



DEEP SEA ELECTRONICS

DSEG7400

Configuration Suite PC Software Manual

Document Number: 057-393

Author: Ian Roberts



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

Sales Tel: +44 (0) 1723 890099

E-mail: sales@deepseaelectronics.com

Website: www.deepseaelectronics.com

DSEG7400 Configuration Suite PC Software Manual

© Deep Sea Electronics Ltd.

All rights reserved. No part of this publication may be reproduced in any material form (including photocopying or storing in any medium by electronic means or other) without the written permission of the copyright holder except in accordance with the provisions of the Copyright, Designs and Patents Act 1988.

Applications for the copyright holder's written permission to reproduce any part of this publication must be addressed to Deep Sea Electronics Ltd. at the address above.

The DSE logo and the names DSE^{Genset}®, DSE^{ATS}®, DSE^{Power}® and DSE^{Control}® are UK registered trademarks of Deep Sea Electronics Ltd.

Any reference to trademarked product names used within this publication is owned by their respective companies.

Deep Sea Electronics Ltd. reserves the right to change the contents of this document without prior notice.

Amendments Since Last Publication

Issue	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.....	6
1.1.1 CLARIFICATION OF NOTATION	7
1.1.2 GLOSSARY OF TERMS	7
1.2 BIBLIOGRAPHY	8
1.2.1 INSTALLATION INSTRUCTIONS	8
1.2.2 MANUALS	8
1.2.3 THIRD PARTY DOCUMENTS	9
1.3 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE	10
2 GENERAL CONTROLS.....	11
2.1 USER CONTROLS.....	11
3 EDITING THE CONFIGURATION	13
3.1 SCREEN LAYOUT	13
3.2 MODULE	14
3.2.1 MODULE OPTIONS.....	14
3.2.2 MISCELLANEOUS OPTIONS.....	16
3.2.3 CONFIGURABLE FRONT PANEL EDITOR.....	20
3.2.4 DISPLAY CONFIGURATION	21
3.2.5 USER DEFINED STRINGS.....	25
3.2.6 EVENT LOG	26
3.2.7 DATA LOGGING	28
3.3 APPLICATION	34
3.4 INPUTS.....	41
3.4.1 ANALOGUE INPUT CONFIGURATION	41
3.4.3 ANALOGUE INPUTS	43
3.4.4 DIGITAL INPUTS	50
3.4.5 ANALOGUE INPUTS	52
3.4.6 INPUT FUNCTIONS.....	53
3.5 OUTPUTS.....	58
3.5.1 DIGITAL OUTPUTS	58
3.5.2 VIRTUAL LEDS	59
3.5.3 VOLTAGE REFERENCE OUTPUT	59
3.5.4 OUTPUT SOURCES	60
3.6 TIMERS	70
3.6.1 START TIMERS	70
3.6.2 LOAD / STOPPING TIMERS	73
3.6.3 MODULE TIMERS	74
3.7 GENERATOR.....	75
3.7.1 GENERATOR OPTIONS	75
3.7.2 GENERATOR VOLTAGE.....	78
3.7.3 GENERATOR FREQUENCY	80
3.7.4 GENERATOR CURRENT	83
3.7.5 GENERATOR POWER	96
3.7.6 AVR	99
3.8 MAINS (AUTO MAINS FAIL).....	100
3.8.1 MAINS OPTIONS	100
3.8.2 MAINS ALARMS	104
3.8.3 MAINS CURRENT	105
3.9 ENGINE.....	106
3.9.1 ENGINE OPTIONS	107
3.9.2 ECU (ECM).....	109
3.9.3 OIL PRESSURE	123
3.9.4 COOLANT TEMPERATURE.....	124
3.9.5 FUEL OPTIONS	127
3.9.6 DEF LEVEL	137
3.9.7 GAS ENGINE OPTIONS	138

3.9.8	CRANKING.....	139
3.9.9	SPEED SENSING	141
3.9.10	SPEED SETTINGS	142
3.9.11	PLANT BATTERY	145
3.9.12	ENGINE ICON DISPLAYS	147
3.10	COMMUNICATIONS	151
3.10.1	COMMUNICATION OPTIONS	151
3.10.2	RS485 PORT.....	152
3.10.3	ETHERNET PORT	153
3.10.4	CAN PORTS.....	156
3.10.5	SNMP	156
3.11	SCHEDULER.....	158
3.11.1	SCHEDULER OPTIONS	158
3.11.2	BANK 1 / BANK 2.....	159
3.12	MAINTENANCE ALARM	160
3.13	CONFIGURABLE CAN INSTRUMENTATION	161
3.13.1	RECEIVED INSTRUMENTATION (1-30)	161
3.13.2	TRANSMITTED INSTRUMENTATION	166
3.14	ALTERNATIVE CONFIGURATIONS	169
3.14.1	ALTERNATIVE CONFIGURATION OPTIONS	169
3.14.2	ALTERNATIVE CONFIGURATION 1 TO 5	170
3.15	EXPANSION	171
3.15.1	2130 INPUT MODULES	172
3.15.2	DSE2131 INPUT MODULES	179
3.15.3	DSE2133 INPUT MODULES	186
3.15.4	DSE2152 OUTPUT MODULES	190
3.15.5	DSE2157 RELAY MODULES	194
3.15.6	2548 ANNUNCIATOR MODULES	195
3.15.7	DSE2160 I/O MODULES	197
3.15.8	BATTERY CHARGERS	209
3.16	ADVANCED.....	210
3.16.1	ADVANCED OPTIONS	210
3.16.2	PLC.....	216
3.16.3	CONFIGURABLE GENCOMM PAGES	217
4	SCADA	219
4.1	GENERATOR IDENTITY	220
4.2	MIMIC	220
4.3	DIGITAL INPUTS	221
4.4	DIGITAL OUTPUTS	222
4.5	VIRTUAL LEDS.....	223
4.6	MAINS	224
4.6.1	FREQUENCY, VOLTAGES AND CURRENT	224
4.6.2	POWER.....	225
4.7	GENERATOR.....	226
4.7.1	FREQUENCY, VOLTAGES AND CURRENT	226
4.7.2	POWER.....	227
4.7.3	MULTISET.....	228
4.8	ENGINE	229
4.9	FUEL USE AND EFFICIENCY.....	230
4.10	FLEXIBLE SENSORS	231
4.10.1	FLEXIBLE SENSOR A TO C	231
4.10.2	FLEXIBLE SENSOR D TO F.....	231
4.11	CONFIGURABLE CAN INSTRUMENTATION	232
4.12	ALARMS.....	232
4.13	ENGINE ALARMS.....	233
4.13.1	CURRENT ENGINE ALARMS	233
4.13.2	PREVIOUS ENGINE ALARMS	233
4.14	STATUS.....	234
4.15	EVENT LOG	235
4.16	ENHANCED CANBUS	236

4.17	REMOTE CONTROL	237
4.18	MAINTENANCE	238
4.18.1	RECALIBRATE TRANSDUCERS	238
4.18.2	EXPANSION CALIBRATION	242
4.18.3	HOURS RUN AND NUMBER OF STARTS	242
4.18.4	TIME	243
4.18.6	FUEL USE AND EFFICIENCY	244
4.18.7	MAINTENANCE ALARM RESET	245
4.18.8	ELECTRONIC ENGINE CONTROLS	246
4.18.9	MANUAL SPEED TRIM	247
4.18.10	MODULE LOCK	248
4.19	DATA LOG	251
4.19.1	DATA LOG STATUS	251
4.21	AVR	252
4.21.1	FREQUENCY, VOLTAGES AND CURRENT	252
4.21.2	DIAGNOSTICS	253
4.21.3	STATUS	253
4.21.4	CONTROL	254
4.21.5	AVR ALARMS	254
4.22	EXPANSION	255
5	ALARM TYPES	256
6	ALARM ARMING	257
6.1	NEVER	258
6.2	ALWAYS	258
6.3	WHEN STATIONARY	258
6.4	WAIT FOR ECU	258
6.5	FROM STARTING	258
6.6	ENGINE PROTECTION	258
6.7	FROM SAFETY ON	258
6.8	OVERSHOOT	259
6.9	LOADING ALARMS	259

1 INTRODUCTION

This document details the use of the *DSE Configuration Suite PC Software* with the DSEG7400 module, which is part of the DSE **Genset**® 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 DSEG7400 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.

1.1.1 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.

1.1.2 GLOSSARY OF TERMS

Term	Description
DSE73xx	All modules in the DSE73xx range.
DSEG7400	DSEG7400 module/module
CAN	Controller Area Network Vehicle standard to allow digital devices to communicate to one another.
CDMA	Code Division Multiple Access Cell phone access used in small number of world areas including parts of the USA and Australia.
CT	Current Transformer An electrical device that takes a large AC current and scales it down by a fixed ratio to a smaller scale.
BMS	Building Management System A digital/computer-based control system for a building's infrastructure.
DEF	Diesel Exhaust Fluid (AdBlue) A liquid used as a consumable in the SCR process to lower nitric oxide and nitrogen dioxide concentration in engine exhaust emissions.
DM1	Diagnostic Message 1 A DTC that is currently active on the engine ECU (ECM).
DM2	Diagnostic Message 2 A DTC that was previously active on the engine ECU (ECM) and has been stored in the ECU's (ECM) internal memory.
DPF	Diesel Particulate Filter A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas.
DPTC	Diesel Particulate Temperature Controlled Filter A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas which is temperature controlled.
DTC	Diagnostic Trouble Code The name for the entire fault code sent by an engine ECU (ECM).
ECU/ECM	Engine Control Unit/Management An electronic device that monitors engine parameters and regulates the fuelling.
FMI	Failure Mode Indicator A part of DTC that indicates the type of failure, e.g. high, low, open circuit etc.

Continued over page...

Term	Description
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
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.
SCADA	Supervisory Control And Data Acquisition A system that operates with coded signals over communication channels to provide control and monitoring of remote equipment.
SCR	Selective Catalytic Reduction A process that uses DEF with the aid of a catalyst to convert nitric oxide and nitrogen dioxide into nitrogen and water to reduce engine exhaust emission.
SIM	Subscriber Identity Module. The small card supplied by the GSM/CDMA provider that is inserted into the cell phone, GSM modem or DSEGateway device to give GSM/GPRS connection.
SMS	Short Message Service The text messaging service of mobile/cell phones.
SPN	Suspect Parameter Number A part of DTC that indicates what the failure is, e.g. oil pressure, coolant temperature, turbo pressure etc.

1.2 BIBLIOGRAPHY

This document refers to and is referred to by the following DSE publications which is obtained from the DSE website www.deepseaelectronics.com.

1.2.1 INSTALLATION INSTRUCTIONS

DSE Part	Description
053-287	DSEG7400 Installation Instructions

1.2.2 MANUALS

DSE Part	Description
057-004	Electronic Engines and DSE wiring
057-151	DSE Configuration Suite PC Software Installation & Operation Manual
057-281	DSEA108 Operator Manual
057-283	DSEA108 Software Manual
057-394	DSEG7400 Operator Manual

1.2.3 THIRD PARTY DOCUMENTS

The following third party documents are also referred to:

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

1.3 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

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

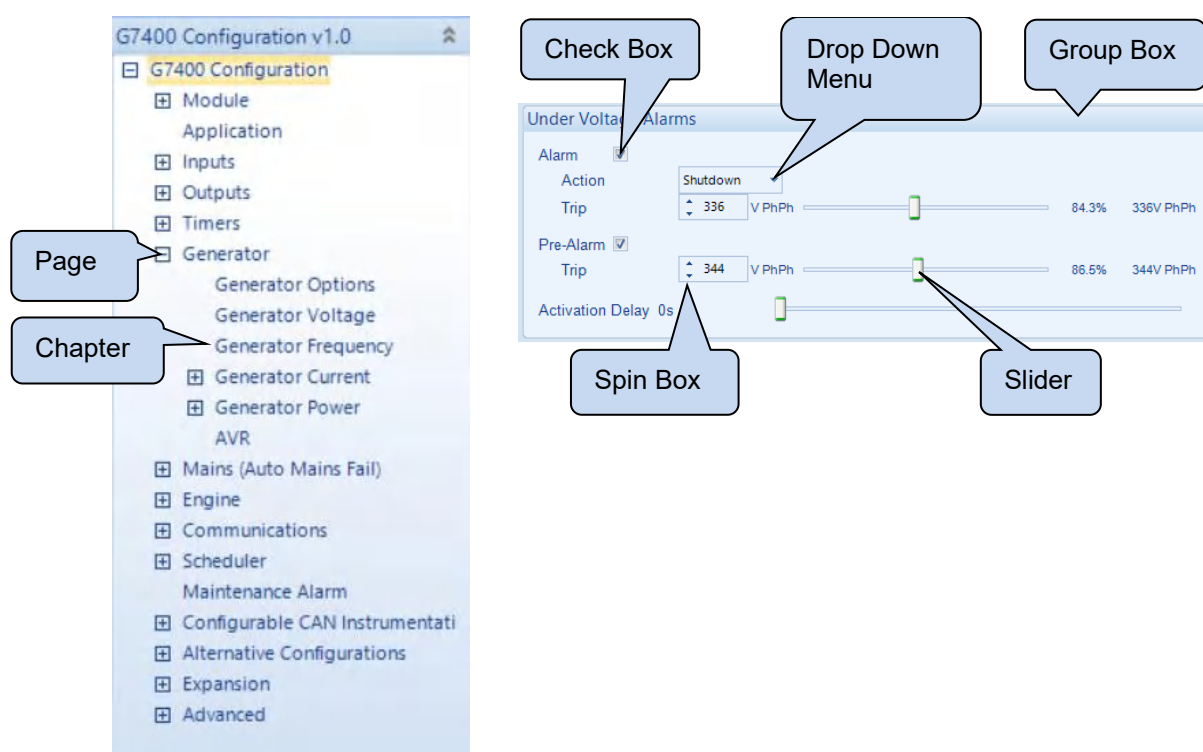
2 GENERAL CONTROLS

NOTE: For information on Menu & Toolbars please refer to DSE Publication: 057-151 *DSE Configuration Suite PC Software Installation & Operation Manual*.

Overview

The *DSE Configuration Suite PC Software* dialog boxes provide the user with a way to type text, choose options, and initiate actions. Controls in other windows provide a variety of services, such as letting the user choose commands and view and edit text. This section describes the controls provided by the *DSE Configuration Suite* and how to manipulate them.

The diagram below shows the general controls of the main configuration screen.



2.1 USER CONTROLS

Slider

The Slider Control allows the user to change a value using a mouse or arrows found on a standard keyboard.

The slider is highlighted in green in its inactive state and changes to orange (active state) once selected by a mouse pointer.



Inactive state

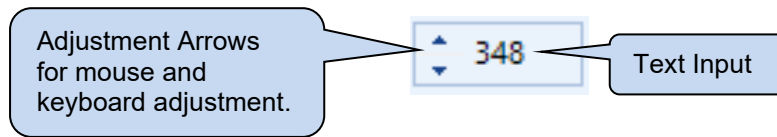


Active state

During the active state, the slider is moved with the mouse pointer and the left and right keyboard arrows.

Spin Box

The Spin box displays the current value of the setting in the group box.



Clicking the mouse over the Spin box changes its colour to orange, putting it in an active state.



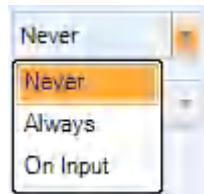
During the active state text is entered using the keyboard, changed using the mouse pointer or the up and down arrows on the keyboard.

Check box

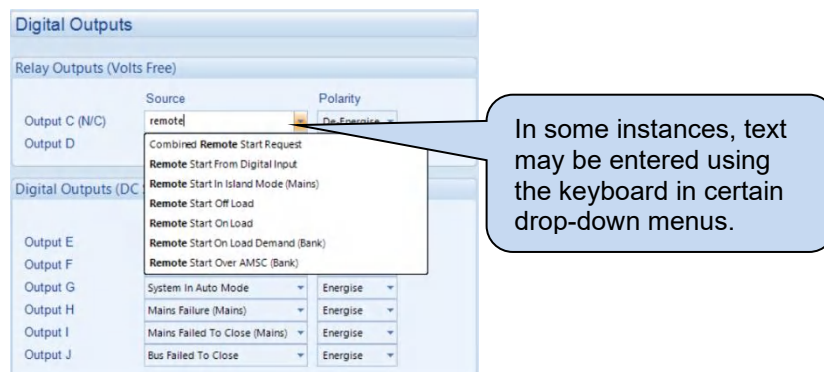


Used to select a parameter

Drop down menu



Used to select an action

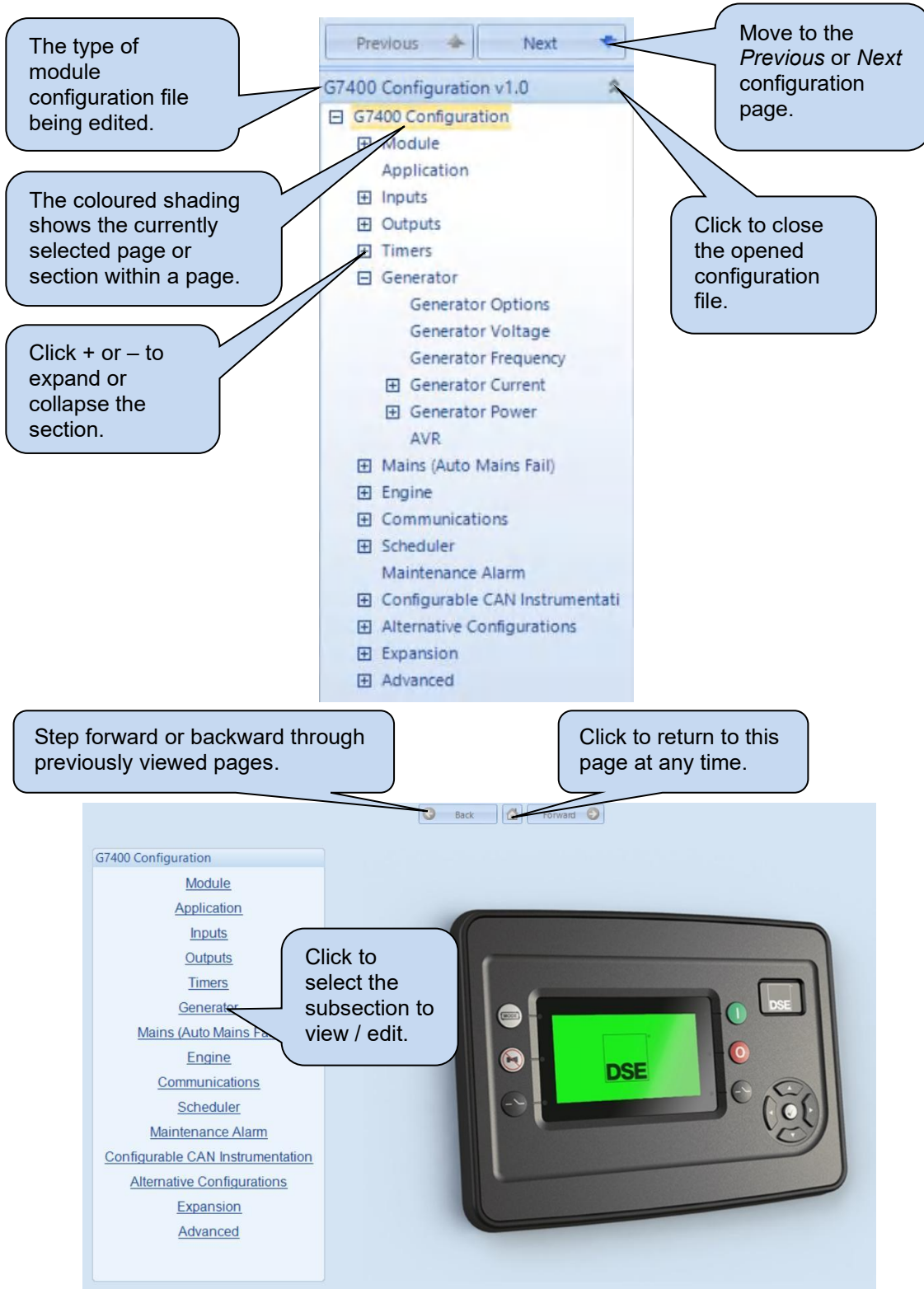


Used to select a source

3 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.

3.1 SCREEN LAYOUT

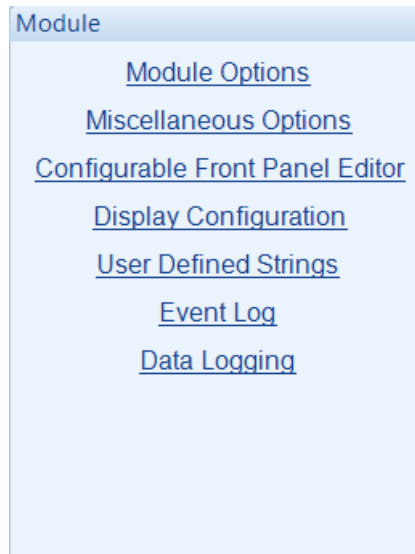


3.2 MODULE

The module section is subdivided into smaller sections.

Select the required section with the mouse.

This section allows the user to change the options related to the module itself.



3.2.1 MODULE OPTIONS

Description

The image shows a software window titled 'Description'. Inside the window, there are two input fields, each preceded by a number in a small box. The first input field is preceded by '1' and the second by '2'. Both input fields are empty.

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

Start Up Image

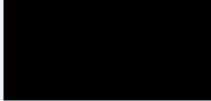
Start Up Image

Show at Start Up ☒

Duration 2s

Use for ScreenSaver ☒

Delay 5m



Select Image

Clear

Monochrome bitmap of size (width x height) 132 x 64 pixels.

Parameter	Description
Show at Start Up	☐ = When disabled, the controller skips the start-up screen and goes straight to the main display; operation is unaffected. ☒ = Enable a <i>Start Up Text</i> or <i>Image</i> to be displayed on the module's LCD at power up. Start Up Image Show at Start Up ☒ Duration 2s Use for ScreenSaver ☒ Delay 5m  Select Image Clear Monochrome bitmap of size (width x height) 132 x 64 pixels.
Use for Screensaver	☐ = When disabled, the screensaver does not activate, and the current screen remains visible; operation is unaffected. ☒ = Module activates the Screensaver to show the selected image after inactivity in any mode for the configured <i>Delay</i> time. Press any button to 'end' the Screensaver.
Select Image	Browse and select the image file to display at power up. The file required has to be a monochrome bitmap image of size 192 pixels in width by 96 pixels in height.
Clear	Clears the image file selection.
Duration	Set the duration for which the <i>Start Up Image</i> is displayed at power up.

3.2.2 MISCELLANEOUS OPTIONS

Miscellaneous Options

Enable Fast Loading Feature	☒
Audible Alarm Prior to Starting	☒
All Warnings are Latched	☒
Enable Sleep Mode	☒
Enable Manual Fuel Pump Control	☒
Enable Manual Frequency Trim Control	☒
Support Right-To-Left Languages in Module Strings	☒
Power Up in Mode	Stop ▼
Enable Cool Down in Stop Mode	☒
Enable Maintenance Reset on Module Front Panel	☒
Enable Backlight Power Saving Mode	☒
Show Active DTC	☒
Show Inactive DTC	☒
Filter Generator Voltage Display	☒
Filter Constant	30 ▲ ▼ ■

Parameter	Description
Enable Fast Loading	NOTE: Enabling Fast Loading is only recommended where steps have been taken to ensure rapid startup 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 module starts the engine with no audible indication. ☒ = The module gives an audible warning during the pre-start sequence as an indicator that the set is about to run. This is often a site's specification requirement of AUTO mode operation.
All Warnings Are Latched	☐ = The <i>All Warnings Are Latched</i> is disabled. The module automatically resets the warning and pre-alarms once the triggering condition has been cleared. ☒ = The <i>All Warnings Are Latched</i> 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 <i>Alarm Reset</i> or, pressing the Stop/Reset Mode  button once the triggering condition has been cleared.

Parameters are continued overleaf...

Parameter	Description
Enable Sleep Mode	 NOTE: Sleep Mode is disabled when the module's USB, or any of its Modbus communication ports (RS232, RS485, Ethernet) are in use, or when it is Data Logging. ☐ = When disabled, the controller remains fully active and does not enter sleep mode; power consumption is increased but operation is unchanged. ☒ = The <i>Sleep Mode</i> is enabled. The module goes into a low current mode when it is left in the Stop/Reset Mode  for the duration of the <i>Sleep Timer</i> if the communication ports or data logging facility are not active. Press any button on the module's fascia to take it out of <i>Sleep Mode</i>.
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.  NOTE: Manual Fuel Pump Control is only available when a fuel level sensor is configured. ☐ = When disabled, manual fuel pump control is unavailable, and pump operation is automatic only. ☒ = The <i>Manual Fuel Pump Control</i> is enabled. To manually control the fuel pump, press the Tick  button when viewing the <i>Fuel Level</i> instrument on the module's display.
Enable Manual Frequency Trim Control	☐ = When disabled, <i>Manual Frequency Trim Control</i> is unavailable, and frequency control remains automatic only. ☒ = <i>Manual Frequency Trim Control</i> is enabled when speed control over CAN is available, this allows manual speed trim control through the <i>Front Panel Running Editor</i>.
Support Right-To-Left Languages in Module Strings	☐ = The <i>Support Right-To-Left Languages in Module Strings</i> is disabled. The module displays user configured strings in the order left to right. ☒ = The <i>Support Right-To-Left Languages in Module Strings</i> is enabled. The module displays user configured strings in the order right to left.
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. Manual: The module powers up in the Manual Mode. Stop: The module powers up in the Stop/Reset Mode .
Enable Cool Down in Stop Mode	☐ = The <i>Cool Down in Stop Mode</i> is disabled. Pressing the Stop/Reset Mode  button instructs the module to immediately open the generator's switchgear and stop the generator. ☒ = The <i>Cool Down in Stop Mode</i> is disabled. Pressing the Stop/Reset Mode  button instructs the module to immediately open the generator's switchgear and instructs the generator to run for the duration of the <i>Cooling</i> time. Pressing the Stop/Reset Mode  button again results in the generator stopping immediately.

Parameters are continued overleaf...

Parameter	Description
Enable Maintenance Reset on Module Front Panel	☐ = The maintenance alarms are only reset through the SCADA section of the DSE Configuration Suite software or digital input if configured. ☒ = The maintenance alarms are also reset by scrolling to the maintenance page on the module. By pressing and holding the <i>Stop / Reset</i> button on each alarm, the operator is able to reset each individual alarm.
Enable Backlight Power Saving Mode	☐ = When disabled, the backlight remains on at all times; power consumption is increased but operation is unaffected. ☒ = Enables DC power saving by turning off the LCD Backlight when the module is not operated for the duration of the <i>Backlight Timer</i>.
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 <i>Show Active DTC</i> is disabled. The module does not display DM1 fault codes that are active on the engine ECU/ECM. ☒ = The <i>Show Active DTC</i> 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 <i>Show Inactive DTC</i> is disabled. The module does not display the historical log of DM2 fault codes from the engine ECU/ECM. ☒ = The <i>Show Inactive DTC</i> 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 <i>Filter Generator Voltage Display</i> is disabled. The rate at which the generator voltage instruments are refreshed is fast in order to display all voltage fluctuations. ☒ = The <i>Filter Generator Voltage Display</i> is enabled. The rate at which the generator voltage instruments are refreshed is configurable based on the <i>Filter Constant</i>. A larger <i>Filter Constant</i> leads to a slower refresh rate, filtering out the fluctuations on the generator voltage instruments.
Filter Constant	Increase <i>Filter Constant</i> to further smooth the display of Generator Voltage.

Auto Mains Fail

Miscellaneous Options (Auto Mains Fail)

Filter Mains Voltage Display ☒

Filter Constant

30



Parameter	Description
Filter Mains 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 <i>Filter Mains Voltage Display</i> is disabled. The rate at which the generator voltage instruments are refreshed is fast in order to display all voltage fluctuations. ☒ = The <i>Filter Mains Voltage Display</i> is enabled. The rate at which the generator voltage instruments are refreshed is configurable based on the <i>Filter Constant</i>. A larger <i>Filter Constant</i> leads to a slower refresh rate, filtering out the fluctuations on the mains voltage instruments.

3.2.3 CONFIGURABLE FRONT PANEL EDITOR

The Configurable Front Panel Editor allows generator OEMs to create a PIN protected, customised Front Panel Editor with up to two security access levels. Items may be added or removed as required by the generator supplier.

Items	Description
Enable	☐ = Configuration parameters are all accessible from Front Panel Editor. ☒ = The Configuration parameters depend on their <i>Access</i> level.
Access	Permits the relevant item to be edited through the Front Panel Editor of the module. Not in FPE: The item cannot be edited through the Front Panel Editor. No PIN: Allowing access to edit the item with no PIN. Level 1 PIN: The Front Panel Editor asks for the configured <i>Level 1 PIN</i> to allow access to the relevant item. Level 2 PIN: The Front Panel Editor asks for the configured <i>Level 2 PIN</i> to allow access to the relevant item.
Level 1 PIN	Set the four digit PIN number, then repeat the PIN in the <i>Confirmation</i> to configure <i>Level 1 PIN</i> for this access level.
Level 2 PIN	Set the four digit PIN number, then repeat the PIN in the <i>Confirmation</i> to configure <i>Level 2 PIN</i> for this access level.

3.2.4 DISPLAY CONFIGURATION

Home Page

Home Page

Home Page

Mode
▼

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

Configurable Status Screens

Configurable Status Screens			
Page 1	Summary Screen ▾	Page 6	Not Used ▾
Page 2	Not Used ▾	Page 7	Not Used ▾
Page 3	Not Used ▾	Page 8	Not Used ▾
Page 4	Not Used ▾	Page 9	Not Used ▾
Page 5	Not Used ▾	Page 10	Not Used ▾

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

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.

Home Page			
Home Page		Instrumentation ▾	

Configurable Status Screens			
Page 1	Engine Coolant Temp ▾	Page 6	Generator kW ▾
Page 2	Engine Oil Pressure ▾	Page 7	Generator Pf ▾
Page 3	Engine Fuel Level ▾	Page 8	Not Used ▾
Page 4	Generator Frequency ▾	Page 9	Not Used ▾
Page 5	Generator Voltage L-N ▾	Page 10	Not Used ▾

Instrumentation Suppression

Instrumentation Suppression

Suppress the following instrumentation on the module screen

Generator Frequency ☒	Generator Voltage ☒
Current ☒	Power Factor ☒
kW ☒	kWh ☒
kVAr ☒	kVArh ☒
kVA ☒	kVAh ☒

Suppress the following instrumentation on the module screen and SCADA

Charge Alternator ☒

Suppress the following instrumentation on the module screen and SCADA, and disable PhPh alarms

Generator PhPh Voltage ☒

PhPh Voltage suppression is not supported for all the delta AC wiring topologies.

Parameter	Description
Generator Frequency	☐ = The <i>Generator Frequency Instrumentation</i> is displayed. ☒ = The <i>Generator Frequency Instrumentation</i> is suppressed.
Current	☐ = The <i>Current Instrumentation</i> is displayed. ☒ = The <i>Current Instrumentation</i> is suppressed.
kW	☐ = The <i>kW Instrumentation</i> is displayed. ☒ = The <i>kW Instrumentation</i> is suppressed.
kVAr	☐ = The <i>kvar Instrumentation</i> is displayed. ☒ = The <i>kvar Instrumentation</i> is suppressed.
kVA	☐ = The <i>kVA Instrumentation</i> is displayed. ☒ = The <i>kVA Instrumentation</i> is suppressed.
Generator Voltage	☐ = The <i>Generator Voltage Instrumentation</i> is displayed. ☒ = The <i>Generator Voltage Instrumentation</i> is suppressed.
Power Factor	☐ = The <i>Power Factor Instrumentation</i> is displayed. ☒ = The <i>Power Factor Instrumentation</i> is suppressed.
kWh	☐ = The <i>kWh Instrumentation</i> is displayed. ☒ = The <i>kWh Instrumentation</i> is suppressed.
kVArh	☐ = The <i>kvarh Instrumentation</i> is displayed. ☒ = The <i>kvarh Instrumentation</i> is suppressed.
kVAh	☐ = The <i>kVAh Instrumentation</i> is displayed. ☒ = The <i>kVAh Instrumentation</i> is suppressed.
Charge Alternator	☐ = The <i>Charge Alternator Instrumentation</i> is displayed. ☒ = The <i>Charge Alternator Instrumentation</i> is suppressed.
Generator PhPh Voltage	☐ = The <i>Generator Phase to Phase Voltage Instrumentation</i> is displayed and alarms are active. ☒ = The <i>Generator Phase to Phase Voltage Instrumentation</i> is suppressed and alarms are disabled.

Instrument Suppression (Auto Mains Fail)

Instrumentation Suppression (Auto Mains Fail)

Suppress the following instrumentation on the module screen

All Mains Instrumentation ☐

Mains Frequency ☐ Mains Voltage ☐

Suppress the following instrumentation on the module screen and SCADA, and disable PhPh alarms

Mains PhPh Voltage ☐

Parameter	Description
All Mains Instrumentation	☐ = The <i>Mains Information</i> is displayed. ☒ = The <i>Mains Information</i> is suppressed.
Mains Frequency	☐ = The <i>Mains Frequency Instrumentation</i> is displayed. ☒ = The <i>Mains Frequency Instrumentation</i> is suppressed.
Mains Voltage	☐ = The <i>Mains Voltage Instrumentation</i> is displayed. ☒ = The <i>Mains Voltage Instrumentation</i> is suppressed.
Mains PhPh	☐ = The <i>Mains PhPh Instrumentation</i> is displayed. ☒ = The <i>Mains PhPh Instrumentation</i> is suppressed.

3.2.5 USER DEFINED STRINGS

User Defined Strings

Page 1

Page Title

Line 1

Line 2

Line 3

Page 2

Page Title

Line 1

Line 2

Line 3

About Page / Start Up Text

Text

Show at Start Up ☒

Duration 2s

Page 1 and 2

Parameter	Description
Page Title	A free entry box to allow the user to give the custom display screen a title relating to the information contained on <i>Line 1 to 3</i> .
Line 1 to 3	Three free entry boxes, one for each line of the module's display. Typically used to show contact details or other information on the module's that is helpful to the end user of the generator.

About Page / Start Up Text

Parameter	Description
Text	A free entry box to allow the user to enter the text to be used for the <i>About Page</i> and <i>Start Up Text</i> .
Show at Start Up	☐ = When disabled, the start-up text is not shown at power-up; operation is unaffected. ☒ = The <i>Start Up Text</i> is enabled. The <i>Start Up Text</i> is displayed on the module's LCD for the configured <i>Duration</i> during power up.

3.2.6 EVENT LOG

Display Options

Display Options

☒ Date and time
☐ Engine hours run

Parameter	Description
Module Display	☒ Date and Time = The module displays what the <i>Date and Time</i> was when the <i>Event</i> was logged. ☐ Engine Hours Run = The module displays what the <i>Engine Hours</i> was when the <i>Event</i> was logged.

Logging Options

Logging Options

Log the following events to the event log

Power-Up ☒	Fuel level when at rest ☐
ECU Lamps ☒	Fuel Level ☒
Engine starts ☒	Incorrect Password Entered ☒
Engine stops ☒	Latched warnings ☒
Shutdown Alarms ☒	Unlatched warnings ☒
Electrical Trip Alarms ☒	Maintenance Alarms ☒
Engine DTC Logging Shutdowns Only	Application Switches ☒

Parameter	Description
Power Up	☐ = Power up events are not logged in the module's event log. ☒ = Power up events are logged when the DC Supply is applied to the module or whenever the module is rebooted.
ECU (ECM) Lamps	 NOTE: ECU Alarms are only available when the module is configured to communicate to an engine's ECU/ECM over CANbus. ☐ = The ECU (ECM) alarm lamps signals are not logged. ☒ = The ECU (ECM) alarm lamps signals are logged when generated by the ECU (ECM).
Engine Starts	☐ = <i>Engine Start</i> events are not logged. ☒ = <i>Engine Start</i> events are logged when the generator successfully crank disconnects.
Engine Stops	☐ = <i>Engine Stop</i> events are not logged. ☒ = <i>Engine Stop</i> events are when the <i>Stopping Timer</i> ceases.
Shutdown Alarms	☐ = <i>Shutdown Alarms</i> are not logged. ☒ = <i>Shutdown Alarms</i> are logged the moment they activate.
Electrical Trip Alarms	☐ = <i>Electrical Trip Alarms</i> are not logged. ☒ = <i>Electrical Trip Alarms</i> are logged the moment they activate.
Electrical Trip Alarms	☐ = <i>Electrical Trip Alarms</i> are not logged. ☒ = <i>Electrical Trip Alarms</i> are logged the moment they activate.

Parameter descriptions are continued overleaf...

Parameter	Description
Engine DTC Logging	Select form the following options: Always: When selected, DTCs are immediately logged upon occurrence. Never: Select to disable Engine DTC logging. Shutdowns and Warnings: When selected, Engine DTCs are logged when an ECU Shutdown or ECU Warning occurs, the timestamp for the DTC in the event log is that of the Shutdown or Warning. Shutdowns Only: When selected, Engine DTCs are logged when an ECU Shutdown occurs, the timestamp for the DTC in the event log is that of the Shutdown.
Fuel Level When at Rest	☐ = <i>Fuel Monitoring</i> events are not logged when the generator is at rest. Fuel level alarms are still logged if the appropriate alarm category is logged. ☒ = <i>Fuel Monitoring</i> events are logged when the generator is at rest.
Fuel Level	☐ = <i>Fuel Monitoring</i> events are not logged when the generator running. Fuel level alarms are still logged if the appropriate alarm category is logged. ☒ = <i>Fuel Monitoring</i> events are logged when the generator is running.
Incorrect Password Entered	☐ = <i>Incorrect passwords</i> are not logged. ☒ = <i>Incorrect passwords</i> are logged.
Latched Warnings	☐ = <i>Latched Warnings Alarms</i> are not logged. ☒ = <i>Latched Warnings Alarms</i> are logged the moment they activate.
Unlatched Warnings	☐ = <i>Unlatched Warnings Alarms</i> are not logged. ☒ = <i>Unlatched Warnings Alarms</i> are logged the moment they activate.
Maintenance Alarms	☐ = <i>Maintenance Alarms</i> are not logged. ☒ = <i>Maintenance Alarms</i> are logged the moment they activate.
Application Switches	☐ = Application Switch events are not logged. ☒ = Application Switch events are logged.

Logging Options (Auto Mains Fail)

Logging Options (Auto Mains Fail)

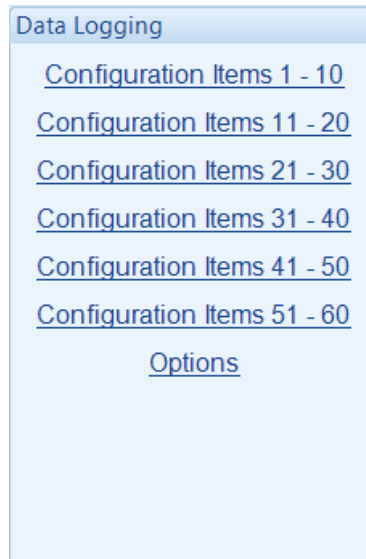
Log the following events to the event log

Mains Return ☒
Mains Fail ☒

Parameter	Description
Mains Return	☐ = <i>Mains Return</i> events are not logged. ☒ = <i>Mains Return</i> events are logged when the mains voltage/frequency falls below/rise above the configured return levels for the duration of the <i>Mains Transient Delay</i> timer.
Mains Fail	☐ = <i>Mains Fail</i> events are not logged. ☒ = <i>Mains Fail</i> events are logged when the mains voltage/frequency rise above/falls below the configured trip levels for the duration of the <i>Mains Transient Delay</i> timer.

3.2.7 DATA LOGGING

 **NOTE: Data Logging to internal and external memory is available.**



The module provides a rolling memory buffer for up to 60 configurable parameters. Logged data is stored in “Logging Windows”, which capture information when any configured Trigger or External Trigger (such as an alarm) occurs. Each Logging Window can include both Pre-Trigger and Post-Trigger data.

- **Internal Logging:**
The module uses a 64 KB rolling memory window for internal data logging. This memory continuously overwrites the oldest data when full, ensuring recent logs are always retained. The duration of each Logging Window depends on:
 - The number of parameters selected.
 - The configured Log Interval (options include 0.1s, 0.5s, and 1s).

For example, logging 20 parameters at 1-second intervals provides approximately 6 minutes 43 seconds per window. The total duration varies based on configuration.

- **External Logging:**
When a USB storage device is connected to the module’s USB Host port (available on G7400 models), the number of Logging Windows can be greatly increased. For example, using a 16 GB USB stick allows up to 250,000 Logging Windows, providing extended data capture capability.
- **Additional Features:**
 - Supports up to 10 triggers and 60 configuration items.
 - Captures a snapshot of all configured parameters at the moment the trigger occurs.
 - Logged data can be reviewed using the *Data Log Viewer* in Config Suite, under the *Tools* menu.

3.2.7.1 CONFIGURATION

Configuration Items 1 - 10

Configuration

	Logged data	Log Interval	Trigger		
1	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	
2	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	
3	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	
4	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	
5	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	
6	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	
7	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	
8	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	
9	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	
10	<Not Used> ▼	1 second ▼	Not Used ▼	▲ 0 ▼	

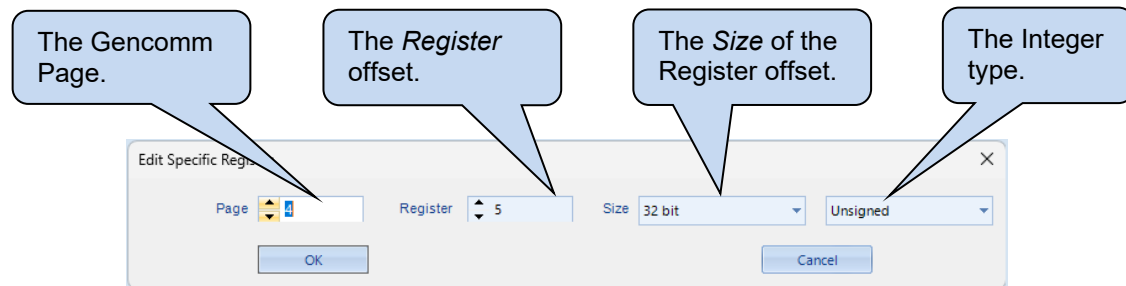
Parameter	Description
Logged Data	Select the instrument required to be logged: <i>Specific Register</i> <i>Instrumentation</i> <i>Status</i>
Log Interval	Select the logging interval of the data.
Trigger	Select when the instrument is logged compared to the configurable value of the slider.

