



DEEP SEA ELECTRONICS PLC

DSE8600 Configuration Suite Software

Manual

Document Number 057-119

Author: Anthony Manton

DEEP SEA ELECTRONICS PLC

Highfield House
 Hunmanby
 North Yorkshire
 YO14 0PH
 ENGLAND



Sales Tel: +44 (0) 1723 890099
 Sales Fax: +44 (0) 1723 893303

E-mail : sales@Deepseapl.com
 Website : www.deepseapl.com

DSE8600 Series configuration suite

© Deep Sea Electronics Plc

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 should be addressed to Deep Sea Electronics Plc at the address above.

The DSE logo is a UK registered trademarks of Deep Sea Electronics PLC.

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

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

Amendments List

Issue	Comments	Minimum Module version required	Minimum Configuration Suite Version required
1	Initial release derived from 7300 and 7500 series manuals	1	
2	Added Address book, PC event log and PLC logic	2	4.22.6.x
3	Added Ethernet, advanced PLC (inc SCADA), customisable Gencomm pages.	3	5.1.23.x
4	Added new CAN configuration	4	5.2.24.x
5	Added new DATA Log information.	4.1	5.3.31.x
6	Added DSE8620 features Added features Single CT/Keep Token (8x60) timer interlock override output	4.2	5.0 5.9.29.x
7	Added DSE2131, DSE2133, DSE2152	4.4	Suite Installer 2011.16
8	Added Dead Bus Synchronising Increased PLC nodes, counters and timers Increased the number of Gencomm output sources.	5.0	2012 5 v1.29 5
9	Control by SMS messages Remote start off/on load / cancel Put into stop mode, put into Auto mode. Added extended SMS message to include oil pressure, coolant temp and engine hours run Option to send SMS message as an alarm/flash message Fuel level SMS Messages PLC added more Nodes 200-to- 400 Number of PLC Timers & PLC Counters increased 10-to-20 Output sources- every alarm and input now has equivalent outputs. Logging Starts / stops in the event log Added new feature to Start Next Set on Warning Added Configurable Editor Screens	5.1	2012 19 v1.36.2.0
10	Added Power Up in different modes,Cool Down in Stop Mode, maintenance reset on module's front panel. Estimate run time to empty fuel tank and extended alarms for fuel level. Added DPF ramp timer. Allowing sets to start with warning in the load demand scheme. Added low load alarm in generator power. Added inter-frame delay timer for modem communications.	6.0	

Amendments List Continued

Issue	Comments	Minimum Module version required	Minimum Configuration Suite Version required
11	New AC topologies added. Arithmetic operations in PLC logic. PLC editor screens for Timers, Counters, Registers and Stores Specific Gencomm registers can be selected in the Configurable Gecomm Pages. Electronic engine controls under SCADA	6.3	2014.16 v1.152.2
12	Added logging when at rest in the Events Log Added Generator Rating section Added negative kvar rating in the Generator Rating	7.0	2014.120 V1.230.2

 NOTE: Version 86xx V 5.0 included a change to the MSC link protocol which is not compatible with lower versions until the lower versions have been upgraded to version 5.0 (This can be done using "Update Firmware" in Configuration Suite Software) .

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

TABLE OF CONTENTS

1	BIBLIOGRAPHY	7
2	INTRODUCTION	8
3	INSTALLATION AND USING THE DSE CONFIGURATION SUITE	8
4	EDIT CONFIG	9
4.1	SCREEN LAYOUT	9
4.2	MODULE	10
4.2.1	MODULE OPTIONS	11
4.2.2	CONFIGURABLE STATUS SCREENS	13
4.2.3	EVENT LOG	14
4.2.3.1	DISPLAY OPTIONS.....	14
4.2.3.2	LOGGING OPTIONS.....	14
4.2.3.3	SMS MESSAGING.....	15
4.2.4	DATA LOGGING	15
4.2.4.1	CONFIGURATION.....	15
4.2.4.2	OPTIONS.....	16
4.3	APPLICATION	17
4.3.1	DSE8610/DSE8620 APPLICATION	17
4.3.2	ECU (ECM) OPTIONS	18
4.3.3	DISABLE PROTECTIONS	19
4.3.4	AUTO VOLTAGE SENSING	20
4.3.5	DSE8660 / DSE8620 APPLICATION	21
4.4	INPUTS	22
4.4.1	OIL PRESSURE	22
4.4.2	COOLANT TEMPERATURE	23
4.4.2.1	COOLANT TEMPERATURE ALARMS.....	23
4.4.2.2	COOLANT TEMPERATURE CONTROL.....	24
4.4.3	FUEL LEVEL	25
4.4.3.1	FUEL CONTROL AND MONITORING.....	25
4.4.3.2	FUEL ALARMS.....	26
4.4.4	FLEXIBLE SENSOR	27
4.4.5	EDITING THE SENSOR CURVES	28
4.4.6	DIGITAL INPUTS	29
4.4.7	DIGITAL INPUT FUNCTIONS	30
4.5	OUTPUTS	36
4.5.1	DIGITAL OUTPUTS	36
4.5.2	VIRTUAL LEDS	37
4.5.3	OUTPUT SOURCES	38
4.6	TIMERS	49
4.6.1	START TIMERS	49
4.6.2	LOAD / STOPPING TIMERS	51
4.6.3	MODULE TIMERS	51
4.7	MAINS	52
4.7.1	MAINS OPTIONS	52
4.7.1.1	MAINS PHASE ROTATION.....	53
4.7.2	MAINS VOLTAGE ALARMS	54
4.7.3	MAINS FREQUENCY ALARMS	55
4.7.3.1	MAINS CURRENT.....	56
4.7.4	MAINS DECOUPLING	57
4.8	GENERATOR	59
4.8.1	GENERATOR OPTIONS	59
4.8.1.1	GENERATOR CONTACTOR ALARM.....	60
4.8.1.2	GENERATOR PHASE ROTATION.....	60
4.8.2	GENERATOR VOLTAGE ALARMS	61
4.8.3	GENERATOR FREQUENCY ALARMS	62
4.8.4	GENERATOR CURRENT	63
4.8.4.1	GENERATOR CURRENT OPTIONS.....	63
4.8.4.2	GENERATOR CURRENT ALARMS.....	63
4.8.4.3	SHORT CIRCUIT.....	67
4.8.4.4	NEGATIVE PHASE SEQUENCE.....	68
4.8.4.5	EARTH FAULT.....	69
4.8.5	GENERATOR POWER	70
4.8.5.1	OVERLOAD PROTECTION.....	70
4.8.5.2	LOAD CONTROL.....	71
4.8.5.3	REVERSE POWER.....	72
4.8.5.4	LOW LOAD.....	72
4.8.6	GENERATOR RATING	73
4.8.7	MAINS DECOUPLING	74
4.8.8	SYNCHRONISING	76
4.8.8.1	SYNC OPTIONS.....	76
4.8.8.2	CHECK SYNC.....	80
4.8.8.3	MSC LINK.....	81
4.8.8.4	LOAD CONTROL.....	82
4.8.8.5	AVR.....	86
4.8.9	BUS	87
4.8.9.1	BUS OPTIONS.....	87

4.8.9.2	BUS NOMINALS	87
4.8.9.3	CHECK SYNC	88
4.8.9.4	MULTISET	88
4.8.9.5	LOAD CONTROL	89
4.9	SYSTEM	90
4.9.1	SYSTEM OPTIONS	90
4.9.1.1	ADVANTAGES OF A LOAD CT	90
4.9.2	PLANT BATTERY	90
4.10	ENGINE	91
4.10.1	ENGINE OPTIONS	91
4.10.1.1	SENSING OPTIONS	92
4.10.1.2	STARTUP OPTIONS	92
4.10.1.3	OVERSPEED OPTIONS	92
4.10.1.4	DROOP	92
4.10.2	CAN OPTIONS	93
4.10.3	CAN ALARMS	94
4.10.3.1	CAN DATA FAIL	94
4.10.3.2	DM1 SIGNALS	94
4.10.3.3	ADVANCED	95
4.10.4	GAS ENGINE OPTIONS	96
4.10.5	CRANKING	97
4.10.6	SPEED SETTINGS	98
4.10.7	PLANT BATTERY	99
4.10.8	INLET TEMPERATURE	100
4.11	COMMUNICATIONS	101
4.11.1	COMMUNICATION OPTIONS	101
4.11.2	RS232 PORT	102
4.11.2.1	BASIC	102
4.11.2.1.1	SERIAL PORT CONFIGURATION	102
4.11.2.1.2	MODEM SETTINGS	103
4.11.2.1.3	RECOMMENDED MODEMS	103
4.11.2.2	ADVANCED	104
4.11.2.2.1	INITIALISATION STRINGS	104
4.11.2.2.2	CONNECTION SETTINGS	105
4.11.3	TROUBLESHOOTING MODEM COMMUNICATIONS	106
4.11.3.1	MODEM COMMUNICATION SPEED SETTING	106
4.11.3.2	GSM MODEM CONNECTION	106
4.11.4	SMS MODULE CONTROL	107
4.11.5	RS485 PORT	108
4.11.6	ETHERNET PORT	109
4.12	SCHEDULER	110
4.13	MAINTENANCE ALARM	110
4.14	ALTERNATIVE CONFIGURATIONS	111
4.14.1	ALTERNATIVE CONFIGURATION OPTIONS	111
4.14.2	ALTERNATIVE CONFIGURATIONS EDITOR	111
4.14.3	EXAMPLE OF USAGE	112
4.14.3.1	ENABLING THE DEFAULT CONFIGURATION	112
4.14.3.2	USING THE ALTERNATIVE CONFIGURATION TO HANDLE SPEED CHANGE	113
4.15	EXPANSION	114
4.15.1	DSE2130 INPUT MODULES	115
4.15.1.1	DIGITAL INPUTS (A-D)	115
4.15.1.2	ANALOGUE INPUTS (E-H)	116
4.15.2	DSE2131 RATIOMETRIC EXPANSION INPUT MODULE	117
4.15.2.1	EDITING THE SENSOR CURVES	120
4.15.3	DSE2133 RTD / THERMOCOUPLE INPUT MODULE	121
4.15.4	DSE2152 ANALOGUE OUTPUT MODULE	123
4.15.4.1	EDITING THE OUTPUT CURVE	124
4.15.5	DSE2157 RELAY MODULES	125
4.15.7	DSE2548 LED EXPANSION	126
4.16	ADVANCED	127
4.16.1	ADVANCED OPTIONS	127
4.16.1.1	PROTECTIONS	128
4.16.1.2	OUT OF SYNC	128
4.16.1.3	OTHER TIMERS	129
4.16.2	DEAD BUS SYNCHRONISING	129
4.16.3	AVR	129
4.16.4	PLC	130
4.16.4.1	PLC LOGIC	130
4.16.4.2	PLC FUNCTIONS	131
4.16.4.3	MODULE DISPLAY	131
4.16.5	CONFIGURABLE GENCOMM PAGES	132
4.16.6	CONFIGURABLE EDITOR SCREENS	133
5	SCADA	134
5.1	GENERATOR IDENTITY	135
5.2	MIMIC	135
5.3	LANGUAGES	136
5.4	DIGITAL INPUTS	137
5.5	DIGITAL OUTPUTS	138
5.6	VIRTUAL LEDS	139
5.7	MAINS	140

5.8	GENERATOR AND BUS	140
5.8.1	FREQUENCY, VOLTAGES AND CURRENT	141
5.8.2	POWER.....	141
5.8.3	MULTISET	142
5.8.4	GOVERNOR/AVR INTERFACE	145
5.8.4.1	SW1	145
5.8.4.2	SW2.....	145
5.8.4.3	SETTINGS.....	146
5.8.4.4	SUMMARY	146
5.8.5	SYNC	147
5.8.5.1	ADJUSTING GAIN AND STABILITY	148
5.9	ENGINE	149
5.10	FLEXIBLE SENSOR	149
5.11	ALARMS	150
5.12	STATUS	151
5.13	EVENT LOG	152
5.14	ENHANCED CANBUS	153
5.15	REMOTE CONTROL	154
5.16	MAINTENANCE	155
5.16.1	RECALIBRATE TRANSDUCERS	155
5.16.3	EXPANSION CALIBRATION.....	156
5.16.4	HOURS RUN AND NUMBER OF STARTS	156
5.16.5	TIME	156
5.16.6	ACCUMULATED INSTRUMENTATION	157
5.16.7	MAINTENANCE ALARM RESET	158
5.16.8	ELECTRONIC ENGINE CONTROLS.....	159
5.16.9	MODULE PIN	160
5.17	DATALOG.....	161
5.18	PLC	162
5.19	EXPANSION	163
6	ALARM TYPES	164

1 BIBLIOGRAPHY

This document refers to and is referred to by the following DSE publications which can be obtained from the DSE website www.deepseapl.com:

DSE PART	DESCRIPTION
057-004	Electronic Engines and DSE wiring
057-045	DSE Guide to Synchronising and Load Sharing Part1
057-046	DSE Guide to Synchronising and Load Sharing Part2
057-047	DSE Load Share Design and Commissioning Guide
057-115	DSE8610 Autostart Module operator manual
057-119	DSE8660 ATS and Mains Controller operator manual
057-142	DSE8620 AMF Controller operators manual
057-151	DSE Configuration Suite PC Software Installation & Operation Manual.
057-082	DSE2130 input expansion manual
057-139	DSE2131 input expansion manual
057-140	DSE2133 input expansion manual
057-141	DSE2152 input expansion manual
057-083	DSE2157 input expansion manual
057-084	DSE2548 input expansion manual
057-175	PLC programming guide

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

2 INTRODUCTION

This manual covers the operation of the **DSE Configuration Suite** for DSE86xx Autostart Load Share Controller. Separate manuals cover the remaining DSE modules supported by the software.

