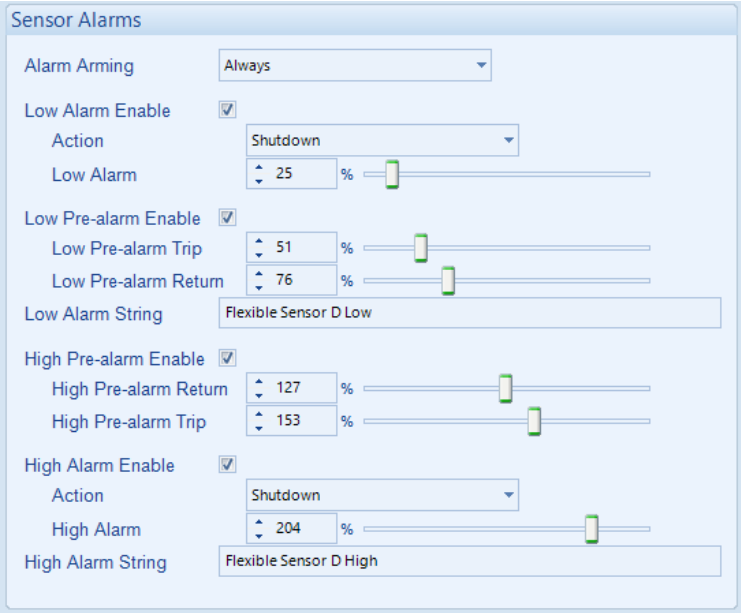
Input Type



NOTE: The selectable measurement quantity (Current, Resistive or Voltage) is dependent on the hardware specification of the analogue input. For more detailed information on the analogue input specification, refer to DSE Publication: 057-2xx DSE8620 MKII Operator Manual.

Parameter	Description
Input Type	Select the sensor type and curve from a pre-defined list or create a user-defined curve ***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 ***Pressure:*** The input is configured as a pressure sensor ***Percentage:*** The input is configured as a percentage sensor ***Temperature:*** The input is configured as a temperature sensor

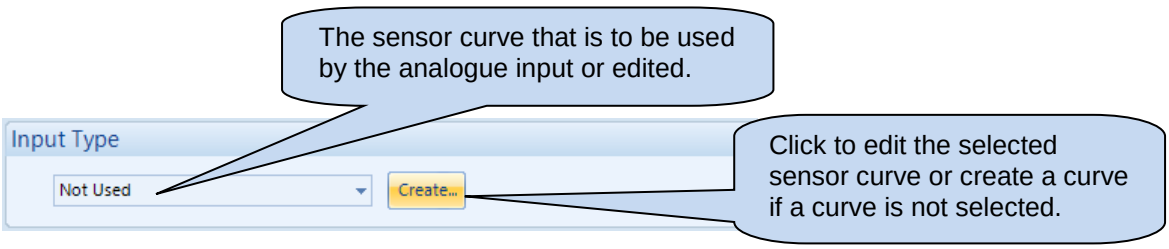
Sensor Alarms



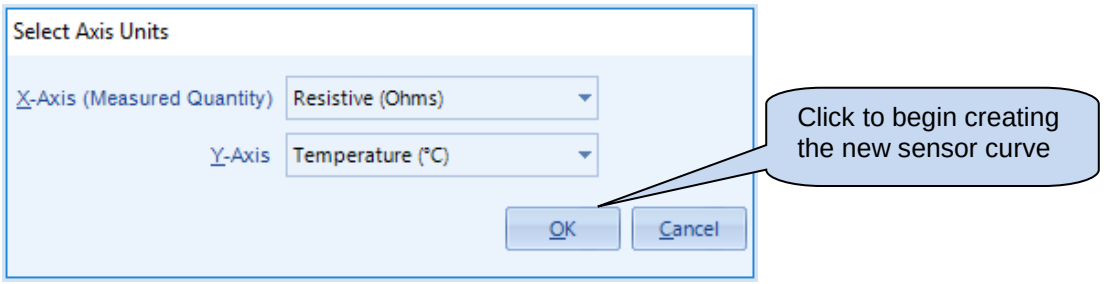
Parameter	Description
Alarm Arming	Select when the input becomes active: ***Always:*** The input state is always monitored ***From Safety On:*** The state of the input is monitored from the end of the *Safety On Delay* timer ***From Starting:*** The state of the input is only monitored from engaging 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.
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.

2.4.2.1 CREATING / EDITING THE SENSOR CURVE

While the *DSE Configuration Suite* holds sensor specifications for the most commonly used resistive sensors, occasionally it is required that the module be connected to a sensor not listed by the *DSE Configuration Suite*. To aid this process, a sensor curve editor is provided.

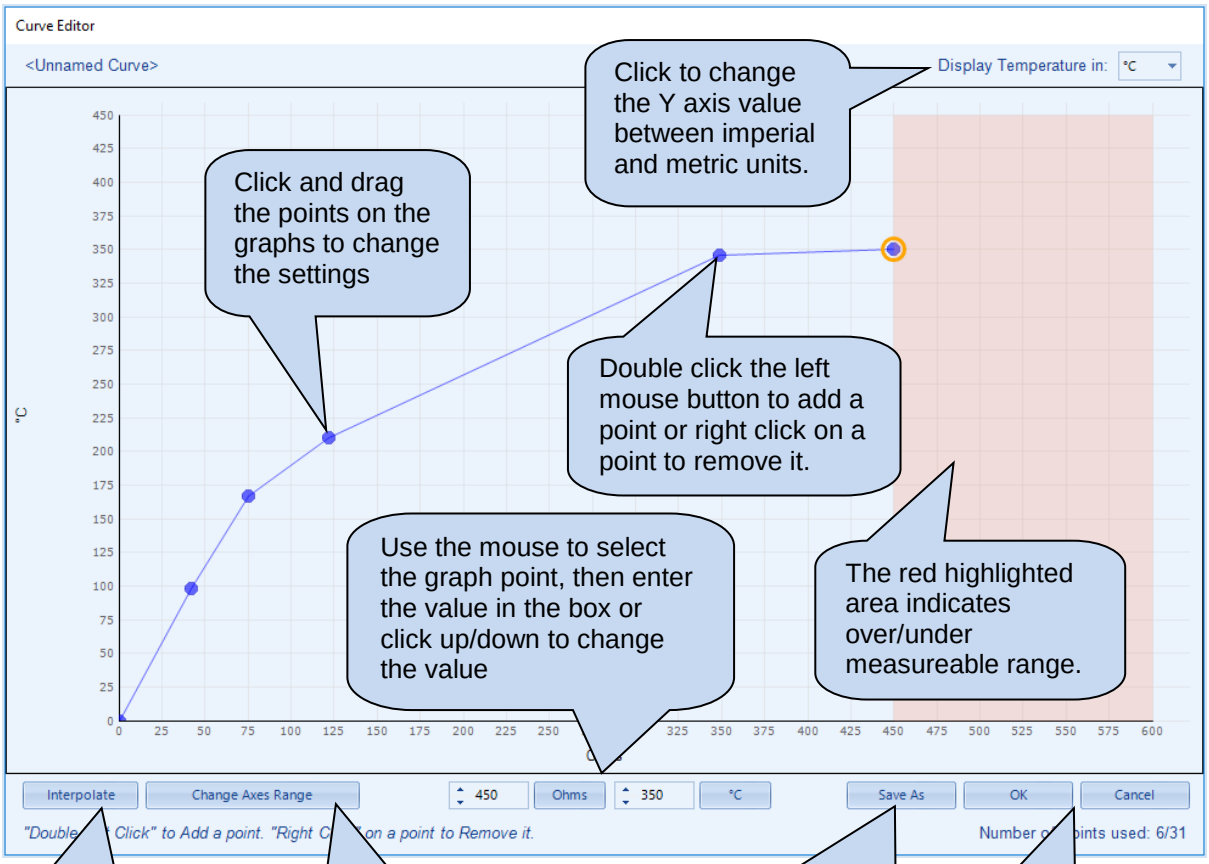


When creating a new sensor curve the measurement quantity and measured parameter are required.



Parameter	Description
X-Axis (Measured Quantity)	**NOTE: The selectable measurement quantity (Current, Resistive or Voltage) is dependent on the hardware specification of the analogue input. For more detailed information on the analogue input specification, refer to DSE Publication: 057-301 DSE8620 MKII Operator Manual.** Select the electrical quantity that the sensor outputs. ***Resistive (Ohms):*** For sensors that output resistance within the analogue inputs specification. ***Current (mA):*** For sensors that output current within a range 0 mA to 20 mA ***Voltage (Volt):*** For sensors that output voltage within a range of 0 V to 10 V
Y-Axis	Select the parameter that is being monitored by the sensor ***Temperature:*** For sensors that measure temperature. ***Pressure:*** For sensors that measure pressure. ***Percentage:*** For sensors that measure percentage.

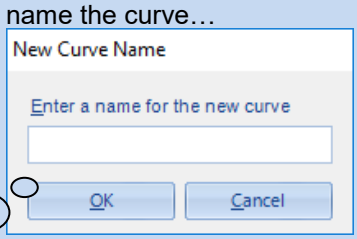
Sensor curve creation / editor descriptions are continued overleaf…



Click *Interpolate* then select two points as prompted to draw a straight line between them.

Click to change the range of the X and Y Axes of the graph and the level of open circuit detection

Click SAVE AS, a prompt to name the curve…



Click OK to save the curve.

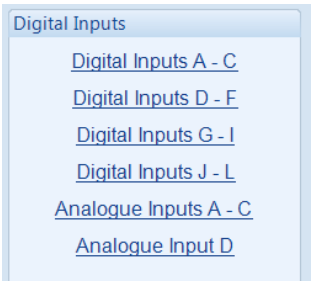
Any saved curves become selectable in the *Input Type* selection list.

Click OK to accept the changes or CANCEL to ignore and lose the changes.

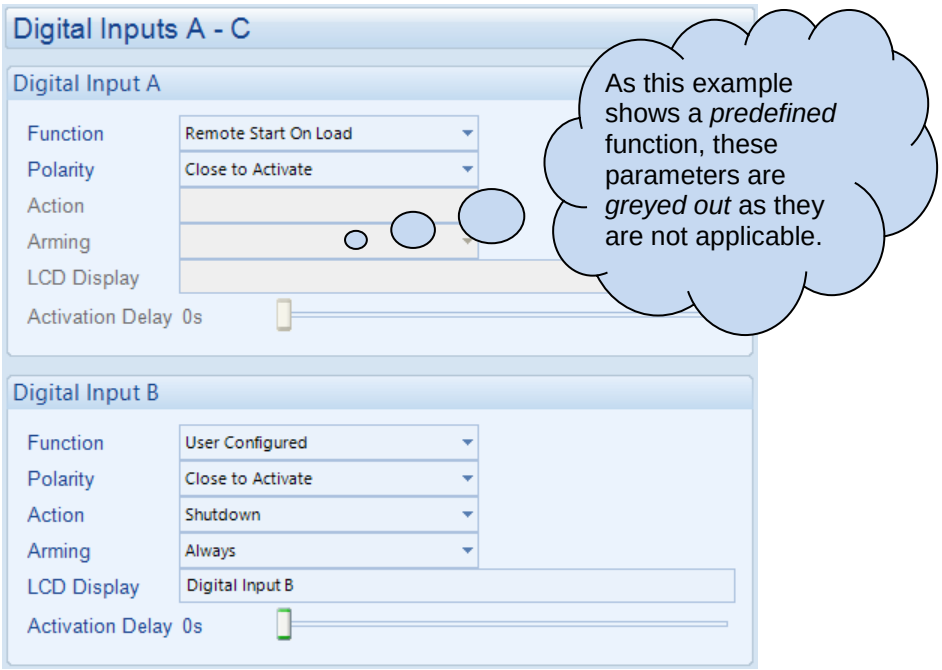
Hint: Deleting, renaming or editing custom sensor curves that have been added is performed in the main menu, select *Tools* | *Curve Manager*.

2.4.3 DIGITAL INPUTS

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



2.4.3.1 DIGITAL INPUTS



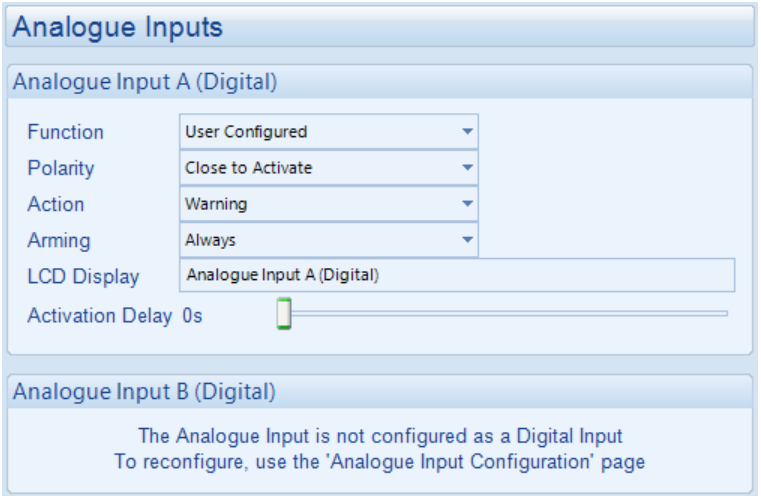
Parameter	Description
Function	Select the input function to activate when the relevant terminal is energised. See section entitled *Input functions* for details of all available functions
Polarity	Select the digital input polarity: ***Close to Activate:*** the input function is activated when the relevant terminal is connected. ***Open to Activate:*** the input function is activated when the relevant terminal is disconnected.
Action	**NOTE: For details of these, see the section entitled Alarm Types elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning***

Parameter descriptions are continued overleaf…

Parameter	Description
Arming	**NOTE: For details of these, see the section entitled Alarm Arming elsewhere in this document.** Select when the input becomes active: ***Active from Parallel*** ***Always*** ***From Safety On*** ***From Starting*** ***Never***
LCD Display	The text that is displayed on the module's LCD when the input activates and generates an alarm.
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.

2.4.3.2 ANALOGUE INPUTS

NOTE: An analogue input is only configurable as a digital input if it has been configured as Digital Input, refer to section entitled Analogue Input Configuration elsewhere in this document for further details.



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	**NOTE: For details of these, see the section entitled Alarm Types elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning***
Arming	**NOTE: For details of these, see the section entitled Alarm Arming elsewhere in this document.** Select when the input becomes active: ***Active from Parallel*** ***Always*** ***From Safety On*** ***From Starting*** ***Never***
LCD Display	The text that is displayed on the module's LCD when the input activates and generates an alarm.
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.

2.4.3.3 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
Air flap closed auxiliary IEEE 37.2 - 3 Checking or Interlocking Relay	This input is used to connect to the Air flap switch contacts. This gives an immediate shutdown in the event of the air-flap being closed. It also prevents the generator from being restarted if the air flap has not been reset following an over-speed shutdown.
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.
Alt Config x Select	These inputs are used to instruct the module to follow the relevant *alternative* configuration settings instead of the *main* configuration settings.
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 Run 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/scheduled run condition occurring. If this input is active and a remote start signal/scheduled run 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/scheduled run 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 a remote start request and another condition exists which requires the generator to run. If the ‘Auto Run Inhibit’ signal becomes active while the generator is running, a controlled shutdown sequence begins. If the generator is running in a load demand scheme, this input takes priority and begins the controlled shutdown sequence, causing another generator to start (if available). This input does not prevent starting of the engine in MANUAL/TEST mode.

Parameter descriptions are continued overleaf…

Function	Description
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 mode.
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.
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.
Coolant Temperature Switch IEEE 37.2 – 26 Apparatus Thermal Device	This input is used to give a *Coolant Temperature High* shutdown from a digital normally open or closed switch. It allows coolant temperature protection.
Disable Protections	The system designer provides this switch (not DSE) so its location varies depending upon manufacturer, however it normally takes the form of a key operated switch to prevent inadvertent activation. Depending upon configuration, a warning alarm is generated when the switch is operated. When active, and the module is suitably configured (see section entitled 'Advanced') this prevents the engine being stopped upon critical alarm (Sometimes called Battle-Short Mode, War Mode or Run to Destruction)
DPF Auto Regen Inhibit	This input is used to override the ECU (ECM) function and prevent the automatic regeneration of the diesel particulate filter
DPF Force Regeneration	This input is used to override the ECU (ECM) function and activate the regeneration of the diesel particulate filter
DPF Regeneration Interlock	This input is used to stop a manual regeneration from occurring
Droop Enable	This input is used to switch the engine into droop mode on CAN engines that support this function.

Parameter descriptions are continued overleaf…

Function	Description
EJP1	For the French EJP (Effacement Jours de Pointe) tarrif 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) tarrif 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.
Enable Power Mode 1 Constant Power (Default)	This input is used to instruct the module to switch to *Power Mode 1 Constant Power (Default)*
Enable Power Mode 2 Frequency-Power	This input is used to instruct the module to switch to *Power Mode 2 Frequency-Power*
Enable Power Mode 3 Voltage-Power	This input is used to instruct the module to switch to *Power Mode 3 Voltage-Power*
Enable Power Mode 1 Constant Power Factor	This input is used to instruct the module to switch to *Power Mode 1 Constant Power Factor*
Enable Reactive Mode 2 Voltage-Reactive Power	This input is used to instruct the module to switch to *Reactive Mode 2 Voltage-Reactive Power*
Enable Reactive Mode 3 Power-Power Factor	This input is used to instruct the module to switch to *Reactive Mode 3 Power-Power Factor*
Enable Reactive Mode 4 Constant Reactive Power (Default)	This input is used to instruct the module to switch to *Reactive Mode 4 Constant Reactive Power (Default)*
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*).
Fuel Tank Bund Level High	This input is used to provide protection against fuel leakage, where a level switch is fitted to the fuel tank bund. The action for this alarm is configurable under the *Engine Protections* page in the module configuration.
Generator Closed Auxiliary IEEE 37.2 - 3 Checking or Interlocking Relay	This input is used to provide feedback to allow the module to give true indication of the contactor or circuit breaker switching status. It must be connected to the generator load switching device auxiliary contact.

Parameter descriptions are continued overleaf…

Function	Description
Generator Load Inhibit IEEE 37.2 - 52 AC Circuit Breaker	**NOTE: This input only operates to control the generator-switching device if the module load switching logic is attempting to load the generator. It does not control the generator switching device when the mains supply is on load.** This input is used to prevent the module from loading the generator. If the generator is already on load, activating this input causes the module to unload the generator. Removing the input allows the generator to be loaded again.
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 generator 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
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.
Load Share Inhibit	This input disables the var share control when in parallel
Low Fuel Level Switch IEEE 37.2 - 71 Liquid Level Switch	This input is used to allow feedback for low fuel level.
Main Config Select	This input is used to select the *Main* configuration when *Alternative Configurations* are enabled.
Mains Closed Auxiliary IEEE 37.2 - 3 Checking or Interlocking Relay	This input is used to provide feedback to allow the module to give true indication of the contactor or circuit breaker switching status. It is 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 load switch status.
Mains Load Inhibit IEEE 37.2 - 3 Checking or Interlocking Relay	**NOTE: This input only operates to control the mains switching device if the module load switching logic is attempting to load the mains. It does not control the mains switching device when the generator is on load.** This input is used to prevent the module from loading the mains supply. If the mains supply is already on load activating this input causes the module to unload the mains supply. Removing the input allows the mains to be loaded again.
Manual Breaker Mode	When breaker control is set to *Active On Input,* this input is used to activate the *Manual Breaker Control.*
Manual Restore Contact IEEE 37.2 - 3 Checking or Interlocking Relay	This is only applicable when the *Auto Restore Inhibit* function is active. It is used to 'hold off' transfer back to the mains after a mains failure and keep the generator on load. Transfer back to the mains supply is held off in *Auto mode* while the *Auto Restore Inhibit* input is present. Typically, a key switch provides this input with *spring return to closed* functionality.
Oil Pressure Switch IEEE 37.2 – 63 Pressure Switch	A digital normally open or closed oil pressure switch gives this input. It allows low oil pressure protection.
Paralleling Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to prevent the generator from running in parallel with the Mains supply. This is used on the DSE8620 MKII module 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.

Parameter descriptions are continued overleaf…

Function	Description
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 is 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.
Reset Electrical Trip	**NOTE: For further details, refer to the section entitled Reset Electrical Trip elsewhere in this document.** Provides an external digital input to reset an electrical trip before the generator has stopped to enable it to go back on load.
Reset Maintenance Alarm 1	Provides an external digital input to reset the maintenance alarm 1
Reset Maintenance Alarm 2	Provides an external digital input to reset the maintenance alarm 2
Reset Maintenance Alarm 3	Provides an external digital input to reset the maintenance alarm 3
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.
Smoke Limiting IEEE 37.2 – 18 Accelerating or Decelerating Device	This input instructs the module to give a *run at idle speed* command to the engine either via an output configured to *smoke limit* or by data commands when used with supported electronic engines.

Parameter descriptions are continued overleaf…

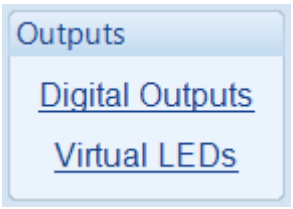
Function	Description
Speed Lower	**NOTE: This input has no effect when using the internal analogue system to control the governor.** This is operational in Manual Mode only, when the breaker is open. On systems where internal relays are used to control the governor, this input is used to decrease the speed.
Speed Raise	**NOTE: This input has no effect when using the internal analogue to control the governor.** This is operational in Manual Mode only, when the breaker is open. On systems where internal relays are used to control the governor, this input is used to increase the speed.
Start Pause IEEE 37.2 - 3 Checking or Interlocking Relay	This input is intended to be used to allow the generator start sequence to commence, but not to complete. This feature is used with air start engines for example to give a controlled start sequence. The function operates such that if the 'Start pause' input is active and an engine start is commanded, the module performs its start sequence thus: The pre-heat output (if used) is activated for the duration of the pre-heat timer. The Fuel output then is energised and the module then enters a pause state - 'Awaiting clear to start'. If the 'start pause' signal becomes inactive at this time then the module continues its normal start sequence. The 'start pause' mode uses the 'manual crank limit' timer and if this expires during the 'Awaiting clear to start' state then a 'Fail to start' alarm is generated and the set shutdown.
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*).
Telemetry Panel Lock	Once the input is active, the module does not respond to mode changes or breaker control by telemetry. The operator is still able to control and view the various instrumentation pages through the front panel buttons.
Transfer To Generator/Open Mains IEEE 37.2 - 52 AC Circuit Breaker	When the generator is running in Manual Mode, activating this input on the first time instructs the module to synchronise the generator to the mains then close the generator breaker, activating this input on the second time the 8620MKII transfers the load to the generator and opens the mains breaker.
Transfer To Mains/ Open Generator IEEE 37.2-52 AC Circuit Breaker	When the generator is running on load and in Manual Mode, activating this input on the first time instructs the module to synchronise the generator to the mains and close the mains breaker, activating this input on the second time the 8620MKII transfers the load to the mains and opens the generator breaker.

Parameter descriptions are continued overleaf…

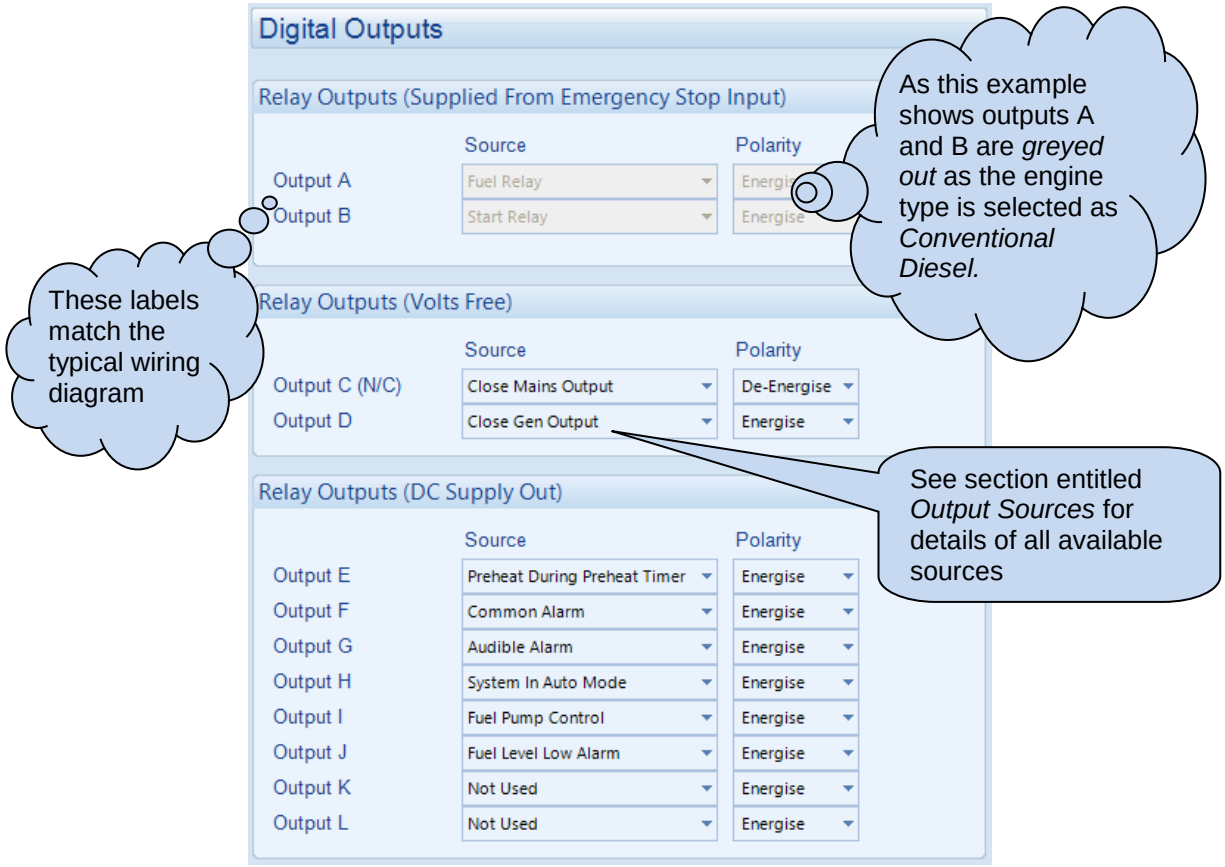
Function	Description
Volts Lower	**NOTE: This input has no effect when using the internal analogue system to control the AVR** This is operational in Manual Mode only, when the breaker is open. On systems where internal relays are used to control the AVR, this input is used to increase the volts.
Volts Raise	**NOTE: This input has no effect when using the internal analogue system to control the AVR** This is operational in Manual Mode only, when the breaker is open. On systems where internal relays are used to control the AVR, this input is used to decrease the volts.
Water in Fuel	Some engines are fitted with water separators, that have a switch indicator for water detection. This input is used to provide protection against high water content in the fuel, where a switch is fitted to the fuel filter. The action for this alarm is configurable under the *Engine Protections* page in the module configuration.

2.5 OUTPUTS

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



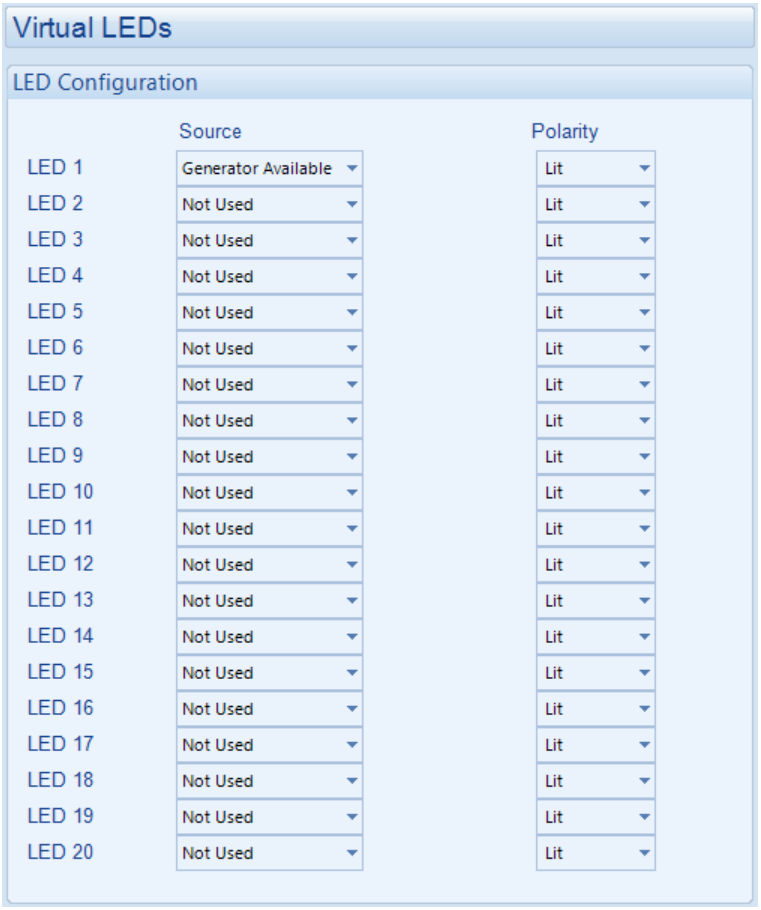
2.5.1 DIGITAL OUTPUTS



Parameter	Description
Source	Select the output source to control the state of the output See section entitled *Output Sources* for details of all available functions
Polarity	Select the digital input polarity: ***Energise:*** When the output source is true, the output activates. ***De-Energise:*** When the output source is true, the output deactivates.

2.5.2 VIRTUAL LEDS

The virtual LEDs provide a configuration of 'status' items. These items are not available for viewing on the module but are seen in the SCADA section of the PC software, or read by third party systems (i.e. BMS or PLCs) using the Modbus protocol.



Parameter	Description
Source	Select the output source to control the state of the output See section entitled *Output Sources* for details of all available functions
Polarity	Select the digital input polarity: ***Lit:*** When the output source is true, the virtual LED activates ***Unlit:*** When the output source is true, the virtual LED deactivates.

2.5.3 OUTPUT SOURCES

The list of output sources available for configuration of the module digital outputs.

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)	
1 Constant Power Factor Mode	Active when the *Reactive Mode 1 Constant Power Factor* is selected.	
1 Constant Power Mode (Default)	Active when the *Power Mode 1 Constant Power (Default)* is selected.	
2 Frequency-Power Mode	Active when the *Power Mode 2 Frequency Power* is selected.	
2 Voltage-Reactive Power Mode	Active when the *Reactive Mode 2 Voltage Reactive Power* is selected.	
3 Power-Power Factor Mode	Active when the *Reactive Mode 3 Power Power Factor* is selected.	
3 Voltage-Power Mode	Active when the *Power Mode 3 Voltage Power* is selected.	
4 Constant Reactive Power Mode (Default)	Active when the *Reactive Mode 4 Constant Reactive Power (Default)* is selected.	
Air Flap Alarm	This output indicates that the air-flap is closed; to operate it requires an input configured as 'Air-flap closed' connected to the external air-flap switch.	
Air Flap Relay	Normally used to control an air flap, this output becomes active upon an Emergency Stop or Over-speed situation.	Inactive when the set has come to rest
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 engine.	
Alternative Config 1, 2, 3 Selected	Active when the alternative configuration is selected.	
Alternative Language Selected	Active when the configured *Alternative Language Select* digital input is active	
Analogue Input A, B, C and D (Digital)	Active when the analogue input A, B, C and D are configured to digital is active.	
Arm Safety On Alarms	Becomes active at the end of the *safety delay* timer whereupon all alarms configured to 'From Safety On' become active	Inactive when : • When the set is at rest • In the starting sequence before the Safety Delay timer has expired
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 Run Inhibited	Active when the *Auto Run Inhibit* function 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	
AVR Maximum Trim Limit Reached	Indicates that the analogue AVR output has reached 100%. This indicates a fault with the control of the AVR (including connection error), incorrect setting of SW2, or that the alternator has reached its maximum capacity.	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not 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
Calling For Scheduled Run	Active during a *Scheduled Run* request from the inbuilt *Scheduler*.	
Charge Alternator Failure Shutdown	Active when the charge alternator shutdown alarm is active	
Charge Alternator Failure Warning	Active when the charge alternator warning alarm is active	
Charger ID0, ID1, ID2, ID3 Common Shutdown	Active when the DSE module detects a Common Shutdown alarm on the relevant DSE Intelligent Charger connected to the DSEnet with the respective ID.	
Charger ID0, ID1, ID2, ID3 Common Warning	Active when the DSE module detects a Common Warning alarm on the relevant DSE Intelligent Charger connected to the DSEnet with the respective ID.	
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.	
Clock Pulse	Also called ‘heartbeat’, it activates and deactivates every few milliseconds to indicate that the module is powered up. It stops energising during write configuration to the module.	
Close Gen Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the generator to be on load this control source is activated.	Inactive whenever the generator is not required to be on load
Close Gen Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the generator to be on load this control source is activated 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 module selects the mains to be on load this control source is activated.	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 module selects the mains to be on load this control source is activated for the duration of the Breaker Close Pulse timer, after which it becomes inactive again.	
Closed To Generator State	Active when the status of the generator breaker is closed.	
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 Maintenance Alarm	Active when any of the maintenance alarm is active.	
Combined Remote Start Request	Indicates that a remote start request is active.	
Combined Under and Over Frequency Alarm	Active when an *Under-Frequency* or *Over-Frequency Shutdown* alarm is active	
Combined Under and Over Frequency Warning	Active when an *Under-Frequency* or *Over-Frequency Warning* alarm is active	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
Combined Under and Over Voltage Alarm	Active when an *Under-Voltage* or *Over-Voltage Shutdown* alarm is active	
Combined Under and Over Voltage Warning	Active when an *Under-Voltage* or *Over-Voltage Warning* alarm 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	
Common Shutdown	Active when one or more *Shutdown* alarms are active	The output is inactive when no shutdown alarms are present
Common Warning	Active when one or more *Warning* alarms are active	The output is inactive when no warning alarms are present
Coolant Cooler Control	Active by the *Coolant Cooler Control* in conjunction with the Coolant Temperature Sensor	
Coolant Heater Control	Active by the *Coolant Heater Control* in conjunction with the Coolant Temperature Sensor	
Cooling Down	Active when the Cooling timer is in progress	
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	
DEF Level Low	Active when *DEF Level Low* CAN alarm is active.	
Digital Input A, B, C, D, E, F, G, H, I, J, K & L	Active when the relevant digital input is active	
Display Heater Fitted and ON	Active when the display heater is on	
DPF Auto Regen Inhibit Request	Active when the *DPF Auto Regen Inhibit Request* is active	
DPF Forced Regeneration Requested	Active when the *DPF Force Regeneration* is active	
DPF Non Mission State	Active when the *DPF Non-Mission State* is active	
DPF Regeneration In Progress	Active when the *DPF Regeneration* is in progress	
DPF Regeneration Interlock Active	Active when the *DPF Regeneration Interlock* is active	
DPTC Filter	Active when the diesel particulate filter CAN alarm is active	
Droop Enable	Active when an input configured to *Droop Enable* is active or if *Droop Enable* has been activated in the module configuration (CAN engine only)	
Dummy Load Control (1-5)	Becomes active when the engine kW falls below the Dummy Load Control Trip Setting.	Inactive when the engine kW returns to above the Dummy Load Control Return setting.
Earth Fault Trip Alarm IEEE 37.2 – 51G or 51N Generator IDMT Earth Fault Relay	Active when the *Earth Fault Protection Alarm* is active.	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
ECU (ECM) Data Fail	Becomes active when no CAN data is received from the ECU after the safety delay timer has expired	Inactive when: • CAN data is being received • The set is at rest During the starting sequence before the safety delay timer has expired
ECU (ECM) Power	Used to switch an external relay to power the CAN ECU (ECM). Exact timing of this output is dependent upon the type of the engine ECU (ECM)	
ECU (ECM) Shutdown	The engine ECU (ECM) has indicated that a Shutdown alarm is present.	Inactive when no Shutdown alarm from the ECU (ECM) is present
ECU (ECM) Stop	Active when the DSE controller is requesting that the CAN ECU (ECM) stops the engine.	
ECU (ECM) Warning	The engine ECU (ECM) has indicated that a Warning alarm is present.	Inactive when no Warning alarm from the ECU (ECM) is present
EJP1 / EJP2	Active when an input configured for *EJP1* or *EJP2* is active	
Electrical Trip Reset	Becomes active when the electrical trip has been reset.	Inactive on the next electrical trip alarm or when the generator is at rest.
Electrical Trip Reset Count Exhausted	Becomes active when the maximum number of resets within specified time frame has been reached.	Inactive when the generator is at rest.
Electrical Trip Stop Inhibited	Becomes active when the generator has been on load, there is an active electrical trip alarm and inhibit engine stop has been enabled.	
Emergency Stop IEEE 37.2 – 5 Stopping Device	Active when the *Emergency Stop* input has been activated	
Energise To Stop	Normally used to control an *Energise to Stop* solenoid, this output becomes active when the controller wants the set to stop running.	Becomes inactive a configurable amount of time after the set has stopped. This is the *ETS hold time*.
Fail To Start IEEE 37.2 - 48 Incomplete Sequence Relay	Becomes active if the set is not seen to be running after the configurable number of start attempts	
Fail To Stop IEEE 37.2 - 48 Incomplete Sequence Relay	If the set is still running a configurable amount of time after it has been given the stop command, the output becomes active. This configurable amount of time is the Fail to Stop Timer.	
Fail to Synchronise IEEE 37.2 - 48 Incomplete Sequence Relay	Becomes active if the module fails to synchronise after the *fail to sync* timer.	
Fan Control	Energises when the engine becomes available (up to speed and volts). This output is designed to control an external cooling fan. When the engine stops, the cooling fan remains running for the duration of the Fan Overrun Delay.	
Flexible Sensor A, B, C or D High Alarm	Active when the analogue input value rises above the Flexible Sensor High Alarm set point.	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
Flexible Sensor A, B, C or D High Pre-Alarm	Active when the analogue input value rises above the *Flexible Sensor High Pre-Alarm* set point.	
Flexible Sensor A, B, C or D Low Alarm	Active when the analogue input value falls below the *Flexible Sensor Low Alarm* set point.	
Flexible Sensor A, B, C or D Low Pre-Alarm	Active when the analogue input value falls below the *Flexible Sensor Low Pre-Alarm* set point.	
Fuel Level High Alarm	Active when the High Fuel Level Alarm is active.	
Fuel Level High Pre-Alarm	Active when the High Fuel Level Pre-Alarm is active.	
Fuel Level Low Alarm	Active when the Low Fuel Level Alarm is active.	
Fuel Level Low Pre-Alarm	Active when the Low Fuel Level Pre-Alarm is active.	
Fuel Pump Control IEEE 37.2 – 71 Level Switch	Becomes active when the *Fuel Level* falls below the *Fuel Pump Control ON* setting and is normally used to transfer fuel from the bulk tank to the day tank.	If the output is already active it becomes inactive when the *Fuel level* is above the *Fuel Pump Control OFF* settings.
Fuel Relay	Becomes active when the controller requires the governor/fuel system to be active.	Becomes inactive whenever the set is to be stopped, including between crank attempts, upon controlled stops and upon fault shutdowns.
Fuel Tank Bund Level High	Active when the *Fuel Bund Level High Alarm* input is active.	
Fuel Usage Alarm IEEE 37.2 – 80 Flow Switch	Active when the *Fuel Usage* alarm becomes active	
Gas Choke On	Becomes active during starting for the duration of the Gas Choke timer. Normally used to choke a gas engine.	Inactive at all other times
Gas Ignition	Becomes active during starting.	Becomes inactive a configurable amount of time after the *Fuel Relay* becomes inactive. This is the *Gas Ignition Off* timer.
Gen And Mains In Parallel	This output is active whenever the generator and mains are in parallel.	
Gen Over Frequency Overshoot Alarm IEEE 37.2 – 81 Frequency Relay	Becomes active when the *Over Frequency Overshoot* alarm is active	
Gen Over Frequency Overshoot Warning IEEE 37.2 – 81 Frequency Relay	Becomes active when the *Over Frequency Overshoot Warning* alarm is active	
Generator Asymmetry High IEEE 37.2 – 59 Overvoltage Relay	Active when the Generator Asymmetry Alarm is active	
Generator at Rest	This output indicates that the generator is not running and no alarms are active.	
Generator Available	Becomes active when the generator is available to take load.	Inactive when • *Loading voltage* and *loading frequency* have not been reached • After *electrical trip* alarm During the starting sequence before the end of the warming timer.
Generator Closed Aux	Active when the *Generator Closed Auxiliary* input is active	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
Generator Excite IEEE 37.2 – 31 Separate Excitation Device	Used to control the excitation of the main alternator (AC).	Becomes inactive when the set is stopped.
Generator Failed To Close IEEE 37.2 – 52B AC Circuit Breaker Position (Contact Open When Breaker Closed)	Active when the *Generator Closed Auxiliary* input fails to become active after the *Close Generator Output* or *Close Generator Output Pulse* becomes active	
Generator Failed to Open IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the generator contactor or breaker. It is only used if the module is configured to use 'Generator Closed Auxiliary' feedback.	
Generator High Voltage Alarm IEEE 37.2 – 59 AC Overvoltage Relay	Active when the *High Voltage Shutdown* alarm is active	
Generator High Voltage Warning IEEE 37.2 – 59 AC Overvoltage Relay	Active when the *High Voltage Warning* alarm is active	
Generator Load Inhibited	Active when the *Generator Load Inhibit* input is active	
Generator Low Voltage Alarm IEEE 37.2 – 27 AC Undervoltage Relay	Active when the generator voltage falls below the *Low Voltage Alarm Trip* level	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
Generator Low Voltage Warning IEEE 37.2 – 27 AC Undervoltage Relay	Active when the generator voltage falls below the *Low Voltage Pre-Alarm Trip* level	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
Generator Negative Sequence Voltage High IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the Generator Negative Sequence Voltage Alarm is active	
Generator Over Frequency Alarm IEEE 37.2 – 81 Frequency Relay	Active when the generator frequency exceeds the *Over Frequency Shutdown Trip* level.	
Generator Over Frequency Warning IEEE 37.2 – 81 Frequency Relay	Active when the generator frequency exceeds the *Over Frequency Warning Trip* level.	
Generator Phase Rotation Alarm IEEE 37.2 – 47 Phase Sequence Relay	Active when the detected generator phase sequence is different than the configured *Generator Phase Rotation*	
Generator Positive Sequence Voltage Low IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the Generator Positive Sequence Alarm is active	
Generator Reverse Power IEEE 37.2 – 32 Directional Power Relay	Active when the *Generator Reverse Power* alarm is active	
Generator Stopping	This output source indicates that the engine has been instructed to stop but has not yet come to rest. Once the engine comes to a standstill this output becomes inactive.	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
Generator Under Frequency Alarm	Active when any of the *Generator Under Frequency Shutdown* or *Electrical Trip* alarm are active	
Generator Under Frequency Warning	Active when the *Generator Under Frequency Warning* alarm is active	
Generator Zero Sequence Voltage High IEEE 37.2 – 47 Phase-Sequence Or Phase Balance Voltage Relay	Active when the *Generator Zero Sequence Alarm* is active	
HEST Active	Active when the High Exhaust System Temperature CAN alarm is active	
High Coolant Temperature Electrical Trip IEEE 37.2 – 26 Apparatus Thermal Device	Active when the *Coolant Temperature* exceeds the configured *High Coolant Temperature Electrical Trip* level	
High Coolant Temperature Shutdown IEEE 37.2 – 26 Apparatus Thermal Device	Active when the *Coolant Temperature* exceeds the configured *High Coolant Temperature Shutdown* level	
High Coolant Temperature Warning IEEE 37.2 – 26 Apparatus Thermal Device	Active when the *Coolant Temperature* exceeds the configured *High Coolant Temperature Warning* level	
High Inlet Temperature Alarm	Active when the High Inlet Temperature Alarm is active on the module.	
High Inlet Temperature Warning	Active when the High Inlet Temperature Warning is active on the module.	
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	
kW Overload Alarm / Warning	Active when the measured kW are above the setting of the *kW overload alarm / pre-alarm* values. Used to give alarms on overload, control a dummy load switch or for load shedding functionality.	
Lamp Test	Active when the lamp test is activated by a digital input or by pressing the *Mute/Lamp Test* control button	
Load Share Inhibit	This output indicates that a digital input that has been configured as '*Load Share Inhibit'* is active. Refer to the '*Edit Inputs*' section of this manual for details.	
Load Shedding Control (1-5)	Becomes active when the engine kW exceeds Load Shedding Control Trip Setting.	Inactive when the engine kW returns to below the Load Shedding Control Return setting.
Loading Frequency Not Reached	Active when the generator frequency has not reached the configured *Loading Frequency* during the starting process.	
Loading Voltage Not Reached	Active when the generator voltage has not reached the configured *Loading Voltage* during the starting process.	
Loss of Magnetic Pickup Signal	Active when the controller senses the loss of signal from the magnetic pickup probe	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
Louvre Control	Active when the fuel relay becomes active. Normally used to drive ventilation louvres for the generator set	
Low Coolant Temperature IEEE 37.2 – 26 Apparatus Thermal Device	Active when the *Coolant Temperature* falls below the *Low Coolant Temperature alarm* setting	
Low kW Load	Active when the kW level falls below configured *Low Load* alarm.	
Low Fuel Level IEEE 37.2 – 71 Level Switch	Active when the *Low Fuel Level* alarm becomes active	
Low Oil Pressure Shutdown IEEE 37.2 - 63 Pressure Switch	Active when the *Oil Pressure* falls below the *Low Oil Pressure Shutdown* setting	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
Low Oil Pressure Warning IEEE 37.2 - 63 Pressure Switch	Active when the *Oil Pressure* falls below the *Low Oil Pressure Warning* setting	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
Main Config Selected	Active when the main configuration is active	
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 – 27 AC Undervoltage Relay IEEE 37.2 – 59 AC Overvoltage Relay	The output indicates that one or more of the module's sources of determining mains failure is 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 – 59 AC 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 – 27 AC Undervoltage Relay	Active when the mains voltage falls below the *Low Voltage* setting	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
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 detected mains phase sequence is different than the configured *Mains Phase Rotation*	
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	
Maintenance Alarm 1, 2 or 3 Due	Active when the relevant maintenance alarm is due.	
Manual Restore Contact	Active when the manual restore contact input is active	
MPU Open Circuit	This output indicates that the module has detected an open circuit failure in the Magnetic Pickup transducer circuit.	
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.	
Negative Phase Sequence Alarm	Active when the *Negative Phase Sequence* alarm is active	
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.	
Oil Pressure Sensor Open Circuit	Active when the *Oil Pressure Sensor* is detected as being open circuit.	
Open Gen Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the generator to be off load this control source is activated.	Inactive whenever the generator is required to be on load
Open Gen Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the generator to be off load this control source is activated for the duration of the Breaker Open Pulse timer, after which it becomes inactive again.	
Open Mains Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the mains to be off load this control source is activated.	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 module selects the mains to be off load this control source is activated for the duration of the Breaker Open Pulse timer, after which it becomes inactive again.	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
Out of Sync	Indicates that the *out of sync* alarm has been triggered.	
Out of Sync Generator	Indicates that the Generator supply has 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.	
Over Current IDMT Alarm	Active when the *Over Current IDMT* alarm is active	
Over Current Immediate Warning	Active when the *Over Current Immediate Warning* alarm is active	
Over Speed Shutdown IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Shutdown* alarm is active	
Over Speed Warning IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Warning* alarm is active	
Over Speed Overshoot Alarm IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Overshoot* alarm is active	
Overspeed Overshoot Warning IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Overshoot Warning* alarm is active	
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	
Preheat During Preheat Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The preheat timer has expired

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
Preheat Until End Of Cranking	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached *crank disconnect* conditions
Preheat Until End Of Safety Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached the end of the *safety delay* timer
Preheat Until End of Warming Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached the end of the *warming* timer
Protections Disabled	Active when protections are turned off (Unticked) in the configuration.	
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 On Load	Active when the *Remote Start On Load* input is active	
Reset AVR to Datum	This output is intended to be used in conjunction with an electronic or motorised potentiometer, which has a 'centre pot' type input. This output is activated whenever the module needs to reset the potentiometer to its centre position.	
Reset Governor to Datum	This output is intended to be used in conjunction with an electronic or motorised potentiometer, which has a 'centre pot' type input. This output is activated whenever the module needs to reset the potentiometer to its centre position.	
Reset Maintenance 1, 2 or 3	Active when the relevant *Maintenance Alarm Reset* is active	
Return delay in progress	This output source is active to indicate that the return timer is running.	
Scheduled Auto Start Inhibit	Active when the *Inhibit Scheduled Run* input is active	
SCR Inducement	Active when SCR Inducement CAN Alarm is active	
Short Circuit Generator	This output indicates that the module has detected a short circuit on the generator output.	
Shutdown Blocked	Becomes active when protections are disabled and one of the parameters goes out of limits	
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 the *Simulate Start Button* digital input is 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.	

Parameter descriptions are continued overleaf…

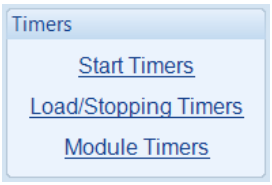
Output Source	Activates…	Is Not Active….
Smoke Limiting	Becomes active when the controller requests that the engine runs at idle speed. As an output, this is used to give a signal to the *Idle Speed Input* on the engine speed governor (if available)	Becomes inactive when the controller requests that the engine runs at rated speed.
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	
Speed Lower Relay	This output is used to give a speed lower signal to the external governor or electronic pot.	
Speed Raise Relay	This output is used to give a speed raise signal to the external governor or electronic pot.	
Start Delay in Progress	This output source is active to indicate that the module's internal start delay timer is running. Once this timer expires the module initiates its start sequence.	
Start Paused	Active when the *Start Pause* digital input is active.	
Start Relay IEEE 37.2 – 54 Turning Gear Engaging Device	Active when the controller requires the cranking of the engine.	
Starting Alarm	This output is used to supply an external sounder with a signal that the engine is about to start. The output is active after the start delay time, during the pre heat delay (if used) and continues until the set starts.	
Starting Alarms Armed	This output indicates that the starting alarms are now enabled. It is used to control external logic circuitry. Starting alarms are armed as soon as the module commences starting of the engine and remain armed until the engine is at rest.	
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.	
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 Test On Load mode is selected	
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 Panel Lock	Active when the *Telemetry Panel Lock* digital input is active	
Telemetry Start in Auto Mode	Active when a *Remote Start Request* is sent over by communication	

Parameter descriptions are continued overleaf…

Output Source	Activates…	Is Not Active….
Under Speed Alarm	Active when the *Underspeed Shutdown* or *Electrical Trip* alarm is active.	
Under Speed Warning	Active when the *Underspeed Warning* alarm is active.	
Voltage Lower Relay	Used when the *internal relays* scheme of AVR control is used. This output is used to drive a motorised potentiometer or Voltage Lower input of an AVR	
Voltage Raise Relay	Used when the *internal relays* scheme of AVR control is used. This output is used to drive a motorised potentiometer or Voltage Raise input of an AVR	
Waiting for Electrical Trip Reset	Active when an electrical trip alarm is active and waiting for it to be reset.	Inactive when the electrical trip alarm has been reset or when the generator is at rest.
Waiting For Generator	This output indicates that the engine has been instructed to start but has not yet become available. Once the generator becomes available this output becomes in-active. (Available = Generator Frequency and Voltage levels are above the '*Loading*' levels set in the configuration)	
Waiting For Manual Restore	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.	
Water in Fuel	Active when the *Water in Fuel* input is active, or when the module is informed of the *Water in Fuel* CAN message from the ECU.	

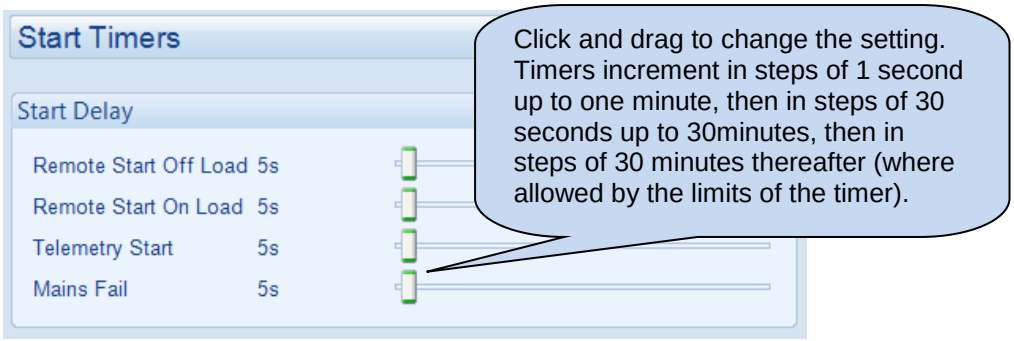
2.6 TIMERS

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.



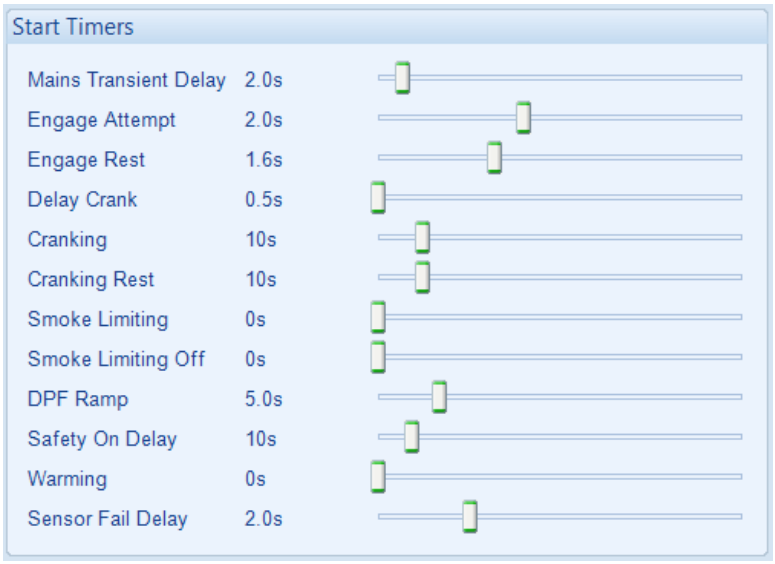
2.6.1 START TIMERS

Start Delay



Timer	Description
Remote Start Off Load	The amount of time delay before starting 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 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 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 in AUTO mode. This timer is activated upon a mains failure detection.

Start Timers



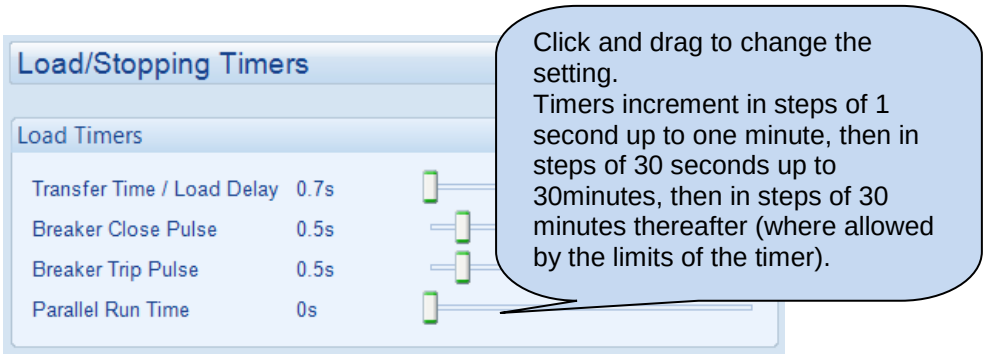
Timer	Description
Mains Transient Delay	Used to give a delay between sensing mains failure and acting upon it. This is used to prevent dropouts of the mains load switch and operation of the system due to mains supply transient conditions.
Engage Attempt	**NOTE: Only available if using magnetic pick-up and multiple engage attempts.** The amount of time the module attempts to engage the starter motor during each engage attempt. If the Magnetic Pick-up is not detecting movement of the flywheel when this timer expires, the engage attempt terminates. When the engage fails consecutively for the configured number of *Engage Attempts*, the *Fail to Engage* alarm is activated.
Engage Rest	**NOTE: Only available if using magnetic pick-up and multiple engage attempts.** The amount of time the module waits between attempts to engage the starter.
Delay Crank	The amount of time delay between the fuel relay and the crank relay energising. This is typically used to allow fuel systems to prime.
Cranking	The amount of time for each crank attempt
Cranking Rest	The amount of time between multiple crank attempts.
Smoke Limiting	The amount of time that the engine is requested to run at idle speed upon starting. This is typically used to limit emissions at startup.
Smoke Limiting Off	The amount of time that the engine takes to run up to rated speed after removal of the command to run at idle speed. If this time is too short, the engine is stopped due to an *Underspeed* alarm. If the time is too long, *Underspeed* protection is disabled until the *Smoke Limit Time Off* time has expired.
DPF Ramp	The amount of time that the engine takes to run up to rated speed after running at its DPF speed.

Parameter descriptions are continued overleaf…

Timer	Description
Safety On Delay	The amount of time at startup that the controller ignores oil pressure and engine speed and other delayed alarms. This is used to allow the engine to run up to speed before protections are activated.
Warming	The amount of time the engine runs before being allowed to take load. This is used to warm the engine to prevent excessive wear.
Sensor Fail Delay	**NOTE: Only available if using Magnetic pick-up.** The amount of time during which the module must receive a speed signal once cranking has commenced. If no signal is present, the engine is shutdown and a *Loss of Speed Sensing* alarm given.

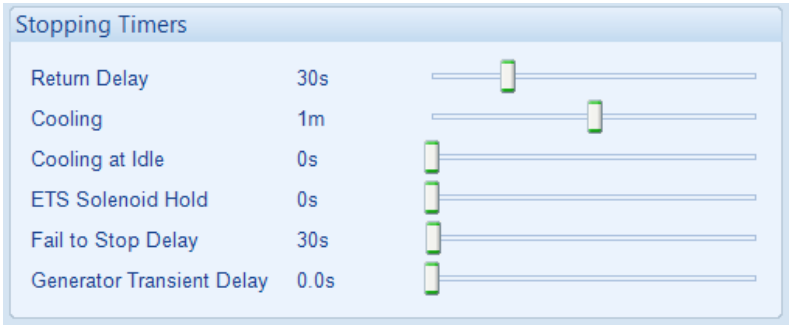
2.6.2 LOAD / STOPPING TIMERS

Load Timers



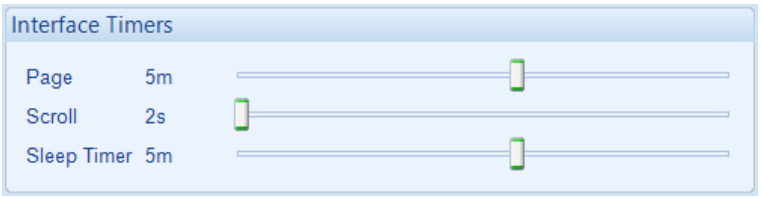
Timer	Description
Transfer Time / Load Delay	The time between one load switch opening and the other closing. Used during transfer to and from the generator.
Breaker Close Pulse	The amount of time that *Breaker Close Pulse* signal is present when the request to close the load switch is given.
Breaker Trip Pulse	The amount of time that *Breaker Open Pulse* signal is present when the request to open the load switch is given.
Parallel Run Time	This timer dictates how long the generator runs in parallel with the mains supply before ramping down.