Specific Register

NOTE: The Gencomm (Modbus) address table for the module is available upon request by contacting DSE technical support: support@deepseaelectronics.com.

Specific Register enables the user to configure a Gencomm (Modbus) address for the *Data Logger* to obtain information from.

The image below shows a typical example when reading battery voltage:



3.2.7.2 OPTIONS

Settings

Settings

Only Log When Engine is Running
☐

Keep Oldest Data
☐

Parameter	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.
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.

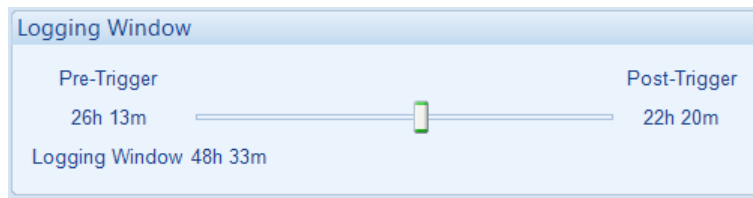
External Triggers

External Triggers

Trigger 1	Not Used ▼	Polarity	Energise ▼
Trigger 2	Not Used ▼	Polarity	Energise ▼
Trigger 3	Not Used ▼	Polarity	Energise ▼
Trigger 4	Not Used ▼	Polarity	Energise ▼
Trigger 5	Not Used ▼	Polarity	Energise ▼
Trigger 6	Not Used ▼	Polarity	Energise ▼
Trigger 7	Not Used ▼	Polarity	Energise ▼
Trigger 8	Not Used ▼	Polarity	Energise ▼
Trigger 9	Not Used ▼	Polarity	Energise ▼
Trigger 10	Not Used ▼	Polarity	Energise ▼

Parameter	Description
Trigger	Select an external trigger to initiate a data log.
Polarity	Select the polarity of the trigger. Energise: the data log is triggered when the configured trigger goes active. De-Energise: the data log is triggered when the configured trigger goes inactive.

Logging Window



Parameter	Description
Pre-Trigger	Shows the duration of time before the trigger, during which the data is logged.
Post-Trigger	Shows the duration of time after the trigger, during which the data is logged.
Logging Window	Shows the total duration of data logging time, combining the duration before and after the trigger.

Example 1

In the example below, the selected three parameters are logged when the *Generator Total Power* exceeds the set trip level of 150 kW.

The *Data Log* in the module contains the values of these three parameters for the duration of the *Logging Window*, which is 22 m 25 s before the *Generator Total Power* exceeded 150 kW and 22 m 25 s after that.

Configuration Items 1 - 10

Configuration

	Logged data	Log Interval	Trigger		
1	Coolant / Engine Temperature	1 second	Not Used	0	°C
2	Oil Pressure	1 second	Not Used	0.00	Bar
3	Generator Total Power	1 second	Not Used	150	kW
4	Generator Frequency	1 second	Not Used	0.0	Hz
5	<Not Used>	1 second	Not Used	0	
6	<Not Used>	1 second	Not Used	0	
7	<Not Used>	1 second	Not Used	0	
8	<Not Used>	1 second	Not Used	0	
9	<Not Used>	1 second	Not Used	0	
10	<Not Used>	1 second	Not Used	0	

Logging Window

Pre-trigger

22m 25s

Post-trigger

22m 25s

Logging Window 44m 50s

Example 2

In the example below, the selected four parameters are logged when a *Common Alarm* occurs on the module.

The *Data Log* in the module contains the values of these four parameters for the duration of the *Logging Window*, which is 33 m 38 s before the *Alarm* occurred.

Configuration

	Logged data	Log Interval	Trigger		
1	Coolant / Engine Temperature	1 second	Not Used	0	°C
2	Oil Pressure	1 second	Not Used	0.00	Bar
3	Generator Total Power	1 second	Not Used	150	kW
4	Generator Frequency	1 second	Not Used	0.0	Hz

External Triggers

Trigger 1	Common Alarm	Polarity	Energise
Trigger 2	Not Used	Polarity	Energise
Trigger 3	Not Used	Polarity	Energise
Trigger 4	Not Used	Polarity	Energise
Trigger 5	Not Used	Polarity	Energise
Trigger 6	Not Used	Polarity	Energise
Trigger 7	Not Used	Polarity	Energise
Trigger 8	Not Used	Polarity	Energise
Trigger 9	Not Used	Polarity	Energise
Trigger 10	Not Used	Polarity	Energise

Logging Window

Pre-Trigger

33m 38s

Post-Trigger

0m 0s

Logging Window 33m 38s

3.3 APPLICATION

Application Switching

Application Switching

Allowed Modes Remote Start and Auto Mains Fail ▼

Parameter	Description
Allowed Modes	Select the operating application of module: Auto Mains Fail Only: Enables only the <i>Auto Mains Fail Only</i> application. This enables the module to operate exclusively in <i>Auto Mains Fail</i> mode, automatically monitoring the mains supply and starting the generator upon mains failure, with support for Auto and Test modes only. Remote Start and Auto Mains Fail: Enables both the <i>Remote Start</i> and <i>Auto Mains Fail</i> application. The application is dynamically selected by activation of a <i>Digital Input</i>, <i>GenComm page 16 command</i> or the <i>Front Panel Editor</i>. Remote Start Only: Enables only the <i>Remote Start Only</i> application. This enables the module to operate exclusively in <i>Remote Start</i> mode, allowing the generator to start on remote command or schedule without mains monitoring, supporting Auto and Manual modes.

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.

ECU (ECM) Options

Engine Type Conventional Diesel ▼
Enhanced J1939 ☐
Alternative Engine Speed ☐
Modbus Engine Comms Port RS485 Port ▼

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 <i>Gas Choke</i> and <i>Gas Ignition</i> 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.

Parameters 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 <i>ECM Speed Control</i> 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 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 <i>Nominal Speed</i> as configured by the Engine Manufacturer. ☒ = The engine is instructed to run at its <i>Alternative Speed</i> 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 module's DSENet port is used to communicate with the engine when a Modbus engine type is selected. The RS485 port remains available for connection to a BMS or other RS485-compatible equipment.

Dual Mutual Standby

 **NOTE:** Dual Mutual Standby operates only when the controller is configured for Remote Start on Load and/or Automatic Mains Failure (AMF) mode.

When a start request is available, the module in duty starts the generator set to supply power to the load.

The start request is initiated by one of the following:

- Activation of a digital input configured as *Remote Start on Load*
- Mains Failure

If the engine fails to start, or is unavailable due to maintenance, engine shutdown etc, the next priority set starts and takes over to supply power to the load.

Dual Mutual Standby

Dual Mutual Standby

Balancing Mode

Start On Current (Amps) Alarms

Duty Time

Always

Dual Mutual Time

☒

8h

Parameter	Description
Dual Mutual Standby	Select when the feature is active. Disabled: The module operates as a standalone module. Always: The <i>Dual Mutual Standby</i> is always active. On Input: The <i>Dual Mutual Standby</i> is only active when a digital input configured for <i>Dual Mutual Standby</i> is active. This allows an external device or switch to enable/disable the feature.
Balancing Mode	Select how the modules are chosen for <i>Dual Mutual Standby</i> duty run. Dual Mutual Time: Load balancing is based upon the configuration of the <i>Duty Time</i>; the modules duty runs change over at the configured <i>Duty Time</i> intervals. Engine Hours: The <i>Dual Mutual Standby</i> is based upon the difference in engine run hours, the modules change over when the difference in <i>Engine Hours</i> is higher than the configured <i>Duty Time</i>. Set Priority: The <i>Dual Mutual Standby</i> is based upon the <i>AMSC Priority</i> set in the SCADA.
Start On Current (Amps) Alarms	This option allows the module to start and run the generator when the other module has a <i>Current (Amps) Alarm</i>. The alarms are: Generator Overcurrent IDMT Generator Earth Fault Generator Short Circuit ☐ = The module does not start the generator when the other module has an active <i>Current (Amps) Alarm</i>. This prevents the generator from starting and closing onto the same potential fault, for example a short circuit. ☒ = The module starts the generator when the other module has an active <i>Current (Amps) Alarm</i>.
Duty Time	Defines the hours difference the module maintains with the other modules in <i>Dual Mutual Standby</i>. Based on the <i>Balancing Mode</i> selection, this defines <i>Duty Time</i> or the <i>Engine Hours</i> difference. The modules change over when the difference in hour meters is higher than the configured <i>Duty Time</i> or <i>Engine Hours</i> (whichever is selected).

Auto Voltage Sensing

NOTE: The Auto Voltage Sensing feature is available when the module is configured for Auto Mains Failure (AMF) or Remote Start mode.

NOTE: Auto Voltage Sensing is not compatible with the AVR configuration based on manually selected voltage feature. Therefore, when one feature is enabled the other must be disabled.

Auto Voltage Sensing (Remote Start)

Enable Auto Voltage Sensing ☐

Over Voltage During Auto Sensing Trip V PhN

Option	Description
Enable Auto Voltage Sensing (Remote Start)	☐ = When disabled, automatic voltage sensing is not active, and the controller operates using fixed configuration settings only. ☒ = <i>Auto Voltage Sensing</i> is enabled. When the generator is started, the module monitors the generator voltage. Depending on the voltage level and AC System detected, the module automatically selects between the Mains Configuration and Alternative Configuration. This is useful for hire generators where the AC System is selectable as no digital input signals are required to be given to the DSE module.

Auto Load Sensing

Auto Load Sensing

Enable Auto Load Sensing ☐

Option	Description
Enable Auto Load Sensing	☐ = When disabled, automatic load sensing is inactive, and the controller does not react to detected load conditions. ☒ = <i>Auto Load Sensing</i> is enabled. When called to run off load, if a load is detected, the module forces the load switch to close (if connected) and enables the cooldown timer when the set is requested to stop. This is to ensure the set is cooled down before stopping after running with an unexpected load (i.e. In a manual load switch system).

Breaker Control

Breaker Control

Enable Manual Breaker Control ☒

Active Always ▼

Parameter	Description
Enable Manual Breaker Control	☐ = Normal operation. When running in Manual mode, activation of any on load request causes the generator breaker to close. ☒ = When running in Manual mode, only the following load requests cause the generator breaker to close: - Pressing the <i>Close Generator Button</i> on the module front fascia. - Activating a digital input configured for <i>Close Generator</i>. This also allows opening the generator breaker when running in Manual even if a load request is available.
Active	Always: <i>Manual Breaker Control</i> is always active. On Input: <i>Manual Breaker Control</i> is only active when a digital input configured for <i>Manual Breaker Mode</i> is active.

Breaker Control (Auto Mains Fail)

Breaker Control (Auto Mains Fail)

Enable Alternative Breaker Button Control ☒

Check Sync ☒

Closed Transition ☒

Parameter	Description
Enable Alternative Breaker Control Button	Controls the operation of the fascia mounted load switch control buttons (manual mode only). ☐ = Normal operation, pressing the respective load switch control button causes the supply to go on load, if it was available. Only a transfer is possible without the ability to open both breakers. ☒ = Alternative operation. If a supply is on load and that supply's load switch button is pressed, the load switch opens. Pressing the button again closes the button. Pressing the 'other' button when a supply is on load causes a transfer to the 'other' supply (if available).
Check Sync	☐ = The module allows an open-transition breaker closure without performing sync checks. This means the breaker can close immediately when commanded, without verifying synchronisation conditions. ☒ = During load transfer from Mains to Generator or Generator to Mains, the module only closes its breaker within the check sync window. See overleaf for description of the <i>Check Sync</i> options.
Closed Transition	 NOTE: It is not possible to write the configuration to the module if the Closed Transition option is enabled and the AC Systems in the Generator Options and in the Mains Options are not the same, in either the Main or Alternative Configurations. ☐ = Break before make operation. The outgoing supply is fully disconnected before the incoming supply is closed. ☒ = Closed-transition operation. During load transfer, the module briefly parallels the generator and mains supplies and only closes the breaker when synchronisation conditions (voltage, frequency, and phase) are within acceptable limits.

Check Sync (Auto Mains Fail)

Check Sync (Auto Mains Fail)	
Low Frequency	-0.1 Hz
High Frequency	0.2 Hz
Voltage	3 V PhPh
Phase Angle	5 °



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

Active Synchronising Enable (Auto Mains Fail)

Active Synchronising Enable (Auto Mains Fail)	
AVR	☐
Speed Trim	☒

Parameter	Description
AVR	NOTE: Check Sync Assistant with <i>AVR</i> is used when a CAN AVR is connected to the module's ECU port. This enables the module to control the generator voltage through CAN messages before the <i>Closed Transition</i> period. NOTE: The G7400 supports Deep Sea Electronics' digital AVR systems, specifically the DSEA106 / DSEA106 MKII, the DSEA109 digital AVR. For further details, refer to DSE Publication: 057-269 DSEA106 MKII and the 057-295 DSEA109 Operator Manuals available on our website: www.deepseaelectronics.com ☐ = No CAN messages are being transmitted from the ECU port to the CAN AVR. ☒ = The module sends CAN messages to the CAN AVR to control the generator's output voltage, for the <i>Voltage Check Sync</i> takes place.
Speed Trim	NOTE: Check Sync Assistant with <i>Speed Trim</i> is only applicable with speed trim enabled Electronic CAN Engines, and when <i>ECU Data Fail</i> alarm is not active. ☐ = No speed messages are transmitted over CAN to the ECU port via the CAN AVR. ☒ = The module controls the Electronic CAN Engine to match the generator frequency with the mains frequency for the <i>Frequency</i> and <i>Phase Angle Check Sync</i> take place.

Fail To Sync Alarm

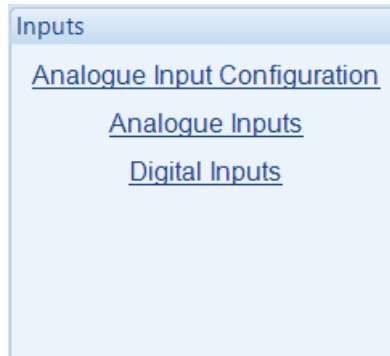
Fail To Sync Alarm (Auto Mains Fail)

Action	Indication ▼	
Return to Open Transition	☒	
Delay	1m	

Parameter	Description
Action	Determines the action to take upon a <i>Fail to Sync</i>. Electrical Trip: The set is stopped with an <i>Electrical Trip</i> alarm. Indication: The set continues to run and no alarm is raised. This is used for internal use, such as in the <i>PLC Logic</i> or <i>Virtual LEDs</i>. Warning: The set continues to run without any transition to the Mains.
Return To Open Transition	☐ = The load remains on the generator. ☒ = This is only applicable with <i>Action</i> to <i>Indication</i>. The load is transferred to Mains.
Delay	The time to allow for successful sync check to take place. Should the process continue longer than <i>Delay</i> , the <i>Action</i> above is taken.

3.4 INPUTS

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



3.4.1 ANALOGUE INPUT CONFIGURATION

Analogue Input Configuration

ECU (ECM) Options

Use Module to Measure Oil Pressure ☐ Oil pressure is read from the ECU (ECM)

Use Module to Measure Coolant Temperature ☐ Engine temperature is read from the ECU (ECM)

Input Configuration

Analogue Input A	Oil Sensor
Analogue Input B	Not Used
Analogue Input C	Not Used
Analogue Input D	Flexible Analogue
Analogue Input E	Flexible Analogue
Analogue Input F	Flexible Analogue

Depending on selection, the configuration of the input is done in different locations in the software.

'Flexible Analogue' selections are configured on the 'Inputs/Analogue Inputs' pages
'Digital Input' selections are configured on the 'Inputs/Digital Inputs' pages
Oil/Temperature/Fuel selections are configured on the 'Engine' pages

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.

Parameters are continued overleaf...

Parameter	Description
Analogue Input A	Select what the analogue input is to be used for: Not Used: The input is disabled. Digital Input: Configured on the <i>Inputs/Digital Inputs</i> pages. Flexible Analogue: Configured on the <i>Inputs/Analogue Inputs</i> pages. Fuel Sensor: Configured on the <i>Engine</i> pages. Oil Sensor: Configured on the <i>Engine</i> pages. Temperature Sensor: Configured on the <i>Engine</i> pages.
Analogue Input B, C, D, E, and F	Select what the analogue input is to be used for: Not Used: The input is disabled. Digital Input: Configured on the <i>Inputs/Digital Inputs</i> pages. Flexible Analogue: Configured on the <i>Inputs/Analogue Inputs</i> pages. Fuel Sensor: Configured on the <i>Engine</i> pages. Temperature Sensor: Configured on the <i>Engine</i> pages.

3.4.3 ANALOGUE INPUTS

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

Analogue Inputs

Analogue Inputs

[Flexible Sensor A](#)

[Flexible Sensor B](#)

[Flexible Sensor C](#)

[Flexible Sensor D](#)

[Flexible Sensor E](#)

[Flexible Sensor F](#)

Sensor Description

Sensor Description

Sensor Name

Flexible Sensor A

Parameter	Description
Sensor Name	Enter the <i>Sensor Name</i> , this text is shown on the module display when viewing the instrument.

Input Type

The screenshot shows a software window titled "Input Type". Inside the window, there is a dropdown menu with the text "Not Used" and a small downward arrow. To the right of the dropdown is a button labeled "Create...".

Parameter	Description
1st Stage Curve	Select the sensor type and curve from a pre-defined list or create a user-defined curve. Available sensor types: Not Used: The input is not used. Current: for sensors with maximum range of 0 mA to 20 mA. Resistive: for sensors with maximum range of 0 Ω to 3 k Ω. Voltage: for sensors A-D with maximum range of 0 V to 10 V. Voltage: for sensors E-G with maximum range of 0 V to 32 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. User Defined: Using the curve editor.
2nd Stage curve	Select the optional curve used to plot a secondary unit against percentage. Available units: Not Used: The input is not used. Percentage: The secondary stage curves Y-Axis is configured as percentage. Pressure: The secondary stage curves Y-Axis is configured as pressure. Temperature: The secondary stage curves Y-Axis is configured as temperature. User Defined: Pounds per Square Inch (PSI).

Sensor Fault Alarm

Sensor Fault Alarm

Enable Alarm ☒

Alarm String

Parameter	Description
Enable Alarm	☐ = The Alarm is disabled. ☒ = The <i>Sensor Fault Alarm</i> is enabled once a <i>Sensor Alarm</i> is enabled.
Alarm String	The text that is displayed on the module's LCD when the <i>Sensor Fault Alarm</i> activates.

Sensor Alarms

Sensor Alarms

Alarm Arming Always

Low Alarm Enable ☒

 Action Shutdown

 Low Alarm 25 %

Low Pre-alarm Enable ☒

 Low Pre-alarm Trip 51 %

 Low Pre-alarm Return 76 %

 Low Alarm String Flexible Sensor A Low

High Pre-alarm Enable ☒

 High Pre-alarm Return 127 %

 High Pre-alarm Trip 153 %

High Alarm Enable ☒

 Action Shutdown

 High Alarm 204 %

 High Alarm String Flexible Sensor A High

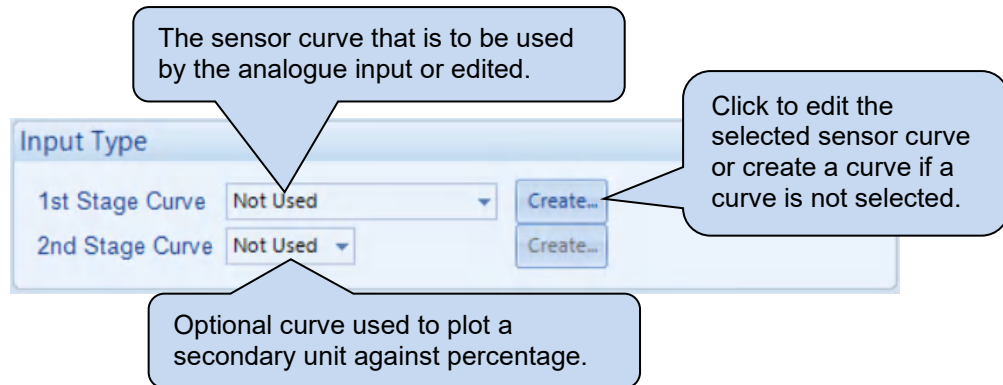
Parameter	Description
Alarm Arming	NOTE: For details of these, see the section entitled <i>Alarm Arming</i> elsewhere in this document. Select when the alarm generated by the analogue input becomes active: Always From Safety On From Starting
Low Alarm Enable	☐ = The Alarm is disabled. ☒ = The <i>Low Alarm</i> activates when the measured quantity drops below the <i>Low Alarm</i> setting.
Low Alarm Action	NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: Electrical Trip Shutdown

Parameter descriptions are continued overleaf...

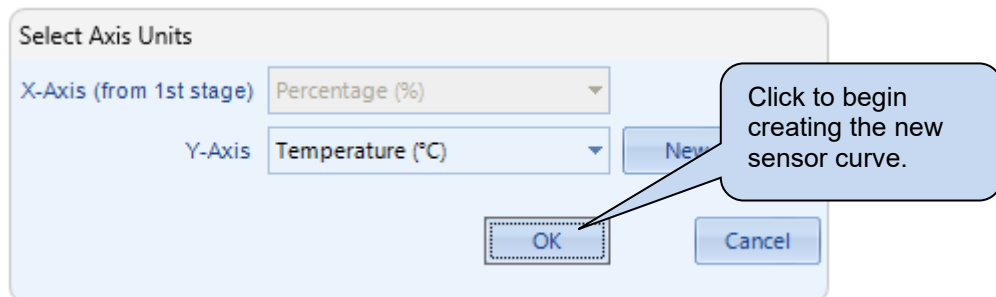
Parameter	Description
Low Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☒ = The <i>Low Pre-Alarm</i> is active when the measured quantity drops below the <i>Low Pre-Alarm Trip</i> setting. The <i>Low Pre-Alarm</i> is automatically reset when the measured quantity rises above the configured <i>Low Pre-Alarm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

3.4.3.1 CREATING / EDITING THE SENSOR CURVE

While the *DSE Configuration Suite* holds sensor specifications for the most 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)	Select the electrical quantity that the sensor outputs. Current (mA) : For sensors that output current within a range 0 mA to 20 mA. Voltage (0-10 Volts) : For sensors that output voltage within a range of 0 V to 10 V. Voltage (0-32 Volts) : For sensors that output voltage within a range of 0 V to 32 V. Resistive (Ohms) : For sensors that output a resistance within a range 0 Ω to 3K Ω on Analogue Input A and 0 to 5K Ω on Analogue Inputs B to G.
Y-Axis	Select the parameter that is being monitored by the sensor. Temperature (°C) : For sensors that measure temperature. Pressure (Bar) : For sensors that measure pressure. Percentage (%) : For sensors that measure percentage.

Sensor curve creation and editor descriptions are continued overleaf...

Curve Editor

<Unnamed Curve> Display Temperature in: °C

Click and drag the points on the graphs to change the settings.

Double click the left mouse button to add a point or right click on a point to remove it.

Click to change the Y axis value between imperial and metric units.

The red highlighted area indicates under measurable range.

Use the mouse to select the graph point, then enter the value in the box or click up/down to change the value.

The red highlighted area indicates over measurable range.

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 prompt to name the curve...

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

Click OK to save the curve.

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

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

Number of points used: 5/31

Change Axis Range



NOTE: The difference between the Minimum and Maximum values on the X and Y axis must exceed the noted limits.

The X Axis is either Volts, mA or Ohms depending on what type of sensor is edited.

The Y Axis is either %, Bar or °C depending on what type of sensor is edited.

Select Range

The graph shows a linear relationship between Ohms (X-axis) and % (Y-axis). The X-axis ranges from 0 to 450, and the Y-axis ranges from 0 to 250. The data points are approximately (0, 0), (50, 25), (100, 50), (150, 75), (200, 100), (250, 125), (300, 150), (350, 175), (400, 200), (450, 225).

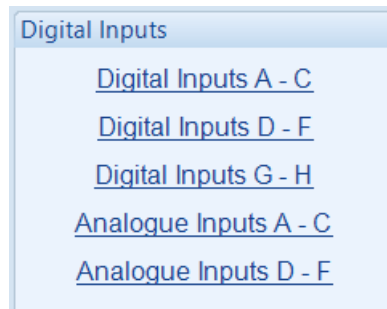
Parameter	Minimum	Maximum	Constraint
X-Axis(Ohms)	0	480	X-Axis range must exceed 200 Ohms
Y-Axis(%)	0	260	Y-Axis range must exceed 200 %
X Axis - Fault Threshold	0	5000	

Buttons: OK, Cancel

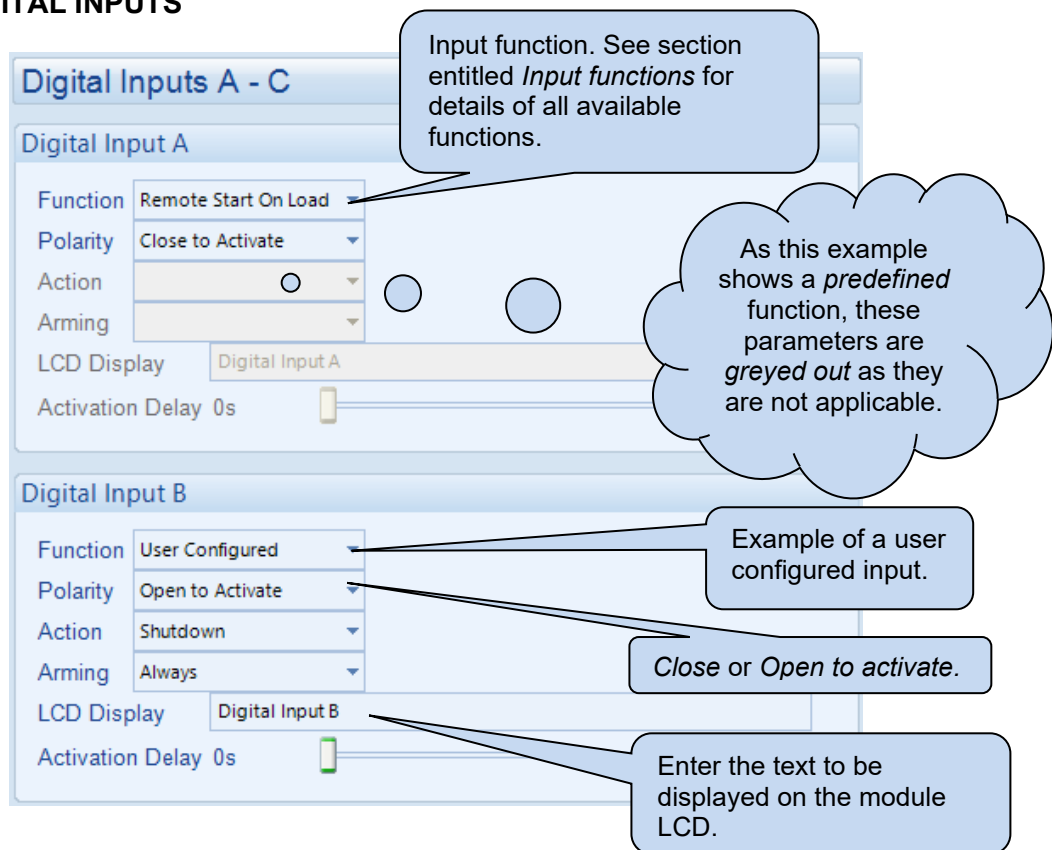
The maximum X Axis Fault Threshold limit.

3.4.4 DIGITAL INPUTS

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



3.4.4.1 DIGITAL INPUTS



Parameters detailed overleaf...

Parameter	Description
Function	Select the input function to activate when the relevant terminal is energised. See section entitled <i>Input functions</i> for details of all available functions.
Polarity	Select the digital input polarity: Close to Activate: the input function is activated when the relevant terminal is connected. Open to Activate: the input function is activated when the relevant terminal is disconnected.
Action	Select the type of alarm required from the list: Electrical Trip Indication Shutdown Warning For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document.
Arming	Refer to the <i>Alarm Arming</i> section elsewhere in this document for more details. Select when the input becomes active: Always: The input state is always monitored. Engine Protection Activation: The state of the input is monitored from the low oil pressure alarm activation. From Safety On: The state of the input is monitored from the end of the <i>Safety On Delay</i> timer. From Starting: The state of the input is only monitored from engaging the crank Never: The input is disabled. Wait For ECU: The state of the input is only monitored if the ECU Startup Delay is enabled and during this timer activation only. When Stationary: The state of the input is only monitored when the engine is at rest.
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.

3.4.5 ANALOGUE INPUTS

Analogue Inputs A - C

Analogue Input A (Digital)

Function: User Configured
 Polarity: Close to Activate
 Action: Warning
 Arming: Always
 LCD Display: Analogue Input A (Digital)
 Activation Delay: 0s

Analogue Input B (Digital)

The Analogue Input is not configured as a Digital Input
 To reconfigure, use the 'Analogue Input Configuration' page

Analogue Input C (Digital)

The Analogue Input is not configured as a Digital Input
 To reconfigure, use the 'Analogue Input Configuration' page

Example of an analogue input configured as digital.

Depending on selection, the configuration of the input is located in different sections in the software.

Parameter	Description
Function	Select the input function to activate when the relevant terminal is energised. See the section entitled <i>Input Functions</i> for details of all available functions elsewhere in this document.
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 <i>Alarm Types</i> 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 <i>Alarm Arming</i> elsewhere in this document. Select when the alarm generated by the input becomes active: Active from Mains 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.

3.4.6 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
User Configured	This input is used to generate a custom alarm using the configured <i>Action</i> , <i>Arming</i> and <i>LCD Display</i> items.
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 1 to 5 Select	These inputs are used to instruct the module to follow the <i>alternative</i> configuration settings instead of the <i>main</i> configuration settings.
Arc Reduction Over Current Protection	Activating this input will enable the Arc Reduction over current alarm.
Auto Restore Inhibit (Auto Mains Fail) 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 <i>Auto Restore Inhibit</i> input is removed. This input allows the module to be fitted as part of a system where the restoration to mains is controlled remotely or by an automated system.
Auto Start Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide an over-ride function to prevent the module 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 module 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 (Auto 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 module. If the devices providing this additional monitoring are connected to operate this input, the module 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.
Coolant Temperature Switch IEEE 37.2 – 26 Apparatus Thermal Device	This input is used to give a <i>Coolant Temperature High</i> shutdown from a digital normally open or closed switch. It allows coolant temperature protection.

Parameters continued overleaf...

Function	Description
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.
Dual Mutual Standby	This input activates the <i>Dual Mutual Standby</i> functionality. This is described fully in the section entitled <i>Module</i> elsewhere in this manual.
ECU Specific 1,2,3	These inputs are used with some supported engine files only for electronic CAN engines. They are used to instruct the engine file to perform certain function controls on the engine without the need to change a configuration on the module. Activating the relevant input allows the engine file to exercise a special operation on the engine.
EJP1	For the French EJP (Effacement Jours de Pointe) tariff system. This input is functionally identical to <i>Remote Start Off Load</i>. When this input is active, operation is similar to the 'Remote Start on load' function except that the generator is not instructed to take the load. This function is also used where an engine only run is required e.g. for exercise.
EJP2	For the French EJP (Effacement Jours de Pointe) tariff system. This input is functionally identical to <i>Remote Start On Load</i>. 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.
Escape Mode	This input function is supported on specific new engines for Maintenance / Regeneration requirements, used when the engine is running off-load. When the Escape Mode input is active, some of the CAN engine alarms are overridden to restore the engine in alarm free mode at no load, to provide a specific maintenance / regeneration type operation to the CAN engine.

Parameters continued overleaf...

Function	Description
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. (<i>Front panel configuration access is still possible while the system lock is active</i>).
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 <i>Engine Protections</i> page in the module configuration.
Fuel Usage Alarm	This input is used to monitor fuel level or consumption via a connected fuel sender. When the measured value falls below the configured threshold, the module raises a fuel usage alarm.
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.
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 Scheduled Run IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide a mean of disabling a scheduled run.
Lamp Test	This input is used to provide a test facility for the front panel indicators fitted to the module. When the input is activated all LEDs illuminate.
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 <i>Main</i> configuration when <i>Alternative Configurations</i> are enabled.
Mains Closed Auxiliary (Auto Mains Fail) 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 (Auto Mains Fail) 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.

Parameters continued overleaf...

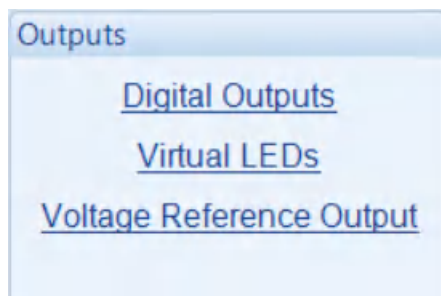
Function	Description
Manual Breaker Mode	When breaker control is set to <i>Active On Input</i> , this input is used to activate the <i>Manual Breaker Control</i> .
Manual Restore Contact (Auto Mains Fail) IEEE 37.2 - 3 Checking or Interlocking Relay	Used to 'hold off' transfer back to the mains after a mains failure and keep the generator on load. Transfer back to the mains supply is held off in <i>Auto mode</i> while the input is present. Typically, a key switch provides this input with <i>spring return to closed</i> 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.
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 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 Lamp Test 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 Left Switchgear Button	Simulates the modules mains close button. See Operation Manual (057-389_G7400_ops) for further details.
Simulate Mains Available (Auto Mains Fail)	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 Mode Button	This input replicates the function of the Mode button and is used to toggle between <i>Auto Mains Failure</i> and <i>Remote Start modes</i> .
Simulate Right Switchgear Button	Simulates the modules generator close button. See Operation Manual (057-389_G7400_ops) for further details.
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.
Smoke Limiting IEEE 37.2 – 18 Accelerating or Decelerating Device	This input instructs the module to give a <i>run at idle speed</i> command to the engine either via an output configured to <i>smoke limit</i> or by data commands when used with supported electronic engines.
Start in Manual Mode	Combined function input that instructs the module to enter <i>Manual Mode</i> and also perform the <i>Start</i> function. Once the input is active, the module is placed into manual mode, and the generator starts.

Parameters continued overleaf...

Function	Description
Stop and Panel Lock	Combined function input that instructs the module to enter <i>Stop Mode</i> and also perform the <i>Panel Lock</i> 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. (<i>Front panel configuration access is still possible while the system lock is active.</i>)
Switch to Auto Mains Fail Mode	This input switches the module to <i>Auto Mains Failure</i> mode.
Switch to Remote Start Mode	This input switches the module to <i>Remote Start</i> mode.
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 <i>Engine Protections</i> page in the module configuration.

3.5 OUTPUTS

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



3.5.1 DIGITAL OUTPUTS

 A screenshot of the 'Digital Outputs' configuration window. The window is divided into three sections: 'Outputs (Supplied From Emergency Stop Input)', 'Outputs (Volts Free)', and 'Outputs (DC Supply Out)'. Each section contains a table with columns for 'Source' and 'Polarity'.

- Outputs (Supplied From Emergency Stop Input):** Contains Output A (Source: Fuel Relay, Polarity: Energise) and Output B (Source: Start Relay, Polarity: Energise). A callout bubble points to these outputs, stating: 'As this example shows outputs A and B are *greyed out* as the engine type is selected as *Conventional Diesel*.'
- Outputs (Volts Free):** Contains Output C (N/C) (Source: Not Used, Polarity: De-Energise) and Output D (Source: Close Gen Output, Polarity: Energise). A callout bubble points to the labels, stating: 'These labels match the typical wiring diagram.'
- Outputs (DC Supply Out):** Contains Output E (Source: Digital Input A, Polarity: Energise), Output F (Source: Common Warning, Polarity: Energise), Output G (Source: Common Shutdown, Polarity: Energise), Output H (Source: Common Electrical Trip, Polarity: Energise), Output I (Source: Combined Maintenance Alarm, Polarity: Energise), and Output J (Source: Audible Alarm, Polarity: Energise).

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

3.5.2 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.

Virtual LEDs

LED Configuration

	Source	Polarity
LED 1	Not Used ▼	Lit ▼
LED 2	Not Used ▼	Lit ▼
LED 3	Not Used ▼	Lit ▼
LED 4	Not Used ▼	Lit ▼
LED 5	Not Used ▼	Lit ▼
LED 6	Not Used ▼	Lit ▼
LED 7	Not Used ▼	Lit ▼
LED 8	Not Used ▼	Lit ▼
LED 9	Not Used ▼	Lit ▼
LED 10	Not Used ▼	Lit ▼
LED 11	Not Used ▼	Lit ▼
LED 12	Not Used ▼	Lit ▼
LED 13	Not Used ▼	Lit ▼
LED 14	Not Used ▼	Lit ▼
LED 15	Not Used ▼	Lit ▼
LED 16	Not Used ▼	Lit ▼
LED 17	Not Used ▼	Lit ▼
LED 18	Not Used ▼	Lit ▼
LED 19	Not Used ▼	Lit ▼
LED 20	Not Used ▼	Lit ▼

Parameter	Description
Source	Select the output source to control the state of the output. See section entitled <i>Output Sources</i> 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.

3.5.3 VOLTAGE REFERENCE OUTPUT

Options

Enable ☐

Parameter	Description
Source	☐ = Disables the stable 5 V reference supply. ☒ = Enables the <i>stable 5 V reference supply for external sensors, ensuring accurate measurement and calibration.</i>

3.5.4 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)	
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, 4, 5 Selected	Active when the alternative configuration is selected.	
Analogue Input A,B,C,D,E,F (Digital)	Active when the analogue input A,B,C,D,E,F configured to digital is active.	
Arm Safety On Alarms	Becomes active at the end of the <i>safety delay</i> 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 push button resets this output once activated.	Inactive if no alarm condition is active or if the Mute push button was pressed.
Auto Restore Inhibit (Auto Mains Fail)	Active when the <i>Auto Restore Inhibit</i> digital input is active.	
Auto Start Inhibit	Active when the <i>Auto-Start Inhibit</i> function is active.	
Auxiliary Mains Fail (Auto Mains Fail)	Active when the <i>Auxiliary Mains Fail</i> input function is active.	
Auto Mains Fail Application Selected	Indicates that the module is set to Auto Mains Failure mode, enabling automatic start on mains failure.	
AVR Data Fail	Active when the <i>AVR Data Fail</i> alarm is active, indicating communication failure with the CAN AVR.	
AVR Fault	Active when the <i>AVR Fault</i> alarm is active, indicating an alarm detection on the CAN AVR.	
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 <i>Scheduled Run</i> request from the inbuilt <i>Scheduler</i> .	
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.	

Parameters continued overleaf...

Output Source	Activates...	Is Not Active....
Check Sync	Active when the <i>Sync Check</i> is active during the generator to mains transition.	
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 Pulse (Auto Mains Fail) 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.	
Combined Maintenance Alarm	Active when any of the maintenance alarm is active.	
Combined Under and Over Frequency Alarm	Active when an <i>Under-Frequency</i> or <i>Over-Frequency Shutdown</i> alarm is active.	
Combined Under and Over Frequency Warning	Active when an <i>Under-Frequency</i> or <i>Over-Frequency Warning</i> alarm is active.	
Combined Under and Over Voltage Alarm	Active when an <i>Under-Voltage</i> or <i>Over-Voltage Shutdown</i> alarm is active.	
Combined Under and Over Voltage Warning	Active when an <i>Under-Voltage</i> or <i>Over-Voltage Warning</i> 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 <i>Electrical Trip</i> alarms are active.	The output is inactive when no shutdown alarms are present.
Common Shutdown	Active when one or more <i>Shutdown</i> alarms are active.	The output is inactive when no shutdown alarms are present.
Common Warning	Active when one or more <i>Warning</i> alarms are active.	The output is inactive when no warning alarms are present.
Configurable CAN 1 to 10 Instrument Active	Active when the relevant Configurable CAN Instrument function is active.	
Coolant Cooler Control	Active by the <i>Coolant Cooler Control</i> in conjunction with the Coolant Temperature Sensor.	
Coolant Heater Control	Active by the <i>Coolant Heater Control</i> in conjunction with the Coolant Temperature Sensor.	
Coolant Temperature Switch IEEE 37.2 – 26 Apparatus Thermal Device	Active when the <i>Coolant Temperature Switch</i> input is active.	
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 <i>Only Log When Engine Is Running</i> is enabled. • The internal memory of the module becomes full, and the option <i>Keep Oldest Data</i> is enabled.

Parameters continued overleaf...

Output Source	Activates...	Is Not Active....
DEF Level Low	Active when <i>DEF Level Low</i> CAN alarm is active.	
DEF Level Low Alarm	Active when <i>DEF Level Low Alarm</i> is active.	
Digital Input A, B, C, D, E, F, G & H	Active when the relevant digital input is active.	
Display Heater Fitted and On	Active when the display heater is on.	
DPF Forced Regeneration Requested	Active when the <i>DPF Force Regeneration</i> is active.	
DPF Non Mission State	Active when the <i>DPF Non-Mission State</i> is active.	
DPF Regeneration In Progress	Active when the <i>DPF Regeneration</i> is in progress.	
DPF Regeneration Interlock Active	Active when the <i>DPF Regeneration Interlock</i> is active.	
DPTC Filter	Active when the diesel particulate filter CAN alarm is active.	
Droop Enable	Active when an input configured to <i>Droop Enable</i> is active or if <i>Droop Enable</i> has been activated in the module configuration (CAN engine only).	
Dual Mutual Active	Active when the <i>Dual Mutual Standby</i> is active.	
Dual Mutual Input	Active when the <i>Dual Mutual Standby</i> digital input is active.	
Dual Mutual On Load	Active when the generator is running due to <i>Dual Mutual Standby</i> .	
Dual Mutual Standby	Active when the generator is in standby in <i>Dual Mutual Standby</i> .	
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 <i>Earth Fault Protection Alarm</i> is 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 module 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.
ECU Pre-Heat	Active when the <i>ECU Pre-Heat</i> is active.	
ECU Specific 1,2,3	Active when the relevant <i>ECU Specific</i> input is active.	
EJP1 / EJP2	Active when an input configured for <i>EJP1</i> or <i>EJP2</i> is active.	
Emergency Stop IEEE 37.2 – 5 Stopping Device	Active when the <i>Emergency Stop</i> input has been activated.	
Energise To Stop	Normally used to control an <i>Energise to Stop</i> solenoid, this output becomes active when the module wants the set to stop running.	Becomes inactive a configurable amount of time after the set has stopped. This is the <i>ETS hold time</i> .
Escape Mode	Active when <i>Escape Mode</i> function is active through a digital input or from the module's Running Editor.	