The **DSE Configuration Suite** allows the Controller to be connected to a PC via USB 'A –USB B' cable. Once connected the various operating parameters within the module can be viewed or edited as required by the engineer. This software allows easy controlled access to these values and also has diagnostic monitoring facilities.

The configuration suite should 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 should be read in conjunction with the information contained in the appropriate module documentation. This manual only details which settings are available and how they may be used.

A separate manual deals with the operation of the individual module (See section entitled *Bibliography* elsewhere in this document).

This manual covers the operation of the **DSE Configuration Suite** for DSE8600 series synchronising modules. Separate manuals cover the remaining DSE modules supported by the software.

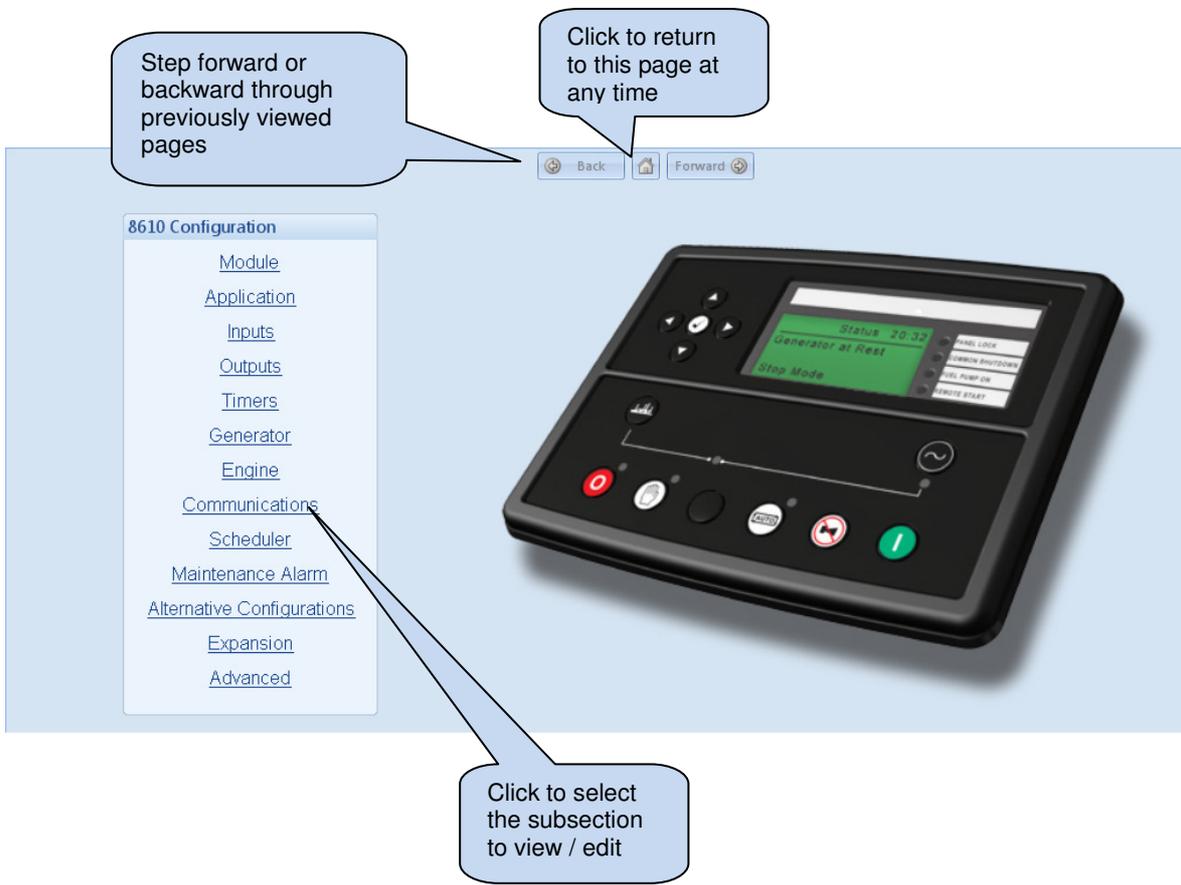
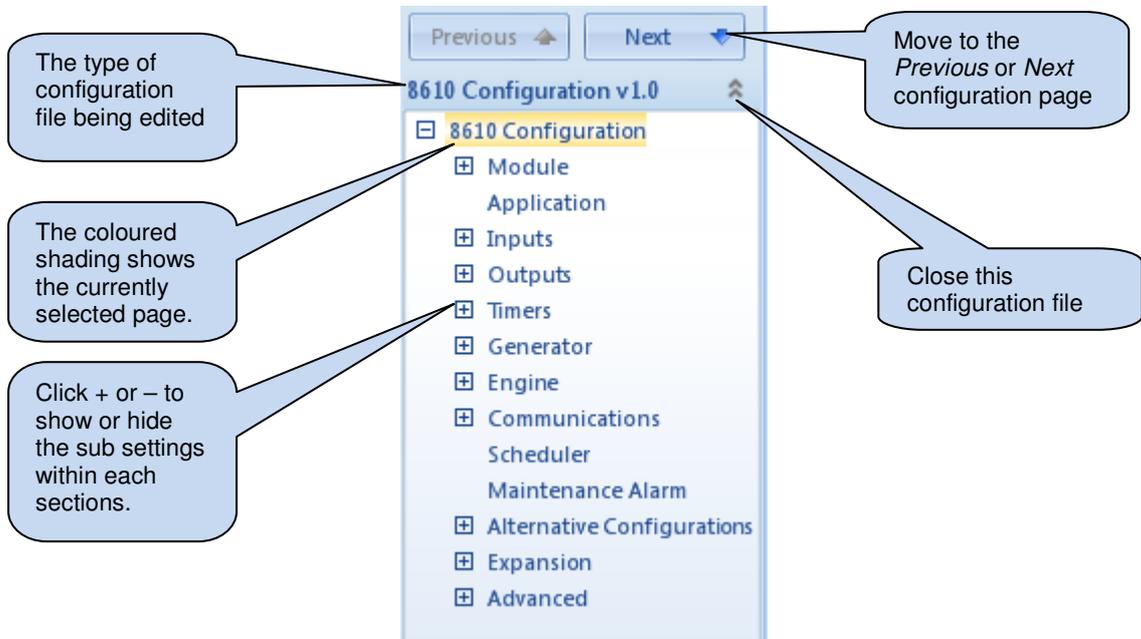
3 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

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

4 EDIT CONFIG

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

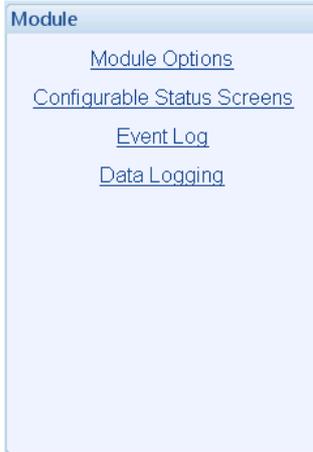
4.1 SCREEN LAYOUT



4.2 MODULE

The module page 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.



4.2.1 MODULE OPTIONS

Allows the user to select the function of the modules user configurable LED indicators. For details of possible selections, please see section entitled *Output sources* elsewhere in this document.

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

Allows the user to create logo and text insert cards

= DSE8660/DSE8620

Miscellaneous Options	
Enable running on load demand <i>IEEE 37.2 - 44 Unit sequence starting</i> DSE8660 only	If this input is active, the load demand start up and shut down scheme will be activated when two or more generators are running in parallel.
Enable fast loading feature DSE8610/DSE8620 only	<p><input type="checkbox"/> = Normal Operation, the safety on timer will be observed in full. This feature is useful if the module is to be used with some small engines where pre-mature termination of the delay timer can lead to overspeed alarms on start up.</p> <p><input checked="" type="checkbox"/> = The module will terminate the safety on timer once all monitored parameters have reached their normal settings. This feature is useful if the module is to be used as a standby controller as it allows the generator to start and go on load in the shortest possible time.</p> <p>NOTE: - Enabling Fast Loading is only recommended where steps have been taken to ensure rapid start up of the engine is possible. (For example when fitted with engine heaters, electronic governors etc.)</p>
Audible alarm prior to starting	<p><input type="checkbox"/> = The module will start with no audible indication</p> <p><input checked="" type="checkbox"/> = The module will give an audible warning during the pre-heat timer as an indicator that the set is about to run. This is often a site's specification requirement of AUTO mode operation.</p>

Miscellaneous Options	
Enable Immediate Mains Dropout 	<input type="checkbox"/> = Normal Operation, in the event of a mains failure the module will attempt to maintain the supply to the load for the incoming AC mains supply until the generator is available to go on load. In the event of a generator failure the module will default back to the incoming AC mains supply. This provides a 'fail-safe' system, ensuring that in the event of a system failure the load will still be fed from the AC mains supply. <input checked="" type="checkbox"/> = As soon as the module detects a mains failure the mains contactor or breaker relay will be opened to remove the supply from the load. This is to prevent damage to the load in case of a single-phase failure; especially useful if the load is a 3-phase motor or pump. The supply to the load will then be fed from the gen-set once it is available. In the event of a generator failure, the module will open the generator relay and remove the supply to the load until either the mains supply is restored or the generator is restarted.
All Warnings Are Latched	<input type="checkbox"/> = Normal Operation, the warnings and pre-alarms will automatically reset once the triggering condition has cleared. <input checked="" type="checkbox"/> = Warnings and pre-alarms latch when triggered. Resetting the alarm is performed by either an external reset applied to one of the inputs or, the 'Stop/Reset' pushbutton must be operated (once the triggering condition has been cleared).
Inhibit Retransfer To Mains  DSE8660 only IEEE 37.2 - 3 Checking or interlocking relay	<input type="checkbox"/> = When the mains supply is reinstated after a failure, the re-transfer back to mains will take place. <input checked="" type="checkbox"/> = This prevents the load being transferred back to the mains supply, even in the event of the generators failing. This can be used in peak lopping systems where the cost of using the mains to supply the load is so prohibitive that the customer does not want to transfer back to the mains supply.
Enable Forced Peak Lop Inhibit  DSE8660 only IEEE 37.2 - 3 Checking or interlocking relay	This function is applicable only to systems with more than one 8660 controller. The description below discusses a two controller system, named 1 and 2. <input checked="" type="checkbox"/> = If the 8660 (1) is in manual mode using the generator sets to peak lop a mains supply and another 8660 (2) requests the generators to power its load following a mains failure, the 8660 (1) will relinquish the generators to the other 8660 (2) <input type="checkbox"/> = The 8660 (1) will continue to use the generator sets regardless of requests by other 8660 controllers for usage of the generators.
 NOTE:- This option only has effect in Manual Mode. If the 8660 using the generators for Peak Lopping is in Auto Mode, then requests from another 8660 for the generators following a mains failure will always be granted and the peak lopping operation is suspended.	
Enable Bus Failure Detection when in Parallel 	Monitors the MSC link to check that there are generators on the bus and not a case of the bus is live from the mains.
Enable Alternative Breaker Button Control Not DSE8610	Default breaker button control is transfer to Generator/ Transfer to mains: Alternative breaker button control is:- Open Mains breaker / Close mains breaker Open Generator breaker / Close breaker.
Enable sleep mode	<input type="checkbox"/> =Normal operation <input checked="" type="checkbox"/> =The module goes into "sleep mode" if left in manual mode for a prolonged time with no button presses.
Enable manual fuel pump control	<input type="checkbox"/> =Normal operation <input checked="" type="checkbox"/> =Allows manual fuel pump control when the "fuel level" instrument page is being viewed.
Support right-left languages in module strings	Determines the direction of text input where supported (i.e. configurable input text) <input type="checkbox"/> =left to right language support <input checked="" type="checkbox"/> =right to left language support
Power Up In Mode	Allows the module to go into the selected mode when it is powered up (Auto, Manual, or Stop)
Enable Cool Down In Stop mode	<input type="checkbox"/> =Normal operation <input checked="" type="checkbox"/> =Allows cooldown in Stop mode, if the generator is running and Stop is pressed. Press the Stop a second time to stop the generator.
Enable maintenance reset on module front panel	<input type="checkbox"/> =Maintenance alarms can be reset either through a digital input or scada <input checked="" type="checkbox"/> =Maintenance alarm can be reset from the front panel (in addition to Scada or Digital Input). To reset the alarm from the front panel, go to the specified maintenance alarm in the Engine page of the controller display and press the Stop button until the maintenance alarm is cleared.