Stopping Timers



Timer	Description
Return Delay	A delay, used in auto mode only, that allows for 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 start request has been removed.
Cooling	The amount of time that the set is made to run OFF LOAD before being stopped. This is to allow the set to cool down and is particularly important for engines with turbo chargers.
Cooling At Idle	The amount of time that the set is made to run OFF LOAD and at Idle Speed before being stopped.
ETS Solenoid Hold	The amount of time the *Energise to stop* solenoid is kept energised after the engine has come to rest. This is used to ensure the set has fully stopped before removal of the stop solenoid control signal.
Fail To Stop Delay	If the set is called to stop and is still running after the *fail to stop* delay, a *Fail to Stop* alarm is generated.
Generator Transient Delay	A delay used to allow for short term transients to be ignored before raising an alarm. Operates upon Engine under/over speed, Generator under/over volts/frequency.

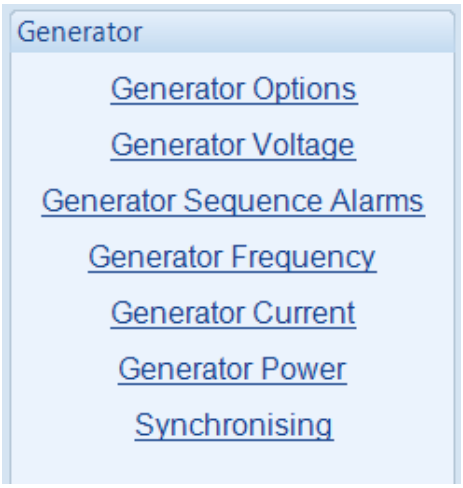
2.6.3 MODULE TIMERS



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
Sleep Timer	In Stop mode, if the module is left unattended for the duration of the *Sleep Timer,* it goes into sleep mode to save power.

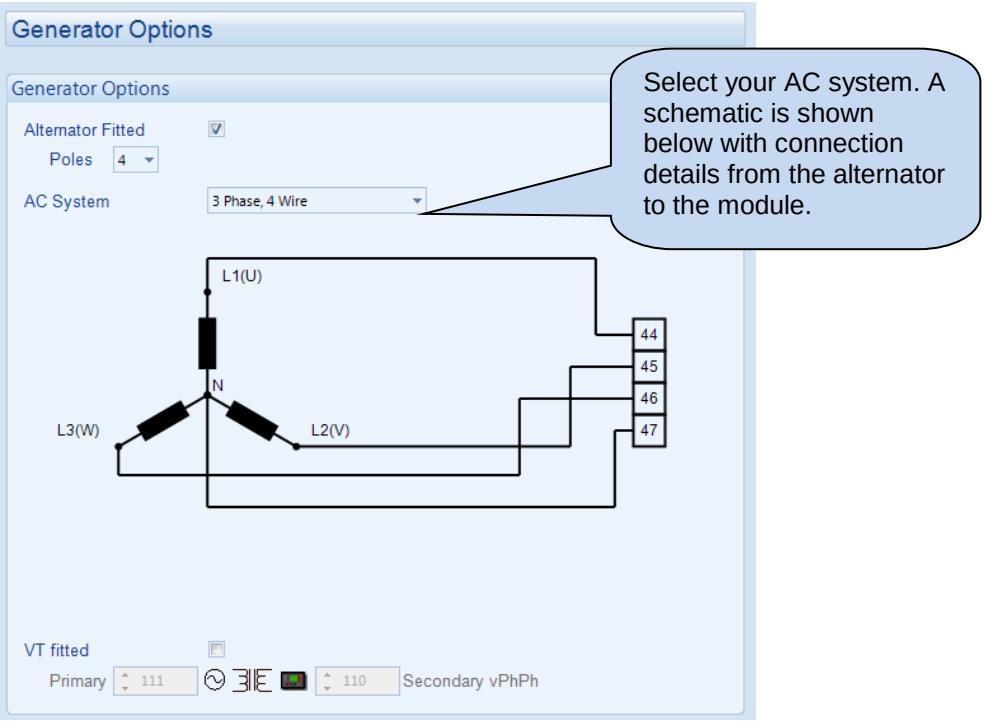
2.7 GENERATOR

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



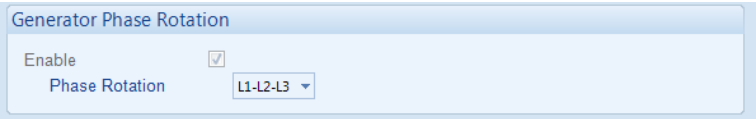
2.7.1 GENERATOR OPTIONS

Generator Options



Parameter	Description
Alternator Fitted	☐ = There is no alternator in the system, it is an *engine only* application ☑ = An alternator is fitted to the engine, it is a generator application.
Poles	The number of poles on the alternator
AC System	**NOTE: For further information on the wiring for the different topologies, please refer to the DSE module 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 alternator ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the generated voltage to be within the controller voltage 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) but also used on systems such as 600V ph-ph.

Generator Phase Rotation



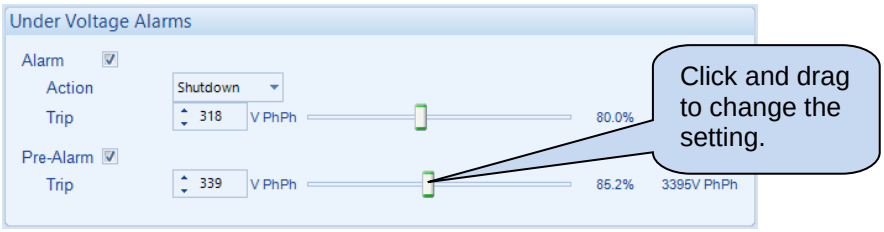
Parameter	Description
Generator Phase Rotation IEEE 37.2 – 47 Phase Sequence Relay	☐ = Generator phase rotation is not checked. ☑ = An electrical trip alarm is generated when the measured phase rotation is not as configured.

Breaker Control

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

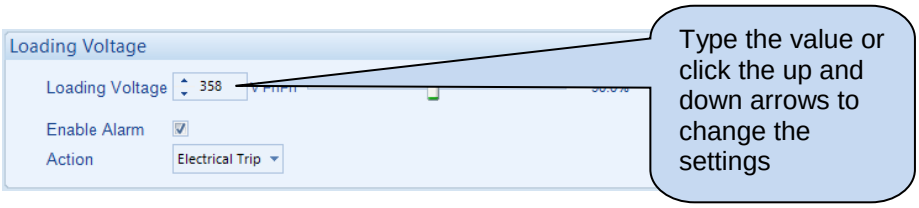
2.7.2 GENERATOR VOLTAGE

Under Voltage Alarms



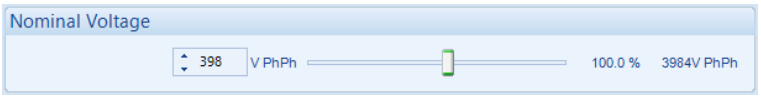
Parameter	Description
Generator Under Voltage Alarm IEEE 37.2 - 27AC Undervoltage Relay	☐ = Generator Under Volts does NOT give an alarm ☑ = Generator Under Volts gives an alarm in the event of the generator output falling below the configured *Under Volts Alarm Trip* value for longer than the *Generator Transient Delay*. The *Under-volts Alarm Trip* value is adjustable to suit user requirements.
Action	Select the type of alarm required from the list: ***Shutdown*** ***Electrical Trip*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Generator Under Voltage Pre-Alarm IEEE 37.2 - 27AC Undervoltage Relay	☐ = Generator Under Volts does NOT give a warning alarm ☑ = Generator Under Volts gives a warning alarm in the event of the generator output falling below the configured *Under Volts Pre-Alarm Trip* value for longer than the *Generator Transient Delay*. The *Under-volts Pre-Alarm Trip* value is adjustable to suit user requirements.

Loading Voltage



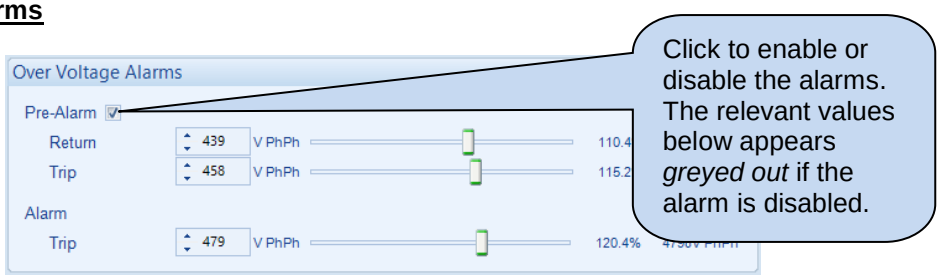
Parameter	Description
Loading Voltage	This is the minimum voltage the generator must be operating at before the module considers it available to take the load. It is also the voltage above the under voltage trip that the generator output must return to before the module considers that the supply is back within limits. (i.e. With an undervolts trip of 184 V and a loading voltage of 207 V, the output voltage must return to 207 V following an under voltage event to be considered within limits.)
Enable Alarm	☐ = Alarm is disabled. ☑ = Upon starting and after the *Safety On Delay Timer* expires, if the generator output voltage fails to reach the *Loading Voltage* set point, the *Loading Voltage Not Reached* alarm is activated.

Nominal Voltage



Parameter	Description
Nominal Voltage	This is used to calculate the percentages of the alarm set points and also instruct the module what voltage to adjust the generator to whilst running on load

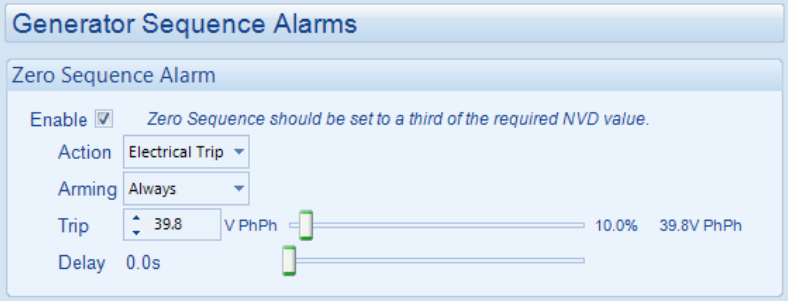
Over Voltage Alarms



Parameter	Description
Generator Over Voltage Pre-Alarm IEEE 37.2 – 59 AC Overvoltage Relay	☐ = Alarm is disabled ☑ = Generator Over Volts gives a warning alarm in the event of the generator output voltage rising above the configured *Over Volts Pre-Alarm Trip* value for longer than the *Generator Transient Delay*. The *Warning* is automatically reset when the generator output voltage falls below the configured *Return* level. The *Over Volts Pre-Alarm Trip* value is adjustable to suit user requirements.
Generator Over Voltage Shutdown IEEE 37.2 – 59 AC Overvoltage Relay	Generator Over Volts gives a *Shutdown* alarm in the event of the generator output rising above the configured *Over Volts Alarm Trip* value for longer than the *Generator Transient Delay*. The *Over-volts Alarm Trip* value is adjustable to suit user requirements.

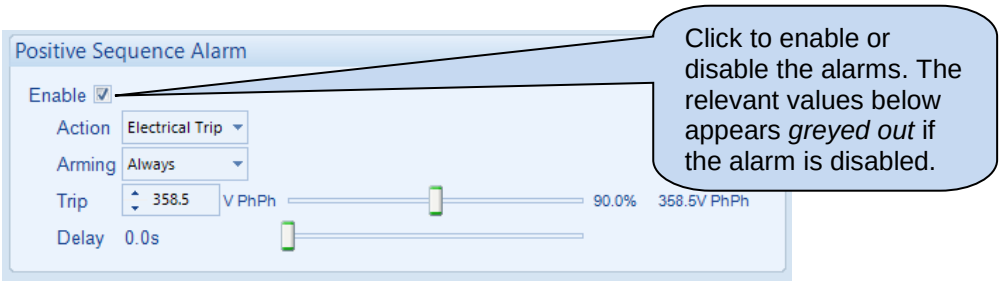
2.7.3 GENERATOR SEQUENCE ALARMS

Zero Sequence Alarm



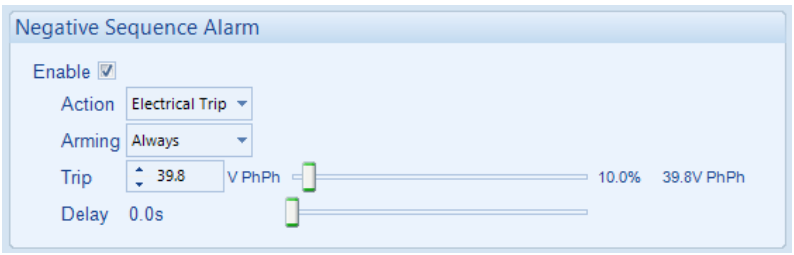
Parameter	Description
Zero Sequence Alarm IEEE 37.2 – 47H Phase-Sequence Or Phase Balance Voltage Relay	**⚠NOTE: The Zero Sequence Alarm must be set to a third of the required Neutral Voltage Displacement (NVD) value. This is because the summation of the three Zero Sequence vector components is equal 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: ***Electrical Trip*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Arming	Select when the alarm becomes active: ***Active From Parallel:*** The *Zero Sequence Alarm* is monitored when generator and mains are in parallel ***Always:*** The *Zero Sequence Alarm* is always monitored ***From Safety On:*** The *Zero Sequence Alarm* is monitored from the end of the *Safety On Delay* timer

Positive Sequence Alarm



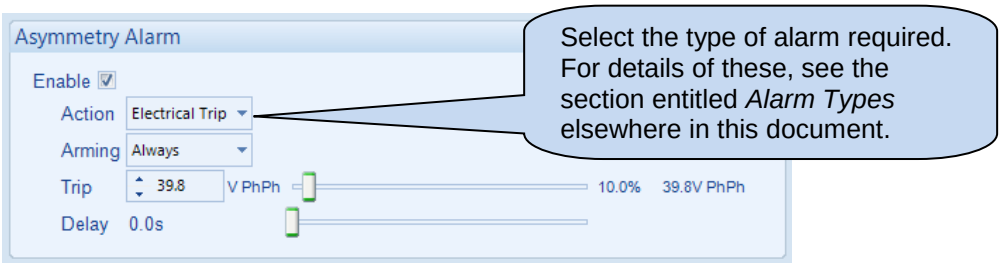
Parameter	Description
Positive Sequence Alarm IEEE 37.2 – 47L Phase-Sequence Or Phase Balance Voltage Relay	☐ = Alarm is disabled ☑ = The alarm activates when the *Positive Sequence* voltage falls below the configured *Positive Sequence Alarm Trip* level for the configured *Delay* time.
Action	Select 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.
Arming	Select when the alarm becomes active: ***Active From Parallel:*** The *Positive Sequence Alarm* is monitored when generator and mains are in parallel ***Always:*** The *Positive Sequence Alarm* is always monitored ***From Safety On:*** The *Positive Sequence Alarm* is monitored from the end of the *Safety On Delay* timer

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.
Arming	Select when the alarm becomes active: ***Active From Parallel:*** The *Negative Sequence Alarm* is monitored when generator and mains are in parallel ***Always:*** The *Negative Sequence Alarm* is always monitored ***From Safety On:*** The *Negative Sequence Alarm* is monitored from the end of the *Safety On Delay* timer

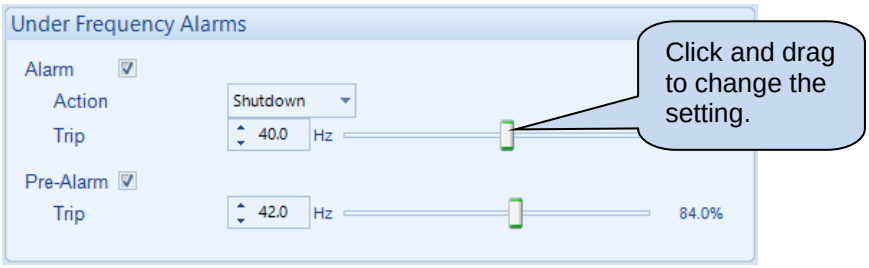
Asymmetry Alarm



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.
Arming	Select when the alarm becomes active: ***Active From Parallel:*** The *Asymmetry Alarm* is monitored when generator and mains are in parallel ***Always:*** The *Asymmetry Alarm* is always monitored ***From Safety On:*** The *Asymmetry Alarm* is monitored from the end of the *Safety On Delay* timer

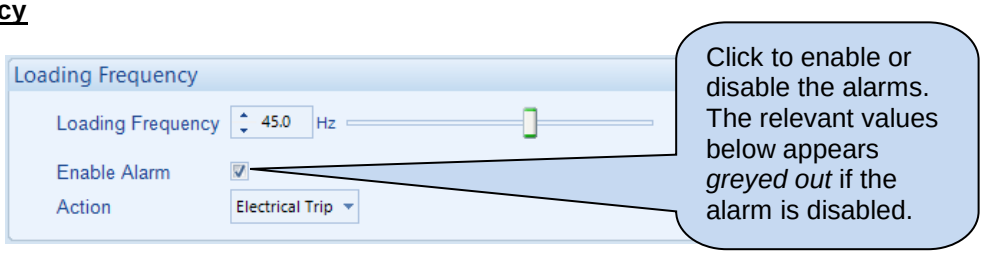
2.7.4 GENERATOR FREQUENCY

Under Frequency Alarms



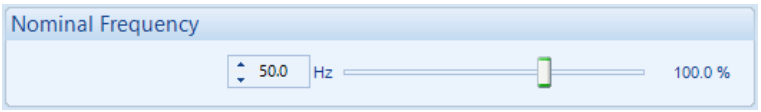
Parameter	Description
Generator Under Frequency Alarm IEEE 37.2 -81 Frequency Relay	☐ = Generator Under Frequency does NOT give an alarm ☑ = Generator Under Frequency gives an alarm in the event of the generator output frequency falling below the configured *Under Frequency Alarm Trip* value for longer than the *Generator Transient Delay*. The *Under-frequency Alarm Trip* value is adjustable to suit user requirements.
Action	Select the type of alarm required from the list: ***Shutdown*** ***Electrical Trip*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Generator Under Frequency Pre-Alarm IEEE 37.2 -81 Frequency Relay	☐ = Generator Under Frequency does NOT give a warning alarm ☑ = Generator Under Frequency gives a warning alarm in the event of the generator output frequency falling below the configured *Under Frequency Pre-Alarm Trip* value for longer than the *Generator Transient Delay*. The *Under Frequency Pre-Alarm Trip* value is adjustable to suit user requirements.

Loading Frequency



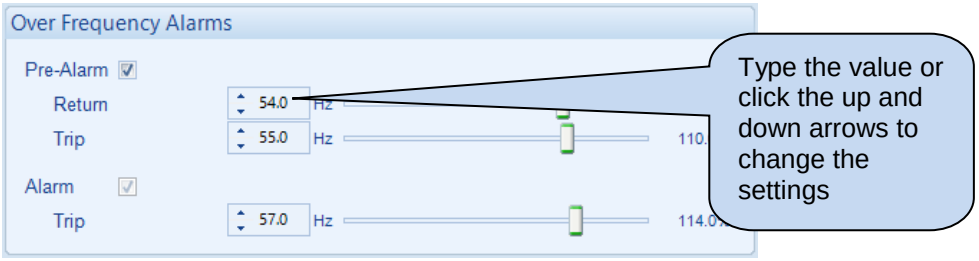
Parameter	Description
Loading Frequency	This is the minimum frequency the generator must be operating at, before the module considers it available to take the load. It is also the frequency above the under frequency trip that the generator output must return to before the module considers that the supply is back within limits. (i.e. With an under-frequency trip of 42.0 Hz and a loading frequency of 45.0 Hz, the output frequency must return to 45.0 Hz following an under frequency event to be considered within limits.)
Enable Alarm	☐ = Alarm is disabled. ☑ = Upon starting and after the *Safety On Delay Timer* expires, if the generator output frequency fails to reach the *Loading Frequency* set point, the *Loading* frequency *Not Reached* alarm is activated.

Nominal Frequency



Parameter	Description
Nominal Frequency	This is used to calculate the percentages of the alarm setpoints and also instruct the module what frequency to adjust the generator to whilst running on load

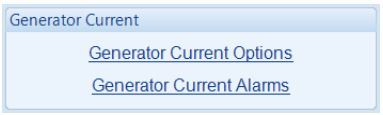
Over Frequency Alarms



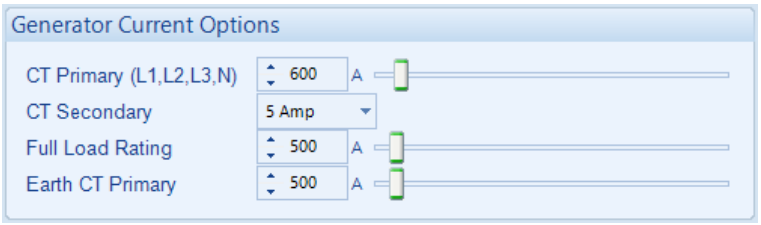
Parameter	Description
Generator Over Frequency Pre-Alarm IEEE 37.2 -81 Frequency Relay	☐ = Alarm is disabled ☑ = Generator Over Frequency gives a warning alarm in the event of the generator output frequency rising above the configured *Over* frequency *Pre-Alarm Trip* value for longer than the *Generator Transient Delay*. The *Warning* is automatically reset when the generator output frequency falls below the configured *Return* level. The *Over Frequency Pre-Alarm Trip* value is adjustable to suit user requirements.
Generator Over Frequency IEEE 37.2 -81 Frequency Relay	☐ = Alarm is disabled ☑ = Generator Over Frequency gives a *Shutdown* alarm in the event of the generator output rising above the configured *Over Frequency Alarm Trip* value for longer than the *Generator Transient Delay*. The *Over Frequency Alarm Trip* value is adjustable to suit user requirements.

2.7.5 GENERATOR CURRENT

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



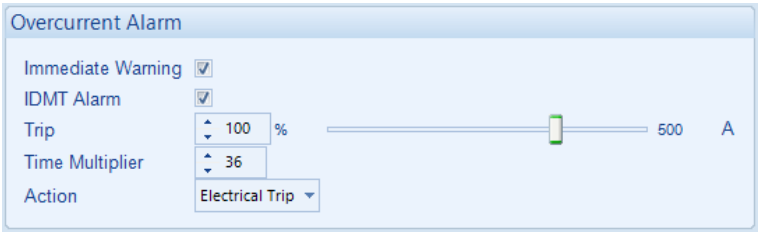
2.7.5.1 GENERATOR CURRENT OPTIONS



Parameter	Description
CT Primary (L1, L2, L3, N)	Primary rating of the three phase current transformers.
CT Secondary	Secondary rating of all the current transformers, options are: ***1 Amp*** ***5 Amp***
Full Load Rating	This is the full load current rating of the alternator.
Earth CT Primary	Primary rating of the earth fault current transformers.

2.7.5.2 GENERATOR CURRENT ALARMS

Overcurrent Alarm

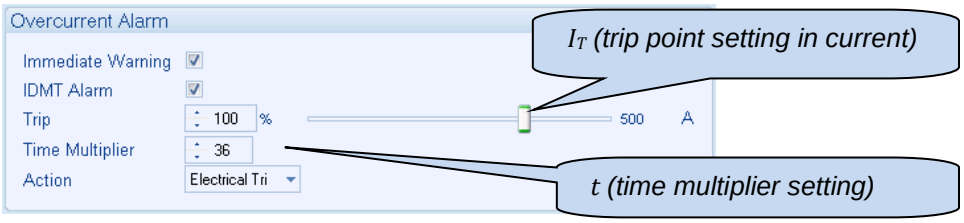


The overcurrent alarm combines a simple warning trip level combined with a fully functioning IDMT curve for thermal protection.

Parameter	Description
Immediate Warning IEEE 37.2 -50 instantaneous overcurrent relay	If the *Immediate Warning* is enabled, the controller generates a *warning alarm* as soon as the *Trip* level is reached. The alarm automatically resets once the generator loading current falls below the *Trip* level (unless *All Warnings are latched* is enabled). For further advice, consult the generator supplier.
IDMT Alarm IEEE 37.2 -51 AC time overcurrent relay (shutdown / electrical trip)	If the *Over Current IDMT Alarm* is enabled, the controller begins following the IDMT 'curve' when the current on any phase passes the *Trip* setting. If the *Trip* is surpassed for an excess amount of time, the *IDMT Alarm* triggers (*Shutdown* or *Electrical Trip* as selected in *Action*). The larger the over circuit fault, the faster the trip. The speed of the trip is dependent upon the fixed formula: $$T = \frac{t}{\left(\frac{I_A}{I_T} - 1\right)^2}$$ **Where:** T is the tripping time in seconds I_A is the actual measured current of the most highly loaded line (L1, L2 or L3) I_T is the delayed trip point setting in current t is the time multiplier setting and also represents the tripping time in seconds at twice full load (when $^{I_A}/_{I_T} = 2$).
Trip	The percentage of alternator full load current at which the IDMT Alarm curve starts to operate from.
Time Multiplier	The time multiplier constant throughout the IDMT curve. It also represents the tripping time in seconds at 200% alternator full load current.
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

Overcurrent Protection Explanation

The settings shown in the example below are a screen capture of the DSE factory settings, taken from the DSE Configuration Suite PC Software for a brushless alternator.



These settings provide for normal running of the generator up to 100% full load. If full load is surpassed, the *Immediate Warning* alarm is triggered and the set continues to run.

The effect of an overload on the generator is that the alternator windings begin to overheat; the aim of the *IDMT Alarm* is to prevent the windings being overload (heated) too much. The amount of time that the alternator is safely overloaded is governed by how high the overload condition is.

The default settings as shown above allow for an overload of the alternator to the limits of the *Typical Brushless Alternator* whereby 110% overload is permitted for 1 hour or 200% overload is permitted for 36 seconds.

If the alternator load reduces, the controller then *follows* a cooling curve. This means that a second overload condition may trip soon after the first as the controller *knows* if the windings have not cooled sufficiently.

For further details on the *Thermal Damage Curve* of your alternator, refer to the alternator manufacturer and generator supplier.

Creating A Spreadsheet For the Over Current IDMT Curve

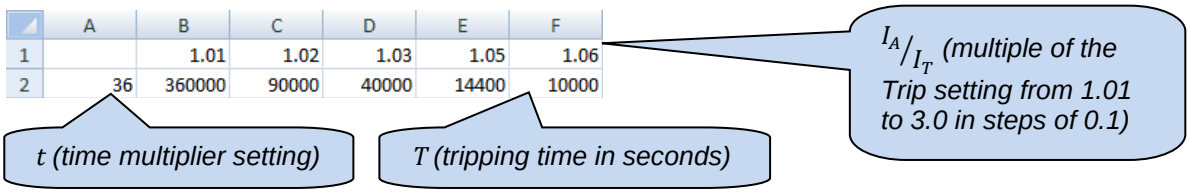
The formula used:

$$T = \frac{t}{\left(\frac{I_A}{I_T} - 1\right)^2}$$

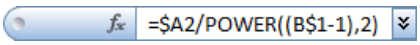
Where:

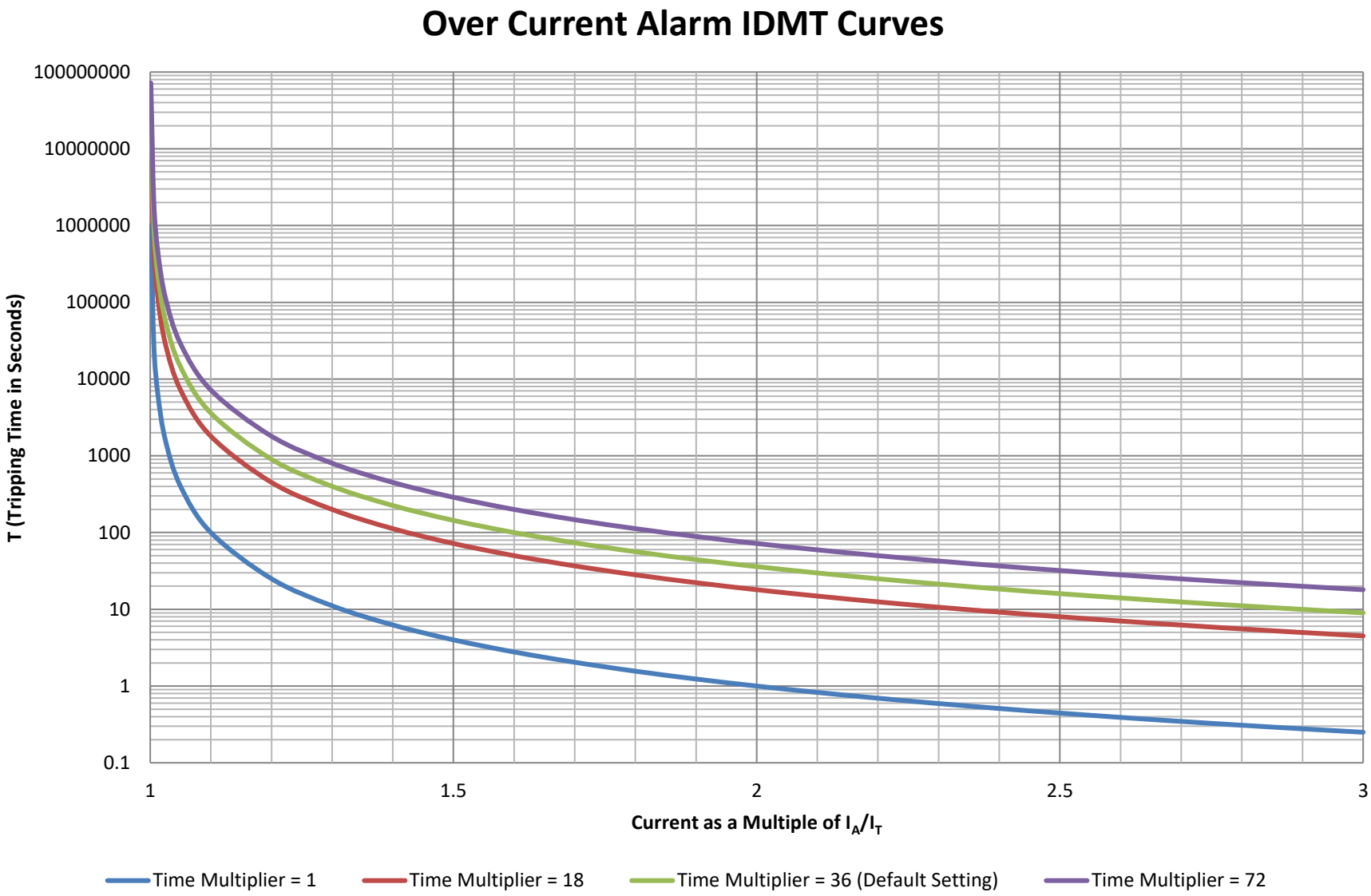
T is the tripping time in seconds
I_A is the actual measured current of the most highly loaded line (L1, L2 or L3)
I_T is the delayed trip point setting in current
t is the time multiplier setting and also represents the tripping time in seconds at twice full load (when $^{I_A}/_{I_T} = 2$).

The equation is simplified for addition into a spreadsheet. This is useful for 'trying out' different values of t *(time multiplier setting)* and viewing the results, without actually testing this on the generator.

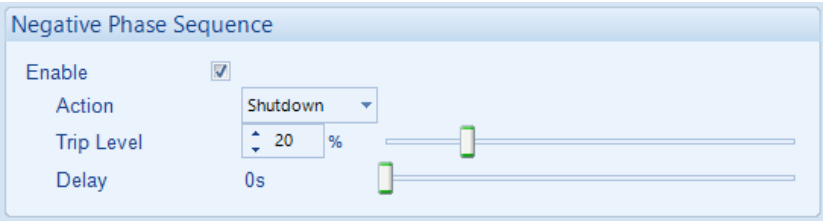


The formula for the *Tripping Time* cells is:




Over Current Alarm IDMT Curves
T (Tripping Time in Seconds)
100000000
10000000
1000000
100000
10000
1000
100
10
1
0.1
1
1.5
2
2.5
3
Current as a Multiple of I_A/I_T
Time Multiplier = 1
Time Multiplier = 18
Time Multiplier = 36 (Default Setting)
Time Multiplier = 72

Negative Phase Sequence

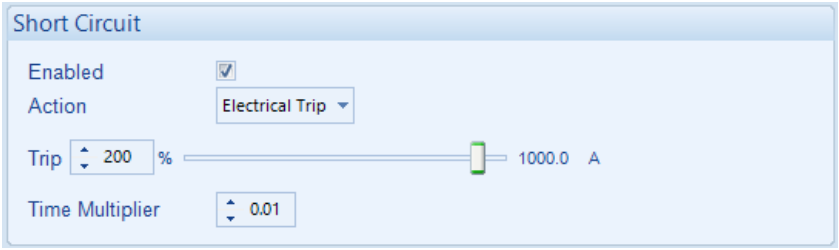


Unbalanced loads cause negative sequence current in the alternator stator. These currents cause harmonics which eventually leads to overheating and melting of the rotor. An unbalanced-load is, however, permissible within limits.

For recommended settings contact your alternator manufacturer.

Parameter	Description
Negative Phase Sequence Enable IEEE C37.2 - 46 Phase-Balance Current Relay	If the *Negative Phase Sequence* is enabled, the controller protects against unbalanced loads. The controller achieves this by measuring the difference between the minimum phase load and the maximum phase load. If this difference is greater than the *Trip* setting for the configured *Delay*, the Negative Phase Sequence Enable triggers. The magnitude of the tripping current is calculated by: $$I_T = I_R \times T_P \times P_N$$ **Where:** I_T is the tripping point setting in current I_R is the rated full load current per phase of the alternator T_P is the *Trip* setting as a percentage P_N is the number of phases the generator is outputting
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Shutdown*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Trip	The trip as a percentage of alternator full load current
Delay	Set the amount of time before the *Negative Phase Sequence* activates.

Short Circuit Alarm

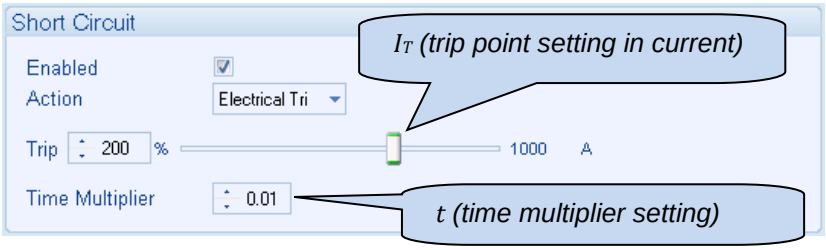


Parameter	Description
Short Circuit IDMT Enable IEEE C37.2 – 51 IDMT Short Circuit Relay	If the *Short Circuit Alarm* is enabled, the controller begins following the IDMT 'curve' when the current on any phase passes the *Trip* setting. If the *Trip* is surpassed for an excess amount of time, the *IDMT Alarm* triggers (*Shutdown* or *Electrical trip* as selected in *Action*). The larger the short circuit fault, the faster the trip. The speed of the trip is dependent upon the fixed formula: $$T = \frac{t \times 0.14}{\left(\left(\frac{I_A}{I_T}\right)^{0.02} - 1\right)}$$ Where: T is the tripping time in seconds (accurate to +/- 5% or +/- 50 ms (whichever is the greater)) I_A is the actual measured current I_T is the trip point setting in current t is the time multiplier setting
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Trip	The percentage of alternator full load current at which the IDMT Alarm curve starts to operate from.
Time Multiplier	The time multiplier constant throughout the IDMT curve.

Short Circuit Protection Explanation

The settings shown in the example below are a screen capture of the DSE factory settings, taken from the DSE Configuration Suite software.

NOTE: Due to large inrush currents from certain loads, such as motors or transformers, the default settings for the Short Circuit alarm may need adjusting to compensate.



The effect of a short circuit on the generator is that the alternator stator and rotor begin to overheat; the aim of the *IDMT alarm* is to prevent the stator and rotor being overload (heated) too much. The amount of time that the alternator is safely overloaded is governed by how high the short circuit condition is.

For further details on the *Thermal & Magnetic Damage Curve* of your alternator, refer to the alternator manufacturer and generator supplier.

Creating a Spreadsheet For the Short Circuit IDMT Curve

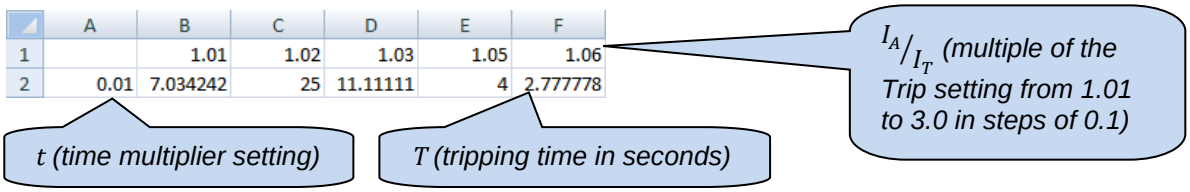
The formula used:

$$T = \frac{t \times 0.14}{\left(\left(\frac{I_A}{I_T}\right)^{0.02} - 1\right)}$$

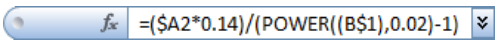
Where:

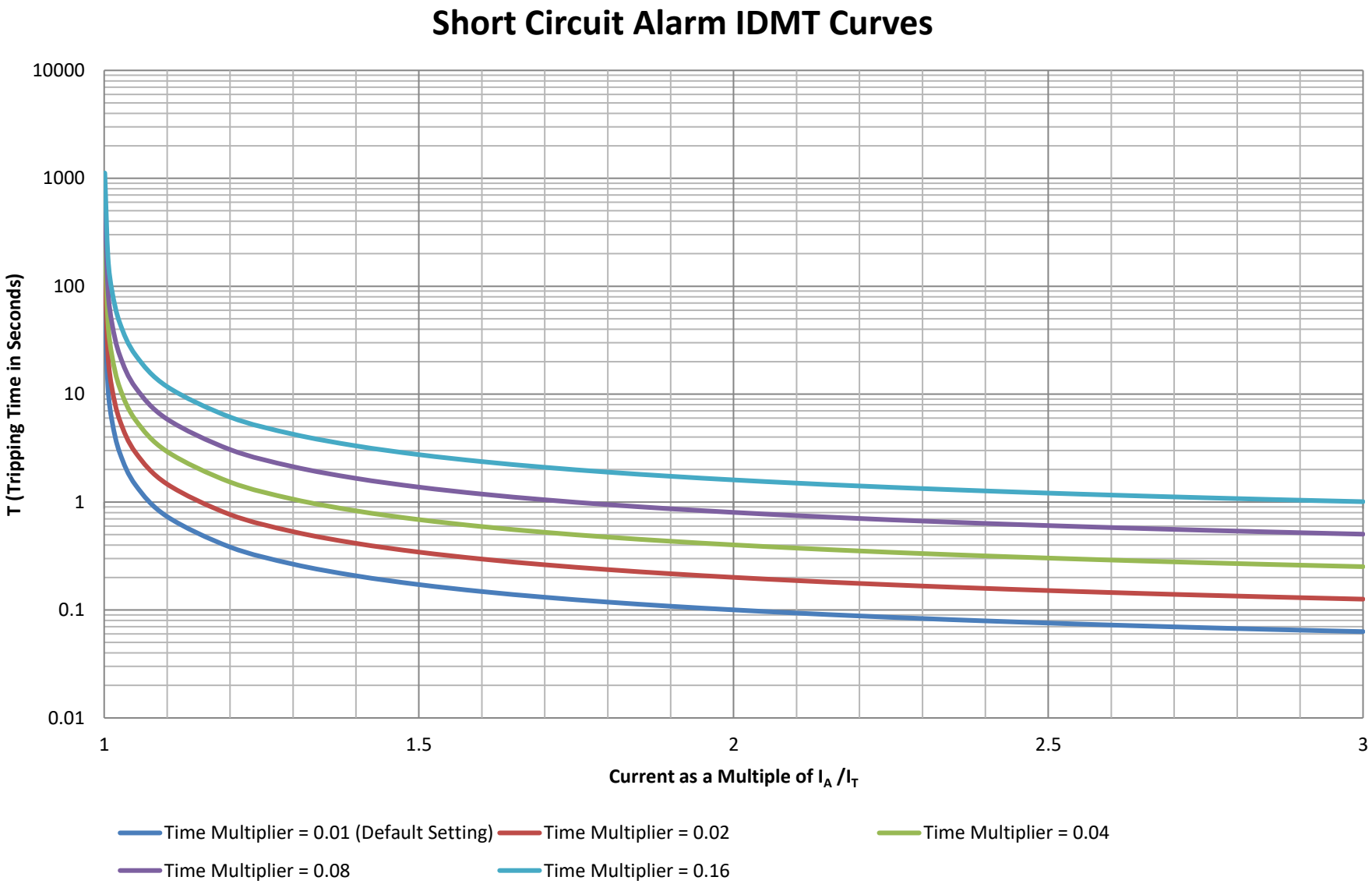
T is the tripping time in seconds (accurate to +/- 5% or +/- 50 ms (whichever is the greater))
I_A is the actual measured current
I_T is the trip point setting in current
t is the time multiplier setting

The equation is simplified for addition into a spreadsheet. This is useful for 'trying out' different values of t *(time multiplier setting)* and viewing the results, without actually testing this on the generator.

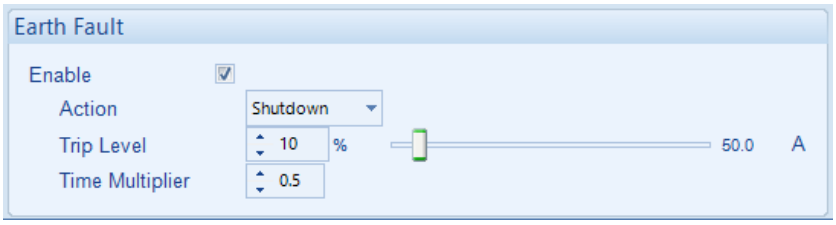


The formula for the *Tripping Time* cells is:




Short Circuit Alarm IDMT Curves
T (Tripping Time in Seconds)
10000
1000
100
10
1
0.1
0.01
1
1.5
2
2.5
3
Current as a Multiple of I_A / I_T
Time Multiplier = 0.01 (Default Setting)
Time Multiplier = 0.02
Time Multiplier = 0.04
Time Multiplier = 0.08
Time Multiplier = 0.16

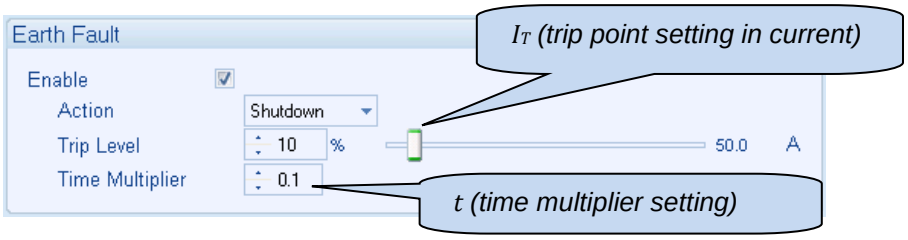
Earth Fault Alarm



Parameter	Description
Earth Fault Enabled	When the module is suitably connected using the 'Earth Fault CT'. The module measures Earth Fault and optionally configured to generate an alarm condition (shutdown or electrical trip) when a specified level is surpassed. If the *Earth Fault Alarm* is enabled, the controller begins following the IDMT 'curve' when the earth fault current passes the *Trip* setting. If the *Trip* is surpassed for an excess amount of time, the *IDMT Alarm* triggers (*Shutdown* or *Electrical Trip* as selected in *Action*). The larger the earth fault, the faster the trip. The speed of the trip is dependent upon the fixed formula: $$T = \frac{t \times 0.14}{\left(\left(\frac{I_A}{I_T}\right)^{0.02} - 1\right)}$$ **Where:** T is the tripping time in seconds (accurate to +/- 5% or +/- 50ms (whichever is the greater)) I_A is the actual measured current I_T is the trip point setting in current t is the time multiplier setting
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Trip	The percentage of the earth current at which the IDMT Alarm curve starts to operate from.
Time Multiplier	The time multiplier constant throughout the IDMT curve.

Earth Fault Protection Explanation

The settings shown in the example below are a screen capture of the DSE factory settings, taken from the DSE Configuration Suite software.



Creating A spreadsheet For the Earth Fault IDMT curve

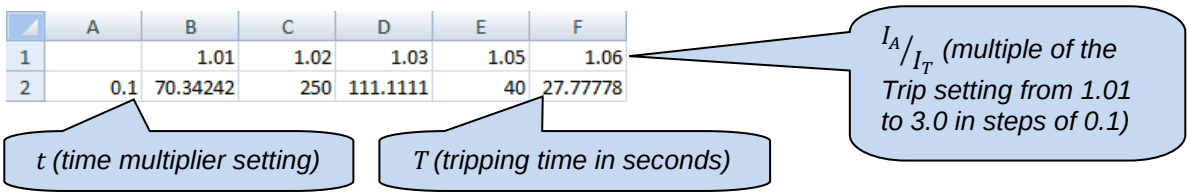
The formula used:

$$T = \frac{t \times 0.14}{\left(\left(\frac{I_A}{I_T}\right)^{0.02} - 1\right)}$$

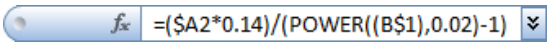
Where:

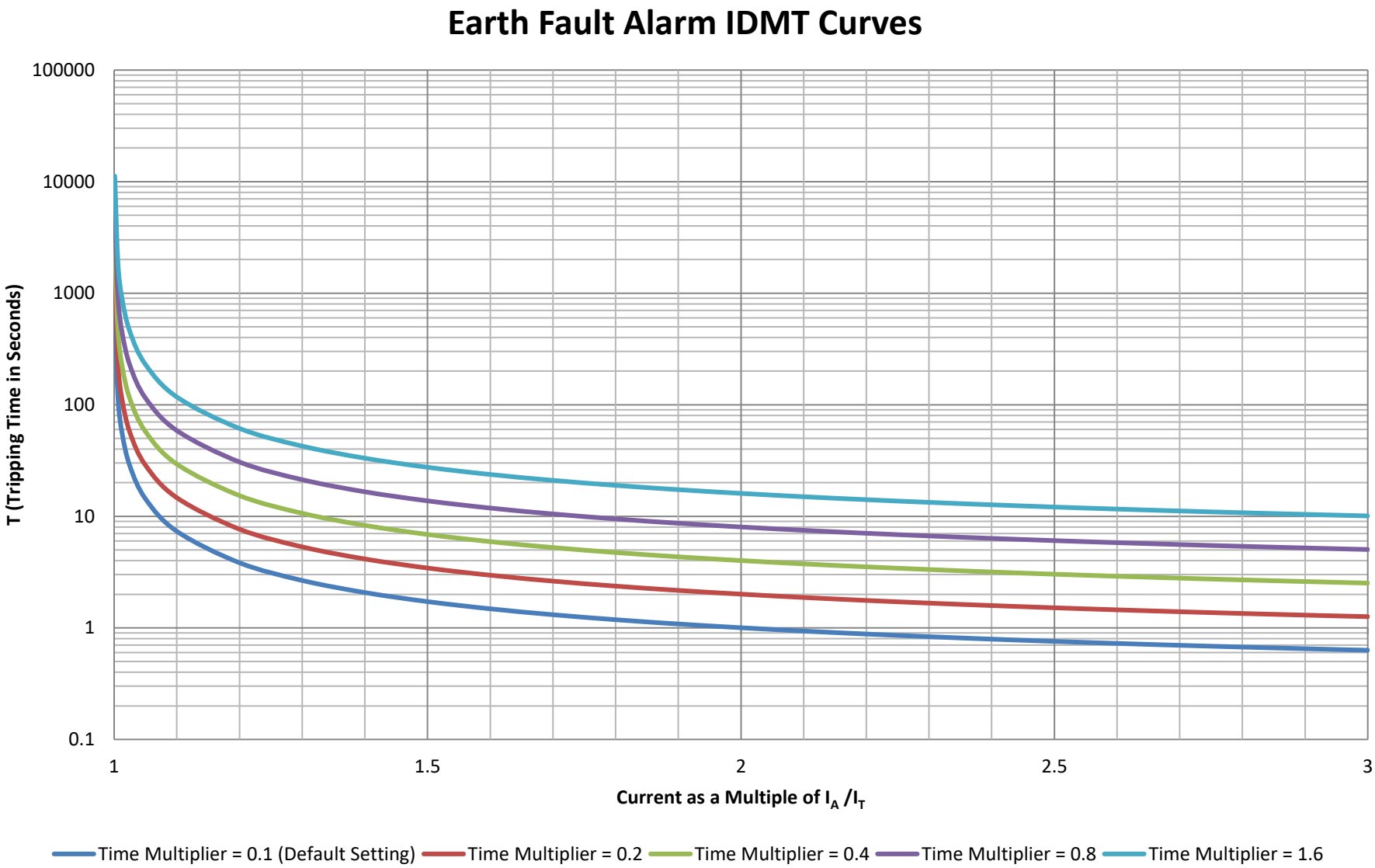
T is the tripping time in seconds (accurate to +/- 5% or +/- 50 ms (whichever is the greater))
I_A is the actual measured current
I_T is the trip point setting in current
t is the time multiplier setting

The equation is simplified for addition into a spreadsheet. This is useful for 'trying out' different values of t *(time multiplier setting)* and viewing the results, without actually testing this on the generator.



The formula for the *Tripping Time* cells is:




Earth Fault Alarm IDMT Curves
100000
10000
1000
100
10
1
0.1
T (Tripping Time in Seconds)
1
1.5
2
2.5
3
Current as a Multiple of I_A / I_T
Time Multiplier = 0.1 (Default Setting)
Time Multiplier = 0.2
Time Multiplier = 0.4
Time Multiplier = 0.8
Time Multiplier = 1.6

Default Current Protection IDMT Tripping Characteristics

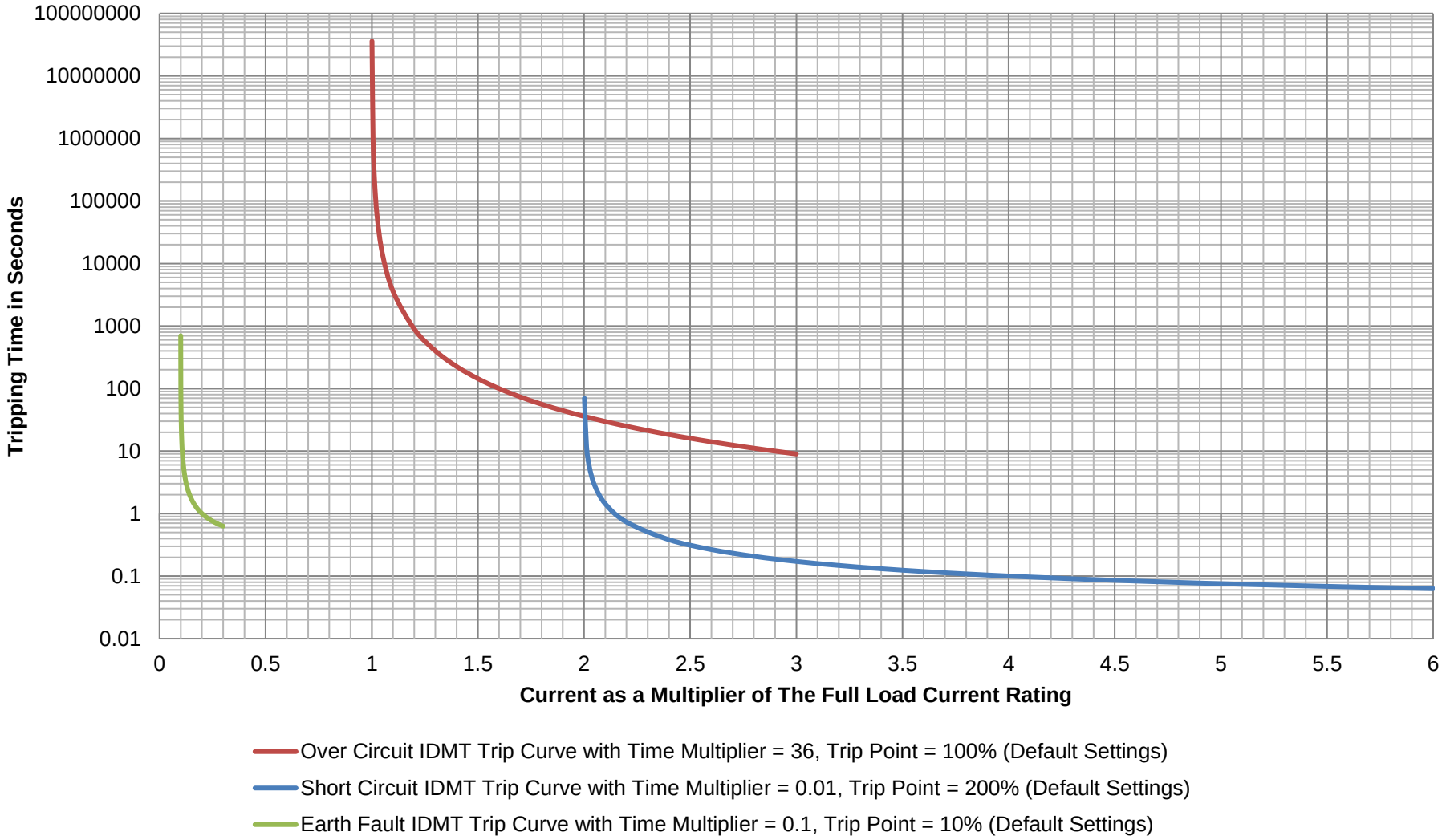
The graph on the following page shows the default settings for the IDMT tripping curves for the *Over Current* and *Short Circuit* protections.

The default setting for the *Over Current* alarm allows for an overload of an alternator to the limits of the *Typical Brushless Alternator* whereby 110% overload is permitted for 1 hour or 200% overload is permitted for 36 seconds. In an over current situation the alternator begins to overheat. The aim of the *Over Current IDMT Alarm* is to prevent the windings being overload (heated) too much. The amount of time that the alternator is safely overloaded is governed by how high the overload condition is.

The default setting for the *Short Circuit* alarm allows for an alternator to supply a high current caused by an genuine short circuit or an in rush current of a motor/transformer. Whereby 300% overload is permitted for 0.17 seconds or 600% overload is permitted for 0.06 seconds. In a short circuit situation the alternator begins to overheat to the point the insulation breaks down, potentially causing a fire. The aim of the *Short Circuit IDMT Alarm* is to prevent the insulation from melting due to excessive heat. The amount of time that the alternator runs safely in a short circuit condition is governed by the alternator's construction.

The default setting for the *Earth Fault* alarm allows for an alternator to supply a fault current caused by a high impedance short to earth or motor drives. Whereby 12% fault current is permitted for 3.83 second or 20% fault current is permitted for 1 second.

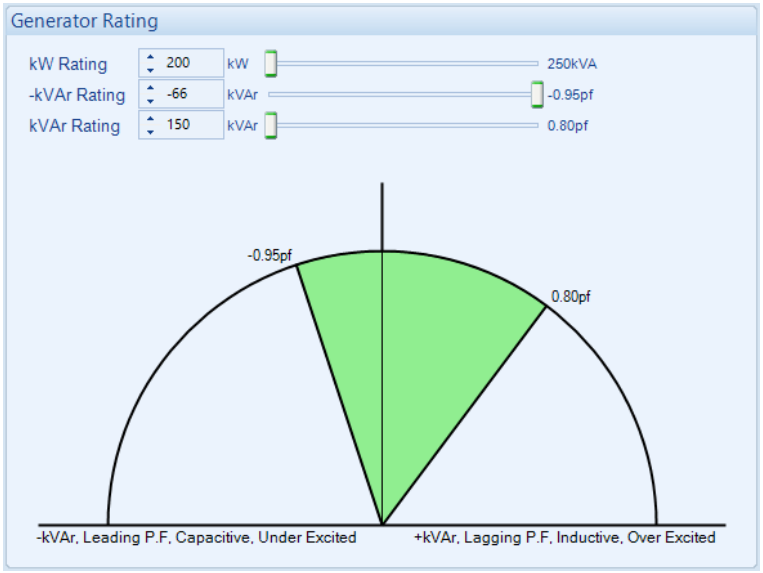
DSE Default Configratuion of Over Current, Short Circuit & Earth Fault IDMT Alarm Curves



2.7.6 GENERATOR POWER

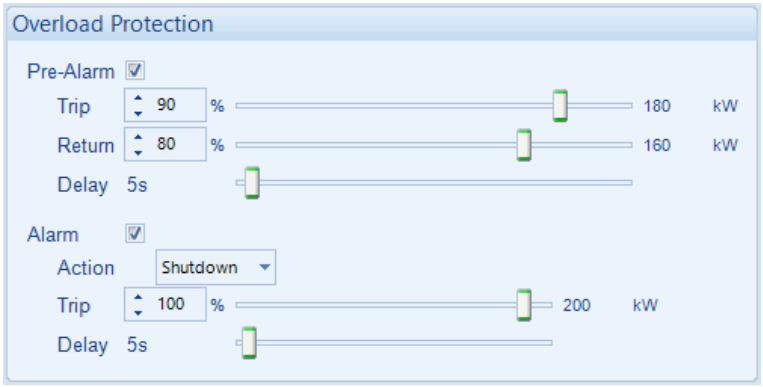
The *Generator Power* section is subdivided into smaller sections.
Select the required section with the mouse.