Parameters continued overleaf...

Output Source	Activates...	Is Not Active....
External Panel Lock	Active when the <i>External Panel Lock</i> digital input is active.	
Fail to Close Generator IEEE 37.2 – 52B AC Circuit Breaker Position (Contact Open When Breaker Closed)	Active when the <i>Generator Closed Auxiliary</i> input fails to become active after the <i>Close Generator Output</i> or <i>Close Generator Output Pulse</i> becomes active.	
Fail to Close Mains IEEE 37.2 – 52B AC Circuit Breaker Position (Contact Open When Breaker Closed)	Active when the <i>Mains Closed Auxiliary</i> input fails to become active after the <i>Close Mains Output</i> or <i>Close Mains Output Pulse</i> becomes active.	
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 <i>Fail to Stop Timer</i> .	
Fail To Synchronise	Active when the <i>Fail to Sync Alarm</i> is active.	
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, D, E or F High Alarm	Active when the analogue input value rises above the <i>Flexible Sensor High Alarm</i> set point.	
Flexible Sensor A, B, C, D, E or F High Pre-Alarm	Active when the analogue input value rises above the <i>Flexible Sensor High Pre-Alarm</i> set point.	
Flexible Sensor A, B, C, D, E or F Low Alarm	Active when the analogue input value falls below the <i>Flexible Sensor Low Alarm</i> set point.	
Flexible Sensor A, B, C, D, E or F Low Pre-Alarm	Active when the analogue input value falls below the <i>Flexible Sensor Low Pre-Alarm</i> set point.	
Flexible Sensor A, B, C, D, E or F Open Circuit	Active when the <i>Flexible Sensor Open Circuit</i> alarm becomes active.	
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 <i>Fuel level</i> falls below the <i>Fuel Pump Control ON</i> 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 <i>Fuel level</i> is above the <i>Fuel Pump Control OFF</i> settings.
Fuel Relay	Becomes active when the module 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 Sensor Open Circuit	Active when the <i>Fuel Sensor Open Circuit</i> alarm becomes active.	
Fuel Tank Bund Level High	Active when the <i>Fuel Bund Level High Alarm</i> input is active.	
Fuel Usage Alarm IEEE 37.2 – 80 Flow Switch	Active when the <i>Fuel Usage</i> alarm becomes active.	
Generator Loading Frequency Not Reached	Indicates that the generator frequency has not reached the configured <i>Loading Frequency</i> during the starting process.	
Generator Loading Voltage Not Reached	Indicates that the generator voltage has not reached the configured <i>Loading Voltage</i> during the starting process.	
Gen Over Frequency Overshoot Alarm IEEE 37.2 – 81 Frequency Relay	Becomes active when the <i>Over Frequency Overshoot</i> alarm is active.	

Parameters continued overleaf...

Output Source	Activates...	Is Not Active....
Gen Over Frequency Overshoot Warning IEEE 37.2 – 81 Frequency Relay	Becomes active when the <i>Over Frequency Overshoot Warning</i> 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 • <i>Loading voltage</i> and <i>loading frequency</i> have not been reached. • After <i>electrical trip</i> alarm. • During the starting sequence before the end of the warming timer.
Generator Closed Aux	Active when the <i>Generator Closed Auxiliary</i> input is 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 High Voltage Alarm IEEE 37.2 – 59 AC Overvoltage Relay	Active when the <i>High Voltage Electrical Trip</i> alarm is active.	
Generator High Voltage Warning IEEE 37.2 – 59 AC Overvoltage Relay	Active when the <i>High Voltage Warning</i> alarm is active.	
Generator High Volts Shutdown IEEE 37.2 – 59 AC Overvoltage Relay	Active when the <i>High Voltage Shutdown</i> alarm is active.	
Generator Load Inhibit	Active when the <i>Generator Load Inhibit</i> input is active.	
Generator Low Voltage Shutdown/Electrical Trip IEEE 37.2 – 27 AC Undervoltage Relay	Active when the generator voltage falls below the <i>Low Voltage Alarm Trip</i> 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 <i>Low Voltage Pre-Alarm Trip</i> level.	Inactive when • The set is stopped. • During starting sequence before the safety delay time has expired.
Generator Over Frequency Alarm IEEE 37.2 – 81 Frequency Relay	Active when the generator frequency exceeds the <i>Over Frequency Shutdown Trip</i> level.	
Generator Over Frequency Delayed Alarm IEEE 37.2 – 81 Frequency Relay	Active when the generator frequency exceeds the configured <i>Over Frequency Shutdown Trip</i> level for a duration longer than the set <i>Overshoot Delay</i> timer.	
Generator Over Frequency Delayed Warning IEEE 37.2 – 81 Frequency Relay	Active when the generator frequency exceeds the configured <i>Over Frequency Warning Trip</i> level for a duration longer than the set <i>Overshoot Delay</i> timer.	
Generator Phase Rotation Alarm IEEE 37.2 – 47 Phase Sequence Relay	Active when the detected generator phase sequence is different than the configured <i>Generator Phase Rotation</i> .	
Generator Reverse Power IEEE 37.2 – 32 Directional Power Relay	Active when the <i>Generator Reverse Power</i> alarm is active.	

Parameters continued overleaf...

Output Source	Activates...	Is Not Active....
Generator Unbalanced Current	This output is active and when the module has detected a phase generator sequence which is different from the configured generator phase rotation.	
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 <i>Coolant Temperature</i> exceeds the configured <i>High Coolant Temperature Electrical Trip</i> level.	
High Coolant Temperature Shutdown IEEE 37.2 – 26 Apparatus Thermal Device	Active when the <i>Coolant Temperature</i> exceeds the configured <i>High Coolant Temperature Shutdown</i> level.	
High Coolant Temperature Warning IEEE 37.2 – 26 Apparatus Thermal Device	Active when the <i>Coolant Temperature</i> exceeds the configured <i>High Coolant Temperature Warning</i> level.	
High Inlet Temperature Shutdown	Active when the High Inlet Temperature Shutdown is active on the module.	
High Inlet Temperature Warning	Active when the High Inlet Temperature Warning is active on the module.	
Inhibit Scheduled run	Active when the Inhibit Scheduled run input is active.	
Interlock Override (Auto Mains Fail)	This function is used to bypass the generator and mains breakers' electrical interlock during the <i>Closed Transition</i> to allow short term paralleling. This output becomes active when the <i>Synchronisation Delay</i> activates and remains active until the <i>Interlock Override Off</i> timer is terminated.	
kW Overload Alarm	Active when the measured kW are above the setting of the <i>kW overload alarm</i> . 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 <i>Mute/Lamp Test</i> control button.	
Load Shedding Control (1 to 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 <i>Loading Frequency</i> during the starting process.	
Loading Voltage Not Reached	Active when the generator voltage has not reached the configured <i>Loading Voltage</i> during the starting process.	
Loss of Mag Pickup Signal	Active when the module senses the loss of signal from the magnetic pickup probe.	
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 <i>Coolant Temperature</i> falls below the <i>Low Coolant Temperature alarm</i> setting.	
Low Load	Active when the <i>Low Load</i> alarm is active.	
Low Oil Pressure Shutdown IEEE 37.2 - 63 Pressure Switch	Active when the <i>Oil Pressure</i> falls below the <i>Low Oil Pressure Shutdown</i> setting.	Inactive when - The set is stopped. - During starting sequence before the safety delay time has expired.

Parameters continued overleaf...

Output Source	Activates...	Is Not Active....
Low Oil Pressure Warning IEEE 37.2 - 63 Pressure Switch	Active when the <i>Oil Pressure</i> falls below the <i>Low Oil Pressure Warning</i> 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 Failure (Auto Mains Fail) 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 (Auto Mains Fail) IEEE 37.2 - 81 Frequency Relay	Active when the mains frequency exceeds the <i>High Frequency</i> setting.	
Mains High Voltage (Auto Mains Fail) IEEE 37.2 - 59 AC Overvoltage Relay	Active when the mains voltage exceeds the <i>High Voltage</i> setting.	
Mains Load Inhibit (Auto Mains Fail)	Active when the <i>Mains Load Inhibit</i> input is active.	
Mains Low Frequency (Auto Mains Fail) IEEE 37.2 - 81 Frequency Relay	Active when the mains frequency falls below the <i>Low Frequency</i> setting.	
Mains Low Voltage (Auto Mains Fail) IEEE 37.2 - 27 AC Undervoltage Relay	Active when the mains voltage falls below the <i>Low Voltage</i> setting.	
Mains Phase Rotation Alarm (Auto Mains Fail)	Active when the detected mains phase sequence is different than the configured <i>Mains Phase Rotation</i> .	
Maintenance Alarm 1, 2 or 3 Due	Active when the relevant maintenance alarm is due.	
Manual Restore Contact (Auto Mains Fail)	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.	
MSC Compatibility	Active when the <i>MSC Compatibility</i> alarm is active.	
MSC Failure	Active when the <i>MSC Failure</i> alarm is active.	
MSC ID Error	Active when the <i>MSC ID Error</i> alarm is active.	
MSC Priority Error	Active when the <i>MSC Priority Error</i> alarm is active.	
Negative VAr Alarm IEEE 37.2 - 40 Field Under Excitation Relay	Active when the negative VAr falls below the configured Generator <i>Negative VAr Alarm</i> level for a duration longer than the set <i>Delay</i> timer.	
Negative VAr Warning IEEE 37.2 - 40 Field Under Excitation Relay	Active when the negative VAr falls below the configured Generator <i>Negative VAr Pre-Alarm</i> level for a duration longer than the set <i>Delay</i> timer.	
Oil Pressure Sensor Open Circuit	Active when the <i>Oil Pressure Sensor</i> is detected as being open circuit.	
Oil Pressure Switch	Active when the oil pressure switch input is active.	
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.

Parameters continued overleaf...

Output Source	Activates...	Is Not Active....
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 (Auto Mains Fail) 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 (Auto Mains Fail) 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.	
Over Current IDMT Alarm	Active when the <i>Over Current IDMT</i> alarm is active.	
Over Current Immediate Warning	Active when the <i>Over Current Immediate Warning</i> alarm is active.	
Over Frequency Runaway IEEE 37.2 -81 Frequency Relay	Active when the <i>Over Frequency Runaway</i> alarm is active.	
Over Frequency Warning IEEE 37.2 -81 Frequency Relay	Active when the <i>Over Frequency Warning</i> alarm is active.	
Over Speed Runaway IEEE 37.2 – 12 Over Speed Device	Active when the <i>Over Speed Runaway</i> alarm is active.	
Over Speed Shutdown IEEE 37.2 – 12 Over Speed Device	Active when the <i>Over Speed Shutdown</i> alarm is active.	
Over Speed Warning IEEE 37.2 – 12 Over Speed Device	Active when the <i>Over Speed Warning</i> alarm is active.	
Overspeed Delayed Alarm IEEE 37.2 – 12 Over Speed Device	Active when the <i>Over Speed Delayed</i> alarm is active.	
Overspeed Delayed Warning IEEE 37.2 – 12 Over Speed Device	Active when the <i>Over Speed Delayed Warning</i> alarm is active.	
Overspeed Overshoot Alarm IEEE 37.2 – 12 Over Speed Device	Active when the <i>Over Speed Overshoot</i> alarm is active.	
Overspeed Overshoot Warning IEEE 37.2 – 12 Over Speed Device	Active when the <i>Over Speed Overshoot Warning</i> alarm is active.	
Positive var Alarm	Active when the positive var exceeds the configured Generator <i>Positive var Alarm</i> level for a duration longer than the set <i>Delay</i> timer.	
Positive var Warning	Active when the positive var exceeds the configured Generator <i>Positive var Pre-Alarm</i> level for a duration longer than the set <i>Delay</i> timer.	
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.
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 <i>crank disconnect</i> 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 <i>safety delay</i> 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 <i>warming</i> timer.

Parameters continued overleaf...

Output Source	Activates...	Is Not Active....
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 Application Selected	Indicates that the module is set to Remote Start mode, allowing the generator to start only when a remote start signal is received.	
Remote Start Off Load	Active when the <i>Remote Start Off Load</i> input is active.	
Remote Start On Load	Active when the <i>Remote Start On Load</i> input is active.	
Reset Maintenance 1, 2 or 3	Active when the relevant <i>Maintenance Alarm Reset</i> is active.	
Scheduled Auto Start Inhibit	Active when the <i>Inhibit Scheduled Run</i> input is active.	
SCR Inducement	Active when <i>SCR Inducement CAN Alarm</i> is active.	
Screensaver Active	Active when the <i>Screensaver</i> is active on the module.	
Shutdown Blocked	Becomes active when protections are disabled and one of the parameters goes out of limits.	
Simulate Lamp Test	Active when the <i>Simulate Lamp Test</i> input digital is active.	
Simulate Left Switchgear Button	Active when the Simulate Left Switchgear Button digital input is active.	
Simulate Mains Available	Active when the <i>Simulate Mains Available</i> digital input is active.	
Simulate Mode Button	Active when the Simulate Mode Button digital input is active.	
Simulate Right Switchgear Button	Active when the Simulate Right Switchgear Button digital input is active.	
Simulate Start Button	Active when the <i>Simulate Start Button</i> digital input is active.	
Simulate Stop Button	Active when the <i>Simulate Stop Button</i> digital input is active.	
Smoke Limiting	Becomes active when the module requests that the engine runs at idle speed. As an output, this is used to give a signal to the <i>Idle Speed Input</i> on the engine speed governor (if available).	Becomes inactive when the module requests that the engine runs at rated speed.
Start Relay IEEE 37.2 – 54 Turning Gear Engaging Device	Active when the module requires the cranking of the engine.	
Stop and Panel lock	Active when the <i>Stop And Panel Lock</i> digital input is active.	
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.	
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 <i>Telemetry Active</i> .	
Temperature Sensor Open Circuit	Active when the <i>Temperature Sensor Open Circuit</i> alarm is active.	
Under Frequency Shutdown \ Electrical Trip	Active when any of the <i>Generator Under Frequency Shutdown</i> or <i>Electrical Trip</i> alarm are active.	
Under Frequency Warning	Active when the <i>Generator Under Frequency Warning</i> alarm is active.	
Under Speed Shutdown \ Electrical trip	Active when any of the <i>Underspeed Shutdown</i> or <i>Electrical Trip</i> alarms are active.	

Parameters continued overleaf...

Output Source	Activates...	Is Not Active....
Under Speed Warning	Active when the <i>Underspeed Warning</i> alarm is active.	
Waiting For Manual Restore (Auto Mains Fail)	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 <i>Water in Fuel</i> input is active, or when the module is informed of the <i>Water in Fuel</i> CAN message from the ECU.	

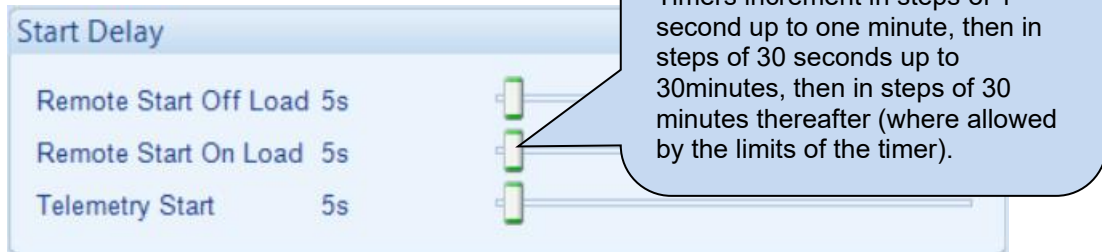
3.6 TIMERS

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.



3.6.1 START TIMERS

Start Delay



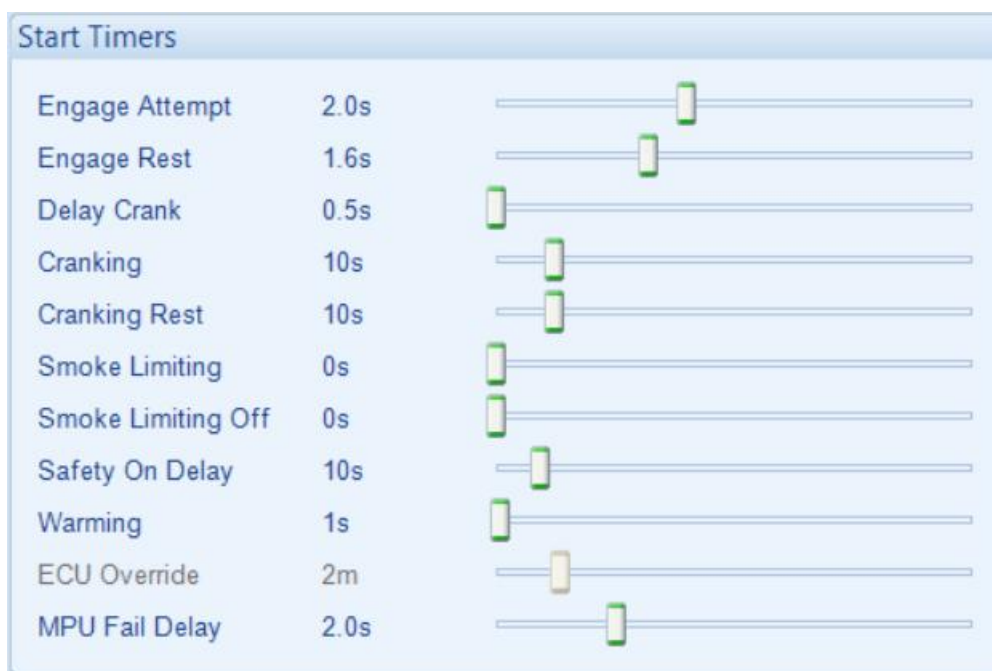
Timer	Description
Remote Start Off Load	The amount of time delay before starting in AUTO mode. This timer is activated upon the <i>Remote Start Off Load</i> command being issued. Typically this timer is applied to prevent starting upon fleeting start signals.
Remote Start On Load	The amount of time delay before starting in AUTO mode. This timer is activated upon the <i>Remote Start On Load</i> 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 <i>Remote Start</i> command being received from a Modbus client. Typically this timer is applied to prevent starting upon fleeting start signals.

Start Delay (Auto Mains Fail)



Timer	Description
Mains Fail	The amount of time delay before starting in AUTO mode. This timer is activated upon a mains failure detection.

Parameter descriptions are continued overleaf...

Start Timers

Timer	Description
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 <i>Engage Attempts</i>, the <i>Fail to Engage</i> 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.
Crank 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 <i>Under-speed</i> alarm. If the time is too long, <i>Under speed</i> protection is disabled until the <i>Smoke Limit Time Off</i> time has expired.

Parameter descriptions are continued overleaf...

Timer	Description
Safety On Delay	The amount of time at startup that the module 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.
ECU (ECM) Override	The amount of time the CAN ECU Power stays energised when the Start button is pressed in Stop mode.
MPU 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 stopped, and a <i>Loss of Magnetic Pickup</i> alarm given.

Start Timers (auto Mains Fail)

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.

3.6.2 LOAD / STOPPING TIMERS

Load Timers

Load Timers	
Transfer Time / Load Delay	0.7s
Breaker Close Pulse	0.5s
Breaker Trip Pulse	0.5s

Timer	Description
Transfer Time	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 <i>Breaker Close Pulse</i> signal is present when the request to close the load switch is given.
Breaker Trip Pulse	The amount of time that <i>Breaker Open Pulse</i> signal is present when the request to open the load switch is given.

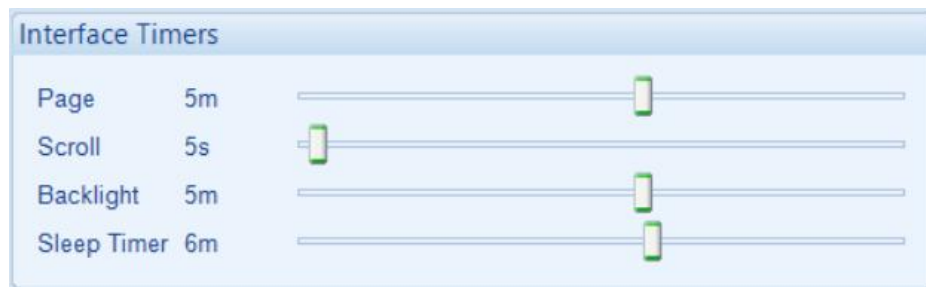
Stopping Timers

Stopping Timers	
Return Delay	30s
Cooling	1m
Cooling at Idle	0s
ETS Solenoid Hold	0s
Fail to Stop Delay	30s

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

Timer	Description
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 <i>Energise to stop</i> 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 <i>fail to stop</i> delay, a <i>Fail to Stop</i> alarm is generated.

3.6.3 MODULE TIMERS



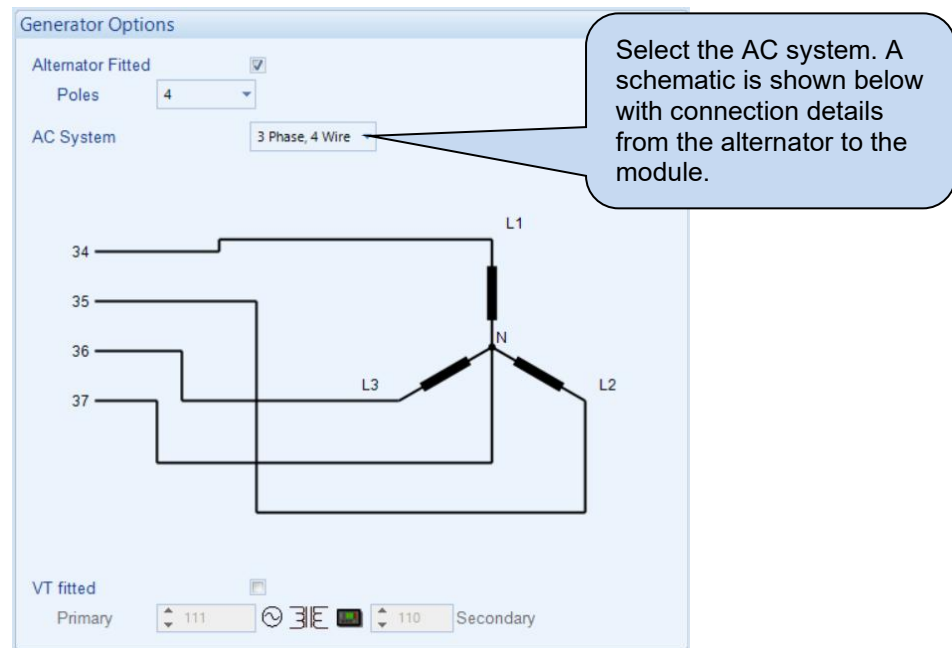
Timer	Description
LCD Page timer	If the module is left unattended for the duration of the <i>LCD Page Timer</i> it reverts to show the <i>Status</i> page.
LCD Scroll Timer	The scroll time between parameters on a selected page.
Backlight Timer	If the module is left unattended for the duration of the <i>Backlight Timer</i> , the LCD backlight turns off.
Sleep Timer	If the module is left unattended for the duration of the <i>Sleep Timer</i> , it goes into sleep mode to save power.

3.7 GENERATOR

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



3.7.1 GENERATOR OPTIONS



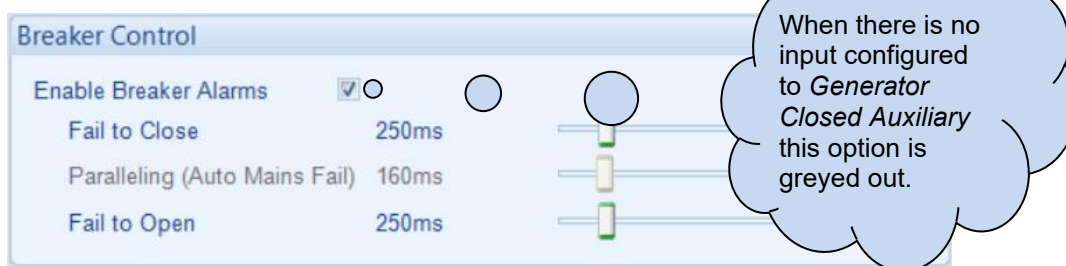
Parameter	Description
Alternator Fitted	☐ = There is no alternator in the system, it is an <i>engine only</i> application. ☒ = An alternator is fitted to the engine; it is a <i>generator</i> application.
Poles	The number of poles on the alternator.
VT Fitted	☐ = The voltage sensing to the module is direct from the alternator. ☒ = The voltage sensing to the module is via Voltage Transformers (VTs or PTs). This is used to step down the generated voltage to be within the module voltage specifications. By entering the <i>Primary</i> and <i>Secondary</i> voltages of the transformer, the module displays the <i>Primary</i> voltage rather than the actual measured voltage. This typically interfaces the DSE module to high voltage systems (i.e. 11kV) but also used on systems such as 600V ph-ph.

3.7.1.1 GENERATOR PHASE ROTATION



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

Breaker Control



Parameter	Description
Enable Breaker Alarms	☐ = When disabled, breaker fail-to-close and fail-to-open alarms are suppressed; operation continues but faults are not reported. ☒ = The <i>Generator Fail To Close Alarm</i> and the <i>Generator Fail To Open Alarm</i> are enabled. During the generator closure process, when the <i>Close Generator</i> output is activated, if the configured <i>Generator Closed Auxiliary</i> digital input does not become active within the <i>Generator Fail To Close Delay</i> timer, the <i>Generator Fail to Close</i> alarm is activated. Or, during the generator opening process, when the <i>Close Generator</i> output is deactivated, if the configured <i>Generator Closed Auxiliary</i> digital input does not become inactive within the <i>Generator Fail To Open Delay</i> timer, the <i>Generator Fail To Open</i> alarm is activated.
Paralleling Time	This is only applicable if the <i>Check Sync Closed Transition</i> is used. It is the time for the supplies remain in parallel during the <i>Closed Transition</i> .

3.7.1.2 GENERATOR kW RATING

Generator Rating

kW Rating	200	kW	250kVA
kVAr Rating	150	kVAr	0.80pf
Power factor	0.80	pf	0.80

The Generator kW rating must be set in order for the *Generator Power* functions to be correctly utilised.

The Generator kW and kvar rating must be correctly set.

The values set here are the kW, kvar, and Pf, NOT the kV A !

Calculating the var rating of a genset

- Most generators are rated for a power factor (W / V A) of 0.8
- From Pythagoras:
 - $\cos \Phi = W / V A$
 - $\cos \Phi = 0.8$
 - $\Phi = \cos^{-1} 0.8 = 36.87^\circ$
- From this we calculate the var rating of the typical 0.8 pf rated generator as:
 - $\tan \Phi = \text{var} / W$
 - $\text{var} = \tan 36.87 \times W$
 - $\text{var} = 0.75 \times W$
- Or to simplify this, the var rating of a 0.8 pf rated generator is $\frac{3}{4}$ of the W rating (kvar rating = 75% of kW rating)

3.7.2 GENERATOR VOLTAGE

The screenshot shows the 'Generator Voltage' configuration window. It is divided into four sections: 'Under Voltage Alarms', 'Loading Voltage', 'Nominal Voltage', and 'Over Voltage Alarms'. Each section contains various settings like checkboxes for alarms, dropdowns for actions, and sliders for trip values. Three callout boxes provide instructions: 1. 'Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.' pointing to the 'Action' dropdown in the 'Under Voltage Alarms' section. 2. 'Click and drag to change the setting.' pointing to a slider in the 'Under Voltage Alarms' section. 3. 'Type the value or click the up and down arrows to change the settings.' pointing to the 'Loading Voltage' input field.

3.7.2.1 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 <i>Under Volts Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Under volts Alarm Trip</i> 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 <i>Alarm Types</i> 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 <i>Under Volts Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Under volts Pre-Alarm Trip</i> value is adjustable to suit user requirements.

3.7.2.2 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 under volts trip of 184.0V and a loading voltage of 207.0V, the output voltage must return to 207.0V following an under-voltage event to be considered within limits.)
Enable Alarm	☐ = When disabled, the <i>Loading Voltage</i> alarm is suppressed; operation continues but the condition is not reported. ☒ = Upon starting and after the <i>Safety On Delay Timer</i> expires, if the generator output voltage fails to reach the <i>Loading Voltage</i> setpoint, the <i>Loading Voltage Not Reached</i> alarm is activated.

3.7.2.3 NOMINAL VOLTAGE

Parameter	Description
Nominal Voltage	This is used to calculate the percentages of the alarm setpoints.

3.7.2.4 OVER VOLTAGE ALARMS

Parameter	Description
Generator Over Voltage Pre-Alarm IEEE 37.2 – 59 AC Overvoltage Relay	☐ = When disabled, the <i>Generator Over Voltage Pre Alarm</i> is suppressed; operation continues but over-voltage conditions are not reported. ☒ = Generator Over Volts gives a warning alarm in the event of the generator output voltage rising above the configured <i>Over Volts Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Warning</i> is automatically reset when the generator output voltage falls below the configured <i>Return</i> level. The <i>Over Volts Pre-Alarm Trip</i> value is adjustable to suit user requirements.
Generator Over Voltage IEEE 37.2 – 59 AC Overvoltage Relay	☐ = When disabled, the <i>Generator Over Voltage</i> alarm is suppressed; operation continues but over-voltage conditions are not reported. ☒ = Generator Over Volts gives a <i>Shutdown</i> alarm in the event of the generator output rising above the configured <i>Over Volts Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Overvolts Alarm Trip</i> value is adjustable to suit user requirements.

3.7.3 GENERATOR FREQUENCY

The screenshot displays the 'Generator Frequency' configuration window, which is organized into several sections:

- Under Frequency Alarms:** Contains settings for 'Alarm' (checked), 'Action' (Shutdown), 'Trip' (40.0 Hz), 'Pre-Alarm' (checked), 'Trip' (42.0 Hz), and 'Activation Delay' (0s). A callout points to the trip sliders with the text: "Click and drag to change the setting."
- Loading Frequency:** Includes 'Loading Frequency' (45.0 Hz) and 'Alarm' (unchecked) with 'Action' (Warning).
- Nominal Frequency:** Shows a fixed value of 50.0 Hz.
- Over Frequency Alarms:** Includes 'Pre-Alarm' (checked), 'Return' (54.0 Hz), 'Trip' (55.0 Hz), 'Shutdown' (checked), 'Trip' (57.0 Hz), and 'Activation Delay' (0s). A callout points to the 'Pre-Alarm' checkbox with the text: "Click to enable or disable the alarms. The relevant values below are *greyed out* if the alarm is disabled."
- Run Away:** Includes 'Run Away' (checked) and 'Trip' (60.0 Hz). A callout points to the trip slider with the text: "Type the value or click the up and down arrows to change the settings."
- Over Frequency Options:** Includes 'Over Frequency Overshoot %' (0) and 'Overshoot Delay' (2.0s).

Parameters are detailed overleaf...

3.7.3.1 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 <i>Under Frequency Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Under frequency Alarm Trip</i> value is adjustable to suit user requirements.
Action	Select the type of alarm required from the list: <i>Shutdown</i> <i>Electrical Trip</i> For details of these, see the section entitled <i>Alarm Types</i> 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 <i>Under Frequency Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Under Frequency Pre-Alarm Trip</i> value is adjustable to suit user requirements.

3.7.3.2 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 underfrequency 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	☐ = When disabled, the Loading Frequency Not Reached alarm is suppressed; operation continues but the condition is not reported. ☒ = Upon starting and after the <i>Safety On Delay Timer</i> expires, if the generator output frequency fails to reach the <i>Loading Frequency</i> setpoint, the <i>Loading frequency Not Reached</i> alarm is activated.

3.7.3.3 NOMINAL FREQUENCY

Parameter	Description
Nominal Frequency	This is used to calculate the percentages of the alarm setpoints.

3.7.3.4 OVER FREQUENCY ALARMS

Parameter	Description
Generator Over Frequency Pre-Alarm IEEE 37.2 -81 Frequency Relay	☐ = When disabled, the <i>Over-Frequency Pre-Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = Generator Over Frequency gives a warning alarm in the event of the generator output frequency rising above the configured <i>Over frequency Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i>. The <i>Warning</i> is automatically reset when the generator output frequency falls below the configured <i>Return</i> level. The <i>Over Frequency Pre-Alarm Trip</i> value is adjustable to suit user requirements.
Generator Over Frequency IEEE 37.2 -81 Frequency Relay	☐ = When disabled, the over-frequency shutdown alarm is suppressed; operation continues without shutdown on over-frequency conditions. ☒ = Generator Over Frequency gives a <i>Shutdown</i> alarm in the event of the generator output rising above the configured <i>Over Frequency Alarm Trip</i> value for longer than the <i>Activation Delay</i>. The <i>Over Frequency Alarm Trip</i> value is adjustable to suit user requirements.

3.7.3.5 RUN AWAY

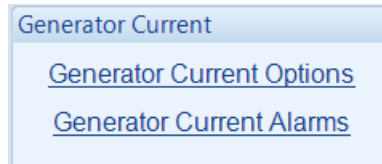
Parameter	Description
Run Away IEEE 37.2 -81 Frequency Relay	 NOTE: Only available if using magnetic pick-up or an electronic engine is connected. ☐ = When disabled, the <i>Run Away Shutdown Alarm</i> is suppressed; no automatic shutdown occurs on runaway conditions. ☒ = In the event of the generator output frequency rising above the configured <i>Trip</i> value, the <i>Run Away Shutdown</i> alarm is immediately triggered. This is used to protect against engine damage due to uncontrolled speed increase, where the engine speed runs away.
Trip	Set the frequency level for the <i>Run Away</i> alarm.

3.7.3.6 OVER FREQUENCY OPTIONS

Parameter	Description
Over Frequency Overshoot % IEEE 37.2 -81 Frequency Relay	To prevent spurious over-frequency alarms at start up, the module includes configurable <i>Over Frequency Overshoot</i> protection. This allows the frequency to 'overshoot' the <i>Over Frequency Shutdown</i> level during the starting process for a short time.
Overshoot Delay	Rather than 'inhibiting' the <i>Over Frequency</i> alarms, the levels are temporarily raised by the <i>Over Frequency Overshoot %</i> for the duration of the <i>Overshoot Delay</i> from starting.

3.7.4 GENERATOR CURRENT

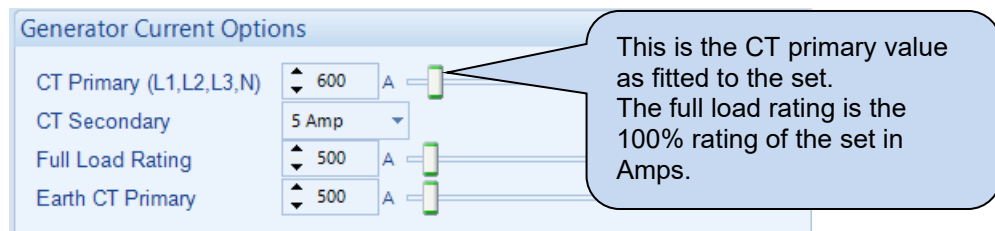
The *generator* section is subdivided into smaller sections.
Select the required section with the mouse.



3.7.4.1 GENERATOR CURRENT OPTIONS

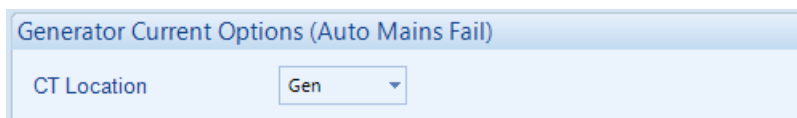
NOTE: It is not possible to write the configuration to the module if the CT Location is set to Load and the AC System in the Generator Options and in the Mains Options are not the same.

Generator Current Options



Parameter	Description
CT Primary	Primary rating of the three phase Current transformers.
CT Secondary	Secondary rating of the Current transformers.
Full Load Rating	This is the full load current rating of the alternator.
Earth CT Primary	Primary rating of the earth fault Current transformers.

Generator Current Options (Auto Mains Fail)



Parameter	Description
CT Location	NOTE: When the <i>CT Location</i> is set to <i>Load</i>, the <i>AC System</i> in the <i>Generator Options</i> and <i>Mains Options</i> must be the same. Gen: The CTs are in the feed from the generator, the module shows only generator load. Load: The CTs are in the feed to the load, the module then displays load current, provided by the mains supply or the generator.

3.7.4.3 GENERATOR CURRENT ALARMS

Overcurrent Alarm

Overcurrent Alarm

Immediate Warning ☒

IDMT Alarm ☒

Trip % 500 A

Time Multiplier

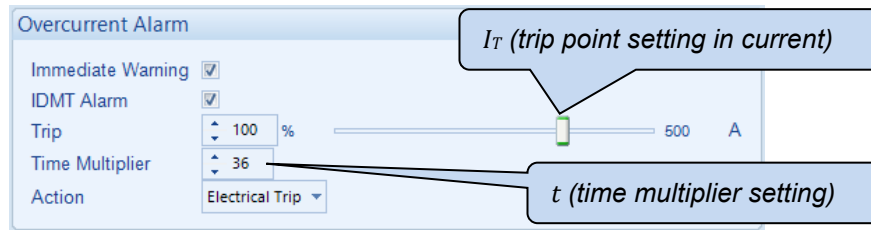
Action

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

Parameter	Description
Immediate Warning IEEE C37.2 -50 Instantaneous Overcurrent Relay	If the <i>Immediate Warning</i> is enabled, the module generates a <i>warning alarm</i> as soon as the <i>Trip</i> level is reached. The alarm automatically resets once the generator loading current falls below the <i>Trip</i> level (unless <i>All Warnings are latched</i> is enabled). For further advice, consult the generator supplier.
IDMT Alarm IEEE C37.2 -51 AC Time Overcurrent Relay (shutdown / electrical trip)	If the <i>Over Current IDMT Alarm</i> is enabled, the module begins following the IDMT 'curve' when the current on any phase passes the <i>Trip</i> setting. If the <i>Trip</i> is surpassed for an excess amount of time, the <i>IDMT Alarm</i> triggers (<i>Shutdown</i> or <i>Electrical Trip</i> as selected in <i>Action</i>). The larger the over current 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 <i>Trip</i> setting in amps. t is the <i>Time Multiplier</i> setting and 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, refer to the section entitled <i>Alarm Types</i> 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 module then *follows* a cooling curve. This means that a second overload condition may trip soon after the first as the module *knows* if the windings have not cooled sufficiently.

For further details on the *Thermal Damage Curve* of an 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 *Trip* setting in amps.

t is the *Time Multiplier* setting and 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 testing this on the generator.

	A	B	C	D	E	F
1		1.01	1.02	1.03	1.05	1.06
2	36	360000	90000	40000	14400	10000

t (time multiplier setting)

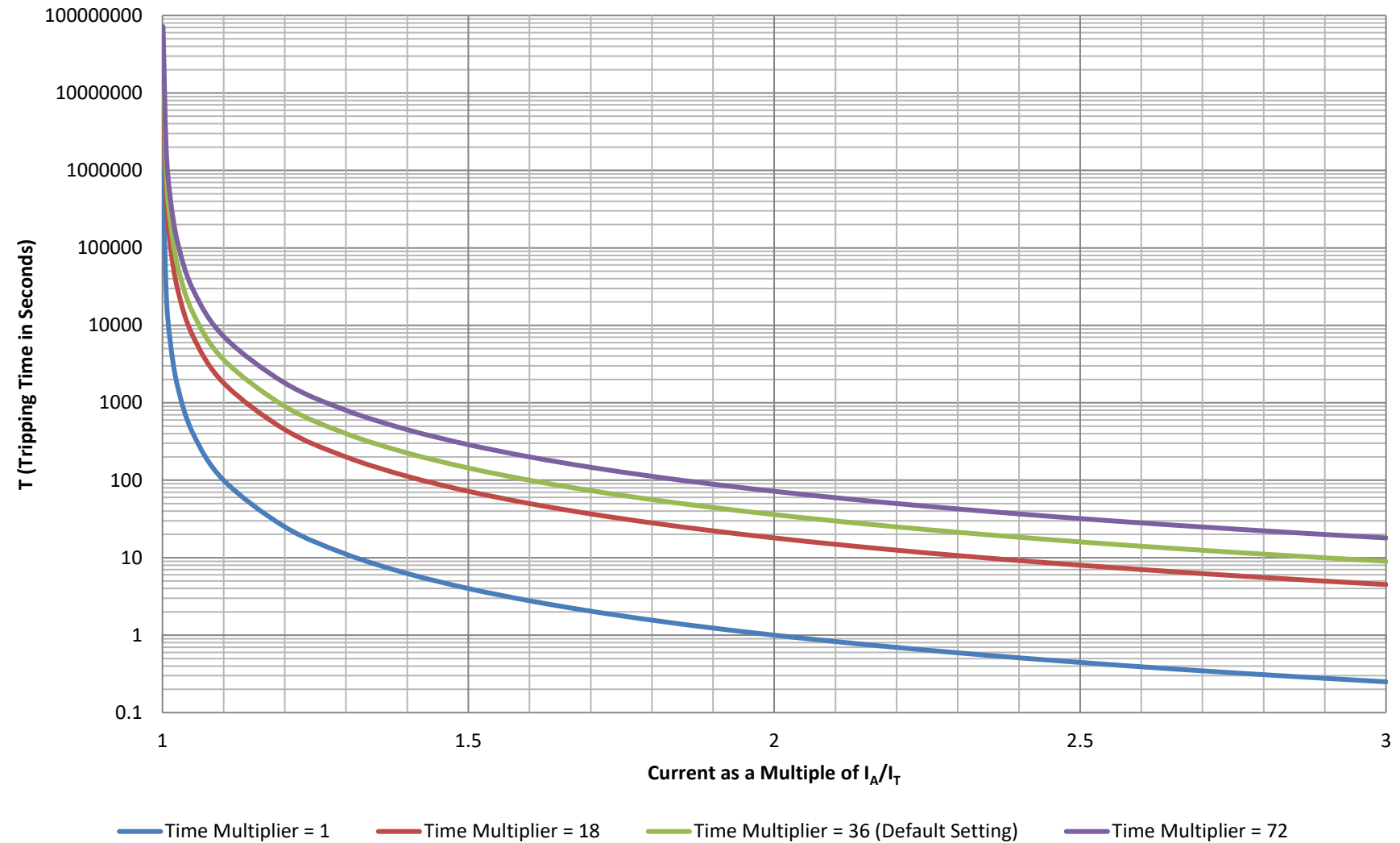
T (tripping time in seconds)

I_A/I_T (multiple of the trip setting from 1.01 to 3.0 in steps of 0.01)

The formula for the *Tripping Time* cells is:

$=A2/POWER((B\$1-1),2)$

Over Current Alarm IDMT Curves



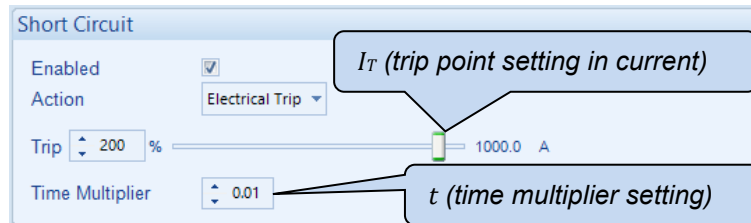
Short Circuit Alarm

Parameter	Description
Short Circuit Enable IEEE C37.2 – 51 IDMT Short Circuit Relay	If the <i>Short Circuit Alarm</i> is enabled, the module begins following the IDMT 'curve' when the current on any phase passes the <i>Trip</i> setting. If the <i>Trip</i> is surpassed for an excess amount of time, the <i>IDMT Alarm</i> triggers (<i>Shutdown</i> or <i>Electrical trip</i> as selected in <i>Action</i>). 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 $\pm 5\%$ or ± 50 ms (whichever is greater)). I_A is the actual measured current. I_T is the <i>Trip</i> setting in current. t is the <i>Time Multiplier</i> setting.
Action	Select the type of alarm required from the list: Electrical Trip Indication Shutdown Warning For details of these, see the section entitled <i>Alarm Types</i> 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

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 for normal operating conditions.