4.2.2 CONFIGURABLE STATUS SCREENS

Configurable Status Screens allow the operator to design the status screen to match the requirements of the end user or application more closely. For instance it is possible to configure the module to show the factory set 'summary screen' and then cycle the display to show instruments specified by the end user. This display cycling occurs with no user intervention.

Configurable Status Screens

Home Page: Home Page Instrumentation

Displayed Pages

Page 1	Summary screen	Page 6	Not Used
Page 2	Engine Fuel Level	Page 7	Not Used
Page 3	Summary screen	Page 8	Not Used
Page 4	Not Used	Page 9	Not Used
Page 5	Not Used	Page 10	Not Used

This is the page that appears automatically when the engine is running (either instrumentation or status)

These instruments are displayed one after the other when the set runs. If an entry is set to 'Not Used', or is not applicable, the entry is skipped over and not displayed.

4.2.3 EVENT LOG

4.2.3.1 DISPLAY OPTIONS

The module display option allows the operator to choose between `Date and Time` or `Engine Hours` displayed on the bottom of the screen.

4.2.3.2 LOGGING OPTIONS

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

8610/8620

Event Log

Display Options

Module display Date and time Engine hours run

Logging Options

Log the following events to the event log

Power up	<input checked="" type="checkbox"/>	Log Fuel Level	<input checked="" type="checkbox"/>
Mains fail	<input checked="" type="checkbox"/>	Log When At Rest	<input type="checkbox"/>
Mains return	<input checked="" type="checkbox"/>	Engine starts	<input checked="" type="checkbox"/>
ECU Shutdown alarms	<input checked="" type="checkbox"/>	Engine stops	<input checked="" type="checkbox"/>

'Repeat SMS' requires a GSM modem to be configured on the Communications/Basic page

Shutdown alarms

Repeat SMS

Repeat delay 12h

Repeats 2

Electrical trip alarms

Repeat SMS

Repeat delay 12h

Repeats 2

Latched warnings

Unlatched warnings

Repeat SMS

Repeat delay 12h

Repeats 2

Maintenance alarms

Repeat SMS

Repeat delay 12h

Repeats 2

8660

Event Log

Logging Options

Log the following events to the event log

Power up	<input checked="" type="checkbox"/>	Starts	<input checked="" type="checkbox"/>
Mains fail	<input checked="" type="checkbox"/>	Stops	<input checked="" type="checkbox"/>
Mains return	<input checked="" type="checkbox"/>	Bus off load	<input checked="" type="checkbox"/>
		Bus on load	<input checked="" type="checkbox"/>

'Repeat SMS' requires a GSM modem to be configured on the Communications/Basic page

Electrical trip alarms

Repeat SMS

Repeat delay 12h

Repeats 2

Latched warnings

Unlatched warnings

Repeat SMS

Repeat delay 12h

Repeats 2

Callouts:

- Event logging options, Tick to enable.
- Enable to send out repeated SMS messages if condition still applies
- Sending time interval between repeated SMS messages if the condition still present
- Number of times you want the SMS message to be sent.

 Mains Fail and Mains Return options applicable to DSE8660/DSE8620.
Shutdown Alarms applicable to DSE8610/DSE8620.

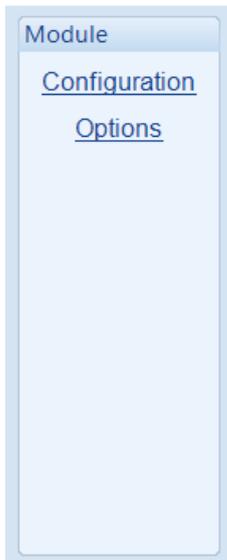
4.2.3.3 SMS MESSAGING

When using the DSE8600 series controller, logged events will also cause modem 'dial outs' and SMS messages to be sent if the module is configured to do so and connected to a suitable external GSM modem with functioning SIM card.

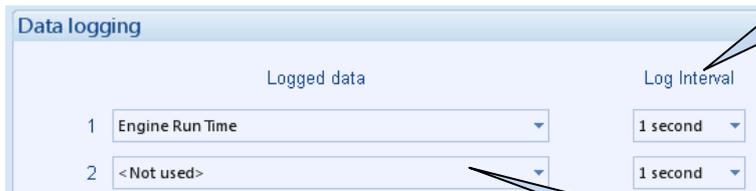
4.2.4 DATA LOGGING

NOTE: Data Logging is available in module version 3.xx and later. Data logging is only a 'live' function in version 3.x.x to version 4.0.x so does not have the ability to store the history of the log. Data logging to internal and external memory is available in version 4.1.x and above.

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



4.2.4.1 CONFIGURATION



Select the logging interval of the data.

Select the instrument / item to be logged. Twenty (20) selection points are possible.

4.2.4.2 OPTIONS

Data log options

Only log when engine is running

Log to USB drive

Keep oldest data

Setting	Description
Only log when engine is running	<input type="checkbox"/> = The module will log data regardless of engine running state. <input checked="" type="checkbox"/> = The module will only log data when the engine is running.
Log to USB drive	<input type="checkbox"/> = The module will log data to the modules internal memory. <input checked="" type="checkbox"/> = The module will log data to an external USB device connect to the USB host socket on the module.
Keep oldest data	<input type="checkbox"/> = When the logging memory is full, the module will overwrite the oldest data first with the new data. <input checked="" type="checkbox"/> = When the logging memory is full, the module will stop recording new data.

4.3 APPLICATION

4.3.1 DSE8610/DSE8620 APPLICATION

The screenshot displays the 'Application' configuration window, divided into three main sections: 'ECU (ECM) Options', 'Auto Voltage Sensing', and 'Protections'. Each section contains various settings with callout boxes providing additional context.

- ECU (ECM) Options:**
 - Engine Type:** A dropdown menu is set to 'Conventional Engine'. A callout explains: "Allows selection of the Engine type being used (ie Conventional Diesel Engine, Gas Engine or Electronic Engine)".
 - Enhanced J1939:** An unchecked checkbox.
 - Alternative Engine Speed:** An unchecked checkbox.
 - Modbus Engine Comms Port:** A dropdown menu set to 'RS485 Port'.
- Auto Voltage Sensing:**
 - Enable Auto Voltage Sensing:** A checked checkbox.
 - Over Voltage During Auto Sensing Trip:** A slider set to 277 V PhN. A callout explains: "Auto Voltage Sensing to automatically select the module configuration from available 'alternative configurations'".
- Protections:**
 - Disable:** An unchecked checkbox.
 - Protections Are Disabled:** A dropdown menu set to 'Never'. A callout explains: "Allows all protections to be disabled and give 'run to destruction' functionality".
 - Protections Disabled Alarm Action:** A dropdown menu set to 'Indication'.
 - Coolant Level Protection Override:** An unchecked checkbox.

See overleaf for description of the parameters....

4.3.2 ECU (ECM) OPTIONS

Parameter	Description
Engine type	<p>Select the engine type appropriate to your system</p> <p><i>Conventional Engine:</i> Select this if you have a traditional (non ECU) engine, either Energise to Run or Energise to Stop.</p> <p><i>Conventional Gas Engine:</i> Select this if you have a traditional (non ECU) engine and require GAS engine functionality. This enables control of configurable outputs for <i>Gas Choke and Gas Ignition</i> and instructs the module to follow the gas engine timers.</p> <p><i>Other Engines:</i> The list of supported CAN (or Modbus) engines is constantly updated, check the DSE website at www.deepseapl.com for the latest version of Configuration Suite software.</p>
Enhanced J1939	<p><input type="checkbox"/> = The module will read 'Basic' instrumentation from the engine ECU and display (where supported by the engine) :</p> <ul style="list-style-type: none"> • Engine Speed • Oil Pressure • Engine Coolant Temperature • Hours Run <p><input checked="" type="checkbox"/> = The module will read and display an 'Enhanced' instrumentation list (where supported by the engine) :</p> <ul style="list-style-type: none"> • Engine Speed • 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 <p>Where an instrument is not supported by the engine ECU, the instrument is not displayed.</p> <p>DSE Reserve the right to change these lists in keeping with our policy of continual development.</p>
Alternative Engine Speed	<p><input type="checkbox"/> = The engine is instructed to run at its <i>Nominal Speed</i> as configured by the Engine Manufacturer.</p> <p><input checked="" type="checkbox"/> = The engine is instructed to run at its <i>Alternative Speed</i> as configured by the Engine Manufacturer.</p>
Modbus Engine Comms Port	<p><i>RS485 Port:</i> The modules RS485 port is used to communicate to the engine (when a Modbus engine type is selected).</p> <p><i>DSENet Port:</i> The modules DSENet port is used to communicate to the engine (when a Modbus engine type is selected. This 'frees' the RS485 port in case connection to BMS or other RS485 compatible equipment is required.</p>

4.3.3 DISABLE PROTECTIONS

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

Options	Description
Enable	<p><input type="checkbox"/> = The module will operate as normal and provide engine shutdown if required. <input checked="" type="checkbox"/> = <i>Protections disabled</i> function is activated. Operation depends upon the following configuration.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>▲NOTE: Writing a configuration to the controller that has “Protections Disabled” configured, results in a warning message appearing on the PC screen for the user to acknowledge before the controller’s configuration is changed. This prevents inadvertent activation of the feature.</p> </div>
Disable All Protections	<p><i>Never</i> : The protections are not disabled <i>Always</i> : Protections are always overridden by the DSE controller. <i>On Input</i> : Protections are disabled whenever a configurable input set to <i>Protections Disabled</i> is activated</p>
Protections Disabled Alarm Action	<p>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.</p> <p><i>Indication</i> : Any output or LCD display indicator configured to <i>Protections Disabled</i> will be made active, however the internal alarm sound will not operate. <i>Warning</i> : Any output or LCD display indicator configured to <i>Protections Disabled</i> will be made active, and the internal alarm sound will operate.</p> <p>When protections are disabled, <i>Protections Disabled</i> will appear on the module display to inform the operator of this status.</p>

4.3.4 AUTO VOLTAGE SENSING

 **NOTE:** This feature is to allow the module to auto-sense the voltage and does not affect the frequency protections.

 **NOTE:** During Auto Voltage Sensing, the frequency protection alarms are derived from the main configuration.

DSE 8610 only

Auto voltage sensing instructs the controller to monitor the generators output during the safety delay timer. During this time, the controller identifies the nominal voltage and topology of the alternator output and selects the most appropriate 'alternative configuration' to use. This is particularly useful where a generator is switched from 120V/240V or rewired to a different topology.

 **NOTE:** During the safety delay timer, the module factory set status page will display the L-N voltage, based upon the generator being 3 phase, 4 wire. This can lead to incorrect status display during the safety timer if Auto Voltage Sensing is enabled and the generator is not 3ph 4w. To prevent this, the status page can be customised to display other parameters if required. At the end of the safety timer, the correct voltages will be displayed.

Application Options	Description
Enable Auto Voltage Sensing	<input type="checkbox"/> = The module will operate as normal. <input checked="" type="checkbox"/> = <i>Auto voltage sensing</i> is enabled. During the safety delay timer, the module attempts to measure the system's nominal voltage to determine the topology of the alternator wiring. At the end of the safety timer, the main and alternative configurations are analysed to see which one is most appropriate to suit the connected system and the module continues to operate, using the most appropriate configuration to provide protection.
Over Voltage During Auto Sensing Trip	During the Auto sensing there is no over voltage trip protection from the main settings until after the safety on timer has elapsed. Therefore the overvoltage trip value is taken from this setting.

4.3.5 DSE8660 / DSE8620 APPLICATION

The screenshot displays the 'Application' configuration window for an 'AC System'. The 'AC System' dropdown menu is set to '3 Phase, 4 Wire'. Below this, a schematic diagram shows a three-phase system with phases L1 (U), L2 (V), and L3 (W), and a neutral line N. Terminals 43, 44, 45, and 46 are connected to the phases. A callout box points to the 'AC System' dropdown with the text: 'Select your AC system. A schematic is shown below with connection details from the alternator to the DSE8600 Series module.' Another callout box points to the 'VT Fitted' checkbox with the text: 'Click to enable or disable the feature. The relevant values below will appear greyed out if the alarm is disabled.' At the bottom, there are input fields for 'Primary' (111) and 'Secondary' (110) voltages, with a transformer icon between them.