2.7.6.1 GENERATOR RATING



Parameter	Description
kW Rating	The kW rating of the generator. This is used for all *Generator Power* functions in addition to the rating in which the kW loadsharing calculations are based on.
kvar Rating	The positive kvar rating of the generator. This is used for all *AVR* functions in addition to the rating in which the kvar loadsharing calculations are based on. To calculate the kvar rating of a genset: • Most generators are rated for a lagging power factor (kW / kVA) of 0.8 • From Pythagoras: $\cos\Phi = \frac{\text{kW}}{\text{kVA}}$ $\cos\Phi = 0.8$ $\Phi = \cos^{-1} 0.8 = 36.87°$ • From this, the kvar rating of the typical 0.8 pf rated generator is: $\tan\Phi = \frac{\text{kvar}}{\text{kW}}$ $\text{kvar} = \tan 36.87° \times \text{kW}$ $\text{kvar} = 0.75 \times \text{kW}$ • Or to simplify this, the kvar rating of a 0.8 pf rated generator is ¾ of the kW rating (kvar rating = 75% of kW rating)
-kvar Rating	The negative kvar rating of the generator. This is only used to limit the magnitude of negative kvar which the generator produces when in parallel with the mains.in addition to the rating in which the kvar loadsharing calculations are based on. To calculate the kvar rating of a genset: • Most generators are rated for a leading power factor of 0.95 • From Pythagoras: $\cos\Phi = \frac{\text{kW}}{\text{kVA}}$ $\cos\Phi = 0.95$ $\Phi = \cos^{-1} 0.95 = 18.20°$ • From this, the kvar rating of the typical 0.95 pf rated generator is: $\tan\Phi = \frac{\text{kvar}}{\text{kW}}$ $\text{kvar} = \tan 18.20° \times \text{kW}$ $\text{kvar} = 0.33 \times \text{kW}$ Or to simplify this, the kvar rating of a 0.95 pf rated generator is ⅓ of the kW rating (-kvar rating = 33% of kW rating)

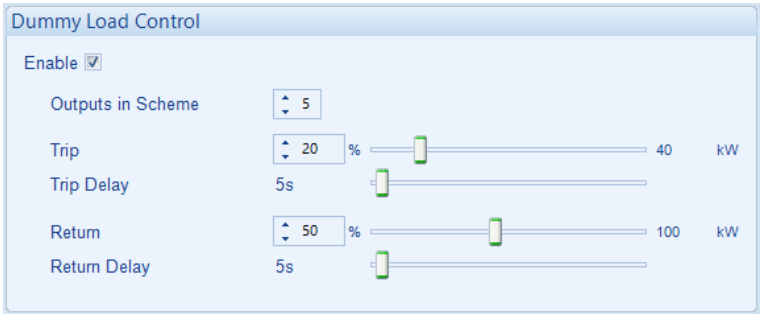
2.7.6.2 OVERLOAD PROTECTION



Parameter	Description
Overload Protection Pre-Alarm	☐ = Overload Protection Pre-Alarm is disabled. ☑ = The *kW Overload Warning Alarm* activates when the kW level exceeds the *Trip* setting for longer than the configured *Delay* time. The *kW Overload Warning Alarm* de-activates when the kW level falls below the *Return* setting.
Overload Protection Alarm	☐ = Overload Protection Alarm is disabled. ☑ = The *kW Overload Alarm* activates when the kW level exceeds the *Trip* setting for longer than the configured *Delay* time.
Action	Select the action for the *kW Overload Protection Alarm:* ***Electrical Trip*** ***Shutdown***

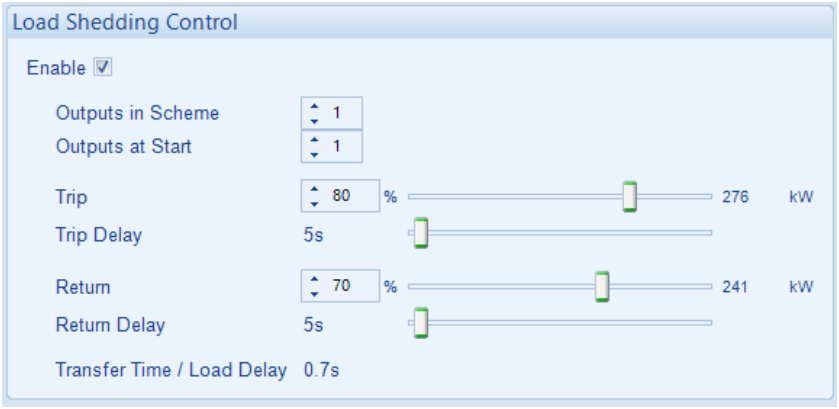
2.7.6.3 LOAD CONTROL

Dummy Load Control



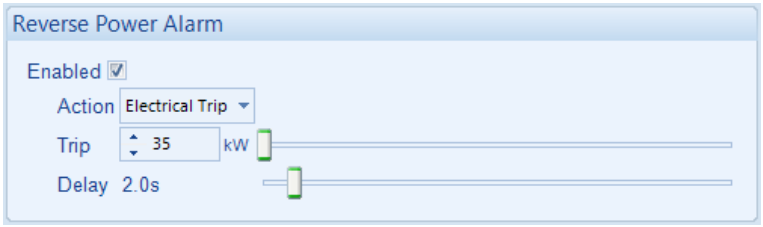
Parameter	Description
Dummy Load Control	Provides control of configurable outputs set to *Dummy Load Control*. ☐ = Dummy Load Control is disabled. ☑ = The module monitors the load and controls outputs configured to *Dummy Load Control (1-5)*
Outputs in Scheme	The amount of Dummy Load Control outputs that are included in the function.
Trip / Trip Delay	When the load level is below the *Trip* setting for the duration of the *Trip Delay*, then the 'next' output configured to *Dummy Load Control* is activated (max 5)
Return / Return Delay	When the load level rises above the *Return* level for the duration of the *Return Delay*, then the 'highest numbered' output configured to *Dummy Load Control* is de-activated and the timer is reset.

Load Shedding Control



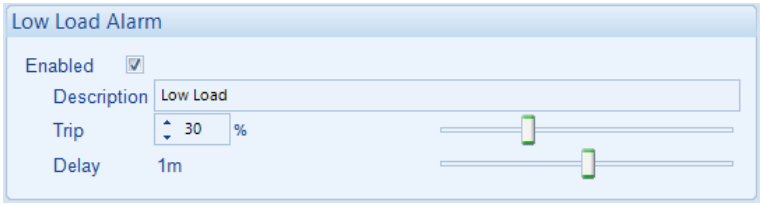
Parameter	Description
Load Shedding Control	Provides control of configurable outputs set to *Load shedding control*. ☐ = Load Shedding Control is disabled. ☑ = The module monitors the load and controls any outputs configured to *Load Shedding Control (1-5)*
Outputs in Scheme	The number of outputs (max 5) that is included in the function.
Outputs at Start	The number of outputs configured to *Load Shedding Control 1-5* that are energised when the set is required to take load. The *Transfer Delay / Load Delay* timer begins. At the end of this timer, the generator load switch is closed – The generator is placed on load.
Trip / Trip Delay	When the load level is above the *Trip* setting for the duration of the *Trip Delay*, then the 'next' output configured to *Load Shedding Control* is activated (max 5)
Return / Return Delay	When the load level is below the *Return* setting for the duration of the *Return Delay*, then the 'highest numbered' output configured to *Load Shedding Control* is de-activated and the timer is reset.
Transfer Time / Load Delay	The time between closing the *Load Shedding Control* outputs (*Outputs at Start)* and closing the generator load switching device.

2.7.6.4 REVERSE POWER



Parameter	Description
Reverse Power IEEE 37.2 – 32 Directional Power Relay	☐ = *Generator Reverse Power Alarm* is disabled. ☑ = The *Generator Reverse Power* Alarm activates when the reverse power exceeds the *Reverse Power Trip* setting longer than the configured *Delay* time. This is used to protect against backfeed from electric motors when mechanically overpowered.
Action	Select the action for the *Reverse Power Alarm:* ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.

2.7.6.5 LOW LOAD



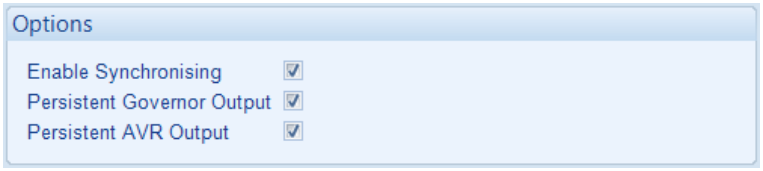
Parameter	Description
Enabled	☐= *Low Load Alarm* is disabled. ☑= The *Low Load Alarm* activates when the generator power drops below the configured *Trip* setting longer than the configured *Delay* time. This is used to prevent the engine from running at very low load levels.
Description	Enter the LCD text that shows up on the display when this alarm activates
Trip	Set the percentage of total power at which the *Low Load Alarm* is activated
Delay	Set the amount of time before the *Low Load Alarm* is activated

2.7.7 SYNCHRONISING

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

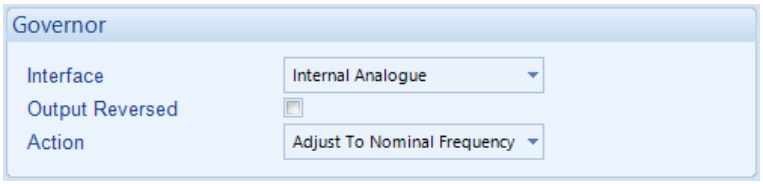
2.7.7.1 SYNC OPTIONS

Options



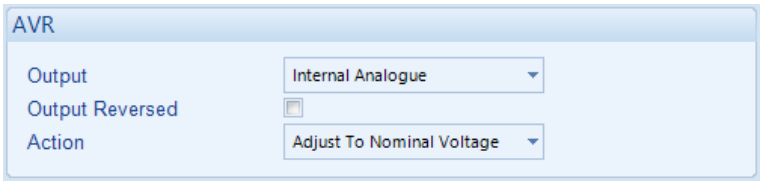
Parameter	Description
Enable Synchronising	☑ = Synchronisation is enabled. When the mains returns and the generator is running on load, the DSE8620 MKII transfers the load to the mains with no break by synchronising the generator to the mains first. ☐ = Synchronisation is disabled. DSE8620 MKII does not synchronise the generator to the mains. When the mains returns, the generator breaker opens first then the mains breaker is closed.
Persistent Governor Output	Configures the action to take when transitioning from *Synchronising* to *Load Sharing* (at the point of closing the load switch device into parallel with another supply). ☑ = Analogue GOV output retains the value achieved during the synchronising process. ☐ = Analogue GOV output resets to *Centre* (SW setting) when the load switch device is closed.
Persistent AVR Output	Configures the action to take when transitioning from *Synchronising* to *Load Sharing* (at the point of closing the load switch device into parallel with another supply). ☑ = Analogue AVR output retains the value achieved during the synchronising process. ☐ = Analogue AVR output resets to *Centre* (SW setting) when the load switch device is closed.

Governor



Parameter	Description
Governor Interface	**NOTE: When *Internal Relays* is selected, it is necessary to configure two of the module digital outputs to provide the required *Speed Raise* and *Speed Lower* signals.** ***Internal Analogue:*** The module uses a CANbus message or it's a 0 V to 10 V output to interface with the engine governor to enable frequency and kW control. ***Internal Relays:*** The module use's is digital outputs (configured for *Speed Raise* and *Speed Lower)* to interface with the engine governor to enable frequency and kW control. ***None: The module does not*** interface with the engine governor, frequency and kW control is achieved using external 3rd party equipment.
Governor Output Reversed	**NOTE: Only available when internal analogue is selected. This allows the module to interface with a greater diversity of Governors.** ☐ **=** Lower analogue output voltage equates to lower engine speed. ☑ **=** Lower analogue output voltage equates to higher engine speed.
Adjust to Nominal Frequency	**NOTE: This determines the modules frequency control when the generator is running on load and not in parallel.** ***Adjust to Centre Point:*** When the generator's switchgear has closed, the generator's frequency is pre-determined by *SW1* setting for the governor. Refer to section entitled *Governor / AVR Interface* elsewhere in this document for further information about the *SW1* setting. ***Adjust to Nominal:*** When the generator's switchgear has closed, the generator's frequency is pre-determined by *Nominal Frequency* setting for the generator. Refer to section entitled *Generator Frequency* elsewhere in this document for further information about the *Nominal Frequency* setting. ***None:*** When the generator's switchgear has closed, the generator's frequency is not controlled by the module. The frequency control is achieved using external 3rd party equipment.

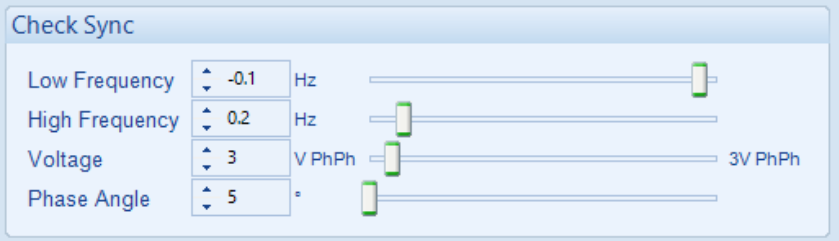
AVR



Parameter	Description
AVR Interface	**NOTE: When *Internal Relays* is selected, it is necessary to configure two of the module digital outputs to provide the required *Voltage Raise* and *Voltage Lower* signals.** ***Internal Analogue:*** The module uses it's 0 V to 10 V AVR output to interface with generator's AVR to enable voltage and kvar control. ***Internal Relays:*** The module use's is digital outputs (configured for *Voltage Raise* and *Voltage Lower)* to interface with the generator's AVR to enable voltage and kvar control. ***None: The module does not*** interface with the generator's AVR, voltage and kvar control is achieved using external 3rd party equipment.
AVR Output Reversed	**NOTE: Only available when internal analogue is selected. This allows the module to interface with a greater diversity of AVRs.** ☐ **=** Lower analogue output voltage equates to lower alternator voltage. ☑ **=** Lower analogue output voltage equates to higher alternator voltage.
Adjust to Nominal Voltage	**NOTE: This setting determines the voltage control when the generator is running on load and not in parallel only.** ***Adjust to Centre Point:*** When the generator's switchgear has closed, the generator's voltage is pre-determined by *SW1* setting for the AVR. Refer to section entitled *Governor / AVR Interface* elsewhere in this document for further information about the *SW1* setting. ***Adjust to Nominal:*** When the generator's switchgear has closed, the generator's voltage is pre-determined by *Nominal Voltage* setting for the generator. Refer to section entitled *Generator Voltage* elsewhere in this document for further information about the *Nominal Voltage* setting. ***None:*** When the generator's switchgear has closed, the generator's voltage is not controlled by the module. The voltage control is achieved using external 3rd party equipment.

2.7.7.2 CHECK SYNC

Check Sync

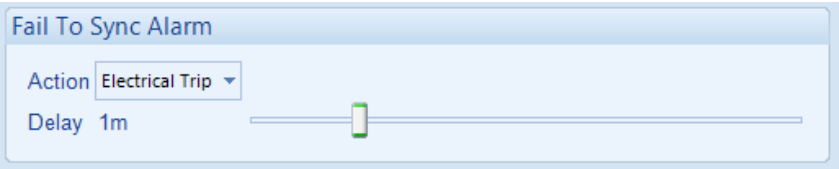


During the synchronising process, the controller adjusts the frequency and voltage of the generator to closely match to the mains. Typically the oncoming set is adjusted to be 0.1 Hz faster than the existing supply, this causes the phase of the two supplies to change continuously.

Before the breaker is closed, the following configurable conditions must be met.

Parameter	Description
Low Frequency High Frequency	The difference between the two supplies frequencies must be between the *Check Sync Low Frequency* and *Check Sync High Frequency*
Voltage	The difference between the two supplies voltages must be equal to or below the *Check Sync Voltage*
Phase	The phase of the two supplies must be equal to or below the *Check Sync Phase Angle*

Fail to Sync Alarm



Used to detect that the synchronising process is taking a long time. This may occurs when changes in the load are making the set control difficult due to changes in voltage and frequency.

Parameter	Description
Action	Determines the action to take upon a *Fail to Sync.* ***Electrical Trip****:* The set is stopped. In a *Load Demand* scheme, other generators may start if available. ***Indication:*** The set 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 set continues to synchronise.
Delay	The time to allow for successful synchronisation to take place. Should the process continue longer than *Delay,* the *Action* above is taken.

2.7.7.3 LOAD CONTROL

NOTE: The *Minimum* and *Maximum Load Levels* are configured within the SCADA section. For further details, refer to section entitled *Load Levels* contained within the *SCADA* section elsewhere within this document.

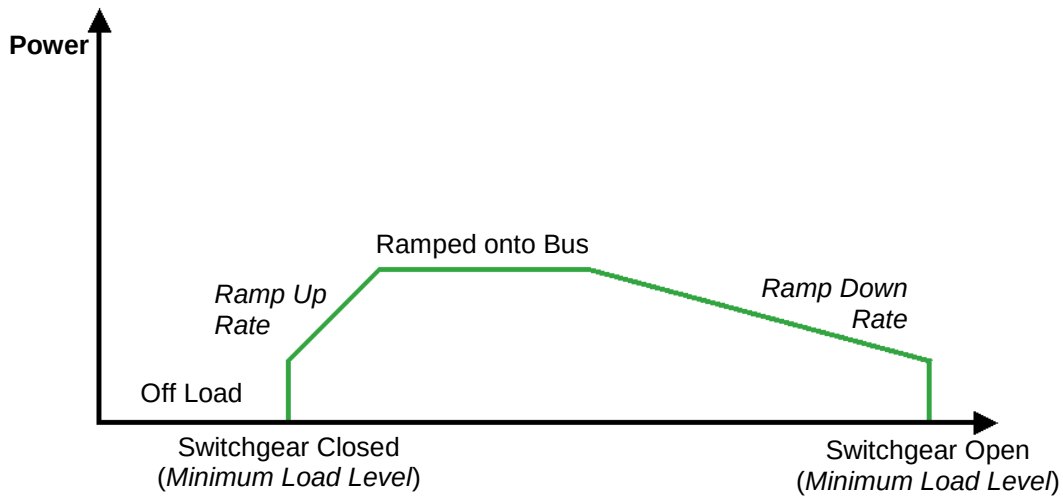
NOTE: The *Minimum Load Level* is only applicable when the DSE module is configured to *Generator* mode.

NOTE: The ramping procedure changes depending upon the *Alternative Ramping Scheme* setting. For further details, refer section entitled *Advanced* elsewhere within this document.

When any of the following *Load Control* modes are selected, the controller performs a 'soft' load transfer when taking or removing load.

Upon generator's switchgear closing, the module controls the generator's power production starting from the *Minimum Load Level* setting ramping up to either the set's share of the *load (Load Share* mode); or to the *Maximum Load Level* when running in *Generator Mode*.

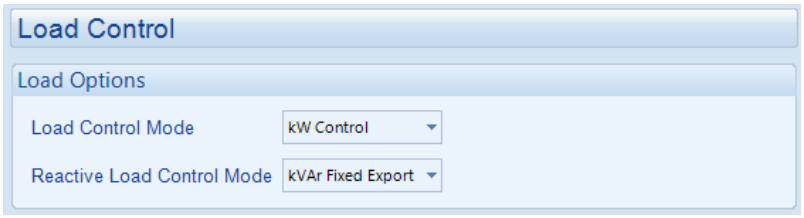
When the set is in parallel with the mains and it has to go off, first the load is ramped down to the *Minimum Load Level*, then the generator's switchgear is opened removing the generator from the load.



'Soft transfers' of this type have many benefits, the most obvious of which are:

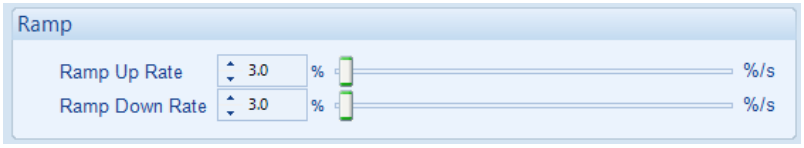
- When the generator breaker has to open, the mains is not suddenly loaded with the load that was being supplied by the generator. Instead the generator is slowly ramped to softly load the mains.
- Opening of the load switch occurs at a much lower load level, helping to reduce arcing of the contacts.

Load Options



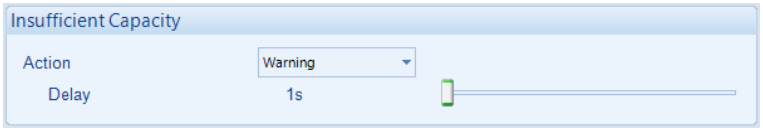
Item	Function
Load Control Mode IEEE 37.2 -90 Regulating device	***None:*** No load sharing takes place. ***kW Share:*** The load is shared between the set and the mains.
Reactive load control mode IEEE 37.2 -90 Regulating device	**NOTE: Not available when Active (kW) load share mode is set to *None*.** ***None:*** No reactive power (var/pf) sharing takes place. ***kvar fixed export:*** The generator produces a fixed amount of reactive power (var) for use when in parallel with the mains supply.

Ramp



Item	Function
Ramp Up Rate	The rate at which the generator is ramped onto the load when in parallel with the mains.
Ramp Down Rate	The rate at which the generator is ramped off the load.

Insufficient Capacity

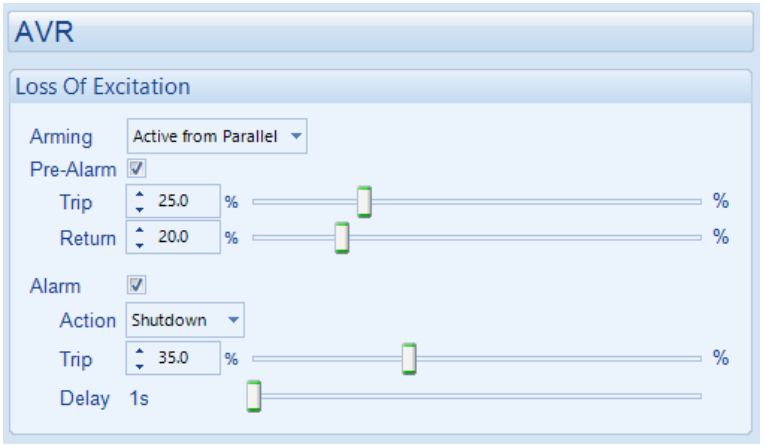


Parameter	Description
Action	Activates when the governor output percentage reaches the maximum value for the configured *Delay* time. This indicates that the generator is not able to produce the kW requested due to not having incorrect settings for SW1 and SW2 or a fault with the engine. The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***None*** ***Indication*** ***Warning*** ***Electrical Trip*** ***Shutdown***

2.7.7.4 AVR

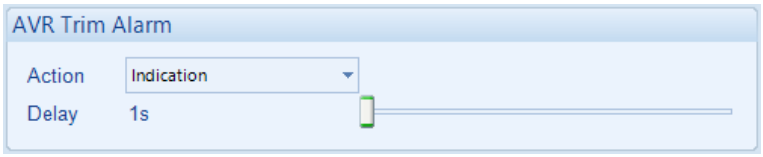
Loss Of Excitation

NOTE: The kvar trip level is taken as a percentage of the kVAr rating. Graphs are obtained from the alternator suppliers to assist in these settings.



Parameter	Description
Arming	**NOTE: For details of these, see the section entitled Alarm Arming elsewhere in this document.** Select when the *Loss Of Excitation* alarm becomes active: ***Always*** ***Active from Mains Parallel***
Loss Of Excitation Pre-Alarm IEEE 37.2 – 32 Directional Power Relay	☐ = *Loss of Excitation* does NOT give a pre-alarm warning ☑ = The *Loss of Excitation Pre-Alarm* is active when the measured negative kvar exceeds the *Loss of Excitation Pre-Alarm* setting. The *Loss of Excitation Pre-Alarm* is automatically reset when the measured negative kvar no longer exceeds the configured *Loss of Excitation Pre-Alarm Return* level. The *Loss Of Excitation Trip* level is adjusted to suit user requirements.
Loss Of Excitation Alarm IEEE 37.2 – 32 Directional Power Relay	☐ = Loss of excitation does NOT give a Shutdown alarm ☑ = The *Loss of Excitation Alarm* is active when the measured negative kvar exceeds the *Loss of Excitation Alarm* setting. The *Loss Of Excitation Trip* level and severity is adjusted to suit user requirements.

AVR Trim Alarm



Parameter	Description
AVR Trim Alarm	Activates when the AVR output percentage reaches the maximum value for the configured *Delay* time. This indicates that the generator is not able to produce the kvar requested due to not having incorrect settings for SW1 and SW2 or a fault with the alternator. The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***None*** ***Indication*** ***Warning*** ***Electrical Trip*** ***Shutdown***

2.7.7.6 POWER CONTROL

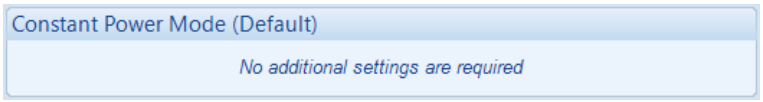
NOTE: The *Power Control* modes and *Voltage and Reactive Power Control* modes are to be used in conjunction with the following documents:
- COMMISSION REGULATION (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators
- P1547 - IEEE Draft Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces

NOTE: The *Power Control* parameters only have effect when the DSE8620 MKII controller is set to operate in *Generator Mode* for paralleling with the mains (utility) supply. For more information on *Generator Mode* and *Mains Mode*, refer to DSE Publication: 056-042 Bus Mode or Mains Mode For DSE8x60 which is found on our website: *www.deepseaelectronics.com*

NOTE: Activation of the different Power Control modes is done through digital inputs, PLC functions, Front Panel Editor or Modbus; with digital inputs having higher priority over PLC functions, and PLC functions have higher priority over Front Panel Editor and Modbus commands.

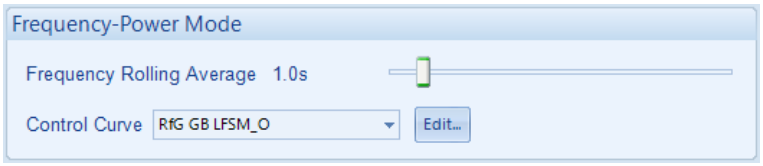
NOTE: Simultaneously activating different *Power Control* modes, results in the lowest number taking priority.

Contact Power Mode (Default)



This is the default mode of exporting power to the mains (utility); where the DSE load share controller holds the amount of power produced at a constant level. The amount of power produced by the generator is irrespective of the load level or any other parameter.
The amount of power produced is defined as Maximum kW Level and is set in SCADA/Generator/Load Levels section, through the Front Panel Running Editor, in PLC Functions, or via Modbus messages.

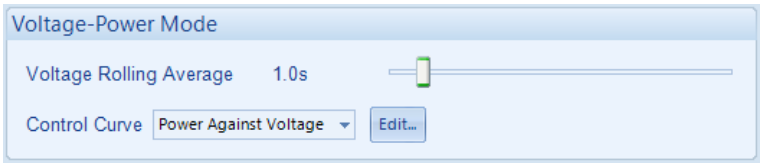
Frequency-Power Mode



In this mode of exporting power to the mains (utility); the DSE load share controller varies the amount of power produced with regards to the Control Curve depending on the measured frequency.
This mode allows the generator to support the mains (utility) frequency stability by monitoring the frequency and changing the amount of power produced.

Parameter	Description
Frequency Rolling Average	The measured frequency is averaged over the period of the *Frequency Rolling Average.* The average frequency is used in the *Control Curve* to determine the required level of power production.
Control Curve	The *Control Curve* determines, based on the average frequency, the amount of power the generator produces. This amount of power is a percentage of the *kW Maximum Load Level* set within the SCADA section. Select the *Control Curve* from a pre-defined list or create a user-defined curve ***RfG GB LFSM_O:*** Requirements for Generators Network Code in Great Britain, Limited Frequency Sensitive Mode Over frequency ***RfG GB LFSM_U:*** Requirements for Generators Network Code in Great Britain, Limited Frequency Sensitive Mode Under frequency ***RfG GB LFSM_U and LFSM_O:*** Requirements for Generators Network Code in Great Britain, Limited Frequency Sensitive Mode Under frequency and Over frequency ***RfG GB FSM 5%:*** Requirements for Generators Network Code in Great Britain, Frequency Sensitive Mode at 50% ***P1547 60Hz 50%:*** Requirements for Generators in United States, Frequency Sensitive Mode at 50% ***P1547 60Hz 75%:*** Requirements for Generators in United States, Frequency Sensitive Mode at 75% ***P1547 60Hz 90%:*** Requirements for Generators in United States, Frequency Sensitive Mode at 90%

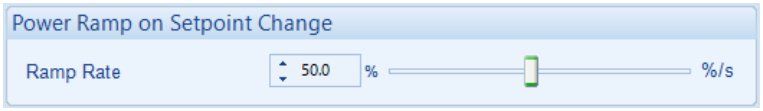
Voltage-Power Mode



In this mode of exporting power to the mains (utility); the DSE load share controller varies the amount of power produced with regards to the Control Curve depending on the measured voltage.
This mode allows the generator to support the mains (utility) voltage stability by monitoring the voltage and changing the amount of power produced.

Parameter	Description
Voltage Rolling Average	The measured voltage is averaged over the period of the *Voltage Rolling Average.* The average voltage is used in the *Control Curve* to determine the required level of power production.
Control Curve	The *Control Curve* determines, based on the average voltage, the amount of power the generator produces. This amount of power is a percentage of the *kW Maximum Load Level.* Select the *Control Curve* from a pre-defined list or create a user-defined curve ***Power Against Voltage***

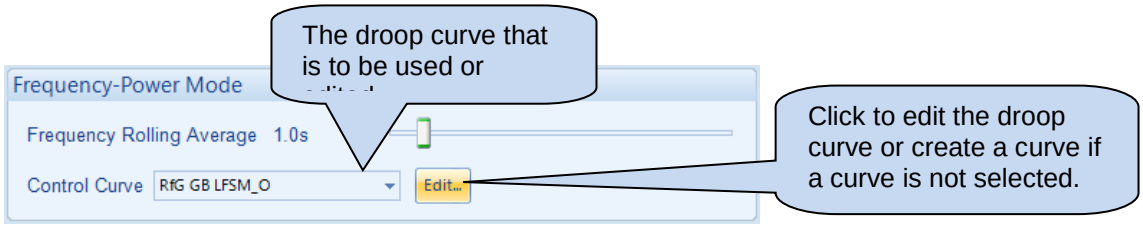
Power Ramp on Setpoint Change

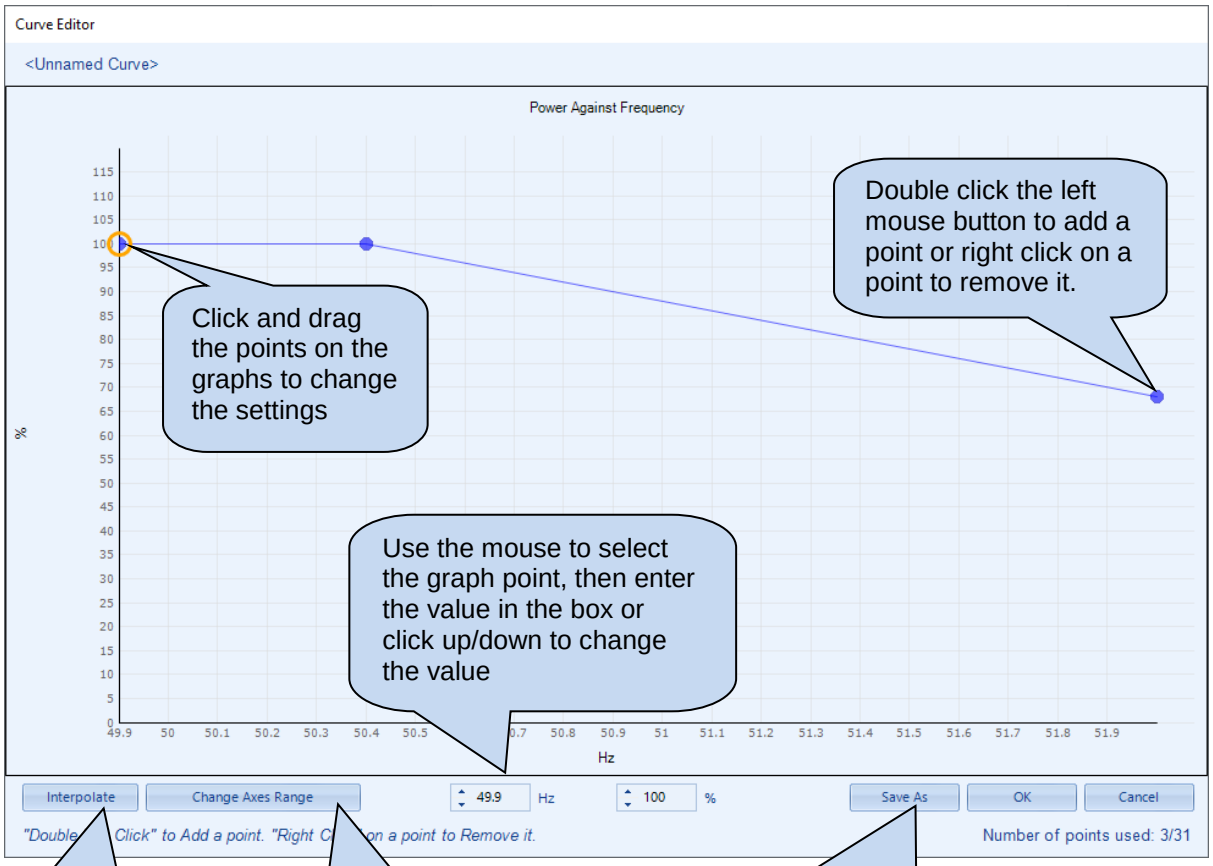


Parameter	Description
Ramp Rate	When changing between *Power Control* modes or changing the set point, the *Ramp Rate* defines how fast the output power changes in percentage points per second.

2.7.7.6.1 CREATING / EDITING THE POWER MODE CURVE

While the *DSE Configuration Suite* holds most commonly used droop curves, occasionally it is required that the module's droop function be configured for a specification application not listed by the *DSE Configuration Suite*. To aid this process, a droop curve editor is provided.

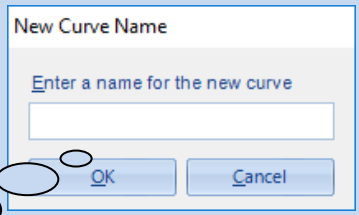




Click *Interpolate* then select two points as prompted to draw a straight line between them.

Click to change the range of the X and Y Axes of the graph and the level of open circuit detection

Click SAVE AS, a prompt to name the curve…



Click OK to save the curve.

Any saved curves become selectable in the *Input Type* selection list.

Click OK to accept the changes or CANCEL to ignore and lose the changes.

Hint: Deleting, renaming or editing custom sensor curves that have been added is performed in the main menu, select *Tools* | *Curve Manager*.

2.7.7.7 VOLTAGE AND REACTIVE POWER CONTROL

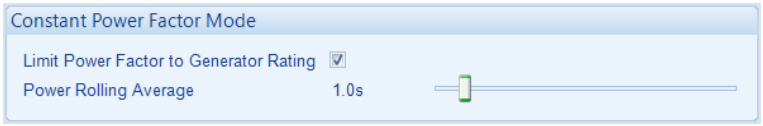
NOTE: The *Power Control* modes and *Voltage and Reactive Power Control* modes are to be used in conjunction with the following documents:
- COMMISSION REGULATION (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators
- P1547 - IEEE Draft Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces

NOTE: The *Voltage and Reactive Power Control* parameters only have effect when the DSE8620 MKII controller is set to operate in *Generator Mode* for paralleling with the mains (utility) supply. For more information on *Generator Mode* and *Mains Mode*, refer to DSE Publication: 056-042b Bus Mode or Mains Mode For DSE8x60 which is found on our website: www.deepseaelectronics.com

NOTE: Activation of the different *Voltage and Reactive Power Control* modes is done through digital inputs, PLC functions, Front Panel Editor or Modbus; with digital inputs having higher priority over PLC functions, and PLC functions have higher priority over Front Panel Editor and Modbus commands.

NOTE: Simultaneously activating different *Voltage and Reactive Power Control* modes, results in the lowest number taking priority.

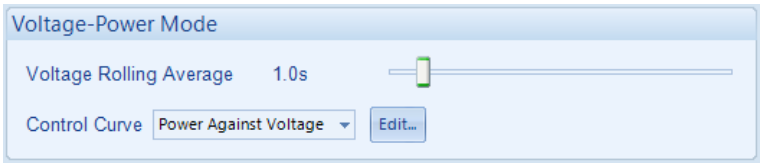
Constant Power Factor Mode



In this mode of exporting power to the mains (utility); the DSE load share controller varies the amount of reactive power produced with regards to maintaining the required power factor.
This mode allows the generator to maintain a constant export power factor if so required.
The required power factor is set in SCADA/Generator/Load Levels section, through the Front Panel Running Editor, PLC Functions, or Modbus messages.

Parameter	Description
Limit Power Factor to Generator Rating	☐ = The generator produces power beyond it's specified power factor rating configured within the *Generator Rating* section. This may lead to the generator producing excessive positive or negative kvar. ☑ = The generator produces power within its specified power factor rating configured within the *Generator Rating* section
Power Rolling Average	The exported power is averaged over the period of the *Power Rolling Average.* The average power is then used to determine the required reactive power production to achieve the set power factor.

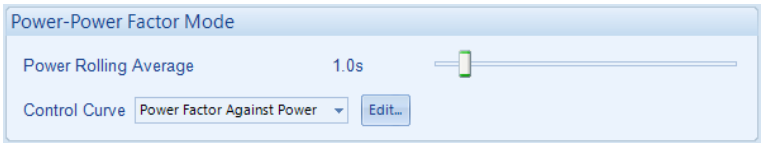
Voltage-Reactive Power Mode



In this mode of exporting power to the mains (utility); the DSE load share controller varies the amount of reactive power produced with regards to the Control Curve depending on the measured voltage. This mode allows the generator(s) to support the mains (utility) voltage stability by monitoring the voltage and changing the amount of reactive power produced.

Parameter	Description
Limit Power Factor to Generator Rating	☐ = The generator produces power beyond it's specified power factor rating configured within the *Generator Rating* section. This may lead to the generator producing excessive positive or negative kvar. ☑ = The generator produces power within its specified power factor rating configured within the *Generator Rating* section
Power Rolling Average	The exported power is averaged over the period of the *Power Rolling Average.* The average power is used to calculate the power factor if the option *Limit Power Factor To Generator Rating* is enabled.
Voltage Rolling Average	The measured voltage is averaged over the period of the *Voltage Rolling Average.* The average voltage is used in the *Control Curve* to determine the required level of reactive power production.
Control Curve	The *Control Curve* determines, based on the average voltage, the amount of reactive power the generator produces. This amount of power is a percentage of the *kvar Maximum Load Level.* Select the *Control Curve* from a pre-defined list or create a user-defined curve ***Reactive Power Against Voltage***

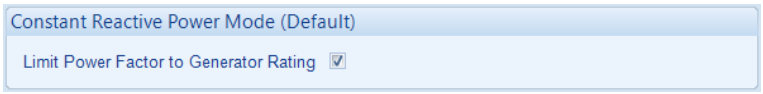
Power-Power Factor Mode



In this mode of exporting power to the mains (utility); the DSE load share controller varies the amount of reactive power produced with regards to maintaining the required power factor. This power factor is derived from the averaged power using the *Control Curve.*
This mode allows the generator to support the mains (utility) stability by varying the power factor depending on the export power.

Parameter	Description
Power Rolling Average	The exported power is averaged over the period of the *Power Rolling Average.* The average is then used in the *Control Curve* to determine the required power factor.
Control Curve	The *Control Curve* determines, based on the average power, the power factor that is required. Select the *Control Curve* from a pre-defined list or create a user-defined curve ***Power Factor Against Power***

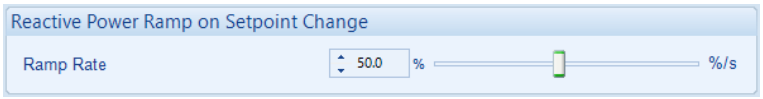
Constant Reactive Power Mode (Default)



This is the default mode of exporting power to the mains (utility); where the DSE load share controller holds the amount of reactive power produced at a constant level. The amount of reactive power produced by the generator is irrespective of the load level or any other parameter.
The amount of reactive power produced is defined as *Maximum kvar Level* and is set in SCADA/Generator/Load Levels section, through the Front Panel Running Editor, in PLC Functions, or via Modbus messages.

Parameter	Description
Limit Power Factor to Generator Rating	☐ = The generator produces power beyond it's specified power factor rating configured within the *Generator Rating* section. This may lead to the generator producing excessive positive or negative kvar. ☑ = The generator produces power within its specified power factor rating configured within the *Generator Rating* section

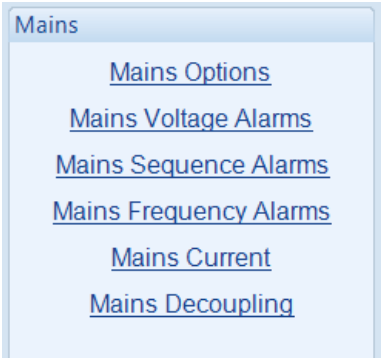
Reactive Power Ramp on Setpoint Change



Parameter	Description
Ramp Rate	When changing between *Voltage and Reactive Power Control* modes or changing the set point, the *Ramp Rate* defines how fast the output reactive power changes in percentage points per second.

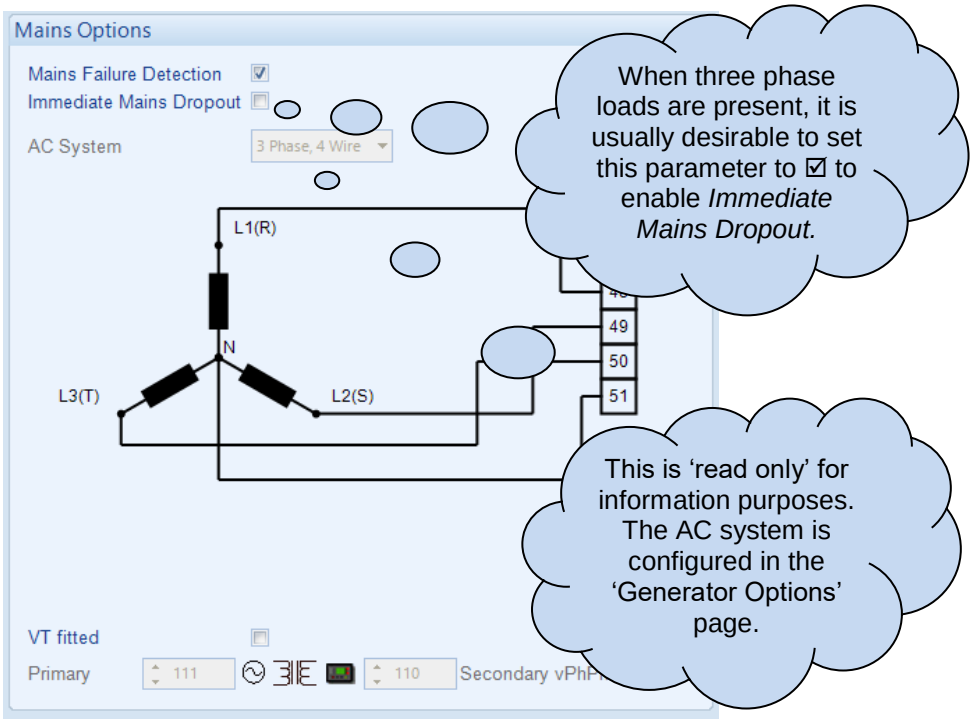
2.8 MAINS

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



2.8.1 MAINS OPTIONS

Mains Options

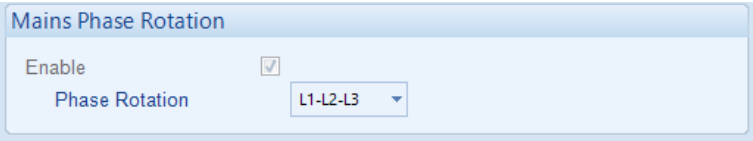


Parameter	Description
Mains Failure Detection	☐ = The module ignores the status of the mains supply. ☑ = The module monitors the mains supply and uses this status for automatically starting and stopping the set in auto mode.
Immediate Mains Dropout	☐ = Upon mains failure, the mains load switch is kept closed until the generator is up to speed and volts. ☑ = Upon mains failure, the mains load switch is opened immediately, subject to the setting of the *mains transient* timer.
AC System	**NOTE: For further information on the wiring for the different topologies, please refer to DSE Publication: 057-301 DSE8620 MKII Operator manual.** The AC System of the mains is fixed to the same setting as the generator. These settings are used to detail the type of AC system to which the module is connected: ***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***

Parameter descriptions are continued overleaf…

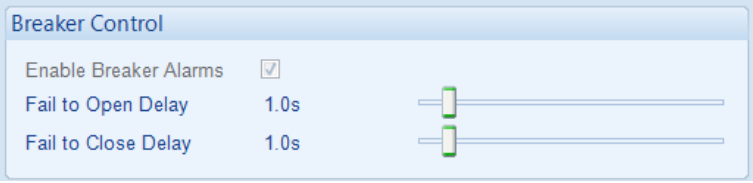
Parameter	Description
VTs	☐ = The voltage sensing to the controller is direct from the Mains ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the mains voltage to be within the controller voltage specifications. By entering the *Primary* and *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 11 kV)

Mains Phase Rotation



Parameter	Description
Mains Phase Rotation IEEE 37.2 – 47 Phase Sequence Relay	☐ = Mains phase rotation is not checked. ☑ = A mains failure is detected when the measured phase rotation is not as configured.

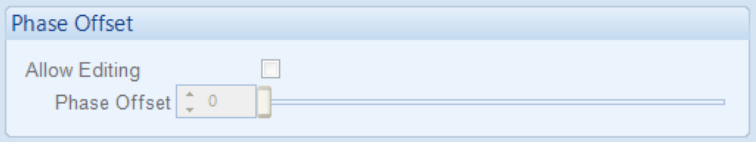
Breaker Control



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

Phase Offset

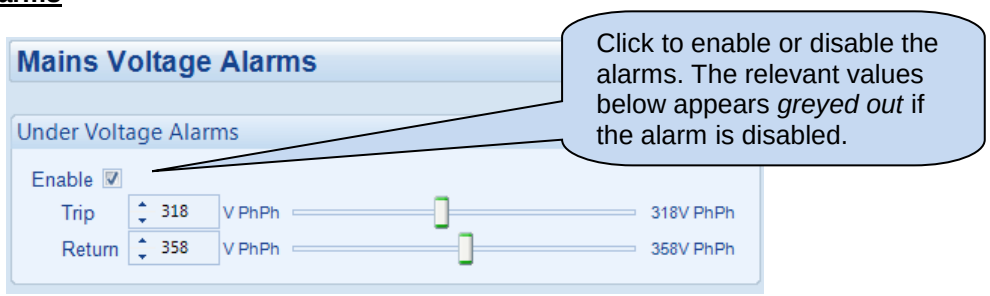
This parameter is greyed out if *VT Fitted* is not enabled.



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

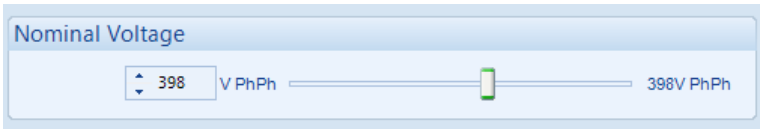
2.8.2 MAINS VOLTAGE

Under Voltage Alarms



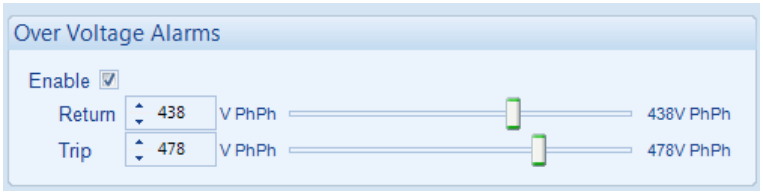
Parameter	Description
Mains Under Voltage Alarm IEEE 37.2 - 27AC Undervoltage Relay	☐ = Mains Under Volts does NOT give an alarm ☑ = The module detects a Mains Failure when the mains supply voltage falls below the configured *Under Volts Alarm Trip* value for longer than the *Mains Transient Delay*.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

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 Generator and Mains VTs have different ratios, to synchronise the voltage of both supplies.

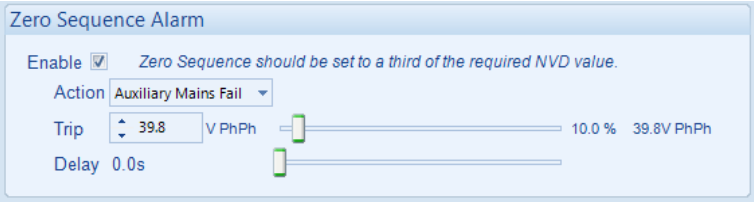
Over Voltage Alarms



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.

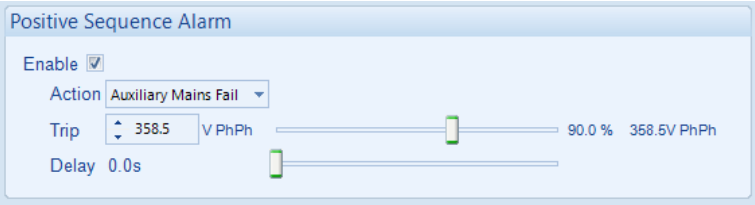
2.8.3 MAINS SEQUENCE ALARMS

Zero Sequence Alarm



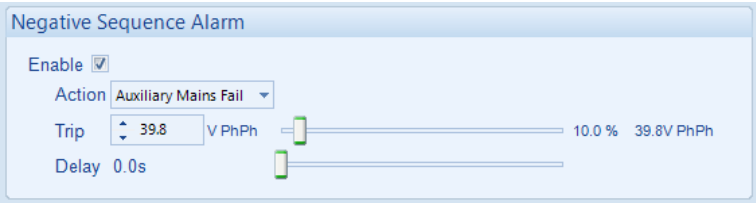
Parameter	Description
Zero Sequence Alarm IEEE 37.2 – 47H Phase-Sequence Or Phase Balance Voltage Relay	**NOTE: The Zero Sequence Alarm must be set to a third of the required Neutral Voltage Displacement (NVD) value. This is because the summation of the three Zero Sequence vector components is equal 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.

Positive Sequence Alarm



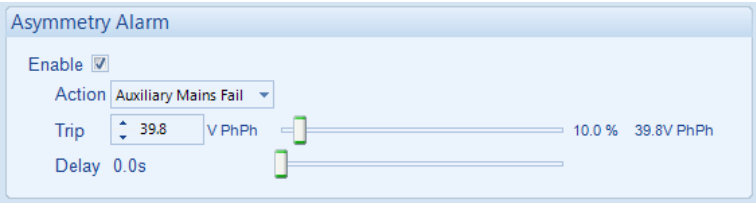
Parameter	Description
Positive Sequence Alarm IEEE 37.2 – 47L Phase-Sequence Or Phase Balance Voltage Relay	☐ = Alarm is disabled ☑ = The alarm activates when the *Positive Sequence* voltage falls below the configured *Positive Sequence Alarm Trip* level for the configured *Delay* time.
Action	Select 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.

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.

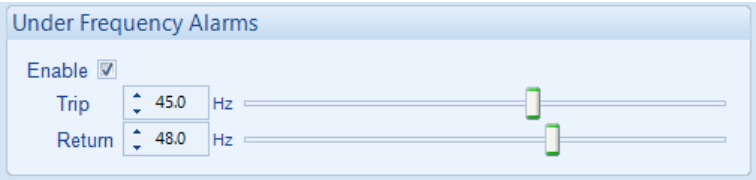
Asymmetry Alarm



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.

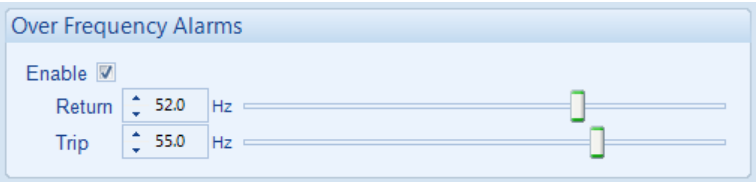
2.8.4 MAINS FREQUENCY

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.

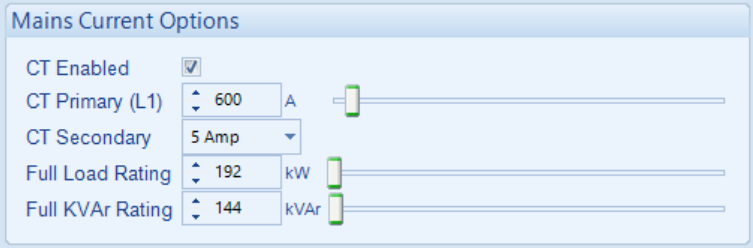
Over Frequency Alarms



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.

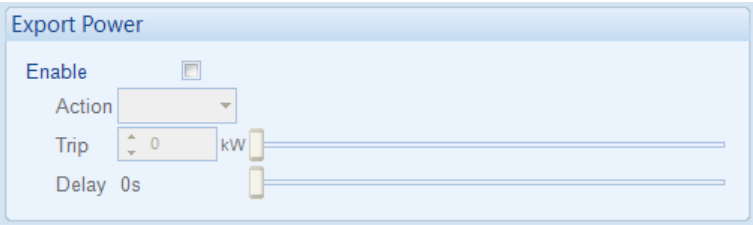
2.8.5 MAINS CURRENT

Mains Current Options



Parameter	Description
Mains CT Enabled	☐ = 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
CT Primary (L1)	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.

Export Power



Parameter	Description
Export Power	☐ = The DSE module does not monitor the export kilowatt. ☑ = the DSE module 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.

2.8.6 MAINS DECOUPLING

DSE8620 MKII module includes “Mains decoupling” detection to be used with the generating set paralleling with the mains (utility) supply.

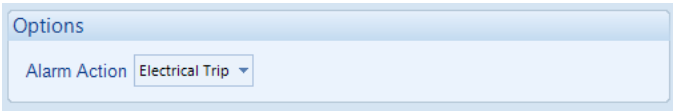
When the generator set is in parallel with the mains supply it is important that failure of the mains is detected as soon as possible otherwise problems arise. It is not possible to simply monitor the mains voltage and frequency as the sensing of this is now being fed by the generator itself!

Because of this and other possible dangerous situations, the power supply companies impose regulations when the generator is 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)

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.

R.O.C.O.F. Alarm

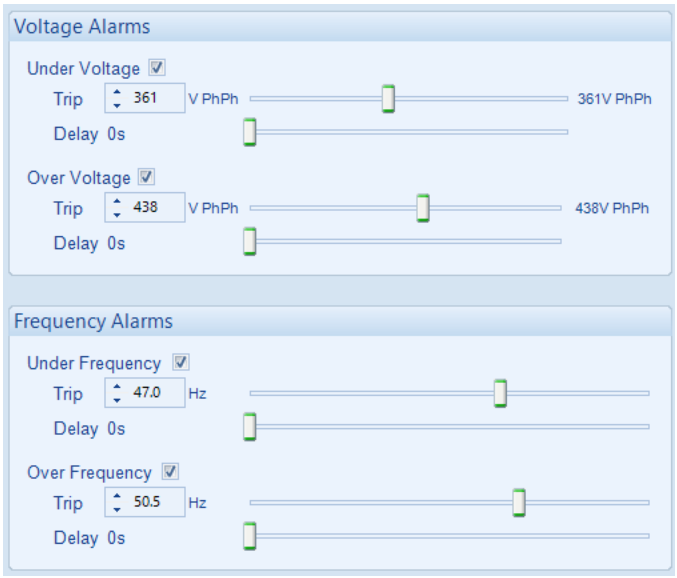
Parameter	Description
R.O.C.O.F. IEEE 37.2 – 81R Frequency Relay	☐ = R.O.C.O.F. alarm is disabled. ☑ = The alarm activates when the Rate of Change of Frequency (R.O.C.O.F.) is greater than the configured settings of the R.O.C.O.F. alarm. R.O.C.O.F. detection of 'mains failure when in parallel' relies 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 generator and a subsequent drop or rise in it's frequency. This is detected by the R.O.C.O.F. alarm.

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 generator leads to a jump in the phase of the generator. If this jump is greater than the setting of the Vector Shift Alarm, the trip is generated.

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.



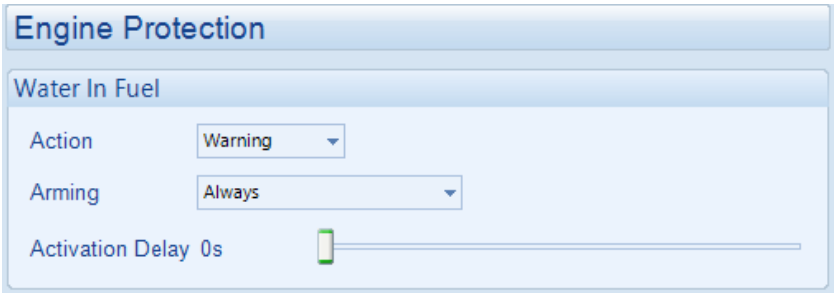
Parameter	Description
Mains Decoupling Under Voltage IEEE 37.2 - 27AC Undervoltage Relay	☐ = Alarm is disabled ☑ = Mains Decoupling Under Volts gives an alarm in the event of the mains supply falling below the configured *Undervolts Trip* level for longer than the *configured Delay* when both mains and generator 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 generator 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 generator 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 generator supplies are in parallel.

2.9 ENGINE

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

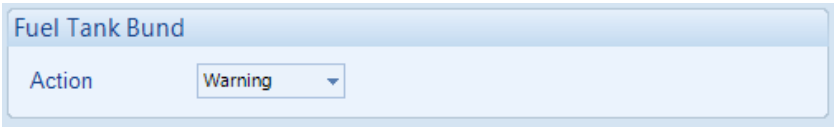
2.9.1 ENGINE PROTECTION

Water in Fuel



Parameter	Description
Action	The alarm goes active when a *Water in Fuel* alarm is received over a CAN message when the DSE module is connected to an ECU, or if a digital input configured for *Water in Fuel* becomes active. Select the action for the alarm: ***None*** ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the alarm is active. Options are as follows: ***Active From Breaker Closed:*** Active only when the breaker is closed ***Active From Parallel:*** Active only when running in parallel ***Always:*** The alarm is active at anytime the CANbus Link is lost ***From Loading:*** Active only after the set is on load ***From Safety On:*** Active only after the *Safety On* delay timer ***From Starting:*** Active only after the *Crank Relay* is energised ***Never****:* Alarm is disabled ***When Stationary:*** Active only when the engine is not running
Activation Delay	The amount of time before the module activates the *CAN ECU (ECM) Data Fail* after a failure.