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



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 $\pm 5\%$ or ± 50 ms (whichever is greater)).
- I_A is the actual measured current.
- I_T is the *Trip* 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 testing this on the generator.

	A	B	C	D	E	F
1		1.01	1.02	1.03	1.05	1.06
2	0.01	7.034242	25	11.11111	4	2.777778

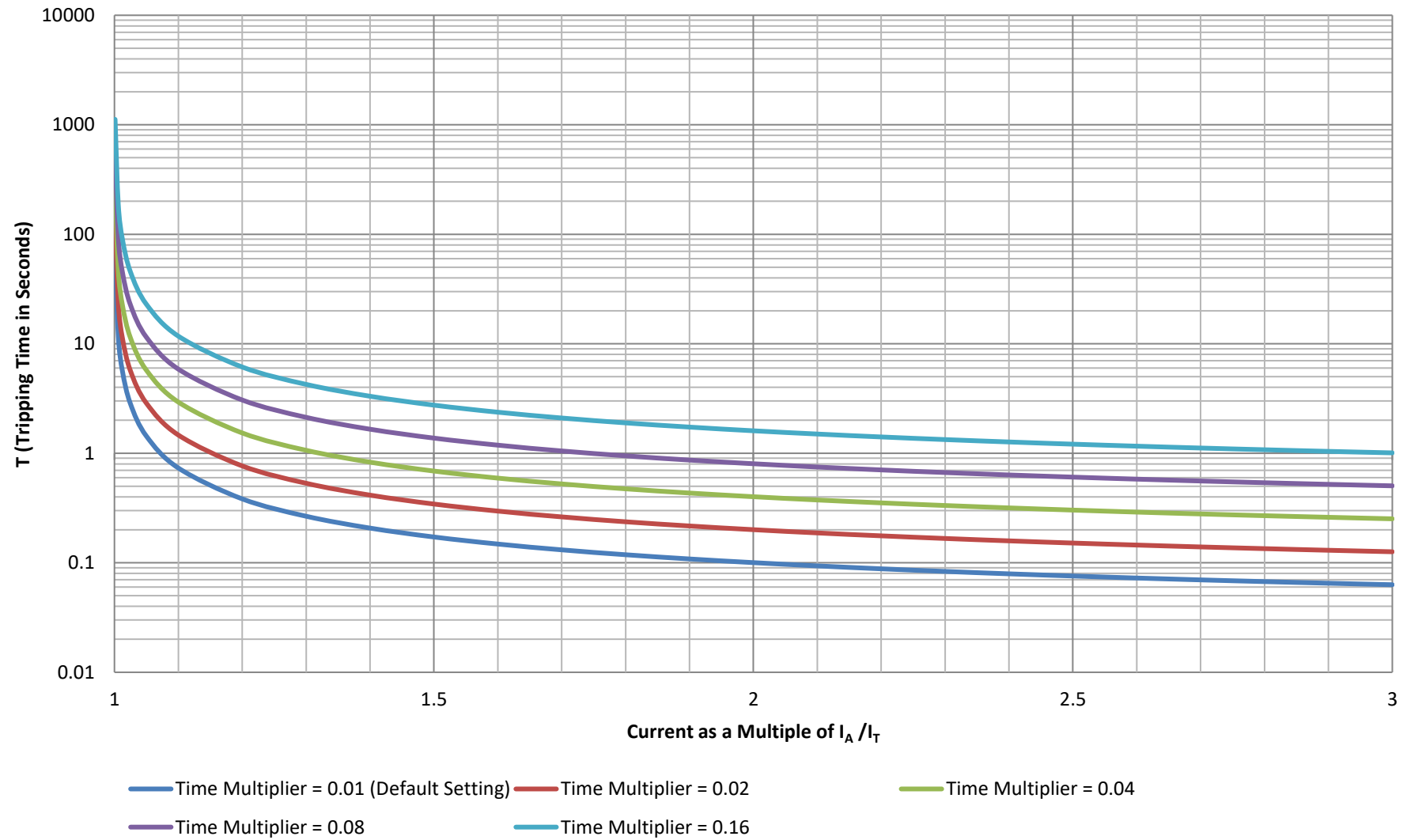
t (*time multiplier setting*)

T (*tripping time in seconds*)

I_A/I_T (*multiple of the trip setting from 1.01 to 3.0 in steps of 0.01*)

The formula for the *Tripping Time* cells is:

Short Circuit Alarm IDMT Curves



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 <i>Negative Phase Sequence</i> is enabled, the module protects against unbalanced loads. The module achieves this by measuring the difference between the minimum phase load and the maximum phase load. If this difference is greater than the <i>Trip</i> setting for the configured <i>Delay</i>, 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 <i>Trip</i> 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 <i>Alarm Types</i> elsewhere in this document.
Trip	The trip as a percentage of alternator full load current.
Delay	Set the amount of time before the <i>Negative Phase Sequence</i> activates.

Earth Fault Alarm

NOTE: The earth current trip triggers on the percentage of the full load current rating. For example, if the CT rating is 750A and the full load current is 500A, then the Earth current at 10% trips at 50A.

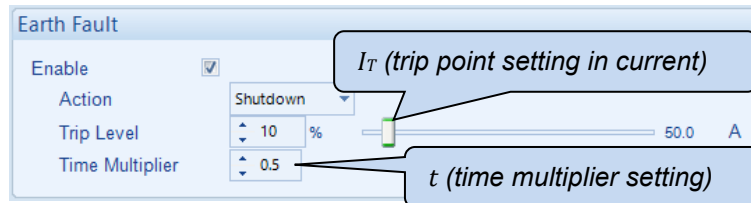
When the module is suitably connected using the 'Earth Fault CT.' The module measures Earth Fault and optionally configured to generate an alarm condition (shutdown or electrical trip) when a specified level is surpassed.

Parameter	Description
Earth Fault Enable IEEE C37.2 – 51 IDMT Earth Fault Relay	If the <i>Earth Alarm</i> is enabled, the module begins following the IDMT 'curve' when the current on any phase passes the <i>Trip</i> setting. If the <i>Trip</i> is surpassed for an excess amount of time, the <i>IDMT Alarm</i> triggers (<i>Shutdown</i> or <i>Electrical trip</i> as selected in <i>Action</i>). 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 $\pm 5\%$ or ± 50 ms (whichever is greater)). I_A is the actual measured current. I_T is the <i>Trip Level</i> setting in current. t is the <i>Time Multiplier</i> setting.
Action	Select the type of alarm required from the list: Electrical Trip Indication Shutdown Warning For details of these, see the section entitled <i>Alarm Types</i> 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.

Earth Fault Protection Explanation

NOTE: Due to unbalanced loads or certain types of load, such as an overloaded L1 or variable frequency drives, the default settings for the Earth Fault alarm may need adjusting to compensate for normal operating conditions.

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 $\pm 5\%$ or ± 50 ms (whichever is 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 testing this on the generator.

	A	B	C	D	E	F
1		1.01	1.02	1.03	1.05	1.06
2	0.01	7.034242	25	11.11111	4	2.777778

t (*time multiplier setting*)

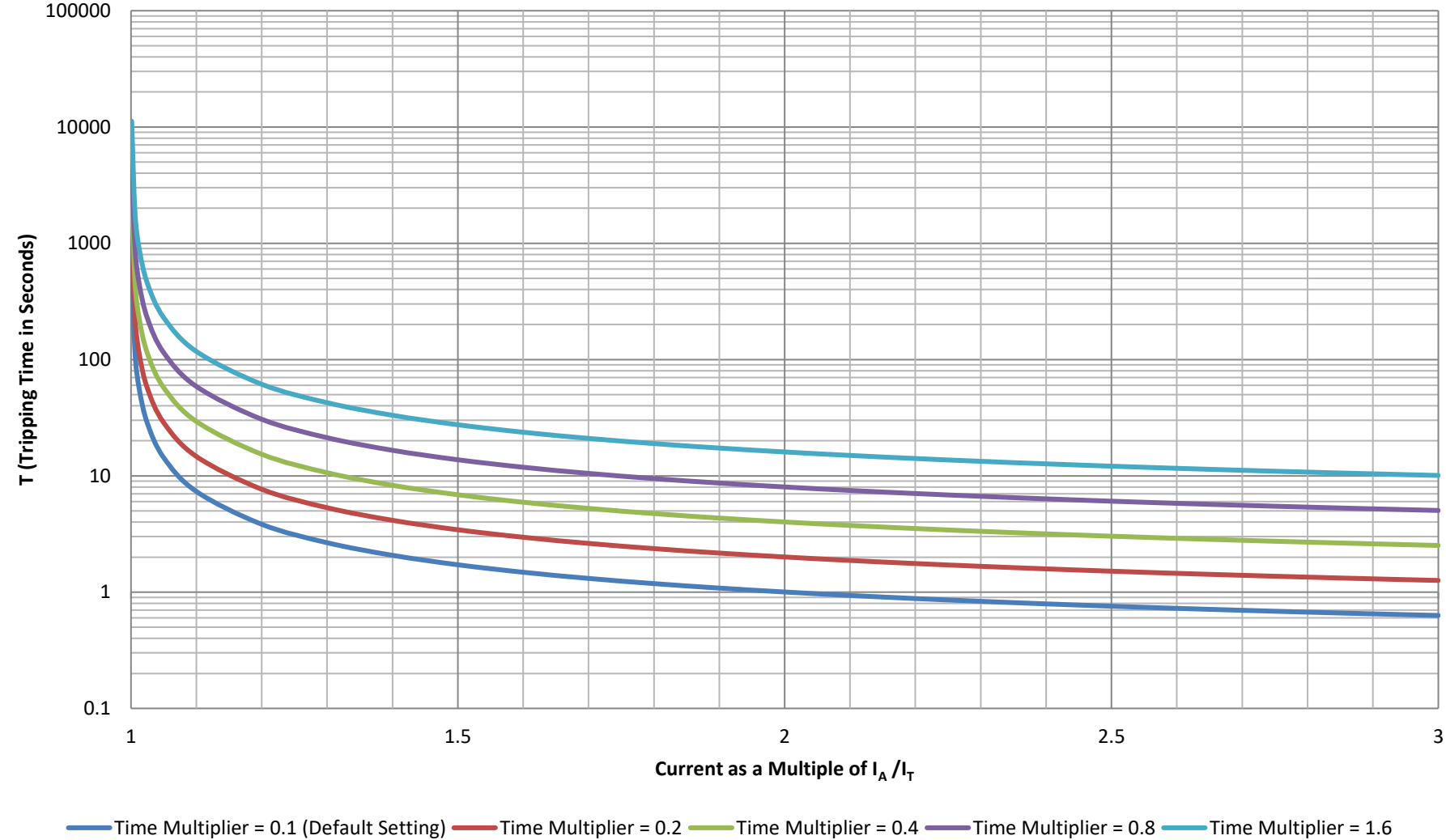
T (*tripping time in seconds*)

I_A/I_T (*multiple of the trip setting from 1.01 to 3.0 in steps of 0.1*)

The formula for the *Tripping Time* cells is:

$f_x = \text{= } (\$A2 * 0.14) / (\text{POWER}((B\$1), 0.02) - 1)$

Earth Fault Alarm IDMT Curves



3.7.4.3.1 DEFAULT CURRENT PROTECTION TRIPPING CHARACTERISTICS

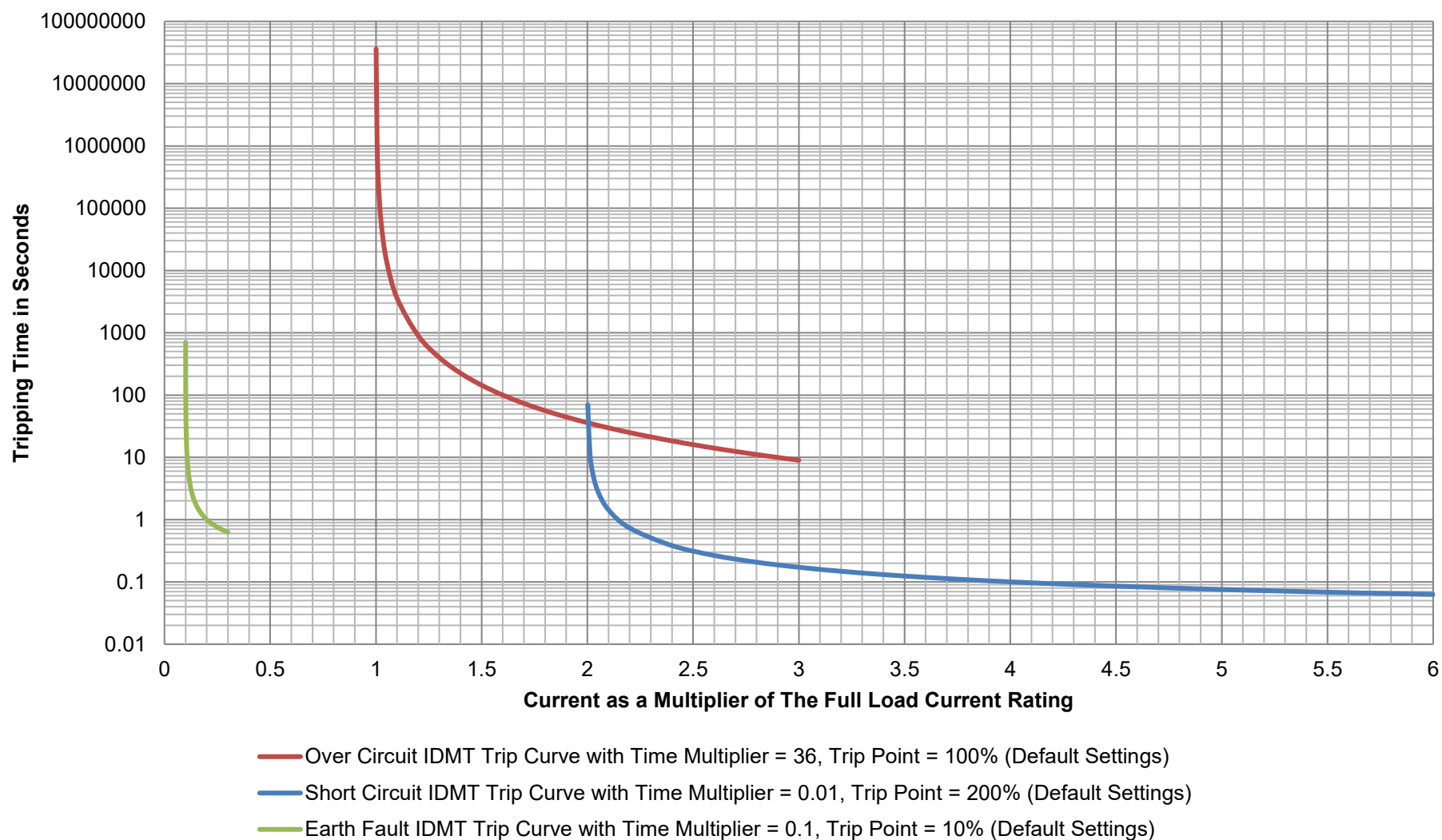
The graph on the following page shows the default settings for the IDMT tripping curves for the *Over Current*, *Short Circuit* and *Earth Fault* protections.

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 overloaded (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 a genuine short circuit or an inrush current of a motor or 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 is safely in a short circuit condition is governed by the alternator's construction.

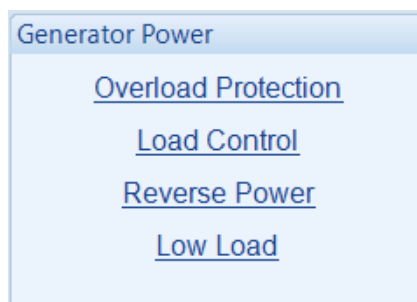
The default setting for the *Earth Fault* alarm allows for an alternator to supply a fault current caused by an imbalanced load, a high impedance short to earth or motor drives. Whereby anything less than 10% is considered normal (caused by imbalanced loads) and permitted, 12% fault current is permitted for 3.83 second or 20% fault current is permitted for 1 second.

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

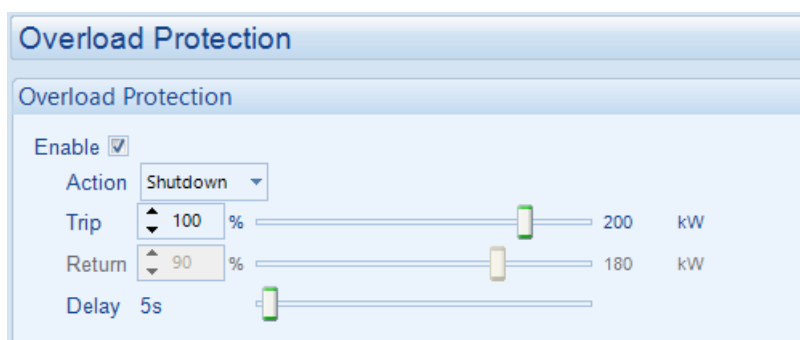


3.7.5 GENERATOR POWER

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



3.7.5.1 OVERLOAD PROTECTION



Parameter	Description
Overload Protection	☐ = When disabled, overload protection is inactive; no alarm or action occurs on overload conditions. ☒ = The <i>kW Overload Alarm</i> activates when the kW level exceeds the <i>Trip</i> setting for longer than the configured <i>Delay</i> time.
Action	Select the action for the <i>kW Overload Alarm</i> : Electrical Trip Indication Shutdown Warning

3.7.5.2 LOAD CONTROL

The screenshot displays the 'Load Control' configuration window, divided into two main sections: 'Dummy Load Control' and 'Load Shedding Control'.

Dummy Load Control:

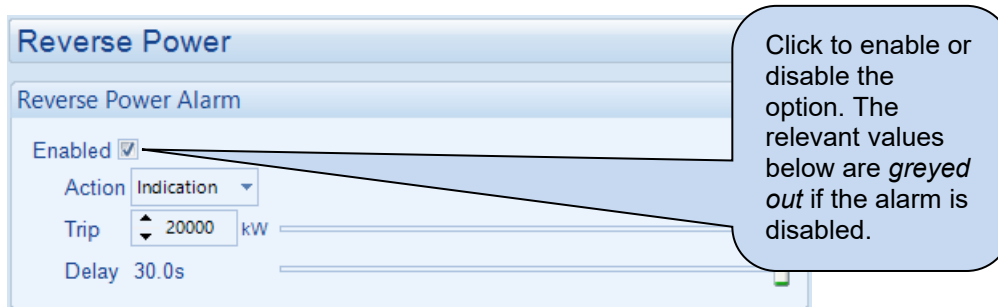
- Enable:** A checkbox that is currently checked. A callout box points to it with the text: "Click to enable or disable the option. The relevant values below appear *greyed out* if the alarm is disabled."
- Outputs in Scheme:** A dropdown menu set to '1'.
- Trip:** A slider set to 20% (range 0-40%).
- Trip Delay:** A dropdown menu set to '5s'.
- Return:** A slider set to 50% (range 0-100%).
- Return Delay:** A dropdown menu set to '5s'.

Load Shedding Control:

- Enable:** A checkbox that is currently checked. A callout box points to it with the text: "Click and drag to change the setting."
- Outputs in Scheme:** A dropdown menu set to '1'.
- Outputs at Start:** A dropdown menu set to '1'.
- Trip:** A slider set to 80% (range 0-160 kW).
- Trip Delay:** A dropdown menu set to '5s'.
- Return:** A slider set to 70% (range 0-140 kW).
- Return Delay:** A dropdown menu set to '5s'.
- Transfer Time / Load Delay:** A text field set to '0.7s'.

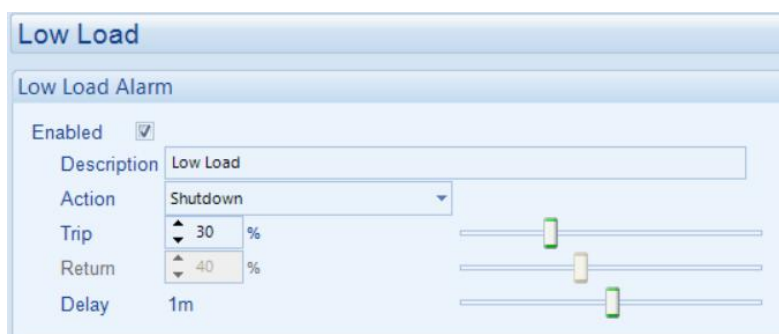
Parameter	Description
Dummy Load Control	Provides control of configurable outputs set to <i>Dummy Load Control</i> . ☐ = When disabled, <i>Dummy Load Control</i> is inactive and configured outputs are not operated. ☒ = The module monitors the load and controls outputs configured to <i>Dummy Load Control (1-5)</i> .
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 <i>Trip</i> setting for the duration of the <i>Trip Delay</i> , then the 'next' output configured to <i>Dummy Load Control</i> is activated (max 5).
Return / Return Delay	When the load level rises above the <i>Return</i> level for the duration of the <i>Return Delay</i> , then the 'highest numbered' output configured to <i>Dummy Load Control</i> is de-activated, and the timer is reset.
Load Shedding Control	Provides control of configurable outputs set to <i>Load shedding control</i> . ☐ = When disabled, <i>Load Shedding Control</i> is inactive and configured outputs are not operated. ☒ = The module monitors the load and controls any outputs configured to <i>Load Shedding Control (1-5)</i> .
Outputs in Scheme	The number of outputs (max 5) that is included in the function.
Outputs at Start	The number of outputs configured to <i>Load Shedding Control 1-5</i> that are energised when the set is required to take load. The <i>Transfer Delay / Load Delay</i> timer begins. At the end of this timer, the generator load switch is closed – The generator is placed on load.
Trip / Trip Delay	When the load level is above the <i>Trip</i> setting for the duration of the <i>Trip Delay</i> , then the 'next' output configured to <i>Load Shedding Control</i> is activated (max 5).
Return / Return Delay	When the load level is below the <i>Return</i> setting for the duration of the <i>Return Delay</i> , then the 'highest numbered' output configured to <i>Load Shedding Control</i> is de-activated, and the timer is reset.
Transfer Time / Load Delay	The time between closing the <i>Load Shedding Control</i> outputs (<i>Outputs at Start</i>) and closing the generator load switching device.

3.7.5.3 REVERSE POWER



Parameter	Description
Reverse Power IEEE 37.2 – 32 Directional Power Relay	☐ = <i>Generator Reverse Power Alarm</i> is disabled. ☒ = The <i>Generator Reverse Power Alarm</i> activates when the reverse power exceeds the <i>Reverse Power Trip</i> setting longer than the configured <i>Delay</i> time. This is used to protect against back feed from electric motors when mechanically overpowered.
Action	Select the action for the <i>Reverse Power Alarm</i> : Electrical Trip Indication Shutdown Warning

3.7.5.4 LOW LOAD



Parameter	Description
Enabled	☐ = <i>Low Load Alarm</i> is disabled. ☒ = The <i>Low Load Alarm</i> activates when the generator power drops below the configured <i>Trip</i> setting longer than the configured <i>Delay</i> 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.
Action	Select the action for the <i>Low Load Alarm</i> : Electrical Trip Indication Shutdown Warning
Trip	Set the percentage of total power at which the <i>Low Load Alarm</i> is activated.
Return	The Return level is only used for the <i>Warning Action</i> . When the load returns to above this percentage level of the total power, the <i>Warning</i> alarm is reset.
Delay	Set the amount of time before the <i>Low Load Alarm</i> activates.

3.7.6 AVR

AVR

Positive VAr

Pre-Alarm ☒

Trip %

Return %

Alarm ☒

Action

Electrical Trip

Trip %

Delay

Negative VAr

Pre-Alarm ☒

Trip %

Return %

Alarm ☒

Action

Electrical Trip

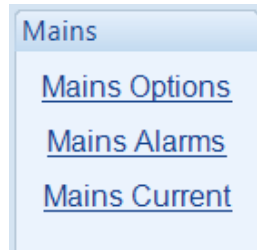
Trip %

Delay

Parameter	Description
AVR	☐ = Alarms are disabled. ☒ = The module monitors the Positive & Negative VAr levels and provides an alarm when the level exceeds the <i>Trip</i> setting longer than the configured <i>Delay</i> setting.
Action	Select the action for the <i>Reverse Power Alarm</i> : Electrical Trip Shutdown

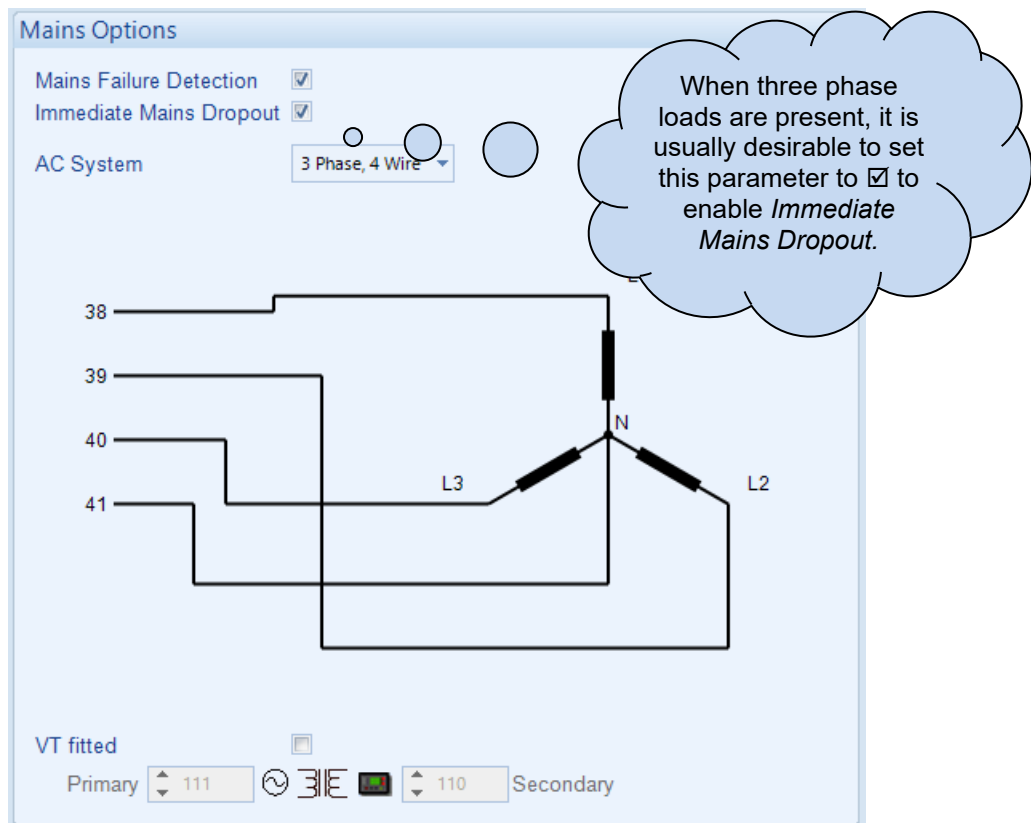
3.8 MAINS (AUTO MAINS FAIL)

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



3.8.1 MAINS OPTIONS

Mains Options



Parameters are detailed overleaf...

Parameter	Description
Mains Failure Detection	☐ = The module ignores the status of the mains supply. ☒ = The module monitors the mains supply and use 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 <i>mains transient</i> timer.
AC System	⚠ NOTE: It is not possible to write the configuration to the module if the Closed Transition option is enabled and the AC Systems are not the same in the Generator and Mains Options. ⚠ NOTE: It is not possible to write the configuration to the module if the CT Location is set to Load and the AC System in the Generator Options and in the Mains Options are not the same. 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
VTs	☐ = The voltage sensing to the module is direct from the Mains. ☒ = The voltage sensing to the module is via Voltage Transformers (VTs or PTs). This is used to step down the generated voltage to be within the module voltage specifications. By entering the <i>Primary</i> and <i>Secondary</i> voltages of the transformer, the module displays the <i>Primary</i> voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (i.e. 11 kV).

Mains Phase Rotation Alarm

Mains Phase Rotation Alarm

Enable ☒

Phase Rotation L1-L2-L3

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

Breaker Control

Enable Breaker Alarms ☒

Fail to Open Delay 250ms

Paralleling 160ms

Fail to Close Delay 250ms

When there is no input configured to *Mains Closed Auxiliary* this option is greyed out.

This is 'read only' for information purposes. The *Paralleling* timer is configured in the 'Generator Options' page.

Parameter	Description
Enable Breaker Alarms	☐ = When disabled, <i>Mains Breaker Fail-To-Close</i> and <i>Fail-To-Open</i> alarms are suppressed; operation continues but faults are not reported. ☒ = The <i>Mains Fail To Close Alarm</i> and the <i>Mains Fail To Open Alarm</i> are enabled. During the mains closure process, when the <i>Close Mains</i> output is activated, if the configured <i>Mains Closed Auxiliary</i> digital input does not become active within the <i>Mains Fail To Close Delay</i> timer, the <i>Mains Fail to Close</i> alarm is activated. Or, during the mains opening process, when the <i>Close Mains</i> output is deactivated, if the configured <i>Mains Closed Auxiliary</i> digital input does not become inactive within the <i>Mains Fail To Open Delay</i> timer, the <i>Mains Fail To Open</i> alarm is activated.

Mains Rating

Mains Rating

Full Load Rating

kW

Full KVAr Rating

kVAr

Parameter	Description
Mains Rating	The Mains Rating is utilised to show the Mains load percentage in the DSE Scada Suite. The Mains kW and kvar rating must be correctly set. The values you set here are the kW, and kvar, NOT the kVA, or PF !

3.8.2 MAINS ALARMS

The screenshot shows the 'Mains Alarms' configuration window. It is divided into 'Voltage Alarms' and 'Frequency Alarms' sections. Each section has checkboxes to enable or disable the respective alarms. Below these are adjustable trip and return values with up/down arrows and graphical sliders. Callouts provide instructions: 'Click to enable or disable the alarms. The relevant values below appears greyed out if the alarm is disabled.' points to the checkboxes; 'Type the value or click the up and down arrows to change the settings.' points to the numerical input fields; and 'Click and drag to change the setting.' points to the sliders.

Alarm	IEEE designation
Mains Under Voltage IEEE 37.2 – 27 AC Undervoltage Relay	☐ = When disabled, <i>Mains Under-Voltage</i> detection and alarms are suppressed; the condition is not reported. ☒ = <i>Mains Under Voltage</i> gives an alarm in the event of the mains voltage falling below the configured <i>Under Voltage Trip</i> value. The <i>Under Voltage Trip</i> value is adjustable to suit the application. The alarm is reset, and the mains is considered within limits when the mains voltage rises above the configured <i>Under Voltage Return</i> level.
Mains Over Voltage IEEE 37.2 – 59 AC Overvoltage Relay	☐ = When disabled, <i>Mains Over-Voltage</i> detection and alarms are suppressed; the condition is not reported. ☒ = <i>Mains Over Voltage</i> gives an alarm in the event of the mains voltage rising above the configured <i>Over Voltage Trip</i> value. The <i>Over Voltage Trip</i> value is adjustable to suit the application. The alarm is reset, and the mains is considered within limits when the mains voltage falls below the configured <i>Over Voltage Return</i> level.
Mains Under Frequency IEEE 37.2 – 81 Frequency Relay	☐ = When disabled, <i>Mains Under-Frequency</i> detection and alarms are suppressed; the condition is not reported. ☒ = <i>Mains Under Frequency</i> gives an alarm in the event of the mains frequency falling below the configured <i>Under Frequency Trip</i> value. The <i>Under Frequency Trip</i> value is adjustable to suit the application. The alarm is reset, and the mains is considered within limits when the mains frequency rises above the configured <i>Under Frequency Return</i> level.
Mains Over Frequency IEEE 37.2 – 81 Frequency Relay	☐ = When disabled, <i>Mains Over-Frequency</i> detection and alarms are suppressed; the condition is not reported. ☒ = <i>Mains Over Frequency</i> gives an alarm in the event of the mains frequency rising above the configured <i>Over Frequency Trip</i> value. The <i>Over Frequency Trip</i> value is adjustable to suit the application. The alarm is reset, and the mains is considered within limits when the mains frequency falls below the configured <i>Over Frequency Return</i> level.

3.8.3 MAINS CURRENT

NOTE: Mains Current Alarms are provided only when the Current Transformers are fitted into the 'load leg'.

NOTE: These alarms are described fully in the section entitled *Generator Current Alarms* elsewhere in this manual.

Mains Current

Mains Current Options

CT Primary (L1,L2,L3,N)

600

A

Full Load Rating

500

A

Earth CT Primary

500

A

Overcurrent Alarm

Immediate Warning

☒

IDMT Alarm

☒

Trip

100

%

500

A

Time Multiplier

36

Action

Electrical Trip

Short Circuit

Enabled

☒

Action

Electrical Trip

Trip

200

%

1000

A

Time Multiplier

0.01

Earth Fault

Enable

☒

Action

Shutdown

Trip Level

10

%

50.0

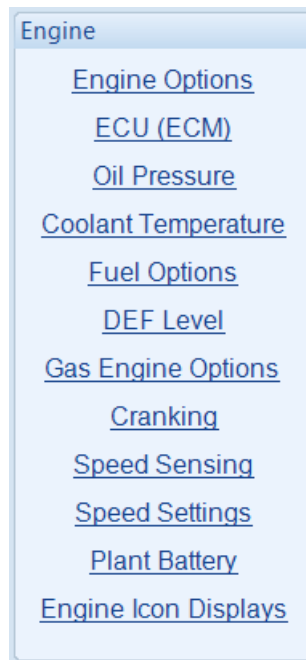
A

Time Multiplier

0.1

3.9 ENGINE

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



3.9.1 ENGINE OPTIONS

ECU (ECM) Options

ECU (ECM) Options

Engine Type	Cummins CM2150E
Enhanced J1939	☒
Alternative Engine Speed	☒
Modbus Engine Comms Port	RS485 Port
Disable ECM Speed Control	☒

These items are read only and not adjustable. To change these items, visit the *Module | Application* menu.

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: *057-263 DSEG7400 Operator Manual* which is found on our website: www.deepseaelectronics.com.

Miscellaneous Options

J1939-75 Instrumentation Enable	☒
J1939-75 Alarms Enable	☒
CAN source address (instrumentation)	44

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 <i>CAN Source Address</i> for the DSE module over which other CANbus devices read the generator set instrumentation.

Startup Options

Startup Options

Start Attempts	3
----------------	---

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 <i>Cranking Time</i>, then the current start attempt is cancelled, and the <i>Crank Rest</i> time takes place before the next crank attempt begins. If, after all configured <i>start attempts</i>, the engine is not detected as running, the <i>Fail to Start</i> shutdown alarm is generated. The engine is detected as running by checking all methods of <i>Crank Disconnect</i>. For further details, see the section entitled <i>Crank Disconnect</i> 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	☐ = When disabled, <i>Pre-Heat</i> is inactive and no pre-heat output is applied before starting. ☒ = When the <i>Coolant Temperature</i> is below the configured <i>On</i> level, the <i>Pre-Heat</i> digital output is activated for the set <i>Duration</i> of time before cranking.
On	Set the coolant temperature below which the pre-heat is activated.
Duration	Set the time delay during which the <i>Pre-Heat</i> digital output remains active before cranking.

3.9.1.1 POST-HEAT

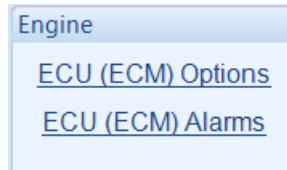
NOTE: For this feature to have effect, configure a digital output for Pre-Heat.

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

Parameter	Description
Enabled	☐ = When disabled, <i>Post-Heat</i> is inactive and no post-heat output is applied after cranking. ☒ = When the <i>Coolant Temperature</i> is below the configured <i>On</i> level, the <i>Pre-Heat</i> digital output is activated for the set <i>Duration</i> of time after cranking and before the set is considered available.
On	Set the coolant temperature below which the pre-heat is activated.
Duration	Set the time delay during which the <i>Pre-Heat</i> digital output remains active after cranking and before the engine is considered available.

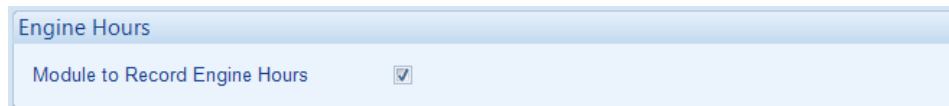
3.9.2 ECU (ECM)

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



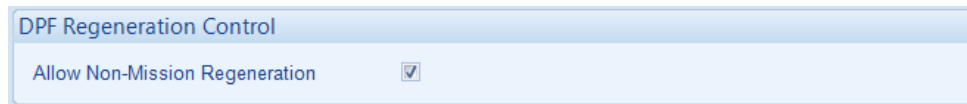
3.9.2.1 ECU (ECM) OPTIONS

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

 **NOTE:** Depending on the Engine Type selected, the Speed Switch options vary to indicate certain speed switch methods such as disabling the speed switch.

Speed Switch

Enable
0: Default Dataset ECU ▼

Parameter	Description
Speed Switch	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: 0: CAN Open Increase Decrease 1: CAN Open Speed Demand 2: Default Dataset ECU 3: ECU Analogue Absolute 4: ECU Analogue Relative 5: ECU CAN Open Analogue 6: ECU Frequency Input 7: ECU Increase Decrease Input

Example:

For some Volvo Engine Types, the Speed Switch indicates specific options as shown below.

Speed Switch

Enable
Always ▼

Parameter	Description
Speed Switch Enable	Defines the method of speed control over CANbus when supported by the Volvo ECU (ECM). Selection needs to match the ECU (ECM) calibration for the speed control method. Available speed control methods to choose from: Always Never On Change

ECU Wakeup

ECU Wakeup

Enable ☒

Periodic Wakeup Time 1h

Coolant Measurement Persistence ☒

Parameter	Description
ECU Wakeup Enable	☐ = When disabled, <i>ECU Wakeup</i> is inactive and the ECU is not powered for parameter access when the engine is stopped. ☒ = When the engine is stopped, the DSE module sends a wakeup signal to the ECU (ECM) and keeps it powered up for the <i>ECU Override</i> time (configured in <i>Start Timers</i>) to read the ECU (ECM) parameters. This is periodically repeated depending on the configured <i>Periodic Wakeup Time</i>.
Coolant Measurement Persistence	NOTE: Available only when ECU Wakeup is enabled. ☐ = When disabled, <i>Coolant Measurement Persistence</i> is inactive, and the measurement is not retained or used for control. ☒ = The <i>Coolant Temperature</i> measurement is used for the <i>Coolant Temperature Control</i>.

ECU (ECM) Startup Delay

ECU (ECM) Startup Delay

Enable ☒

Delay 2s

Parameter	Description
ECU Startup Delay	☐ = When disabled, <i>ECU Startup Delay</i> is not applied, and the controller starts immediately without waiting for ECU response. ☒ = When the engine has to start, the DSE module sends the wakeup signal to the ECU (ECM) before activating the <i>Fuel Relay</i>, <i>Start Relay</i> outputs, or sending the start signal by CAN message, and waits for the ECU to respond before sending the start request. If the ECU (ECM) doesn't respond within the <i>Delay</i> time, the module activates the <i>ECU Start Fail</i> alarm.

Droop

Droop

Enable ☒

4.0 %

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. ☐ = When disabled, engine <i>Droop</i> control is inactive, and no droop is applied by the module. ☒ = Where supported by the electronic engine ECU (ECM), the module enables droop in the engine ECU (ECM) governor at the configured percentage.

DTC Ignore List

The screenshot shows a window titled "DTC Ignore List". It contains two columns of DTC selection lists. The left column lists DTCs 1 through 5, and the right column lists DTCs 6 through 10. Each entry consists of a checkbox and a dropdown arrow.

Parameter	Description
DTC 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

The screenshot shows a window titled "Miscellaneous". It contains a single parameter: "CAN source address (engine messages)" with a dropdown arrow and the value 17.

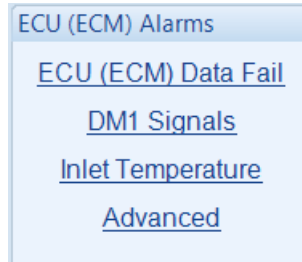
Parameter	Description
CAN Source Address (Engine Messages)	Set the <i>CAN Source Address</i> the DSE module uses to communicate with the engine's ECU over the CANbus connection. When an ECU <i>Engine Type</i> is selected in the <i>Application</i> section, the <i>CAN Source Address</i> is automatically configured to suit the engine ECU's default requirement. However in some cases a change is required depending on the ECU's configuration, contact the engine manufacturer for further details.

3.9.2.2 ECU (ECM) ALARMS

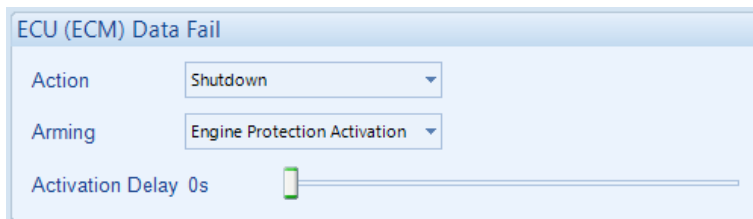


NOTE: This section is only available when the module is connected to an ECU.