4.4 INPUTS

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

Oil Pressure, Coolant Temperature, Fuel Level and Flexible Sensor applicable only to DSE8610/DSE8620



4.4.1 OIL PRESSURE

Oil Pressure applicable only to DSE8610/DSE8620.

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

- Input Type:** A callout points to the 'VDO 10 Bar' dropdown menu, stating 'Select the sensor type'. Another callout points to the 'Edit...' button, stating 'Click to edit the "sensor curve". See section entitled *Editing the sensor curve*.' A third callout points to the 'Use Module to Measure Oil Pressure' checkbox, stating 'With electronic engines, the pressure will be measured by the controller if enabled.'
- Sensor Open Circuit Alarm:** A callout points to the 'Enable Open Circuit Alarm' checkbox, stating 'Enable or disable the open circuit alarm.'
- Low Oil Pressure Alarms:** A callout points to the 'Alarm' and 'Pre-alarm' checkboxes, stating 'Enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.'
- Alarm and Pre-alarm values:** Callouts point to the numerical values in the trip settings, stating 'Type the value or click the up and down arrows to change the settings' and 'Click and drag to change the settings'.

Section	Setting	Value	Equivalent
Low Oil Pressure Alarms	Alarm	<input checked="" type="checkbox"/>	
	Trip	103 Bar	14.94 PSI, 103 kPa
	Pre-alarm	<input checked="" type="checkbox"/>	
Pre-alarm	Trip	124 Bar	17.98 PSI, 124 kPa
	Return	138 Bar	20.01 PSI, 138 kPa

4.4.2 COOLANT TEMPERATURE

Coolant Temperature applicable only to DSE8610/DSE8620.

Coolant Temperature

- [Coolant Temperature Alarms](#)
- [Coolant Temperature Control](#)

4.4.2.1 COOLANT TEMPERATURE ALARMS

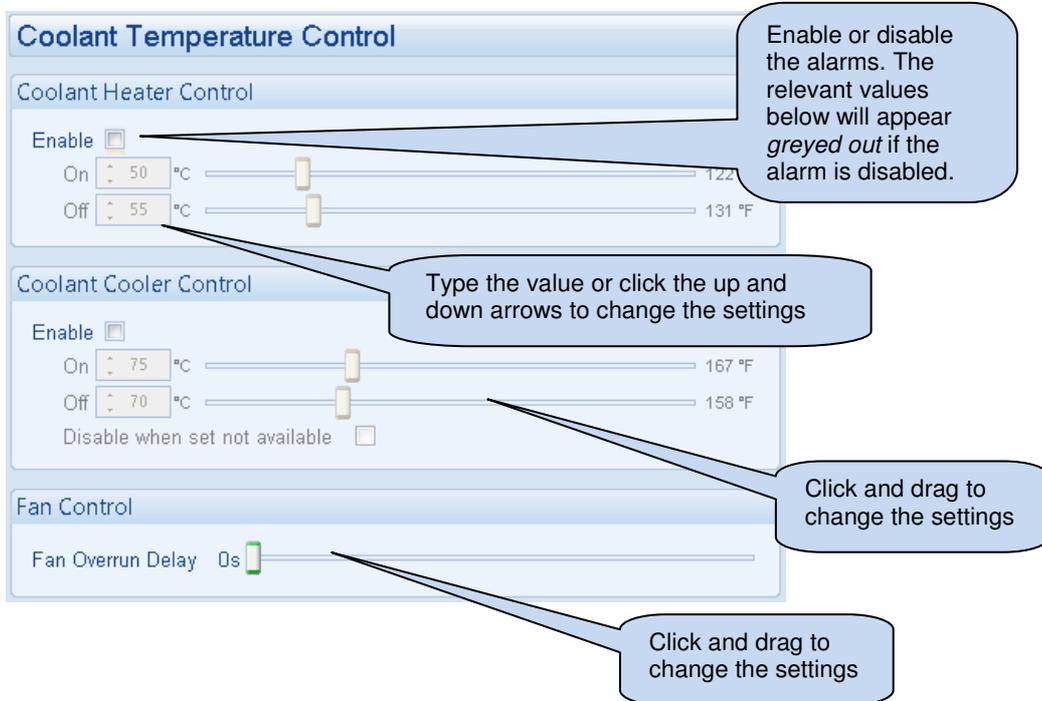
The screenshot shows the 'Coolant Temperature Alarm' configuration page. It includes sections for 'Sender Usage', 'Input Type', 'Open Circuit Alarm', 'High Coolant Temperature Alarms', and 'Low Coolant Temperature Alarms'. Callouts provide the following information:

- Sender Usage:** 'Use sensor as' is set to 'Temperature sensor'. Callout: 'Optional temperature sensor change to flexible'.
- Input Type:** 'Use Module to Measure Coolant Temperature' is unchecked. 'VDO 120 °C' is selected. Callout: 'Select the sensor type'. An 'Edit...' button is present. Callout: 'Click to edit the 'sensor curve'. See section entitled *Editing the sensor curve*.' Another callout: 'With electronic engines, the pressure will be measured by the controller if enabled.'
- Open Circuit Alarm:** 'Enable' is unchecked.
- High Coolant Temperature Alarms:**
 - Alarm:** Trip is 95 °C. Callout: 'Enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.'
 - Electrical Trip:** Trip is 92 °C. Callout: 'Enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.'
 - Pre-alarm:** Trip is 90 °C, Return is 88 °C. Callout: 'Enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.'
- Low Coolant Temperature Alarms:**
 - Pre-alarm:** Return is 75 °C, Trip is 70 °C. Callout: 'Type the value or click the up and down arrows to change the settings'.
 - Callout: 'Click and drag to change the settings'.

Options	Description
Pre alarm	<input type="checkbox"/> = Pre-alarm is disabled <input checked="" type="checkbox"/> = If the temperature exceeds the <i>trip</i> setting, an alarm is generated. The temperature must fall below the <i>return</i> setting to cease the alarm.
Electrical Trip	<input type="checkbox"/> = Electrical trip is disabled <input checked="" type="checkbox"/> = If the temperature exceeds the <i>trip</i> setting, an alarm is generated, the load switch is opened and the module enters the cooling timer after which the set is stopped.
Shutdown	If the temperature exceeds the <i>trip</i> setting, an alarm is generated, the load switch is opened and the set is immediately stopped.

4.4.2.2 COOLANT TEMPERATURE CONTROL

The Coolant temperature control settings provide for control of coolant heaters / coolers using the Coolant Temperature Sensor as the control input. Outputs should be configured to *Coolant Cooler Control* and/or *Coolant Heater Control* to achieve this.



Coolant temperature control	
Coolant heater control	<input type="checkbox"/> = Coolant Heater Control function is disabled <input checked="" type="checkbox"/> = Coolant Heater Control function is enabled. If the engine coolant temperature falls below the <i>On</i> setting, any output configured to <i>Coolant Heater Control</i> will be energised. This is designed to control an external engine heater. If the coolant temperature rises above the <i>Off</i> setting, the output is de-energised.
Coolant Cooler control	<input type="checkbox"/> = Coolant Cooler Control function is disabled <input checked="" type="checkbox"/> = Coolant Cooler Control function is enabled. If the engine coolant temperature rises above the <i>On</i> setting, any output configured to <i>Coolant Cooler Control</i> will be energised. This is designed to control an external engine cooling system, for instance an additional cooling fan. If the coolant temperature falls below the <i>On</i> setting, the output is de-energised.
Fan Control	An output configured to <i>Fan Control</i> is energised 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 will remain running for the duration of the <i>Fan Overrun Delay</i> .

4.4.3 FUEL LEVEL

Fuel Level applicable only to DSE8610/DSE8620.



4.4.3.1 FUEL CONTROL AND MONITORING

Change the fuel sensor to flexible if required. (Callout pointing to 'Use sender as' dropdown)

Select the sensor type. (Callout pointing to 'VDO Ohm range (10-180)' dropdown)

Click to edit the 'sensor curve'. See section entitled *Editing the sensor curve*. (Callout pointing to 'Edit...' button)

Type the value or click the up and down arrows to change the settings (Callout pointing to percentage sliders)

Hint : Set an output to "Fuel pump control". This can be used to transfer fuel from a bulk tank to the day tank, for example. (Callout pointing to 'Enable' checkbox)

SMS logging of Fuel monitoring. (Callout pointing to 'SMS interval every' field)

Parameter	Description
Fuel Pump Control	If enabled, allows the module to control an external fuel pump to transfer fuel from a bulk tank to the generator set's day tank.
Estimate Run Time to Empty	<input type="checkbox"/> = Normal operation <input checked="" type="checkbox"/> = This feature will estimate the time remaining to empty the fuel tank. The estimated time will be shown on the Engine's Fuel page of the controller display.
Fuel Tank Run Time	The amount of time required to empty the fuel tank during the generator's operation.
Fuel Tank Run Time Load Level Percentage	It is the load percentage of the generator's total capacity to empty the fuel tank at the <i>Fuel Tank Run Time</i> .

4.4.3.2 FUEL ALARMS

The screenshot shows the 'Fuel Alarms' configuration window, divided into 'Level Alarms' and 'Fuel Usage Alarm' sections. Callouts provide instructions on how to interact with the settings:

- Level Alarms:**
 - Low Alarm:** A callout points to the 'Low Alarm Enable' checkbox, stating: "Click to enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled." Below this, the 'Action' is set to 'Shutdown', 'Low Alarm' is 10%, and 'Delay' is 0s.
 - Low Pre-alarm:** A callout points to the 'Delay' slider, stating: "Click and drag to alter the time delay." The 'Low Pre-alarm Trip' is 30% and 'Low Pre-alarm Return' is 40%.
 - High Pre-alarm:** A callout points to the 'Action' dropdown, stating: "Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document." The 'High Pre-alarm Return' is 50% and 'High Pre-alarm Trip' is 60%.
 - High Alarm:** The 'High Alarm' is set to 75% and 'Delay' is 0s.
- Fuel Usage Alarm:** A callout points to the 'Running Rate' and 'Stopped Rate' sliders, stating: "Click and drag to change the settings." The 'Action' is 'Warning Always Latched', 'Running Rate' is 10% / Hr, and 'Stopped Rate' is 10% / Hr.

Fuel Usage Alarm	
Fuel Usage Alarm	Provides an alarm to monitor the usage of the generator set's fuel. There are two settings, one to monitor fuel usage when the set is running and another to monitor the fuel usage when the set is stopped. These alarms are provided to check for fuel leakage problems or potential fuel theft.

4.4.4 FLEXIBLE SENSOR

Flexible Sensor applicable only to DSE8610/DSE8620.

The following screen shot shows the configuration when set for *Temperature Sensor*. When set to other Sensor Type, consult the relevant manual section for details (Digital inputs, Oil Pressure input etc)

The screenshot displays the 'Flexible Sensor' configuration window, divided into several sections:

- Sensor Description:** Includes a 'Sensor Type' dropdown menu (set to 'Temperature Sensor') and a 'Sensor Name' text field (containing 'Flexible Sensor').
- Input Type:** Features a dropdown menu (set to 'Doosan sensor') and an 'Edit...' button.
- Sensor Alarms:** This section is divided into 'Low Alarms' and 'High Alarms'.
 - Low Alarms:**
 - Low Alarm:** Includes a checkbox (checked), an 'Action' dropdown (set to 'Shutdown'), and a 'Trip' slider (set to 65 °C).
 - Low Pre-alarm:** Includes a checkbox (unchecked), 'Trip' (70 °C) and 'Return' (75 °C) sliders.
 - Low Alarms String:** A text field containing 'Flexible Sensor Low'.
 - High Alarms:**
 - High Pre-alarm:** Includes a checkbox (checked), 'Return' (88 °C) and 'Trip' (90 °C) sliders.
 - High Alarm:** Includes a checkbox (checked), an 'Action' dropdown (set to 'Shutdown'), and a 'Trip' slider (set to 95 °C).
 - High Alarms String:** A text field containing 'Flexible Sensor High'.

Callouts provide the following instructions:

- 'Select the sensor type' points to the 'Sensor Type' dropdown.
- 'Click to edit the 'sensor curve'. See section entitled *Editing the sensor curve*.' points to the 'Edit...' button.
- 'Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.' points to the 'Action' dropdown for the Low Alarm.
- 'Click to enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.' points to the checkboxes for the Low and High Alarms.
- 'Click and drag to change the settings' points to the 'Trip' slider for the High Alarm.
- 'Type the value or click the up and down arrows to change the settings' points to the 'Trip' input field for the High Alarm.
- 'Type the text you want to appear on the screen when the alarm is triggered.' points to the 'Low Alarms String' and 'High Alarms String' text fields.