Fuel Tank Bund

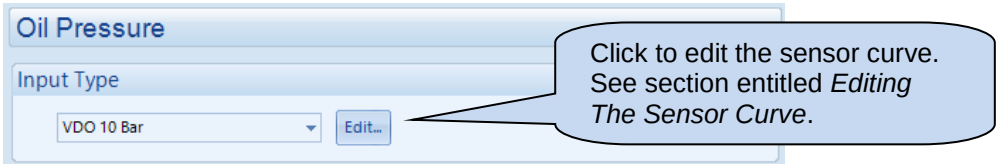


Parameter	Description
Action	The alarm goes active when a digital input configured for *Fuel Tank Bund* becomes active. The input is designed to connect to a level switch within the tank bund (sometimes known as the Fuel Retention Tank). This is used to detect fuel leaks and/or overflows. Select the action for the alarm: ***Electrical Trip*** ***Shutdown*** ***Warning***

2.9.2 OIL PRESSURE

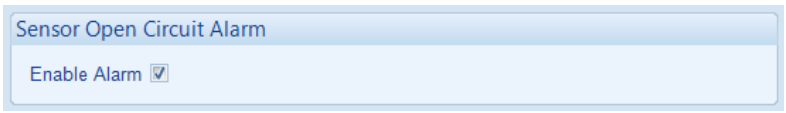
NOTE: The DSE module reads oil pressure from the ECU (ECM) if the selected Engine Application supports it. In these cases, Analogue Input A is configured as Flexible Analogue or Digital Input. Configuration of Flexible Analogue Inputs and Digital Inputs is detailed elsewhere in this document.

Input Type



Parameter	Description
Input Type	Choose the measured quantity from the Standard Sensors in the list. ***Current:*** for sensors with maximum range of 0 mA to 20 mA ***Resistive:*** for sensors with maximum range of 0 Ω to 240 Ω ***Voltage:*** for sensors with maximum range of 0 V to 10 V Then, select the sensor curve from a pre-defined list or create a user-defined curve.

Sensor Open Circuit Alarm



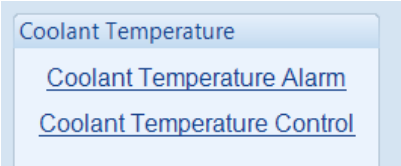
Parameter	Description
Enable Open Circuit Alarm	☐ = Alarm is disabled. ☑ = The *Low Oil Pressure Open Circuit Alarm* is active when the module detects an open circuit when the sender is disconnected

Low Oil Pressure Alarms

Parameter	Description
Low Oil Pressure Alarm	☐ = Alarm is disabled. ☑ = The *Low Oil Pressure Shutdown Alarm* is active when the measured oil pressure drops below the configured *Trip* level.
Low Oil Pressure Pre-Alarm	☐ = Alarm is disabled. ☑ = The *Low Oil Pressure Warning Alarm* is active when the measured oil pressure drops below the configured *Trip* level. The warning is automatically reset when the oil pressure increases above the configured *Return* level.

2.9.3 COOLANT TEMPERATURE

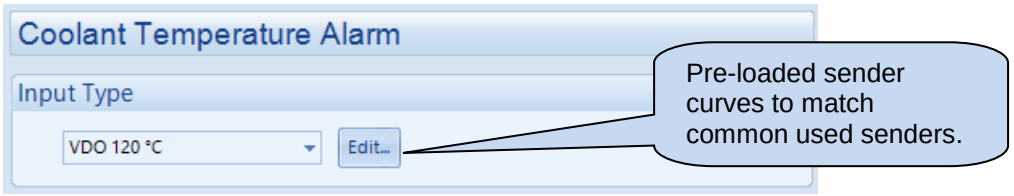
The *Coolant Temperature* page is subdivided into smaller sections.
Select the required section with the mouse.



2.9.3.1 COOLANT TEMPERATURE ALARM

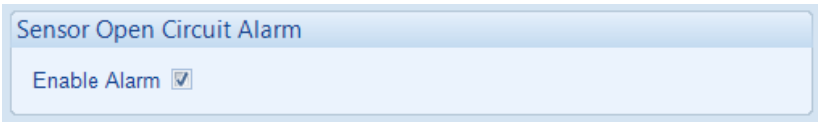
NOTE: The DSE module reads oil pressure from the ECU (ECM) if the selected Engine Application supports it. In these cases, Analogue Input B is configured as Flexible Analogue or Digital Input. Configuration of Flexible Analogue Inputs and Digital Inputs is detailed elsewhere in this document.

Input Type



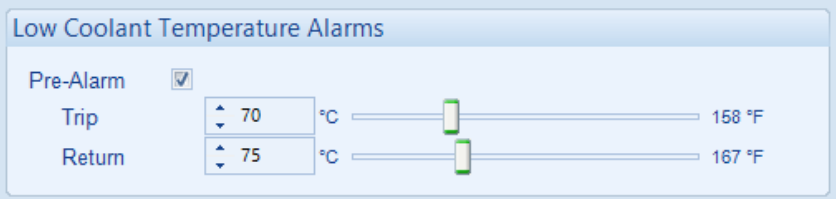
Parameter	Description
Input Type	Choose the measured quantity from the Standard Sensors in the list. ***Current:*** for sensors with maximum range of 0 mA to 20 mA ***Resistive:*** for sensors with maximum range of 0 Ω to 480 Ω ***Voltage:*** for sensors with maximum range of 0 V to 10 V Then, select the sensor curve from a pre-defined list or create a user-defined curve.

Sensor Open Circuit Alarm



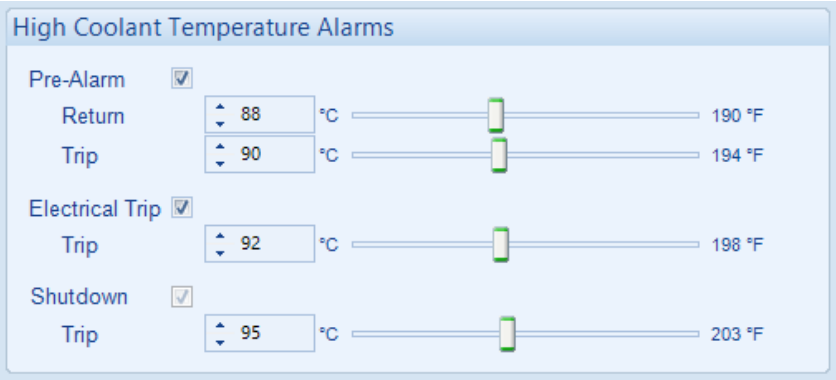
Parameter	Description
Enable Open Circuit Alarm	☐ = Alarm is disabled. ☑ = The *Coolant Temperature Open Circuit* Alarm is active when the module detects an open circuit when the sensor is disconnected

Low Coolant Temperature Alarm



Parameter	Description
Low Coolant Temperature Pre-Alarm	☐ = Alarm is disabled. ☑ = The *Low Coolant Temperature Warning Alarm* is active when the measured coolant temperature falls below the configured *Trip* level. The *Warning* is automatically reset when the coolant temperature rises above the configured *Return* level.

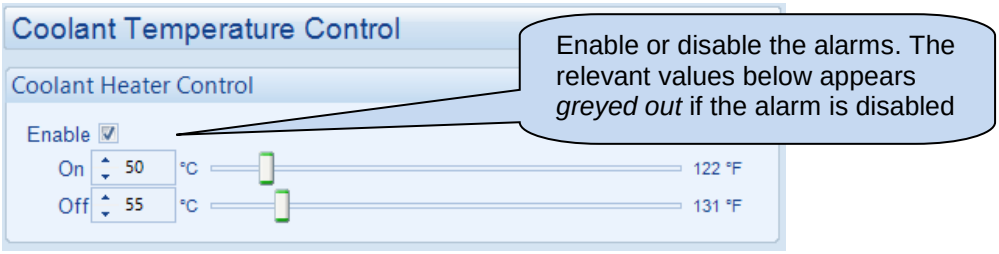
High Coolant Temperature Alarms



Parameter	Description
High Coolant Temperature Pre-Alarm	☐ = Alarm is disabled. ☑ = The *High Coolant Temperature Warning Alarm* is active when the measured coolant temperature rises above the configured *Trip* level. The *Warning* is automatically reset when the coolant temperature falls below the configured *Return* level.
Electrical Trip	☐ = Alarm is disabled. ☑ = The *High Coolant Temperature Controlled Shutdown Alarm* is active when the measured coolant temperature rises above the configured *Trip* level.
High Coolant Temperature Alarm	The *High Coolant Temperature Shutdown Alarm* is active when the measured coolant temperature rises above the configured *Trip* level.

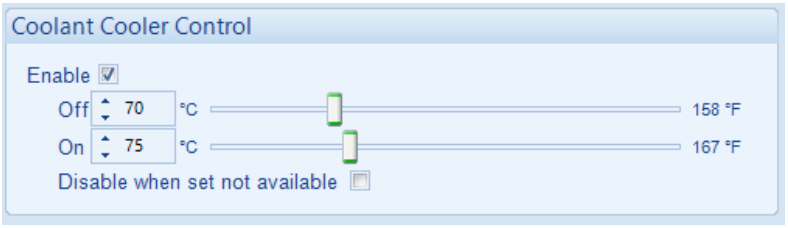
2.9.3.2 COOLANT TEMPERATURE CONTROL

Coolant Heater Control



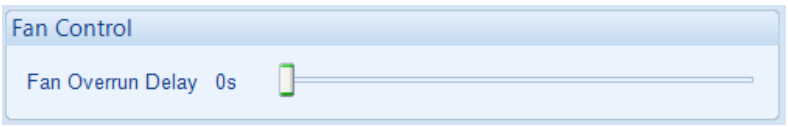
Parameter	Description
Coolant Heater Control	☐ = Coolant Heater Control function is disabled ☑ = The digital output configured to *Coolant Heater Control* is energised when the engine coolant temperature falls below the configured *On* level. This is designed to control an external engine heater. When the coolant temperature rises above the configured *Off* level, the digital output is de-energised.

Coolant Cooler Control



Parameter	Description
Coolant Cooler Control	☐ = Coolant Cooler Control function is disabled ☑ = The digital output configured to *Coolant Cooler Control* is energised when the engine coolant temperature exceeds the configured *On* level. This is designed to control an external engine cooling system, for instance an additional cooling fan. When the coolant temperature falls below the configured *Off* level, the digital output is then de-energised.

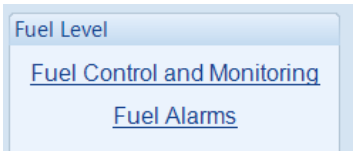
Fan Control



Parameter	Description
Fan Control	An output configured to *Fan Control* energises when the engine becomes available (up to speed). This output is designed to control an external cooling fan. When the engine stops, the cooling fan remains running for the duration of the *Fan Overrun Delay.*

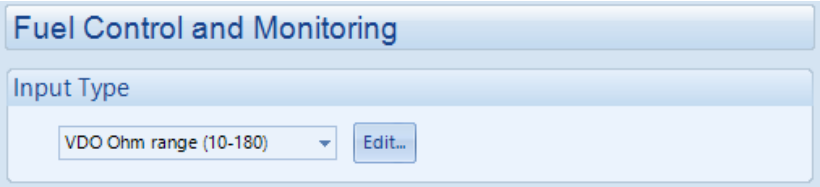
2.9.4 FUEL LEVEL

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



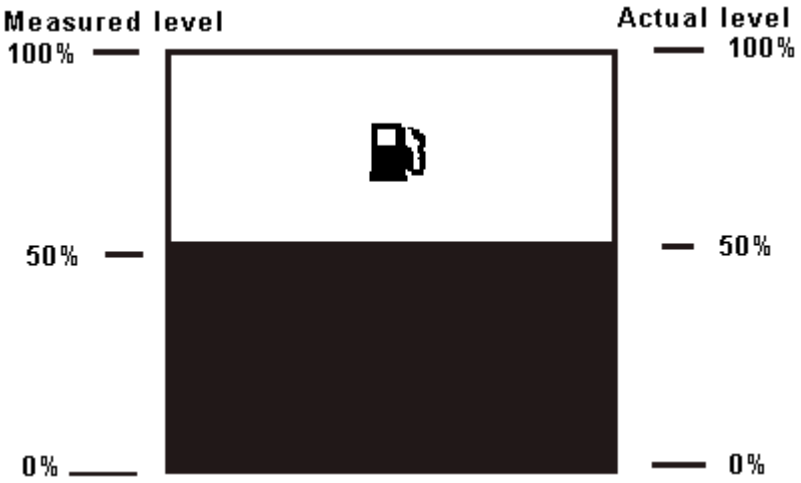
2.9.4.1 FUEL CONTROL AND MONITORING

Input Type



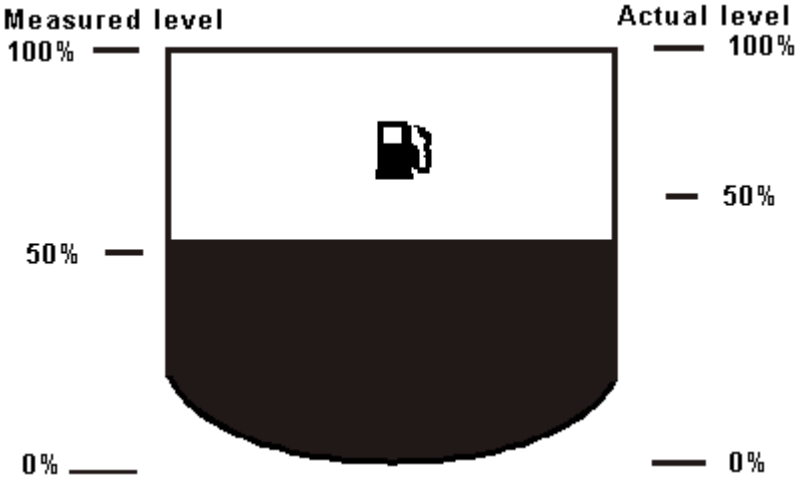
Parameter	Description
Input Type	Select the sensor type and curve from a pre-defined list or create a user-defined curve ***Resistive:*** for sensors with maximum range of 0 Ω to 480 Ω ***Current:*** for sensors with maximum range of 0 mA to 20 mA ***Voltage:*** for sensors with maximum range of 0 V to 10 V

In the case of a parallel sided fuel tank, an accurate measure of the fuel level is easily made, however this is not the case with non-parallel sided fuel tanks. Alteration to the fuel level sensor curve is required for non-parallel sided to attain more accurate level indication. This is because a fuel level sensor measures the distance between the top of the tank and the fuel level.



In this example, the distance between the top of the tank and the level of the fuel is 50% of the height of the tank. The fuel level sensor correctly reports the tank as being 50% full.

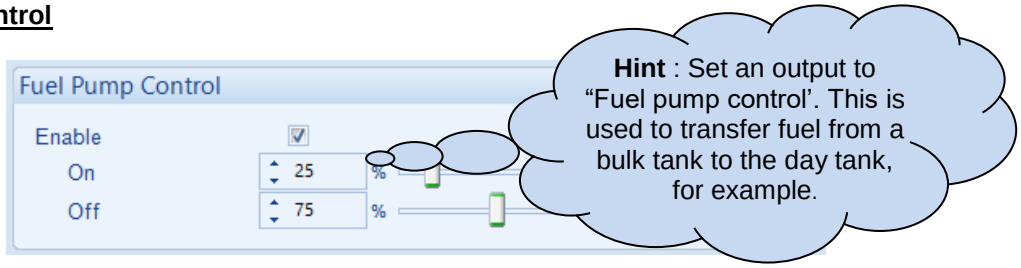
For a parallel-sided tank like this one, 50% distance between the top of the tank and the level of the fuel occurs when the tank is 50% full of fuel.



In this example, the distance between the top of the tank and the level of the fuel is again 50% of the height of the tank.

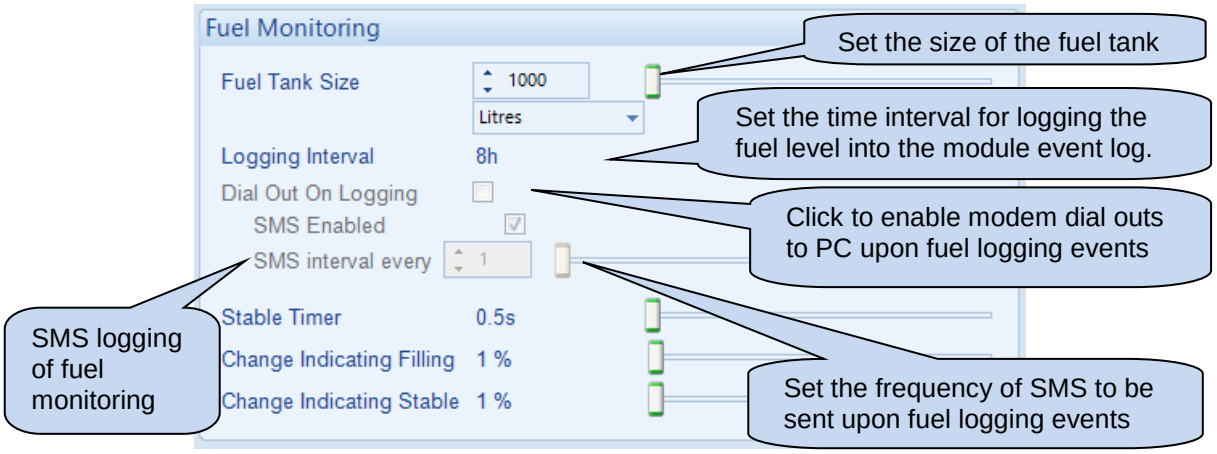
For this non-parallel sided tank, the actual amount of fuel in the tank is roughly 40%. However, the fuel level sensor incorrectly reports the tank as being 50% full.

Fuel Pump Control



Parameter	Description
Fuel Pump Control	☐ = Fuel Pump Control is disabled. ☑ = Allows the module to control an external fuel pump to transfer fuel from a bulk tank to the day tank. A digital output configured for *Fuel Pump Control* energises when the fuel level falls below the configured *On* setting and de-energises when the fuel level exceeds the configured *Off* setting.

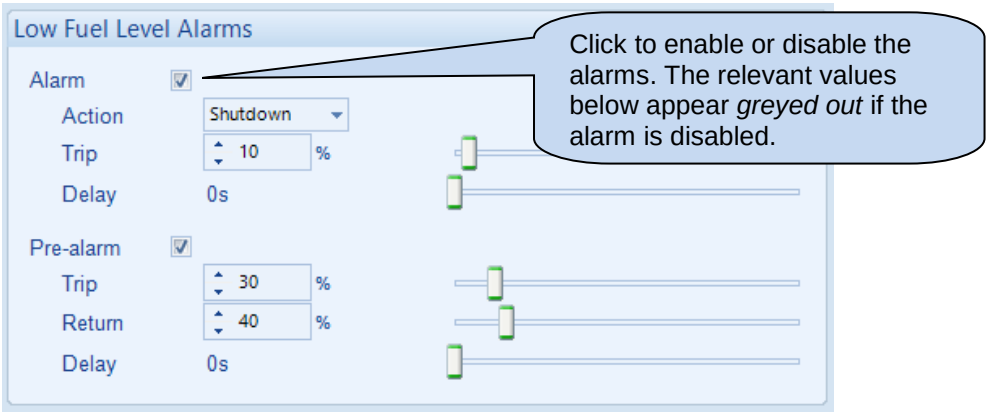
Fuel Monitoring



Parameter	Description
Stable Timer	The controller maintains a rolling record of the fuel level percentage for the duration of the *Stable Timer*. When the rolling record of the fuel level percentage indicates that the fuel level has increased more than the *Change Indicating Filling* during the *Stable Timer*, the controller records a *Fuel Filling Start* event in its event log. When the rolling record of the fuel level indicates that the fuel level has not changed more than the *Change Indicating Stable* during the *Stable Timer*, the controller records a *Fuel Filling Stop* event in its event log.
Change Indicating Filling	When the fuel level increases at a rate higher than $\frac{\textit{Change Indicating Filling}}{\textit{Stable Timer}}$ then a fuel fill start event is recorded into the event log. Depending on configuration this generates a dial out or SMS message. **Example:** *Stable Timer* = 1 minute *Change Indicating Filling* = 3 % When the fuel level increases by more than 3% in 1 minute, a fuel fill event is recorded.
Change Indicating Stable	During filling, if the fuel level increases at a rate less than $\frac{\textit{Change Indicating Stable}}{\textit{Stable Timer}}$ then a fuel fill end event is recorded into the event log. Depending on configuration this generates a dial out or SMS message. **Example:** *Stable Timer* = 1 minute *Change Indicating Stable* = 2 % When the fuel level increases by less than 2% in 1 minute, a fuel fill end event is recorded.

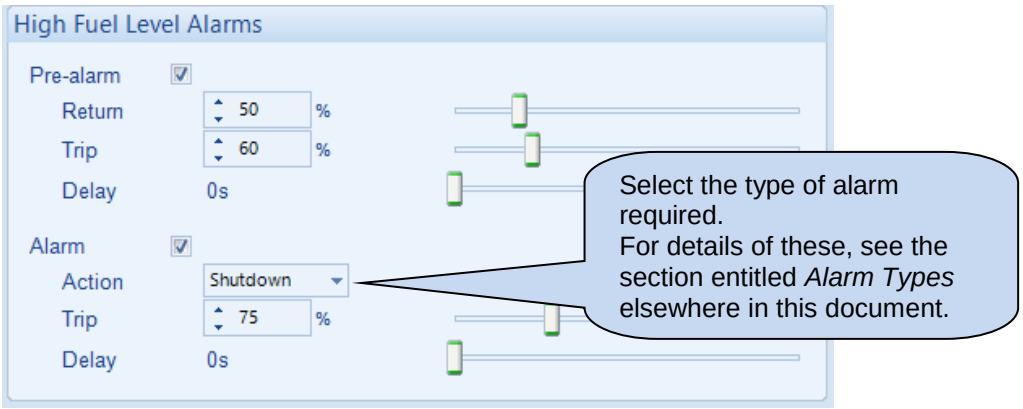
2.9.4.2 FUEL ALARMS

Fuel Level Alarms



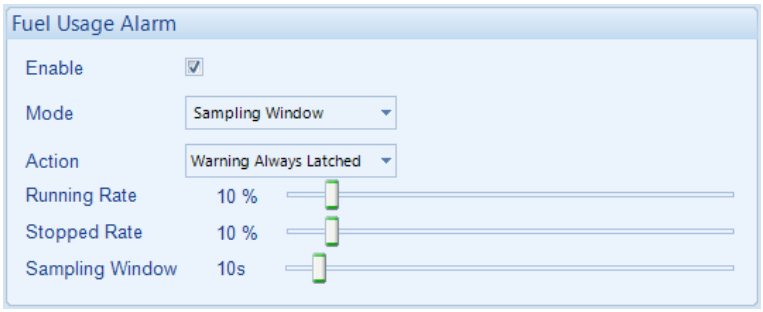
Parameter	Description
Low Fuel Level Alarm	☐ = Alarm is disabled. ☑ = The *Low Fuel Level Alarm* is active when the measured fuel level drops below the *Trip* setting for the configured *Delay* time.
Low Fuel Level Pre-Alarm	☐ = Pre-Alarm is disabled. ☑ = The *Low Fuel Level Pre-Alarm* is active when the measured fuel level drops below the *Trip* setting for the configured *Delay* time, the alarm is automatically reset when the fuel level is increased above the *Return* level.

High Fuel Level Alarms



Parameter	Description
High Fuel Level Pre-Alarm	☐ = Pre-Alarm is disabled. ☑ = The *High Fuel Level Pre-Alarm* is active when the measured fuel level rises above the *Trip* setting for the configured *Delay* time, the alarm is automatically reset when the fuel level is decreased below the *Return* level.
High Fuel Level Alarm	☐ = Alarm is disabled. ☑ = The *High Fuel Level Alarm* is active when the measured fuel level rises above the *Trip* setting for the configured *Delay* time.

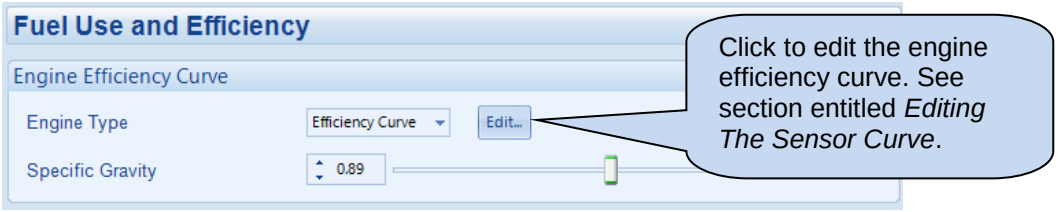
Fuel Usage Alarms



Parameter	Description
Fuel Usage Alarm	☐ = Alarm is disabled. ☑ = Provides an alarm to monitor the usage of the fuel. The alarm activates when the fuel level drops at a higher rate than the configured *Running Rate* while the engine is running. Or if the fuel level drops at a higher rate than the configured *Stopped Rate* while the engine is stopped. This alarm is provided to check for fuel leakage problems or potential fuel theft.
Mode	***Standard Mode:*** The fuel usage alarm activates when the fuel level decreases at a higher rate per hour than the configured *Running Rate* while the engine is running, or *Stopped Rate* while the engine is stopped. ***Sampling Window:*** The fuel usage alarm activates when the fuel level decreases at a higher rate per *Sampling Window* than the configured *Running Rate* while the engine is running, or *Stopped Rate* while the engine is stopped.
Action	The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***Latched Indication*** ***Warning Always Latched*** ***Electrical Trip*** ***Shutdown***

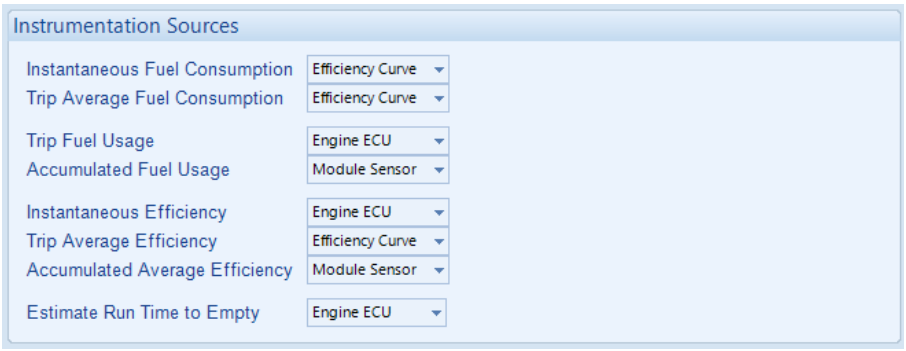
2.9.5 FUEL USE AND EFFICIENCY

Engine Efficiency Curve



Parameter	Description
Engine Type	Select the engine type from a pre-defined list or create a user-defined curve.
Specific Gravity	The relative fuel density of the fuel (usually given as kg/m^3) being consumed by the generator.

Instrumentation Sources

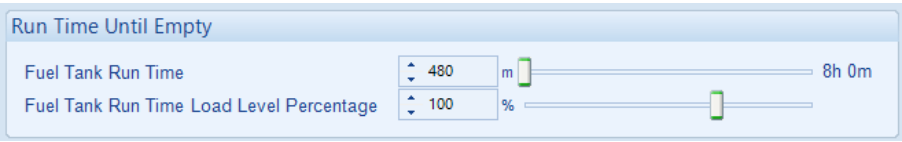


Parameter	Description
Instantaneous Fuel Consumption	**Not Used:** *Instantaneous Fuel Consumption* is not displayed **Efficiency Curve:** The DSE module calculates the *Instantaneous Fuel Consumption* as Litre/hour from *Generator Total kW Percentage* using the *Efficiency Curve* and *Specific Gravity.* **Engine ECU:** The DSE module reads the *Instantaneous Fuel Consumption* as Litre/hour from the engine ECU.
Trip Average Fuel Consumption	**Not Used:** *Trip Average Fuel Consumption* is not displayed **Efficiency Curve:** The DSE module calculates the *Trip Average Fuel Consumption* as litre/hour over the current or last run from *Generator Total kW Percentage* using the *Efficiency Curve* and *Specific Gravity.* **Engine ECU:** The DSE module reads the *Trip Average Fuel Consumption* as litre/hour over the current or last run from the engine ECU. **Module Sensor:** The DSE module calculates the *Trip Average Fuel Consumption* as litre/hour over the current or last run from the change in fuel tank level using the *Fuel Tank Size*.
Trip Fuel Usage	**Not Used:** *Trip Fuel Usage* is not displayed **Efficiency Curve:** The DSE module calculates the *Trip Fuel Usage* as litres over the current or last run from *Generator Total kW Percentage* using the *Efficiency Curve* and *Specific Gravity.* **Engine ECU:** The DSE module reads the *Trip Fuel Usage* as litres over the current or last run from the engine ECU. **Module Sensor:** The DSE module calculates the *Trip Fuel Usage* as litres over the current or last run from the change in fuel tank level using the *Fuel Tank Size*.

Parameter descriptions continued overleaf…

Parameter	Description
Accumulated Fuel Usage	**Not Used:** Accu*mulated Fuel Usage* is not displayed **Efficiency Curve:** The DSE module calculates the *Accumulated Fuel Usage* as litres over the entire run time from *Generator Total kW Percentage* using the *Efficiency Curve* and *Specific Gravity.* **Engine ECU:** The DSE module reads the *Accumulated Fuel Usage* as litres over the entire run time from the engine ECU. **Module Sensor:** The DSE module calculates the *Accumulated Fuel Usage* as litres over the entire run time from the change in fuel tank level using the *Fuel Tank Size*.
Instantaneous Efficiency	**Not Used:** *Instantaneous Efficiency* is not displayed **Efficiency Curve:** The DSE module calculates the *Instantaneous Efficiency* as kWh/litre from *Generator Total kW Percentage* using the *Efficiency Curve* and *Specific Gravity.* **Engine ECU:** The DSE module reads the *Instantaneous Fuel Consumption* as Litre/hour from the engine ECU and calculates the *Instantaneous Efficiency* as kWh/litre using the *Generator Total kW Percentage*.
Trip Average Efficiency	**Not Used:** *Trip Average Efficiency* is not displayed **Efficiency Curve:** The DSE module calculates the *Trip Average Efficiency* as kWh/litre over the current or last run from *Generator Total kW Percentage* using the *Efficiency Curve* and *Specific Gravity.* **Engine ECU:** The DSE module reads the *Trip Average Fuel Consumption* as Litre/hour from the engine ECU over the current or last run and calculates the *Trip Average Efficiency* as kWh/litre using the *Generator Total kW Percentage*. **Module Sensor:** The DSE module calculates the *Trip Average Efficiency* as kWh/litre over the current or last run from the change in fuel tank level using the *Fuel Tank Size* and *Generator Total kW Percentage*.
Accumulated Average Efficiency	**Not Used:** *Accumulated Average Efficiency* is not displayed **Efficiency Curve:** The DSE module calculates the *Accumulated Average Efficiency* as kWh/litre over the entire run time from *Generator Total kW Percentage* using the *Efficiency Curve* and *Specific Gravity.* **Engine ECU:** The DSE module reads the *Accumulated Fuel Usage* as litres over the entire run time from the engine ECU and calculates *the Accumulated Average Efficiency* as kWh/litre using the *Generator Total kW Percentage*. **Module Sensor:** The DSE module calculates the *Accumulated Average Efficiency* as kWh/litre over the entire run time from the change in fuel tank level using the *Fuel Tank Size* and *Generator Total kW Percentage*.
Estimate Run Time to Empty	**Not Used:** *Estimate Run Time to Empty* is not displayed **Engine ECU:** The DSE module reads the *Instantaneous Fuel Consumption* as Litre/hour from the engine ECU and *Estimates Run Time to Empty* using the *Fuel Tank Size*. **Module Sensor:** The DSE module *Estimates Run Time to Empty* using the *Run Time Until Empty* parameters.

Run Time Until Empty



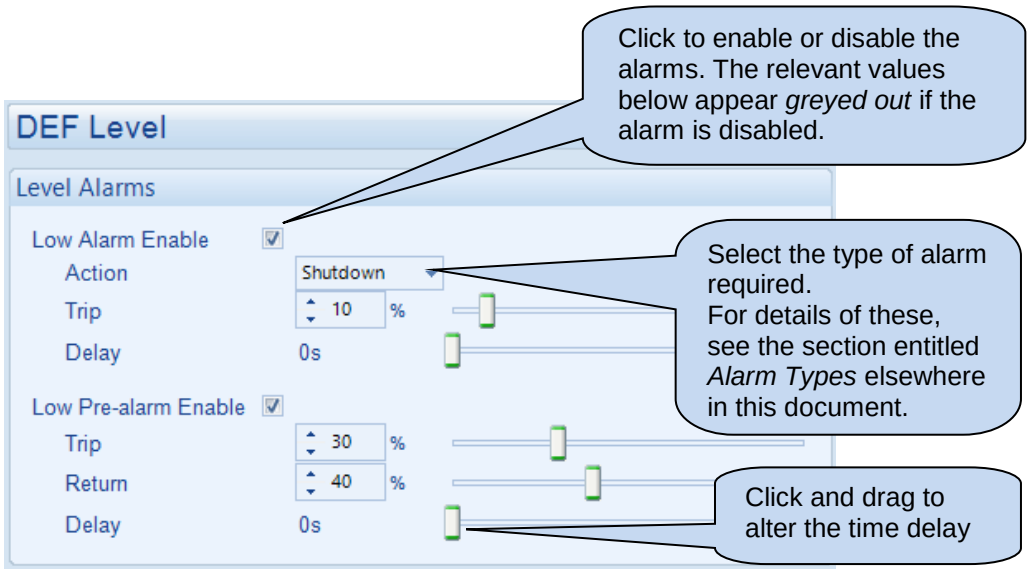
Parameter	Description
Fuel Tank Run Time	The time in minutes how long the generator's fuel tank last when running at the *Fuel Tank Run Time Load Level Percentage*
Fuel Tank Run Time Load Level Percentage	The percentage of full load kW the generator which is used to calculate how long the fuel in the tank lasts.

2.9.6 DEF LEVEL

NOTE: Configuration of alarms in this section only has effect when the ECU (ECM) supports DEF Level.

NOTE: Configuration of the *Alarm Action* in this section defines the DSE module response to the CANbus message; however, the ECU (ECM) still shuts down the engine depending on the alarm severity.

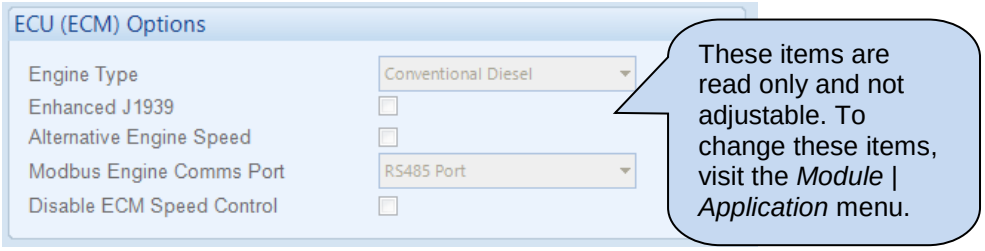
DEF Level is a CANbus message from the ECU (ECM). The following parameters allow configuration of how the DSE module responds to the DEF Level.



Parameter	Description
DEF Level Low Alarm	☐ = Disable the alarm ☑ = *DEF Low Alarm* will be activated when the *DEF Level* sent from the ECU is below the configured *Trip* level for longer than the configured *Delay* time.
Action	Select the type of alarm required from the list: ***Shutdown*** ***Electrical Trip*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
DEF Level Low Pre-Alarm	☐ = The Pre-alarm is disabled. ☑ = *DEF Low Pre-Alarm* will be activated when the *DEF Level* sent from the ECU is below the configured *Trip* level for longer than the configured *Delay* time. The Pre-Alarm is deactivated when the *DEF Level* rises above the *Return* level.

2.9.7 ENGINE OPTIONS

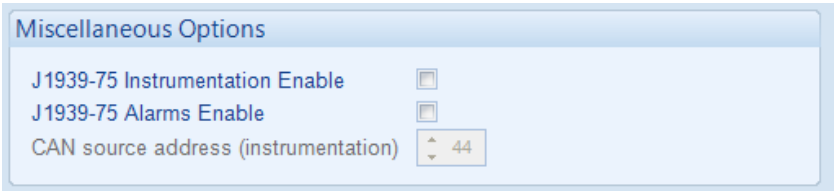
ECU (ECM) Options



Parameter	Description
Disable ECM Speed Control	Disables speed control by the DSE module. Useful when an external device (i.e. remote speed potentiometer) is used to control engine speed.

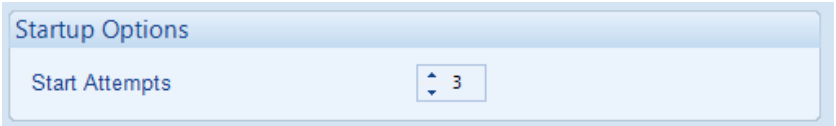
Miscellaneous options

NOTE: For a full list of the J1939-75 alarms and instrumentation, refer to DSE Publication: *057-254 DSE8620 MKII Operator Manual* which is found on our website: *www.deepseaelectronics.com*



Parameter	Description
J1939-75 Instrumentation Enable	Allows the DSE module to be interrogated by another CAN device and transfer the generator set instrumentation over J1939 link.
J1939-75 Alarms Enable	Allows the DSE module to be interrogated by another CAN device and transfer the alarms over J1939 link.
CAN Source Address (Instrumentation)	Set the *CAN Source Address* for the DSE module over which other CANbus devices read the generator set instrumentation.

Startup options

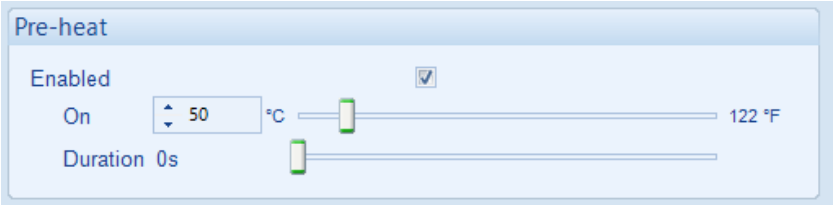


Parameter	Description
Start Attempts	The number of starting attempts the module makes. If the module does not detect that the engine has fired before the end of the *Cranking Time*, then the current start attempt is cancelled and the *Crank Rest* time takes place before the next crank attempt begins. If, after all configured *start attempts,* the engine is not detected as running, the *Fail to Start* shutdown alarm is generated. The engine is detected as running by checking all methods of *Crank Disconnect.* For further details, see the section entitled *Crank Disconnect* elsewhere in this document.

Pre-heat

NOTE: For this feature to have effect, configure a digital output for *Pre-Heat.*

NOTE: Depending on *Engine Type* configuration, this is controlled direct by the ECU (ECM).

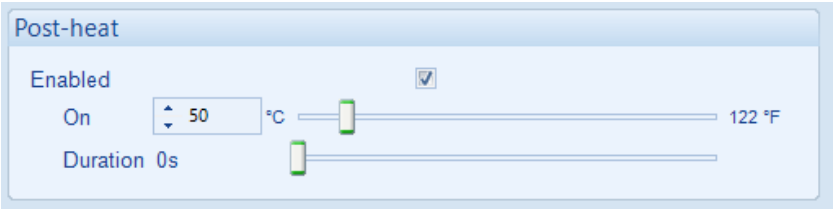


Parameter	Description
Enabled	☐ = Temperature dependant Pre-heat is disabled. Preheat occurs prior to cranking regardless of temperature. ☑ = When the *Coolant Temperature* is below the configured *On* level, the *Pre-Heat* digital output is activated for the set *Duration* of time before cranking.
On	Set the coolant temperature below which the pre-heat is activated.
Duration	Set the time delay during which the *Pre-Heat* digital output remains active before cranking

Post-heat

NOTE: For this feature to have effect, configure a digital output for *Pre-Heat.*

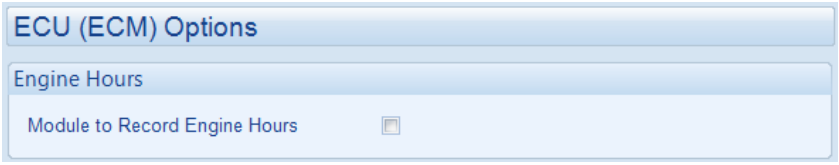
NOTE: Depending on *Engine Type* configuration, this is controlled direct by the ECU (ECM).



Parameter	Description
Enabled	☐ = Temperature dependant Post-heat is disabled. Post-Heat occurs after cranking regardless of temperature. ☑ = When the *Coolant Temperature* is below the configured *On* level, the *Pre-Heat* digital output is activated for the set *Duration* of time after cranking and before the set is considered available.
On	Set the coolant temperature below which the P*re-Heat* digital output is activated.
Duration	Set the time delay during which the *Pre-Heat* digital output remains active after cranking and before the engine is considered available.

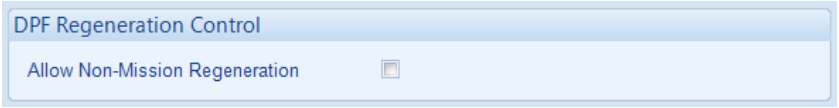
2.9.8 ECU (ECM) OPTIONS

Engine Hours



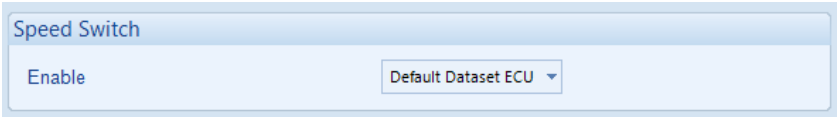
Parameter	Description
Module to Record Engine Hours	When enabled, DSE module counts Engine Run Hours. When disabled, Engine ECU (ECM) provides Run Hours.

DPF Regeneration Control



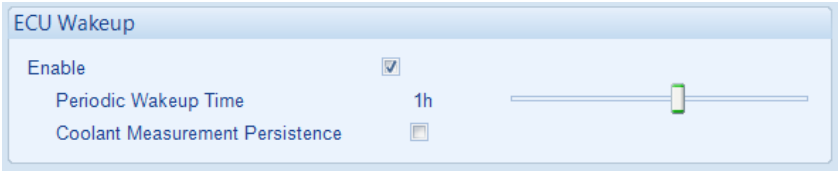
Parameter	Description
DPF Regeneration Control	Available for ECUs (ECM) which require the engine speed to drop during a manual regeneration cycle. During this time, the generator is not available to supply power and the under speed and under frequency alarms are not active.

Speed Switch



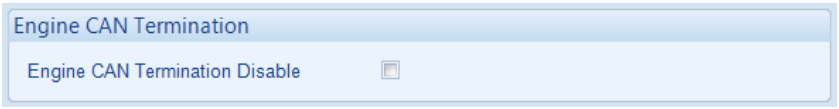
Parameter	Description
Speed Switch	**NOTE: Always use *Default Dataset ECU* unless instructed to do otherwise by DSE.** Defines the method of speed control over CANbus when supported by the ECU (ECM). Selection needs to match the ECU (ECM) calibration for the speed control method. Available speed control methods to choose from: ***CAN Open Increase Decrease*** ***CAN Open Speed Demand*** ***Default Dataset ECU*** ***ECU Analogue Absolute*** ***ECU Analogue Relative*** ***ECU CAN Open Analogue*** ***ECU Frequency Input*** ***ECU Increase Decrease Input***

ECU Wakeup



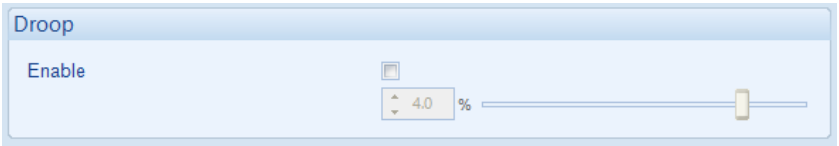
Parameter	Description
ECU Wakeup	☐ = Option is disabled. ☑ = When the engine is stopped, the DSE module sends a wakeup signal to the ECU (ECM) and keeps it powered up for 2 minutes to read the ECU (ECM) parameters. This is periodically repeated depending on the configured *Periodic Wakeup Time.*
Coolant Measurement Persistence	**NOTE: Available only when *ECU Wakeup* is enabled.** ☐ = Option is disabled. ☑ = The *Coolant Temperature* measurement is used for the *Coolant Temperature Control.*

Engine CAN Termination



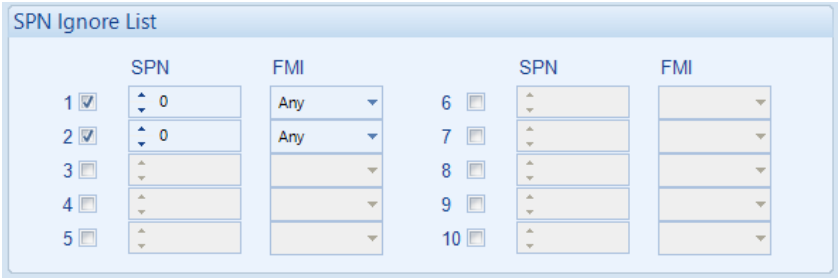
Parameter	Description
Engine CAN Termination	DSE8620 MKII includes a switchable internal 120 Ω termination resistor for the ECU port. ☐ = Internal 120 Ω termination resistor is disabled. ☑ = Internal 120 Ω termination resistor is enabled across the H and L terminals of the ECU port.

Droop



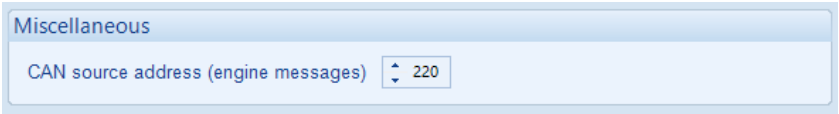
Parameter	Description
Droop	**NOTE: Droop options are only available where supported by the Engine ECU (ECM) over the CAN or MODBUS datalink. Contact the engine manufacturer for further details.** ☐ = Engine droop is not enabled. ☑ = Where supported by the electronic engine ECU (ECM), the DSE enable droop in the engine ECU (ECM) governor at the %age configured.

SPN Ignore List



Parameter	Description
SPN Ignore List	Choose the specific DTC for the module to ignore. The module allows the engine to keep running when the ignored DTC occurs; however, depending on the severity, the engine shuts down based on the ECU (ECM) calibration. This is used to mask certain indications or warnings on the ECU (ECM) and not display them on the DSE module.

Miscellaneous

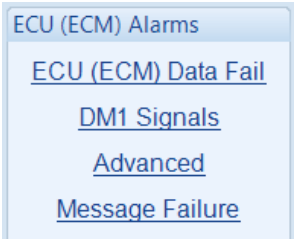


Parameter	Description
CAN Source Address (Engine Messages)	**NOTE: Although automatically pre-set upon selection of the Engine Type, this parameter is available for change if required.** Set the *CAN Source Address* that the DSE8620 MKII is to read instrumentation from. This is typically the Source Address of the engine ECU.

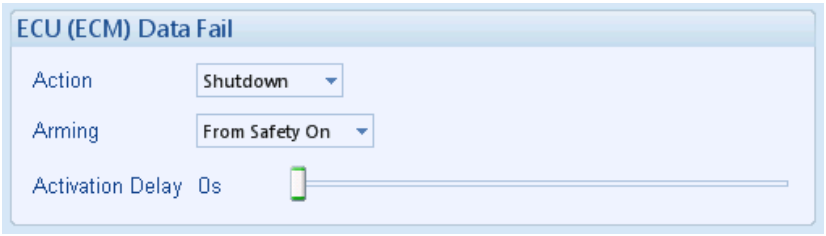
2.9.9 ECU (ECM) ALARMS

NOTE: This section is only available when the module is connected to an ECU.

The *ECU (ECM) Alarms* section is subdivided into smaller sections.
Select the required section with the mouse.



2.9.9.1 ECU (ECM) DATA FAIL



Parameter	Description
CAN Data Fail	Provides protection against failure of the ECU (ECM) CANbus data link. The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***None*** ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the *CAN ECU (ECM) Data Fail* alarm is active. Options are as follows: ***Active From Breaker Closed:*** Active only when the generator breaker is closed ***Active From Parallel:*** Active only when running in parallel ***Always:*** The alarm is active at anytime the CANbus Link is lost ***Engine Protection Activation:*** Active when the engine protection alarms are armed ***From Safety On:*** Active only after the *Safety On* delay timer ***From Starting:*** Active only after the *Crank Relay* is energised ***Never****:* Alarm is disabled ***When Stationary:*** Active only when the engine is not running
Activation Delay	The amount of time before the module activates the *CAN ECU (ECM) Data Fail* after a failure.

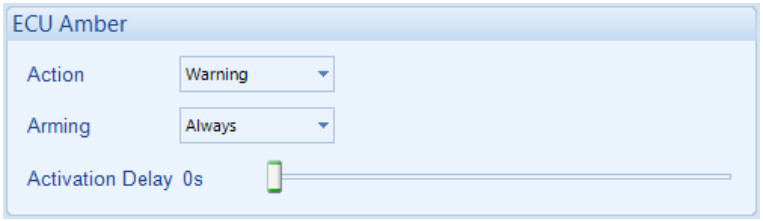
2.9.9.2 DM1 SIGNALS

NOTE: Configuration of parameters in this section only has effect when the ECU (ECM) supports these features.

NOTE: Configuration of the *Alarm Action* in this section defines the DSE module response to the CANbus message; however, the ECU (ECM) still shuts down the engine depending on the alarm severity.

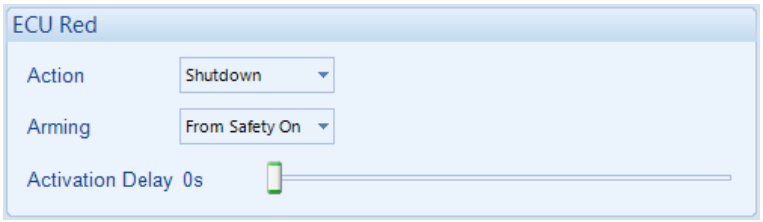
DM1 signals are messages from the CANbus (ECM) ECU. The following parameters allows configuration of how the DSE module responds to these messages.

ECU Amber



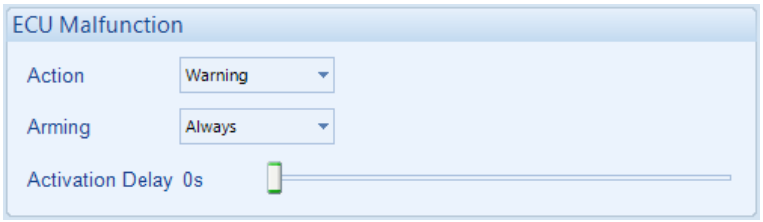
Parameter	Description
ECU Amber Action	The action the DSE module takes when receiving and ECU Amber fault condition. The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***None*** ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the DSE module activates it *ECU Amber* alarm. Options are as follows, see the section entitled *Alarm Arming* elsewhere in this document: ***Active From Breaker Closed*** ***Active From Mains Parallel*** ***Always*** ***From Safety On*** ***From Starting*** ***Never****:* ***When Stationary***
Activation Delay	The amount of time before the module activates the *ECU Amber* alarm after a receiving an ECU Amber fault condition from the ECU.

ECU Red



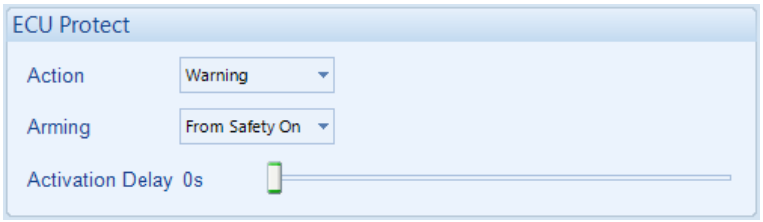
Parameter	Description
ECU Red Action	The action the DSE module takes when receiving and ECU Red fault condition. The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***None*** ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the DSE module activates it *ECU Red* alarm. Options are as follows, see the section entitled *Alarm Arming* elsewhere in this document: ***Active From Breaker Closed*** ***Active From Mains Parallel*** ***Always*** ***From Safety On*** ***From Starting*** ***Never****:* ***When Stationary***
Activation Delay	The amount of time before the module activates the *ECU Red* alarm after a receiving an ECU Red fault condition from the ECU.

ECU Malfunction



Parameter	Description
ECU Malfunction Action	The action the DSE module takes when receiving and ECU Malfunction fault condition. The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***None*** ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the DSE module activates it *ECU Malfunction* alarm. Options are as follows, see the section entitled *Alarm Arming* elsewhere in this document: ***Active From Breaker Closed*** ***Active From Mains Parallel*** ***Always*** ***From Safety On*** ***From Starting*** ***Never****:* ***When Stationary***
Activation Delay	The amount of time before the module activates the *ECU Malfunction* alarm after a receiving an ECU Malfunction fault condition from the ECU.

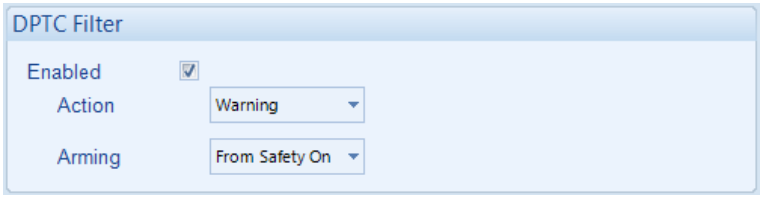
ECU Protect



Parameter	Description
ECU Protect Action	The action the DSE module takes when receiving and ECU Protect fault condition. The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***None*** ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the DSE module activates it *ECU Protect* alarm. Options are as follows, see the section entitled *Alarm Arming* elsewhere in this document: ***Active From Breaker Closed*** ***Active From Mains Parallel*** ***Always*** ***From Safety On*** ***From Starting*** ***Never****:* ***When Stationary***
Activation Delay	The amount of time before the module activates the *ECU Protect* alarm after a receiving an ECU Protect fault condition from the ECU.

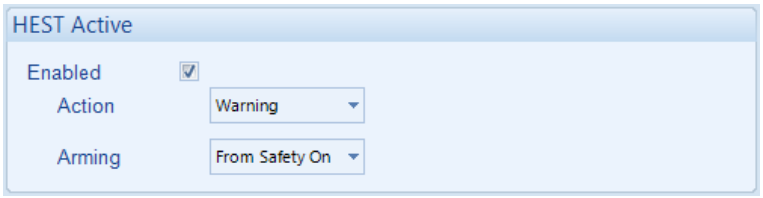
2.9.9.3 ADVANCED

DPTC Filter



Parameter	Description
DPTC Filter Enabled	☐ = The DSE module's *DPTC Filter* alarm is disabled, it does not act upon any DPTC Filter fault conditions from the ECU. ☑ = The DSE module's *DPTC Filter* alarm is enabled. The action the DSE module takes when receiving a DPTC Filter fault condition from the ECU. The alarm action list is as follows, see section entitled *Alarm Types* The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning***
Arming	Select when the DSE module activates its *DPTC Filter* alarm. Options are as follows, see the section entitled *Alarm Arming* elsewhere in this document: ***Always*** ***From Safety On*** ***From Starting***

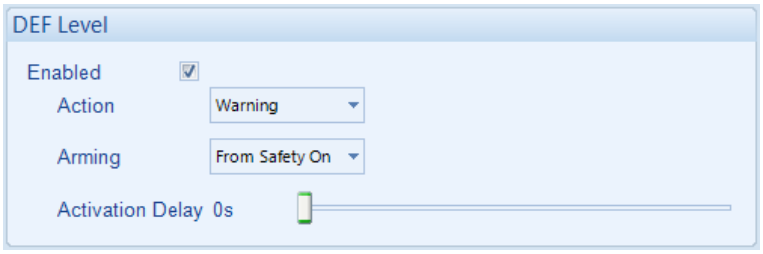
HEST Active



Parameter	Description
HEST Active Enabled	☐ = The DSE module's *HEST* alarm is disabled, it does not act upon any HEST fault conditions from the ECU. ☑ = The DSE module's *HEST* alarm is enabled. The action the DSE module takes when receiving a HEST fault condition from the ECU. The alarm action list is as follows, see section entitled *Alarm Types* The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***Indication*** ***Warning***
Arming	Select when the DSE module activates its *HEST* alarm. Options are as follows, see the section entitled *Alarm Arming* elsewhere in this document: ***Always*** ***From Safety On*** ***From Starting***

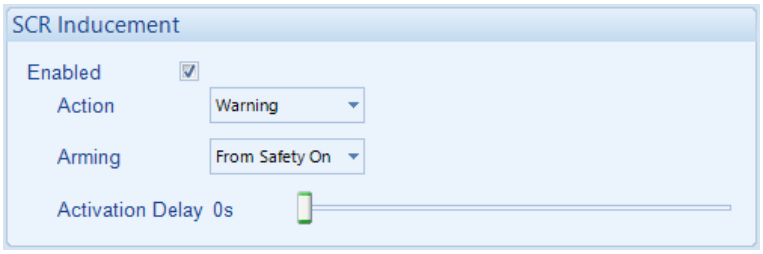
Parameter descriptions are continued overleaf…

DEF Level



Parameter	Description
DEF Level Enabled	☐ = The DSE module's *DEF Level* alarm is disabled, it does not act upon any DEF Level fault conditions from the ECU. ☑ = The DSE module's *DEF Level* alarm is enabled. The action the DSE module takes when receiving a DEF Level fault condition from the ECU. The alarm action list is as follows, see section entitled *Alarm Types* The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the DSE module activates its *DEF Level* alarm. Options are as follows, see the section entitled *Alarm Arming* elsewhere in this document: ***Always*** ***From Safety On*** ***From Starting*** ***Loading Alarms Activation*** ***Never****:* ***When Stationary***
Activation Delay	The amount of time before the module activates the *DEF Level* alarm after a receiving a DEF Level fault condition from the ECU.