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



3.9.2.2.1 ECU (ECM) DATA FAIL



Parameter	Description
ECU (ECM) Data Fail	Provides protection against failure of the ECU (ECM) CAN data link. The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: None Electrical Trip Shutdown Warning
Arming	Select when the <i>CAN ECU (ECM) Data Fail</i> alarm is active. Options are as follows: Always: The alarm is active at any time the CAN Link is lost. Engine Protection Activation: The alarm is monitored after the engine is running and the oil pressure engine protection is in a 'healthy' state, until the engine stops. From Safety On: Active only after the <i>Safety On</i> delay timer. From Starting: Active only after the <i>Crank Relay</i> is energised. Loading Alarms Activation: The alarm is monitored when the generator voltage and frequency are above their <i>Loading</i> levels. 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 <i>CAN ECU (ECM) Data Fail</i> after a failure.

3.9.2.2.2 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 CAN message; however, the ECU (ECM) still shuts down the engine depending on the alarm severity.

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

ECU Amber

ECU Amber

Action: Warning

Arming: Always

Activation Delay: 0s

Parameter	Description
ECU Amber Action	The action the DSE module takes when receiving an ECU Amber fault condition. The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: None Electrical Trip Shutdown Warning
Arming	Select when the DSE module activates it <i>ECU Amber</i> alarm. Options are as follows, see the section entitled <i>Alarm Arming</i> elsewhere in this document: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation Never When Stationary
Activation Delay	The amount of time before the module activates the <i>ECU Amber</i> alarm after receiving an ECU Amber fault condition from the ECU.

ECU Red

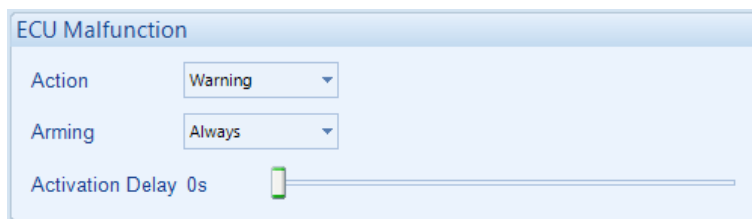
ECU Red

Action: Shutdown

Arming: From Safety On

Activation Delay: 0s

Parameter	Description
ECU Red Action	The action the DSE module takes when receiving an ECU Red fault condition. The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: None Electrical Trip Shutdown Warning
Arming	Select when the DSE module activates its <i>ECU Red</i> alarm. Options are as follows, see the section entitled <i>Alarm Arming</i> elsewhere in this document: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation Never When Stationary
Activation Delay	The amount of time before the module activates the <i>ECU Red</i> alarm after receiving an ECU Red fault condition from the ECU.

ECU Malfunction


ECU Malfunction

Action Warning

Arming Always

Activation Delay 0s 

Parameter	Description
ECU Malfunction Action	The action the DSE module takes when receiving an ECU Malfunction fault condition. The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: None Electrical Trip Shutdown Warning
Arming	Select when the DSE module activates it <i>ECU Malfunction</i> alarm. Options are as follows, see the section entitled <i>Alarm Arming</i> elsewhere in this document: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation Never When Stationary
Activation Delay	The amount of time before the module activates the <i>ECU Malfunction</i> alarm after receiving an ECU Malfunction fault condition from the ECU.

ECU Protect

ECU Protect

Action: Warning

Arming: From Safety On

Activation Delay: 0s

Parameter	Description
ECU Protect Action	The action the DSE module takes when receiving an ECU Protect fault condition. The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: None Electrical Trip Shutdown Warning
Arming	Select when the DSE module activates its <i>ECU Protect</i> alarm. Options are as follows, see the section entitled <i>Alarm Arming</i> elsewhere in this document: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation Never When Stationary
Activation Delay	The amount of time before the module activates the <i>ECU Protect</i> alarm after receiving an ECU Protect fault condition from the ECU.

3.9.2.2.3 INLET TEMPERATURE

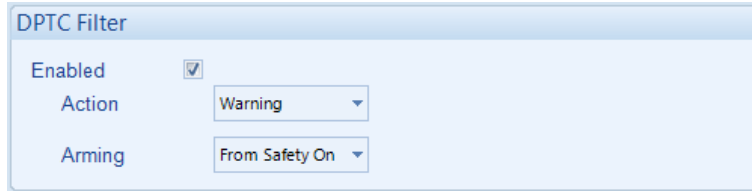
Provides inlet temperature alarms when the module is used in conjunction with electronic (ECU) engines that support the reading of inlet temperature.

Parameter	Description
Inlet Temperature Alarm	 NOTE: The feature is only available when an electronic engine is selected. ☐ = When disabled, the <i>Inlet Temperature Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = <i>Inlet Temperature Alarm</i> is activated when the <i>Inlet Temperature</i> sent from the ECU rise above the <i>Trip</i> level.
Action	Select the type of alarm required from the list: Electrical Trip Shutdown For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document.
Inlet Temperature Pre-Alarm	☐ = When disabled, the <i>Inlet Temperature Pre-Alarm</i> is suppressed; operation continues but the early warning is not reported. ☒ = <i>Inlet Temperature Pre-Alarm</i> is activated when the <i>Inlet Temperature</i> sent from the ECU is above the configured <i>Trip</i> level. The Pre-Alarm is deactivated when the <i>Inlet Temperature</i> falls below the <i>Return</i> level.

3.9.2.2.4 ADVANCED

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

Allows configuration of selected additional CAN messages from the engine ECU (ECM).

DPTC Filter


Parameter	Description
DPTC Filter Enabled	☐ = The DSE module's <i>DPTC Filter</i> alarm is disabled, it does not act upon any DPTC Filter fault conditions from the ECU. ☒ = The DSE module's <i>DPTC Filter</i> 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 <i>Alarm Types</i> The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: Electrical Trip Indication Shutdown Warning
Arming	Select when the DSE module activates its <i>DPTC Filter</i> alarm. Options are as follows, see the section entitled <i>Alarm Arming</i> elsewhere in this document: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation When Stationary

HEST Active

HEST Active

Enabled ☒

Action Warning

Arming From Safety On

Parameter	Description
HEST Active Enabled	☐ = The DSE module's <i>HEST</i> alarm is disabled, it does not act upon any HEST fault conditions from the ECU. ☒ = The DSE module's <i>HEST</i> 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 <i>Alarm Types</i> The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: Indication Warning
Arming	Select when the DSE module activates its <i>HEST</i> alarm. Options are as follows, see the section entitled <i>Alarm Arming</i> elsewhere in this document: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation When Stationary

DEF Level

Parameter	Description
DEF Level Enabled	☐ = The DSE module's <i>DEF Level</i> alarm is disabled; it does not act upon any DEF Level fault conditions from the ECU. ☒ = The DSE module's <i>DEF Level</i> 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 <i>Alarm Types</i> The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: Electrical Trip Shutdown Warning
Arming	Select when the DSE module activates its <i>DEF Level</i> alarm. Options are as follows, see the section entitled <i>Alarm Arming</i> elsewhere in this document: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation When Stationary
Activation Delay	The amount of time before the module activates the <i>DEF Level</i> alarm after a receiving a DEF Level fault condition from the ECU.

SCR Inducement

SCR Inducement

Enabled ☒

Action Warning

Arming From Safety On

Activation Delay 0s

Parameter	Description
SCR Inducement Enabled	☐ = The DSE module's <i>SCR Inducement</i> alarm is disabled; it does not act upon any SCR Inducement fault conditions from the ECU. ☒ = The DSE module's <i>SCR Inducement</i> 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 <i>Alarm Types</i> The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: Electrical Trip Shutdown Warning
Arming	Select when the DSE module activates its <i>SCR Inducement</i> alarm. Options are as follows, see the section entitled <i>Alarm Arming</i> elsewhere in this document: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation When Stationary
Activation Delay	The amount of time before the module activates the <i>SCR Inducement</i> alarm after a receiving a SCR Inducement fault condition from the ECU.

3.9.3 OIL PRESSURE

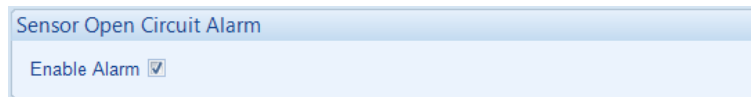
NOTE: The DSE module reads oil pressure from the ECU (ECM) if the selected Engine Application supports it. In these cases, Analogue Input A is configured as Flexible Analogue or Digital Input. Configuration of Flexible Analogue Inputs and Digital Inputs is detailed elsewhere in this document.

Input Type



Parameter	Description
Input Type	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.

Sensor Open Circuit Alarm



Parameter	Description
Enable Alarm	☐ = When disabled, open circuit alarms are suppressed, and sensor disconnection faults are not reported. ☒ = The <i>Sensor Open Circuit Alarm</i> is active when the module detects an open circuit when the sensor is disconnected.

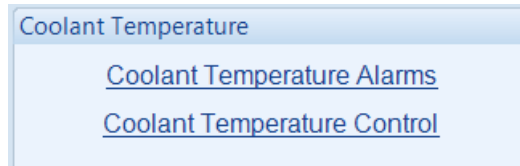
Low Oil Pressure Alarms



Parameter	Description
Low Oil Pressure Shutdown	☐ = When disabled, the <i>Low Oil Pressure Shutdown</i> alarm is suppressed; operation continues without shutdown on low oil pressure conditions. ☒ = The <i>Low Oil Pressure Shutdown Alarm</i> is active when the measured oil pressure drops below the configured <i>Trip</i> level.
Low Oil Pressure Pre-Alarm	☐ = When disabled, the <i>Low Oil Pressure Pre-Alarm</i> is suppressed; operation continues without shutdown on low oil pressure conditions. ☒ = The <i>Low Oil Pressure Warning Alarm</i> is active when the measured oil pressure drops below the configured <i>Trip</i> level. The warning is automatically reset when the oil pressure increases above the configured <i>Return</i> level.

3.9.4 COOLANT TEMPERATURE

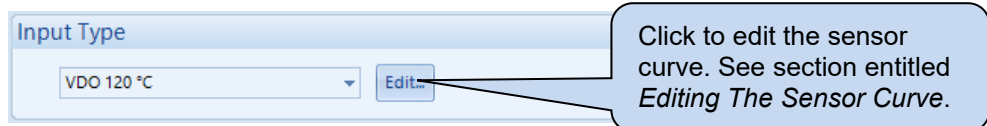
The *Coolant Temperature* page is subdivided into smaller sections. Select the required section with the mouse.



3.9.4.1 COOLANT TEMPERATURE ALARM

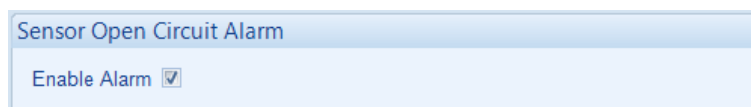
NOTE: The DSE module reads oil pressure from the ECU (ECM) if the selected Engine Application supports it. In these cases, Analogue Input B is configured as Flexible Analogue or Digital Input. Configuration of Flexible Analogue Inputs and Digital Inputs is detailed elsewhere in this document.

Input Type



Parameter	Description
Input Type	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.

Sensor Open Circuit Alarm



Parameter	Description
Enable Alarm	☐ = When disabled, coolant temperature open circuit alarms are suppressed, and sensor disconnection faults are not reported. ☒ = The <i>Coolant Temperature Open Circuit Alarm</i> is active when the module detects an open circuit when the sensor is disconnected.

Low Coolant Temperature Alarms

Low Coolant Temperature Alarms

Pre-Alarm ☒

Trip °C 158 °F

Return °C 167 °F

Parameter	Description
Low Coolant Temperature Pre-Alarm	☐ = When disabled, the <i>Low Coolant Temperature Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>Low Coolant Temperature Warning Alarm</i> is active when the measured coolant temperature falls below the configured <i>Trip</i> level. The <i>Warning</i> is automatically reset when the coolant temperature rises above the configured <i>Return</i> level.

High Coolant Temperature Alarms

High Coolant Temperature Alarms

Pre-Alarm ☒

Return °C 190 °F

Trip °C 194 °F

Electrical Trip ☒

Trip °C 198 °F

Shutdown ☒

Trip °C 203 °F

Parameter	Description
High Coolant Temperature Pre-Alarm	☐ = When disabled, the <i>High Coolant Temperature Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>High Coolant Temperature Warning Alarm</i> is active when the measured coolant temperature rises above the configured <i>Trip</i> level. The <i>Warning</i> is automatically reset when the coolant temperature falls below the configured <i>Return</i> level.
High Coolant Temperature Electrical Trip	☐ = When disabled, the <i>High Coolant Temperature Electrical Trip</i> is suppressed; operation continues without tripping on this condition. ☒ = The <i>High Coolant Temperature Controlled Shutdown Alarm</i> is active when the measured coolant temperature rises above the configured <i>Trip</i> level.
High Coolant Temperature Shutdown	The <i>High Coolant Temperature Shutdown Alarm</i> is active when the measured coolant temperature rises above the configured <i>Trip</i> level.

3.9.4.2 COOLANT TEMPERATURE CONTROL

Coolant Heater Control

Parameter	Description
Coolant Heater Control	☐ = When disabled, <i>Coolant Heater Control</i> is inactive, and the heater output is not operated automatically. ☒ = The digital output configured to <i>Coolant Heater Control</i> is energised when the engine coolant temperature falls below the configured <i>On</i> level. This is designed to control an external engine heater. When the coolant temperature rises above the configured <i>Off</i> level, the digital output is de-energised.

Coolant Cooler Control

Parameter	Description
Coolant Cooler Control Enable	☐ = When disabled, <i>Coolant Cooler Control</i> is inactive, and the cooling output is not operated automatically. ☒ = The digital output configured to <i>Coolant Cooler Control</i> is energised when the engine coolant temperature exceeds the configured <i>On</i> 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 <i>Off</i> level, the digital output is then de-energised.
Disable When Set Not Available	☐ = The <i>Coolant Cooler Control</i> operates as normal. ☒ = The <i>Coolant Cooler Control</i> operates only when the generator is running.

Fan Control

Parameter	Description
Fan Control	An output configured to <i>Fan Control</i> 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 <i>Fan Overrun Delay</i>.

3.9.5 FUEL OPTIONS

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



3.9.5.1 FUEL CONTROL AND MONITORING

Input Type

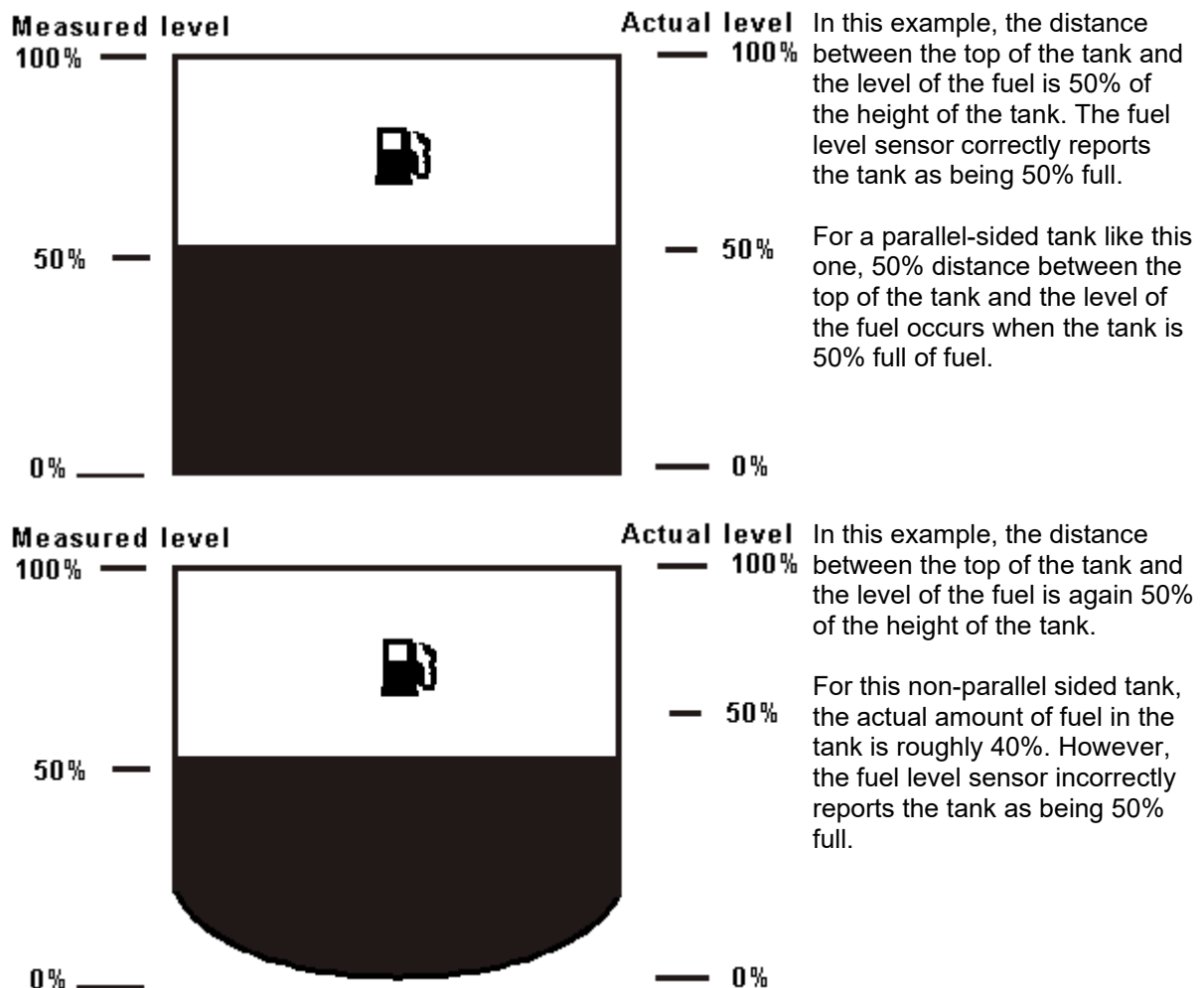
Input Type
 VDO Ohm range (10-180)

Edit...

Click to edit the sensor curve. See section entitled *Editing The Sensor Curve*.

Parameter	Description
Input Type	Select the sensor type and curve from a pre-defined list or create a user-defined curve.

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.



Fuel Pump Control

Fuel Pump Control

Enable ☒

On 25 %

Off 75 %

Parameter	Description
Fuel Pump Control Enable	☐ = When disabled, <i>Fuel Pump Control</i> is inactive, and the pump is not automatically operated. ☒ = 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 <i>Fuel Pump Control</i> energises when the fuel level falls below the configured <i>On</i> setting and de-energises when the fuel level exceeds the configured <i>Off</i> setting.

Fuel Monitoring

Fuel Monitoring

Display Fuel Level as Gauge ☐

Display Units ☒

Fuel Tank Size 1000 Litres

Logging Interval 8h

Stable Timer 0.5s

Change Indicating Filling 1 %

Change Indicating Stable 1 %

Parameter	Description
Display Fuel Level as Gauge	☐ = When disabled, the fuel level gauge is not shown; the value is displayed numerically only. ☒ = When enabled, the fuel level is shown as a graphical gauge on the module's status screen, giving an at-a-glance indication of remaining fuel.
Display Units	☐ = The <i>Display Units</i> are not shown. ☒ = When enabled it displays the fuel quantity in the selected unit (e.g., litres or gallons) alongside the percentage reading.
Fuel Tank Size	Select the tank size and the units for the module's display: Imperial Gallons Litres US Gallons
Logging Interval	The interval at which the fuel level is stored in the event log.
Stable Timer	The module maintains a rolling record of the fuel level percentage for the duration of the <i>Stable Timer</i>. When the rolling record of the fuel level percentage indicates that the fuel level has increased more than the <i>Change Indicating Filling</i> during the <i>Stable Timer</i>, the module records a <i>Fuel Filling Start</i> event in its event log. When the rolling record of the fuel level indicates that the fuel level has not changed more than the <i>Change Indicating Stable</i> during the <i>Stable Timer</i>, the module records a <i>Fuel Filling Stop</i> event in its event log.

Parameter descriptions are continued overleaf...

Parameter	Description
Change Indicating Filling	When the fuel level increases at a rate higher than <u><i>Change Indicating Filling</i></u> <i>Stable Timer</i> Then a fuel fill start event is recorded into the event log. Depending on configuration this generates a dial out or SMS message. Example <i>Stable Timer</i> = 1 minute <i>Change Indicating Filling</i> = 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 <u><i>Change Indicating Stable</i></u> <i>Stable Timer</i> then a fuel fill end event is recorded into the event log. Depending on configuration this generates a dial out or SMS message. Example: <i>Stable Timer</i> = 1 minute <i>Change Indicating Stable</i> = 2 % When the fuel level increases by less than 2% in 1 minute, a fuel fill end event is recorded.

Fuel Usage Alarm

Fuel Usage Alarm

Enable ☒

Mode Standard Mode

Action Warning Always Latched

Running Rate 10 % / Hr

Stopped Rate 10 % / Hr

Parameter	Description
Fuel Usage Alarm	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 <i>Running Rate</i> while the engine is running. Or if the fuel level drops at a higher rate than the configured <i>Stopped Rate</i> 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 <i>Running Rate</i> while the engine is running or <i>Stopped Rate</i> while the engine is stopped. Sampling Window: The fuel usage alarm activates when the fuel level decreases at a higher rate per <i>Sampling Window</i> than the configured <i>Running Rate</i> while the engine is running or <i>Stopped Rate</i> while the engine is stopped.

3.9.5.2 FUEL LEVEL ALARMS

Sensor Open Circuit Alarm

Sensor Open Circuit Alarm

Enable Alarm ☒

Parameter	Description
Sensor Open Circuit Alarm	☐ = When disabled, fuel level open circuit alarms are suppressed, and sensor disconnection faults are not reported. ☒ = The <i>Fuel Level Open Circuit Alarm</i> is active when the module detects an open circuit when the sensor is disconnected.

Low Fuel Level Alarms

Low Fuel Level Alarms

Alarm ☒

Action

Shutdown

Trip

25

%

Delay

0s

Pre-Alarm ☒

Action

Warning

Trip

51

%

Return

76

%

Delay

0s

Parameter	Description
Low Fuel Level Alarm	☐ = When disabled, the <i>Low Fuel Level Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>Low Fuel Level Alarm</i> activates with the configured <i>Action</i> when the measured fuel level drops below the <i>Trip</i> setting for the configured <i>Delay</i> time.
Action	NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: Electrical Trip Shutdown
Low Fuel Level Pre-Alarm	☐ = When disabled, the <i>Low Fuel Level Pre-Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>Low Fuel Level Pre-Alarm</i> activates with the configured <i>Action</i> when the measured fuel level drops below the <i>Low Pre-Alarm Trip</i> setting for the configured <i>Delay</i> time. The pre-alarm is automatically reset when the fuel level exceeds the configured <i>Low Pre-Alarm Return</i> setting.

High Fuel Level Alarms

High Fuel Level Alarms

Pre-Alarm ☒

Action

Warning

Return

127

%

Trip

153

%

Delay

0s

Alarm ☒

Action

Shutdown

Trip

191

%

Delay

0s

Parameter	Description
High Fuel Level Pre-Alarm	☐ = When disabled, the <i>High Fuel Level Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>High Fuel Level Pre-Alarm</i> activates with the configured <i>Action</i> when the measured fuel level rises above the <i>High Pre-Alarm Trip</i> setting for the configured <i>Delay</i> time. The pre-alarm is automatically reset when the fuel level drops below the configured <i>High Pre-Alarm Return</i> setting.
High Fuel Level Alarm	☐ = When disabled, the <i>High Fuel Level Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>High Fuel Level Alarm</i> activates with the configured <i>Action</i> when the measured fuel level raises above the <i>Trip</i> setting for the configured <i>Delay</i> time.
Action	NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: <i>Electrical Trip</i> <i>Shutdown</i>

3.9.5.3 ADVANCED ALARMS

Water in Fuel

Water In Fuel

Action

Warning ▼

Arming

Always ▼

Activation Delay

0s

Parameter	Description
Action	The alarm activates when a <i>Water in Fuel</i> alarm is received from the engine ECU, or if a digital input configured for <i>Water in Fuel</i> activates for longer than the configured <i>Activation Delay</i> timer. The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: None Electrical Trip Shutdown Warning
Arming	Select when the alarm is active, see section entitled <i>Alarm Arming</i> for more information: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation Never When Stationary

Fuel Tank Bund

Fuel Tank Bund

Action Warning

Arming Always

Activation Delay 0s 

Parameter	Description
Action	The alarm goes active when a digital input configured for <i>Fuel Tank Bund Level High</i> activates for longer than the configured <i>Activation Delay</i> timer. 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. The alarm action list is as follows, see section entitled <i>Alarm Types</i> for more information: None Electrical Trip Shutdown Warning
Arming	Select when the alarm is active, see section entitled <i>Alarm Arming</i> for more information: Always Engine Protection Activation From Safety On From Starting Loading Alarms Activation Never When Stationary

3.9.5.4 FUEL USE AND EFFICIENCY

Engine Efficiency Curve

Engine Efficiency Curve

Engine Type: Not Used

Specific Gravity: 0.89

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

Instrumentation Sources

Instantaneous Fuel Consumption: Efficiency Curve

Trip Average Fuel Consumption: Efficiency Curve

Trip Fuel Usage: Efficiency Curve

Accumulated Fuel Usage: Efficiency Curve

Instantaneous Efficiency: Efficiency Curve

Trip Average Efficiency: Efficiency Curve

Estimate Run Time to Empty: Module Sensor

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

Parameter descriptions are continued overleaf...

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

Run Time Until Empty

Run Time Until Empty

Fuel Tank Run Time

Fuel Tank Run Time Load Level Percentage

8h 0m

Parameter	Description
Fuel Tank Run Time	The time in minutes how long the generator's fuel tank last when running at the <i>Fuel Tank Run Time Load Level Percentage</i> .
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.

3.9.6 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.

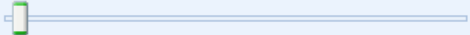
DEF Level is a CANbus message from the ECU (ECM). The following parameters allow configuration of how the DSE module responds to the DEF Level.

The screenshot shows the 'Level Alarms' configuration window. It contains two main sections: 'Low Alarm Enable' and 'Low Pre-alarm Enable'. Each section has a checkbox that is checked. Below each checkbox are three parameters: 'Action', 'Trip', and 'Delay'. For 'Low Alarm Enable', the 'Action' is set to 'Shutdown', 'Trip' is 10%, and 'Delay' is 0s. For 'Low Pre-alarm Enable', the 'Trip' is 30%, 'Return' is 40%, and 'Delay' is 0s. Each parameter has a slider control to the right.

Parameter	Description
DEF Level Low Alarm	☐ = When disabled, the module ignores low DEF level readings and will not raise the <i>Low Level DEF Alarm</i> or carry out any linked shutdown/trip actions. The engine ECU may still take its own protective action. ☒ = <i>DEF Low Alarm</i> activates when the <i>DEF Level</i> sent from the ECU is below the configured <i>Trip</i> level for longer than the configured <i>Delay</i> time.
Action	Select the type of alarm required from the list: Shutdown Electrical Trip For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document.
DEF Level Low Pre-Alarm	☐ = When disabled, no early-warning alarm is issued for low DEF level. Only the main DEF Low Alarm (if enabled) can activate. ☒ = <i>DEF Low Pre-Alarm</i> activates when the <i>DEF Level</i> sent from the ECU is below the configured <i>Trip</i> level for longer than the configured <i>Delay</i> time. The Pre-Alarm is deactivated when the <i>DEF Level</i> rises above the <i>Return</i> level.

3.9.7 GAS ENGINE OPTIONS

Gas Engine Timers

Choke	2s	
Gas on Delay	2s	
Ignition Off Delay	2s	

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.

3.9.8 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.

Options

Options

Crank Disconnect on Oil Pressure ☐

Check Oil Pressure Prior to Starting ☒

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.

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

Crank Disconnect

Generator Frequency Hz

Engine Speed RPM

Oil Pressure Bar

Delay

Charge Alternator ☒ V DC

Generator Voltage ☒ V PhPh

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 <i>Oil Pressure Delay time</i> .
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

Manual Crank

Hold Start Button To Crank ☒

Manual Crank Limit 30s 

Parameter	Description
Hold Start Button To Crank	☐ = When disabled, manual crank via the Start button is not available; cranking is automatic only. ☒ = Press and hold the <i>Start</i> button to crank in <i>Manual</i> mode, releasing the <i>Start</i> 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 <i>Start</i> button is kept pressed.

3.9.9 SPEED SENSING

Options	
Disable ECM Speed Sensing	☐
Magnetic Pickup Fitted	☐ Engine speed is read from the ECU (ECM)
Flywheel Teeth	190
Enable Multiple Engage Attempts	☒
Engage Attempts	2
Loss of Sensing Signal	Shutdown
Disable Under Speed Alarms If Sensor Fails	☒
Magnetic Pickup Open Circuit	Shutdown

Parameter	Description
Disable ECM Speed Sensing	☐ = An ECM is connected to the DSE module and being used for speed sensing. ☒ = When enabled, ECM speed sensing is disabled, and an alternative input (e.g. magnetic pickup) is required.
Magnetic Pickup Fitted	 NOTE: For specifications of the magnetic pickup input, refer to DSE Publication: 057-263 DSEG7400 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 <i>Fail To Start</i> 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 <i>Engage Attempts</i> .
Loss of Sensing Signal	If the speed sensing signal is lost during engine running (or not present during cranking when <i>Multiple Engage Attempts</i> is enabled), an alarm is generated: Shutdown: The engine is removed from load and is immediately stopped. Warning: The engine continues to run; however a warning alarm is raised.
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: The engine is removed from load and is immediately stopped. Warning Always Latched: The engine continues to run; however a latched warning alarm is raised even if the magnetic pickup signal returns to normal.

3.9.10 SPEED SETTINGS

Under Speed

Under Speed

Alarm ☒

Action Shutdown

Trip 1200 RPM

Pre-Alarm ☒

Trip 1260 RPM

Return 1350 RPM

Activation Delay 0s

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

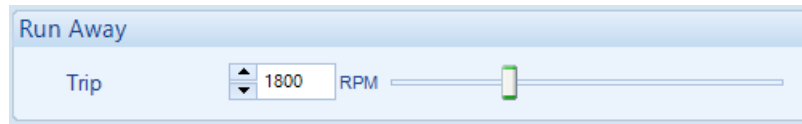
Parameter	Description
Under Speed Alarm	☐ = When disabled, the <i>Under Speed Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = Under Speed gives an alarm in the event of the engine speed falling below the configured <i>Under Speed Alarm Trip</i> value for longer than the <i>Activation Delay</i>. The <i>Underspeed Alarm Trip</i> 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 <i>Alarm Types</i> elsewhere in this document.
Under Speed Pre-Alarm	☐ = When disabled, the <i>Under Speed Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = Under Speed gives a warning alarm in the event of the engine speed falling below the configured <i>Under Speed Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i>. The <i>Under Speed Pre-Alarm Trip</i> value is adjustable to suit user requirements.

Over Speed

The screenshot shows the 'Over Speed' configuration interface. It includes a 'Pre-Alarm' section with a checkbox, 'Return' and 'Trip' RPM values (1620 and 1650 respectively), and a 'Shutdown' section with a 'Trip' RPM value (1710) and an 'Activation Delay' of 0s. A blue cloud callout on the right states: 'Overspeed shutdown is never disabled.'

Parameter	Description
Over Speed Pre-Alarm	☐ = When disabled, the <i>Over Speed Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = Over Speed gives a warning alarm in the event of the engine speed rising above the configured <i>Over Speed Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i>. The <i>Warning</i> is automatically reset when the engine speed falls below the configured <i>Return</i> level. The <i>Over Speed Pre-Alarm Trip</i> value is adjustable to suit user requirements.
Over Speed Alarm	☐ = When disabled, the over speed shutdown alarm is suppressed; operation continues without shutdown on over speed conditions. ☒ = Over Speed gives a <i>Shutdown</i> alarm in the event of the engine speed rising above the configured <i>Over Speed Alarm Trip</i> value for longer than the <i>Activation Delay</i>. The <i>Over Speed Alarm Trip</i> value is adjustable to suit user requirements.

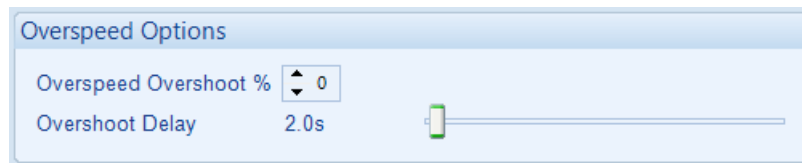
Run Away



The 'Run Away' configuration window has a title bar 'Run Away'. Below it, there is a label 'Trip' followed by a numeric input field containing '1800' and the unit 'RPM'. To the right of the input field is a horizontal slider bar with a green handle positioned at approximately one-third of the way across the bar.

Parameter	Description
Run Away	☐ = When disabled, the <i>Run Away</i> shutdown alarm is suppressed; no automatic shutdown occurs on <i>Run Away</i> conditions. ☒ = In the event of the engine speed rising above the configured <i>Trip</i> value the <i>Run Away Shutdown</i> alarm is immediately triggered. This is used to protect against engine damage due to uncontrolled speed increase, where the engine speed runs away.
Trip	Set the speed level for the <i>Run Away</i> alarm.

Overspeed Options



The 'Overspeed Options' configuration window has a title bar 'Overspeed Options'. Below it, there are two settings: 'Overspeed Overshoot %' with a numeric input field containing '0', and 'Overshoot Delay' with a value of '2.0s' and a horizontal slider bar. The slider bar for 'Overshoot Delay' has a green handle positioned at approximately one-third of the way across the bar.

Parameter	Description
Overspeed Overshoot %	To prevent spurious overspeed alarms at engine start up, the module includes configurable <i>Overspeed Overshoot</i> 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 <i>Overspeed Overshoot</i> % for the duration of the <i>Overspeed Overshoot</i> delay from starting.

3.9.11 PLANT BATTERY

Voltage Alarms

Voltage Alarms

Under Voltage ☒

Warning: 10.0 VDC

Return: 10.5 VDC

Delay: 1m

Over Voltage ☒

Return: 29.5 VDC

Warning: 30.0 VDC

Delay: 1m

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

Charge Alternator Alarm

Charge Alternator Alarm

Use Module for Charge Alternator ☒

Shutdown ☒

Trip: 4.0 VDC

Delay: 5s

Warning ☒

Trip: 6.0 VDC

Delay: 5s

Parameter	Description
Use Module For Charge Alternator	NOTE: The feature is only available when an electronic engine is selected. When enabled, DSE module measures the charge alternator voltage. When disabled, Engine ECU (ECM) provides charge alternator voltage.
Charge Alternator Shutdown Alarm	The alarm activates when the charge alternator voltage falls below the configured <i>Trip</i> level for the configured <i>Delay</i> time.
Charge Alternator Warning Alarm	The alarm activates when the charge alternator voltage falls below the configured <i>Trip</i> level for the configured <i>Delay</i> time.

Start on Low Battery

Start On Low Battery

Enable ☐

Level V DC

Engine Run Duration 1h

Start Delay 5s

Parameter	Description
Start On Low Battery	☐ = When disabled, automatic <i>Start On Low Battery</i> is inactive and no start attempt is made based on battery voltage. ☒ = Select to enable automatic starting upon the battery voltage falling below the threshold level for the duration of the <i>Start Delay</i> timer. The engine starts and run for the specified <i>Engine Run Duration</i>. This occurs only if the module is in AUTO mode.

3.9.12 ENGINE ICON DISPLAYS

This section is used with Electronic Engines, it allows to create or define a CAN Lamp icon and how to be displayed when the configured alarm or message is active, such as flashing the CAN icon rapidly or slowly. The first screen is enabled by default, and it cannot be disabled, the second and third screens are configurable to be enabled or disabled through this section to allow the user create more CAN Icon Displays. The CAN icon instrument is activated based on a DTC message sent from the ECU or according to GenComm instrumentation conditions.

Engine Icon Displays

Displays

- DEF Tank Level 100 %
- DPF Regeneration
- SCR-DEF Lamps

Title

Title: DEF Tank Level

Title Instrumentation

Instrumentation: DEF Tank Level (numeric)

Display

☐ Display On Module

Provide the Title of the relevant screen.

Select the display method to show the *DEF Tank Level* next to the *Title*. Details found in below section.
Options are:
Not Used
DEF Tank Level (gauge)
DEF Tank Level (numeric)

Select the required screen with the mouse to configure, then tick the *Display* box to enable the screen on the module.

3.9.12.1 TITLE INSTRUMENTATION

Select the display form of the DEF Tank Level instrument in the relevant screen.

Title Instrumentation	Display
Not Used	The <i>DEF Tank Level</i> is not displayed in the title of the screen.
DEF Tank Level (Gauge)	The <i>DEF Tank Level</i> is displayed in form of bar gauge meter The DEF Tank Level (gauge) display is flashed slowly or rapidly on the screen if the conditions and values are configured and the instrument readings are satisfied.
DEF Tank Level (numeric)	The <i>DEF Tank Level</i> is displayed in numeric form

3.9.12.2 ICON INSTRUMENTATION

Displays

Select the required Lamp Icon from the screen to configure or click on the  tab to create a new Lamp Icon.



Display tab tools	Description
	Click on the Plus tab to create a new Lamp Icon within the selected screen.
	Click on the delete tab to delete the selected Lamp Icon from the screen.
	Click on the right or left tab to select the next Lamp Icon in the screen.
	Click to hide the instruments from the screens.
	Click to show all the instruments in the screens.
	This tool is for flashing demonstration. Click to flash all the instruments slowly.
	This tool is for flashing demonstration. Click to flash all the instruments rapidly.
	Click to import a saved <i>Engine Icon Displays</i> .
	Click to export the configured <i>Engine Icon Displays</i> .

Icon Bitmaps

Configure the Icon Bitmaps of the selected instrument from the screen, to show the Lamp Icon when it active or inactive.

Icon Bitmaps

Flash On (On) 

Flash Off 

Off 

Position X  Y 

Indicates the selected Icon to show when the instrument is active and the module is flashing it on.

Click on  to delete the icon.

Click to select the Lamp Icon. The available icons are listed in the below table.

Icon Bitmaps	Description
Flash On (On)	Select the icon to show when the instrument is active and the module has flashed on the <i>Engine Icons</i> on the screen.
Flash Off	Select the icon to show when the instrument is active and the module has flashed off the <i>Engine Icons</i> on the screen.
Off	Select the icon to show when the instrument is not active on the screen.
Position X, Y	Configure the instrument positions for X & Y coordinates on the screen.

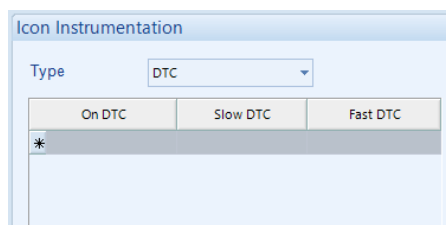
Continued Overleaf...

Lamp Icons	Display
	DEF On Large
	DEF On
	DPF Active
	DPF Inhibit
	DPF Stop
	DPF Warning
	ECU Red Alarm
	ECU Yellow Alarm
	HEST On
	SCR Active Large
	SCR Active

Icon Instrumentation

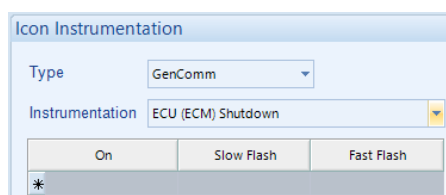
Configure the Type of the Instrumentation to read from the DTC or from a GenComm register, and on what condition(s) the selected instrument to be On or flashing.

Icon Instrumentation DTC Type

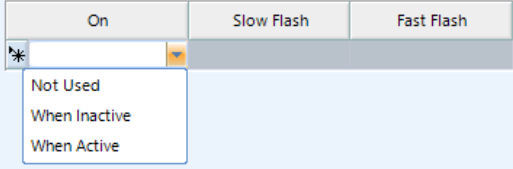


Icon Instrumentation	Description
On DTC	Configure the DTC code to activate the instrument when <i>On DTC</i> satisfied.
Slow DTC	Configure the DTC code to flash the instrument slowly when <i>Slow DTC</i> satisfied.
Fast DTC	Configure the DTC code to flash the instrument rapidly when <i>Fast DTC</i> satisfied.

Icon Instrumentation GenComm Type



Parameters detailed overleaf...

Icon Instrumentation	Description
Instrumentation	Select the instrument to monitor. This could be a flag condition or an instrumentation value.
Flag type of GenComm Icon Instrument	Select the required Condition to activate the Instrumentation Icon, or to Slow Flash, or to Fast Flash based on the options below: <i>Not Used</i> <i>When Inactive</i> <i>When Active</i> 
Instrumentation type of GenComm Icon Instrument	Configure the required Condition to activate the Instrumentation Icon, or to Slow Flash, or to Fast Flash. 

3.10 COMMUNICATIONS

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



3.10.1 COMMUNICATION OPTIONS

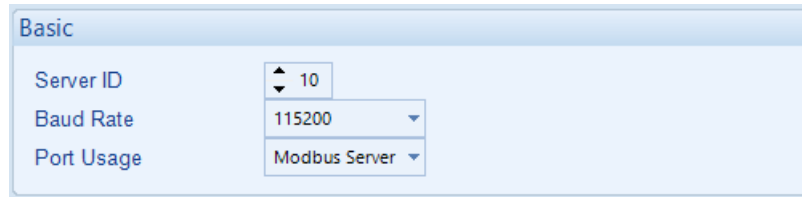
Provides a means of giving the module an identity. This is used in the SCADA section to allow the operator to see the site name and engine identity that it is currently connected to. This feature is used when a remote module is connected over modem or Ethernet.

A screenshot of a 'Module Identification' form. It contains two text input fields: 'Site Identity' and 'Genset Identity'. A blue callout bubble with a pointer to the 'Site Identity' field contains the text: 'Free text entries to identify the engine. This text is displayed on the SCADA screen when the module is connected to the PC.'

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.