4.4.5 EDITING THE SENSOR CURVES

While the *configuration suite* holds sensor specification for the most commonly used resistive sensors, occasionally it is required that the DSE8600 Series module be connected to a sensor not listed by the *configuration suite*. To aid this process, a sensor editor has been provided. Deleting custom sensor curves that have been added is performed in the main menu, select *Tools | Curve Manager*.

In this example, the closest match to the sensor in use is the VDO 10-180Ω fuel level sensor.

Click to edit the 'sensor curve'.

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

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

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

Click CANCEL to ignore and lose any changes you have made

Click OK to accept the changes and return to the configuration editor

Click SAVE AS, you are prompted to name your curve....

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*.

4.4.6 DIGITAL INPUTS

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

Digital Inputs

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

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

Input function. See section entitled *Input functions* for details of all available functions

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

Configures when the input is active: Never, always, active from starting, active from the end of the safety timer

This is the text that will be displayed on the module screen when the alarm is triggered.

Digital Input B

Function: User Configured

Polarity: Close to Activate

Action: Shutdown

Arming: Always

LCD Display: Sample Text

Activation Delay: 2s

Example of a user configured input

Close or open to activate

Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.

Click and drag to change the setting. 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.

4.4.7 DIGITAL INPUT FUNCTIONS

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

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

 **NOTE: - Input selection is dependant on controller.**

Function	Description
Air flap closed auxiliary IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to connect to the Air flap switch contacts. This will give an immediate shutdown in the event of the air-flap being closed. It will also prevent the generator from being restarted if the air flap has not been reset following an overspeed shutdown.
Alarm Mute	This input is used to silence the audible alarm from an external source, such as a remote mute switch.
Alarm Reset	This input is used to reset any latched alarms from a remote location. It is also used to clear any latched warnings which may have occurred (if configured) without having to stop the generator.
Alt Config 1-3 Select	These inputs are used to instruct the DSE8600 Series module to follow one of the <i>alternative</i> configuration settings instead of the <i>main</i> configuration settings.
Alternative Language Select	Used to instruct the module to switch to the alternative language instead of the default English language.
Auto Restore Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	In the event of a remote start/mains failure, the generator will be instructed to start and take load. On removal of the remote start signal/mains return the module will continue to run the generator on load until the <i>Auto Restore Inhibit</i> input is removed. This input allows the controller to be fitted as part of a system where the restoration to mains is controlled remotely or by an automated system.
Auto Start Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide an over-ride function to prevent the controller from starting the generator in the event of a remote start/mains out of limits condition occurring. If this input is active and a remote start signal/mains failure occurs the module will not give a start command to the generator. If this input signal is then removed, the controller will operate as if a remote start/mains failure has occurred, starting and loading the generator. This function can be used to give an ‘AND’ function so that a generator will only be 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 will be ignored until the module has returned the mains supply on load and shutdown. This input does not prevent starting of the engine in MANUAL or TEST modes.
Auxiliary Mains Fail	The module will monitor the incoming single or three phase supply for Over voltage, Under Voltage, Over Frequency or Under frequency. It may be required to monitor a different mains supply or some aspect of the incoming mains not monitored by the controller. If the devices providing this additional monitoring are connected to operate this input, the controller will operate as if the incoming mains supply has fallen outside of limits, the generator will be instructed to start and take the load. Removal of the input signal will cause the module to act if the mains has returned to within limits providing that the mains sensing also indicates that the mains is within limits.
Bus Closed Auxiliary IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide feedback to allow the DSE8660 to give true indication of the contactor or circuit breaker switching status. It should be connected to the generator bus load switching device auxiliary contact. Action: Warning (<i>Alarm only, No shutdown</i>)

Function	Description
Bus Load Inhibit IEEE 37.2 - 3 Checking or interlocking relay	<p>This input is used to prevent the DSE8660 from loading the generator bus. If the generator is already on load, activating this input will cause the DSE8660 to unload the generator bus. Removing the input will allow the bus to be loaded again.</p> <div style="border: 1px solid black; padding: 5px;"> <p>⚠ NOTE: -This input only operates to control the generator bus load switching device if the DSE8660 load switching logic is attempting to load the generator. It will not control the generator-switching device when the mains supply is on load.</p> </div>
Clear Mains Decoupling Alarms	This input is used to clear the module following a mains decoupling alarm trip. The input must switch from inactive to active to reset the trip, it cannot be left permanently active.
Close Generator IEEE 37.2 - 52 AC Circuit Breaker	Closes the Generator load switch (synchronising first if required)
Coolant Temperature Switch	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 using the switch and the analogue input can be used in parallel to give protection or configured to be used for indication only.
Disable Protections	<p>The system designer provides this switch (not DSE) so its location will vary depending upon manufacturer, however it normally takes the form of a key operated switch to prevent inadvertent activation. Depending upon configuration, a warning alarm may be generated when the switch is operated.</p> <p>When active, and the module is suitably configured (see section entitled 'Application') this prevents the engine being stopped upon critical alarm (Sometimes called War Mode or Run to Destruction)</p>
DPF Auto Regen Inhibit	This input is used to override the ECU function and prevent the automatic regeneration of the diesel particulate filter
DPF Force Regeneration	This input is used to override the ECU 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.
Duty Select IEEE 37.2 - 10 Unit sequence switch	This input is used to force the appropriate set to become the duty set when using a load demand scheme. Irrespective of the priority number configured in the module, it will be forced to become the priority set. This allows for manual duty selection, overriding the automatic system normally used by the modules.
EJP1	<p>For the French EJP (Effacement Jours de Pointe) tariff system.</p> <p>This input is functionally identical to <i>Remote Start Off Load</i>. If this input is active, operation will be similar to the 'Remote Start on load' function except that the generator will not be instructed to take the load. This function can be used where an engine only run is required e.g. for exercise.</p>
EJP2	<p>For the French EJP (Effacement Jours de Pointe) tariff system.</p> <p>This input is functionally identical to <i>Remote Start On Load</i>.</p> <p>When in auto mode, the module will perform the start sequence and transfer load to the generator. If in Manual mode, the load will be transferred to the generator if the engine is already running, however in manual mode, this input will not generate start/stop requests of the engine. In both cases, synchronising takes place if required.</p>

Function	Description
External Panel Lock	<p>This input is used to provide security to the installation. If the External Panel lock input is active, the module will 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 will still be able to view the various instrumentation pages etc. (<i>Front panel configuration access is still possible while the system lock is active</i>).</p> <div style="border: 1px solid black; padding: 5px;"> <p>⚠ NOTE: - External control sources (i.e. Simulate Start Button) are not affected by the external panel lock input and will continue to operate normally.</p> </div>
Generator Closed Auxiliary IEEE 37.2 - 3 Checking or interlocking relay	<p>This input is used to provide feedback to allow the DSE8600 to give true indication of the contactor or circuit breaker switching status. It should be connected to the generator load switching device auxiliary contact.</p> <p>Action: Warning (<i>Alarm only, No shutdown</i>)</p>
Generator Load Inhibit IEEE 37.2 - 52 AC circuit breaker	<p>This input is used to prevent the DSE8610/DSE8620 from loading the generator. If the generator is already on load, activating this input will cause the DSE8610/DSE8620 to unload the generator. Removing the input will allow the generator to be loaded again.</p> <div style="border: 1px solid black; padding: 5px;"> <p>⚠ NOTE: -This input only operates to control the generator-switching device if the DSE8610/DSE8620 load switching logic is attempting to load the generator. It will not control the generator-switching device when the mains supply is on load.</p> </div>
Inhibit Retransfer To Mains IEEE 37.2 - 3 Checking Or Interlocking Relay 	<p>When active, this input prevents the load being transferred back to the mains supply, even in the event of the generators failing. This can be used in peak lopping systems where the cost of using the mains to supply the load is so prohibitive that the customer does not want to transfer back to the mains supply.</p>
Inhibit Scheduled Run IEEE 37.2 - 3 Checking Or Interlocking Relay	<p>This input is used to provide a means of disabling a scheduled run.</p>
Inhibit SMS Remote Start	<p>This input is used to provide a means of disabling remote starts by SMS</p>
Keep Control Of 8610s	<p>This input is used to provide the means of keeping the token once all the normal rules of giving and taking from other controllers has released the token for the unit with this active input.</p>
Lamp Test	<p>This input is used to provide a test facility for the front panel indicators fitted to the DSE8600 module. When the input is activated all LED's should illuminate.</p>
Load Share Inhibit	<p>When active, this input disables the VAr share control when in parallel</p>
Low Fuel Level Switch	<p>A digital normally open or closed fuel level switch gives this input. It allows fuel level detection using the switch and the analogue input to be used in parallel to give protection or to be used for fuel level indication only.</p>
Main Config Select	<p>This input is used to select the <i>Main</i> configuration when <i>Alternative</i> configurations are enabled.</p>
Mains Parallel Mode DSE8610 only	<p>This input is used to configure the DSE8610 load-sharing module as to how it will operate when in parallel.</p> <p>If the input is not active, the DSE8610 will communicate with other DSE8610 controllers to maintain equal share of the load between systems.</p> <p>If the mains parallel mode input is active, the controller will not communicate with others, but will instead ramp up to the pre-configured level to "peak lop" with the mains supply.</p>
Mains Closed Auxiliary IEEE 37.2 - 3 Checking or interlocking relay 	<p>This input is used to provide feedback to allow the DSE8600 to give true indication of the contactor or circuit breaker switching status. It should be connected to the mains load switching device auxiliary contact.</p> <p>Incorrect application of this signal does not trigger an alarm condition, it is used solely for indication of the breaker status.</p>

Function	Description
Mains Load Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay 	<p>This input is used to prevent the DSE8600 from loading the mains supply. If the mains supply is already on load activating this input will cause the DSE8600 to unload the mains supply. Removing the input will allow the mains to be loaded again.</p> <p>NOTE: This input only operates to control the mains switching device if the DSE8600 load switching logic is attempting to load the mains. It will not control the mains switching device when the generator is on load.</p>
Manual Restore Contact 8620/8660 Only	This input is used to manually allow back-sync to the mains without removing the <i>Auto-Restore Inhibit</i> input.
MSC Alarms Inhibit	<p>This input is used to prevent MSC alarms. It is particularly useful when a set is being removed from duty for maintenance.</p> <p>NOTE: For further details on MSC alarms, refer to the DSE Guide to Synchronising and Load Sharing.</p>
Oil Pressure Switch	A digital normally open or closed oil pressure switch gives this input. It allows oil pressure protection using the switch and the analogue input to be used in parallel to give protection or to be used for oil pressure indication only.
Open Generator IEEE 37.2 - 52 AC Circuit Breaker	Opens the generator breaker, ramping off load if part of a parallel system.
Paralleling Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to prevent the generator from running in parallel with the Bus/Mains supply. This can be used on the DSE8660/8620 modules to prevent the generator and mains from being paralleled and force a clean break transfer. If the input becomes active while in parallel then the transfer will be completed and paralleling ends.
Remote Start Dead Bus Synchronising	<p>When Dead Bus Synchronising is configured, this input is used to start the set in Dead Bus Synchronising scheme.</p> <p>NOTE: For further details, please refer to the section titled Dead Bus Synchronising elsewhere in this document.</p>
Remote Start In Island Mode 8620/8660 Only	<p>When in auto mode, the module will perform the start sequence and transfer the load to the generator. The mains breaker is left open and the generator(s) is (are) to run in island mode.</p> <p>In Manual mode, the load will be transferred to the generator if the engine is already running, however in manual mode; this input will not generate start/stop requests of the engine.</p>
Remote Start Off Load	If this input is active, operation will be similar to the 'Remote Start on load' function except that the generator will not be instructed to take the load. This function can be used where an engine only run is required e.g. for exercise.
Remote Start On Load	<p>When in auto mode, the module will perform the start sequence and transfer load to the generator.</p> <p>In Manual mode, the load will be transferred to the generator if the engine is already running, however in manual mode; this input will not generate start/stop requests of the engine.</p>
Remote Start On Load Demand	If this input is active, the load demand start up and shut down scheme will be activated when two or more generators are running in parallel. On application, all sets will start a race for the bus. The first available set will close onto the dead bus and the others will synchronise to it. Once the sets are on load they will compare load levels and redundant sets will commence a shutdown sequence and return to standby until the load level is such that they are required.
Reset Maintenance Alarm 1-3	These inputs are used to reset the maintenance alarms. When activated it will reset the maintenance counter to the pre-configured value (i.e. 250 hours). If the maintenance alarm is configured to monitor the monthly service interval this will also be reset to the pre-configured period (i.e. 6 Months).