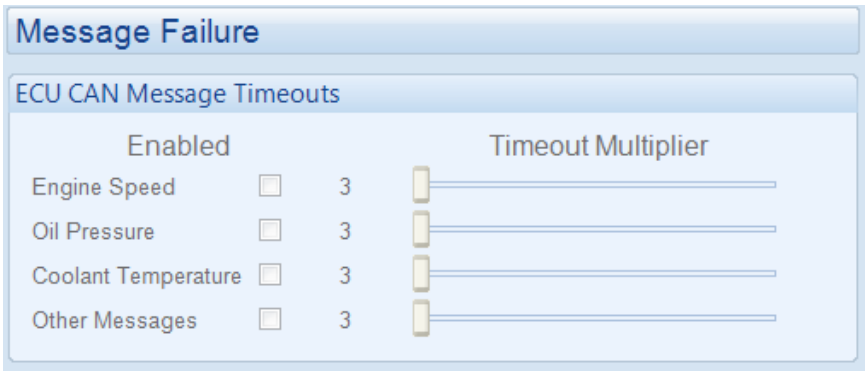
SCR Inducement



Parameter	Description
SCR Inducement Enabled	☐ = The DSE module's *SCR Inducement* alarm is disabled, it does not act upon any SCR Inducement fault conditions from the ECU. ☑ = The DSE module's *SCR Inducement* alarm is enabled. The action the DSE module takes when receiving a SCR Inducement fault condition from the ECU. The alarm action list is as follows, see section entitled *Alarm Types* The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the DSE module activates its *SCR Inducement* alarm. Options are as follows, see the section entitled *Alarm Arming* elsewhere in this document: ***Always*** ***From Safety On*** ***From Starting*** ***Loading Alarms Activation*** ***Never****:* ***When Stationary***
Activation Delay	The amount of time before the module activates the *SCR Inducement* alarm after a receiving a SCR Inducement fault condition from the ECU.

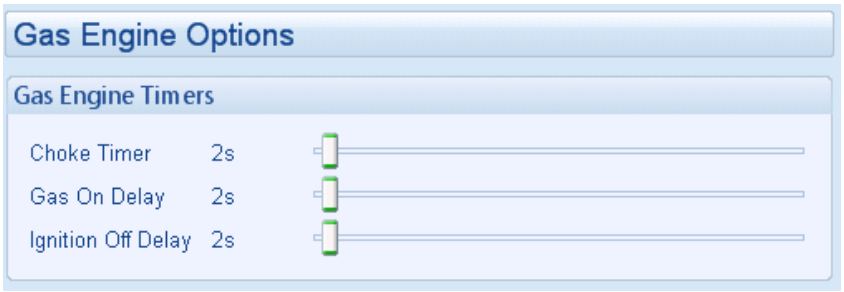
2.9.9.4 MESSAGE FAILURE

Allows adjustment of the CAN message failure rate for instrumentation parameters received from the ECU (ECM). This is to allow for spurious CAN data loss error message caused by longer than usual timeouts.



Parameter	Description
Message Failure	☐ = The message failure monitoring works on the default setting as specified by the manufacturer. ☑ = When enabled, this option overrides the standard message timeout with a longer timeout to avoid spurious failures. Set the *Timeout Multiplier* to adjust the timeout value for the parameter by between three and ten times the standard value.

2.9.10 GAS ENGINE OPTIONS



Parameter	Description
Choke Timer	Controls the amount of time that the Gas Choke output is active during the starting sequence.
Gas On Delay	Controls the amount of time between energising the Gas Ignition and energising the Fuel output. Used in the starting sequence to purge old gas from the engine.
Ignition Off Delay	Controls the amount of time between de-energising the Fuel output and de-energising the Gas Ignition output. Used in the stopping sequence to purge unburnt gas from the engine before it is stopped.

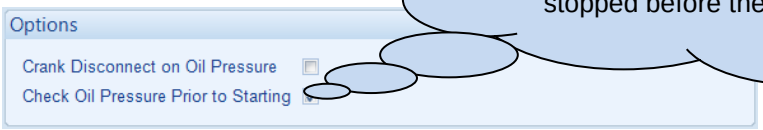
2.9.11 CRANKING

Crank disconnect settings are used to detect when the set fires during the starting sequence. As the set is cranked, the first parameter that passes it's *crank disconnect* setting results in the cessation of the cranking signal.

Having more than one *crank disconnect* source allows for a much faster crank disconnect response leading to less wear on the engine and starter components, and provides added safety in case one source is lost, by a blown or tripped fuse for example.

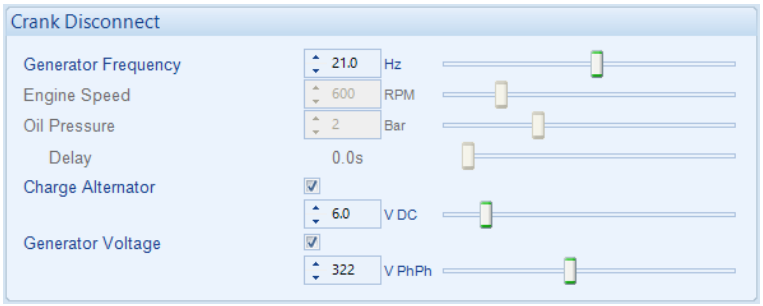
When *Check Oil Pressure Prior to Starting* is enabled, the cranking is not allowed if the oil pressure is not seen as being low. This is used as a *double check* that the engine is stopped before the starter is engaged.

Options



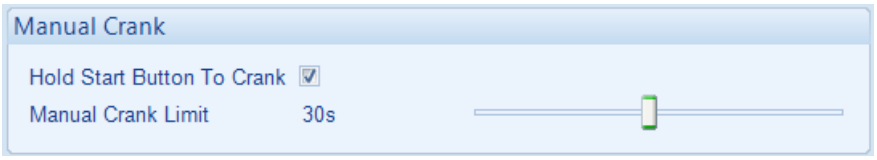
Parameter	Description
Crank Disconnect on Oil Pressure	☐ = The DSE module does not use oil pressure to decide when to disengage the starter motor. ☑ = The DSE module does uses oil pressure to decide when to disengage the starter motor in addition to the enabled methods
Check Oil Pressure Prior to Starting	☐ = The DSE module does not use oil pressure as an indication if the engine is running. This is disabled for large engines that have an electrical oil pump which is used to maintain oil pressure even when the engine is stationary. ☑ = The DSE module uses oil pressure as an indication if the engine is running.

Crank Disconnect



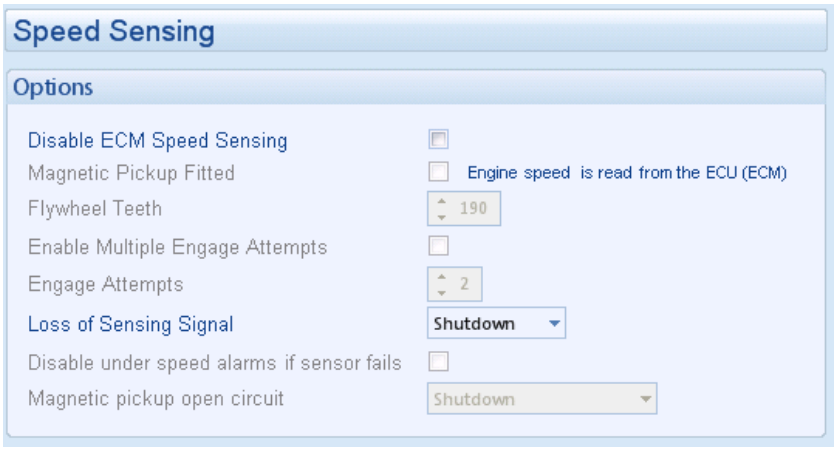
Parameter	Description
Generator Frequency	The DSE module disengages the starter motor when the generator frequency rises above the configured level.
Engine Speed	The DSE module disengages the starter motor when the engine speed rises above the configured level.
Oil Pressure	The DSE module disengages the starter motor when the engine oil pressure rises above the configured level for longer than the *Oil Pressure Delay time*.
Charge Alternator	☐ = The DSE module does not use charge alternator voltage to decide when to disengage the starter motor. ☑ = The DSE module disengages the starter motor when the charge alternator voltage rises above the configured level.
Generator Voltage	☐ = The DSE module does not use the generator voltage to decide when to disengage the starter motor. ☑ = The DSE module disengages the starter motor when the generator voltage rises above the configured level.

Manual Crank



Parameter	Description
Hold Start Button To Crank	☐ = Manual Crank is disabled. ☑ = Press and hold the *Start* button to crank in *Manual* mode, releasing the *Start* button during a manual start disconnects the crank.
Manual Crank Limit Timer	Manual Crank Limit protects the engine from being cranked too long in case of a start failure. This is the maximum time to crank the engine when the *Start* button is kept pressed.

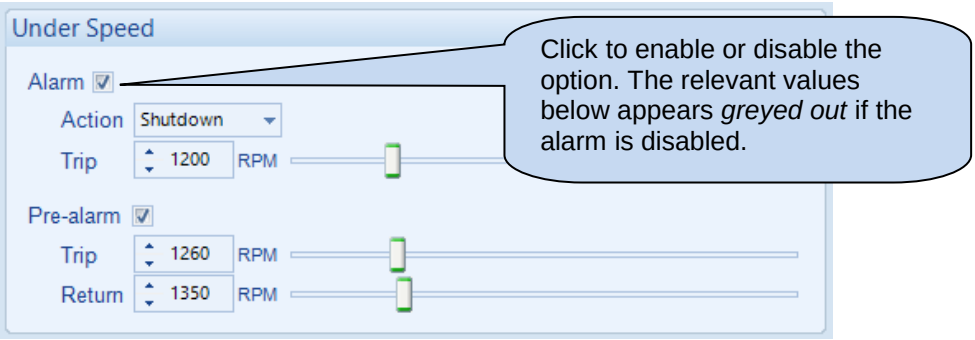
2.9.12 SPEED SENSING



Parameter	Description
Disable ECM Speed Sensing	☐ = An ECM is connected to the DSE module and being used for speed sensing. ☑ = An ECM is connected to the DSE module but another form of speed sensing fitted to the DSE module is being used.
Magnetic Pickup Fitted	**NOTE: For specifications of the magnetic pickup input, refer to DSE Publication: *057-301 DSE8620 MKII Operator Manual* which is found on our website: *www.deepseaelectronics.com*** ☐ = Magnetic pickup device is not connected to the DSE module. ☑ = A low impedance magnetic pickup device is connected to the DSE module to measure engine speed.
Flywheel Teeth	Define the number of pulses which are counted by the speed sensing device in each engine revolution.
Enable Multiple Engage Attempts	☐ = No engage attempt is given. If no speed sensing is detected during cranking, the *Fail To Start* alarm is active. ☑ = If no magnetic pickup pulses are detected during cranking, it is assumed that the starter has not engaged to turn the engine. The starter is withdrawn and re-energised for the configured number of *Engage Attempts.*
Loss of Sensing Signal	If the speed sensing signal is lost during engine running (or not present during cranking when *Multiple Engage Attempts* is enabled), an alarm is generated: ***Shutdown*** ***Warning***
Disable Under Speed Alarms If Sensor Fails	☐ = Under speed alarms activate even if speed sensor has failed. ☑ = Under speed alarms are disabled when the speed sensor fails.
Magnetic Pickup Open Circuit	If the magnetic pickup device is not detected, an alarm is generated: ***Shutdown*** ***Warning Always Latched***

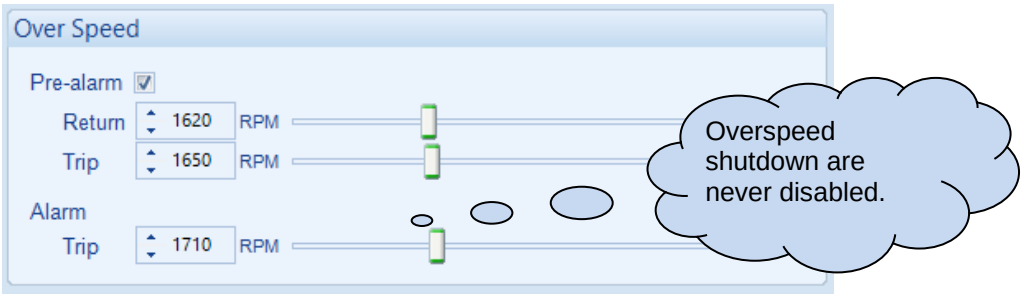
2.9.13 SPEED SETTINGS

Under Speed



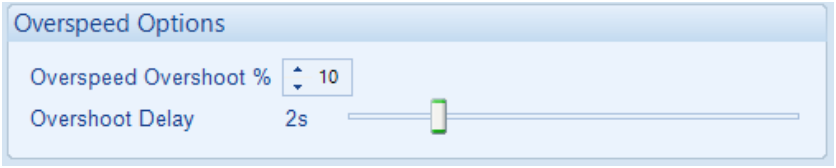
Parameter	Description
Under Speed Alarm	☐ = *Under Speed* alarm is disabled ☑ = Under Speed gives an alarm in the event of the engine speed falling below the configured *Under Speed Alarm Trip* value for longer than the *Activation Delay*. The *Underspeed Alarm Trip* value is adjustable to suit user requirements.
Action	Select the type of alarm required from the list: ***Shutdown*** ***Electrical Trip*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Under Speed Pre-Alarm	☐ = *Under Speed Warning* alarm is disabled ☑ = Under Speed gives a warning alarm in the event of the engine speed falling below the configured *Under Speed Pre-Alarm Trip* value for longer than the *Activation Delay*. The *Under Speed Pre-Alarm Trip* value is adjustable to suit user requirements.

Over Speed



Parameter	Description
Over Speed Pre-Alarm	☐ = Alarm is disabled ☑ = Over Speed gives a warning alarm in the event of the engine speed rising above the configured *Over Speed Pre-Alarm Trip* value for longer than the *Activation Delay*. The *Warning* is automatically reset when the engine speed falls below the configured *Return* level. The *Over Speed Pre-Alarm Trip* value is adjustable to suit user requirements.
Over Speed Alarm	☐ = Alarm is disabled ☑ = Over Speed gives a *Shutdown* alarm in the event of the engine speed rising above the configured *Over Speed Alarm Trip* value for longer than the *Activation Delay*. The *Over Speed Alarm Trip* value is adjustable to suit user requirements.

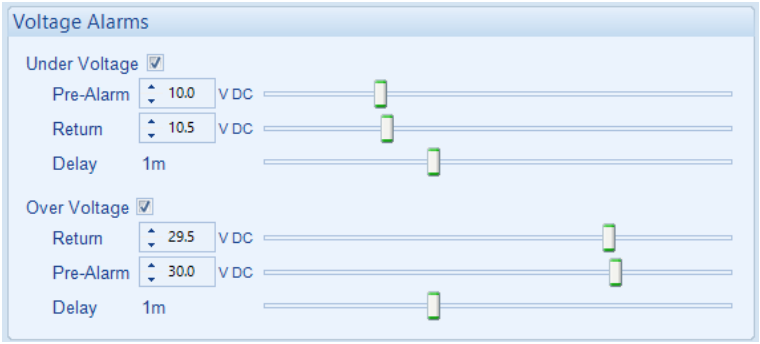
Overspeed options



Parameter	Description
Overspeed Overshoot %	To prevent spurious overspeed alarms at engine start up, the module includes configurable *Overspeed Overshoot* protection. This allows the engine speed to 'overshoot' the Overspeed setting during the starting process for a short time.
Overshoot Delay	Rather than 'inhibiting' the Overspeed alarms, the levels are temporarily raised by the *Overspeed Overshoot %* for the duration of the *Overspeed Overshoot* delay from starting.

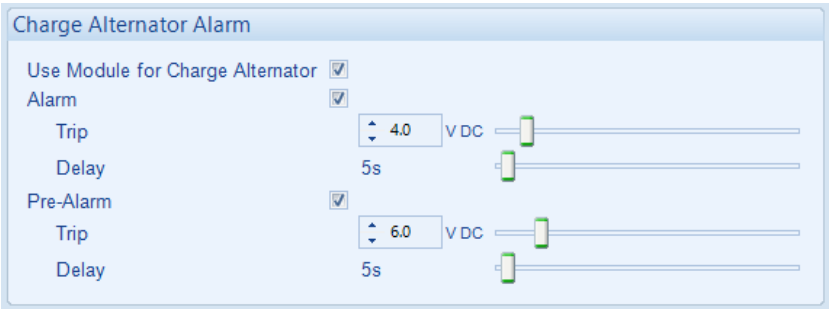
2.9.14 PLANT BATTERY

Voltage Alarms



Parameter	Description
Plant Battery Under Voltage IEEE 37.2 -27 DC Undervoltage Relay	☐ = The alarm is disabled. ☑ = 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 Over Voltage IEEE 37.2 -59 DC Overvoltage Relay	☐ = The alarm is disabled. ☑ = 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.

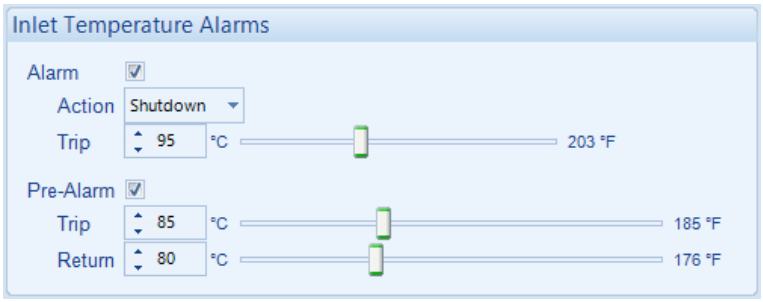
Charge Alternator Alarm



Parameter	Description
Use Module For Charge Alternator	**NOTE: The feature is only available when an electronic engine is selected.** ☐ = DSE module measures the charge alternator voltage. ☑ = Engine ECU (ECM) provides charge alternator voltage.
Charge Alternator Alarm	☐ = The alarm is disabled. ☑ = The alarm activates when the charge alternator voltage falls below the configured *Trip* level for the configured *Delay* time.
Charge Alternator Pre-Alarm	☐ = The alarm is disabled. ☑ = The alarm activates when the charge alternator voltage falls below the configured *Trip* level for the configured *Delay* time.

2.9.15 INLET TEMPERATURE

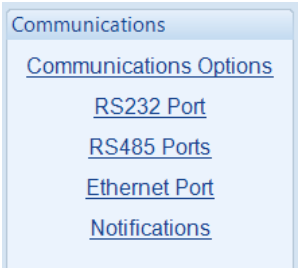
Provides inlet temperature alarms when the module is used in conjunction with electronic (ECU) engines that support the reading of inlet temperature.



Parameter	Description
Inlet Temperature Alarm	**NOTE: The feature is only available when an electronic engine is selected.** ☐ = Disable the alarm ☑ = *Inlet Temperature Alarm* is activated when the *Inlet Temperature* sent from the ECU rise above the *Trip* level.
Action	Select the type of alarm required from the list: ***Electrical Trip*** ***Shutdown*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Inlet Temperature Pre-Alarm	☐ = The alarm is disabled. ☑ = *Inlet Temperature Pre-Alarm* is activated when the *Inlet Temperature* sent from the ECU is above the configured *Trip* level The Pre-Alarm is deactivated when the *Inlet Temperature* falls below the *Return* level.

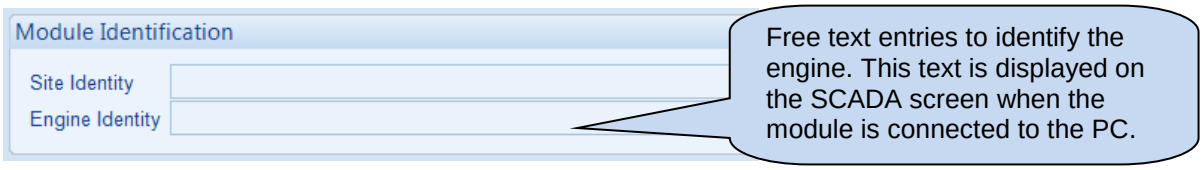
2.10 COMMUNICATIONS

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



2.10.1 COMMUNICATION OPTIONS

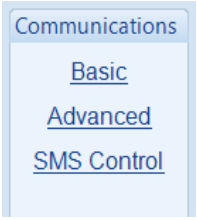
Provides a means of giving the controller an identity. This is used in the SCADA section to allow the operator to see the site name and engine identity that it is currently connected to. This feature is used when a remote module is connected over modem or Ethernet.



Parameter	Description
Site Identity	A free entry boxes to allow the user to give the DSE module a description of where the site is located. This text is not shown on the module's display and is only seen when performing remote communication. This aids the user in knowing where the generator is located.
Genset Identity	A free entry boxes to allow the user to give the DSE module a description of which generator it is connected to. This text is not shown on the module's display and is only seen when performing remote communication. This aids the user in knowing which generator on a specific site is being monitored.

2.10.2 RS232 PORT

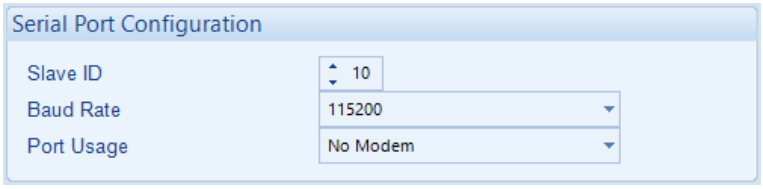
The *RS232 Port* section is subdivided into smaller sections.
Select the required section with the mouse.



2.10.2.1 BASIC

Serial Port Configuration

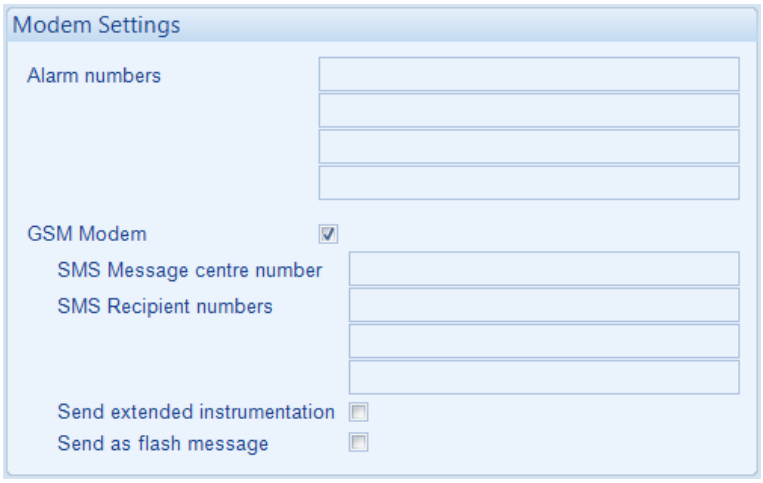
NOTE: Connecting a modem directly to the module's RS232 for is legacy support only. When a new installation requires remote communication using the cellular network is required, refer to DSE products DSE890, DSE891 and DSEWebNet on the DSE website: www.deepseaelectronics.com.



Parameter	Description
Slave ID	Select the Slave ID of the DSE module's RS232 port.
Baud Rate	Select the Baud Rate (speed of communication) of the DSE module's RS232 port. Every device on the RS232 link must have the same Baud Rate. ***1200*** ***2400*** ***4800*** ***9600*** ***14400*** ***19200*** ***28800*** ***38400*** ***57600*** ***115200***
Port Usage	***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 (Sequence):*** RS232 port connected to modem used to accept incoming calls from a PC and also make calls upon events. 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. ***Incoming And Outgoing Modem (Cyclic):*** RS232 port connected to modem used to accept incoming calls from a PC and also make calls upon events. 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*. ***Outgoing Modem Alarms (Sequence):*** RS232 port connected to modem, used to make calls upon events. 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. ***Outgoing Modem Alarms (Cyclic):*** RS232 port connected to modem, used to make calls upon events. 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*.

Modem Settings

NOTE: Connecting a modem directly to the module's RS232 for is legacy support only. When a new installation requires remote communication using the cellular network is required, refer to DSE products DSE890, DSE891 and DSEWebNet on the DSE website: www.deepseaelectronics.com.

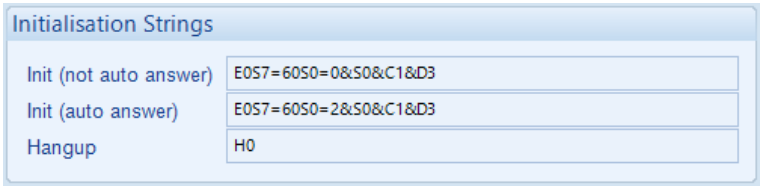


Parameter	Description
Alarm Numbers	The phone number that the module dials upon an event. This number must be connected to a PC modem on a PC running the DSE Configuration Suite Software. Leave this field empty when dial-out to a PC is not required.
GSM Modem	☐ = The connected modem is a fixed line telephone 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.
Send Extended Instrumentation	☐ = The SMS message that is sent only contains information about the event. ☑ = When the module sends an SMS message for an event, it also contains information about the generator (such as oil pressure) at the time the event occurred.
Send as Flash Message	☐ = The type of SMS message that is sent is standard. ☑ = The type of SMS message that is sent is a flash message. A flash SMS is a type of message that without user action appears directly and full screen on the phone.

2.10.2.2 ADVANCED

NOTE: Connecting a modem directly to the module's RS232 for is legacy support only. When a new installation requires remote communication using the cellular network is required, refer to DSE products DSE890, DSE891 and DSEWebNet on the DSE website: www.deepseaelectronics.com.

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)

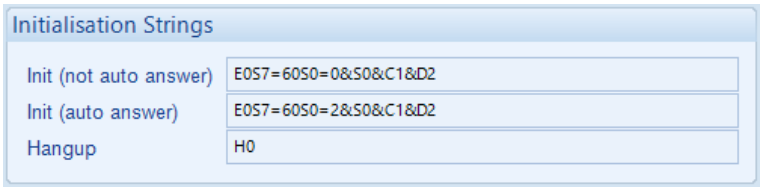
Silent Operation

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 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.

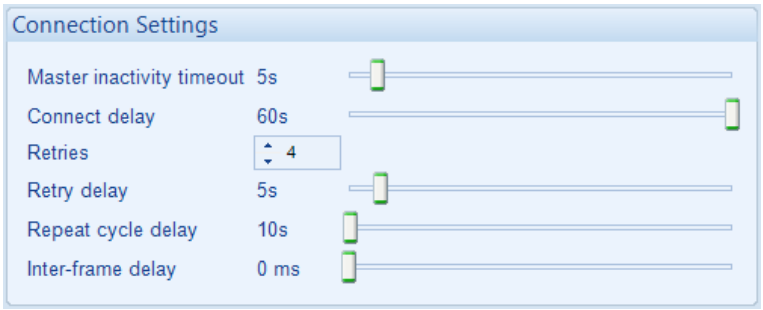


Parameter	Description
&D2 (required for Sierra / Wavecom Fastrak Supreme)	Hang up on DTR-drop
&D3 (DSE module factory settings)	Reset on DTR-drop

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.

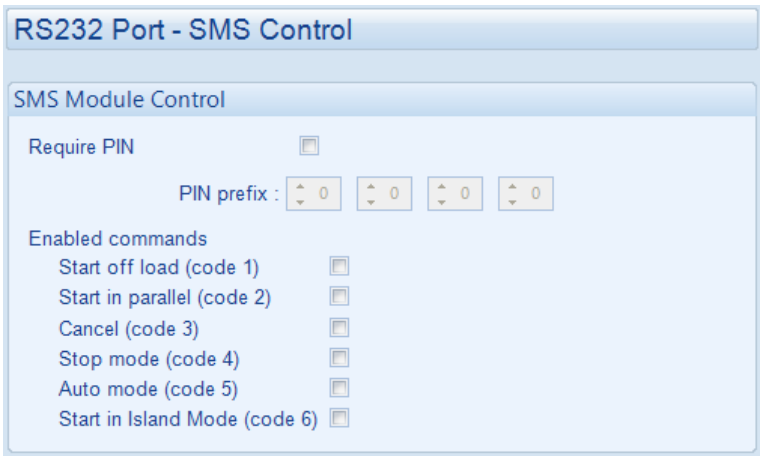
Connection Settings



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 dialling out calls to multiple *Alarm Numbers* fails.
Inter-frame Delay	Set the time delay between the DSE module receiving a MODBUS RTU request and the DSE module's response.

2.10.2.3 SMS CONTROL

NOTE: Connecting a modem directly to the module's RS232 for is legacy support only. When a new installation requires remote communication using the cellular network is required, refer to DSE products DSE890, DSE891 and DSEWebNet on the DSE website: www.deepseaelectronics.com.



Parameter	Description
Require PIN	☐ = A control code sent by SMS does not require a PIN code entered before the code. ☑ = For security, the configured *PIN Prefix* must be entered in the SMS prior to the control code.
Start Off Load (Code 1)	☐ = Sending code 1 to the module via SMS does not issue a *Start Off Load* command. ☑ = When in Auto mode, the module performs the start sequence but the engine is not instructed to take the load when code 1 is sent via SMS. This function is used where an engine only run is required e.g. for exercise.
Start in Parallel (Code 2)	☐ = Sending code 2 to the module via SMS does not issue a *Start In Parallel* command. ☑ = When in auto mode, sending code 2 to the module performs a start request and parallels the set with the mains.
Cancel (Code 3)	☐ = Sending code 3 to the module via SMS does not issue a cancel the start command issued by code 1 or 2. ☑ = Sending code 3 to the module via SMS cancels the start command issued by code 1 or 2.
Stop Mode (Code 4)	☐ = Sending code 4 to the module via SMS does not issue place the unit into its *Stop Mode*. ☑ = Sending code 4 to the module via SMS mimics the operation of the 'Stop' button and is used to provide a remote SMS stop command.
Auto Mode (Code 5)	☐ = Sending code 5 to the module via SMS does not issue place the unit into its *Auto Mode*. ☑ = Sending code 5 to the module via SMS mimics the operation of the Auto button.
Start in Island Mode (Code 6)	☐ = Sending code 6 to the module via SMS does not issue a *Start In Island Mode* command. ☑ = When in auto mode, sending code 6 to the module performs a start request and transfers the load to the generator.

2.10.2.4 TROUBLESHOOTING MODEM COMMUNICATIONS

NOTE: Connecting a modem directly to the module's RS232 for is legacy support only. When a new installation requires remote communication using the cellular network is required, refer to DSE products DSE890, DSE891 and DSEWebNet on the DSE website: www.deepseaelectronics.com.

2.10.2.4.1 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>

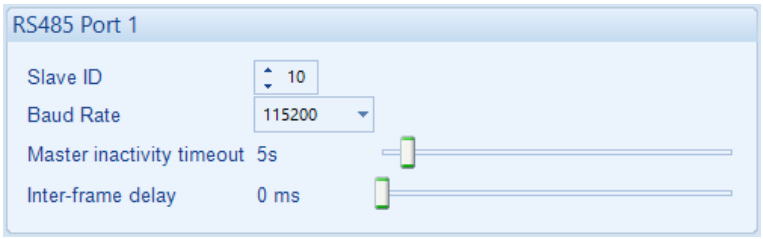
This saves the new setting in the modem. Power is now removed. The next time power is applied, the modem starts with the new settings (Baud rate = 9600), suitable to communicate with the DSE module.

2.10.2.4.2 GSM MODEM CONNECTION

Most GSM modems have a *Status* LED. The Wavecom Fastrack Supreme as recommended and previously 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 (approximately once every two seconds)	Connected to GSM network
Flashing Fast (approximately twice per second)	Connected to GSM network data transmission in progress.

2.10.3 RS485 PORTS

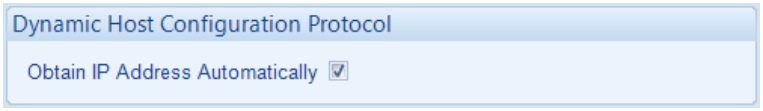


Parameter	Description
Slave ID	Select the Slave ID of the DSE module's RS485 port. Every device on the RS485 link must have an individual Slave ID.
Baud Rate	Select the Baud Rate (speed of communication) of the DSE module's RS485 port. Every device on the RS485 link must have the same Baud Rate. ***1200*** ***2400*** ***4800*** ***9600*** ***14400*** ***19200*** ***28800*** ***38400*** ***57600*** ***115200***
Master Inactivity Timeout	Set the time delay between a MODBUS RTU request and the receipt of a response. 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.
Modbus Inter-frame Delay	Set the time delay between the DSE module receiving a MODBUS RTU request and the DSE module's response.

2.10.4 ETHERNET PORT

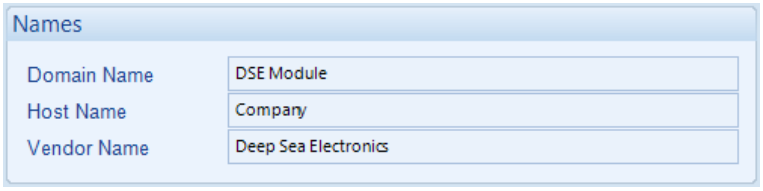
NOTE: Consult the network administrator of the host network before changing these settings.
Incorrect settings cause network errors in the existing local area network. These settings must only be changed by qualified network administrators.

Dynamic Host Configuration Protocol



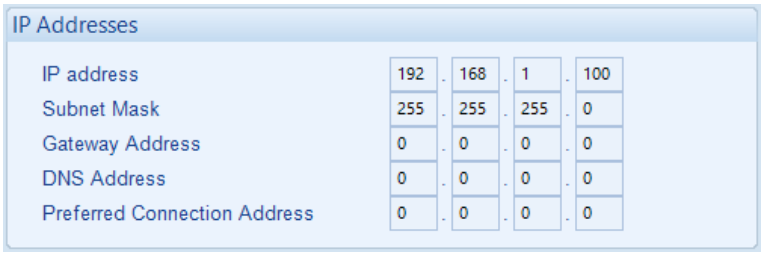
Parameter	Description
Obtain IP Address Automatically	☐ = The Dynamic Host Configuration Protocol (DHCP) is disable and the unit has a fixed IP address as configured in the *IP Address* section. ☑ = The Dynamic Host Configuration Protocol (DHCP) is enable and the unit automatically attains an IP address from the network it is connected to if it has DHCP enabled.

Names



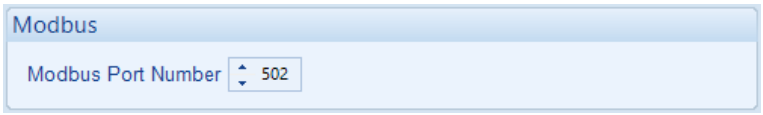
Parameter	Description
Domain Name	The hostname of the device which is used for DHCP requests and acknowledgements. Consult the network IT manager for suitable naming
Host Name	Additional description string for DHCP
Vendor Name	Additional description string for DHCP

IP Address



Parameter	Description
IP Address	The static IP address of the module.
Subnet Mask	The subnet mask is to determine whether the module is on the local subnet or on a remote network.
Gateway Address	IP address of the internet router that module is connected to.
DNS Address	IP address of the Domain Name Service (DNS). Usually this is the same as the module's IP address.
Preferred Connection Address	The module allows up to five MODBUS masters to connect to it. The *Preferred Connection Address* enables the unit to reserve one of the five connections for a specific IP address, such as for a remote display module to ensure it always connects.

MODBUS



Parameter	Description
MODBUS Port Number	The port number which the module serves MODBUS traffic on.

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.

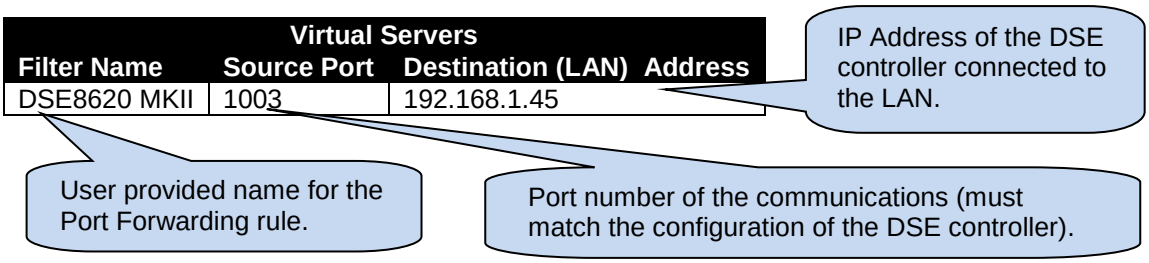
Incoming Traffic (Virtual Server)

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.

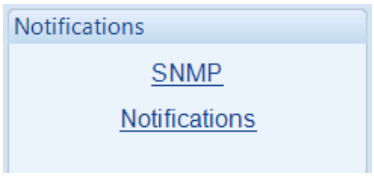
Example:



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.

2.10.5 NOTIFICATIONS

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



2.10.5.1 SNMP

NOTE: The SNMP V2c MIB file for the module is available to download from the DSE website: www.deepseaelectronics.com.

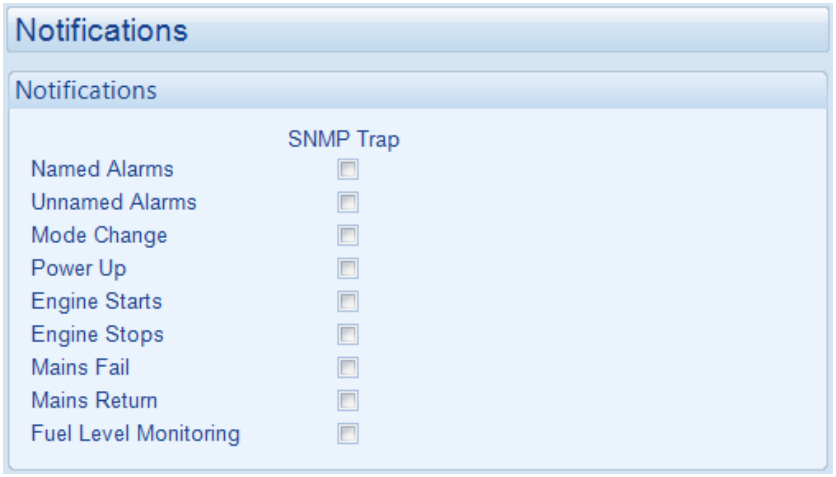
The module supports SNMP v2c with GetRequest, SetRequest, GetNextRequest, GetBulkRequest and Response. The module also allows communication up to two different SNMP managers at the same time on different IP addresses.

A fixed MIB file is available for the module for use by external SNMP managers.
The MIB file is a file used by the SNMP manager to give context to the information held within the module.

Parameter	Description
SNMP Enable	☐ = SNMP is disabled ☑ = SNMP is enabled and the 86xxMKII module communicates with the SMTP server through its Ethernet port.
Device Name	The name of the module which is attainable by SNMP requests using sysName OID contained within the standard RFC1213 MIB file.
Manager 1 Address	The static IP address of the first SNMP manager.
Manager 2 Address	The static IP address of the second SNMP manager.
Manager Port	The port number which the module serves SNMP GET, GET Next, Get Bulk, Get Subtree, Walk and SET messages.
Notification Port	The port number which the module sends SNMP TRAP messages via.
Read Community String	The SNMP *Read Community* String. (Factory setting *public*)
Write Community String	The SNMP *Write Community* String. (Factory setting *private*)

2.10.5.2 NOTIFICATIONS

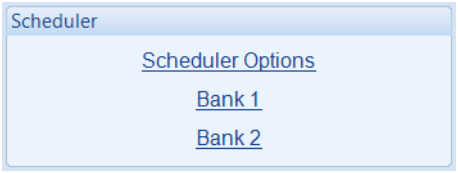
The user is able to select the types of events which are sent to the SNMP managers as SNMP TRAP messages.



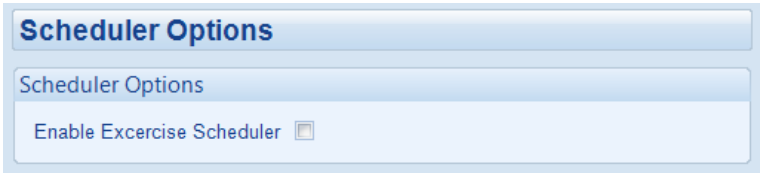
Parameter	Description
Named Alarms	☐ = No SNMP TRAPs are sent when a *Named Alarm* activates. ☑ = An SNMP TRAP is sent when a *Named Alarm* activates. A *Named Alarm* is a protection with a pre-set name, e.g. Generator Over Voltage.
Unnamed Alarms	☐ = No SNMP TRAPs are sent when an *Unnamed Alarm* activates. ☑ = An SNMP TRAP is sent when an *Unnamed Alarm* activates. An *Unnamed Alarm* is a protection with a user configured name, e.g. a digital input configured for *User Configured.*
Mode Change	☐ = No SNMP TRAPs are sent when the module changes operating mode. ☑ = An SNMP TRAP is sent to indicate the operating mode has changed and what is has changed to.
Power Up	☐ = No SNMP TRAPs are sent when the module powers up. ☑ = An SNMP TRAP is sent when the module powers up.
Engine Starts	☐ = No SNMP TRAPs are sent when the engine starts. ☑ = An SNMP TRAP is sent when the engine starts.
Engine Stops	☐ = No SNMP TRAPs are sent when the engine stops. ☑ = An SNMP TRAP is sent when the engine stops.
Mains Fail	☐ = No SNMP TRAPs are sent when the mains fails. ☑ = An SNMP TRAP is sent when the mains fails.
Mains Return	☐ = No SNMP TRAPs are sent when the mains returns. ☑ = An SNMP TRAP is sent when the mains returns.
Fuel Level Monitoring	☐ = No SNMP TRAPs are sent when a *Fuel Level Monitoring* event is logged within the module's event log. ☑ = An SNMP TRAP is sent when a *Fuel Level Monitoring* event is logged within the module's event log.

2.11 SCHEDULER

The section is subdivided into smaller sections.



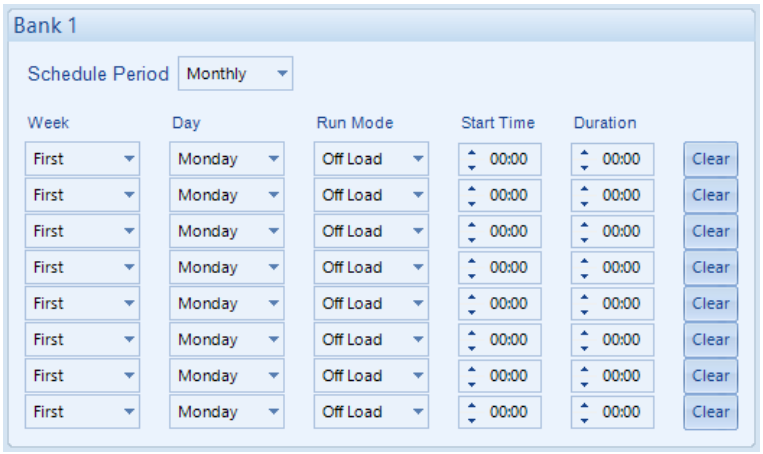
2.11.1 SCHEDULER OPTIONS



Function	Description
Enable Exercise Scheduler	☐ = The scheduler is disabled. ☑ = The scheduler is enabled, Bank 1 and Bank 2 become editable.

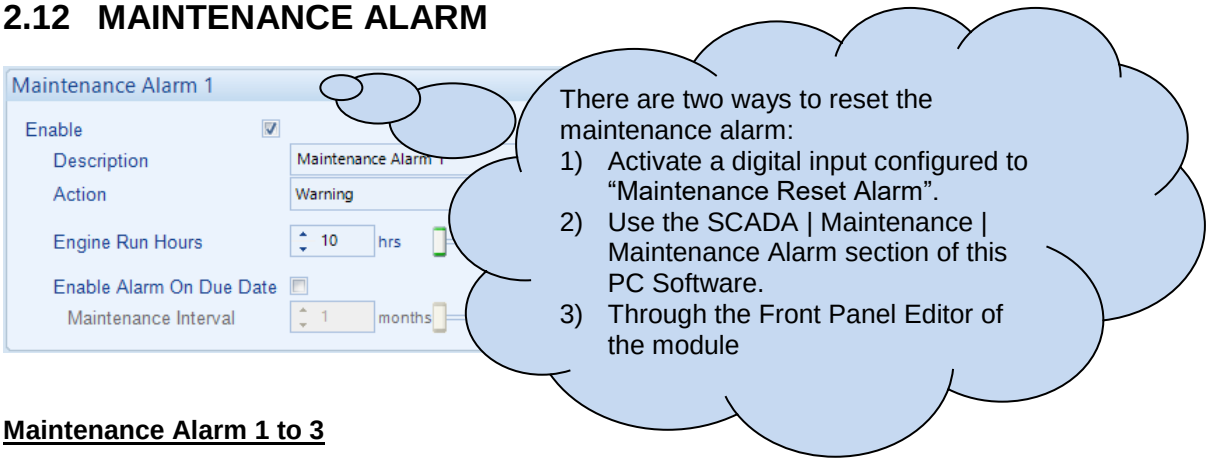
2.11.2 BANK 1 / BANK 2

Each Bank of the Exercise Scheduler is used to give up to 8 scheduled runs per bank, 16 in total. This run schedule is configurable to repeat every 7 days (weekly) or every 28 days (monthly). The run is *On Load*, *Off Load* or *Auto Start Inhibit.*
Each scheduler bank configured differently either to weekly or monthly based exercises.



Function	Description
Schedule Period	Determines the repeat interval for the scheduled run. Options available are: ***Weekly:*** The schedule events occur every week. ***Monthly:*** The schedule events occur every month on the week selected.
Week	Specifies the week of the month, on which the scheduled run takes place
Day	Specifies the day of week, on which the scheduled run takes place
Run Mode	Determines the loading state mode of the generator when running on schedule ***Auto Start Inhibit:*** The generator is prevented from running in *Auto* mode. ***Island*****:** The module runs the generator in island mode, generator breaker closed and mains breaker opened. ***Off Load:*** The module runs the generator on schedule with the load switch open ***Parallel*****:** In *Generator Mode*, the module starts the generator and closes the generator breaker to provide the configured amount of power. In *Mains Mode*, the module starts the generator and closes the generator breaker for peak lopping.
Start Time	Determines at what time of day the scheduled run starts
Duration	Determines the time duration in hours for the scheduled run
Clear	Resets the values for the Day, Start Time and Duration to defaults

2.12 MAINTENANCE ALARM



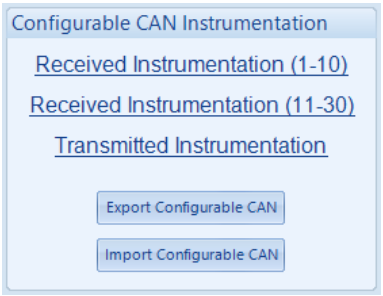
Maintenance Alarm 1 to 3

Function	Description
Enable	☐ = The maintenance alarm is disabled. ☑ = The maintenance alarm is activated with the configured *Action* when the engine hours increases more than the *Engine Run Hours* or when the date increase more than the *Maintenance Interval* settings.
Description	The text that is displayed on the module's LCD when the maintenance alarm activates.
Action	**NOTE: For details of these, see the section entitled Alarm Types elsewhere in this document.** Select the type of alarm required from the list: ***Shutdown*** ***Warning***
Engine Run Hours	The value the engine hours must increase by to trigger the maintenance alarm.
Enable Alarm on Due Date	☐ = The maintenance alarm only activates on the engine hours increasing ☑ = The maintenance alarm activates on the engine hours increasing or the date increasing, whichever occurs first.
Maintenance Interval	The value the date must increase by to trigger the maintenance alarm.

2.13 CONFIGURABLE CAN INSTRUMENTATION

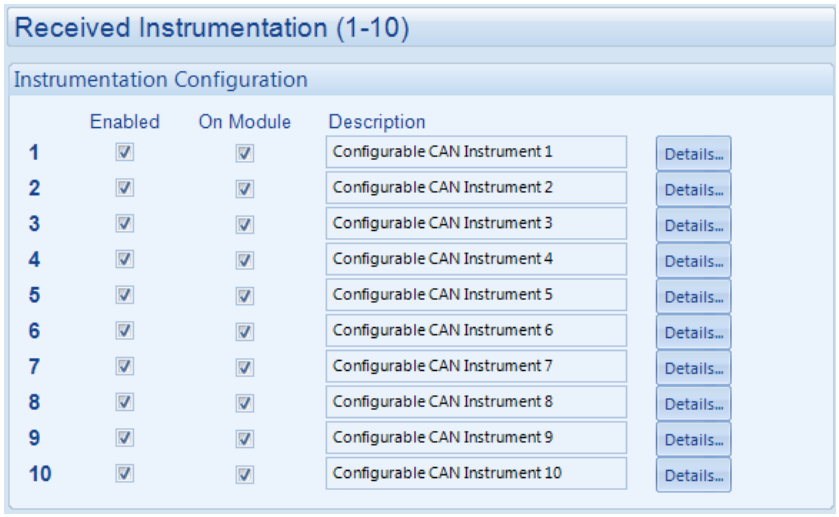
NOTE: For further details and instructions on using *Configurable CAN*, refer to DSE Publication: *056-118 PLC Configurable CAN* which is found on our website: *www.deepseaelectronics.com*

The *Configurable CAN Instrumentation* section is subdivided into smaller sections. Select the required section with the mouse.



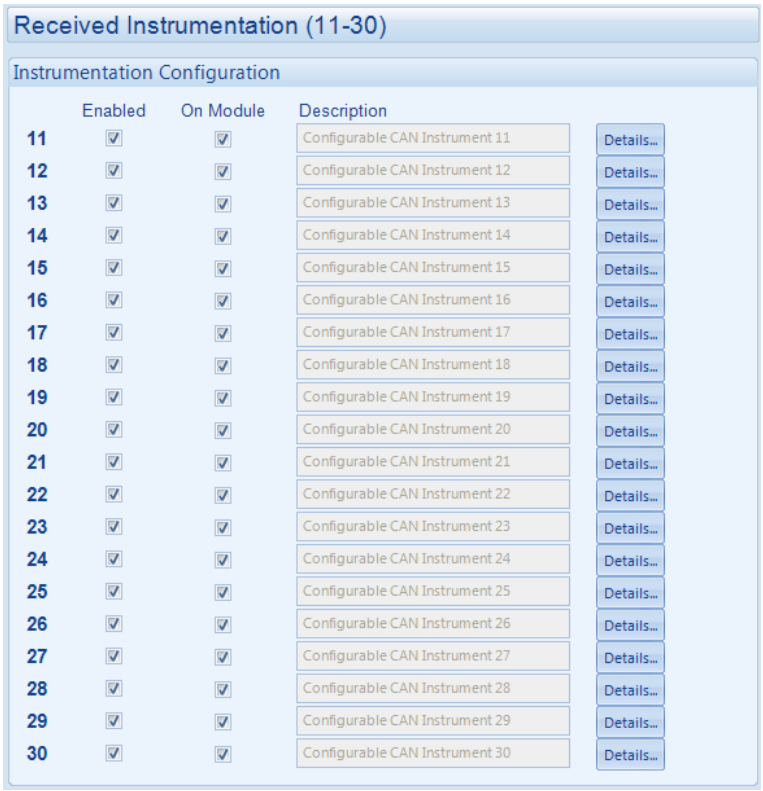
2.13.1 RECEIVED INTRUMENTATION (1-10)

This feature allows for up to ten custom engine CAN instrumentation items to be decoded from CAN messages on the connected ECU port.



Parameter	Description
Enabled	**NOTE: The CAN instrumentation must already be available on the CAN bus. There is no request for a non-standard instrumentation.** ☐ = The CAN instrumentation is disabled. ☑ = The CAN instrumentation is enabled. Reading depends upon the message availability on the bus.
On Module	**NOTE: The CAN instrumentation is always available on the SCADA, Data Logging, PLC as long as at least one CAN instrumentation is enabled. The CAN instrumentation is shown on the DSE module's display when the On Module is enabled.** ☐ = The CAN instrumentation is not displayed on the DSE module. ☑ = The CAN instrumentation is displayed on the DSE module.
Description	Provide a description for the CAN instrumentation. This description is only shown in the SCADA.
Details	Click on Details to set the *Message Decoding* CAN options.

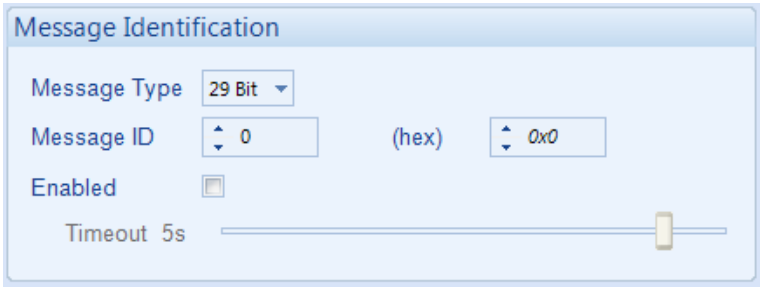
2.13.2 RECEIVED INTRUMENTATION (11-30)



Parameter	Description
Enabled	**NOTE: The CAN instrumentation must already be available on the CAN bus. There is no request for a non-standard instrumentation.** ☐ = The CAN instrumentation is disabled. ☑ = The CAN instrumentation is enabled. Reading depends upon the message availability on the bus.
On Module	**NOTE: The CAN instrumentation is always available on the SCADA Data Logging, PLC as long as at least one CAN instrumentation is enabled. The CAN instrumentation is shown on the DSE module's display when the On Module is enabled.** ☐ = The CAN instrumentation is not displayed on the DSE module. ☑ = The CAN instrumentation is displayed on the DSE module.
Description	Provide a description for the CAN instrumentation. This description is only shown in the SCADA.
Details	Click on Details to set the *Message Decoding* CAN options.

2.13.2.1 DETAILS

Message Identification



Parameter	Description
Message Type	Select the required message type: ***11 Bit:*** message identifier for standard CAN ***29 Bit:*** message identifier for extended CAN
Message ID	CAN message ID
Enabled	☐ = Timeout is disabled ☑ = Timeout is enabled
Timeout	It indicates how often the messages are expected to be seen on the CAN bus. If no new instrumentation is seen beyond the timeout period, the calculated instrumentation value changes to a 'bad data' sentinel value.

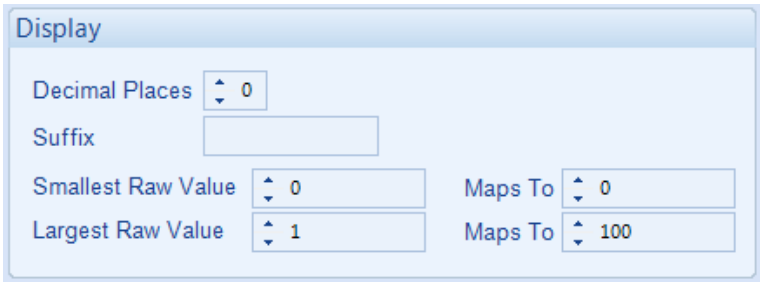
Data Structure

Parameter	Description
Byte Order	Select the *Byte Order* ***Big Endian:*** the bytes on the bus are sent from the Most Significant Byte to the Least Significant Byte. ***Little Endian:*** the bytes on the bus are sent from the Least Significant Byte to the Most Significant Byte.
Offset Byte	Set the start position Byte
Offset Bit	Set the start position Bit
Length (Bits)	Data length 1-32 bits
Signed Value	☐ = Unsigned value ☑ = Signed value

Parameter descriptions are continued overleaf…

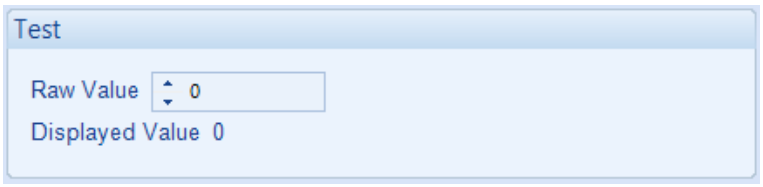
Display

NOTE: If the received CAN instrument is outside the configured raw values, the module displays sentinel value.



Parameter	Description
Decimal Places	Display the decimal point. 0 represents 0 scaling factor, 1 represents 0.1 scaling factor, -1 represents 10 multiplier.
Suffix	Unit display (example: m^3/hr)
Smallest Raw Value	The smallest data sent over the CAN bus before the transformations (decimal places).
Maps To	The output format after all transformations including decimal point shift) as to be shown on the module screen, or SCADA, in data log file, etc.
Largest Raw Value	The largest data sent over the CAN bus before the transformations (decimal places).
Maps To	The output format after all transformations including decimal point shift) as to be shown on the module screen, or SCADA, in data log file, etc.

Test



Parameter	Description
Test Raw Value	**NOTE: The Test Raw Value is not saved in the configuration, this is only to check the displayed value.** This is a test case to check the representation of the *Raw Value* when they are complicated. *Test Raw Value* is the value read from the CAN bus before the transformation
Displayed Value	The *Test Raw Values's* represented value as to be shown on the DSE module's screen, or in the Scada.

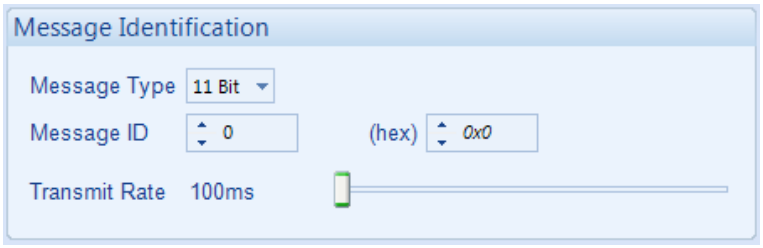
2.13.3 TRANSMITTED INSTRUMENTATION

The module allows transmitting up to ten instruments over the CANbus on the ECU port by specifying the source address (message ID) of the selected Instrument.

Parameter	Description
Enabled	☐ = The Transmit CAN instrumentation is disabled. ☑ = The Transmit CAN instrumentation is enabled.
Source	Select the instrument to be created over the CAN.
Details	Click on Details to set the *Message Encoding* CAN options.

2.13.3.1 DETAILS

Message Identification



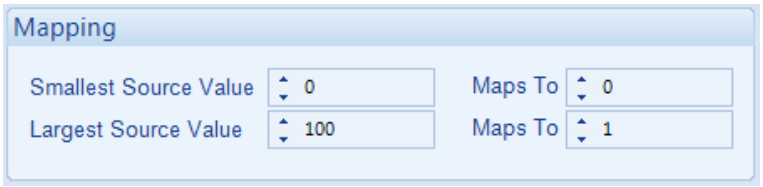
Parameter	Description
Message Type	Select the required message type to transmit: ***11 Bit:*** message identifier for standard CAN ***29 Bit:*** message identifier for externded CAN
Message ID	CAN message ID
Transmit Rate	The rate at which the *CAN Instrument* is transmitted over the CANbus.