3.10.2 RS485 PORT

RS485 Port 1



Basic

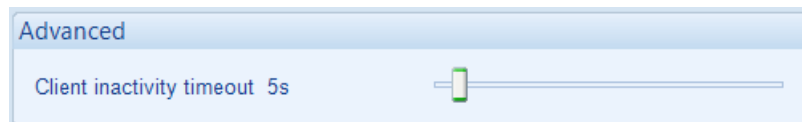
Server ID: 10

Baud Rate: 115200

Port Usage: Modbus Server

Parameter	Description
Server ID	Select the server ID of the DSE module's RS485 port. Every device on the RS485 link must have an individual server 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

Advanced

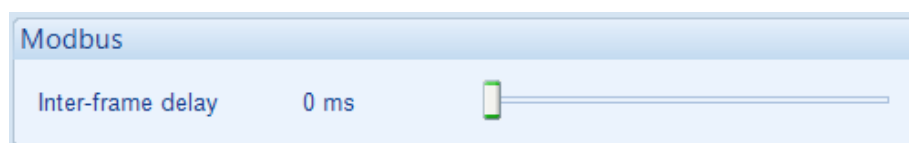


Advanced

Client inactivity timeout 5s

Parameter	Description
Client 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 client <i>Inactivity Timer</i> , it reverts to looking at the USB port. This needs to be set longer than the time between Modbus polls from the client.

Modbus



Modbus

Inter-frame delay 0 ms

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

3.10.3 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. Qualified network administrators must only change these settings. When the Ethernet settings have been changed the module must be re booted to apply the new settings.

Dynamic Host Configuration Protocol

Dynamic Host Configuration Protocol

Obtain IP Address Automatically ☒

Parameter	Description
Obtain IP Address Automatically	☐ = The Dynamic Host Configuration Protocol (DHCP) is disabled, and the unit has a fixed IP address as configured in the <i>IP Address</i> section. ☒ = The Dynamic Host Configuration Protocol (DHCP) is enabled, and the unit automatically attains an IP address from the network it is connected to if it has DHCP enabled.

Names

Names

Domain Name	DSE Module
Host Name	Company
Vendor Name	Deep Sea Electronics

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

IP Addresses				
IP address	192	168	1	100
Subnet Mask	255	255	255	0
Gateway Address	0	0	0	0
DNS Address	0	0	0	0
Preferred Connection Address	0	0	0	0

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 clients to connect to it. The <i>Preferred Connection Address</i> enables the unit to reserve one of the five connections for a specific IP address.

Modbus

Modbus	
Secure Modbus Port Number (DSE Connections)	802
3rd-party TCP/IP Mode	Disabled
Modbus Port Number	502

Parameter	Description
Secure Modbus Port Number	The port number which the module serves Modbus traffic on.
3rd-party TCP/IP Mode	Enables the module to communicate with external third-party devices using standard TCP/IP. When activated, the module listens for incoming TCP connections on the configured Modbus Port Number, allowing non-DSE devices or software to exchange data with the system. Select form the following: Disabled: Prevents the module from accepting any incoming TCP/IP connections from external third-party devices. The module will not listen on the Modbus Port Number, and no non-DSE devices or software can communicate with the system. Enabled (Secure): Allows the module to accept incoming TCP/IP connections from third-party devices, using secure communication controls. Only authenticated or trusted connections are permitted. This mode enables interoperability with external systems while maintaining enhanced security protections. Enabled (Security Disabled): Allows the module to accept incoming TCP/IP connections from third-party devices without applying security controls. All connection attempts on the configured Modbus Port Number are accepted. This mode maximises compatibility but reduces connection security and should only be used in trusted network environments.

3.10.3.1 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 information on how to establish a connection to a modem/router, please consult the supplier of the modem/router equipment.

The DSE module makes its data available to a configurable TCP port number. The modem/router must be configured to allow inbound traffic on this port. Refer to the WAN interface device (modem/router) manufacturer for more information.

3.10.3.2 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:

Virtual Servers		
Filter Name	Source Port	Destination (LAN) Address
DSEG8600	1003	192.168.1.45

The diagram shows a table with three columns: Filter Name, Source Port, and Destination (LAN) Address. The first row contains the values DSEG8600, 1003, and 192.168.1.45. Three callout boxes provide explanations: one for the Filter Name (DSEG8600) stating 'User provided name for the Port Forwarding rule.', one for the Source Port (1003) stating 'Port number of the communications (must match the configuration of the DSE module).', and one for the Destination (LAN) Address (192.168.1.45) stating 'IP Address of the DSE module connected to the LAN.'

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.

3.10.4 CAN PORTS

CAN Port 2

Baud Rate 250000

Parameter	Description
Baud Rate	Set the CAN Port Baud Rate.

3.10.5 SNMP

SNMP

[Settings](#)

[Notifications](#)

3.10.5.1 SETTINGS

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.

SNMP Settings

Enable ☒

Include Device Name (SysName OID) in Trap Messages ☒

Device Name DSE Module

Manager 1 Address 192.168.1.99

Manager 2 Address

Manager Port 161

Notification Port 162

Read Community String public

Write Community String private

Parameter	Description
Enable	☐ = When disabled, SNMP communication is inactive and no monitoring or trap reporting is performed. ☒ = The SNMP function is enabled. The module communicates with the SNMP manager using its ethernet port.
Include Device Name (SysName OID) in Trap Messages	☐ = Device name is not included. ☒ = Includes the module's device name in outgoing SNMP trap messages using the standard <i>SysName</i> object identifier (OID).
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 <i>Read Community String</i> . (Factory setting <i>public</i>).
Write Community String	The SNMP <i>Write Community String</i> . (Factory setting <i>private</i>).

3.10.5.2 NOTIFICATIONS

This page allows the user to select the types of events which are sent to the SNMP managers as SNMP TRAP messages.

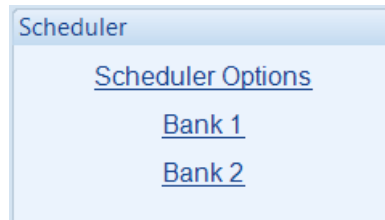
Notifications	
Named Alarms	☐ SNMP Trap
Unnamed Alarms	☐
Mode Change	☐
Power Up	☐
Engine Starts	☐
Engine Stops	☐
ECU Lamps	☐
Fuel Level Monitoring	☐
Incorrect Password Entered	☐

Notifications (Auto Mains Fail)	
Mains Fail	☐ SNMP Trap
Mains Return	☐

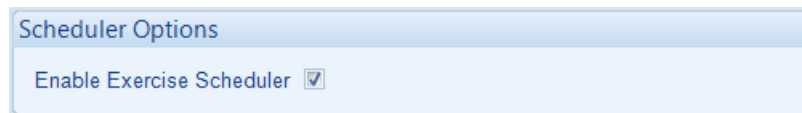
Parameter	Description
Named Alarms	☐ = No SNMP TRAPs are sent when a <i>Named Alarm</i> activates. ☒ = An SNMP TRAP is sent when a <i>Named Alarm</i> activates. A <i>Named Alarm</i> is a protection with a pre-set name, e.g., Generator Over Voltage.
Unnamed Alarms	☐ = No SNMP TRAPs are sent when an <i>Unnamed Alarm</i> activates. ☒ = An SNMP TRAP is sent when an <i>Unnamed Alarm</i> activates. An <i>Unnamed Alarm</i> is a protection with a user configured name, e.g., a digital input configured for <i>User Configured</i> .
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.
ECU Lamps	☐ = No SNMP TRAPs are sent when the ECU Lamps are active. ☒ = An SNMP TRAP is sent when the ECU Lamps are active.
Fuel Level Monitoring	☐ = No SNMP TRAPs are sent when a <i>Fuel Level Monitoring</i> event is logged within the module's event log. ☒ = An SNMP TRAP is sent when a <i>Fuel Level Monitoring</i> event is logged within the module's event log.
Incorrect Password Entered	☐ = No SNMP TRAPs are sent when an <i>Incorrect Password</i> is entered. ☒ = An SNMP TRAP is sent when an <i>Incorrect Password</i> is entered.
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.

3.11 SCHEDULER

The section is subdivided into smaller sections.



3.11.1 SCHEDULER OPTIONS



Function	Description
Enable Exercise Scheduler	☐ = When disabled, the exercise scheduler is inactive, and no scheduled runs are performed. ☒ = The scheduler is enabled, Bank 1 and Bank 2 become editable.

3.11.2 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.

Bank 1

Schedule Period: Monthly

Week	Day	Run Mode	Start Time	Duration	
First	Monday	Off Load	00:00	00:00	Clear
First	Monday	Off Load	00:00	00:00	Clear
First	Monday	Off Load	00:00	00:00	Clear
First	Monday	Off Load	00:00	00:00	Clear
First	Monday	Off Load	00:00	00:00	Clear
First	Monday	Off Load	00:00	00:00	Clear
First	Monday	Off Load	00:00	00:00	Clear
First	Monday	Off Load	00:00	00:00	Clear

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 <i>Auto</i> mode. Off Load: The module runs the generator on schedule with the load switch open. On Load: The module runs the generator on schedule and closes the load switch.
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.

3.12 MAINTENANCE ALARM

There are two ways to reset the maintenance alarm:

- 1) Activate a digital input configured to "Maintenance Reset Alarm".
- 2) Use the SCADA | Maintenance | Maintenance Alarm section of this PC Software.
- 3) Through the Front Panel Editor of the module.

Maintenance Alarm 1 to 3

Function	Description
Enable	☐ = When disabled, maintenance alarms are inactive and no maintenance reminders are generated. ☒ = The maintenance alarm is activated with the configured <i>Action</i> when the engine hours increases more than the <i>Engine Run Hours</i> or when the date increase more than the <i>Maintenance Interval</i> 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: Electrical Trip 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.

3.13 CONFIGURABLE CAN INSTRUMENTATION

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

Configurable CAN Instrumentation

[Received Instrumentation](#)

[Transmitted Instrumentation](#)

3.13.1 RECEIVED INSTRUMENTATION (1-30)

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

Received Instrumentation

Export

Import

Instrumentation Configuration

Module		Message ID			Timeout		Data Structure				Display		Bus Value		Mapped Value		
Enabled	View	Description	Bits	CAN ID	Enable	(ms)	Byte	Bit	Length	Signed	D. Places	Suffix	Smallest	Largest	Smallest	Largest	Fn
☒		Configurable CAN 1	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☒		Configurable CAN 2	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☒		Configurable CAN 3	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☐		Configurable CAN 4	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☐		Configurable CAN 5	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☐		Configurable CAN 6	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☐		Configurable CAN 7	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☐		Configurable CAN 8	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☐		Configurable CAN 9	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☐		Configurable CAN 10	29	0x0	☒	5000	1	0	1		0		0	1	0	100	Fn
☐		Configurable CAN 11	29	0x0	☒	5000	1	0	1		0		0	1	0	100	
☐		Configurable CAN 12	29	0x0	☒	5000	1	0	1		0		0	1	0	100	
☐		Configurable CAN 13	29	0x0	☒	5000	1	0	1		0		0	1	0	100	
☐		Configurable CAN 14	29	0x0	☒	5000	1	0	1		0		0	1	0	100	
☐		Configurable CAN 15	29	0x0	☒	5000	1	0	1		0		0	1	0	100	
☐		Configurable CAN 16	29	0x0	☒	5000	1	0	1		0		0	1	0	100	
☐		Configurable CAN 17	29	0x0	☒	5000	1	0	1		0		0	1	0	100	
☐		Configurable CAN 18	29	0x0	☒	5000	1	0	1		0		0	1	0	100	
☐		Configurable CAN 19	29	0x0	☒	5000	1	0	1		0		0	1	0	100	

Export/Import

This feature is used to import/export the *Configurable CAN Instrumentation* settings.

Parameter	Description
Export	This allows to export the configuration settings of the CAN Received Instrumentation or Transmitted Instrumentation into *.canrx file.
Import	This allows to import an existing configuration settings of the Legacy CAN Export File (*.xml) or Transmitted (*.canrx) file.

3.13.1.1 INSTRUMENT CONFIGURATION

Module

Parameter	Description
Enabled	 NOTE: The CAN instrumentation must already be available on the CANbus. There is no request for a non-standard instrumentation. ☐ = When disabled, CAN instrumentation is inactive and CAN-based measurements are not displayed. ☒ = The CAN instrumentation is enabled. Reading depends upon the message availability on the bus.
View	The options are as follows: CAN: The value is shown under CAN page on the module display screen. Disabled: The value is not shown on the module display screen. Engine: The value is shown under Engine page on the module display screen.

Message ID

Parameter	Description
Description	Provide a description for the CAN instrumentation. This description is shown in the Scada, and module display screen.
Bits	The options are: 29: A 29 bit identifier (extended format) allows a total of 229 (= 536+ million) messages. 11: An 11 bit identifier (standard format) allows a total of 211 (= 2048) different messages.
CAN ID	29-bit CAN Message Identifier to receive. CAN ID must match exactly the full ID of the message to be received in the standard J1939 29-bit (Extended) format.

Timeout

Parameter	Description
Enable	☐ = When disabled, the instrumentation value is retained indefinitely using the last valid received CAN message, and no timeout action is applied. ☒ = When enabled, the timeout defines the maximum period (in milliseconds) that the controller will wait for a valid CAN message for the instrumentation item. If no valid message is received within this period, the instrumentation value is marked as invalid and any associated alarms or substitutions are applied.
(ms)	It indicates how often the messages are expected to be seen on the CANbus in milliseconds. 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	Set the start position Byte.
Bit	Set the start position Bit.
Length (Bits)	Data length 1-32 bits.
Signed	☐ = Unsigned value. ☒ = Signed value.

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).

Bus Value

Parameter	Description																								
Smallest	This is the smallest value (up to the Largest Bus Value setting) which can be sent over the CANbus.																								
Largest	This is the largest value (up to the maximum <i>Data Structure-Length</i> setting) which can be sent over the CANbus. For Example: If the un-signed <i>Data Structure- Length</i> value is 4 then the <i>Largest Bus Value</i> will be 15. Data Structure length (un-signed). Largest Bus Value. <table><tr><th colspan="4">Data Structure</th><th colspan="2">Display</th><th colspan="2">Bus Value</th></tr><tr><th>Byte</th><th>Bit</th><th>Length</th><th>Signed</th><th>D. Places</th><th>Suffix</th><th>Smallest</th><th>Largest</th></tr><tr><td>1</td><td>0</td><td>4</td><td>☐</td><td>0</td><td></td><td>0</td><td>15</td></tr></table>	Data Structure				Display		Bus Value		Byte	Bit	Length	Signed	D. Places	Suffix	Smallest	Largest	1	0	4	☐	0		0	15
Data Structure				Display		Bus Value																			
Byte	Bit	Length	Signed	D. Places	Suffix	Smallest	Largest																		
1	0	4	☐	0		0	15																		

Mapped Value

Parameter	Description
Mapped Value Smallest	Details how the Displayed Values relate to the received <i>Bus Values</i> . For example: <i>Bus Value</i> 10 to 100.
Mapped Value Largest	<i>Mapped Value</i> 20 to 200. This configures the device to display 20 when the value 10 is received and to display 200 when the value 100 is received. Values in between are linearly interpolated.

Test

Test

Test Value

Output Value
0

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 <i>Raw Value</i> when they are complicated. <i>Test Raw Value</i> is the value read from the CANbus before the transformation.
Displayed Value	The <i>Test Raw Values</i> ' represented value as to be shown on the module's screen, or in the Scada.

Function

The Function is only available for the Received Instrumentation (1-10), it allows the configuration of a User Configured alarm by monitoring the relevant *Configurable CAN Instrumentation*.

Parameter	Description
Function	Select a digital input function to activate according to the CAN value received. NOTE: Refer to the <i>Digital Inputs</i> section elsewhere in this document for the list of descriptions of the functions list. NOTE: <i>Crank Disconnect</i> function has been added in this list to instruct the DSE74xx MKII module to crank disconnect when the value sent over the CAN line is under or over the configured Trip level.
Action	NOTE: <i>Action</i> is only adjustable when <i>Function</i> is set to <i>User Configured</i>. Select the type of alarm to activate the <i>Function</i> after the <i>Activation Delay</i> time. Electrical Trip Indication Shutdown Warning
Arming	NOTE: <i>Arming</i> is only adjustable when <i>Function</i> is set to <i>User Configured</i>. Select when the <i>Trip</i> level is monitored. Options are as follows: Always: The protection is always active on the module. This is used to constantly monitor status of the <i>CAN Instrumentation</i>. From Safety On: Active only after the <i>Safety On</i> delay timer. When Stationary: Active only when the engine is not running.
Activation Delay	The amount of time before the module activates the selected <i>Function</i> upon the <i>Configurable CAN Instrumentation</i> reaching the <i>Trip</i> level.

Parameters are continued overleaf...

Parameter	Description
Type	Select the required option to monitor the <i>Configurable CAN Instrumentation</i> when to trip. Over: The <i>Function</i> is active when the <i>Configurable CAN Instrumentation</i> raises above the Trip level for longer than the <i>Activation Delay</i> timer. Under: The <i>Function</i> is active when the <i>Configurable CAN Instrumentation</i> lowers below the Trip level for longer than the <i>Activation Delay</i> timer.
Return	The Function is removed when the <i>Configurable CAN Instrumentation</i> value rises above the <i>Return</i> level if <i>Type</i> is <i>Under</i> . The Function is removed when the <i>Configurable CAN Instrumentation</i> value is reduced below the <i>Return</i> level if <i>Type</i> is <i>Over</i> .

3.13.2 TRANSMITTED INSTRUMENTATION

The module allows transmitting up to 10 instruments over the CANbus on the ECU port by specifying the source address (message ID) of the selected Instrument.

Transmitted Instrumentation

Export

Import

Instrumentation Configuration

Enabled	Message ID			Data Structure				Source Value			Bus Value	
	Bits	CAN ID	Rate (ms)	Byte	Bit	Length	Signed	Source	Smallest	Largest	Smallest	Largest
☒	29	0x0	100	1	0	1	☐	<Not Used>	0	100	0	1
☒	29	0x0	100	1	0	1	☐	<Not Used>	0	100	0	1
☒	29	0x0	100	1	0	1	☐	<Not Used>	0	100	0	1
☐	29	0x0	100	1	0	1	☐	<Not Used>	0	100	0	1
☐	29	0x0	100	1	0	1	☐	<Not Used>	0	100	0	1
☐	29	0x0	100	1	0	1	☐	<Not Used>	0	100	0	1
☐	29	0x0	100	1	0	1	☐	<Not Used>	0	100	0	1
☐	29	0x0	100	1	0	1	☐	<Not Used>	0	100	0	1
☐	29	0x0	100	1	0	1	☐	<Not Used>	0	100	0	1

Export/Import

This feature is used to import/export the *Configurable CAN Instrumentation* settings.

Parameter	Description
Export	This allows to export the configuration settings of the CAN Received Instrumentation or Transmitted Instrumentation into *.cantx file.
Import	This allows to import an existing configuration settings of the Legacy CAN Export File (*.xml) or Transmitted (*.cantx) file.

3.13.2.1 INSTRUMENT CONFIGURATION

Message ID

Parameter	Description
Enabled	☐ = The module does not transmit any instrumentation data over the CAN bus. No CAN frames are generated, and all message-ID, data-structure, and scaling settings are ignored. ☒ = The module actively transmits the selected instrumentation data over the CAN bus using the configured CAN ID, data structure, and update rate.
CAN Port	The options are: ECU: CAN:
Bits	The options are: 29: A 29 bit identifier (extended format) allows a total of 229 (= 536+ million) messages. 11: An 11 bit identifier (standard format) allows a total of 211 (= 2048) different messages.
CAN ID	29-bit CAN Message Identifier to transmit. CAN ID must match exactly the full ID of the message to be received in the standard J1939 29-bit (Extended) format.
Rate (ms)	The rate at which the <i>CAN Instrument</i> is transmitted over the CANbus.

Data Structure

Parameter	Description
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.

Source Value

Parameter	Description
Source	Select the source of the data to be transmitted over the CANbus. Alarms Control Instrumentation Status See section entitled Output Sources for details of all available functions.
Smallest Source Value	The smallest instrument value before being sent over the CANbus.
Largest Source Value	The largest instrument value before being sent over the CANbus.

Bus Value

Parameter	Description
Smallest	The smallest data sent over the CANbus before the transformations (decimal places).
Largest	The largest data sent over the CANbus before the transformations (decimal places).

Test

Test

Test Value

Output Value
0

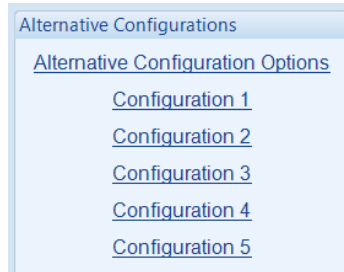
Parameter	Description
Test Raw Value	 NOTE: The Test Raw Value is not saved in the configuration, this is only to check the displayed value. This is a test case to check the representation of the <i>Raw Value</i> when they are complicated. <i>Test Raw Value</i> is the value read from the CANbus before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

3.14 ALTERNATIVE CONFIGURATIONS

An Alternative Configuration is 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) 120V 50Hz and 240V 50Hz 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.



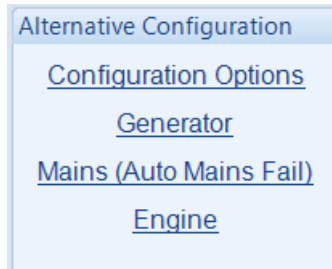
3.14.1 ALTERNATIVE CONFIGURATION OPTIONS

The screenshot shows a form titled 'Alternative Configuration Options'. It contains two fields: 'Default Configuration' with a dropdown menu showing 'Main Configuration', and 'Main Configuration Name' with a text input field containing 'Main Configuration'.

Parameter	Description
Default Configuration	Select the 'default' configuration that is used when there is no instruction to use an 'alternative configuration'.
Main Configuration Name	Free entry box to allow the user to give the Main Configuration name. This is shown on the module's display when the configuration is selected.

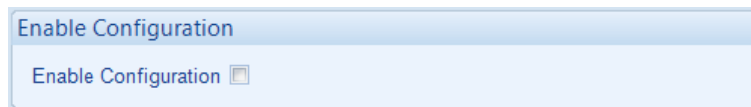
3.14.2 ALTERNATIVE CONFIGURATION 1 TO 5

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



3.14.2.1 CONFIGURATION OPTIONS

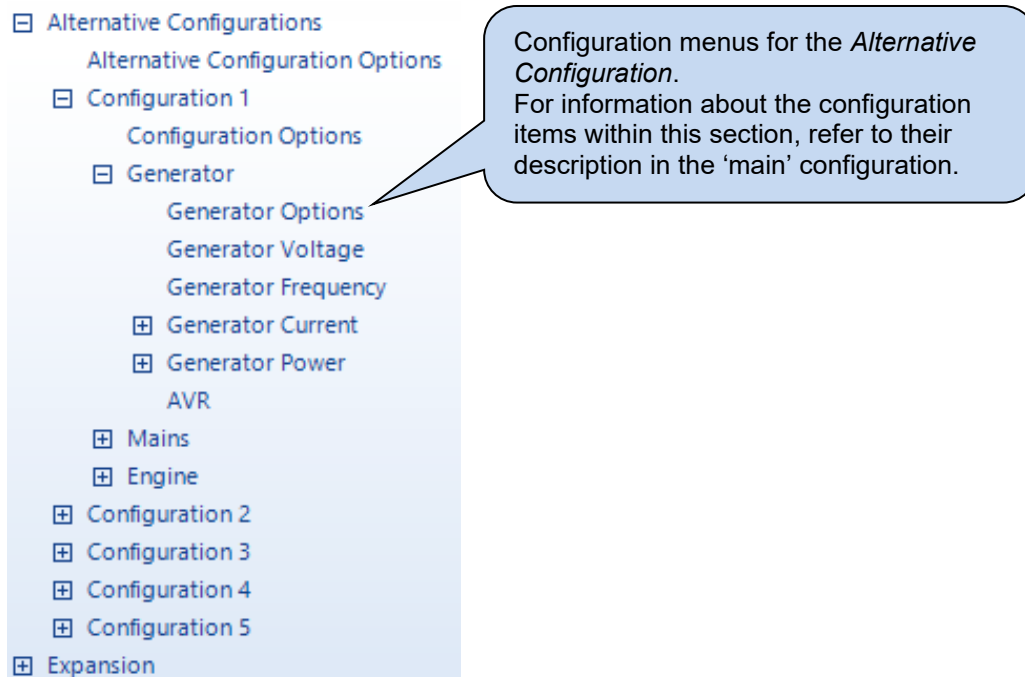
Enable Alternative Configuration



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

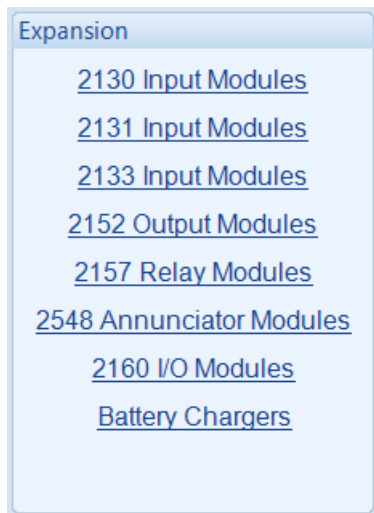
3.14.2.2 GENERATOR / MAINS / ENGINE

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:



3.15 EXPANSION

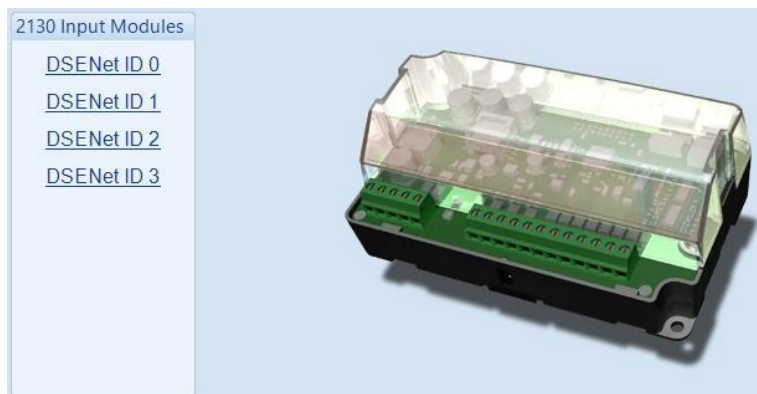
The *Expansion* page is subdivided into smaller sections.
Select the required section with the mouse.



See overleaf for description of the different expansion modules.

3.15.1 2130 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

2130 Expansion Enable

Expansion Enabled ☒

Link Lost Alarm Action Shutdown ▾

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 <i>Exp. Unit Failure</i> alarm with the configured <i>Link Lost Alarm Action</i> severity.

2130 Expansion Inputs

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

2130 Expansion Inputs

[Analogue Input Configuration](#)
[Analogue Inputs](#)
[Digital Inputs](#)

3.15.1.1 ANALOGUE INPUT CONFIGURATION

Input Configuration

Analogue Input E	Flexible Analogue ▼
Analogue Input F	Not Used ▼
Analogue Input G	Digital Input ▼
Analogue Input H	Flexible Analogue ▼

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.

3.15.1.2 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

Sensor Description

Sensor Name	2130 ID0 Flexible Sensor E
-------------	----------------------------

Parameter	Description
Sensor Name	Enter the <i>Sensor Name</i> , this text is shown on the module display when viewing the instrument.

Input Type

Input Type

VDO Ohm range (10-180) ▼

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

Sensor Alarms

Alarm Arming:

Low Alarm Enable: ☒

Action:

Low Alarm: %

Low Pre-alarm Enable: ☒

Low Pre-alarm Trip: %

Low Pre-alarm Return: %

Low Alarm String:

High Pre-alarm Enable: ☒

High Pre-alarm Return: %

High Pre-alarm Trip: %

High Alarm Enable: ☒

Action:

High Alarm: %

High Alarm String:

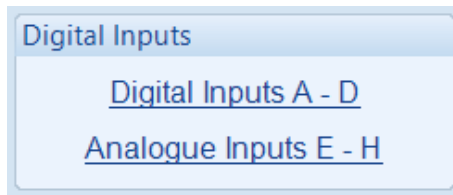
Parameter	Description
Alarm Arming	NOTE: For details of these, see the section entitled Alarm Arming elsewhere in this document. Select when the alarm generated by the analogue input becomes active: Always From Safety On From Starting
Low Alarm Enable	☐ = When disabled, the <i>Low Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>Low Alarm</i> activates when the measured quantity drops below the <i>Low Alarm</i> 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	☐ = When disabled, the <i>Low Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>Low Pre-Alarm</i> is active when the measured quantity drops below the <i>Low Pre-Alarm Trip</i> setting. The <i>Low Pre-Alarm</i> is automatically reset when the measured quantity rises above the configured <i>Low Pre-Alarm Return</i> level.
Low Alarm String	The text that is displayed on the module's LCD when the <i>Low Alarm</i> or <i>Low Pre-Alarm</i> activates.

Parameter descriptions are continued overleaf...

Parameter	Description
High Pre-Alarm Enable	☐ = When disabled, the <i>High Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>High Pre-Alarm</i> is active when the measured quantity rises above the <i>High Pre-Alarm Trip</i> setting. The <i>High Pre-Alarm</i> is automatically reset when the measured quantity falls below the configured <i>High Pre-Alarm Return</i> level.
High Alarm Enable	☐ = When disabled, the <i>High Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>High Alarm</i> is active when the measured quantity rises above the <i>High Alarm</i> setting.
High Alarm Action	 NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: <i>Electrical Trip</i> <i>Shutdown</i>
High Alarm String	The text that is displayed on the module's LCD when the <i>High Alarm</i> or <i>High Pre-Alarm</i> activates.

3.15.1.3 DIGITAL INPUTS

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



3.15.1.3.1 DIGITAL INPUTS

Digital Inputs A - C

Digital Input A

Function: Remote Start On Load
Polarity: Close to Activate
Action: [Greyed Out]
Arming: [Greyed Out]
LCD Display: [Greyed Out]
Activation Delay: 0s

Digital Input B

Function: User Configured
Polarity: Close to Activate
Action: Shutdown
Arming: Always
LCD Display: Digital Input B
Activation Delay: 0s

As this example shows a *predefined* function, these parameters are *greyed out* as they are not applicable.

Parameter	Description
Function	Select the input function to activate when the relevant terminal is energised. See section entitled <i>Input Functions</i> 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 <i>Alarm Types</i> 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 <i>Alarm Arming</i> elsewhere in this document. Select when the input becomes active: Active from Mains 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.

3.15.1.3.2 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.

Analogue Inputs E - H

Analogue Input E (Digital)

Function	User Configured
Polarity	Close to Activate
Action	Warning
Arming	Always
LCD Display	2130 ID0 Analogue E (Digital)
Activation Delay	0s

Analogue Input F (Digital)

The Analogue Input is not configured as a Digital Input
To reconfigure, use the 'Analogue Input Configuration' page

Parameter	Description
Function	Select the input function to activate when the relevant terminal is energised. See section entitled <i>Input Functions</i> 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 <i>Alarm Types</i> 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 <i>Alarm Arming</i> elsewhere in this document. Select when the input becomes active: Active from Mains 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.

3.15.2 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

2131 Expansion Enable

Expansion Enabled ☒
Link Lost Alarm Action Shutdown ▾

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 <i>Exp. Unit Failure</i> alarm with the configured <i>Link Lost Alarm Action</i> severity.

2131 Expansion Inputs

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

2131 Expansion Inputs

[Analogue Input Configuration](#)
[Analogue Inputs](#)
[Digital Inputs](#)

3.15.2.1 ANALOGUE INPUT CONFIGURATION

Input Configuration

Analogue Input A	Flexible Analogue ▼
Analogue Input B	Flexible Analogue ▼
Analogue Input C	Not Used ▼
Analogue Input D	Flexible Analogue ▼
Analogue Input E	Digital Input ▼
Analogue Input F	Digital Input ▼
Analogue Input G	Digital Input ▼
Analogue Input H	Flexible Analogue ▼
Analogue Input I	Digital Input ▼
Analogue Input J	Not Used ▼

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 <i>2131/Digital Inputs</i> pages. Flexible Analogue: Configured on the <i>2131/Analogue Inputs</i> pages.

3.15.2.2 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

Sensor Description

Sensor Name

Parameter	Description
Sensor Name	Enter the <i>Sensor Name</i> , this text is shown on the module display when viewing the instrument.

Input Type

Input Type

VDO Ohm range (10-180)

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

Sensor Alarms

Alarm Arming: Always

Low Alarm Enable: ☒

Action: Shutdown

Low Alarm: 25 %

Low Pre-alarm Enable: ☒

Low Pre-alarm Trip: 30 %

Low Pre-alarm Return: 35 %

Low Alarm String: 2131 ID0 Flexible Sensor A Low

High Pre-alarm Enable: ☒

High Pre-alarm Return: 85 %

High Pre-alarm Trip: 90 %

High Alarm Enable: ☒

Action: Shutdown

High Alarm: 95 %

High Alarm String: 2131 ID0 Flexible Sensor A High

Parameter	Description
Alarm Arming	NOTE: For details of these, see the section entitled <i>Alarm Arming</i> elsewhere in this document. Select when the alarm generated by the analogue input becomes active: Always From Safety On From Starting
Low Alarm Enable	☐ = When disabled, the <i>Low Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>Low Alarm</i> activates when the measured quantity drops below the <i>Low Alarm</i> setting.
Low Alarm Action	NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: Electrical Trip Shutdown
Low Pre-Alarm Enable	☐ = When disabled, the <i>Low Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>Low Pre-Alarm</i> is active when the measured quantity drops below the <i>Low Pre-Alarm Trip</i> setting. The <i>Low Pre-Alarm</i> is automatically reset when the measured quantity rises above the configured <i>Low Pre-Alarm Return</i> level.
Low Alarm String	The text that is displayed on the module's LCD when the <i>Low Alarm</i> or <i>Low Pre-Alarm</i> activates.

Parameter descriptions are continued overleaf...

Parameter	Description
High Pre-Alarm Enable	☐ = When disabled, the <i>High Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>High Pre-Alarm</i> is active when the measured quantity rises above the <i>High Pre-Alarm Trip</i> setting. The <i>High Pre-Alarm</i> is automatically reset when the measured quantity falls below the configured <i>High Pre-Alarm Return</i> level.
High Alarm Enable	☐ = When disabled, the <i>High Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>High Alarm</i> is active when the measured quantity rises above the <i>High Alarm</i> 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: <i>Electrical Trip</i> <i>Shutdown</i>
High Alarm String	The text that is displayed on the module's LCD when the <i>High Alarm</i> or <i>High Pre-Alarm</i> activates.

3.15.2.3 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.

Analogue Inputs A - C

Analogue Input A (Digital)

Function	Alarm Mute
Polarity	Close to Activate
Action	[Greyed Out]
Arming	[Greyed Out]
LCD Display	2131 ID0 Flexible Sensor A
Activation Delay	0s

Analogue Input B (Digital)

Function	User Configured
Polarity	Close to Activate
Action	Warning
Arming	Always
LCD Display	2131 ID0 Flexible Sensor B
Activation Delay	0s

Analogue Input C (Digital)

The Analogue Input is not configured as a Digital Input
To reconfigure, use the 'Analogue Input Configuration' page

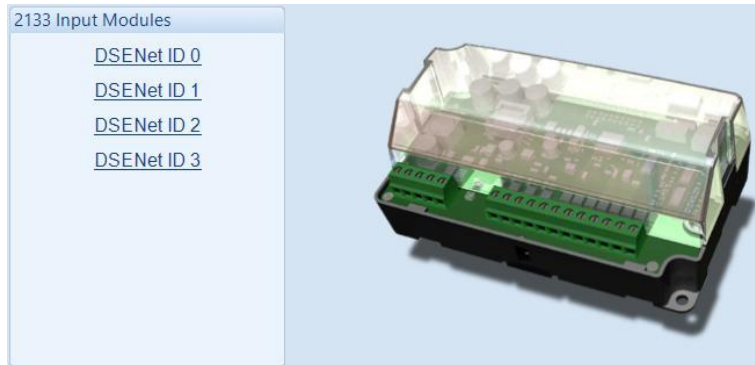
As this example shows a *predefined* function, these parameters are *greyed out* as they are not applicable.

Parameter descriptions are overleaf...

Parameter	Description
Function	Select the input function to activate when the relevant terminal is energised. See section entitled <i>Input Functions</i> 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 <i>Alarm Types</i> 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 <i>Alarm Arming</i> elsewhere in this document. Select when the input becomes active: Active from Mains 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.

3.15.3 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

2133 Expansion Enable

Expansion Enabled
☒

Link Lost Alarm Action

Shutdown ▼

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 <i>Exp. Unit Failure</i> alarm with the configured <i>Link Lost Alarm Action</i> severity.

2133 Expansion Inputs

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

2133 Expansion Inputs

[Inputs A - H](#)

3.15.3.1 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

Sensor Description

Sensor Name

2133 ID0 Flexible Sensor A

Parameter	Description
Sensor Name	Enter the <i>Sensor Name</i> , this text is shown on the module display when viewing the instrument.

Input Type

Input Type

3 Wire PT100

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

Parameter descriptions are continued overleaf...

Sensor Alarms

The screenshot shows the 'Sensor Alarms' configuration window. It contains several sections for configuring different types of alarms. The 'Alarm Arming' section has a dropdown set to 'Always'. The 'Low Alarm' section has 'Low Alarm Enable' checked, 'Action' set to 'Shutdown', and 'Low Alarm' set to -95 °C. The 'Low Pre-alarm' section has 'Low Pre-alarm Enable' checked, 'Low Pre-alarm Trip' set to 10 °C, 'Low Pre-alarm Return' set to 115 °C, and 'Low Alarm String' set to '2133 ID0 Flexible Sensor A Low'. The 'High Alarm' section has 'High Pre-alarm Enable' checked, 'High Pre-alarm Return' set to 325 °C, 'High Pre-alarm Trip' set to 430 °C, 'High Alarm Enable' checked, 'Action' set to 'Shutdown', 'High Alarm' set to 640 °C, and 'High Alarm String' set to '2133 ID0 Flexible Sensor A High'.

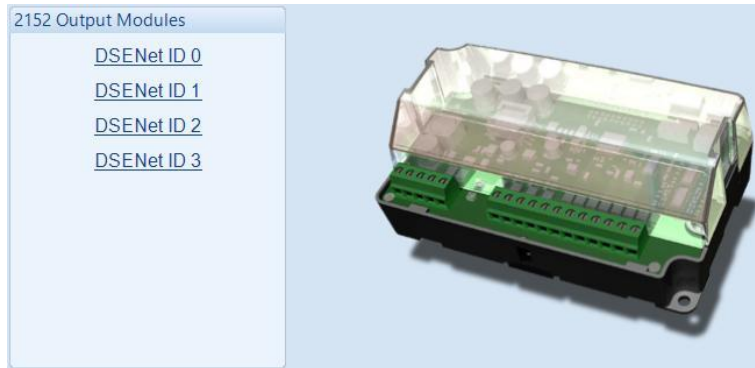
Parameter	Description
Alarm Arming	NOTE: For details of these, see the section entitled <i>Alarm Arming</i> elsewhere in this document. Select when the alarm generated by the analogue input becomes active: Always From Safety On From Starting
Low Alarm Enable	☐ = When disabled, the <i>Low Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>Low Alarm</i> activates when the measured quantity drops below the <i>Low Alarm</i> setting.
Low Alarm Action	NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: Electrical Trip Shutdown
Low Pre-Alarm Enable	☐ = When disabled, the <i>Low Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>Low Pre-Alarm</i> is active when the measured quantity drops below the <i>Low Pre-Alarm Trip</i> setting. The <i>Low Pre-Alarm</i> is automatically reset when the measured quantity rises above the configured <i>Low Pre-Alarm Return</i> level.
Low Alarm String	The text that is displayed on the module's LCD when the <i>Low Alarm</i> or <i>Low Pre-Alarm</i> activates.

Parameter descriptions are continued overleaf...

Parameter	Description
High Pre-Alarm Enable	☐ = When disabled, the <i>High Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>High Pre-Alarm</i> is active when the measured quantity rises above the <i>High Pre-Alarm Trip</i> setting. The <i>High Pre-Alarm</i> is automatically reset when the measured quantity falls below the configured <i>High Pre-Alarm Return</i> level.
High Alarm Enable	☐ = When disabled, the <i>High Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>High Alarm</i> is active when the measured quantity rises above the <i>High Alarm</i> setting.
High Alarm Action	 NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: <i>Electrical Trip</i> <i>Shutdown</i>
High Alarm String	The text that is displayed on the module's LCD when the <i>High Alarm</i> or <i>High Pre-Alarm</i> activates.

3.15.4 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

2152 Expansion Enable

Expansion Enabled ☒
Link Lost Alarm Action Shutdown

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 <i>Exp. Unit Failure</i> alarm with the configured <i>Link Lost Alarm Action</i> severity.

2152 Expansion Outputs

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

2152 Expansion Outputs

[Outputs A - F](#)

3.15.4.1 ANALOGUE OUTPUTS

Analogue Output A

Output Configuration

Output Name
2152 ID0 Flexible Output A

Output Type

Source
Generator Power Total

Curve
0kW to 100kW = 0V to 10V

Edit...

Output Configuration

Output Configuration

Output Name
2152 ID0 Flexible Output A

Parameter	Description
Output Name	Enter the <i>Output Name</i> , this text is shown on in the SCADA section when viewing the output.

Output Type

Output Type

Source
Generator Power Total

Curve
0kW to 100kW = 0V to 10V

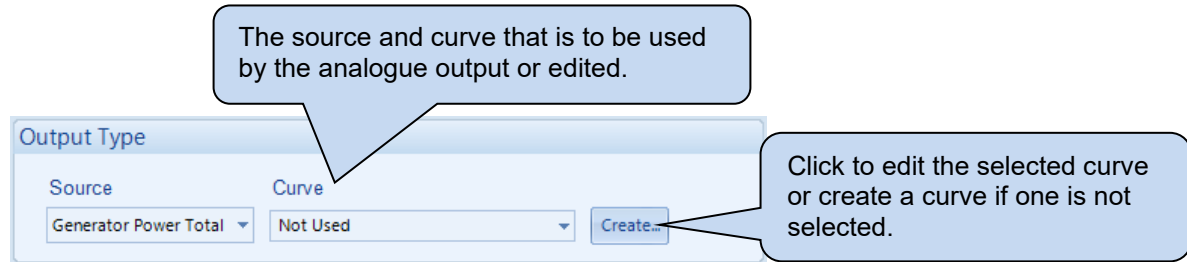
Edit...

Click to edit the 'output curve'. See section entitled *Editing the Output Curve*.