Function	Description
Simulate Auto Button	<p> NOTE: - If a call to start is present when AUTO MODE is entered, the starting sequence will begin. Call to Start can come from a number of sources depending upon module type and configuration and includes (but is not limited to) : Remote start input present, Mains failure, Scheduled run, Auxiliary mains failure input present, Telemetry start signal from remote locations.</p> <p>This input mimics the operation of the 'Auto' button and is used to provide a remotely located Auto mode push button.</p>
Simulate Lamp test \ Alarm Mute Button	This input is used to provide a test facility for the front panel indicators fitted to the module. When the input is activated all LED's should illuminate. The input also serves a second function, in that it also provides a mute signal to silence the audible alarm. The input is recognised by the module as though it was the Push button on the module itself being operated.
Simulate Mains Available	This function is provided to override the module's internal monitoring function. If this input is active, the module will not respond to the state of the incoming AC mains supply.
Simulate Manual Button	This input mimics the operation of the 'Manual' button and is used to provide a remotely located Manual mode push button.
Simulate Start Button	This input mimics the operation of the 'Start' button and is used to provide a remotely located start push button.
Simulate Stop Button	This input mimics the operation of the 'Stop' button and is used to provide a remotely located stop/reset push button.
Simulate Test On Load Button 	This input mimics the operation of the 'Test' button and is used to provide a remotely located Test on load mode push button.
Smoke Limiting IEEE 37.2 – 18 Accelerating or Decelerating Device	This input instructs the module to give a <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.
Speed Lower	<p>This is operational in Manual Mode only, when the breaker is open.</p> <p>On DSE8610/DSE8620 systems where internal relays are used to control the governor, this input can be used to decrease the speed.</p> <p> NOTE: -This input has no effect when utilising the internal analogue system to control the governor.</p>
Speed Raise	<p>This is operational in Manual Mode only, when the breaker is open.</p> <p>On DSE8610/DSE8620 systems where internal relays are used to control the governor, this input can be used to increase the speed.</p> <p> NOTE: -This input has no effect when utilising the internal analogue to control the governor.</p>
Start Pause IEEE 37.2 - 3 Checking or Interlocking Relay	<p>This input is intended to be used to allow the generator start sequence to commence, but not to complete. This feature can be used with Air start engines for example to give a controlled start sequence. The function operates such that if the 'Start pause' input is active and an engine start is commanded, the module will perform its start sequence thus: -</p> <p>The pre-heat output (if used) will be activated for the duration of the pre-heat timer.</p> <p>The Fuel output will then be energised and the module will then enter a pause state - 'Awaiting clear to start'. If the 'start pause' signal becomes inactive at this time then the module will continue its normal start sequence.</p> <p>The 'start pause' mode uses the 'manual crank limit' timer and if this expires during the 'Awaiting clear to start' state then a 'Fail to start' alarm will be generated and the set shutdown.</p>

Function	Description
Stop and Panel Lock	<p>Combined function input that instructs the module to enter STOP MODE and also perform the <i>Panel Lock</i> function. Once the input is active, the module will not respond to operation of the Mode select or start buttons.</p> <p>The operator will still be able to view the various instrumentation pages etc. (<i>Front panel configuration access is still possible while the system lock is active</i>).</p>
Transfer To Generator (Bus)/Open Mains IEEE 37.2 - 52 AC Circuit Breaker 8620/8660 Only	<p>This input is used to transfer the load to the generator when running in MANUAL MODE</p> <p>On 8620/8660 module only: Once synchronised the genset and bus/mains will parallel. The second press of the button (or expiry of the parallel run timer) will then cause the genset to take full load and open the mains contactor.</p>
Transfer to Mains/ Open Generator (Bus) IEEE 37.2 - 52 AC Circuit Breaker 8620/8660 Only	<p>This input is used to transfer the load to the mains supply (AMF module) when running in MANUAL MODE or provide the 'Open Generator' signal in a non AMF Module.)</p>
Volts Raise	<p>This is operational in Manual Mode only, when the breaker is open.</p> <p>On DSE8610/DSE8620 systems where internal relays are used to control the AVR, this input can be used to decrease the volts.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> NOTE: -This input has no effect when utilising the internal analogue system to control the AVR</p> </div>
Volts Lower	<p>This is operational in Manual Mode only, when the breaker is open.</p> <p>On DSE8610/DSE8620 systems where internal relays are used to control the AVR, this input can be used to increase the volts.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> NOTE: -This input has no effect when utilising the internal analogue system to control the AVR</p> </div>

4.5 OUTPUTS

4.5.1 DIGITAL OUTPUTS

The screenshot shows a configuration window titled "Digital Outputs" with four sections:

- Relay Outputs (Supplied from Emergency Stop Input):** Contains Output A (Fuel Relay, Energise) and Output B (Start Relay, Energise). A callout notes these are fixed for DSE8610/DSE86.
- Relay Outputs (Volts Free):** Contains Output C (N/C, De-Energise) and Output D (Close Gen Output, Energise). A callout explains the polarity selection.
- Relay Outputs (DC Supply Out):** Contains Outputs E through J with sources like Digital Input A, Loss Of Mag Pickup Signal, Low Fuel Level, Fuel Pump Control, and Not Used. A callout notes these labels match typical wiring diagrams.

Additional callouts explain that greyed-out options are fixed and not adjustable without a CAN engine, and that the source selection is for control purposes.

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

4.5.2 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

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

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

4.5.3 OUTPUT SOURCES

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

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

 **NOTE: - Output selection is dependant on controller.**

The outputs are in alphabetical order with the *parameter* first. For instance for overspeed output, it's listed as *Engine Overspeed*.

Output source	Activates...	Is not active....
Not Used	The output will not change state (Unused)	
8660 controls 8610s	Indicates that the 8660 module is currently in control of the generator sets (controlled by the 8610 controller(s))	
Air Flap Alarm	This output indicates that the air-flap is closed; to operate it requires an input configured as 'Air-flap closed' connected to the external air-flap switch.	
Air Flap Relay	Normally used to control an air flap, this output becomes active upon an Emergency Stop or Over-speed situation.	Inactive when the set has come to rest
Alarm Mute	Indicates that an alarm mute operation is in progress by digital input	
Alarm Reset	Indicates that an alarm reset operation is in progress by digital input	
All Available Sets Are On The Bus	This output indicates that all the available sets in the Multiset load sharing system are closed onto the generator bus. This output can be used to close an external breaker to allow the generator bus to power the load. 'Available sets' are sets in auto mode with no alarms present. So sets not in auto mode, or sets that have alarms present are not considered to be 'available sets'.	
Alternative Config 1-3 selected	Indicates which of the three alternative configurations has been selected (if any)	
Alternative Language Selected	Active when the alternative display language is selected	
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 : <ul style="list-style-type: none"> • 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	This output indicates that the internal sounder is operating to allow it to feed an external sounder. Operation of the Mute pushbutton will reset this output once activated.	Inactive if the internal sounder is not operating.
Auto Mode	Active when the controller is in AUTO mode	Inactive in any other mode.
Auto Restore Inhibit	Active when the <i>Auto Restore Inhibit</i> digital input is active.	
Auto Start Inhibit IEEE 37.2 – 3 Checking Or Interlocking Relay	Indicates that an auto start inhibit operation is in progress.	
Auxiliary Mains Failure	Active when the <i>Auxiliary Mains Failure</i> digital input is active.	
AVR Maximum Trim Limit Reached	Indicates that the analogue AVR output has reached 100%. This can indicate a fault with the control of the AVR (including connection error), incorrect setting of SW2, or that the alternator has reached its maximum capacity.	

Output source	Activates...	Is not active....
Battery High Voltage IEEE 37.2 – 59DC Over Voltage Relay	This output indicates that a Battery Over voltage alarm has occurred.	Inactive when battery voltage is not High
Battery Low Voltage IEEE 37.2 – 27DC Under Voltage Relay	This output indicates that a Battery Under Voltage alarm has occurred.	Inactive when battery voltage is not Low
Bus Live	This output indicates that a voltage has been detected on the bus. Once the voltage on the bus is detected above the “Dead bus relay setting”, it will no longer be considered a ‘dead-bus’ and the generator will need to synchronise in order to get onto the bus.	
Bus Not Live Alarm	This output indicates that the generator bus remains ‘dead’ after closing the generator load breaker.	
Bus And Mains In Parallel	This output is active whenever the bus and mains are in parallel.	
Bus Closed Auxiliary	Active when the <i>Bus closed auxiliary</i> input is active	
Bus Failed To Close IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the Bus contactor or breaker. It can only be used if the module is configured to use ‘Bus Closed Auxiliary’ feedback.	
Bus Failed To Open IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the Bus contactor or breaker. It can only be used if the module is configured to use ‘Bus Closed Auxiliary’ feedback.	
Bus Live	Output active when the bus goes live	
Bus Not Live	Active when generator breaker closes and the bus is not seen to go live.	
Bus Phase Rotation Alarm	This output indicates that the module has detected a phase sequence error on the bus.	
Calling For Scheduled Run	Active during a <i>scheduled run</i> request from the inbuilt scheduler.	
CAN ECU Data Fail	Becomes active when no CAN data is received from the ECU after the safety delay timer has expired	Inactive when: <ul style="list-style-type: none"> • CAN data is being received • The set is at rest • During the starting sequence before the safety delay timer has expired
CAN ECU Power	Used to switch an external relay to power the CAN ECU. Exact timing of this output is dependent upon the type of the engine ECU	
CAN ECU Shutdown	The engine ECU has indicated that a Shutdown alarm is present.	Inactive when no Shutdown alarm from the ECU is present
CAN ECU Stop	Active when the DSE controller is requesting that the CAN ECU stops the engine.	
CAN ECU Warning	The engine ECU has indicated that a Warning alarm is present.	Inactive when no Warning alarm from the ECU is present
Charge Alternator Failure (Shutdown or warning)	Indicates that there is a charging fault with the auxiliary charging alternator	<ul style="list-style-type: none"> • When the set is at rest • During the starting sequence before the safety delay timer has expired
Check Sync IEEE 37.2 – 25 Synchronising Or Synchronising Check Relay	Indicates that the internal check synchroscope has determined that the supplies are in sync.	
Clear Mains Decoupling	Active when the <i>Clear Mains Decoupling Alarms</i> digital input is active.	
Close Bus Output IEEE 37.2 – 52 AC Circuit Breaker 	Used to control the load switching device. Whenever the 8600 module selects the bus to be on load this control source will be active.	Inactive whenever the bus is not required to be on load
Close Bus Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8600 module selects the bus to be on load this control source will be active for the duration of the Breaker Close Pulse timer, after which it will become inactive again.	
Close Gen Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the 8600 module selects the generator to be on load this control source will be active.	Inactive whenever the generator is not required to be on load

Output source	Activates...	Is not active...
Close Gen Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8600 module selects the generator to be on load this control source will be active for the duration of the Breaker Close Pulse timer, after which it will become inactive again.	
Close Mains Output IEEE 37.2 – 52 AC Circuit Breaker 	Used to control the load switching device. Whenever the DSE8600 module selects the mains to be on load this control source will be active.	The output is inactive whenever the mains is not required to be on load
Close Mains Output Pulse IEEE 37.2 – 52 AC Circuit Breaker 	Used to control the load switching device. Whenever the DSE8600 module selects the mains to be on load this control source will be active for the duration of the Breaker Close Pulse timer, after which it will become inactive again.	
Closed To Generator State	Active when the status of the generator breaker is closed	
Closed To Mains State	Active when the status of the mains breaker is closed.	
Combined Maintenance Alarm	Indicates that one of the maintenance alarms is active	
Combined Mains Failure 	Active when the mains supply is out of limits OR the input for Auxiliary Mains Failure is active	
Combined Mains Decoupling Alarm	Indicates that during parallel operation, one of the internal mains decoupling functions has been triggered.	
Combined Remote Start Request	Indicates that a remote start request is active.	
Combined Under and Over Frequency Shutdown IEEE 37.2 - 81 Frequency Relay	Active when the generator is shutdown due to either under OR over frequency	
Combined Under and Over Frequency Warning IEEE 37.2 - 81 Frequency Relay	Active when the generator alarm for either under OR over frequency is active	
Combined Under And Overvoltage Shutdown IEEE 37.2 – 27AC Under Voltage Relay IEEE 37.2 – 59AC Over Voltage Relay	Active when the generator is shutdown due to either under OR overvoltage	
Combined Under and Overvoltage Warning IEEE 37.2 – 27AC Under Voltage Relay IEEE 37.2 – 59AC Over Voltage Relay	Active when the generator alarm for either under OR overvoltage is active	
Common Alarm IEEE 37.2 – 74 Alarm Relay	Active when one or more alarms (of any type) are active	The output is inactive when no alarms are present
Common Electrical Trip IEEE 37.2 – 74 Alarm Relay	Active when one or more <i>Electrical trip</i> alarms are active	The output is inactive when no electrical alarms are present
Common Mains Decoupling Alarm	Indicates 1 or more of the decoupling alarm have activated	
Common Shutdown IEEE 37.2 – 74 Alarm Relay	Active when one or more <i>Shutdown</i> alarms are active	The output is inactive when no shutdown alarms are present
Common Warning IEEE 37.2 – 74 Alarm Relay	Active when one or more <i>Warning</i> alarms are active	The output is inactive when no warning alarms are present
Coolant Cooler Control IEEE 37.2 – 23 Temperature Control Device	Activated by the Coolant Cooler Control in conjunction with the Coolant Temperature Sensor.	
Coolant Heater Control IEEE 37.2 – 23 Temperature Control Device	Activated by the Coolant Heater Control in conjunction with the Coolant Temperature Sensor.	
Cooling Down	Active when the Cooling timer is in progress	The output is inactive at all other times