Parameter descriptions are continued overleaf…

Data Structure

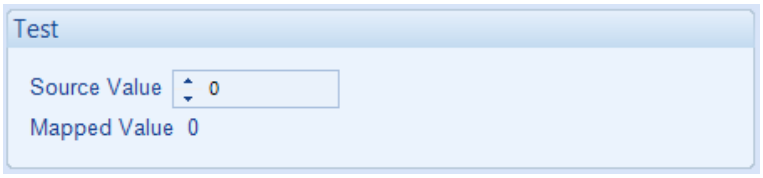
Parameter	Description
Byte Order	Select the *Byte Order* ***Big Endian:*** the bytes on the bus are sent from the Most Significant Byte to the Least Significant Byte. ***Little Endian:*** the bytes on the bus are sent from the Least Significant Byte to the Most Significant Byte.
Offset Byte	Set the start position Byte
Offset Bit	Set the start position Bit
Length (Bits)	Data length 1-32 bits
Signed Value	☐ = Transmit unsigned value ☑ = Transmit signed value

Mapping



Parameter	Description
Smallest Source Value	The smallest instrument value before being sent over the CAN bus.
Maps To	The transmitted format for the *Smallest Source Value*.
Largest Source Value	The largest instrument value before being sent over the CAN bus.
Maps To	The transmitted format for the *Largest Source Value*.

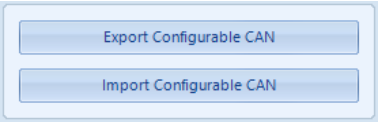
Test



Parameter	Description
Source Value	**NOTE: The Source Value is not transmitted over the CANbus, this is only to check the encoded value.** This is a test case to check the representation of the *Source Value* when they are complicated. *Source Value* is the instrument value before being encoded.
Mapped Value	The *Mapped Value* represents the transmitted *Source value*.

2.13.4 EXPORT / IMPORT CONFIGURABLE CAN

This feature is used to import the *Configurable CAN Instrumentation* settings into another DSE module.



Parameter	Description
Export	This allows the configuration settings of all Configurable CAN Instrumentation (Received & Transmitted) into one XML file.
Import	This allows to import an existing configuration settings of all Configurable CAN Instrumentation saved in XML format.

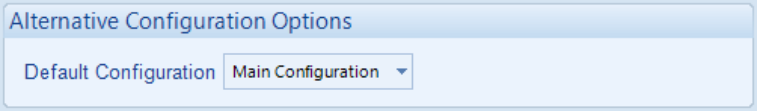
2.14 ALTERNATIVE CONFIGURATIONS

An Alternative Configurations are provided to allow the system designer to cater for different AC requirements utilising the same generator system. Typically this feature is used by Rental Set Manufacturers where the set is capable of being operated at (for instance) 120 V 50 Hz and 240V 50 Hz using a selector switch.

The Alternative Configuration is selected using either:

- Configuration Suite Software (Selection for ‘Default Configuration’)
- Module Front Panel Editor
- Via external signal to the module input configured to “Alternative Configuration” select.

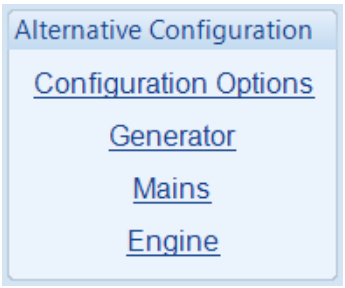
2.14.1 ALTERNATIVE CONFIGURATION OPTIONS



Parameter	Description
Default Configuration	Select the ‘default’ configuration that is used when there is no instruction to use an ‘alternative configuration’.

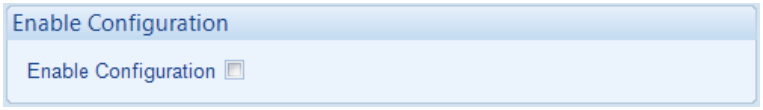
2.14.2 ALTERNATIVE CONFIGURATION 1 TO 3

The Alternative Configurations Editor allows for editing of the parameters that are to be changed when an Alternative Configuration is selected.



2.14.2.1 CONFIGURATION OPTIONS

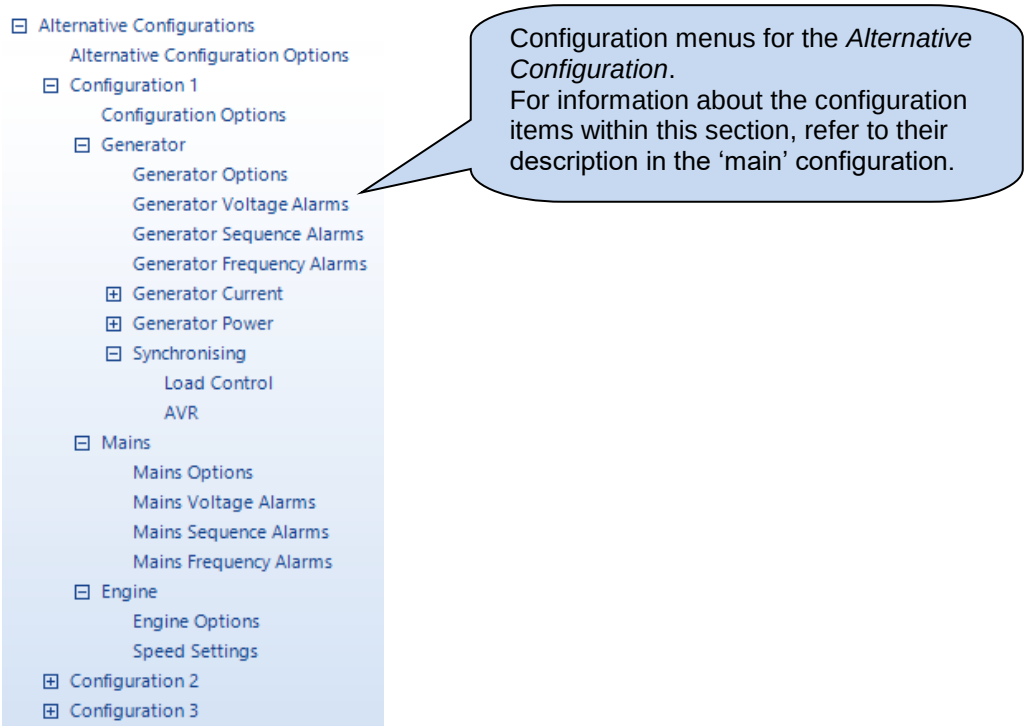
Enable Alternative Configuration



Parameter	Description
Enable Configuration	☐ = *Alternative Configuration* is disabled. ☑ = Alternative Configuration is enabled. The configuration is enabled by changing the *Default Configuration,* activating a digital input or through the module's *Front Panel Editor*.

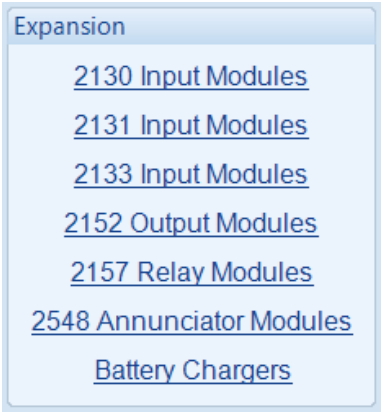
2.14.2.2 GENERATOR / MAINS / ENGINE

Alternative configuration options contain a subset of the main configuration. The adjustable parameters are not discussed here as they are identical to the main configuration options :



2.15 EXPANSION

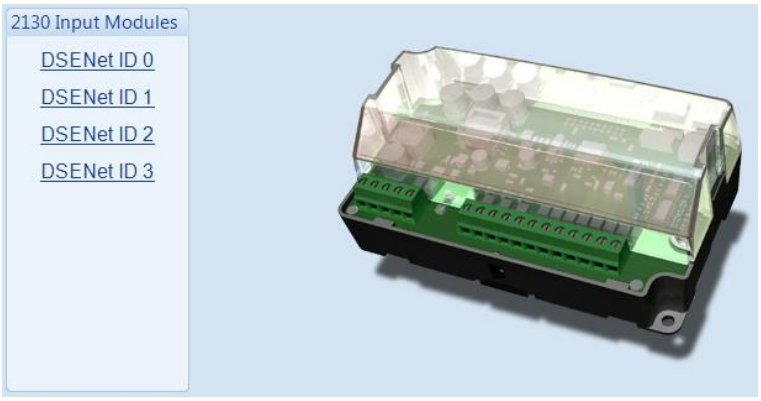
The *Expansion* page is subdivided into smaller sections.
Select the required section with the mouse.



See overleaf for description of the different expansion modules.

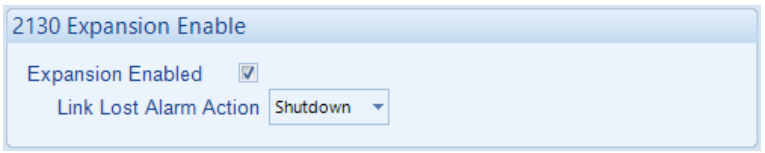
2.15.1 DSE2130 INPUT MODULES

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



The following options are then shown:

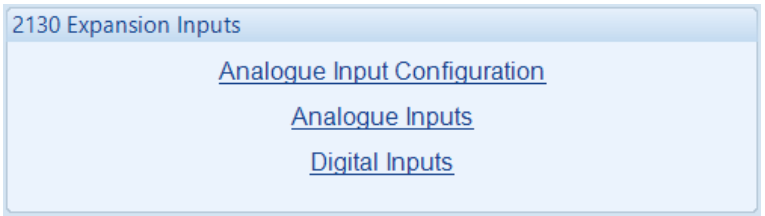
2130 Expansion Enable



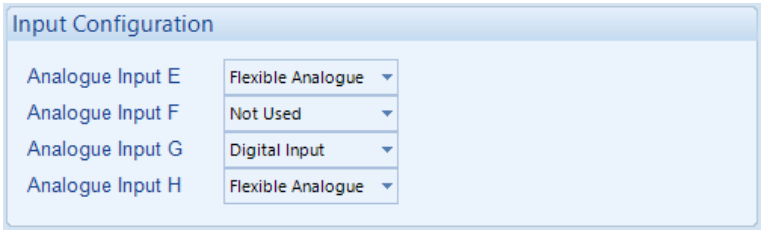
Parameter	Description
Expansion Enabled	☐ = The expansion module with the selected ID is not enabled. ☑ = The expansion module with the selected ID is enabled. If the expansion module is not connected / detected by the module, the module generates an *Exp. Unit Failure* alarm with the configured *Link Lost Alarm Action* severity.

2130 Expansion Inputs

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



2.15.1.1 ANALOGUE INPUT CONFIGURATION



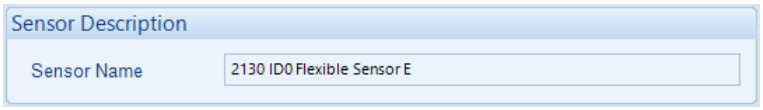
Input Configuration

Parameter	Description
Analogue Input E to H	Select what the analogue input is to be used for: ***Not Used:*** The analogue input is disabled ***Digital Input:*** Configured on the 2130/Digital Inputs pages ***Flexible Analogue:*** Configured on the *2130/Analogue Inputs* pages

2.15.1.2 ANALOGUE INPUTS

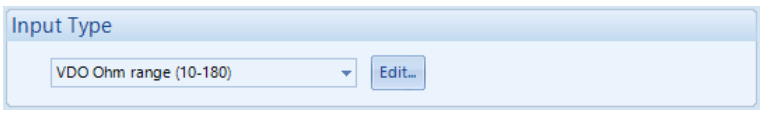
NOTE: An analogue input is only configurable as a flexible sensor if it has been configured as Flexible Analogue, refer to section entitled *Analogue Input Configuration* elsewhere in this document for further details.

Sensor Description



Parameter	Description
Sensor Name	Enter the *Sensor Name*, this text is shown on the module display when viewing the instrument.

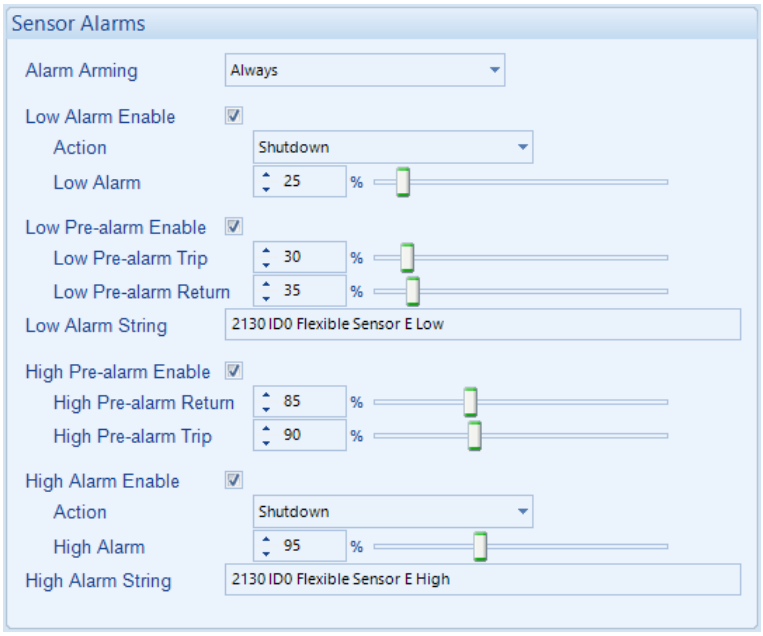
Input Type



Parameter	Description
Input Type	Select the sensor type and curve from a pre-defined list or create a user-defined curve. Available sensor types: ***Resistive:*** for sensors with maximum range of 0 Ω to 480 Ω Available parameters to be measured: ***Pressure:*** The input is configured as a pressure sensor ***Percentage:*** The input is configured as a percentage sensor ***Temperature:*** The input is configured as a temperature sensor

Parameter descriptions are continued overleaf…

Sensor Alarms



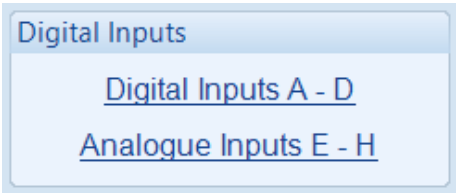
Parameter	Description
Alarm Arming	**NOTE: For details of these, see the section entitled *Alarm Arming* elsewhere in this document.** Select when the alarm generated by the analogue input becomes active: ***Always*** ***From Safety On*** ***From Starting***
Low Alarm Enable	☐ = The Alarm is disabled. ☑ = The *Low Alarm* activates when the measured quantity drops below the *Low Alarm* setting.
Low Alarm Action	**NOTE: For details of these, see the section entitled *Alarm Types* elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Shutdown***
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 Trip* setting. The *Low Pre-Alarm* is automatically reset when the measured quantity rises above the configured *Low Pre-Alarm Return* level.
Low Alarm String	The text that is displayed on the module's LCD when the *Low Alarm* or *Low Pre-Alarm* activates.

Parameter descriptions are continued overleaf…

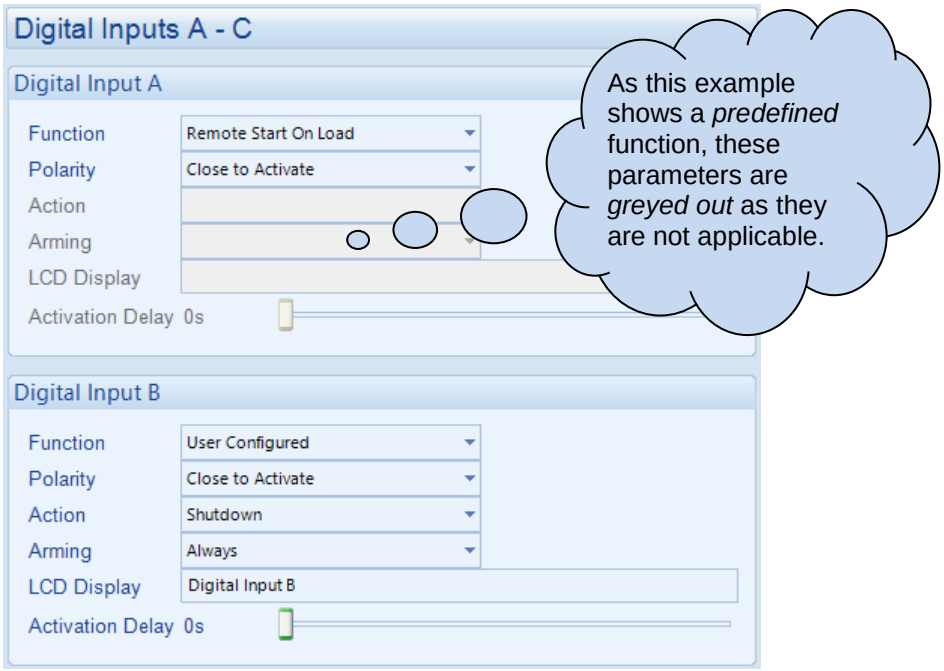
Parameter	Description
High Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☑ = The *High Pre-Alarm* is active when the measured quantity rises above the *High Pre-Alarm Trip* setting. The *High Pre-Alarm* is automatically reset when the measured quantity falls below the configured *High Pre-Alarm Return* 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 Action	**NOTE: For details of these, see the section entitled *Alarm Types* elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Shutdown***
High Alarm String	The text that is displayed on the module's LCD when the *High Alarm* or *High Pre-Alarm* activates.

2.15.1.3 DIGITAL INPUTS

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



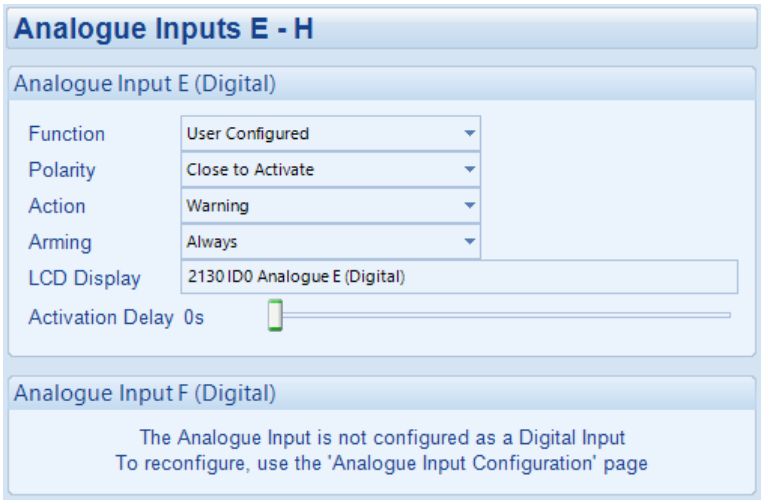
2.15.1.3.1 DIGITAL INPUTS



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	**NOTE: For details of these, see the section entitled *Alarm Types* elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning***
Arming	**NOTE: For details of these, see the section entitled *Alarm Arming* elsewhere in this document.** Select when the input becomes active: ***Active from Parallel*** ***Always*** ***From Safety On*** ***From Starting*** ***Never***
LCD Display	The text that is displayed on the module's LCD when the input activates and generates an alarm.
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.

2.15.1.3.2 ANALOGUE INPUTS

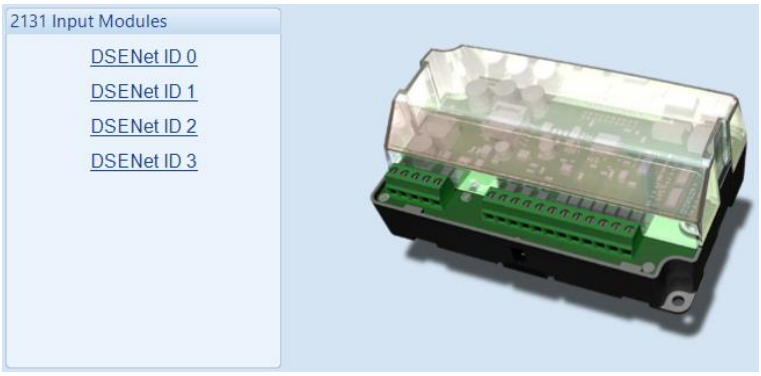
NOTE: An analogue input is only configurable as a digital input if it has been configured as Digital Input, refer to section entitled *Analogue Input Configuration* elsewhere in this document for further details.



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	**NOTE: For details of these, see the section entitled *Alarm Types* elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning***
Arming	**NOTE: For details of these, see the section entitled *Alarm Arming* elsewhere in this document.** Select when the input becomes active: ***Active from Parallel*** ***Always*** ***From Safety On*** ***From Starting*** ***Never***
LCD Display	The text that is displayed on the module's LCD when the input activates and generates an alarm.
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.

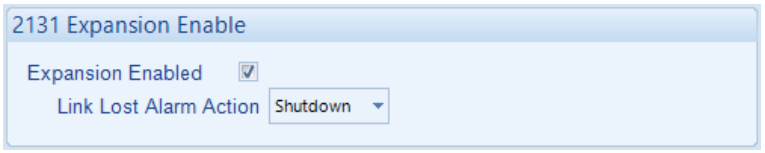
2.15.2 DSE2131 INPUT MODULES

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



The following options are then shown:

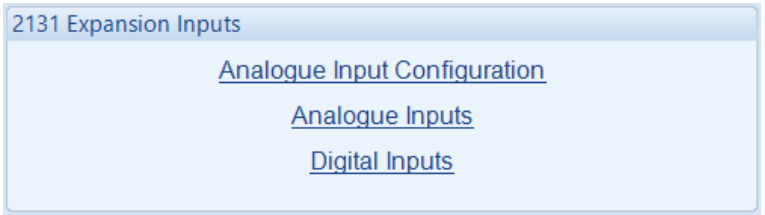
2131 Expansion Enable



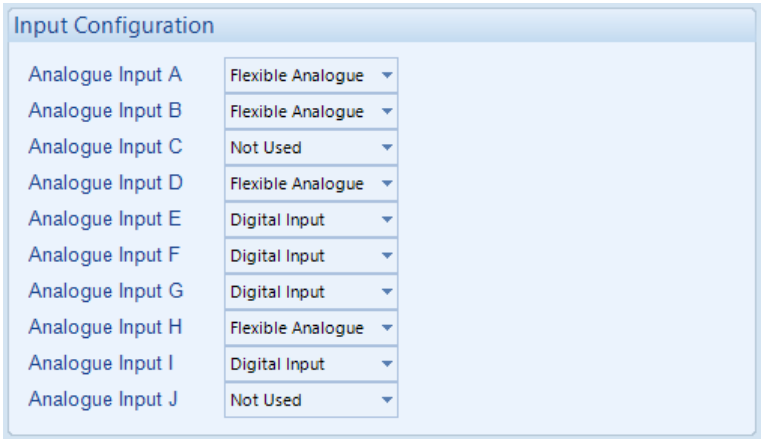
Parameter	Description
Expansion Enabled	☐ = The expansion module with the selected ID is not enabled. ☑ = The expansion module with the selected ID is enabled. If the expansion module is not connected / detected by the module, the module generates an *Exp. Unit Failure* alarm with the configured *Link Lost Alarm Action* severity.

2131 Expansion Inputs

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



2.15.2.1 ANALOGUE INPUT CONFIGURATION



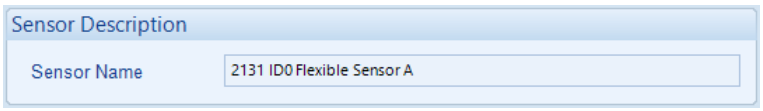
Input Configuration

Parameter	Description
Analogue Input A to J	Select what the analogue input is to be used for: ***Not Used:*** The analogue input is disabled ***Digital Input:*** Configured on the *2131/Digital Inputs* pages ***Flexible Analogue:*** Configured on the *2131/Analogue Inputs* pages

2.15.2.2 ANALOGUE INPUTS

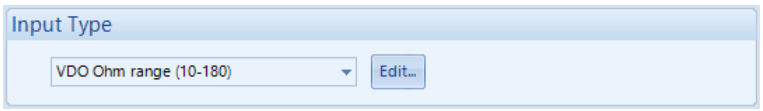
NOTE: An analogue input is only configurable as a flexible sensor if it has been configured as Flexible Analogue, refer to section entitled *Analogue Input Configuration* elsewhere in this document for further details.

Sensor Description



Parameter	Description
Sensor Name	Enter the *Sensor Name*, this text is shown on the module display when viewing the instrument.

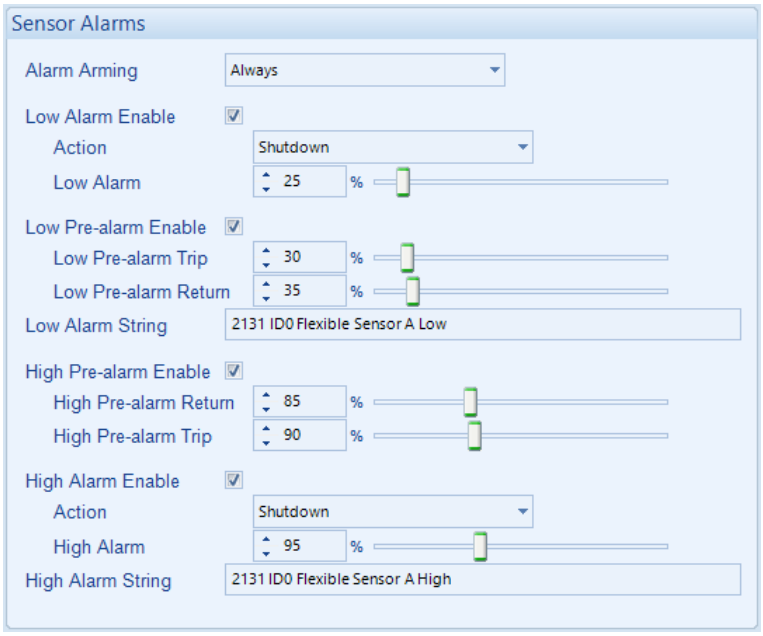
Input Type



Parameter	Description
Input Type	Select the sensor type and curve from a pre-defined list or create a user-defined curve. Available sensor types: ***Current:*** for sensors with maximum range of 0 mA to 20 mA ***Resistive:*** for sensors with maximum range of 0 Ω to 1920 Ω ***Voltage:*** for sensors with maximum range of 0 V to 10 V Available parameters to be measured: ***Pressure:*** The input is configured as a pressure sensor ***Percentage:*** The input is configured as a percentage sensor ***Temperature:*** The input is configured as a temperature sensor

Parameter descriptions are continued overleaf…

Sensor Alarms



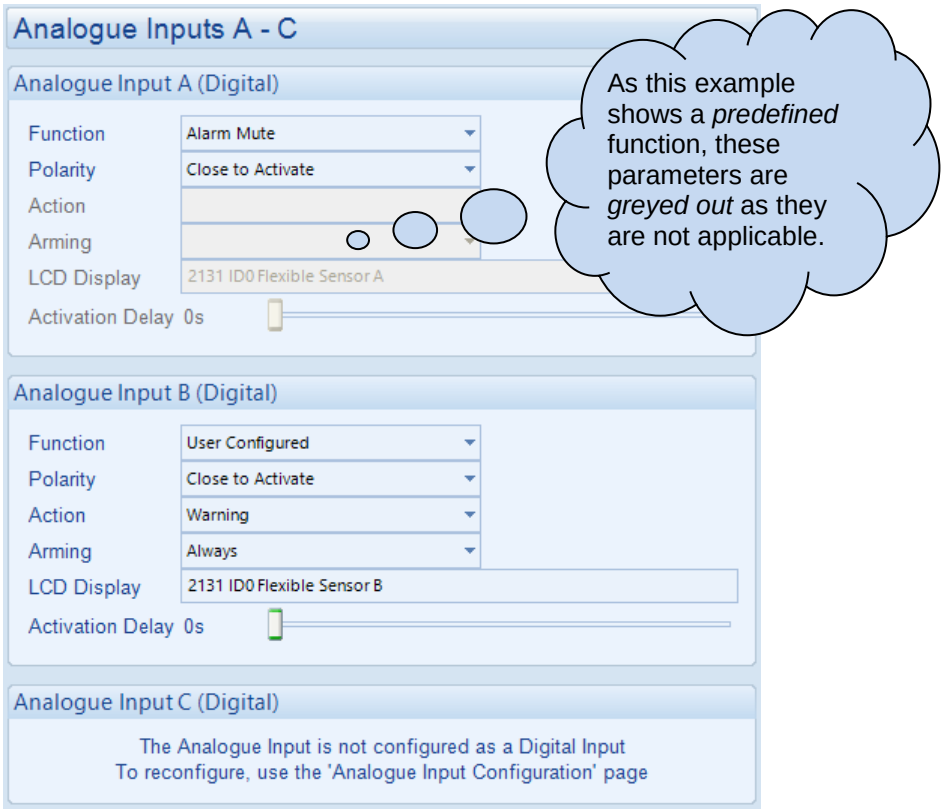
Parameter	Description
Alarm Arming	**NOTE: For details of these, see the section entitled *Alarm Arming* elsewhere in this document.** Select when the alarm generated by the analogue input becomes active: ***Always*** ***From Safety On*** ***From Starting***
Low Alarm Enable	☐ = The Alarm is disabled. ☑ = The *Low Alarm* activates when the measured quantity drops below the *Low Alarm* setting.
Low Alarm Action	**NOTE: For details of these, see the section entitled *Alarm Types* elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Shutdown***
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 Trip* setting. The *Low Pre-Alarm* is automatically reset when the measured quantity rises above the configured *Low Pre-Alarm Return* level.
Low Alarm String	The text that is displayed on the module's LCD when the *Low Alarm* or *Low Pre-Alarm* activates.

Parameter descriptions are continued overleaf…

Parameter	Description
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 Trip* 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 Action	**NOTE: For details of these, see the section entitled *Alarm Types* elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Shutdown***
High Alarm String	The text that is displayed on the module's LCD when the *High Alarm* or *High Pre-Alarm* activates.

2.15.2.3 DIGITAL INPUTS

NOTE: An analogue input is only configurable as a digital input if it has been configured as Digital Input, refer to section entitled *Analogue Input Configuration* elsewhere in this document for further details.

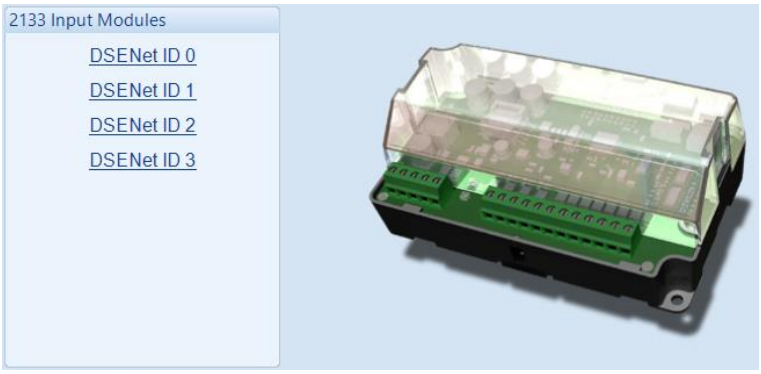


Parameter descriptions are overleaf…

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	**NOTE: For details of these, see the section entitled *Alarm Types* elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Indication*** ***Shutdown*** ***Warning***
Arming	**NOTE: For details of these, see the section entitled *Alarm Arming* elsewhere in this document.** Select when the input becomes active: ***Active from Parallel*** ***Always*** ***From Safety On*** ***From Starting*** ***Never***
LCD Display	The text that is displayed on the module's LCD when the input activates and generates an alarm.
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.

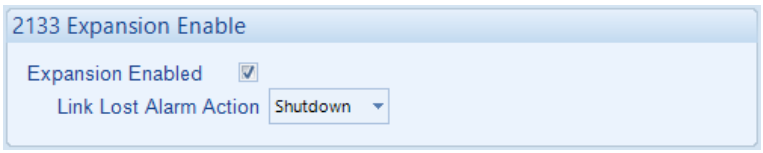
2.15.3 DSE2133 INPUT MODULES

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



The following options are then shown:

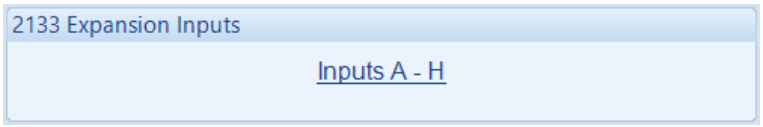
2133 Expansion Enable



Parameter	Description
Expansion Enabled	☐ = The expansion module with the selected ID is not enabled. ☑ = The expansion module with the selected ID is enabled. If the expansion module is not connected / detected by the module, the module generates an *Exp. Unit Failure* alarm with the configured *Link Lost Alarm Action* severity.

2133 Expansion Inputs

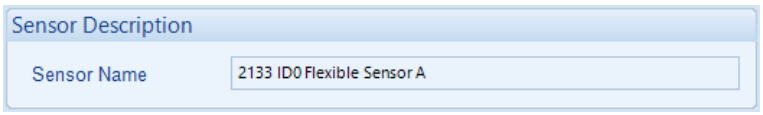
The *Expansion Unit* page is then subdivided into smaller sections.
Select the required section with the mouse.



2.15.3.1 ANALOGUE INPUTS

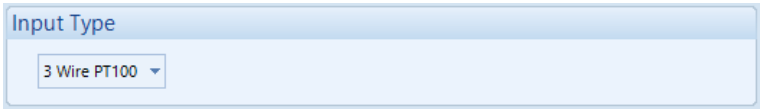
NOTE: An analogue input is only configurable as a flexible sensor if it has been configured as Flexible Analogue, refer to section entitled *Analogue Input Configuration* elsewhere in this document for further details.

Sensor Description



Parameter	Description
Sensor Name	Enter the *Sensor Name*, this text is shown on the module display when viewing the instrument.

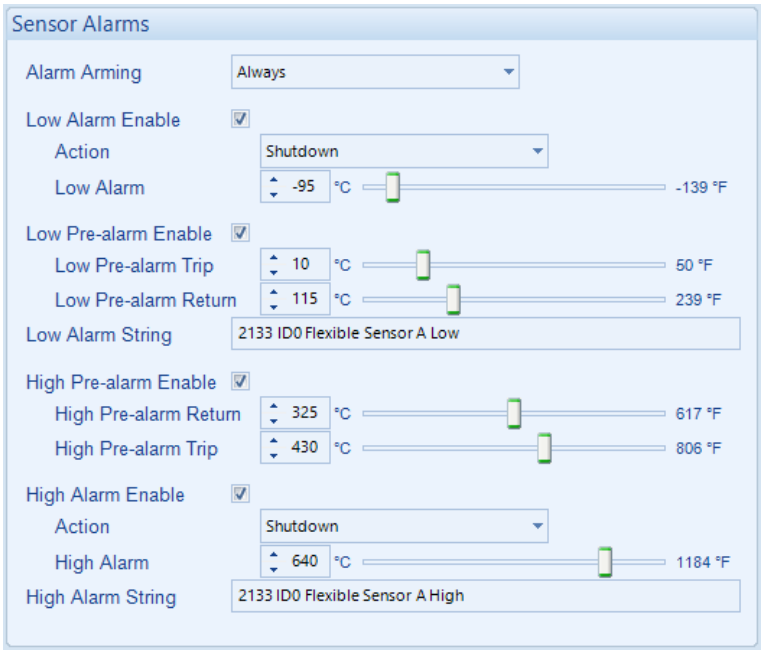
Input Type



Parameter	Description
Input Type	Select the sensor type from the pre-defined list: ***2 Wire PT100*** ***3 Wire PT100*** ***Type J (Thermocouple)*** ***Type K (Thermocouple)***

Parameter descriptions are continued overleaf…

Sensor Alarms



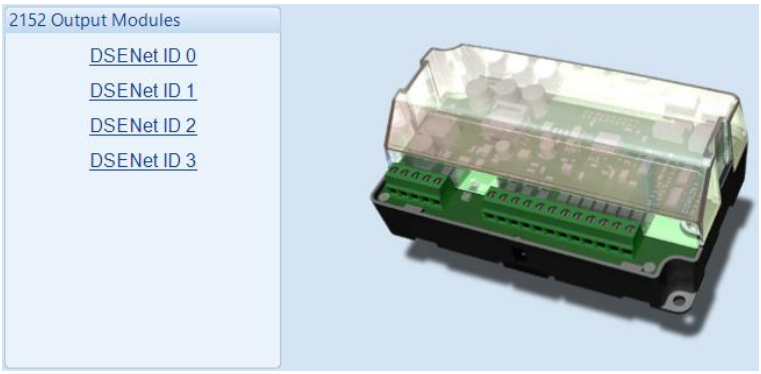
Parameter	Description
Alarm Arming	**NOTE: For details of these, see the section entitled *Alarm Arming* elsewhere in this document.** Select when the alarm generated by the analogue input becomes active: ***Always*** ***From Safety On*** ***From Starting***
Low Alarm Enable	☐ = The Alarm is disabled. ☑ = The *Low Alarm* activates when the measured quantity drops below the *Low Alarm* setting.
Low Alarm Action	**NOTE: For details of these, see the section entitled *Alarm Types* elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Shutdown***
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 Trip* setting. The *Low Pre-Alarm* is automatically reset when the measured quantity rises above the configured *Low Pre-Alarm Return* level.
Low Alarm String	The text that is displayed on the module's LCD when the *Low Alarm* or *Low Pre-Alarm* activates.

Parameter descriptions are continued overleaf…

Parameter	Description
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 Trip* 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 Action	**NOTE: For details of these, see the section entitled *Alarm Types* elsewhere in this document.** Select the type of alarm required from the list: ***Electrical Trip*** ***Shutdown***
High Alarm String	The text that is displayed on the module's LCD when the *High Alarm* or *High Pre-Alarm* activates.

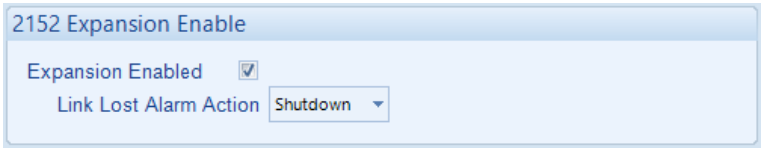
2.15.4 DSE2152 OUTPUT MODULES

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



The following options are then shown:

2152 Expansion Enable

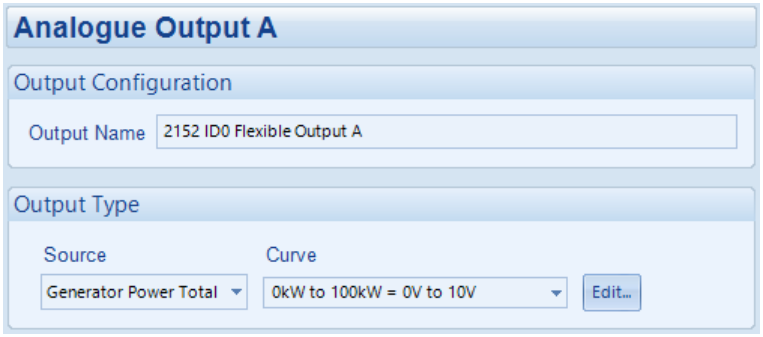


Parameter	Description
Expansion Enabled	☐ = The expansion module with the selected ID is not enabled. ☑ = The expansion module with the selected ID is enabled. If the expansion module is not connected / detected by the module, the module generates an *Exp. Unit Failure* alarm with the configured *Link Lost Alarm Action* severity.

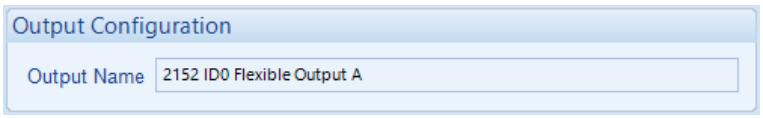
2152 Expansion Outputs

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

2.15.4.1 ANALOGUE OUTPUTS

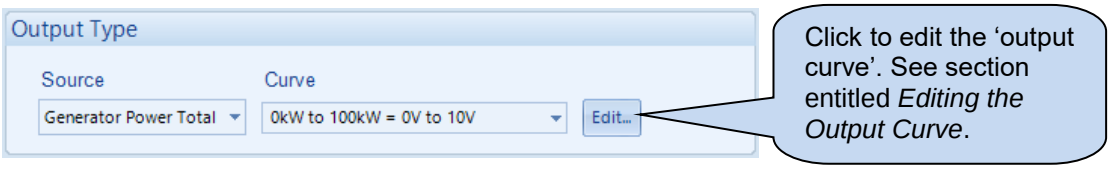


Output Configuration



Parameter	Description
Output Name	Enter the *Output Name*, this text is shown on in the SCADA section when viewing the output.

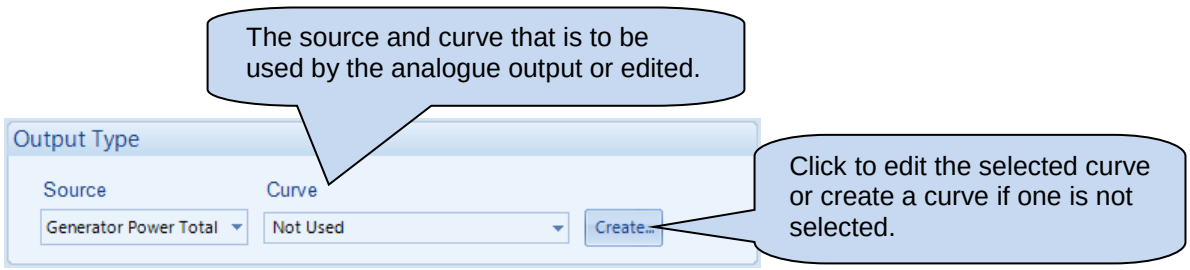
Output Type



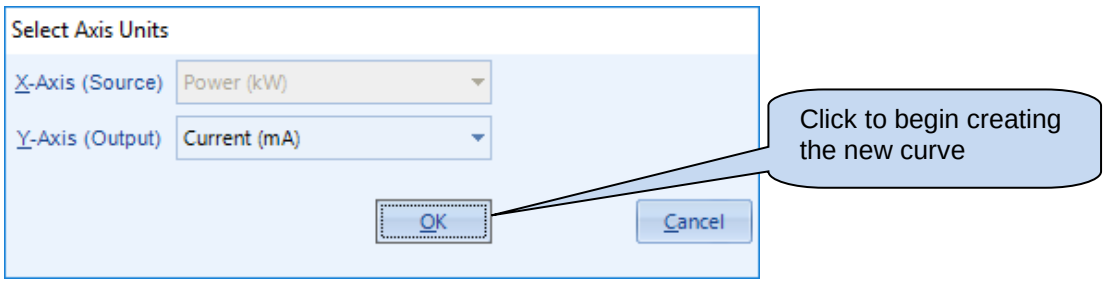
Parameter	Description
Source	Select the parameter that is to be mapped to the analogue output.
Curve	Select the output type and curve from a pre-defined list or create a user-defined curve ***Current:*** for sensors with maximum range of 0 mA to 20 mA ***Voltage:*** for sensors with maximum range of 0 V to 10 V

2.15.4.2 CREATING / EDITING THE OUTPUT CURVE

While the *DSE Configuration Suite* holds specifications for the most used output ranges, occasionally it is required that the expansion module's output be connected to a none standard device. To aid this process, a curve editor is provided.

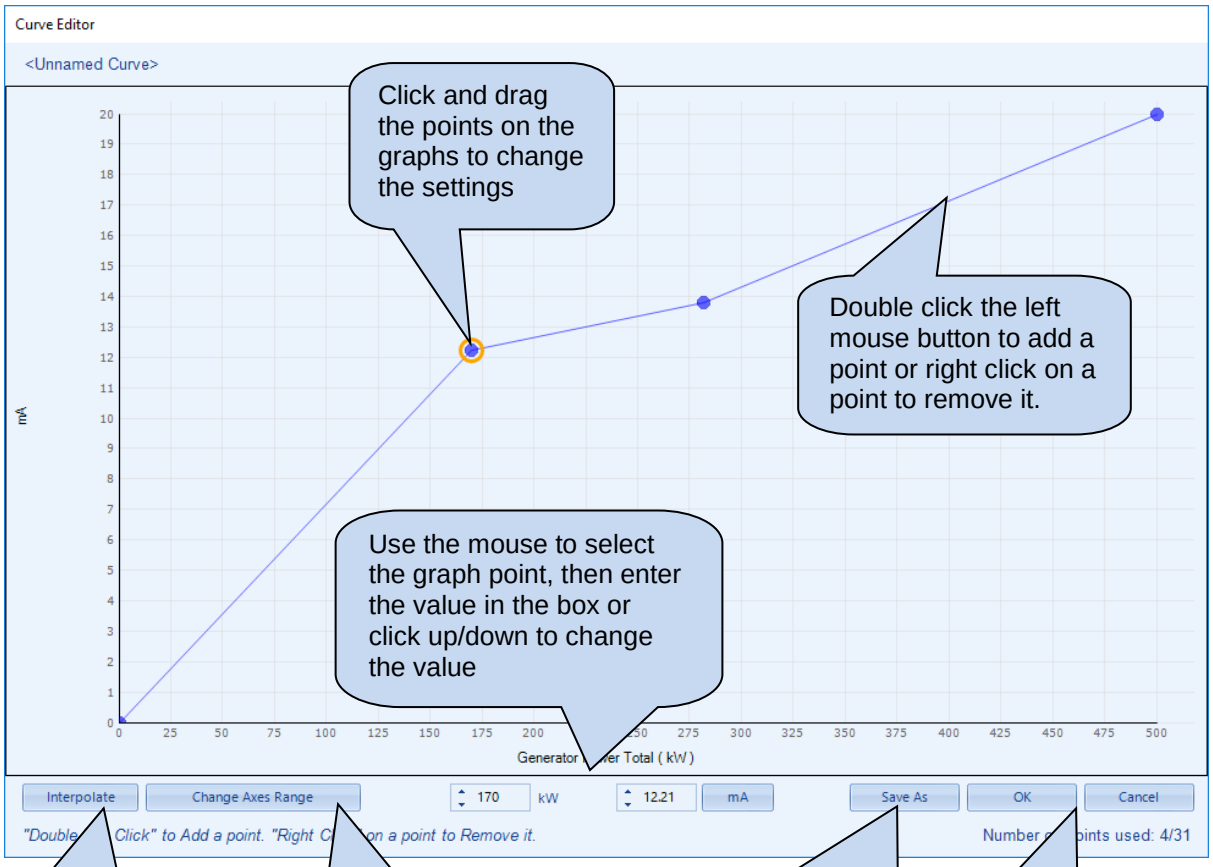


When creating a new sensor curve the measurement quantity and measured parameter are required.



Parameter	Description
Y-Axis (Source)	The parameter measured by the DSE module that is to be mapped to the output.
X-Axis (Output)	Select the electrical quantity that the sensor outputs. ***Current (mA):*** For an output current within a range 0 mA to 20 mA ***Voltage (Volt):*** For an output voltage within a range of 0 V to 10 V

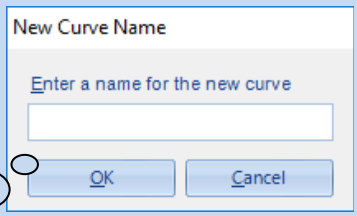
Curve creation / editor descriptions are continued overleaf…



Click *Interpolate* then select two points as prompted to draw a straight line between them.

Click to change the range of the X and Y Axes of the graph and the level of open circuit detection

Click SAVE AS, a prompt to name the curve…



Click OK to save the curve.

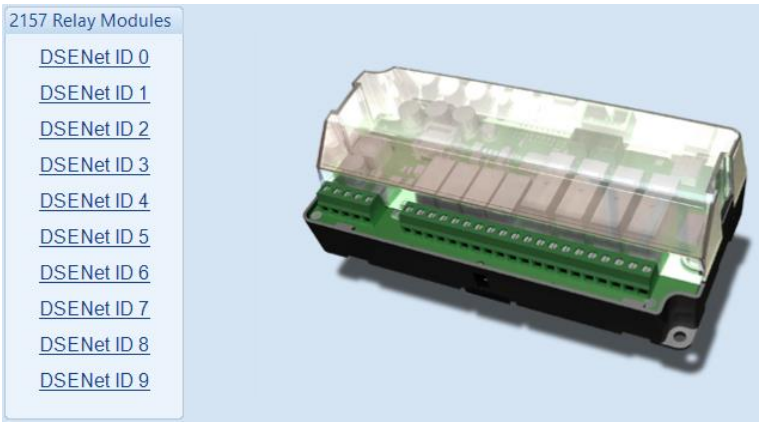
Any saved curves become selectable in the *Output Type* selection list.

Click OK to accept the changes or CANCEL to ignore and lose the changes.

Hint: Deleting, renaming or editing custom curves that have been added is performed in the main menu, select *Tools* | *Curve Manager*.

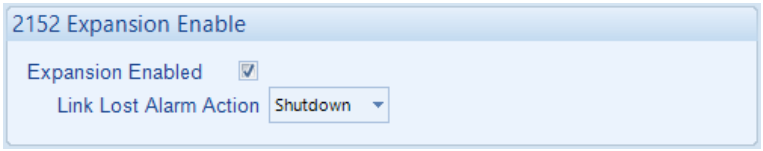
2.15.5 DSE2157 RELAY MODULES

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



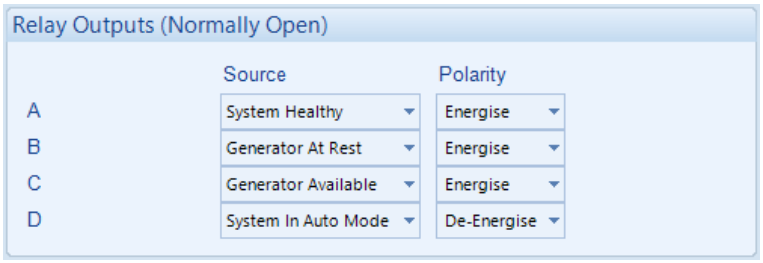
The following options are then shown:

2152 Expansion Enable



Parameter	Description
Expansion Enabled	☐ = The expansion module with the selected ID is not enabled. ☑ = The expansion module with the selected ID is enabled. If the expansion module is not connected / detected by the module, the module generates an *Exp. Unit Failure* alarm with the configured *Link Lost Alarm Action* severity.

Relay Outputs (Normally Open / Changeover)



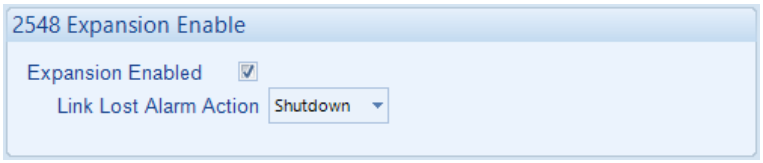
Parameter	Description
Source	Select the output source to control the state of the output See section entitled *Output Sources* for details of all available functions
Polarity	Select the digital input polarity: ***Energise:*** When the output source is true, the output activates. ***De-Energise:*** When the output source is true, the output deactivates.

2.15.6 DSE2548 ANNUCIATOR MODULES

Select the DSENet ID of the LED expansion to be configured. The ID of the expansion input module is set by rotary decimal switch accessible on the rear of the device.

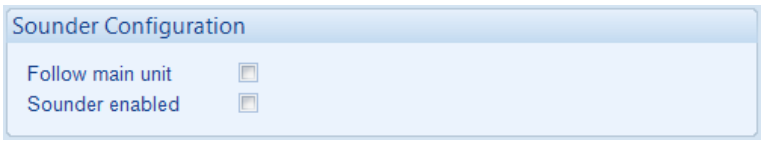
The following options are then shown:

2548 Expansion Enable



Parameter	Description
Expansion Enabled	☐ = The expansion module with the selected ID is not enabled. ☑ = The expansion module with the selected ID is enabled. If the expansion module is not connected / detected by the module, the module generates an *Exp. Unit Failure* alarm with the configured *Link Lost Alarm Action* severity.

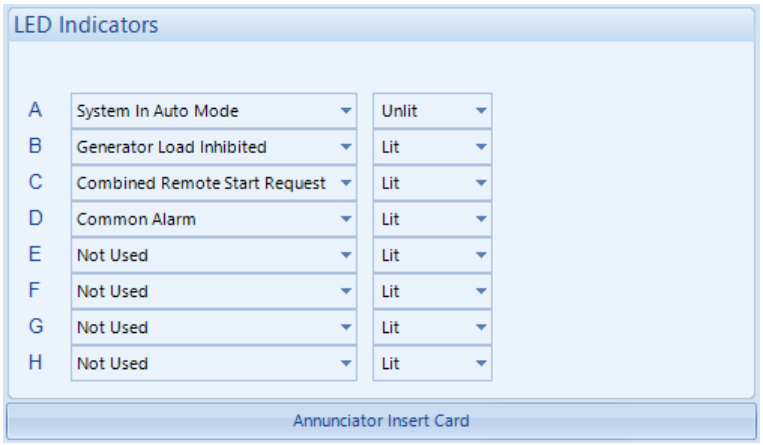
Sounder Configuration



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	☐ = The DSE2548 internal sounder does not annunciate on a fault condition becoming active. ☑ = The DSE2548 internal sounder annunciates on a fault condition becoming active.

Parameter descriptions are continued overleaf…

LED Indicators



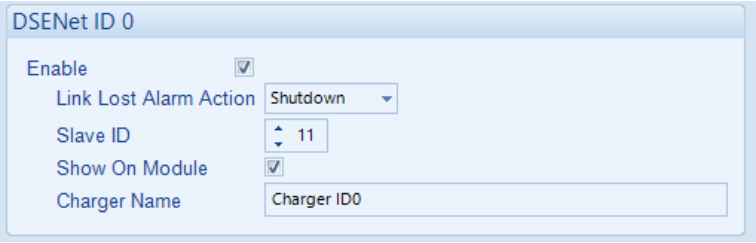
Parameter	Description
Source	Select the output source to control the state of the output See section entitled *Output Sources* for details of all available functions
Polarity	Select the digital input polarity: ***Energise:*** When the output source is true, the output activates. ***De-Energise:*** When the output source is true, the output deactivates.
Annunciator Insert Card	Allows the user to create and print the custom text insert cards for the LEDs.

2.15.7 BATTERY CHARGERS

Select the DSENet ID of the battery charger to be configured. The ID of the expansion module is set by configuration of the device.

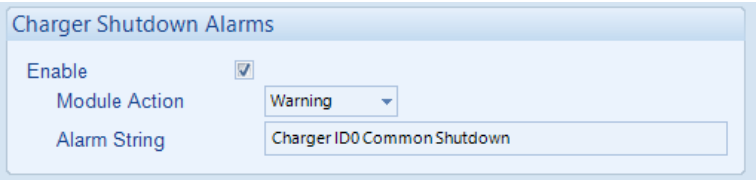
The following options are then shown:

DSENet ID



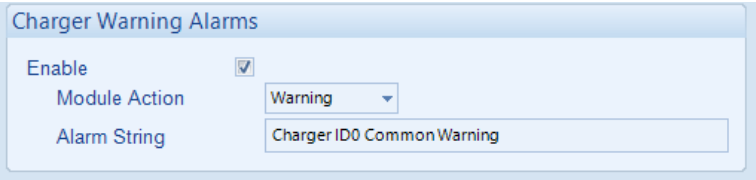
Parameter	Description
Enable	☐ = The battery charger with the selected ID is not enabled. ☑ = The battery charger with the selected ID is enabled. If the expansion module is not connected / detected by the module, the module generates an *Exp. Unit Failure* alarm with the configured *Link Lost Alarm Action* severity.
Modbus Slave ID	The Slave ID used to address the battery charger via the host module's RS485 when using the host module as a MODBUS RTU pass through.
Display Instrumentation	☐ = The battery chargers' information is not shown on the host module's display. ☑ = The battery charger information is shown on the host module's display.
Charger Name	Enter the *Charger Name*, this text is shown on the module display when viewing the battery charger instrumentation

Charger Shutdown Alarms



Parameter	Description
Enable	☐ = The DSE module does not display any shutdown alarms from the battery charger. ☑ = The DSE module displays shutdown alarms from the battery charger with the configured action.
Alarm String	The text that is displayed on the module's LCD when the DSE module detects a shutdown fault from the battery charger.

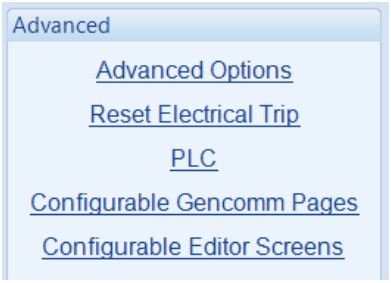
Charger Warning Alarms



Parameter	Description
Enable	☐ = The DSE module does not display any warning alarms from the battery charger. ☑ = The DSE module displays warnings alarms from the battery charger with the configured action.
Alarm String	The text that is displayed on the module's LCD when the DSE module detects a warning fault from the battery charger.

2.16 ADVANCED

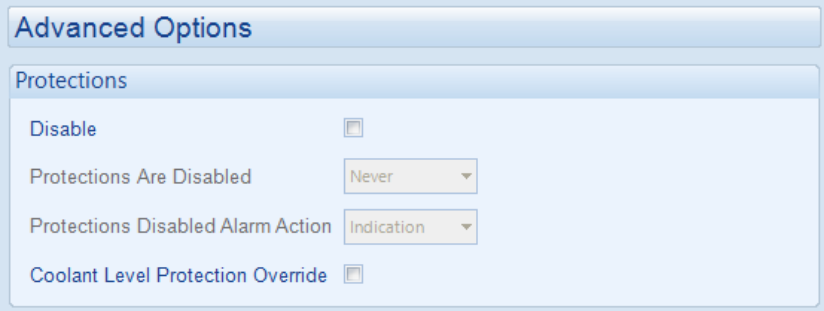
The *Advanced* page is subdivided into smaller sections.
Select the required section with the mouse.



2.16.1 ADVANCED OPTIONS

Protections

WARNING! - Enabling this feature prevents the set being stopped upon critical alarm conditions. All shutdown alarms are disabled with the exception of EMERGENCY STOP which continues to operate.

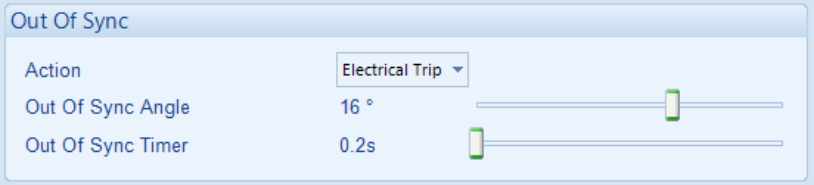


This feature is provided to assist the system designer in meeting specifications for “Warning only”, “Protections Disabled”, “Run to Destruction”, “Battleshort Mode” or other similar wording.