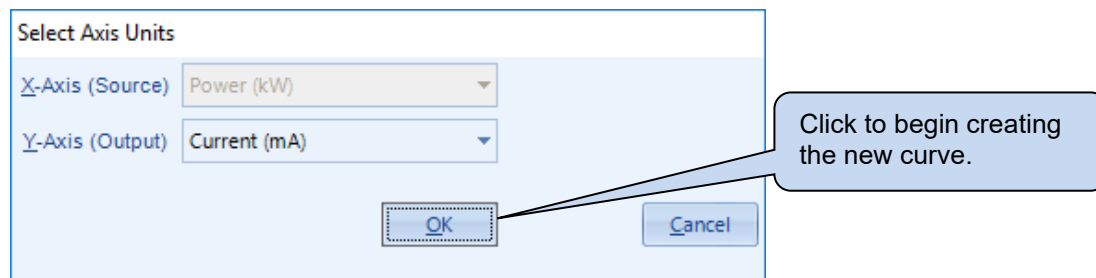
Parameter	Description
Source	Select the parameter that is to be mapped to the analogue output.
Curve	Select the output type and curve from a pre-defined list or create a user-defined curve. Current: for sensors with maximum range of 0 mA to 20 mA. Voltage: for sensors with maximum range of 0 V to 10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

3.15.4.2 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 nonstandard 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...

The screenshot shows the 'Curve Editor' window with a graph titled '<Unnamed Curve>'. The Y-axis is labeled 'mA' and ranges from 0 to 20. The X-axis is labeled 'Generator Power Total (kW)' and ranges from 0 to 500. A blue line connects four data points. One point at approximately (170, 12.2) is highlighted with an orange circle. Below the graph is a control bar with buttons for 'Interpolate', 'Change Axes Range', and 'Save As', along with input fields for X (170 kW) and Y (12.21 mA) values, and 'OK' and 'Cancel' buttons. A status bar at the bottom indicates 'Number of points used: 4/31'.

Click and drag the points on the graphs to change the settings.

Double click the left mouse button to add a point or right click on a point to remove it.

Use the mouse to select the graph point, then enter the value in the box or click up/down to change the value.

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

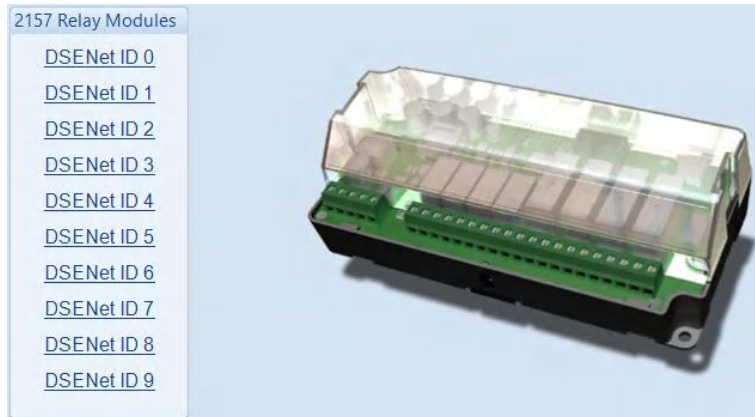
Click OK to save the curve.

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

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

3.15.5 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:

2157 Expansion Enable

2157 Enable

Expansion Enabled ☒

Link Lost Alarm Action Shutdown

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 <i>Exp. Unit Failure</i> alarm with the configured <i>Link Lost Alarm Action</i> severity.

Relay Outputs (Normally Open / Changeover)

Relay Outputs (Normally Open)

	Source	Polarity
A	System Healthy	Energise
B	Generator At Rest	Energise
C	Generator Available	Energise
D	System In Auto Mode	De-Energise

Parameter	Description
Source	Select the output source to control the state of the output. See section entitled <i>Output Sources</i> 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.

3.15.6 2548 ANNUNCIATOR 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

2548 Expansion Enable

Expansion Enabled ☒

Link Lost Alarm Action Shutdown

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 <i>Exp. Unit Failure</i> alarm with the configured <i>Link Lost Alarm Action</i> severity.

Sounder Configuration

Sounder Configuration

Follow main unit ☐

Sounder enabled ☐

Parameter	Description
Follow Main Unit	☐ = If the <i>mute / lamp test</i> button is pressed, other DSE2548 modules and the host module does not respond to this. ☒ = If the <i>mute / lamp test</i> button is pressed, other DSE2548 modules configured to <i>Follow main unit</i> , 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

LED Indicators		
A	System In Auto Mode	Unlit
B	Generator Load Inhibited	Lit
C	Combined Remote Start Request	Lit
D	Common Alarm	Lit
E	Not Used	Lit
F	Not Used	Lit
G	Not Used	Lit
H	Not Used	Lit

Annunciator Insert Card

Parameter	Description
Source	Select the output source to control the state of the output. See section entitled <i>Output Sources</i> 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.

3.15.7 DSE2160 I/O 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:

2160 Expansion Enable

2160 Expansion Enable

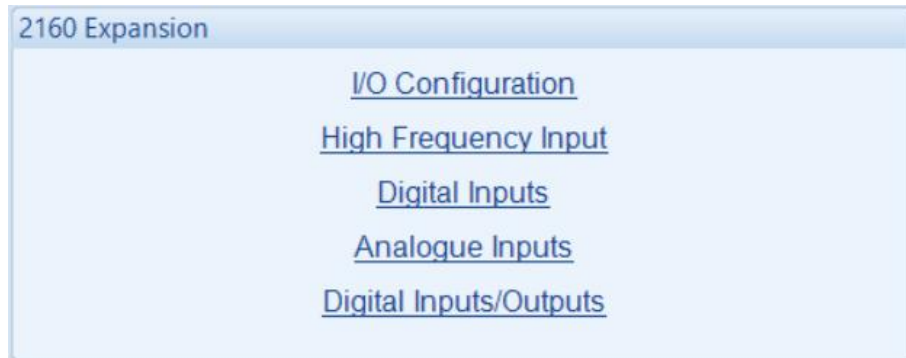
Expansion Enabled ☒

Link Lost Alarm Action Shutdown ▾

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 <i>Exp. Unit Failure</i> alarm with the configured <i>Link Lost Alarm Action</i> severity.
Link Lost Alarm Action	Select the type of alarm required from the list: Electrical Trip: Shutdown: Warning:

Expansion

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



3.15.7.1 I/O CONFIGURATION

Digital Input A



Parameter	Description
Digital Input A	Select the input source from the list. <i>Not Used</i> <i>Digital Input</i> <i>Frequency Input</i> <i>Pulse Counter</i> <i>RPM Input</i>

Analogue Inputs



Parameter	Description
Analogue Input A & B	Select the input source from the list. <i>Not Used</i> <i>Digital Input</i> <i>Flexible Analogue</i>

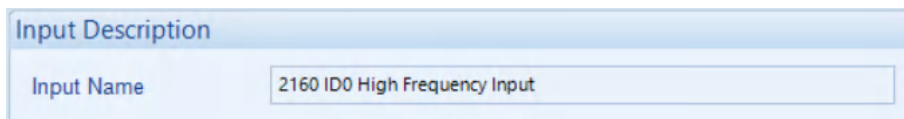
Digital Inputs/Outputs

Digital Inputs/Outputs	
Digital Input/Output A	Not Used ▼
Digital Input/Output B	Not Used ▼
Digital Input/Output C	Not Used ▼
Digital Input/Output D	Not Used ▼
Digital Input/Output E	Not Used ▼
Digital Input/Output F	Not Used ▼
Digital Input/Output G	Not Used ▼
Digital Input/Output H	Not Used ▼

Parameter	Description
Digital Input/Output A to H	Select the input source from the list. <i>Not Used</i> <i>Digital Input</i> <i>Digital Output – Negative Switching</i> <i>Digital Output – Positive Switching</i>

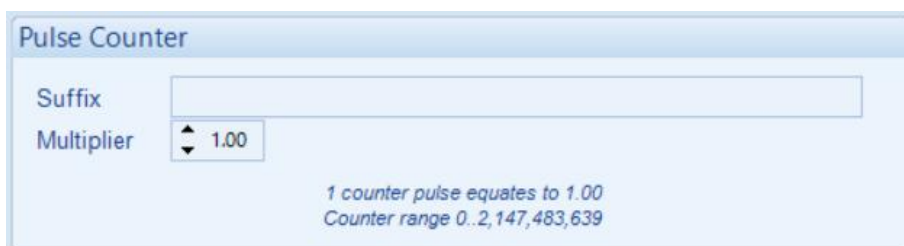
3.15.7.2 HIGH FREQUENCY INPUT

Input Description



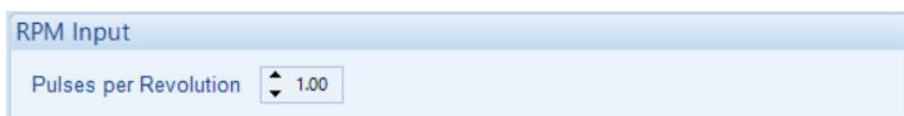
Parameter	Description
Input Name	Enter the <i>Input Name</i> , this text is shown on the module display when viewing the instrument.

Pulse Counter



Parameter	Description
Suffix	Unit display (example: m³/hr).
Multiplier	Enter the amount to scale each pulse value.

RPM Input



Parameter	Description
Pulse per Revolution	Enter the number of pulses generated per revolution to enable accurate RPM calculation from the input signal.

Input Alarms

Input Alarms

Alarm Arming

Always

Low Alarm Enable

☒

Action

Shutdown

Low Alarm

100

Hz

100 Hz

Low Pre-alarm Enable

☒

Low Pre-alarm Trip

200

Hz

200 Hz

Low Pre-alarm Return

300

Hz

300 Hz

Low Alarm String

2160 ID0 High Frequency (Low)

High Pre-alarm Enable

☒

High Pre-alarm Return

800

Hz

800 Hz

High Pre-alarm Trip

900

Hz

900 Hz

High Alarm Enable

☒

Action

Shutdown

High Alarm

1000

Hz

1000 Hz

High Alarm String

2160 ID0 High Frequency (Hi)

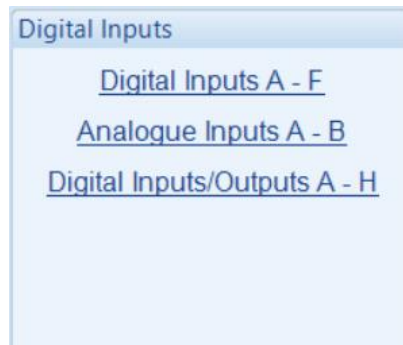
Parameter	Description
Alarm Arming	NOTE: For details of these, see the section entitled <i>Alarm Arming</i> elsewhere in this document. Select when the alarm generated by the analogue input becomes active: <i>Always</i> <i>From Safety On</i> <i>From Starting</i>
Low Alarm Enable	☐ = When disabled, the <i>Low Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>Low Alarm</i> activates when the measured quantity drops below the <i>Low Alarm</i> setting.

Parameter descriptions are continued overleaf...

Parameter	Description
Low Alarm Action	 NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document.
	Select the type of alarm required from the list: <i>Electrical Trip</i> <i>Shutdown</i>
Low Pre-Alarm Enable	☐ = When disabled, the <i>Low Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>Low Pre-Alarm</i> is active when the measured quantity drops below the <i>Low Pre-Alarm Trip</i> setting. The <i>Low Pre-Alarm</i> is automatically reset when the measured quantity rises above the configured <i>Low Pre-Alarm Return</i> level.
Low Alarm String	The text that is displayed on the module's LCD when the <i>Low Alarm</i> or <i>Low Pre-Alarm</i> activates.
High Pre-Alarm Enable	☐ = When disabled, the <i>High Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>High Pre-Alarm</i> is active when the measured quantity rises above the <i>High Pre-Alarm Trip</i> setting. The <i>High Pre-Alarm</i> is automatically reset when the measured quantity falls below the configured <i>High Pre-Alarm Return</i> level.
High Alarm Enable	☐ = When disabled, the <i>High Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>High Alarm</i> is active when the measured quantity rises above the <i>High Alarm</i> setting.
High Alarm Action	 NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document.
	Select the type of alarm required from the list: <i>Electrical Trip</i> <i>Shutdown</i>
High Alarm String	The text that is displayed on the module's LCD when the <i>High Alarm</i> or <i>High Pre-Alarm</i> activates.

3.15.7.3 DIGITAL INPUTS

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



Digital Inputs A to F

Digital Input A

Function
User Configured

Polarity
Close to Activate

Action
Warning

Arming
Always

LCD Display
2160 ID0 Digital Input A

Activation Delay
0s

Digital Input B

Function
User Configured

Polarity
Close to Activate

Action
Warning

Arming
Always

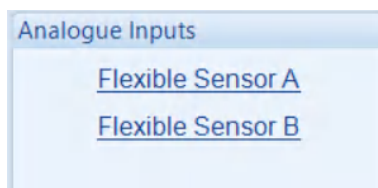
LCD Display
2160 ID0 Digital Input B

Activation Delay
0s

Parameter	Description
Function	Select the input function to activate when the relevant terminal is energised. See section entitled <i>Input Functions</i> 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 <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: <i>Electrical Trip</i> <i>Indication</i> <i>Shutdown</i> <i>Warning</i>
Arming	 NOTE: For details of these, see the section entitled <i>Alarm Arming</i> elsewhere in this document. Select when the input becomes active: <i>Active from Mains Parallel</i> <i>Always</i> <i>From Safety On</i> <i>From Starting</i> <i>Never</i>
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.

3.15.7.4 ANALOGUE INPUTS

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



Sensor Description

Parameter	Description
Sensor Name	Enter the <i>Sensor Name</i> , 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 3 k 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.

Sensor Fault Alarm

Sensor Fault Alarm

Enable Alarm ☒

Alarm String

Sensor Alarms

Sensor Alarms

Alarm Arming Always

Low Alarm Enable ☒

 Action Shutdown

 Low Alarm 25 %

Low Pre-alarm Enable ☒

 Low Pre-alarm Trip 51 %

 Low Pre-alarm Return 76 %

 Low Alarm String

High Pre-alarm Enable ☒

 High Pre-alarm Return 127 %

 High Pre-alarm Trip 153 %

High Alarm Enable ☒

 Action Shutdown

 High Alarm 204 %

 High Alarm String

Parameter	Description
Alarm Arming	 NOTE: For details of these, see the section entitled <i>Alarm Arming</i> elsewhere in this document. Select when the alarm generated by the analogue input becomes active: <i>Always</i> <i>From Safety On</i> <i>From Starting</i>
Low Alarm Enable	☐ = When disabled, the <i>Low Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>Low Alarm</i> activates when the measured quantity drops below the <i>Low Alarm</i> setting.
Low Alarm Action	 NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: <i>Electrical Trip</i> <i>Shutdown</i>
Low Pre-Alarm Enable	☐ = When disabled, the <i>Low Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>Low Pre-Alarm</i> is active when the measured quantity drops below the <i>Low Pre-Alarm Trip</i> setting. The <i>Low Pre-Alarm</i> is automatically reset when the measured quantity rises above the configured <i>Low Pre-Alarm Return</i> level.
Low Alarm String	The text that is displayed on the module's LCD when the <i>Low Alarm</i> or <i>Low Pre-Alarm</i> activates.

Parameter descriptions are overleaf...

Parameter	Description
High Pre-Alarm Enable	☐ = When disabled, the <i>High Pre-Alarm</i> is suppressed; operation continues but the warning is not reported. ☒ = The <i>High Pre-Alarm</i> is active when the measured quantity rises above the <i>High Pre-Alarm Trip</i> setting. The <i>High Pre-Alarm</i> is automatically reset when the measured quantity falls below the configured <i>High Pre-Alarm Return</i> level.
High Alarm Enable	☐ = When disabled, the <i>High Alarm</i> is suppressed; operation continues but the condition is not reported. ☒ = The <i>High Alarm</i> is active when the measured quantity rises above the <i>High Alarm</i> setting.
High Alarm Action	 NOTE: For details of these, see the section entitled <i>Alarm Types</i> elsewhere in this document. Select the type of alarm required from the list: <i>Electrical Trip Shutdown</i>
High Alarm String	The text that is displayed on the module's LCD when the <i>High Alarm</i> or <i>High Pre-Alarm</i> activates.

3.15.7.5 DIGITAL INPUTS/OUTPUTS

Digital Outputs

	Source	Polarity
Output A	Not Used ▼	Energise ▼
Output B	Not Used ▼	Energise ▼
Output C	Not Used ▼	Energise ▼
Output D	Not Used ▼	Energise ▼
Output E	Not Used ▼	Energise ▼
Output F	Not Used ▼	Energise ▼
Output G	Not Used ▼	Energise ▼
Output H	Not Used ▼	Energise ▼

Parameter	Description
Source	Select the output source to control the state of the output. For details of all available functions see the section entitled <i>Output Sources</i> elsewhere in this document.
Polarity	Select the digital output polarity: <i>De-Energise</i> : When the output source is true, the output deactivates. <i>Energise</i> : When the output source is true, the output activates.

3.15.8 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

DSENet ID 0

Enable ☒

Link Lost Alarm Action Shutdown

Modbus Slave ID 11

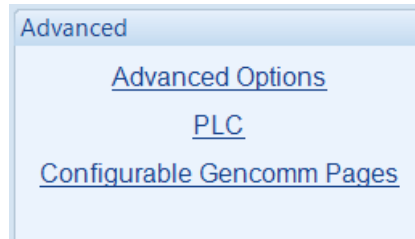
Display Instrumentation ☒

Charger Name Charger ID0

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 <i>Exp. Unit Failure</i> alarm with the configured <i>Link Lost Alarm Action</i> severity.
Modbus Server ID	The server 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 <i>Charger Name</i> , this text is shown on the module display when viewing the battery charger instrumentation.

3.16 ADVANCED

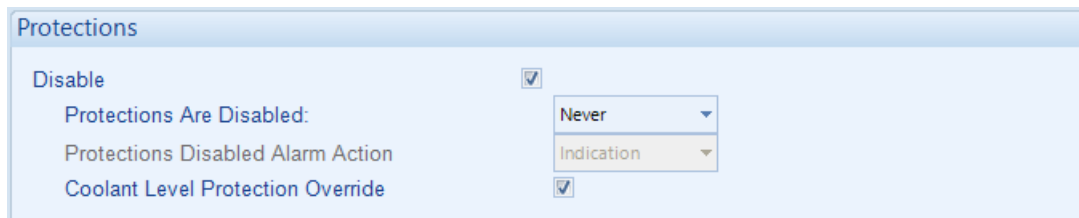
The *Advanced* page is subdivided into smaller sections.
Select the required section with the mouse.



3.16.1 ADVANCED OPTIONS

3.16.1.1 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 module that has “Protections Disabled” configured, results in a warning message appearing on the PC screen for the user to acknowledge before the module’s configuration is changed. This prevents inadvertent activation of the feature. ☐ = The module operates as normal and provide engine shutdown if required. ☒ = <i>Protections disabled</i> 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 module. On Input: Protections are disabled whenever a configurable input set to <i>Protections Disabled</i> is activated.

Parameter descriptions are continued overleaf...

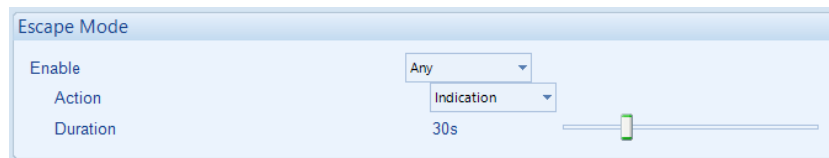
Parameter	Description
Protections Disabled Alarm Action	If <i>Disable All Protections</i> is set to <i>On Input</i>, this selection allows configuration of an alarm to highlight that the protections have been disabled on the engine. Indication: Any output or LCD display indicator configured to <i>Protections Disabled</i> is made active; however the internal alarm sound does not operate. Warning: Any output or LCD display indicator configured to <i>Protections Disabled</i> is made active, and the internal alarm sound operates. When protections are disabled, <i>Protections Disabled</i> appears on the module display to inform the operator of this status.
Coolant Level Protection Override	☐ = When a CANbus engine is selected, the <i>Coolant Level Protection</i> is provided when supported by the ECU (ECM). ☒ = The <i>Coolant Level Protection</i> is overridden and does not activate an alarm on the module.

3.16.1.2 ESCAPE MODE

The *Escape Mode* is used to instruct the CAN Engine to disable some of its specific ECU alarms to perform a special Maintenance / Regeneration operation while running off-load. The *Escape Mode* is activated through a Digital Input or through the control module's *Running Editor*. This feature is only supported on some electronic CAN engines.

 **NOTE:** Activating *Escape Mode* does not disable the protections by the module.

 **NOTE:** Refer to DSE Publication: *057-263 DSEG7400 Operator Manual* for details on how to activate the *Escape Mode* through the control module's *Running Editor*, available on our website: www.deepseaelectronics.com.



Parameter	Description
Enable	Select the required method to activate <i>Escape Mode</i>. Options are as follows: Any: The <i>Escape Mode</i> is activated when the <i>Escape Mode</i> input function is active or <i>Escape Mode</i> option on the module <i>Running Editor</i> is activated. Disabled: The <i>Escape Mode</i> is disabled, activating the <i>Escape Mode</i> input doesn't activate <i>Escape Mode</i>, and the <i>Escape Mode</i> parameter is hidden on the module's <i>Running Editor</i>. On Input: The <i>Escape Mode</i> is activated when the <i>Escape Mode</i> input function is active. With this option <i>Escape Mode</i> parameter is hidden on the module's <i>Running Editor</i>. Running Editor: The <i>Escape Mode</i> is activated when the <i>Escape Mode</i> option on the module <i>Running Editor</i> is activated. The module does not respond to the <i>Escape Mode</i> input when active.
Action	Select the action when the <i>Escape Mode</i> is activated through a digital input or from the module's <i>Running Editor</i>. Options are: Indication Warning
Duration	The time duration for the <i>Escape Mode</i> remains active when activated from the module's <i>Running Editor</i> or from the input. Upon termination of this timer the <i>Escape Mode</i> deactivates.

3.16.1.3 SYNCHRONISING TIMERS

Synchronising Timers (Auto Mains Fail)		
Synchronisation Delay	3s	
Interlock Override Off	0.1s	

Parameter	Description
Synchronising Delay	This timer starts when a breaker closure is requested in manual mode, either by pressing the <i>Generator Close Button</i> or the <i>Mains Close Button</i> , or upon a Mains Return, it waits for the configured time before it starts the <i>Check Sync</i> process.
Interlock Override Off	This timer activates when the <i>Generator Closed Auxiliary</i> becomes inactive after the <i>Closed Transition</i> , it is used to keep the <i>Interlock Override</i> output active after that the generator breaker has opened to make sure that the breaker has responded correctly.

3.16.1.4 AVR OPTIONS

This feature allows the module to communicate with a supported CAN AVR through its ECU port.

NOTE: At the time of writing, only the DSEA108 and DSEA109 AVRs are supported. For further details, refer to DSE Publication: *057-281 DSEA108 Operator Manual* or *057-295 DSEA109 Operator Manual* available on our website: www.deepseaelectronics.com.

NOTE: The module's ECU Port's baud rate is defined by the engine file selected in the *Application* section. Most engines' ECU baud rates are set to be 250 kb/s, ensure the baud rate of the AVR matches the engine ECU's baud rate.

NOTE: When connecting the AVR to the module's CAN Port, ensure the correct baud rate is configured in order to match the AVR's baud rate. Refer to the section entitled *CAN Port* elsewhere in this document for further details.

AVR Options

Enable AVR CAN Communications ☒

AVR Source Address

Module CAN Address

Match AVR Alternative Configuration to Controller ☒

Parameter	Description
Enable AVR CAN Communications	☐ = Communications with the CAN AVR is disabled. ☒ = Enables communication with the CAN AVR through the ECU port.
AVR Source Address	NOTE: For a full list of the AVR CAN message and instrumentation, refer to DSE Publication: <i>057-281 DSEA108 Operator Manual</i> or <i>057-295 DSEA109 Operator Manual</i> which is found on our website: www.deepseaelectronics.com. NOTE: For further details on how to configure the DSEA108 or DSEA109 CAN Source address, refer to DSE Publication: <i>057-283 DSEA108 Software Manual</i> or <i>057-294 DSEA109 Software Manual</i> which is found on our website: www.deepseaelectronics.com. Set the AVR's <i>CAN Source Address</i> to communicate through.
Module CAN Address	The CAN Source address used by the module when sending CAN messages to the AVR.

Descriptions continued overleaf...

Parameter	Description
Match AVR Alternative Configuration to Controller	NOTE: For further details on how to configure the DSEA108 alternative configurations, refer to DSE Publication: 057-283 DSEA108 Software Manual or 057-294 DSEA109 Software Manual which is found on our website: www.deepseaelectronics.com. This feature is used to send the module's Alternative Configurations Nominal Voltage and Nominal Frequency levels to the CAN AVR, to match the CAN AVR's Alternative Configurations with the module's Alternative Configurations. ☐ = The module does not send its Alternative Configurations settings to the CAN AVR. ☒ = The sends its <i>Alternative Configurations' Nominal Voltage</i> and <i>Nominal Frequency</i> levels to the CAN AVR's to match its Alternative Configurations' Voltage Set Point and Frequency select.

3.16.1.5 AVR DATA FAIL

Indicates CAN communication failure between the module and the CAN AVR.

AVR Data Fail

Action

Shutdown

Arming

From Safety On

Activation Delay

0s

Parameter	Description
Action	Select the action to take when the module detects a communication failure with the CAN AVR. The options are: Electrical Trip Indication Shutdown Warning
Arming	Select when the <i>AVR Data Fail</i> is monitored. Options are as follows: Always: The alarm is active at any time the CAN Link is lost. From Safety On: Active only after the <i>Safety On</i> delay timer. From Starting: Active only after the <i>Crank Relay</i> is energised. Never: Alarm is disabled. Loading Alarms Activation: The alarm is monitored after the generator is running, and the voltage and frequency are above their <i>Loading</i> levels, until the generator stops.
Activation Delay	The time delay for the module to wait before activating <i>AVR Data Fail</i> alarm when detected.

3.16.1.6 AVR FAULT

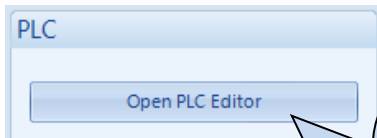
AVR Fault	
Action	Shutdown
Arming	From Safety On
Activation Delay	0s

Parameter	Description
Action	Select the action to take after the <i>Activation Delay</i> timer, when the CAN AVR activates an alarm. The options are: Electrical Trip Indication Shutdown Warning
Arming	Select when the <i>AVR Fault</i> is monitored. Options are as follows: Always: The alarm is active at any time the CAN Link is lost. From Safety On: Active only after the <i>Safety On</i> delay timer. From Starting: Active only after the <i>Crank Relay</i> is energised.
Activation Delay	The time delay for the module to wait before activating <i>AVR Fault</i> alarm when detected.

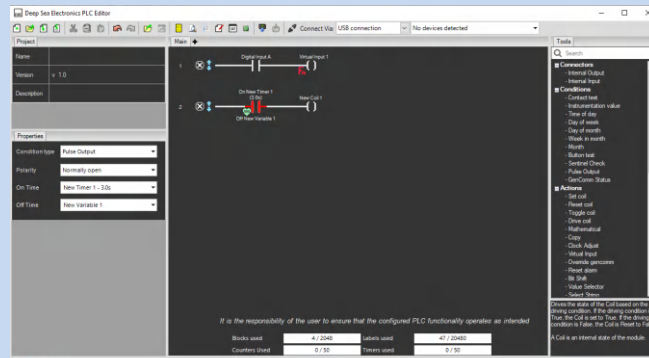
3.16.2 PLC

NOTE: For further details and instructions on the PLC Editor, refer to DSE Publication: 057-314 Advanced PLC Software Manual which is found on our website: www.deepseaelectronics.com.

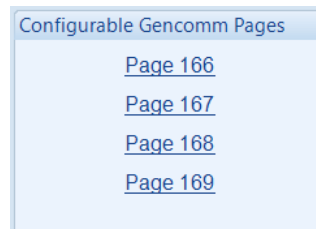
NOTE: For the earlier software versions pre-V5 of the module, refer to DSE Publication: 057-175 PLC Programming Guide which is found on our website: www.deepseaelectronics.com.



Click to open the *PLC Editor*, then the *PLC Editor* opens as shown below.



3.16.3 CONFIGURABLE GENCOMM PAGES



Configurable Gencomm pages are available for advanced Modbus applications on the module. 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 client and hence speed up data collection.

All configurable Gencomm registers are 32-bit unsigned format.

The Configurable Modbus pages are:

Page 166

Register	Value	Register	Value	Register	Value	Register	Value
0-1	<Not Used>	64-65	<Not Used>	128-129	<Not Used>	192-193	<Not Used>
2-3	<Not Used>	66-67	<Not Used>	130-131	<Not Used>	194-195	<Not Used>
4-5	<Not Used>	68-69	<Not Used>	132-133	<Not Used>	196-197	<Not Used>
6-7	<Not Used>	70-71	<Not Used>	134-135	<Not Used>	198-199	<Not Used>
8-9	<Not Used>	72-73	<Not Used>	136-137	<Not Used>	200-201	<Not Used>
10-11	<Not Used>	74-75	<Not Used>	138-139	<Not Used>	202-203	<Not Used>
12-13	<Not Used>	76-77	<Not Used>	140-141	<Not Used>	204-205	<Not Used>
14-15	<Not Used>	78-79	<Not Used>	142-143	<Not Used>	206-207	<Not Used>
16-17	<Not Used>	80-81	<Not Used>	144-145	<Not Used>	208-209	<Not Used>
18-19	<Not Used>	82-83	<Not Used>	146-147	<Not Used>	210-211	<Not Used>
20-21	<Not Used>	84-85	<Not Used>	148-149	<Not Used>	212-213	<Not Used>
22-23	<Not Used>	86-87	<Not Used>	150-151	<Not Used>	214-215	<Not Used>
24-25	<Not Used>	88-89	<Not Used>	152-153	<Not Used>	216-217	<Not Used>
26-27	<Not Used>	90-91	<Not Used>	154-155	<Not Used>	218-219	<Not Used>
28-29	<Not Used>	92-93	<Not Used>	156-157	<Not Used>	220-221	<Not Used>
30-31	<Not Used>	94-95	<Not Used>	158-159	<Not Used>	222-223	<Not Used>

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

Example of Gencomm page configuration:

Page 166	
Register	Value
0-1	Engine At Rest
2-3	Engine Speed
4-5	Fuel Temperature
6-7	Oil Pressure

The register address is obtained from the formula:

$\text{register_address} = \text{page_number} * 256 + \text{register_offset}$.

To read the *Engine Speed* from the above register, the Modbus client device needs to read the data in two registers and then combine the data from the Most Significant Bit and the Least Significant Bit.

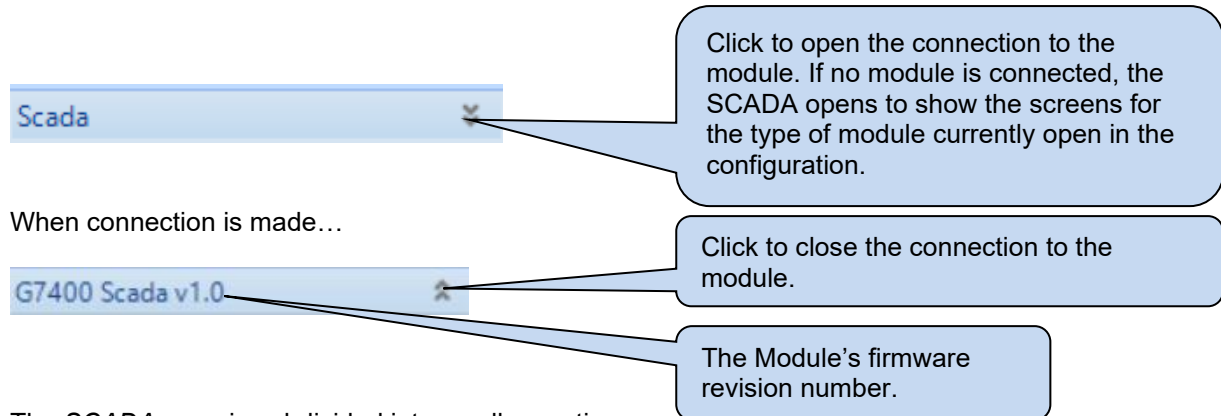
MSB address in Decimal = $(166 * 256) + 2 = 42498$

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

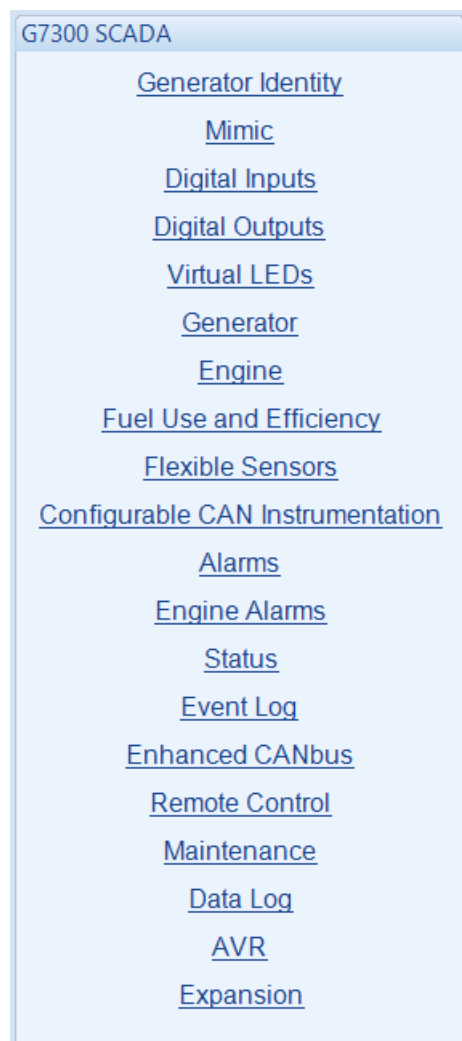
4 SCADA

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

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



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



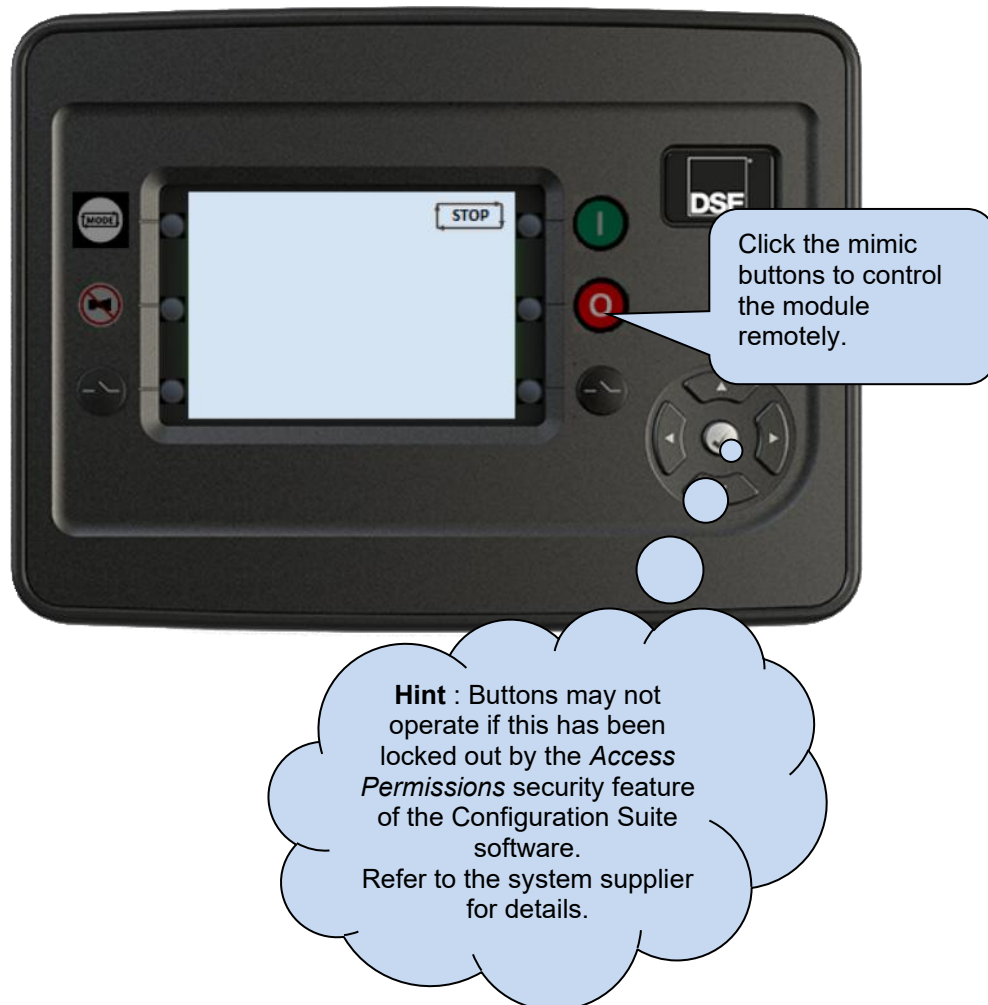
4.1 GENERATOR IDENTITY

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

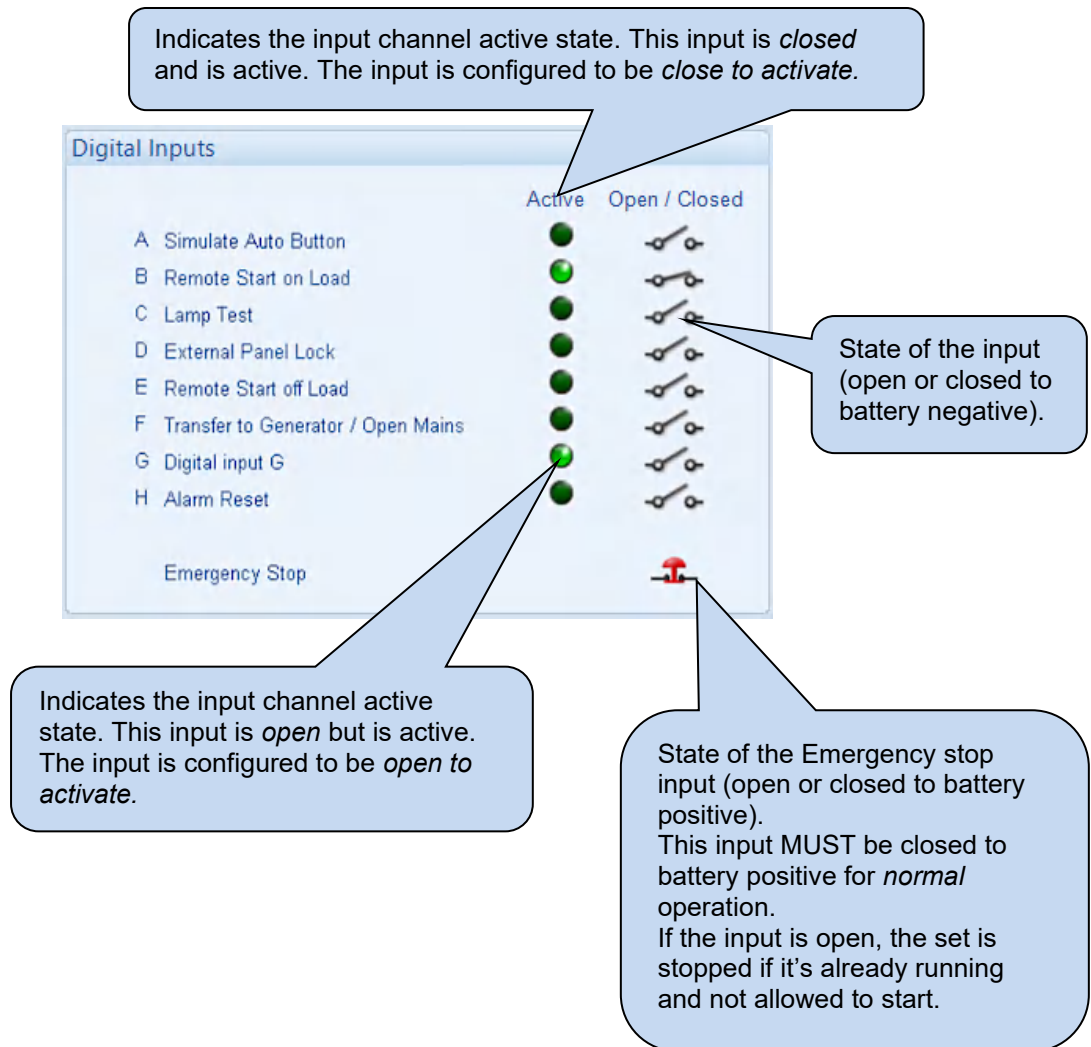
Generator Identity	
Site Identity	Deep Sea Electronics Head Office
Genset Identity	Volvo TAD941 GE

4.2 MIMIC

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



4.3 DIGITAL INPUTS



4.4 DIGITAL OUTPUTS

Digital Outputs			
Digital Outputs (Supplied From Emergency Stop Input)			
		Active	Open / Closed
A	Fuel Relay		
B	Start Relay		
Digital Outputs (Volts Free)			
		Active	Open / Closed
C	Not Used		
D	Inhibit Scheduled Run		
Digital Outputs (DC Supply Out)			
		Active	Open / Closed
E	Preheat During Preheat Timer		
F	Combined Remote Start Output		
G	Lamp Test		
H	System In Manual Mode		
I	Not Used		
J	Not Used		

Indicates the output channel active state. This output is *closed* and is active. The output is configured to be *System in Manual Mode Energise*. As the module is in Manual mode, the output is *energised*.

State of the output (open or closed).

4.5 VIRTUAL LEDS

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

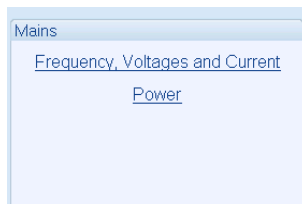
Virtual LEDs		
LED Status		
		Active
LED 1	Combined Remote Start Output	
LED 2	Fuel Relay	
LED 3	Start Relay	
LED 4	Common Alarm	
LED 5	Not Used	
LED 6	Common Warning	
LED 7	Common Shutdown	
LED 8	Not Used	
LED 9	Not Used	
LED 10	Not Used	
LED 11	Not Used	
LED 12	Not Used	
LED 13	Not Used	
LED 14	Not Used	
LED 15	Not Used	
LED 16	Not Used	
LED 17	Not Used	
LED 18	Not Used	
LED 19	Not Used	
LED 20	Not Used	

Shows if the Virtual LED is active or not.