Output source	Activates...	Is not active...
Data Logging Active	Active when data is being logged	Inactive when: <ul style="list-style-type: none"> Data logging is disabled The engine is at rest and the option <i>Only Log When Engine Is Running</i> is enabled The USB drive becomes full and the option <i>Log To USB Drive</i> is enabled The internal memory of the module becomes full and the option <i>Keep Oldest Data</i> is enabled
DC Power On	Active when DC power is supplied to the module	
Dead Bus Run on Timer Active	Indicates that the set has closed onto the bus and that the Dead Bus Run On Timer is in progress. When this has expired, the <i>Load Demand Scheme</i> is activated.	
Dead Bus Synchronise Enabled	Active when Dead Bus Synchronising is enabled.	
Dead Bus Synchronise In Progress	Active when the set is running dead bus synchronising.	
De-Excite Alternator	Active during Dead Bus Synchronising start until the <i>Excitation Delay</i> timer expires	
Digital Input A - K	Active when the digital input is active	Inactive when : <ul style="list-style-type: none"> If the input is not active If the input is active but conditioned by <i>activation delay, safety timer</i> or <i>Arming</i> requirements.
DPF Auto Regen Inhibit Request	Active when the <i>DPF Auto-Regen Inhibit</i> is active.	
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	Becomes 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)	
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.
Duty Select	Indicates that a digital input configured to <i>Duty Select</i> is active.	
Earth Fault Trip alarm IEEE 37.2 – 71 Level Switch	Indicates that an earth fault alarm is active.	
EJP1 / EJP2	Indicates that an input configured to EJP1 or EJP2 is active	
Emergency Stop IEEE 37.2 – 86 Lockout Relay	Active when the Emergency Stop input has been activated	
Energise to Stop	Normally used to control an <i>Energise to Stop</i> solenoid, this output becomes active when the controller wants the set to stop running.	Becomes inactive a configurable amount of time after the set has stopped. This is the <i>ETS hold time</i> .
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 will become active. This is the <i>Fail to stop</i> timer.	
Fail to Synchronise IEEE 37.2 - 48 Incomplete Sequence Relay	Becomes active if the module fails to synchronise after the <i>fail to sync</i> timer.	
Fan Control	Energises when the engine becomes available (up to speed and volts). This output is designed to control an external cooling fan. When the engine stops, the cooling fan will remain running for the duration of the Fan Overrun Delay.	

Output source	Activates...	Is not active....
Flexible Sensor Active	When the flexible sensor is configured as digital input, this output becomes active when the flexible sensor is active.	
Flexible Sensor x (Pre) Alarm	Indicates that the respective flexible sensor (pre) alarm is active.	
Fuel Level High/Low (Pre) Alarm	Active when the respective 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 will become inactive when the <i>Fuel level</i> is above the <i>Fuel Pump Control OFF</i> settings.
Fuel Relay	Becomes active when the controller requires the governor/fuel system to be active.	Becomes inactive whenever the set should be stopped, including between crank attempts, upon controlled stops and upon fault shutdowns.
Fuel Usage Alarm	Becomes active when the amount of fuel used over a set time period exceeds the set value.	
Gas Choke On	Becomes active during starting for the duration of the Gas Choke timer. Normally used to choke a gas engine.	Inactive at all other times
Gas Ignition	Becomes active during starting.	Becomes inactive a configurable amount of time after the <i>fuel relay</i> becomes inactive. This is the <i>Gas ignition off</i> timer.
Gen And Mains In Parallel	Active when both generator breaker and mains breaker are closed in parallel.	
Gen Over Frequency Overshoot Alarm	Becomes active when the <i>Over-Frequency Overshoot Shutdown</i> is active.	
Gen Over Frequency Overshoot Warning	Becomes active when the <i>Over-Frequency Overshoot Warning</i> is active.	
Generator at Rest	This output indicates that the generator is not running.	
Generator Available	Becomes active when the generator is available to take load.	Inactive when <ul style="list-style-type: none"> • <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 Failed to Close IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the generator contactor or breaker. It can only be used if the module is configured to use 'Generator Closed Auxiliary' feedback.	
Generator Failed to Open IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the generator contactor or breaker. It can only be used if the module is configured to use 'Generator Closed Auxiliary' feedback.	
Generator High Voltage Shutdown IEEE 37.2 – 59AC Over Voltage Relay	Active when the generator voltage exceeds the <i>High Voltage Shutdown</i> setting	
Generator High Voltage Warning IEEE 37.2 – 59AC Over Voltage Relay	Active when the generator voltage exceeds the <i>High Voltage Warning</i> setting	
Generator Load Inhibited	This output indicates that a digital input that has been configured as ' <i>Generator Load Inhibit</i> ' is active. Refer to the ' <i>Edit Inputs</i> ' section of this manual for details.	
Generator Low Voltage Shutdown IEEE 37.2 – 27AC Under Voltage Relay	Active when the generator voltage falls below the <i>Low Voltage Shutdown</i>	Inactive when <ul style="list-style-type: none"> • The set is stopped • During starting sequence before the safety delay time has expired.

Output source	Activates...	Is not active....
Generator Low Voltage Alarm IEEE 37.2 – 27AC Under Voltage Relay	Active when the generator voltage falls below the <i>Low Voltage Warning</i> setting	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Generator Over Frequency Warning / Alarm	Active when the generator rises above the <i>high frequency Warning/ Shutdown</i> setting	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Generator Phase Rotation Alarm	This output indicates that the module has detected a phase sequence error from the generator output.	
Generator Reverse Power	This output indicates that a Generator Reverse Power alarm has occurred.	
Generator Stopping	This output source indicates that the engine has been instructed to stop but has not yet come to rest. Once the engine comes to a standstill this output will become in-active.	
Generator Under Frequency Warning(Alarm) / Shutdown IEEE 37.2 – 81 Frequency Relay	Active when the generator falls below the <i>low frequency Warning/ Shutdown</i> setting	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
HEST Active	Active when the high exhaust system temperature alarm is active.	
High Coolant Temperature Electrical Trip	Active when the <i>Coolant Temperature</i> exceeds the <i>High Coolant Temperature Electrical Trip</i> setting	
High Coolant Temperature Shutdown	Active when the <i>Coolant Temperature</i> exceeds the <i>High Coolant Temperature Shutdown</i> setting	
High Coolant Temperature Warning	Active when the <i>Coolant Temperature</i> exceeds the <i>High Coolant Temperature Warning</i> setting	
High Inlet Temperature Shutdown	Active when the <i>Inlet Temperature</i> exceeds the <i>High Inlet Temperature Shutdown</i> setting	
High Inlet Temperature Warning	Active when the <i>Inlet Temperature</i> exceeds the <i>High Inlet Temperature Warning</i> setting	
Inhibit Scheduled Run	Active when the digital input configured for <i>Inhibit Scheduled Run</i> is active	
Inhibit SMS Start	Active when the digital input configured for <i>Inhibit SMS Start</i> is active.	
Insufficient Capacity Available	Indicates that during parallel operation, it has been determined that the set(s) is(are) not capable of providing the power that they have been configured to deliver.	
Inhibit Retransfer to Mains	Indicates when mains fails,Gens fails and mains not enough capacity to take load inhibit retransfer.	
Interlock Override	Comes on just before and just after the gen-set goes into parallel enabling an output for a mechanical or electrical interlock	
Keep Control of 8610s 	Output active when the a input is set for keep control of 8610's and the unit has control of the token.	
kW Overload Alarm / Warning	Active when the kW exceeds the configured level of the <i>kW overload alarm / warning</i> . Can be used to give alarms on overload, control a dummy load breaker or for load shedding functionality.	
Lamp test	This output indicates that the module is performing a lamp test. Once the lamp test is completed, the output will become inactive again. The output can be used to feed a lamp test on external modules or panel lamps.	
Load Share Inhibit	Active when the configured digital input <i>Load Share Inhibit</i> becomes active.	
Load Shedding Control (1-5)	Becomes active when the engine kW exceeds Load Shedding Control Trip Setting.	Inactive when the engine kW returns to below the Load Shedding Control Return setting.
Loading Frequency Not Reached	Indicates that the generator frequency has not reached the configured <i>loading frequency</i> during the starting process.	
Loading Voltage Not Reached	Indicates that the generator voltage has not reached the configured <i>loading voltage</i> during the starting process.	
Loss of Mag Pickup Signal	Active when the controller senses the loss of signal from the magnetic pickup probe	
Louvre Control	Normally used to drive ventilation louvres for the generator set, this output becomes active when the fuel relay becomes active	Inactive when the fuel relay becomes inactive.

Output source	Activates...	Is not active....
Low Coolant Temperature	Active when the <i>Coolant Temperature</i> falls below the <i>Low Coolant Temperature alarm</i> setting	
Low kW Load	Active when the kW level falls below configured <i>Low Load</i> alarm.	
Low Load	Indicates that the stopping sequence is beginning due to low load levels. (<i>Load Demand Scheme</i>)	
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 <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Low Oil Pressure Warning IEEE 37.2 - 63 Pressure Switch	Active when the <i>Oil Pressure</i> falls below the <i>Low Oil Pressure Warning</i> setting	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
MPU Open Circuit (Not Applicable To 8660)	This output indicates that the module has detected an open circuit failure in the Magnetic Pickup transducer circuit.	
Main Config Selected	Indicates that the main configuration fail has been selected	
Mains Closed Aux	Active when the <i>Mains closed auxiliary</i> input is active	
Mains Decoupling High Frequency	This output indicates that the mains decoupling high frequency alarm has been triggered.	
Mains Decoupling High Voltage	This output indicates that the mains decoupling high voltage alarm has been triggered.	
Mains Decoupling Low Frequency	This output indicates that the mains decoupling low frequency alarm has been triggered.	
Mains Decoupling Low Voltage	This output indicates that the mains decoupling low voltage alarm has been triggered.	
Mains Failed To Close	This output indicates the mains breaker failed to close	
Mains Failed To Open	This output indicates the mains breaker failed to open	
Mains Failure  IEEE 37.2 - 81 Frequency Relay IEEE 37.2 - 27AC Under Voltage Relay IEEE 37.2 - 59AC Over Voltage Relay	The output indicates that one or more of the module's sources of determining mains failure is active. The output is inactive when the mains supply is healthy	
Mains Load Inhibited	Active when the <i>Mains Load Inhibit</i> digital input is active.	
Mains Over Frequency IEEE 37.2 - 81 Frequency Relay	Active when the mains frequency exceeds the <i>High Frequency</i> setting	
Mains Over Voltage IEEE 37.2 - 59AC Overvoltage Relay	Active when the mains voltage exceeds the <i>High Voltage</i> setting	
Mains Phase Rotation Alarm	Active when the <i>Mains Phase Rotation Alarm</i> is active	
Mains Parallel Mode Input	Active when the <i>Mains Parallel Mode</i> digital input becomes active.	
Mains R.O.C.O.F. IEEE 37.2 - 81 Frequency Relay	Indicates that the R.O.C.O.F. protection (when in parallel with mains) has triggered.	
Mains Under Frequency IEEE 37.2 - 81 Frequency Relay	Active when the mains frequency falls below the <i>Low Frequency</i> setting	
Mains Under Voltage IEEE 37.2 - 27AC Under Voltage Relay	Active when the mains voltage falls below the <i>Low Voltage</i> setting	
Mains Vector Shift	Indicates that the Vector Shift protection (when in parallel with mains) has triggered.	
Maintenance Alarm 1,2,3 Due	Indicates that the specified maintenance alarm is due	
Manual Restore Contact	Active when the <i>Manual Restore Contact</i> digital input is active.	
Manual Mode	Active when the controller is in MANUAL mode	Inactive in any other mode.
Minimum Sets Not Reached	Indicates that the number of sets connected on the MultiSet Comms (MSC) Link is lower than the <i>Minimum sets required</i> setting.	