Parameter	Description
Disable	**NOTE: Writing a configuration to the controller that has “Protections Disabled” configured, results in a warning message appearing on the PC screen for the user to acknowledge before the controller’s configuration is changed. This prevents inadvertent activation of the feature.** ☐ = The module operates as normal and provide engine shutdown if required. ☑ = *Protections disabled* function is activated. Operation depends upon the following configuration.
Protections are disabled	***Never*** : The protections are not disabled ***Always***: Protections are always overridden by the DSE controller. ***On Input***: Protections are disabled whenever a configurable input set to *Protections Disabled* is activated
Protections Disabled Alarm Action	If *Disable All Protections* is set to *On Input*, this selection allows configuration of an alarm to highlight that the protections have been disabled on the engine. ***Indication:*** Any output or LCD display indicator configured to *Protections Disabled* is made active; however the internal alarm sound does not operate. ***Warning:*** Any output or LCD display indicator configured to *Protections Disabled* is made active, and the internal alarm sound operates. When protections are disabled, *Protections Disabled* appears on the module display to inform the operator of this status.
Coolant Level Protection Override	☐ = When a CANbus engine is selected, the *Coolant Level Protection* is provided when supported by the ECU (ECM). ☑ = The *Coolant Level Protection* is overridden and does not activate an alarm on the module

Out Of Sync

NOTE: Refer to DSE publication: 056-047 Out of Sync and Failed to Close which is found on our website: www.deepseaelectronics.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 DSE8620 MKII monitors the phase angle of both supplies generator and mains 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).

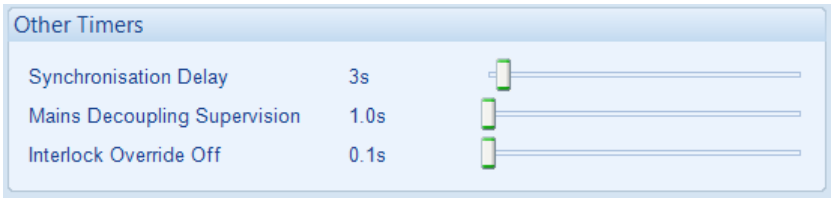
If the angle exceeds the *Out of Sync Angle* for longer than the duration of the *Out of Sync Timer*, an electrical trip alarm is generated taking the set off load and into the cooling timer, after which the set is stopped.

Troubleshooting Out of Sync

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

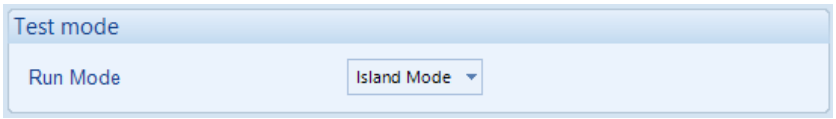
- The *Mains Sensing* connections have not been made between the mains supply and the DSE module, or the mains sensing fuses have blown or have been removed.
- The load switching device does not close quickly enough. Ensure the breaker closes within 100mS of receiving the close signal.
- The *Out of 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.

Other Timers



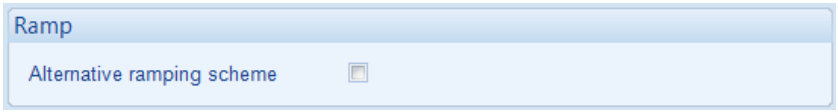
Parameter	Description
Synchronisation Delay	Delays the synchronising process to allow the Generator to stabilise and power parasitic loads or transformers (for instance) before the synchronising process begins.
Mains Decoupling Supervision	Delays the activation of the inbuilt Mains Decoupling detection when Generator switchgear closes in parallel with the mains. Upon closing into parallel, the timer is activated. After the timer has expired, the Mains decoupling protection becomes active.
Interlock Override Off	Timer to delay the *Interlock Override* de-energising once a breaker has opened.

Test Mode



Parameter	Description
Run Mode	Configures the operation of the *Test* button as: ***Island Mode:*** The module performs the start sequence and transfers all the load to the Generator. The Mains switchgear is left open and the Generator runs in island mode. ***Parallel Mode:*** The module performs the start sequence and synchronises the generator Bus to the Mains to allow long term parallel operation; peak lopping when set to *Mains Mode*, or fixed export / base load when in *Generator Mode*.

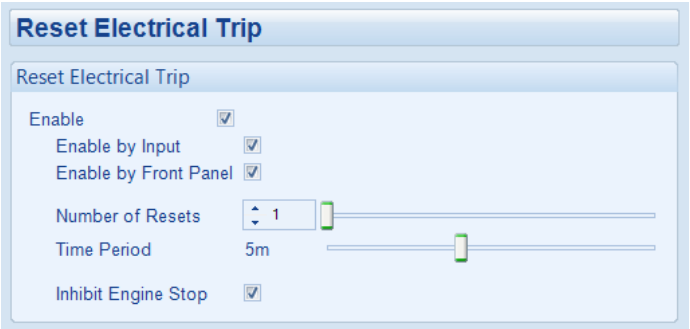
Ramp



Parameter	Description
Alternative Ramping Scheme	**NOTE: The *Maximum Load Level* are configured within the SCADA section. For further details, refer to section entitled *Load Levels* contained within the *SCADA* section elsewhere within this document.** ☐ **=** In *Generator Mode*, when the Mains returns the Generator ramps up to the *Maximum Load Level* before ramping off to the Mains. ☑ **=** In *Generator Mode*, when the Mains returns the Generator ramps off from its current load level to the Mains

2.16.2 RESET ELECTRICAL TRIP ALARM

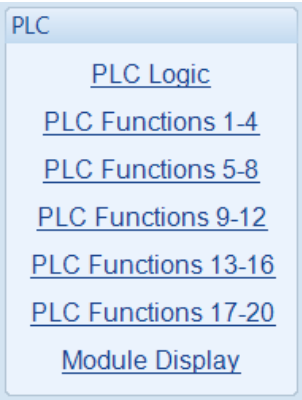
This feature is provided to assist the system designer in meeting specifications requirements to ensure the generator (if running) is able to take load again after the *Electrical Trip* alarm has been reset. Depending upon configuration, the generator may go into a cooling run or be inhibited from stopping after the *Electrical Trip* alarm activates.



Options	Description
Enable	**NOTE: Writing a configuration to the controller that has "Reset Electrical Trip" enabled, results in a warning message appearing on the PC screen for the user to acknowledge before the controller's configuration is changed. This prevents inadvertent activation of the feature.** ☐ = If an Electrical Trip alarm is reset, the generator must continue to cooldown before it becomes available again. ☑ = If an Electrical Trip alarm is reset, the generator is placed back on load if requested.
Enable by Input	**NOTE: Can only be enabled if an input is configured to *Reset Electrical Trip*.** ☐ = *Reset Electrical Trip* only by pressing the ***Close Generator*** button (if enabled). ☑ = *Reset Electrical Trip* by an input configured for *Reset Electrical Trip* and/or by pressing the ***Close Generator*** button (if enabled).
Enable by Front Panel	☐ = *Reset Electrical Trip* only by activating an input configured for *Reset Electrical Trip* (if enabled). ☑ = *Reset Electrical Trip* by pressing the ***Close Generator*** button and/or activating an input configured for *Reset Electrical Trip* (if enabled).
Number of Resets	The number of times any electrical trips can be reset whilst the generator is running to enable it to go back on load. The counter goes to zero upon the generator stopping.
Time Period	The time interval for the Number of Resets. If the Number of Resets is reached within configured Time Period, no more resets can occur until the generator has stopped.
Inhibit Engine Stop	**NOTE: Writing a configuration to the controller that has "Inhibit Engine Stop" enabled, results in a warning message appearing on the PC screen for the user to acknowledge before the controller's configuration is changed. This prevents inadvertent activation of the feature.** ☐ = When an Electrical Trip alarm activates, the generator's load switch opens and the generator goes into a cooling run before shutting down. ☑ = When an Electrical Trip alarm activates, the generator's load switch opens and the generator continues to run with the *Electrical Trip Stop Inhibited Warning* alarm active.

2.16.3 PLC

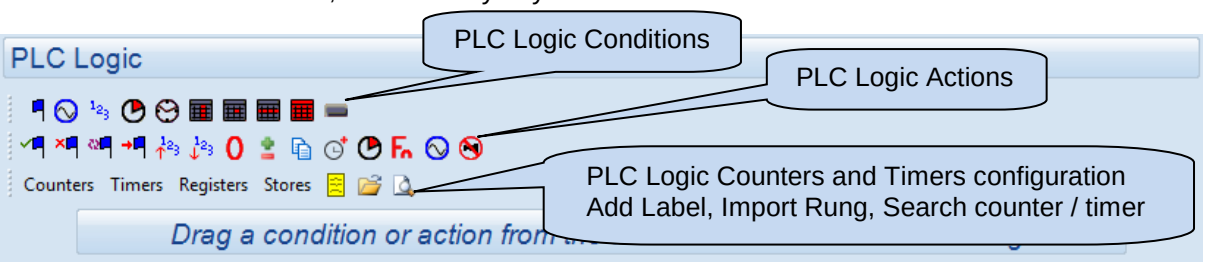
The *PLC* section is subdivided into smaller sub-sections.



2.16.3.1 PLC LOGIC

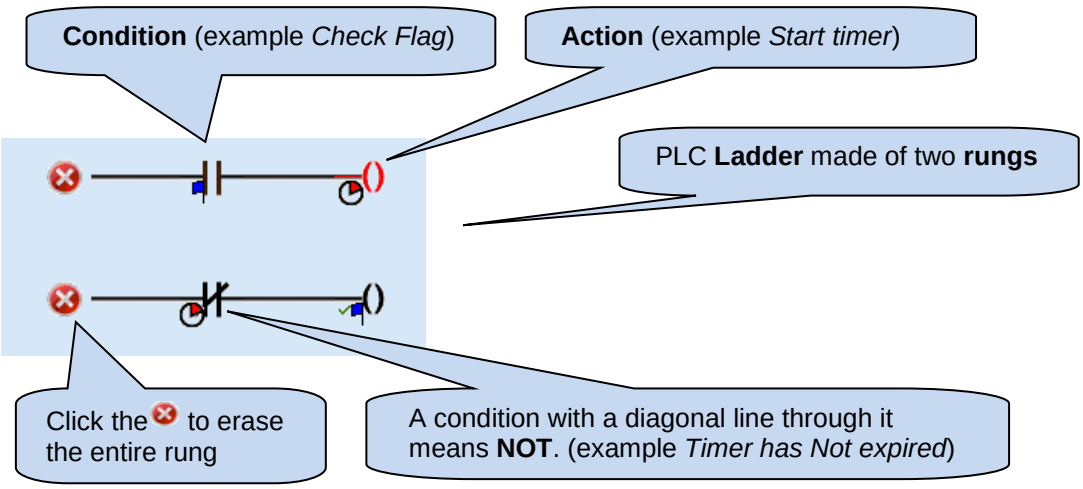
NOTE: For further details and instructions on PLC Logic and PLC Functions, refer to DSE Publication: *057-175 PLC Programming Guide* which is found on our website: *www.deepseaelectronics.com*

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*.

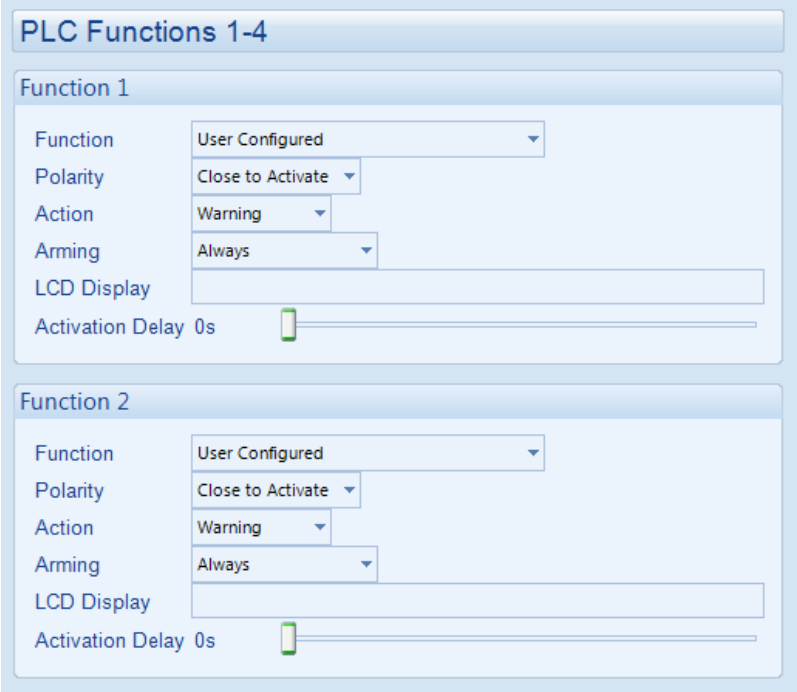
For instance if the conditions in the rung are met, the action takes place.



2.16.3.2 PLC FUNCTIONS

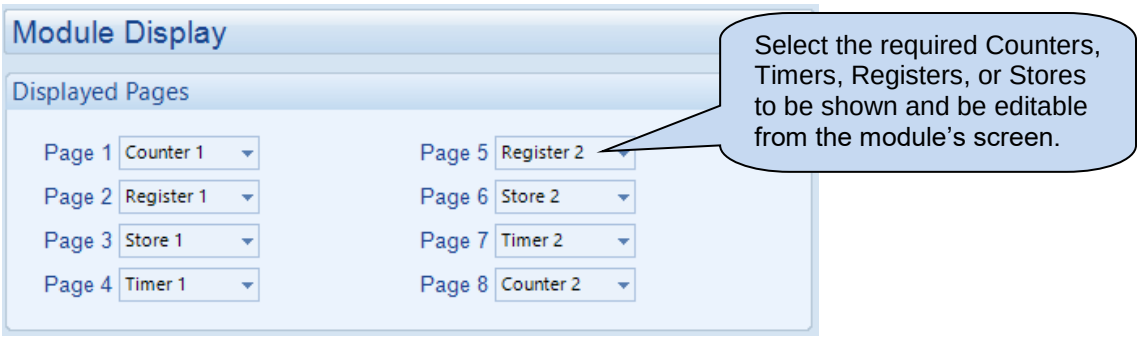
NOTE: For further details and instructions on PLC Logic and PLC Functions, refer to DSE Publication: *057-175 PLC Programming Guide* which is found on our website: *www.deepseaelectronics.com*

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.

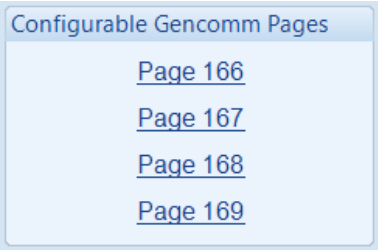


2.16.3.3 MODULE DISPLAY

The *Module Display* shows a combination of Counters, Timers, Registers and Stores on the module's PLC screen page when configured. A maximum of eight instruments can be configured in the *Module Display*.

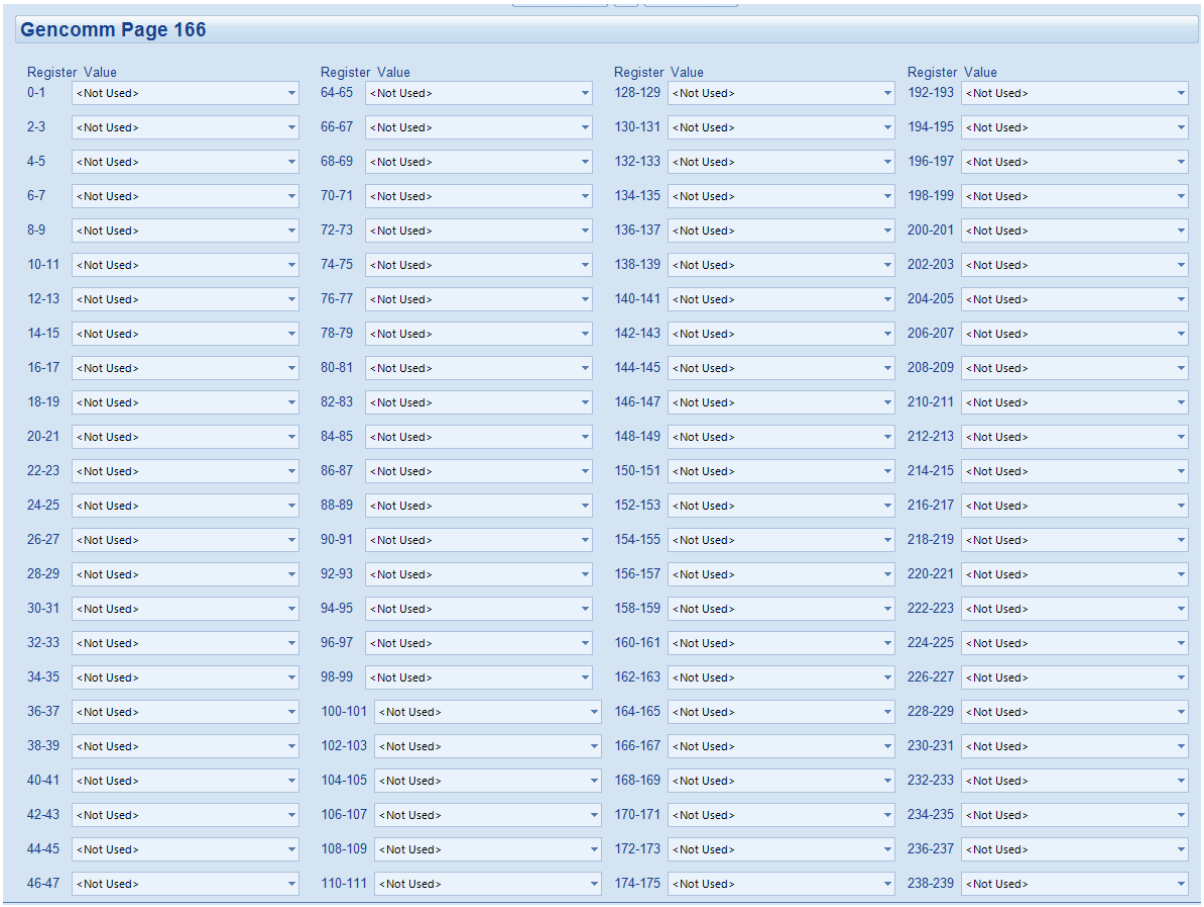


2.16.4 CONFIGURABLE GENCOMM PAGES 166 TO 169



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.

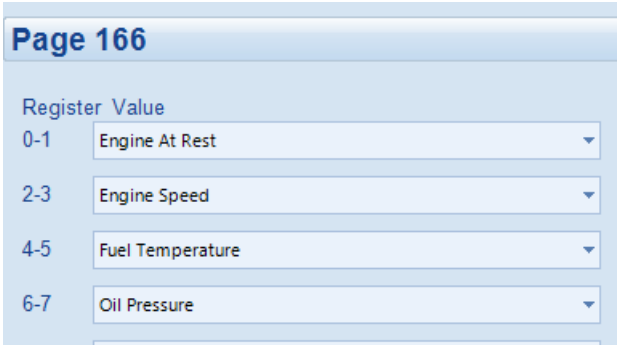
All configurable Gencomm registers are 32-bit unsigned format.



The configurable MODBUS pages are:

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

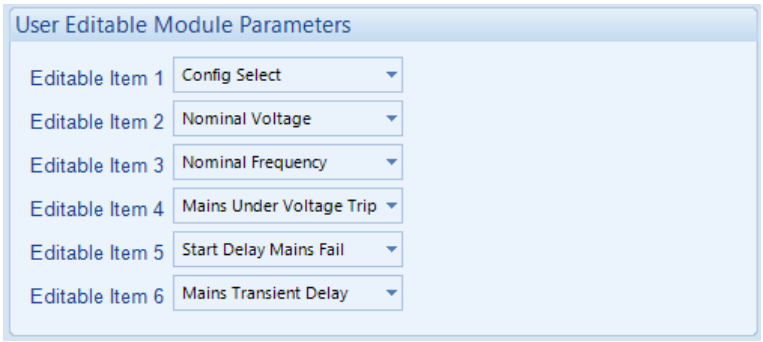
Example of Gencomm Page Configuration:



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 Significant Bit and the Least Significant Bit.
MSB address in Decimal = (166 * 256) + 2 = 42498
LSB address in Decimal = (166 * 256) + 3 = 42499

2.16.5 CONFIGURABLE EDITOR SCREENS

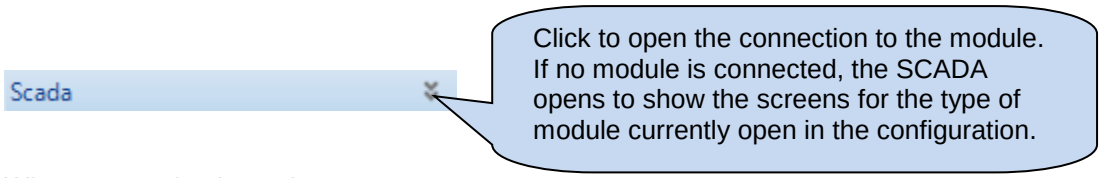
The *Configurable Editor Screens* enables the user to select six parameters to be editable through the module display. The editing of these parameters is not protected by the PIN (if enabled).



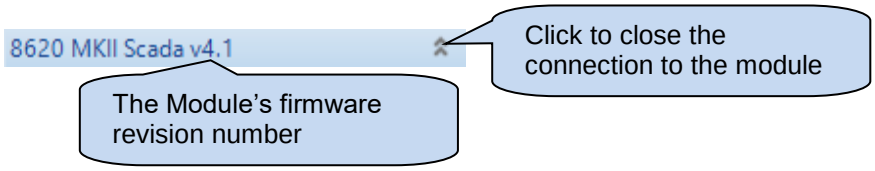
Parameter	Description
Editable Item 1 to 6	Select the required parameter to be shown and be editable from the module's screen.

3 SCADA

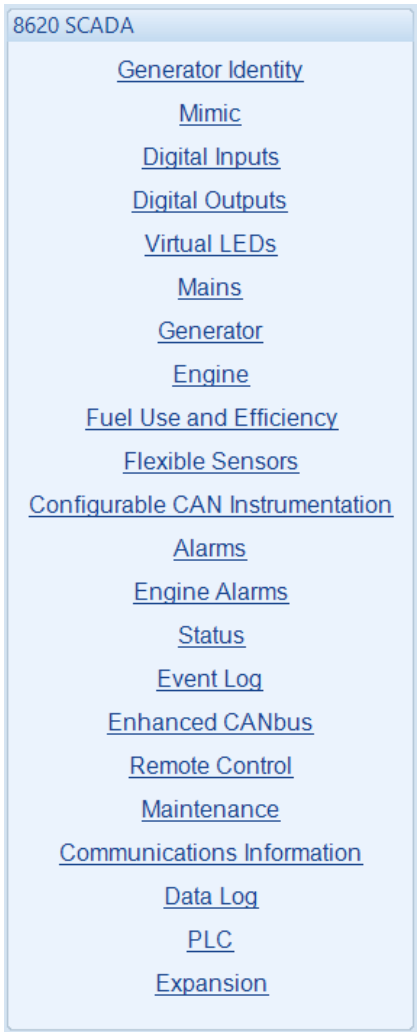
SCADA stands for Supervisory Control And Data Acquisition and is provided both as a service tool and also as a means of monitoring / controlling the generator set.
As a service tool, the SCADA pages are to check the operation of the controller's inputs and outputs as well as checking the generators operating parameters.



When connection is made…



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



3.1 GENERATOR IDENTITY

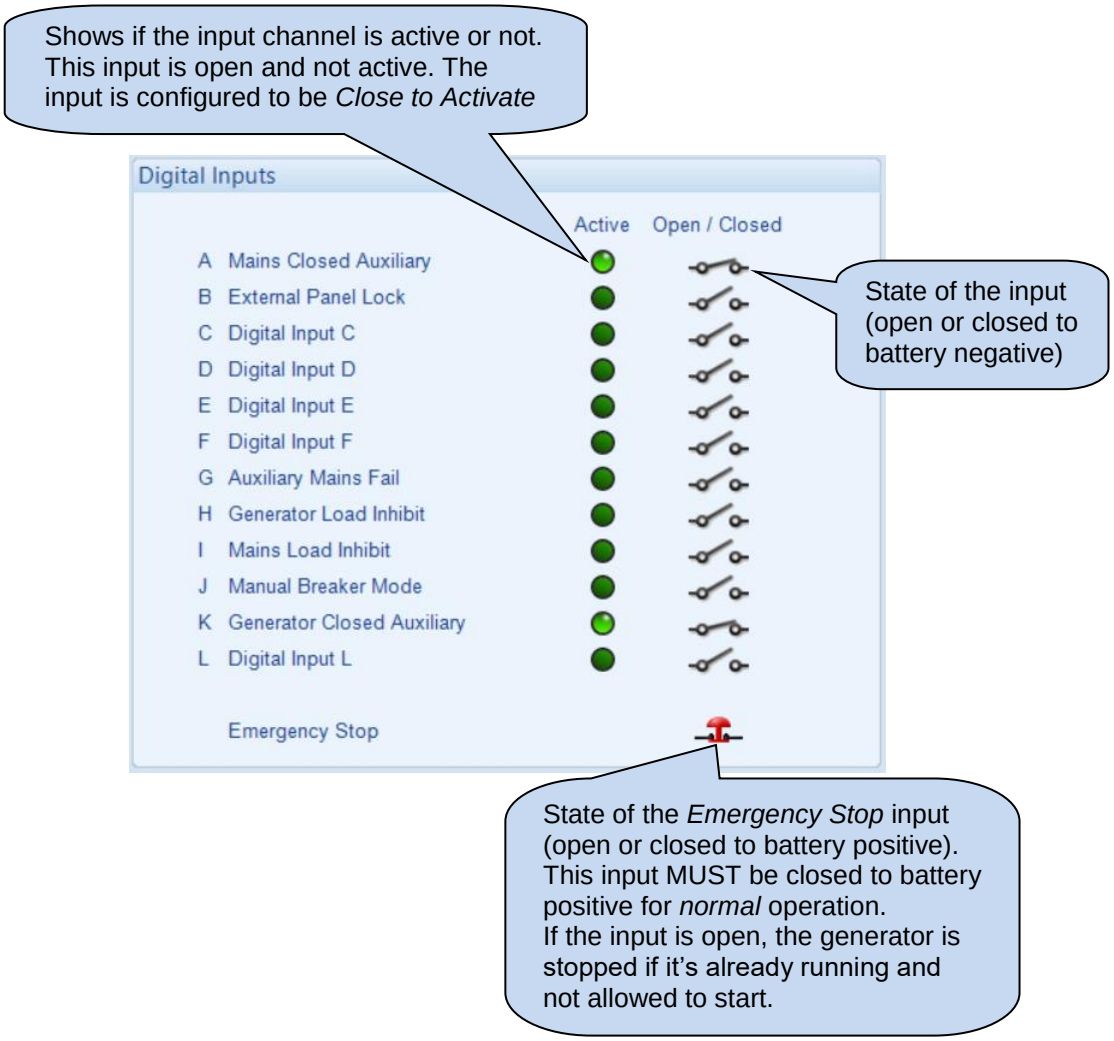
Shows the module's current settings for *Site ID* and *Genset ID*

3.2 MIMIC

This section provides a mimic of the module's fascia and allows the operator to change the control mode of the module. For information in regards to operating the DSE module, refer to DSE publication: ***057-301 DSE8620 MKII Operation Manual*** which is found on the DSE website: www.deepseaelectronics.com

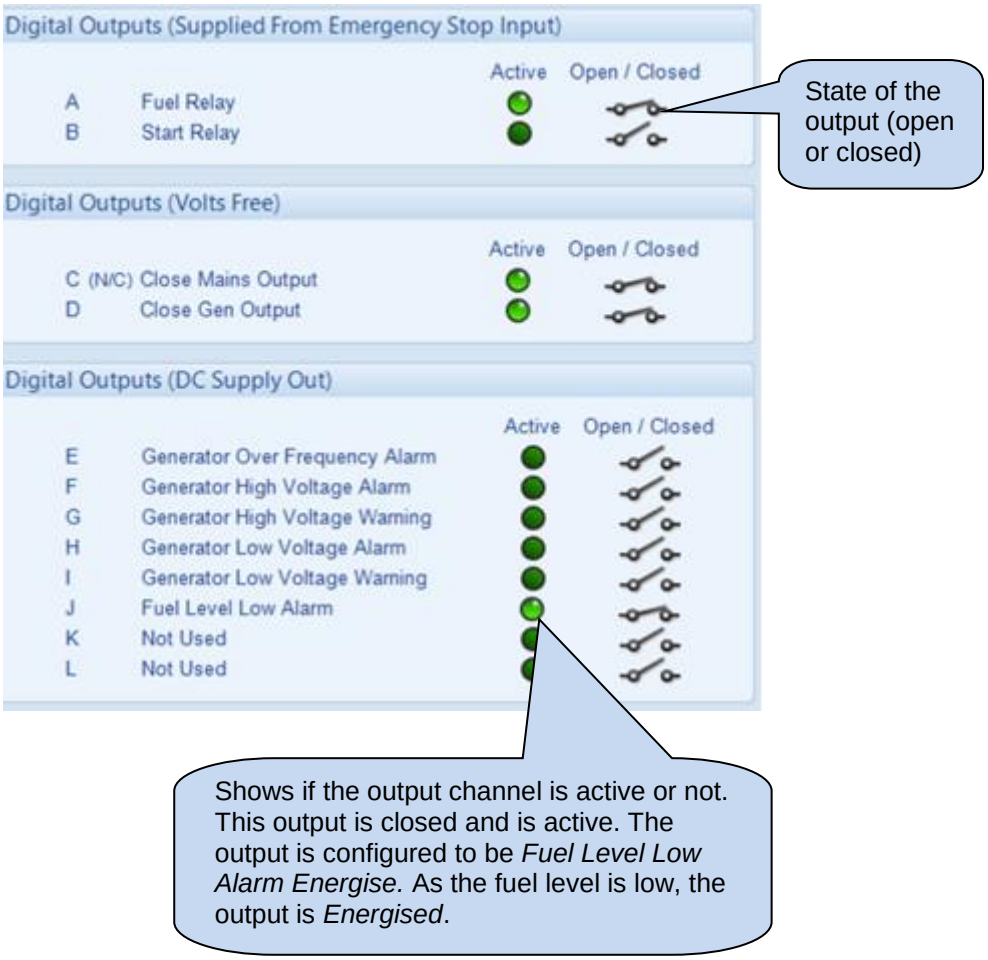
3.3 DIGITAL INPUTS

This section displays the status of the module's digital inputs and the functions they are configured for. *For further details on how to configure these items, refer to section entitled Digital Inputs elsewhere within this document.*



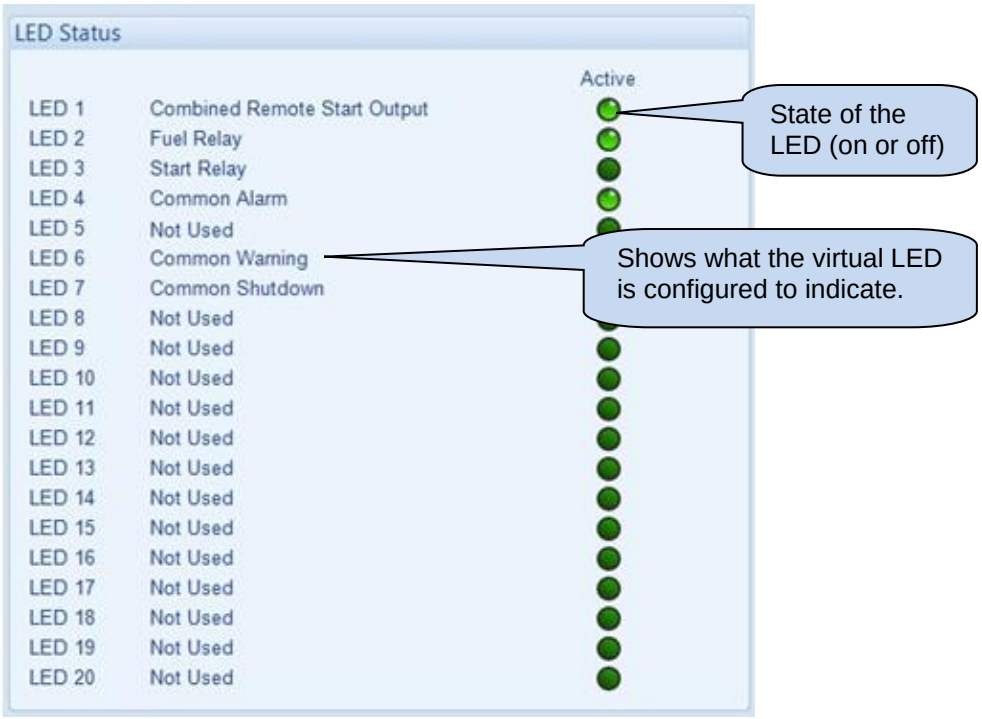
3.4 DIGITAL OUTPUTS

This section displays the status of the module's digital outputs and the functions they are configured for. *For further details on how to configure these items, refer to section entitled Digital Outputs elsewhere within this document.*



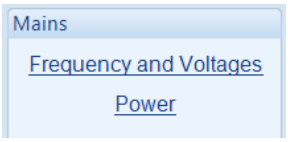
3.5 VIRTUAL LEDS

This section displays the status of the module's *Virtual LEDs* and the functions they are configured for. 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 DSE Configuration Suite, or read by third party PLC or Building Management Systems (for example) using the MODBUS protocol. *For further details on how to configure these items, refer to section entitled Digital Outputs elsewhere within this document.*



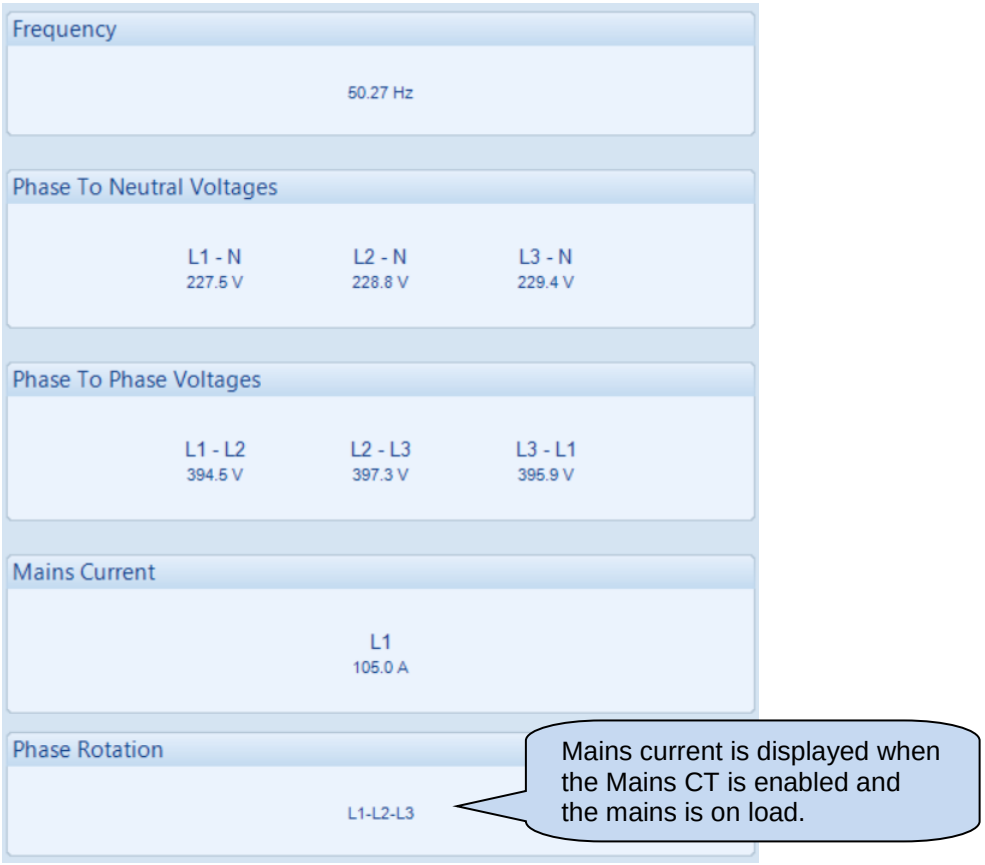
3.6 MAINS

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



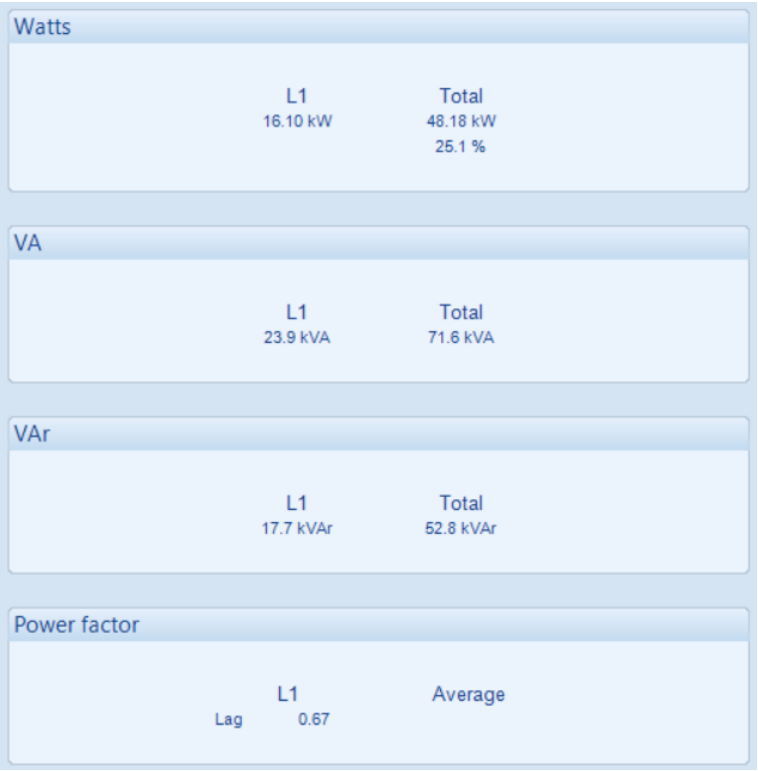
3.6.1 FREQUENCY, AND VOLTAGES

Shows the module's measurements of the mains supply.



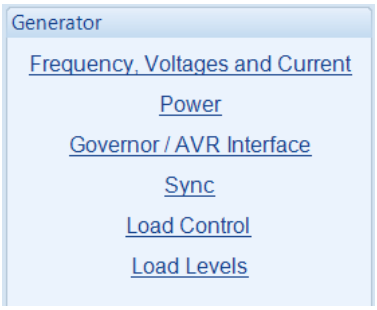
3.6.2 POWER

Shows the modules measurements of the mains supply power.



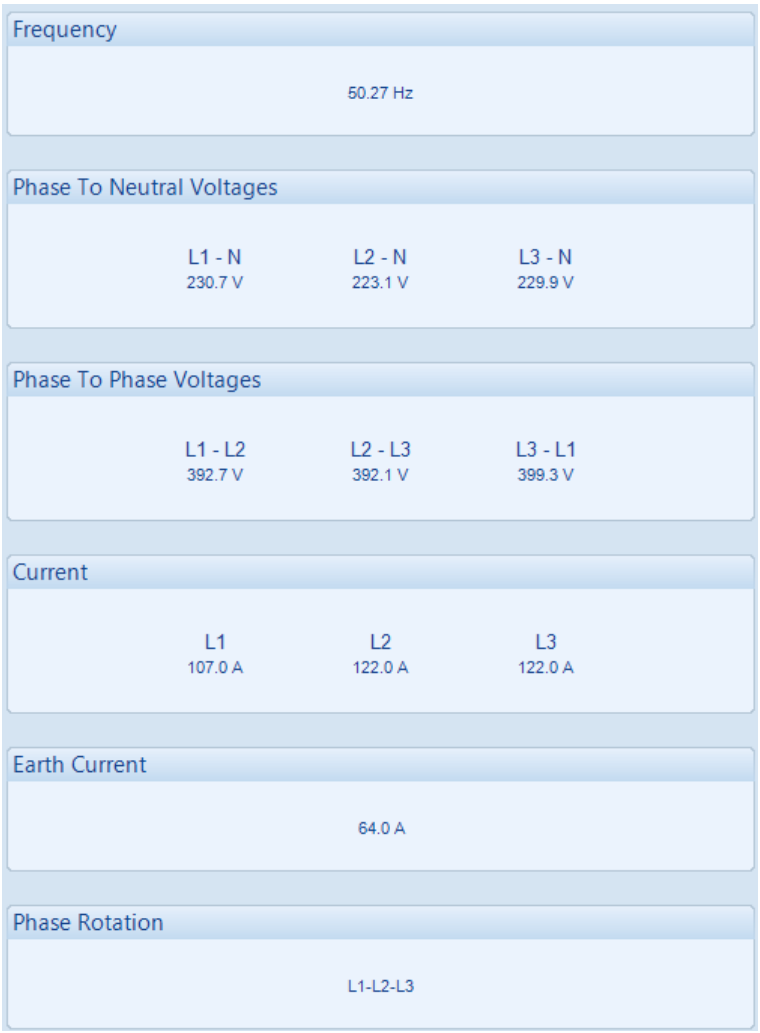
3.7 GENERATOR

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



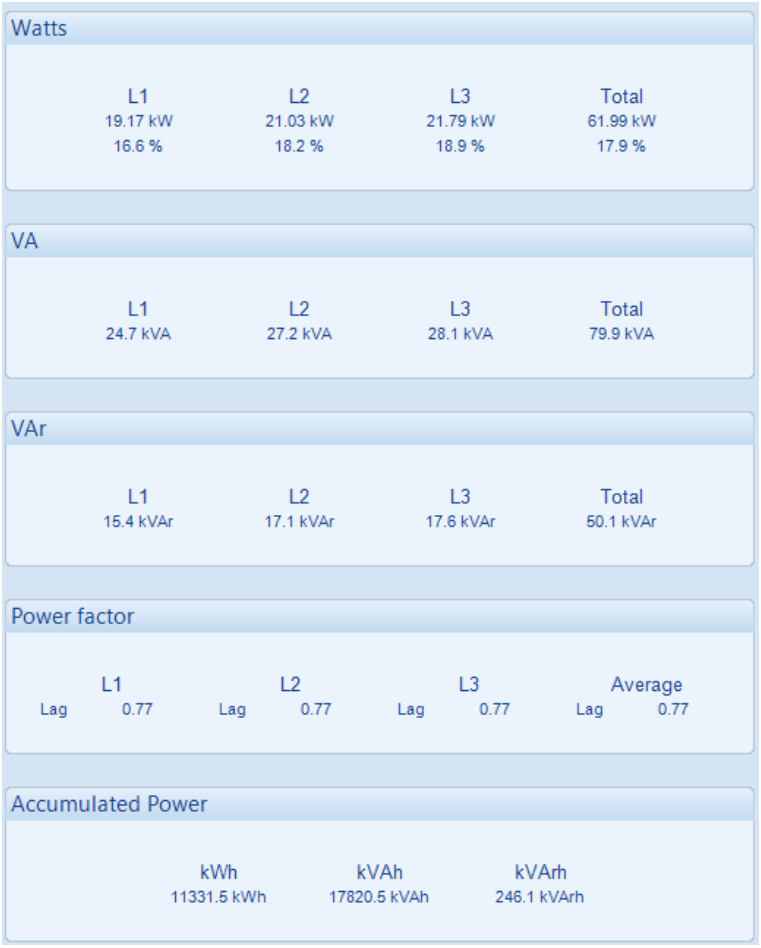
3.7.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the modules measurements of the generator supply.



3.7.2 POWER

Shows the module's measurements of the generator supply power.

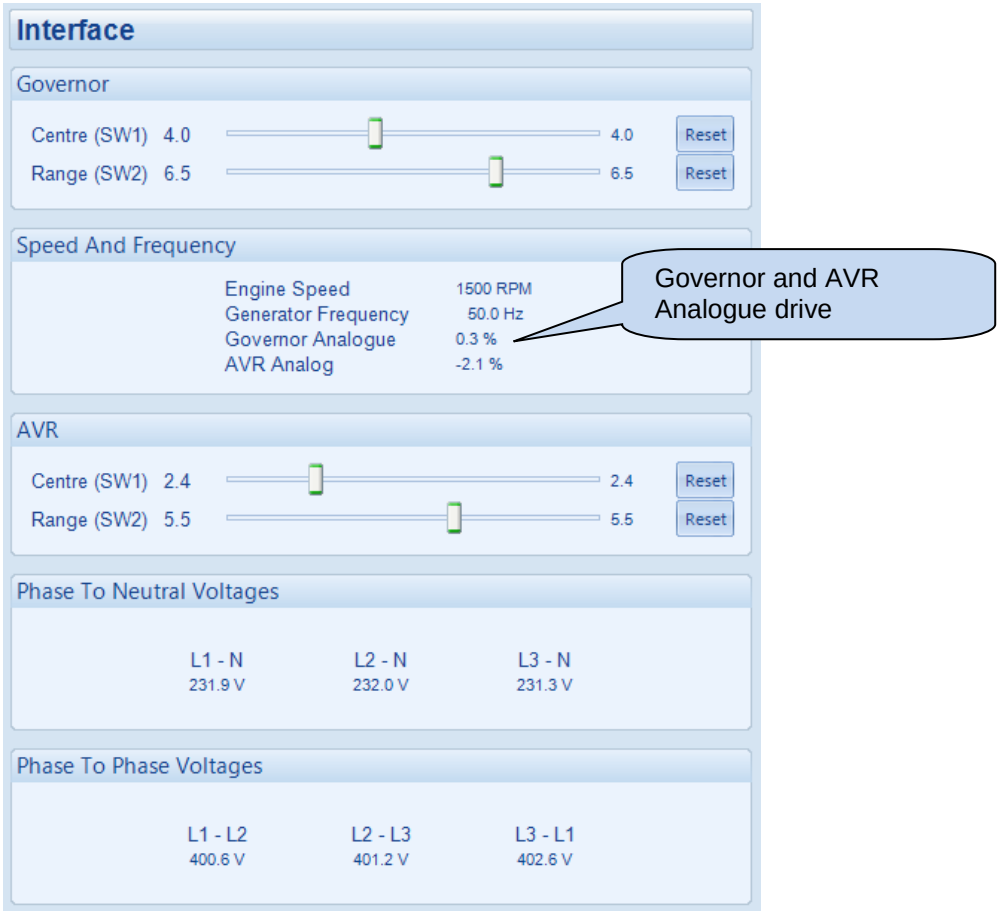


3.7.3 GOVERNOR/AVR INTERFACE

NOTE: These settings are not saved within the module's configuration file. They are stored in a different memory area and not transferred with the configuration file. The *Backup Module* feature transfers both the configuration file AND the settings of the Multi-set, Governor / AVR interface and Sync page.

This section allows the user to calibrate the *SW1* (Switch 1) and *SW2* (Switch 2) settings for the *Analogue Governor Output* and *Analogue AVR Output* which the DSE module uses to control synchronising and load sharing. For information in regards to calibrating these settings, refer to DSE publication: ***057-301 DSE8620 MKII Operator Manual*** which is found on the DSE website: www.deepseaelectronics.com.

As the input requirements of governors and AVRs vary from manufacturer to manufacturer, and even from model to model, the DSE module is configurable to allow connection to these devices. For information in regards to typical wiring diagrams and suggested SW1 / SW2 settings for common governors and AVRs, refer to DSE publication: ***057-046 DSE Guide to Synchronising and Load Sharing (Part 2)*** which is found on the DSE website: www.deepseaelectronics.com.



3.7.3.1 SW1

SW1 is also known as *Centre*. *SW1* sets the voltage produced by the DSE module's *Analogue Governor / AVR Outputs* for 'nominal' running condition. For example SW1 = 5 for the *Analogue Governor Output*, means that the *Analogue Governor Output* is 2.5 V_{DC} when the generator is required to run at it's nominal speed.

3.7.3.2 SW2

SW2 is also known as *Range*. *SW2* sets the range of adjustment around the *SW1 (Centre)* voltage to adjust engine speed or generator voltage away from nominal conditions. For example SW2 = 3 for the *Analogue Governor Output*, means that the *Analogue Governor Output* is made to change by ±2 V_{DC} around the *SW1 (Centre)* voltage to make the engine run at lower/higher speed to synchronise or to increase/decrease kW for load sharing.

3.7.3.3 SETTINGS

The *Analogue Governor Output* and *Analogue AVR Output* are both isolated from ground and battery negative, allowing compatibility with devices with inputs that are not referenced to ground or battery negative. The tables below specify the relationship between the SW1 / SW2 setting and the voltage set point.

SW1 Setting	*Centre* Voltage of Analogue Output
0	0.0 V_{DC}
1	0.5 V_{DC}
2	1.0 V_{DC}
3	1.5 V_{DC}
4	2.0 V_{DC}
5	2.5 V_{DC}
6	3.0 V_{DC}
7	3.5 V_{DC}
8	4.0 V_{DC}
9	4.5 V_{DC}

SW2 Setting	Voltage *Range* of Analogue Output
0	±0.5 V_{DC}
1	±1.0 V_{DC}
2	±1.5 V_{DC}
3	±2.0 V_{DC}
4	±2.5 V_{DC}
5	±3.0 V_{DC}
6	±3.5 V_{DC}
7	±4.0 V_{DC}
8	±4.5 V_{DC}
9	±5.0 V_{DC}

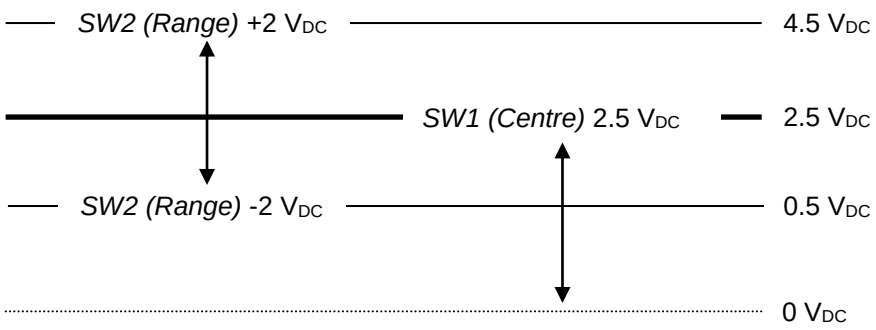
3.7.3.4 SUMMARY

Consider the settings for the *Analogue Governor / AVR Output* as *SW1 ± SW2*

In the example mentioned previously this means the *Analogue Governor Output* is 2.5 V_{DC} ± 2 V_{DC} (based upon the settings of SW1 = 5 and SW2 = 3), effectively giving a range of adjustment between 0.5 V_{DC} to 4.5 V_{DC}.

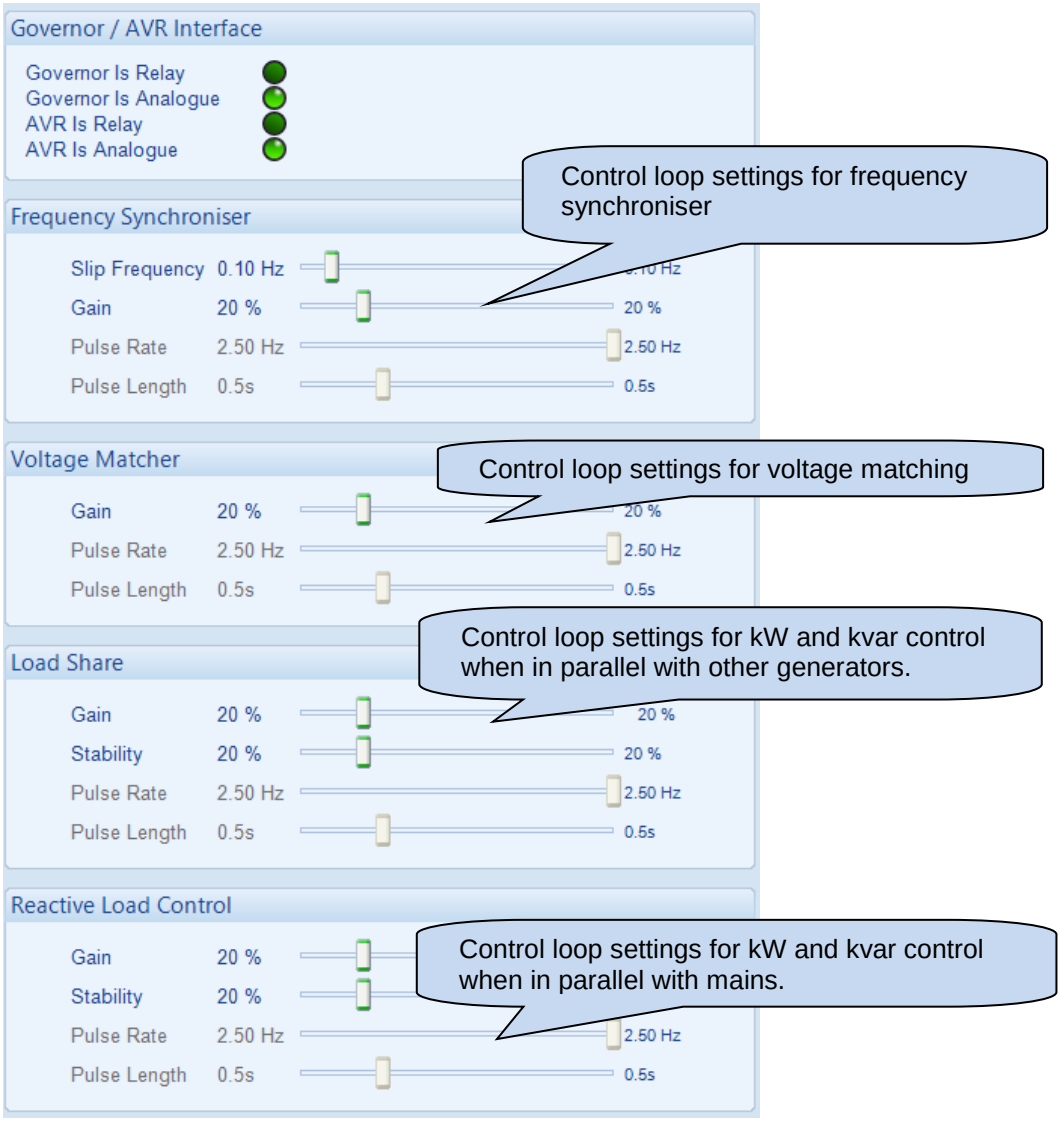
SW1 is the voltage above or below 0 V_{DC} that the *Analogue Governor / AVR Output* produces to instruct the generator to operate at 'nominal' running condition

SW2 is the maximum voltage adjustment above and below *SW1* that the *Analogue Governor / AVR Output* produces to instruct the voltage / frequency of the generator to change.



3.7.4 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 Multiset, Governor/AVR interface and the Sync page.



Item	Function
Slip frequency	The difference between generator frequency and the bus/mains frequency. The controller adjusts engine speed until the frequency difference matches the slip frequency. The phase of the supplies 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.
Gain Stability	**NOTE: Not applicable when using external relays control system.** In general, lower setting results in a slow frequency matching process, but too high a setting may cause instability (hunting). If this occurs, lower the stability setting. If this has no effect, lower the gain setting.

3.7.4.1 ADJUSTING GAIN (P), STABILITY (I) AND DERIVATIVE (D)

3.7.4.2 INITIAL SETUP

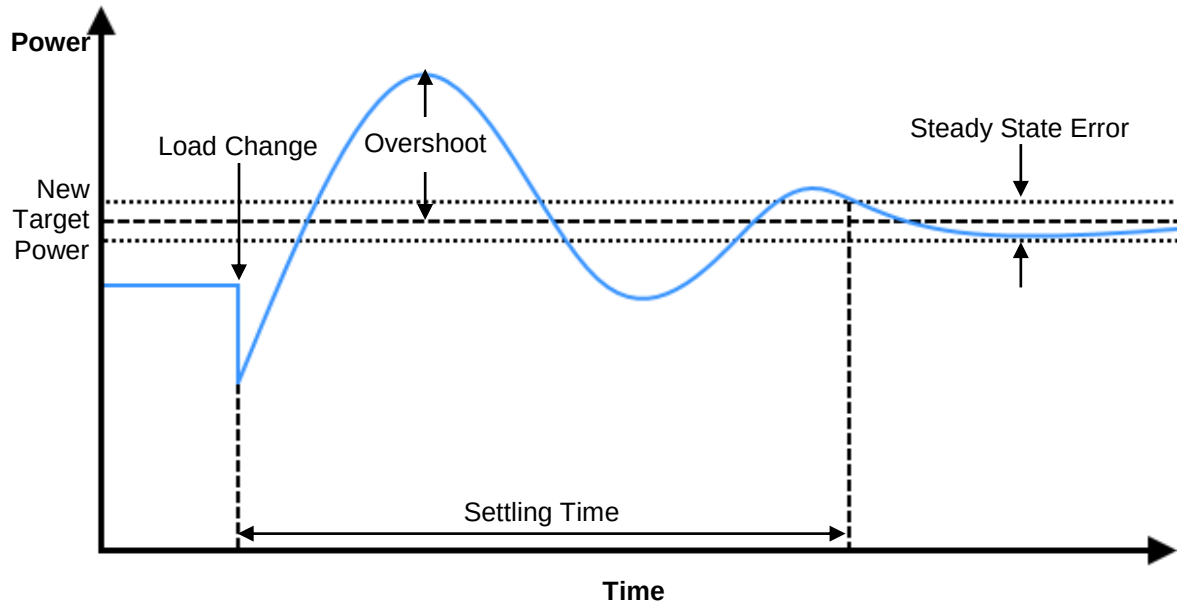
In most cases the DSE factory settings of 20% for *Gain (P)* and *Stability (I)* are suitable for most systems. This is because the DSE module's control is limited by the *Gain (P)* and *Stability (I)* settings of the engine's governor / alternator's AVR. Before adjusting the DSE module's settings, adjust the *Gain (P)* and *Stability (I)* settings of the engine's governor / alternator's AVR in accordance with the manufacturer's recommendations.

3.7.4.3 CALIBRATION

If the power control of the generator is not satisfactory after adjusting the *Gain (P)* and *Stability (I)* settings of the engine's governor / alternator's AVR, then start to adjust the DSE's settings by:

1. Starting with the *Gain (P)* and *Stability (I)* at 5 %. Place the generator in parallel with the mains.
2. Gradually increase the *Gain (P)* setting until the generator power production becomes unstable. Very slowly decrease the *Gain (P)* setting, until the power production stabilises. Reduce the setting further by approximately 10 %.
3. Gradually increase the *Stability (I)* setting until the generator power production becomes unstable. Very slowly decrease the *Stability (I)* setting, until the power production stabilises.
4. Attempt to 'knock' the governor actuator or change the 'slip frequency' setting to disturb the engine speed and force the controller into making further changes.