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

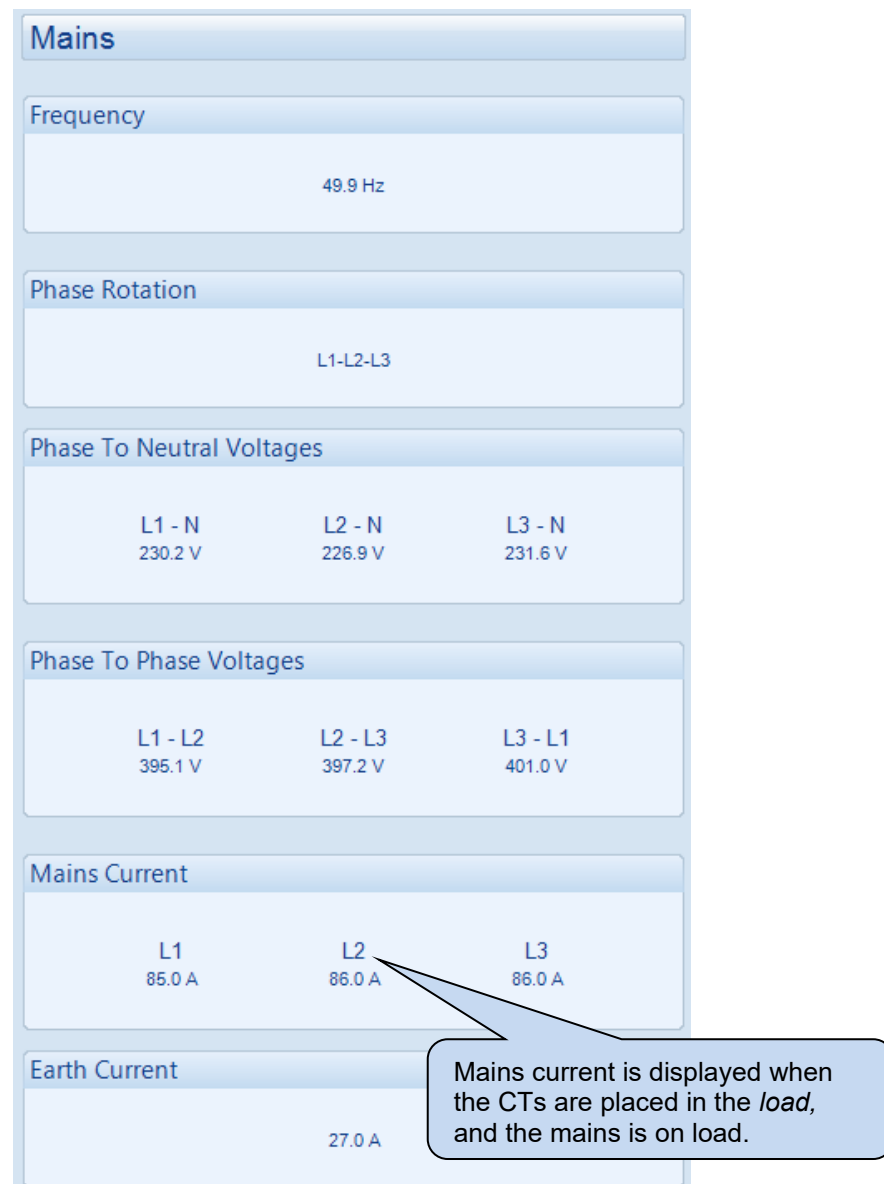
4.6 MAINS

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



4.6.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the module's measurements of the mains supply.



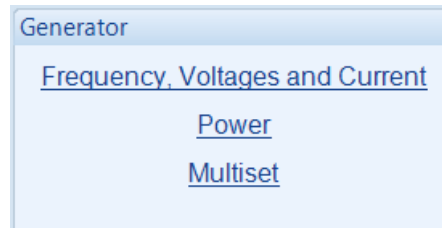
4.6.2 POWER

Shows the modules measurements of the mains supply power.

Power				
Watts				
L1	L2	L3	Total	
3.0 kW	3.0 kW	3.0 kW	9.0 kW	
VA				
L1	L2	L3	Total	
10.0 kVA	10.0 kVA	10.0 kVA	30.0 kVA	
VAr				
L1	L2	L3	Total	
8.0 kVAr	8.0 kVAr	8.0 kVAr	24.0 kVAr	
Power factor				
L1	L2	L3	Average	
Lag 0.32	Lag 0.32	Lag 0.31	Lag 0.30	
Accumulated Power				
kWh	kVAh	kVArh		
107.7 kWh	174.2 kVAh	75.0 kVArh		

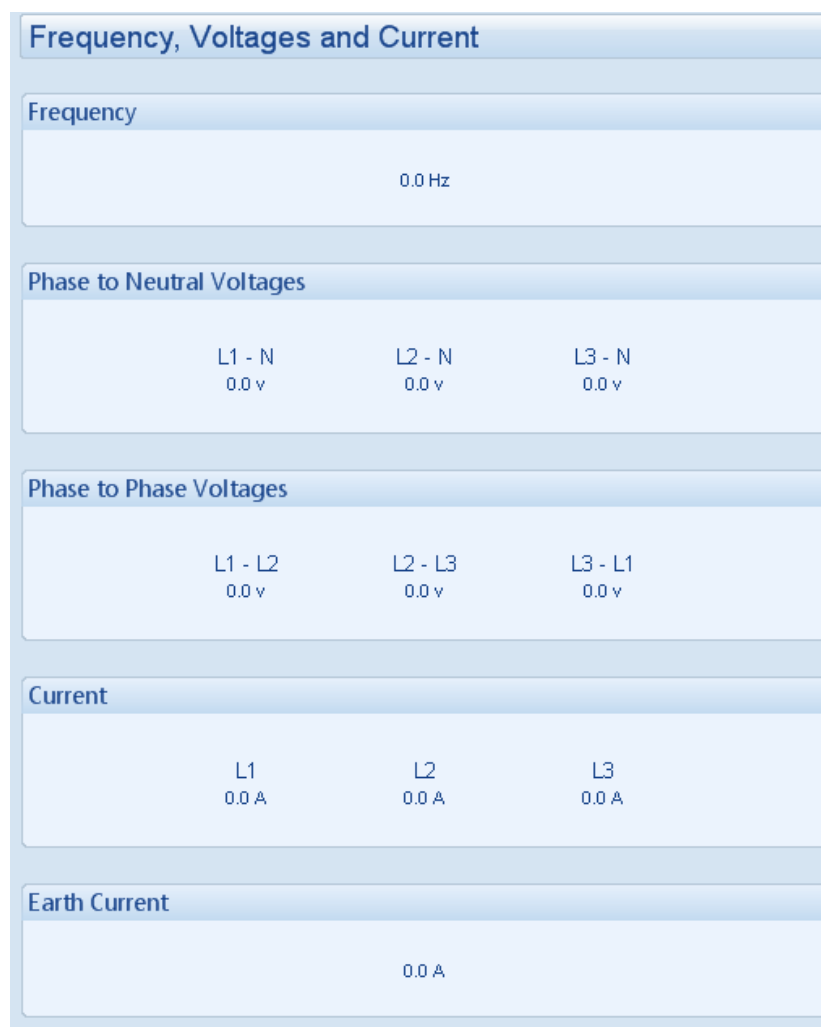
4.7 GENERATOR

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



4.7.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the modules measurements of the generator supply.



4.7.2 POWER

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

Power				
Watts				
L1	L2	L3	Total	
33.0 kW	34.0 kW	33.0 kW	100.0 kW	
VA				
L1	L2	L3	Total	
41.0 kVA	42.0 kVA	42.0 kVA	125.0 kVA	
VAr				
L1	L2	L3	Total	
24.0 kVAr	24.0 kVAr	24.0 kVAr	72.0 kVAr	
Power Factor				
L1	L2	L3	Average	
Lag 0.80	Lag 0.80	Lag 0.79	Lag	0.80
Accumulated Power				
kWh	kVAh	kVArh		
15.5 kWh	19.2 kVAh	10.7 kVArh		

4.7.3 MULTISET

Allows setting the module's MSC link parameters.

The screenshot shows a web-based configuration interface for a module's MSC link parameters. It is organized into four sections: 'Multiset' (the main title), 'Bus', 'GenSet', and 'Dual Mutual Time'. The 'Bus' section contains a single parameter 'Sets On The Bus' with a value of '1'. The 'GenSet' section contains two parameters: 'MSC ID' with a value of '1' and a spinner control set to '2', and 'Priority' with a value of '1' and a spinner control set to '1'. Each spinner control has a 'Set' button next to it. The 'Dual Mutual Time' section contains a parameter 'Time (hh:mm)' with a value of '07:01' and a spinner control set to '07:00', also with a 'Set' button.

Parameter	Description
Sets On The Bus	Shows the number of modules currently connected to the MSC link.
MSC ID	Each module connected to the MSC link must have a unique ID. When all the modules are powered up "one at a time," this is automatically set. If powering all modules up at the same time results in "MSC ID alarm," manually setting the <i>MSC ID</i> here prevents this.
Priority	Used when the <i>Dual Mutual Standby</i> is in operation and the <i>Balancing Mode</i> is configured to <i>Set Priority</i> .
Dual Mutual Time	This is an incremental internal hour's counter used only for the <i>Dual Mutual Standby</i> when the <i>Balancing Mode</i> is set to <i>Dual Mutual Time</i> . It holds the accumulated hours counter for the <i>Duty Time</i> of operation.

4.8 ENGINE

Shows the modules measurements of the engine parameters.

Engine	
Coolant Temperature	Plant Battery
59 °C, 138 °F	24.1 v DC
Oil Pressure	Charge Altenator
5.03Bar, 73 PSI, 503 KPa	22.3 v DC
Speed	Hours Run
1497 RPM	00:12
Fuel Level	Number of Starts
52 %	3

4.9 FUEL USE AND EFFICIENCY

Shows the measurement of the fuel use and efficiency (If configured).

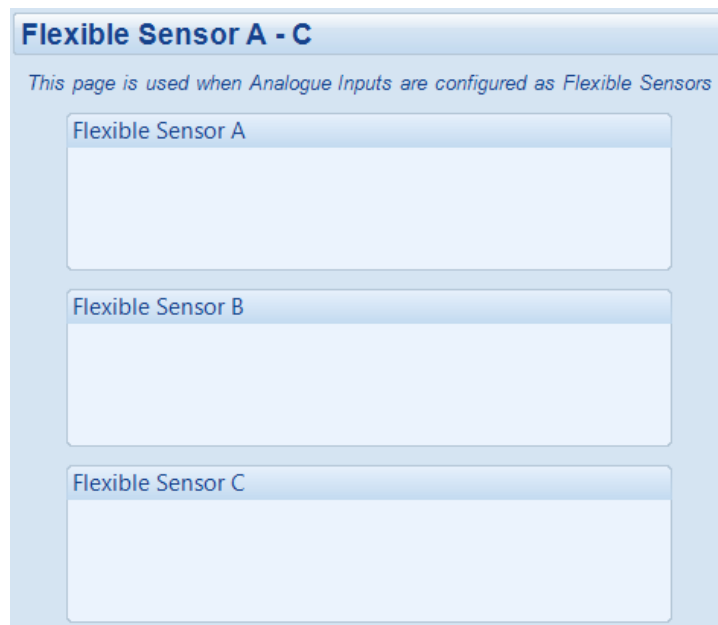
Fuel Use and Efficiency		
Fuel Consumption		
Instantaneous	Trip	
100.77 l/hr	142.38 l/hr	
Fuel Use		
Trip		Accumulated
---		2049 litres
Fuel Efficiency		
Instantaneous	Trip	Accumulated
315.65 kWh/l	0.00 kWh/l	3.40 kWh/l
Run Time Until Empty		
17:46		

4.10 FLEXIBLE SENSORS

Shows the modules measurements of the flexible sensor's parameters.
The *Flexible Sensor* is subdivided into smaller sections.
Select the required section with the mouse.



4.10.1 FLEXIBLE SENSOR A TO C

A screenshot of the "Flexible Sensor A - C" configuration page. The page has a title bar "Flexible Sensor A - C" and a subtitle "This page is used when Analogue Inputs are configured as Flexible Sensors". Below the subtitle, there are three large, empty rectangular input fields, each with a header: "Flexible Sensor A", "Flexible Sensor B", and "Flexible Sensor C".

4.10.2 FLEXIBLE SENSOR D TO F

A screenshot of the "Flexible Sensor D - F" configuration page. The page has a title bar "Flexible Sensor D - F" and a subtitle "This page is used when Analogue Inputs are configured as Flexible Sensors". Below the subtitle, there are three large, empty rectangular input fields, each with a header: "Flexible Sensor D", "Flexible Sensor E", and "Flexible Sensor F".

4.11 CONFIGURABLE CAN INSTRUMENTATION

Shows 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 CANbus.

Configurable CAN Instrumentation		
Configurable CAN Instrumentation		
1	Longitude - VP	210.0072902
2	Engine Oil Pressure - EFL_P1	124 kPa
3	Latitude - VP	1.0036625
4	Engine Coolant Pressure - EFL_P1	234 kPa
5	Engine Fuel Pressure - EFL_P1	0 kPa
6	Engine Hours - HOURS	1000.0 hr
7	Engine Oil Temperature 1 - ET1	84.37042 deg C
8	Engine Coolant Temperature - ET1	55 deg C
9	Engine Fuel Rate - LFE	10.00 L/h
10	Electrical Potencial Plnp - VEP1	0.00 V

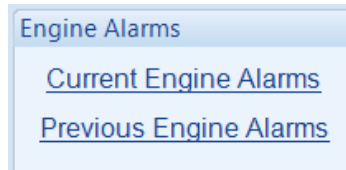
4.12 ALARMS

Shows any present alarm conditions.

Alarms	
Shutdown Alarms Emergency Stop Oil Pressure Sensor Open Circuit Temperature Sensor Open Circuit	Warning Alarms
Electrical Trip Alarms 	

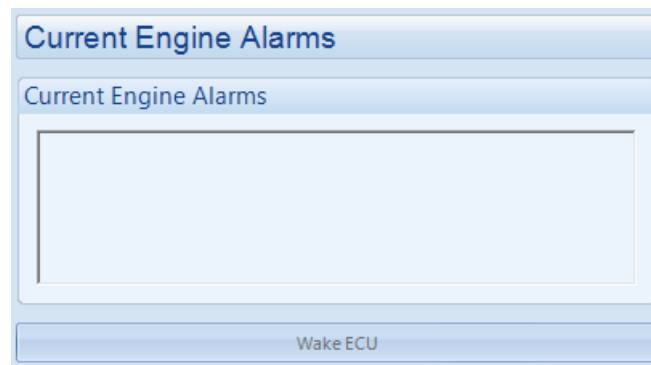
4.13 ENGINE ALARMS

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



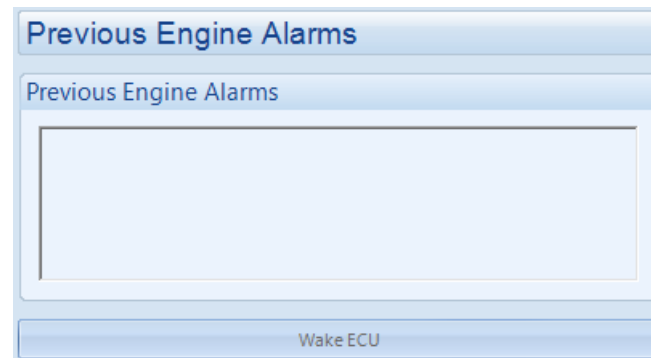
4.13.1 CURRENT ENGINE ALARMS

Shows the current engine alarms.



4.13.2 PREVIOUS ENGINE ALARMS

Shows the previous engine alarms.



4.14 STATUS

Shows the module's current status.

Status	
Supervisor State Running On Load	Software Version 1.0
Engine/Generator State Running	Module ID 218DDA17D
Mains Detection State	Mode 
Load Switching State Closed To Generator	
Protections Enabled	
Heater Fitted	

4.15 EVENT LOG

Shows the contents of the module's event log.

#	Date	Time	Hours Run	Event	Details
1	02/10/2008	11:41:20	0:12	Shutdown	Oil Pressure Sensor Open Circuit
2	02/10/2008	11:41:19	0:12	Mains	Mains fail
3	02/10/2008	11:41:18	0:12	Restart	Power Up
4	28/09/2008	08:24:43	0:12	Shutdown	Oil Pressure Sensor Open Circuit
5	28/09/2008	08:24:42	0:12	Mains	Mains fail
6	28/09/2008	08:24:40	0:12	Restart	Power Up
7	27/09/2008	07:48:17	0:12	Shutdown	Oil Pressure Sensor Open Circuit
8	27/09/2008	07:48:16	0:12	Mains	Mains fail
9	27/09/2008	07:48:14	0:12	Restart	Power Up
10	27/09/2008	07:31:00	0:12	Shutdown	Oil Pressure Sensor Open Circuit
11	27/09/2008	07:30:59	0:12	Mains	Mains fail
12	27/09/2008	07:30:57	0:12	Restart	Power Up
13	26/09/2008	07:48:19	0:12	Shutdown	Oil Pressure Sensor Open Circuit
14	26/09/2008	07:48:18	0:12	Mains	Mains fail
15	26/09/2008	07:48:17	0:12	Restart	Power Up
16	26/09/2008	07:45:58	0:12	Restart	Power Up
17	26/09/2008	06:54:11	0:12	Shutdown	Oil Pressure Sensor Open Circuit
18	26/09/2008	06:54:10	0:12	Mains	Mains fail
19	26/09/2008	06:54:09	0:12	Restart	Power Up
20	25/09/2008	08:56:38	0:12	Shutdown	Oil Pressure Sensor Open Circuit
21	25/09/2008	08:56:37	0:12	Mains	Mains fail
22	25/09/2008	08:56:35	0:12	Restart	Power Up
23	25/09/2008	08:52:50	0:12	Mains	Mains fail
24	25/09/2008	08:52:48	0:12	Restart	Power Up
25	25/09/2008	06:55:04	0:12	Shutdown	Oil Pressure Sensor Open Circuit
26	25/09/2008	06:55:03	0:12	Mains	Mains fail

Export to Excel
Export to CSV
Export to PDF
Print event log

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

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

Click to print the log.

4.16 ENHANCED CANBUS

Shows the module's readings of enhanced CANbus parameters. This is only available if the module is configured for CAN communication and the *Enhanced CANbus* option is enabled.

Enhanced CANbus	
Engine Oil Temperature	Inlet Manifold Temperature
	Temp. 1 Temp. 2
Exhaust Temperature	Coolant Pressure
Temp. 1 Temp. 2	Press. 1 Press. 2
Fuel Pressure	Turbo Pressure
Press. 1 Press. 2	Press. 1 Press. 2

4.17 REMOTE CONTROL

The remote control section of the SCADA section is used for monitoring and control of module 'remote control' sources.

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

Control	Activate	Active
1	☒	
2	☐	
3	☐	
4	☒	
5	☐	
6	☐	
7	☒	
8	☐	
9	☐	
10	☐	

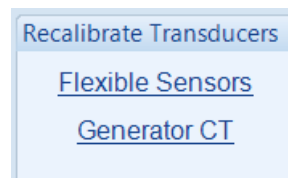
4.18 MAINTENANCE

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



4.18.1 RECALIBRATE TRANSDUCERS

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



4.18.1.1 FLEXIBLE SENSORS

Allows the recalibration of the flexible sensors (when enabled in the module configuration).

Flexible Sensor A - C

This page is used when Analogue Inputs are configured as Flexible Sensors

Flexible Sensor A

Flexible Sensor A
0 %

Flexible Sensor B

Flexible Sensor B
0.06 Bar

Flexible Sensor C

Flexible Sensor C
Fault

Flexible Sensor D - F

This page is used when Analogue Inputs are configured as Flexible Sensors

Flexible Sensor D

Not Used

Flexible Sensor E

Configured As Digital Input

Flexible Sensor F

Not Used

4.18.1.2 GENERATOR CT

Allows the recalibration of the generator CT readings.

Generator CT

Current L1



Current L2



Current L3



Current Earth/Neutral



Reset

Reset to Default

4.18.1.3 MAINS CT

Only available when the *CT Location* is configured to *Load*.

Mains CT

Current L1



Current L2



Current L3



Current Earth/Neutral



Reset

Reset to Default

4.18.2 EXPANSION CALIBRATION

This section allows the analogue sensor inputs of the DSE2130 and DSE2131 input 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.

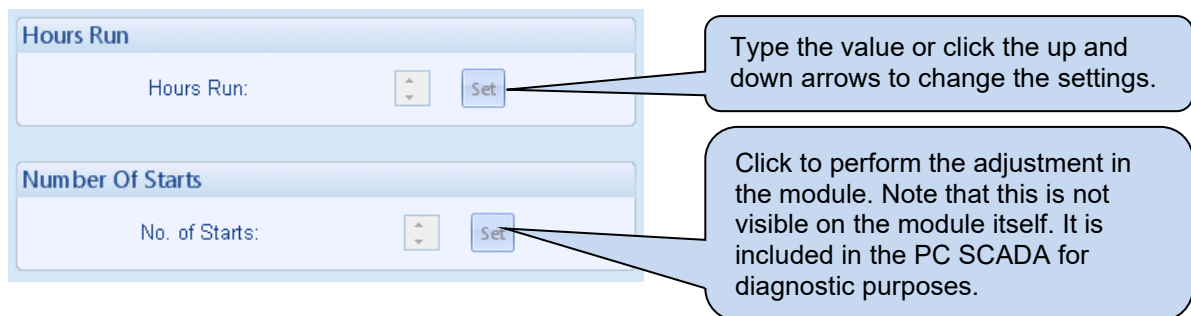


Expansion Calibration

- [2130 DSENet ID 0](#)
- [2130 DSENet ID 1](#)
- [2130 DSENet ID 2](#)
- [2130 DSENet ID 3](#)
- [2131 DSENet ID 0](#)
- [2131 DSENet ID 1](#)
- [2131 DSENet ID 2](#)
- [2131 DSENet ID 3](#)
- [2160 DSENet ID 0](#)
- [2160 DSENet ID 1](#)
- [2160 DSENet ID 2](#)
- [2160 DSENet ID 3](#)

4.18.3 HOURS RUN AND NUMBER OF STARTS

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



Hours Run

Hours Run:

Number Of Starts

No. of Starts:

Type the value or click the up and down arrows to change the settings.

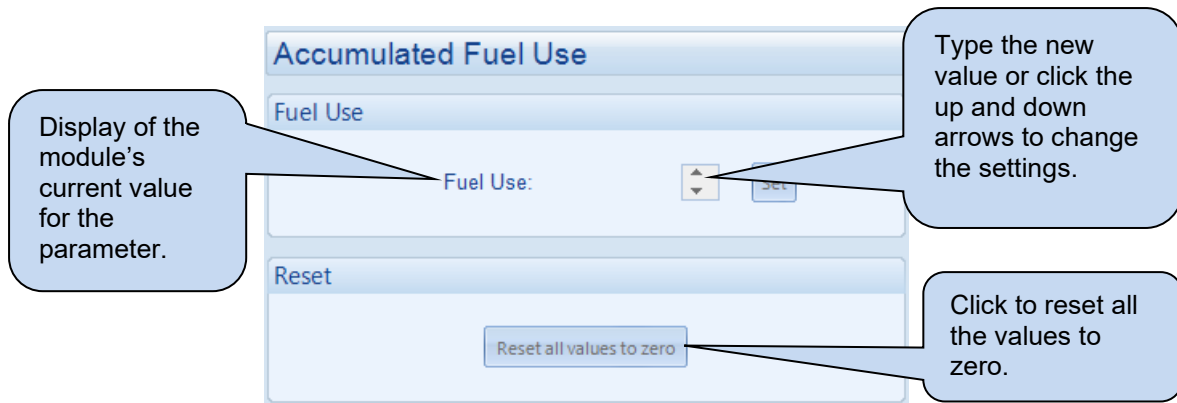
Click to perform the adjustment in the module. Note that this is not visible on the module itself. It is included in the PC SCADA for diagnostic purposes.

4.18.4 TIME

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

The screenshot displays the 'Date and Time' configuration window, which includes the following sections and callouts:

- Date and Time** (Section Header)
- Module Date**: Displays the current date as 21/01/2014. Callout: "Display of the module's current date and time."
- Module Time**: Displays the current time as 09:53:10.
- Set Date And Time**: Contains input fields for Date (14/02/2000) and Time (05:29:57), each with up/down arrows for adjustment. A 'Set' button is located below these fields. Callout: "Type the new date / time or click the up and down arrows to change the settings."
- Set To PC Time**: Displays the PC's current date (21/01/2014) and time (09:53:11). A 'Set To PC Time' button is located below. Callout: "Click Set to adjust the module to the date/time that your PC is set to."
- Callout for the 'Set' button: "Click Set to adjust the module to the selected date/time."

4.18.6 FUEL USE AND EFFICIENCY

4.18.7 MAINTENANCE ALARM RESET

Three maintenance alarms active in the control module. Each is reset individually.

The screenshot displays a web-based interface titled "Maintenance Alarm Reset". It contains three vertically stacked sections for "Maintenance Alarm 1", "Maintenance Alarm 2", and "Maintenance Alarm 3". Each section shows the "Running Time Until Next Maintenance" and the "Date Of Next Maintenance". A "Reset" button is present in each section, with a note below it stating: "Press reset to schedule next maintenance, based upon module's maintenance configuration." A callout box points to the "Reset" button of Maintenance Alarm 2, containing the text: "Reset the maintenance alarm based upon the module's configuration."

Alarm	Running Time Until Next Maintenance	Date Of Next Maintenance	Reset Button
Maintenance Alarm 1	10:00		Reset
Maintenance Alarm 2	1000:00		Reset
Maintenance Alarm 3	100:00		Reset

4.18.8 ELECTRONIC ENGINE CONTROLS

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

DPF Regeneration

DPF Auto Regen Inhibit ☐

DPF Force Regeneration

Click to start the DPF Regeneration Manually.

Governor Gain (ECM)

Gain 5.0 5.0

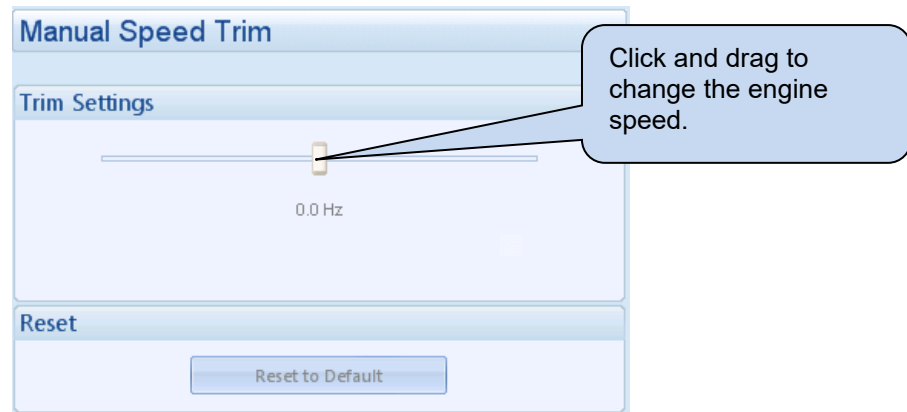
Frequency Adjust Offset

Offset 0.0 % 0.0 %

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 <i>Gain (P)</i> 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 <i>Offset</i> of -1% with a nominal speed of 1500 RPM would result in the entire ECU's droop curve being offset by 15 RPM.

4.18.9 MANUAL SPEED TRIM

Allows manual speed trim of the engine (when enabled in the module configuration).



4.18.10 MODULE LOCK

Module Access Password

NOTE : If the PIN is lost or forgotten, it is no more possible to access the module!

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

The image shows two screenshots of a software interface for setting a PIN. The top screenshot is titled "Module Configuration Write Password" and the bottom is "Module Configuration Read Password". Both screens have a "Password" row and a "Confirmation" row, each with five spinners. A warning message is present on both: "Warning - care should be taken when adjusting these controls. If the password is lost or forgotten, it will not be possible to access the module." A "Set PIN" button is at the bottom of each screen. Two callouts are present: one pointing to the spinners in the "Write Password" screen saying "Enter the desired PIN number and reconfirm.", and another pointing to the "Set PIN" button in the same screen saying "Click to set the PIN number in the module."

Module Configuration Write Password

Enter the desired PIN number and reconfirm.

Click to set the PIN number in the module.

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

Set PIN

Module Configuration Read Password

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

Set PIN

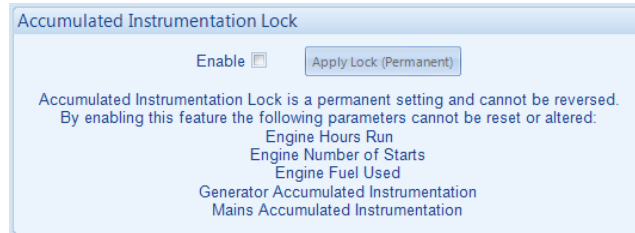
3rd Party TCP/IP Security Certificate

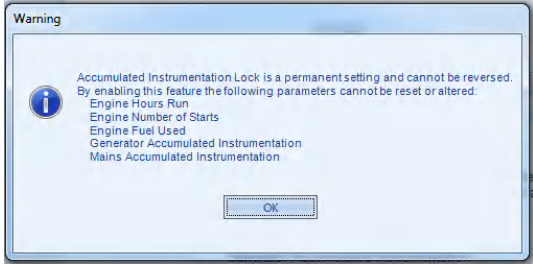
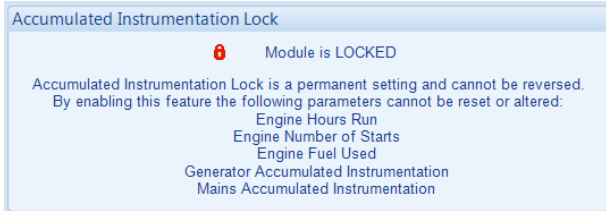
This feature allows the controller to communicate securely with third-party systems over Ethernet by using encrypted connections and trusted certificates.

Parameter	Description
Load Server Certificate	Loads the server certificate used to identify the controller during secure communication with third-party systems.
Load Private Key	Loads the private key associated with the server certificate. This is required to enable secure authentication and encrypted communication.
Load Certificate Chain	Loads the certificate chain linking the server certificate to a trusted root authority, ensuring the certificate is valid and trusted.
Use Server Root for Client Validation	☐ = When disabled, a separate client validation root certificate is required to validate incoming connections. ☒ = If enabled, the server root certificate is used to validate connecting clients instead of a separate client validation root.
Load Client Validation Root	Loads the root certificate used to validate external client connections to the controller. Only trusted clients with valid certificates are allowed to connect.
Ignore Certificate Timestamps	If enabled, certificate validity dates (e.g. expiry) are ignored when validating certificates.
Reset	Clears all loaded certificate data and resets the security configuration to its default state.

Accumulated Instrumentation Lock

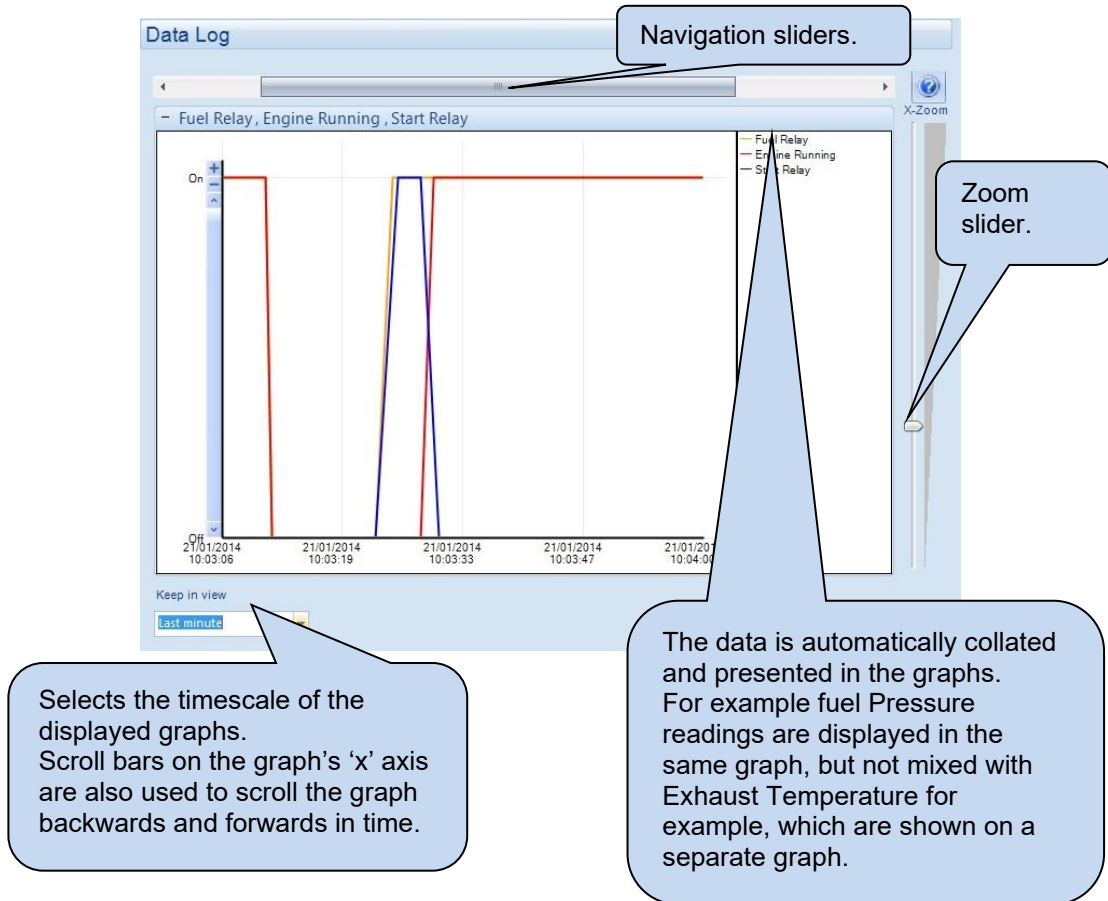
 **NOTE:** Enabling the *Accumulated Instrumentation Lock* option is **PERMANENT** and cannot be **REVERSED**. This is used to prevent tampering with the Accumulated Instrumentation such as Engine Hours. For further information, contact DSE Technical Support at support@deepseaelectronics.com.



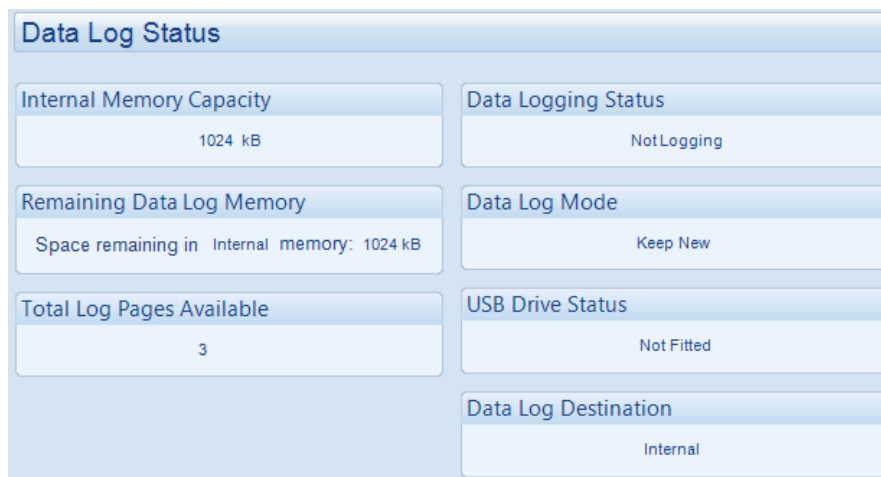
Parameter	Description
Accumulated Instrumentation Lock Enable	 NOTE: Enabling this option in the module's configuration locks the <i>Accumulated Instrumentations</i> permanently and it is not possible to disable it again through the configuration. For more information contact DSE Technical Support at support@deepseaelectronics.com. This feature is used to prevent the <i>Accumulated Instrumentation</i> being reset or edited by any means. The <i>Accumulated Instrumentation</i> consists of <i>Engine Run Hours</i>, <i>Number of Starts</i>, <i>Fuel Use</i>, <i>Generator kwh/kvarh/kvah</i>, and <i>Mains kwh/kvarh/kvah</i>. ☐ = The module does not lock its accumulated instrumentations, the <i>Apply Lock (permanent)</i> tab is greyed out. ☒ = The <i>Apply Lock (Permanent)</i> tab becomes visible.
Apply Lock Permanent	When pressing the <i>Apply Lock (Permanent)</i> button the below warning message warns the user that this is a PERMANENT lock and once it is written to the module it cannot be changed.  Upon pressing OK, the module LOCKS all its Accumulated Instrumentations (Engine Run Hours, Number of Starts, Generator kwh/kvarh/kvah, and Mains kWh/kVArh/kVAh). When the module's Accumulated Instrumentations are locked, the Scada page changes to show the padlock icon indicating that the Accumulated Instrumentations are locked, the checkbox and the button are no longer available. 

4.19 DATA LOG

Allows viewing of the module data log (if configured).

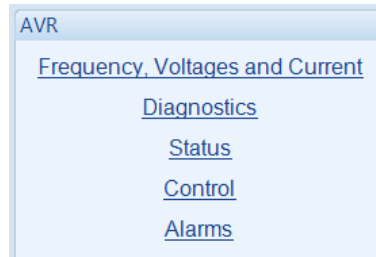


4.19.1 DATA LOG STATUS



4.21 AVR

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



4.21.1 FREQUENCY, VOLTAGES AND CURRENT

NOTE: The *Feedback Voltages* might not indicate the true *Generator Voltage* values. The *Feedback Voltage* instruments reading depend on the CAN AVR device being used and the way it is connected to the AC alternator. The DSEA108 supports only single-phase voltage sensing connected as *Ph-N* or *Ph-Ph*. The DSEA109 supports single phase or three phase voltage sensing. For further details, refer to DSE Publication: 057-281 *DSEA108 Operator Manual* or 057-295 *DSEA109 Operator Manual* available on our website: www.deepseaelectronics.com.

Frequency		
50.1 Hz		
Feedback Voltage		
L1 - L2	L2 - L3	L3 - L1
209.4 V	209.3 V	209.2 V
Average		
209.3 V		
Droop Current		
0.00 A		
Excitation Voltage		
12.9 V		
Auxiliary Voltage		
173.7 V		

4.21.2 DIAGNOSTICS

External Control		
Potentiometer +++	Voltage 0.02 V	

Set Points		
Voltage 120.0 V	Droop 3.0 %	UFRO Knee 42.7 Hz
Proportional 80.6	Integral 9.7	Derivative 50.0

Excitation Output	
Off Load Duty Cycle 8.0 %	Maximum Duty Cycle 100.0 %

Soft Start	
Ramp Start Point (% of set point) 27.0 %	Ramp Rate (%/s) 30.0 %

4.21.3 STATUS

Status	
Software Version	
2.0.2	
Configuration	
Active Configuration 0	Active Stability Configuration 1

4.21.4 CONTROL

NOTE: The *Active Configuration Selection* and the *Active Stability Configuration Selection* SCADA settings are only adjustable if they are enabled within the DSE CAN AVR's configuration. For further details, refer to DSE Publication: *057-283 DSEA108 Software Manual* or *057-294 DSEA109 Software Manual* available on our website: www.deepseaelectronics.com.

Set Points			
Droop	3.0 %	<input type="range"/>	3.0 %
Proportional	80.6	<input type="range"/>	80.6
Integral	9.7	<input type="range"/>	9.7
Derivative	50.0	<input type="range"/>	50.0

Excitation Output			
Off Load Duty Cycle	8.0 %	<input type="range"/>	8.0 %
Maximum Duty Cycle	100.0 %	<input type="range"/>	100.0 %

Soft Start			
Ramp Start Point (% of set point)	27.0 %	<input type="range"/>	27.0 %
Ramp Rate (%/s)	30.0 %	<input type="range"/>	30.0 %

Configuration			
Active Configuration	0	<input type="range"/>	0
Active Stability Configuration	1	<input type="range"/>	1

4.21.5 AVR ALARMS

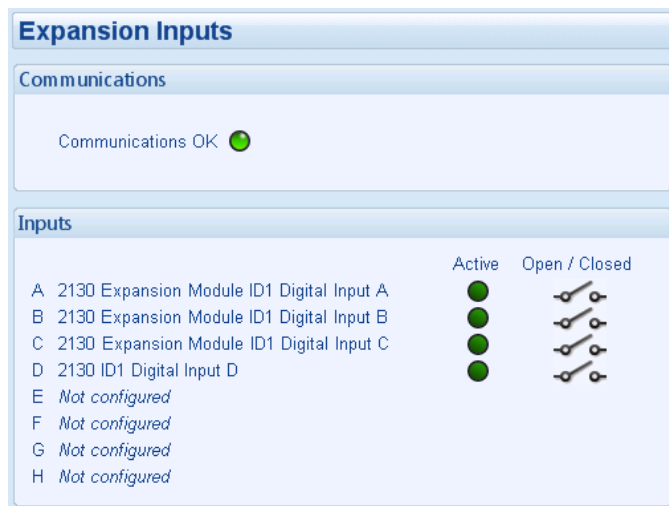
AVR Alarms
Start-up failed trip

4.22 EXPANSION



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

For example:



5 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
Indication	No audible alarm or common warning signal occurs. <i>Indication</i> 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. <i>Warning alarms</i> 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. <i>Electrical Trip alarms</i> 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. <i>Shutdown alarms</i> are serious issues that demand immediate stopping of the generator. For instance, Emergency Stop or Overspeed alarms require immediate shutdown.

6 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 Delay	Smoke Limiting	Smoke Limiting Off	Warming Up	Gen Available / Gen On Load	Cooling	Cooling in Idle
Never												
Always												
When Stationary												
Wait for ECU												
From Starting												
Overfrequency / Overspeed Overshoot												
Engine Protection												
From Safety On												
Loading Alarms												

6.1 NEVER

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

6.2 ALWAYS

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

6.3 WHEN STATIONARY

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

6.4 WAIT FOR ECU

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

6.5 FROM STARTING

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

6.6 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

6.7 FROM SAFETY ON

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

6.8 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 $(57 \text{ Hz} \times 1.1) = 62.7 \text{ Hz}$ 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.

6.9 LOADING ALARMS

This alarm is active after the generator runs, and the voltage and frequency are above their Loading levels, until the generator stops.

This Page Intentionally Blank