The affect the *Gain (P)* and *Stability (I)* settings have on the response of a load step being applied to the generator are shown below.



PID Adjustment	Overshoot	Settling Time	Steady State Error
Increase Gain (P)	Increases	Minimal Effect	Decreases
Increase Stability (I)	Increases	Increases	Eliminates

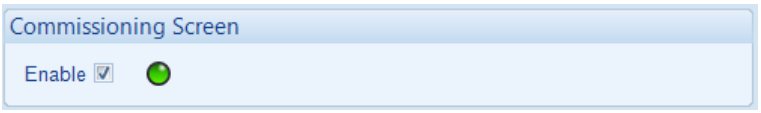
3.7.4.4 TROUBLESHOOTING

NOTE: An over damped response results in a slower control process. An under damped response (overshooting the target) leads to an unstable control process.
Either case leads to undesirable consequences such as overcurrent or reverse power, resulting in generator shutdown, and loss of supply to the load.

If the load is oscillating quickly between the generators it suggests that the setting for the *Gain (P)* on the generator(s) is too high or too low. A slow rolling oscillation usually indicates that the *Stability (I)* is too high or too low. These oscillations are caused by incorrect settings on the engine's governor / alternator's AVR and/or the DSE module.

3.7.5 LOAD CONTROL

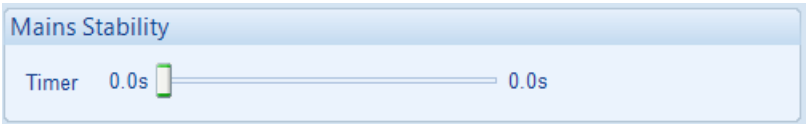
Commissioning Screen



NOTE: For further details and instructions on Commissioning Screen, refer to DSE Publication: *057-301 DSE8620 MKII Operators Manual* which is found on our website: *www.deepseaelectronics.com*

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

Mains Stability



Parameter	Description
Mains Stability Timer	This is the time the DSE8620 MKII module takes to average the Mains kilowatt during the peak lopping or peak shaving. It is used to prevent the generator kilowatt change so rapidly when the mains is unstable, instead a rolling average is used as the target for the mains rather than the actual mains kW.

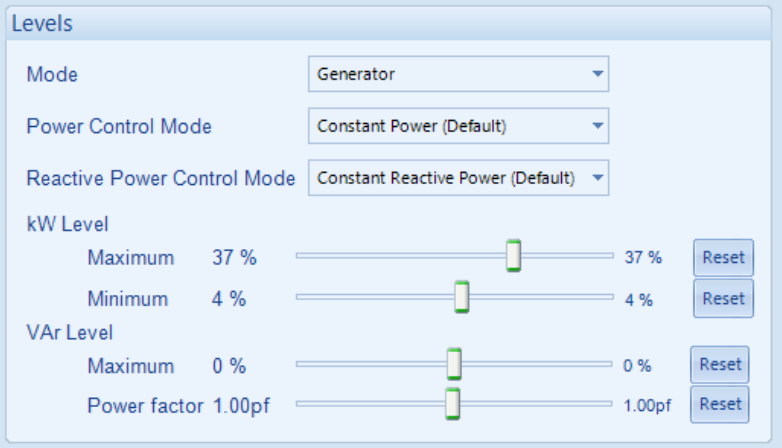
3.7.6 LOAD LEVELS

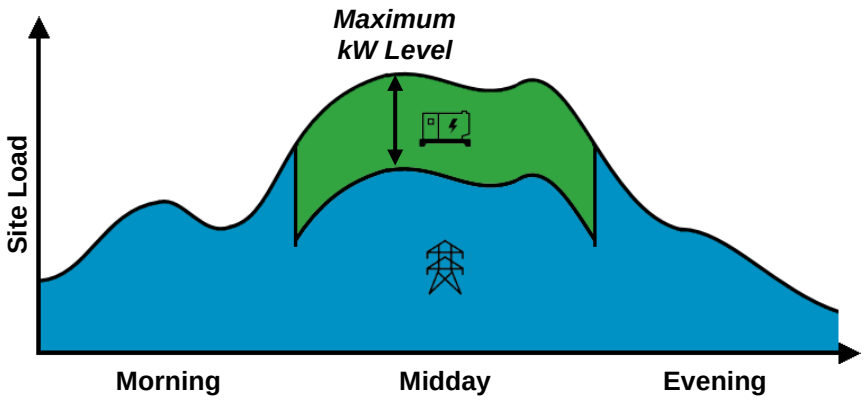
Analogue Drive

Parameter	Description
Governor Analogue Drive	Shows the percentage of the module's range of adjustment over the governor (set by SW2) to run the generator at the required frequency or kW level for load sharing. For example, with an SW2 = 3 (±2 V_{DC}) for the *Analogue Governor Output* and a *Governor Analogue Drive Percentage* = -50% , means that the *Analogue Governor Output* is made to change by -1 $V_{DC\ from}$ the *SW1 (Centre)* voltage Typical magnitudes at full load, with the switchgear closed and running in *Isochronous Load Sharing* or *Mains Parallel Mode* operation are as follows: • No more than 10% when there is no external governor droop enabled • No more than 30% when external governor droop is enabled Typical magnitude at no load, with the switchgear closed and *Frequency Droop* enabled within the module's configuration are follows: • No more than 85%
AVR Analogue Drive	Shows the percentage of the module's range of adjustment over the AVR (set by SW2) to run the generator at the required voltage or kvar level for load sharing. For example, with an SW2 = 3 (±2 V_{DC}) for the *Analogue AVR Output* and a *AVR Analogue Drive Percentage* = +75% , means that the *Analogue AVR Output* is made to change by +1.5 $V_{DC\ from}$ the *SW1 (Centre)* voltage Typical magnitudes at full load, with the switchgear closed and running in *Isochronous Load Sharing* or *Mains Parallel Mode* operation are as follows: • No more than 10% when there is no external AVR droop enabled • No more than 30% when external AVR droop is enabled Typical magnitude at no load, with the switchgear closed and *Voltage Droop* enabled within the module's configuration are follows: • No more than 85%

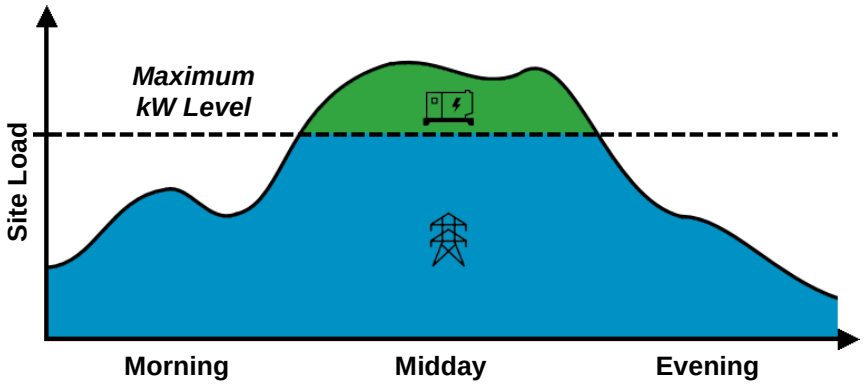
Levels

NOTE: The *Load Level* settings only have effect when the generator is in parallel with the mains.



Parameter	Description
Mode: Generator	Using the *Remote Start on Load* input to the module, the generator is instructed to go into continuous parallel operation with the mains. This may be required to only occur during specified times of the day. When the module is set to *Generator Mode,* this causes the generator to produce a fixed (base) level of *Active Power* (kW) and *Reactive Power* (kvar) against the mains when in continuous parallel operation.  With *Generator Mode*, care must be taken if exporting power to the mains supply is not allowed. For instance, if the *Maximum kW Level* is set to 100 kW and the site load is 75 kW, the generator exports 25 kW into the mains supply. The *Maximum kW Level* and *Maximum kvar Level* are a percentage of the generator's capacity. E.g. when a generator is rated at 500 kW and the *Maximum kW Level* was set to 50%, the running generator produces 250 kW.

Parameters continued overleaf…

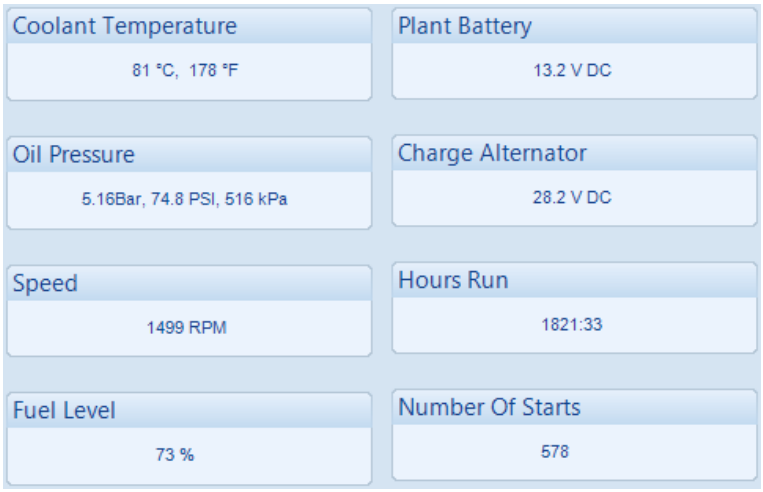
Parameter	Description
Mode: Mains	**NOTE: When operating in *Mains Mode,* the generator is never driven to more than 100% of its full load rating. When the generator reaches 100% of its full load rating, the *Insufficient Capacity* alarm activates (if configured).** Using the *Remote Start on Load* input to the module, the generator is instructed to go into continuous parallel operation with the mains once the mains power exceeds the *Maximum kW Level* setting. This may be required to only occur during specified times of the day. When the module is set to *Mains Mode,* this enables the generator to provide *Peaking Lopping/Shaving Parallel* operation when in continuous parallel with the mains.  With *Mains Mode*, the generator is used to provide a variable amount of *Active Power* (kW) to maintain the mains import/export levels to the configured *Maximum kW Level.* The *Maximum kW Level* and *Maximum kvar Level* are a percentage the mains rating. E.g. If the mains rating was configured as 250 kW, the generator supplies the difference between 250 kW and total connected load. If the load is lower than 250 kW, generator comes off load performs a controlled stop.
Power Control Mode	**NOTE: For further information on these operating modes, refer to section entitled *Power Control* elsewhere within this document.** Allows selection of the *Power Control Mode*. This can also be selected by activation of a configured digital input or via the *Running Editor*.
Reactive Power Control Mode	**NOTE: For further information on these operating modes, refer to section entitled *Voltage and Reactive Power Control* elsewhere within this document.** Allows selection of the *Reactive Power Control Mode*. This can also be selected by activation of a configured digital input or via the *Running Editor*.

Parameters continued overleaf…

Parameter	Description
Load Level Minimum	**NOTE: This parameter is only applicable when in *Generator* mode.** The kW load level the generator starts to ramp from when its switchgear closes. It is also the kW load level when the generator's switchgear opens during ramping down and going off load.
Load Level Maximum	**NOTE: When in *Generator Mode* if *Maximum kW Level* is greater than the load, power is exported to the mains. If required, enable the module's *Mains Export Power* alarm to protect against undesired power export.** The operation of this setting depends on the parallel mode selected: ***Generator:*** The percentage of total kW the generator to produce whilst in continuous parallel with the mains. ***Mains:*** The percentage of the mains kW rating the generator is to maintain whilst in continuous parallel.
VAR Level Maximum	**NOTE: When in *Generator Mode* if *Maximum kvar Level* is greater than the load, power is exported to the mains.** The percentage of total kvar the generator to produce whilst in continuous parallel with the mains.
Power Factor	The power factor the generator is to produce whilst in continuous parallel with the mains.

3.8 ENGINE

This section displays the measurement of the *Engine* parameters. These measurements come from either the module's inputs or from the engine ECU/ECM. For further details on how to configure these items, refer to section entitled *Application* elsewhere within this document.

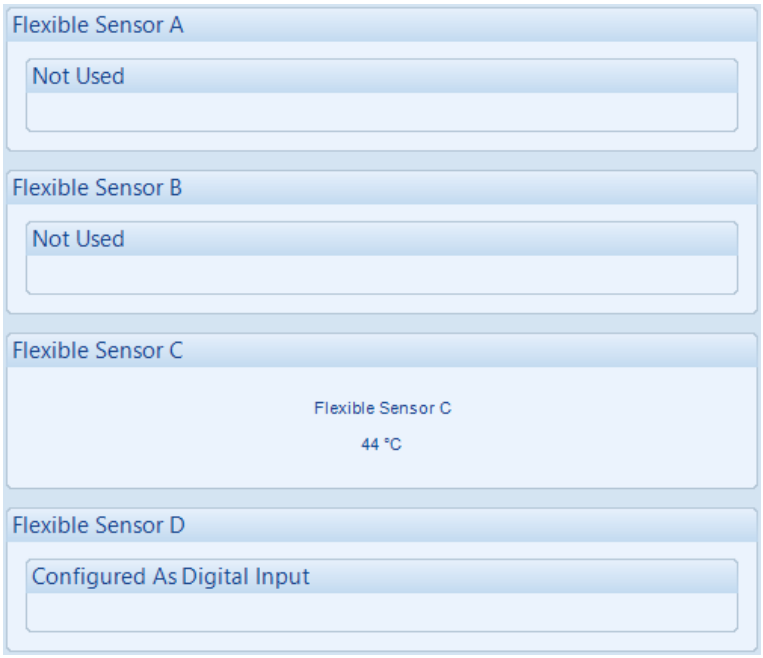


3.9 FUEL USE AND EFFICIENCY

This section displays the measurement of the Fuel Use and Efficiency parameters. These measurements come from either the module's inputs or from the engine ECU/ECM. For further details on how to configure these items, refer to section entitled *Fuel Use and Efficiency* under the *Engine* section elsewhere within this document.

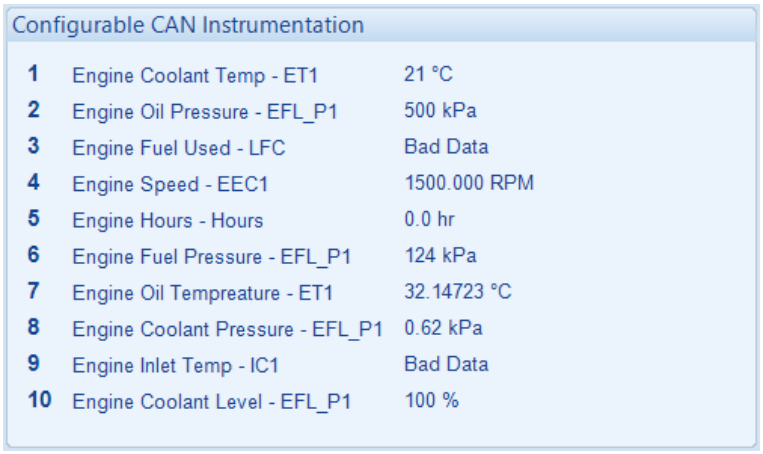
3.10 FLEXIBLE SENSORS

This section displays the status and instrumentation measured by the module's analogue inputs and the functions they are configured for. For further details on how to configure these items, refer to section entitled *Analogue Inputs* elsewhere within this document.



3.11 CONFIGURABLE CAN INSTRUMENTATION

This section displays the module's readings of the configured *CAN Instrumentation.* This is only available if the module is configured for *Configurable CAN Instrumentation*, the *Enhanced Canbus* option is enabled, and the message is available over the relevant configured CAN bus. For further details on how to configure these items, refer to section entitled *Configurable CAN Instrumentation* in the *Edit Config* section elsewhere within this document.

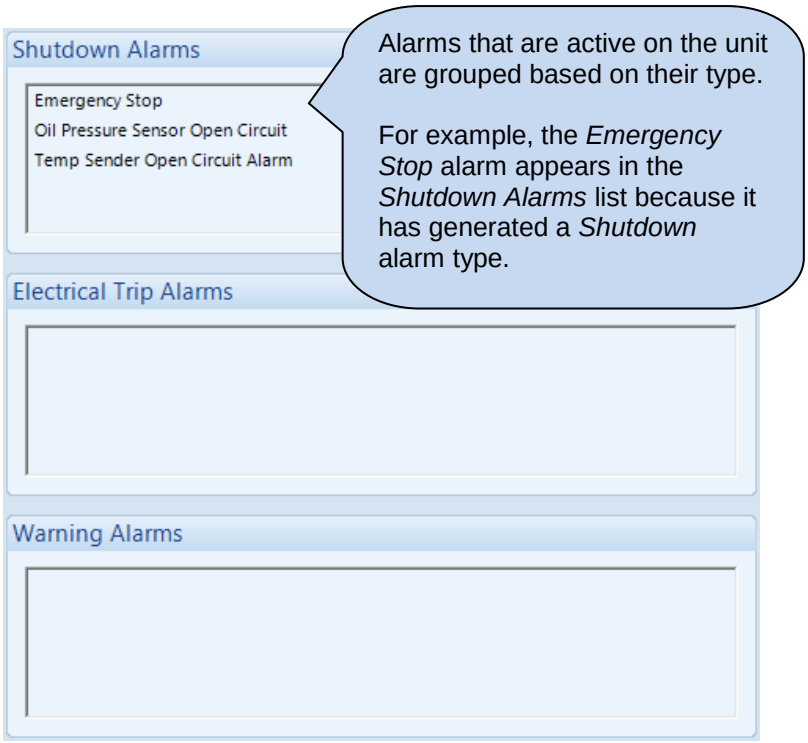


3.12 ALARMS

This section displays the alarms that are currently active on the module. For information in regards to alarm descriptions, refer to DSE publication: ***057-301 DSE8620 MKII Operation Manual*** which is found on the DSE website: www.deepseaelectronics.com.

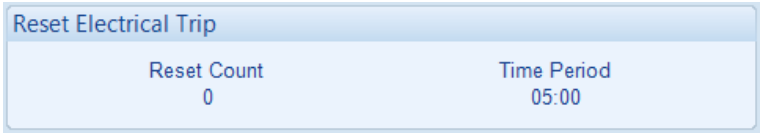
For information in regards to alarm severity, refer *to section entitled Alarm Types elsewhere within this document.*

Alarms



Reset Electrical Trip

NOTE: For further details on how this function is configured, refer to section entitled *Reset Electrical Trip* elsewhere within this document.



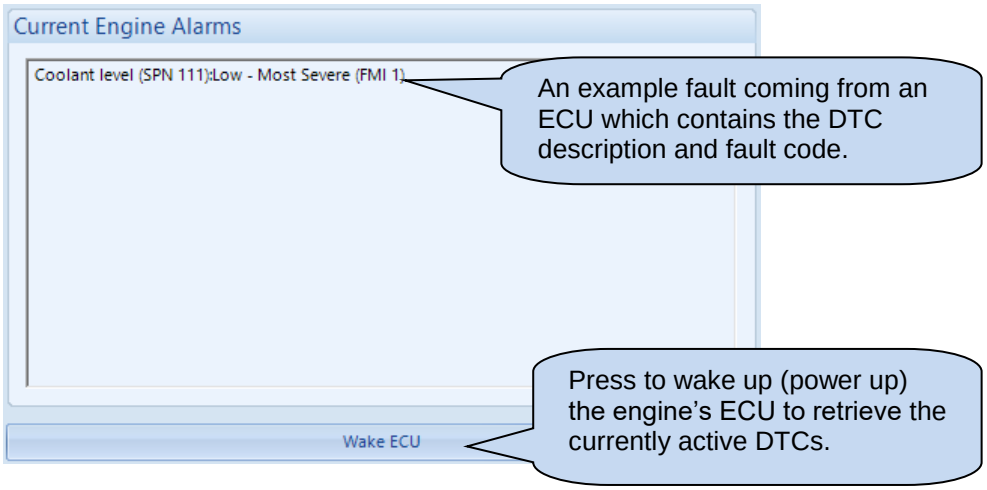
Parameter	Description
Reset Count	The number of times any electrical trips has been reset whilst the generator is running to enable it to go back on load. The counter goes to zero upon the generator stopping.
Time Period	The time interval for the *Reset Count*. If the *Reset Count* limit is reached within configured *Time Period*, no more resets can occur until the generator has stopped.

3.13 ENGINE ALARMS

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

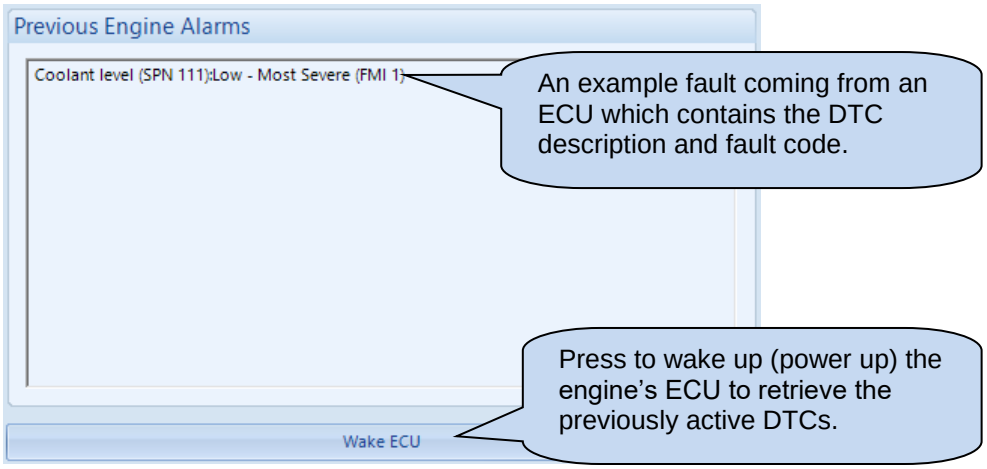
3.13.1 CURRENT ENGINE ALARMS

This section displays the list of active *ECU Current DTCs* (Diagnostic Trouble Codes) which are being read from the engine's ECU. *ECU Current DTCs* are DM1 messages and are only read when the engine's ECU is awake (powered up). For information, refer to DSE publication: ***057-004 Electronic Engines And DSE Wiring*** which is found on the DSE website: www.deepseaelectronics.com.



3.13.2 PREVIOUS ENGINE ALARMS

This section displays the list of active *ECU Previous DTCs* (Diagnostic Trouble Codes) which are being read from the engine's ECU. *ECU Previous DTCs* are DM2 messages and are only read when the engine's ECU is awake (powered up). For information, refer to DSE publication: ***057-004 Electronic Engines And DSE Wiring*** which is found on the DSE website: www.deepseaelectronics.com.



3.14 STATUS

This section displays the status information about the module.

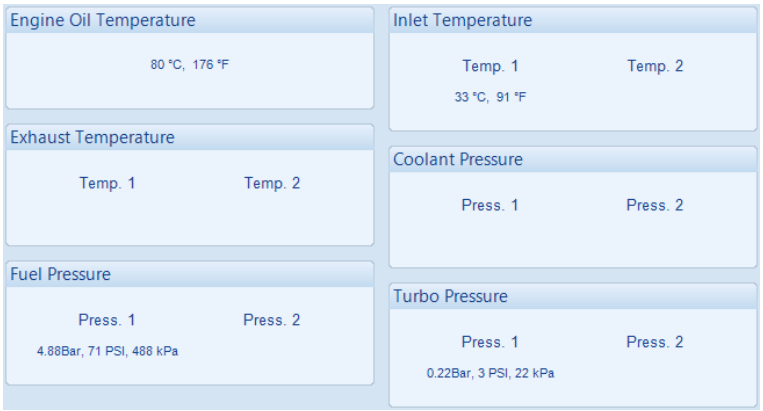
3.15 EVENT LOG

This section displays the events which are recorded with the module's event log along with the time, date and engine hours in which they occurred. For further details on how what events are recorded, refer to section entitled *Event Log* elsewhere within this document.

For information in regards to alarm descriptions, refer to DSE publication: ***057-301 DSE8620 MKII Operator Manual*** which is found on the DSE website: www.deepseaelectronics.com.

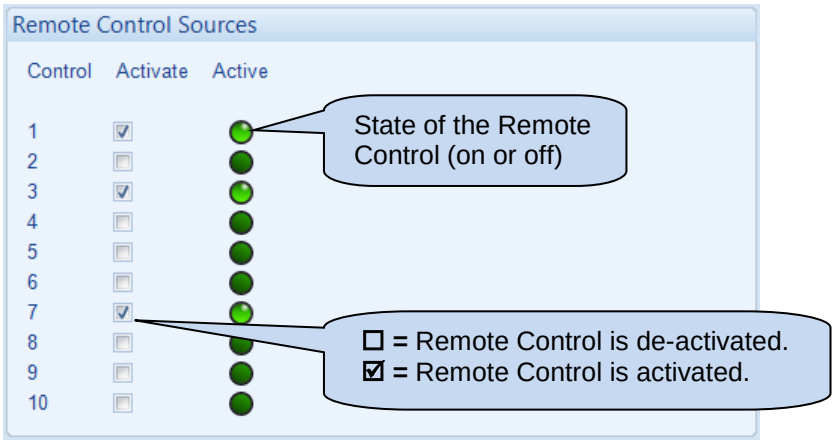
3.16 ENHANCED CANBUS

This section displays the measurement of the *Engine* parameters. These measurements come from the engine ECU/ECM. For further details on how to configure engine ECU/ECM, refer to section entitled *Application* elsewhere within this document.



3.17 REMOTE CONTROL

This section displays and controls the status of the module's *Remote Control* functions. Any of the module's outputs, expansion outputs, LED indicators, expansion LEDs indicators or PLC Flag Tests are to be configured to *Remote Control 1 to 10*. They are provided to enable control using the SCADA section of the DSE Configuration Suite or by third party PLC or Building Management Systems (for example) using the MODBUS protocol. For further details on how to configure these items, refer to section entitled *Digital Outputs* elsewhere within this document.

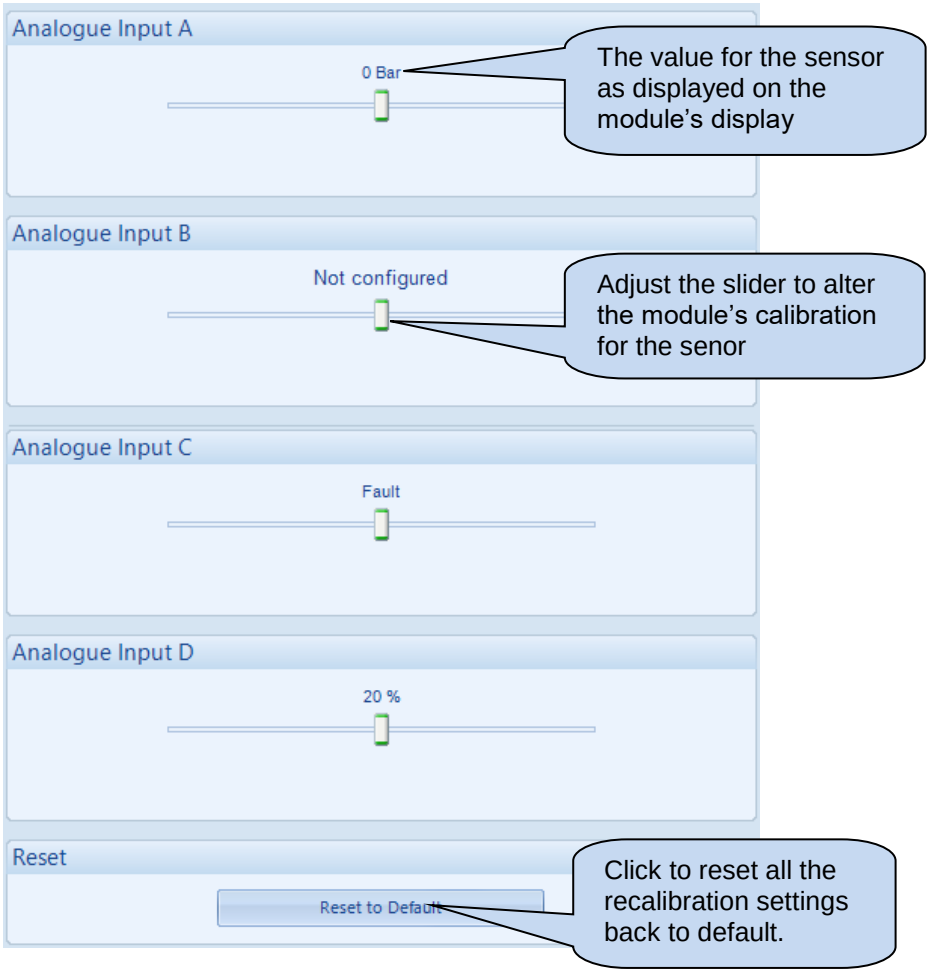


3.18 MAINTENANCE

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

3.18.1 RECALIBRATE TRANSDUCERS

This section allows the analogue sensor inputs of the module to be calibrated to remove inaccuracies caused by the tolerance of the sensor devices. While the engine is running, the instruments are calibrated and reference needs to be made to a third party accurate sensing device to ensure accurate recalibration.

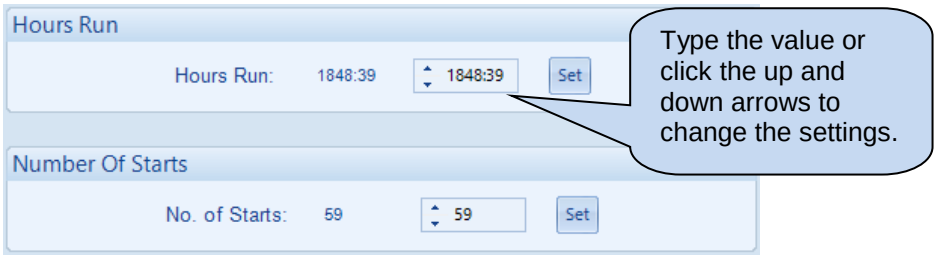


3.18.2 EXPANSION CALIBRATION

This section allows the analogue sensor inputs of the DSE2130 and DSE2131 expansion modules to be calibrated to remove inaccuracies caused by the tolerance of the sensor devices. While the engine is running, the instruments are calibrated and reference needs to be made to a third party accurate sensing device to ensure accurate recalibration.

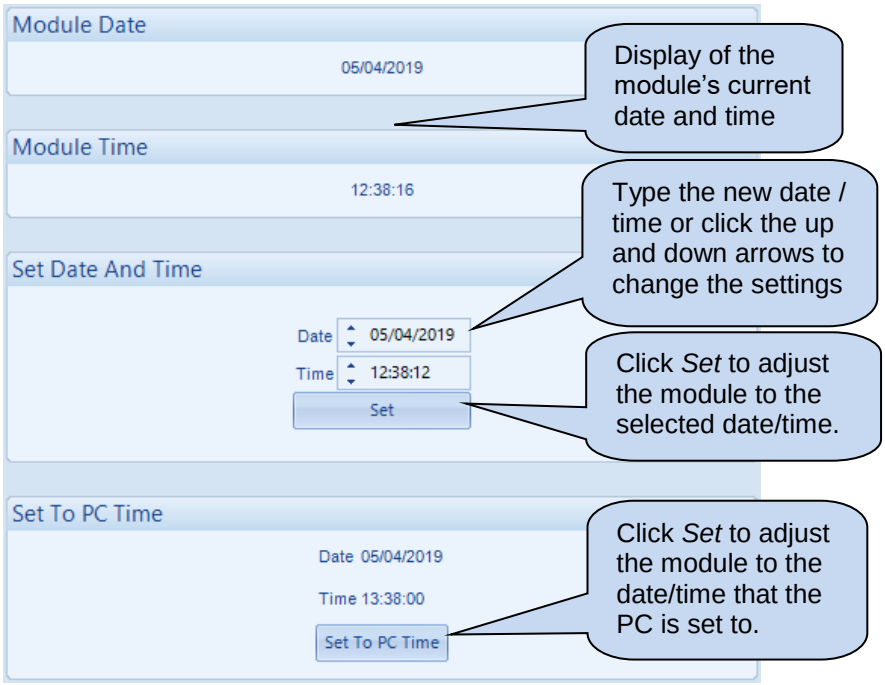
3.18.3 HOURS RUN AND NUMBER OF STARTS

This section allows the Hours Run and Number of Starts to be customised on the controller. Typically, this is used when fitting a new controller to an older engine so that the controller display matches the amount of work previously done by the system.



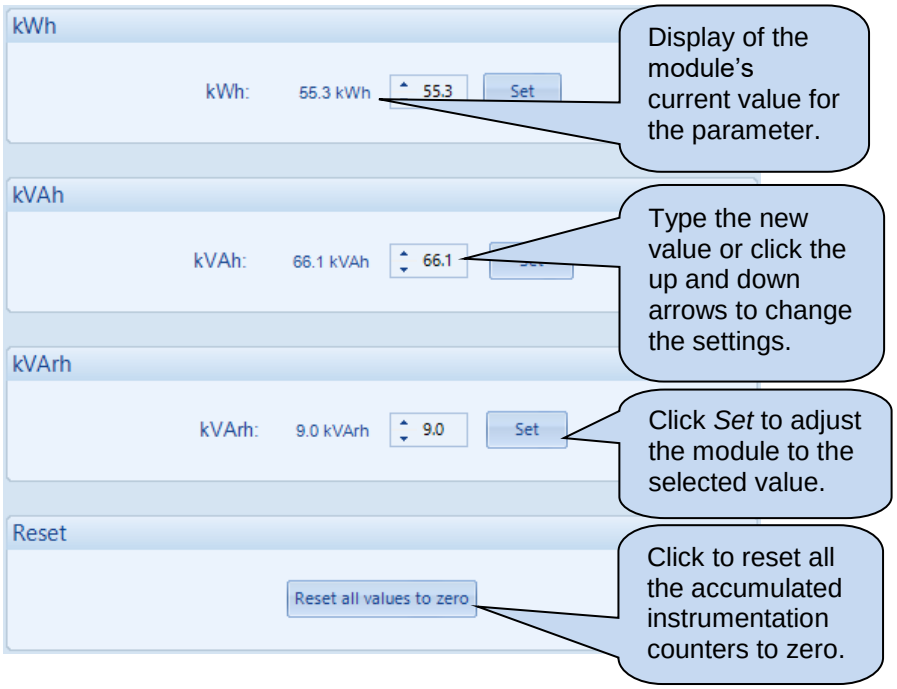
3.18.4 TIME

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

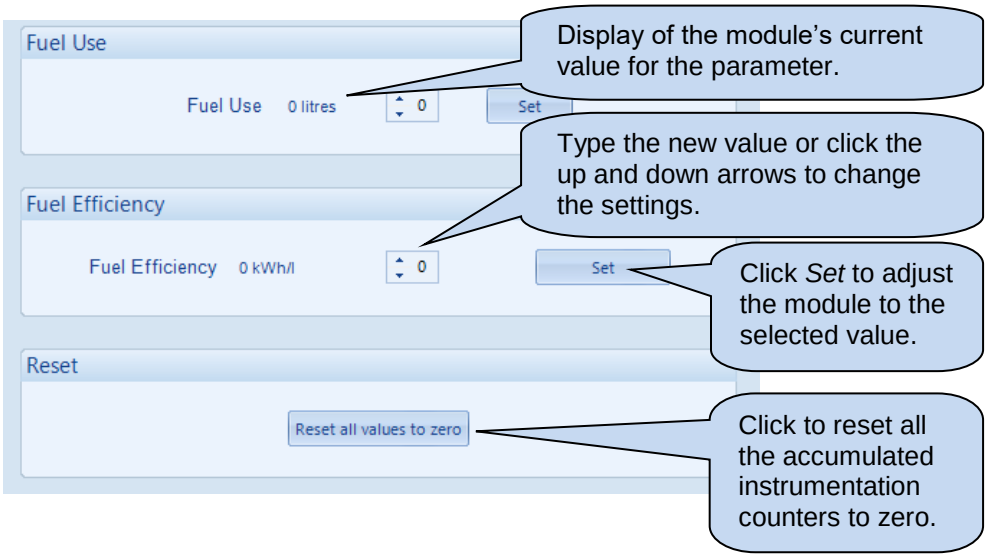


3.18.5 ACCUMULATED INSTRUMENTATION

This section allows the generators accumulated instrumentation to be adjusted on the controller.



3.18.6 FUEL USE AND EFFICIENCY

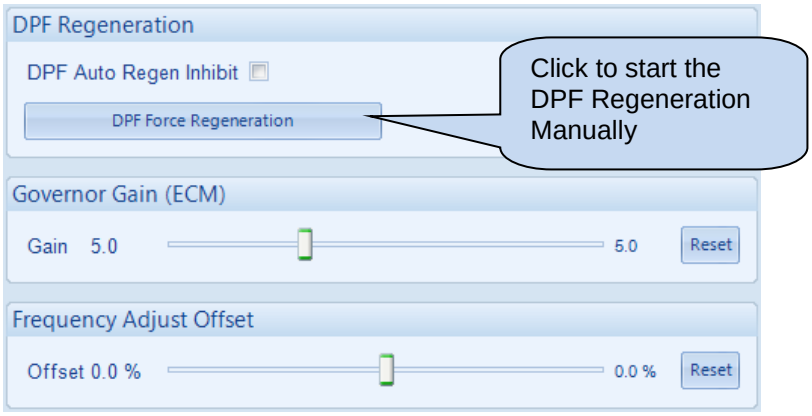


3.18.7 MAINTENANCE ALARM RESET

This section allows the module's three maintenance alarms to be reset and when the alarm is due to activate.

3.18.8 ELECTRONIC ENGINE CONTROLS

This section allows settings within the engine's ECU to be altered when supported.

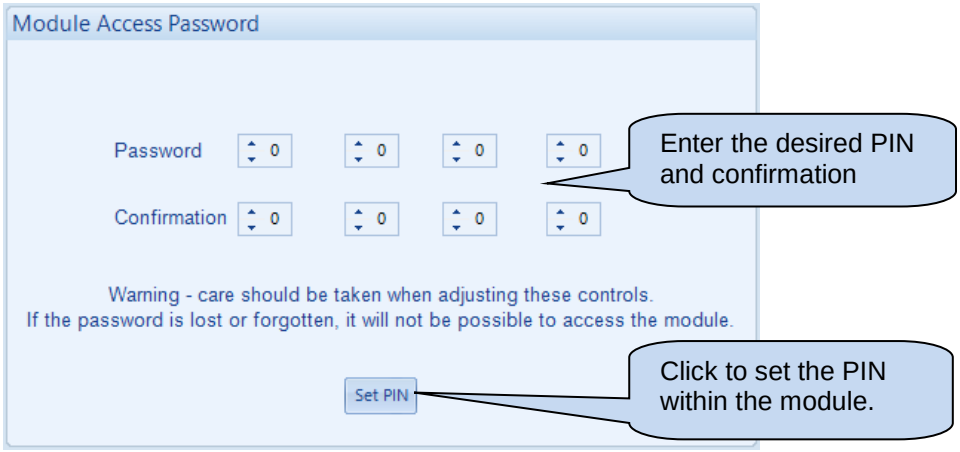


Parameter	Description
DPF Auto Regen Inhibit	☐ = The ECU's DPF Auto Regeneration happens automatically. ☑ = The ECU's DPF Auto Regeneration is inhibited from activating.
Governor Gain (ECM)	The setting for the *Gain (P)* of the ECU/ECM's control loop over the engine speed.
Frequency Adjust Offset	A positive/negative offset that is applied to the entire ECU/ECM's droop setting as percentage its configured nominal speed. An *Offset* of -1% with a nominal speed of 1500 RPM would result in the entire ECU's droop curve being offset by 15 RPM.

3.18.9 MODULE PIN

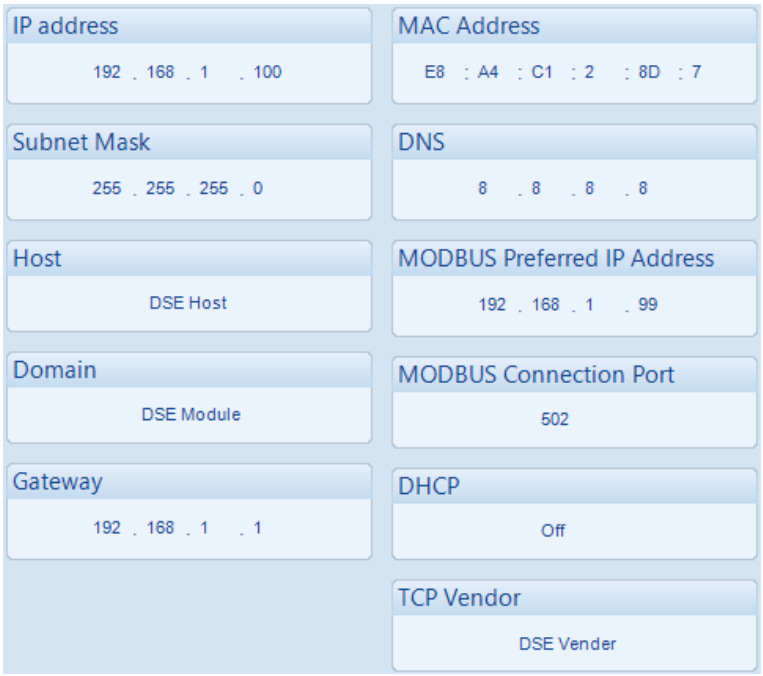
CAUTION!: If the module PIN is lost or forgotten, it is no longer possible to access or make changes to the module!

This section allows the user to configure a PIN (Personal Identification Number) within the module. This PIN must be entered to access the modules *Main Front Panel Configuration Editor* or, when writing a configuration / changing a value in SCADA using the DSE Configuration Suite PC Software.



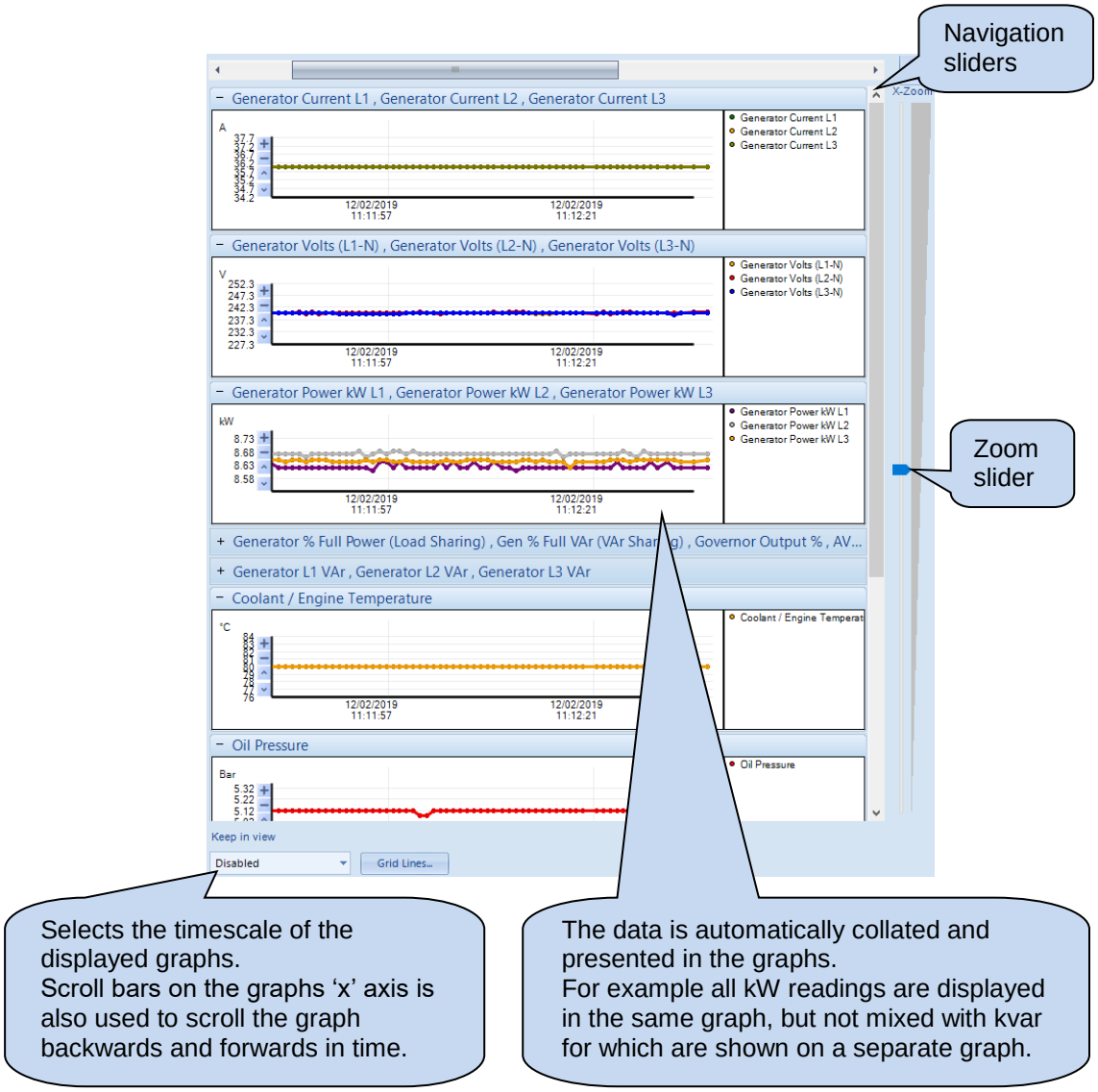
3.19 COMMUNICATIONS INFORMATION

This section displays the information about the configuration of the module's ethernet port. For further details on how to configure the module's ethernet port, refer to section entitled *Ethernet* elsewhere within this document.



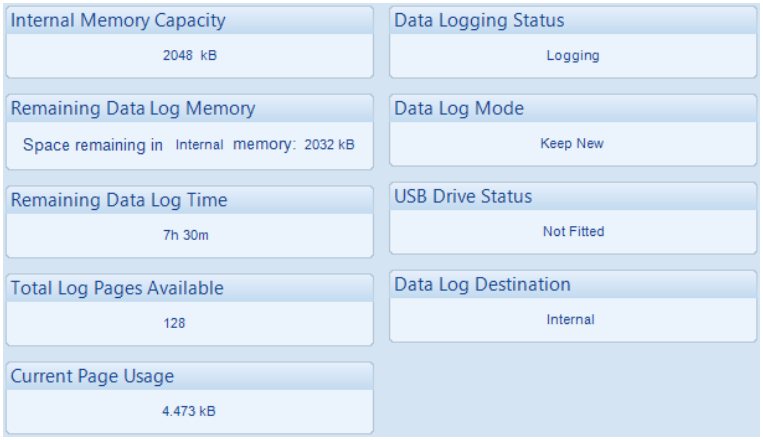
3.20 DATA LOG

This section displays and temporarily records the instruments configured within the module's *Data Logging* facility to the PC. The data which is temporarily recorded is only for the duration in which the *Data Log* section is viewed. For further details on how to configure these items, refer to section entitled *Data Logging* elsewhere within this document.



3.20.1 DATA LOG STATUS

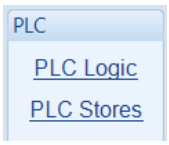
This section displays the information module's *Data Logging* function. For further details on how to configure the module's Data Logging function, refer to section entitled *Data Logging* elsewhere within this document.



3.21 PLC

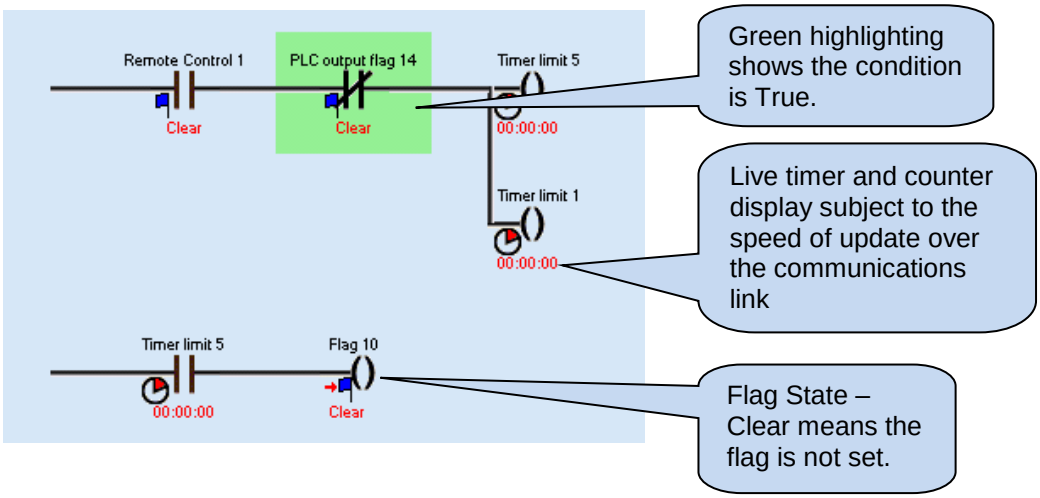
NOTE: For further details and instructions on how to utilise the *PLC,* refer to DSE publication: *057-175 PLC Programming Guide for DSE Controllers*, which is found on the DSE website: www.deepseaelectronics.com.

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



3.21.1 PLC LOGIC

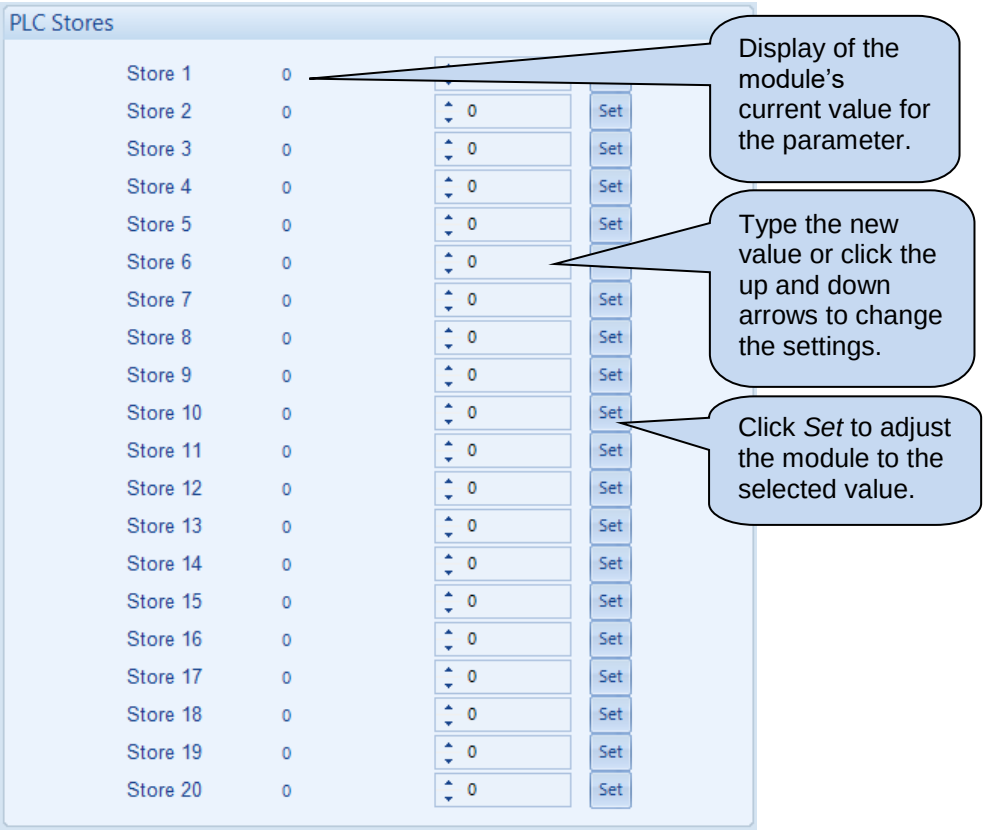
Allows monitoring of the PLC functions within the controller.



3.21.2 PLC SOTRES

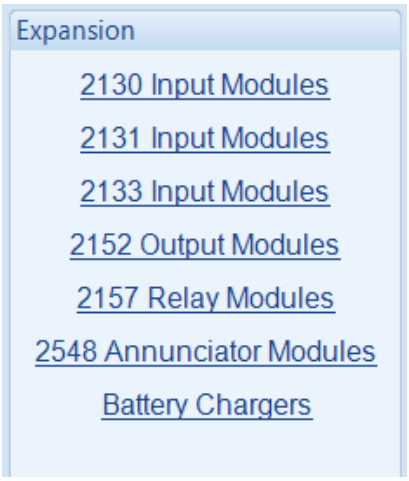
The *PLC Stores* section is subdivided into smaller sections.
Select the required section with the mouse.

The selected section displays the value currently set for each *Store* an provides the user with the ability to change that value. *Stores* are used within the module's PLC to affect mathematical equations or change set points within the created PLC functions.

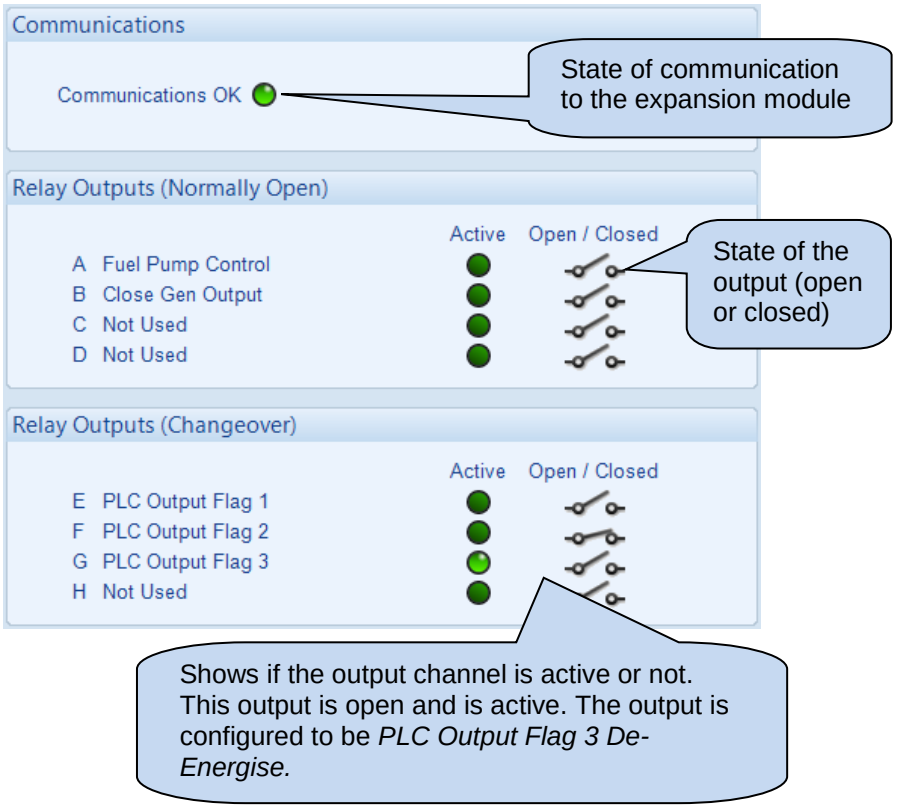


3.22 EXPANSION

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



The selected section displays the status of the expansion module's inputs/outputs/LEDs etc and the functions they are configured for. For further details on how to configure these items, refer to section entitled *Expansion* in the *Edit Config* section elsewhere within this document. An example status of a DSE2157 Output Expansion is shown below.



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 is 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.
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 or Shutdown Alarm if left untreated.
Electrical Trip	Audible alarm and common alarm signal is generated. The set is taken off load and the cooling timer begins, after which the set is 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.
Shutdown	Audible alarm and common alarm signal is generated. The set is taken off load and immediately stopped. *Shutdown alarms* are serious issues that demand immediate stopping of the generator. For instance Emergency Stop or Overspeed alarms require immediate shutdown.

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	Stopped	Start Delay	ECU Wake Up Delay	Preheat	Cranking	Safety On Delay	Smoke Limiting	Smoke Limiting Off	Warming Up	Gen Available	Gen On Load	Generator and Mains in Parallel	Cooling	Cooling in Idle
Never														
Active from Parallel														
Always														
When Stationary														
Wait for ECU														
From Starting														
Overfrequency / Overspeed Overshoot														
Engine Protection														
From Safety On														
From Breaker Closed														
From Mains Parallel														

5.1 NEVER

The protection is never active on the controller. This is used to disable the protection.

5.2 ACTIVE FROM PARALLEL

The protection is active from the moment the generator and the mains supplies are in parallel.

5.3 ALWAYS

The protection is always active on the controller. This is used to constantly monitor statuses such as a fuel level switch irrespective of the engine running state.

5.4 WHEN STATIONARY

The protection is active from the moment the engine stops until the beginning of engine cranking.

5.5 WAIT FOR ECU

The protection is active if the ECU Start Up delay has been configured and the timer is currently active.

5.6 FROM STARTING

The protection is active from the beginning of engine cranking, until the engine stops.

5.7 OVERSHOOT

Active during the *Safety Delay* timer, this allows for a temporary raise of the overspeed/overfrequency trip points during start-up.

Protection Level	Over Frequency Trip Level	Over Speed Trip Level
Immediate Shutdown	Over Frequency + Overshoot %	Over Speed + Overshoot %
Delayed Shutdown (Overspeed Overshoot Delay)	Over Frequency	Over Speed

Example

57 Hz *Over Frequency* setting, 10% *Overspeed Overshoot*
During *Safety Delay* a generator frequency above (57 Hz x 1.1) = 62.7 Hz results in an immediate shutdown without delay.
After *Safety delay*, a generator frequency above 57 Hz for the period of the *Generator Transient Delay* results in a shutdown

5.8 ENGINE PROTECTION

The protection is active when the engine is running and all engine protection (for example oil pressure and coolant temperature) are in a ‘healthy’ state.
Oil Pressure Warning
Oil Pressure Shutdown
Oil Pressure Open Circuit (CANbus engine)
High Coolant Temperature Warning
High Coolant Temperature Shutdown
High Coolant Temperature Electrical Trip
High Coolant Temperature Open circuit (CANbus engine)
CAN ECU Warning
CAN ECU Shutdown
Generator Phase Rotation Shutdown

5.9 FROM SAFETY ON

The protection is active when the set is running at nominal speed, until the engine stops.

5.10 FROM BREAKER CLOSED

The protection is active when the set is running with it’s switchgear closed .

5.11 FROM MAINS PARALLEL

he protection is active when the set is running with it’s switchgear closed and a digital input configured for *Mains Parallel Mode* which is active.

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