Output source	Activates...	Is not active...
MPU Open Circuit	Active when the <i>MPU Open Circuit</i> alarm is enabled and active.	
MSC Compatibility	Indicates that one or more of the modules connect on the MultiSet Comms (MSC) Link are incompatible with the controller. DSE8600 series controllers are not compatible with DSE55x, DSE55xx or DSE75xx controllers.	
MSC Data Error	Indicates bad data transfer in the MultiSet Comms (MSC) Link	
MSC Failure	Indicates that the number of sets on the MultiSet Comms (MSC) Link is lower than it was previously.	
MSC ID Error	Indicates that two or more modules connected on MultiSet Comms (MSC) Link share the same MSC ID.	
MSC Too Few Sets	Indicates that the number of sets connected on the MultiSet Comms (MSC) Link is lower than the <i>Minimum sets required</i> setting.	
Mute / Lamp test button pressed	This output indicates that the alarm mute / Lamp test pushbutton is being operated. Once the button is released, the output will become inactive.	
Negative Phase Sequence Alarm IEEE 37.2 - 46 Phase Balance Current Relay	Active when the Negative Phase Sequence alarm is active	
No Loading Command	<p>DSE8610/DSE8620: This output indicates that the module is not calling for the generator load switch to be closed. Should the module close the generator load switch, this output will become inactive.</p> <p>DSE8660: This output indicates that the module is not calling for the generator or mains load switch to be closed. Should the module close the generator or mains load switch, this output will become inactive.</p>	
Oil Pressure Sender Open Circuit	Active when the <i>Oil Pressure Sensor</i> is detected as being <i>open circuit</i> .	
Open Bus Output IEEE 37.2 – 52 AC Circuit Breaker 	Used to control the load switching device. Whenever the DSE8600 module selects the bus to be off load this control source will be active.	Inactive whenever the bus is required to be on load
Open Bus Output Pulse  IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8600 module selects the bus to be off load this control source will be active for the duration of the Breaker Open Pulse timer, after which it will become inactive again.	
Open Gen Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8600 module selects the generator to be off load this control source will be active.	Inactive whenever the generator is required to be on load
Open Gen Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the DSE8600 module selects the generator to be off load this control source will be active for the duration of the Breaker Open Pulse timer, after which it will become inactive again.	
Open Mains Output IEEE 37.2 – 52 AC Circuit Breaker 	Used to control the load switching device. Whenever the DSE8600 module selects the mains to be off load this control source will be active.	The output is inactive whenever the mains is required to be on load
Open Mains Output Pulse IEEE 37.2 – 52 AC Circuit Breaker 	Used to control the load switching device. Whenever the DSE8600 module selects the mains to be off load this control source will be active for the duration of the Breaker Open Pulse timer, after which it will become inactive again.	
Out of Sync	Indicates that the <i>Out of Sync</i> alarm has been triggered when both supply breakers were closed.	
Out Of Sync Generator/Bus DSE8620/8660 Only	Active when the mains and generator are not in sync immediately after the signal to close the generator breaker has been given.	
Out Of Sync Mains DSE8620/8660 Only	Active when the mains and generator are not in sync immediately after the signal to close the mains breaker has been given.	
Over Current IDMT Alarm IEEE 37.2 – 51 AC Time Overcurrent Relay	Active when an overcurrent condition has caused the <i>Overcurrent IDMT</i> alarm to trigger	
Over Current Immediate Warning IEEE 37.2 – 50 Instantaneous overcurrent relay	Active when an overcurrent condition exceeds the <i>Overcurrent alarm Trip</i> setting. At the same time, the controller begins following the <i>IDMT curve</i> . If the overload condition exists for an excess time, the <i>Overcurrent IDMT</i> alarm will activate.	

Output source	Activates...	Is not active....
Generator Over Frequency Warning IEEE 37.2 - 81 Frequency Relay	Active when the generator frequency exceeds the <i>High Frequency Warning</i> setting	
Generator Over Frequency Shutdown IEEE 37.2 - 81 Frequency Relay	Active when the generator frequency exceeds the <i>High Frequency Shutdown</i> setting	
Over Speed Shutdown IEEE 37.2 – 12 Over Speed Device	Active if the engine speed exceeds the <i>Over Speed Shutdown</i> setting	
Over Speed Warning IEEE 37.2 – 12 Over Speed Device	Active if the engine speed exceeds the <i>Over Speed Warning</i> setting	
Overspeed Overshoot Alarm IEEE 37.2 – 12 Over Speed Device	Active when the <i>Overspeed Overshoot Alarm</i> is active.	
Overspeed Overshoot Warning IEEE 37.2 – 12 Over Speed Device	Active when the <i>Overspeed Overshoot Warning</i> is active.	
Panel Locked	This output indicates that the module ' <i>Panel Lock</i> ' is active. If the Panel lock input is active, the module will 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 will still be able to view the various instrumentation pages etc. (<i>Front panel configuration access is barred while system lock is active</i>).	
Panel Lock By Digital Input	This output indicates that a digital input that has been configured as ' <i>Panel Lock</i> ' is active. If the Panel lock input is active, the module will 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 will still be able to view the various instrumentation pages etc. (<i>Front panel configuration access is barred while system lock is active</i>). Refer to the ' <i>Edit Inputs</i> ' section of this manual for details.	
Panel Lock By Telemetry	This output indicates that remote ' <i>Panel Lock</i> ' via telemetry is active. If the Panel lock is active, the module will not respond to operation of the Mode select or start buttons. This allows the module to be controller remotely without local interference. The operation of the module is not affected and the local operator will still be able to view the various instrumentation pages etc. (<i>Front panel configuration access is barred while system lock is active</i>).	
Parallel Inhibit	Active when the <i>Parallel Inhibit</i> digital input is active.	
PLC Output Flag 1-40	A Series of user configured flags that can be used by the PLC to control / drive internal and external functions	
Preheat During Preheat Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : <ul style="list-style-type: none"> • 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 : <ul style="list-style-type: none"> • The set is stopped • The set has reached <i>crank disconnect</i> conditions
Preheat Mode Until End Of Safety Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : <ul style="list-style-type: none"> • The set is stopped • The set has reached the end of the <i>safety delay</i> timer
Preheat Mode Until End Of Warming Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : <ul style="list-style-type: none"> • The set is stopped • The set has reached the end of the <i>warming</i> timer
Protections Disabled	Indicates the protection system of the module has been disabled by configuration or by digital input configured to perform this disabling function.	
Remote Control 1-10	A series of output sources that can be controlled by remote control in the SCADA section of the software. They can be used to control external circuits or can be used in the <i>control logic</i> section of the configuration suite.	

Output source	Activates...	Is not active....
Remote Start From Digital Input	Active when any configured <i>Remote Start</i> digital input is active.	
Remote Start In Island Mode	This output indicates that a digital input that has been configured as ' <i>Remote Start in island mode</i> ' is active. This output could be used to pass the start signal on to elsewhere in the control system.	
Remote Start Off Load	This output indicates that a digital input that has been configured as ' <i>Remote Start off load</i> ' is active. This output could be used to pass the remote start signal on to elsewhere in the control system.	
Remote Start On Load	This output indicates that a digital input that has been configured as ' <i>Remote Start on load</i> ' is active. This output could be used to pass the remote start signal on to elsewhere in the control system.	
Remote Start On Load Demand	Indicates that the module's input is active for remote start on load demand. Also indicates that the 8610 has received a remote start on load signal from the 8660 via the MSC link.	
Remote Start Over MSC	Indicates that the 8610 has received a remote start on load signal from the 8660 via the MSC link.	
Reset to AVR Datum	This output is intended to be used in conjunction with an electronic or motorised potentiometer, which has a 'centre pot' type input. This output is activated whenever the module needs to reset the potentiometer to its centre position.	
Reset to Governor Datum	This output is intended to be used in conjunction with an electronic or motorised potentiometer, which has a 'centre pot' type input. This output is activated whenever the module needs to reset the potentiometer to its centre position.	
Reset Maintenance 1, 2, 3	Indicates that the relative <i>Reset Maintenance Alarm</i> digital input is active.	
Return Delay In Progress	This output source will be active to indicate that the return timer is running.	
Short Circuit Generator	This output indicates that the module has detected a short circuit on the generator output.	
Shutdown Blocked	Indicates that a <i>Shutdown</i> type alarm is active but that the shutdown function has been blocked because the <i>Protections Disabled</i> function is active.	
Simulate Auto Button	Active when the <i>Simulate Auto Button</i> digital input is active.	
Simulate Mains Available	Active when the <i>Simulate Mains Available</i> 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.	
Simulate Test On Load Button	Active when the <i>Simulate Test On Load Button</i> digital input is active.	
Simulate Transfer to Generator Button	Active when the <i>Simulate Transfer To Generator Button</i> digital input is active.	
Simulate Transfer to Mains Button	Active when the <i>Simulate Transfer To Mains Button</i> digital input is active.	
Smoke Limiting	Becomes active when the controller requests that the engine runs at idle speed. As an output, this can be used to give a signal to the <i>Idle input</i> of an engine speed governor (if available)	Becomes inactive when the controller requests that the engine runs at rated speed.
SMS Remote Start in Island Mode	Indicates that a remote start in island mode request was received by SMS	
SMS Remote Start Off Load	Indicates that a remote start off load request was received by SMS	
SMS Remote Start On Load	Indicates that a remote start on load request was received by SMS	
Speed Lower Relay	This output will be used to give a speed lower signal to the external governor or electronic pot.	
Speed Raise Relay	This output will be used to give a speed raise signal to the external governor or electronic pot.	
Start Delay in Progress	This output source will be active to indicate that the 8600 module's internal start delay timer is running. Once this timer expires the module will initiate its start sequence.	
Start Paused	Active when the <i>Start Pause</i> digital input is active.	
Start Relay IEEE 37.2 – 54 Turning Gear Engaging Device	Active when the controller requires the cranking of the engine.	
Starting Alarm	This output is used to supply an external sounder with a signal that the engine is about to start. The output will be active AFTER the start delay time, during the pre heat delay (if used) and will continue until the set starts.	
Starting Alarms Armed	This output indicates that the starting alarms are now enabled. It can be used to control external logic circuitry. Starting alarms are armed as soon as the module commences starting of the engine and remain armed until the engine is at rest.	

Output source	Activates...	Is not active...
Stop And Panel Lock	Active when the <i>Stop And Panel Lock</i> digital input is active.	
Stop Button Pressed	This output indicates that the stop pushbutton is being operated. Once the button is released, the output will become inactive.	
Stop Mode	Active when the controller is in STOP mode	Inactive in any other mode.
Sufficient sets available 	This output indicates that there are sufficient sets available on the bus.	
Synching Enabled	This output indicates that the synchronisation feature has been enabled.	
System Healthy	This output indicates that the module is in <i>Auto</i> mode and there are no alarms present.	
System In Auto Mode	Active when the module is in Auto mode.	
System In Manual Mode	Active when the module is in Manual mode.	
System In Stop Mode	Active when the module is in Stop mode.	
System in Test Mode	Active when the module is in Test mode.	
Telemetry Active (Relay)	Active when the communication port is live and for a short time after transmission stops. Can be used as a relay or LED source.	
Telemetry Data Active (LED)	Active when data is being transmitted. This output will change continuously state (flash) upon data transfer. Normally used as an LED source rather than a relay source as this source will flash repeatedly. For a similar source more suited to drive a relay, see <i>Telemetry Active</i> .	
Telemetry Start in Auto Mode	Active when a start request is received via telemetry.	
Test Mode 	Active when the controller is in TEST mode	Inactive in any other mode.
Trip Bus In Parallel 	This output indicates that the 8660 has been forced to remove the generators from its load to pass control of the generators over to another 8660 that has detected a mains failure. This will only occur if the <i>Enable forced 'peak lop inhibit'</i> has been selected on the 'misc' tab.	
Under Frequency Warning IEEE 37.2 - 81 Frequency Relay	Active when the generator frequency falls below the <i>Low Frequency Warning</i>	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Under Frequency Shutdown IEEE 37.2 - 81 Frequency Relay	Active when the generator frequency falls below the <i>Low Frequency Shutdown</i>	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Under Speed Alarm IEEE 37.2 - 14 Under Speed Relay	Active when the engine speed falls below the <i>Under speed Shutdown</i> setting	
Under Speed Warning IEEE 37.2 - 14 Under Speed Relay	Active when the engine speed falls below the <i>Under speed Warning</i> setting	
User Defined Control 1-3 Active	Indicates that the specified User Defined Control (Control Logic) is active	
Voltage Lower Relay	Used when the <i>internal relays</i> scheme of AVR control is used. This output can be used to drive a motorised potentiometer or Voltage Lower input of an AVR	
Voltage Raise Relay	Used when the <i>internal relays</i> scheme of AVR control is used. This output can be used to drive a motorised potentiometer or Voltage Raise input of an AVR	
Waiting For Generator (Not applicable to 8660)	This output indicates that the engine has been instructed to start but has not yet become available. Once the generator becomes available this output will become in-active. (Available = Generator Frequency and Voltage levels are above the ' <i>Loading</i> ' levels set in the configuration)	
Waiting for Manual Restore  IEEE 37.2 – 3 Checking or Interlocking Relay	Becomes active when the generator is on load and the mains supply is healthy but an input configured to Manual Restore is active. This can be used to signal to an operator that action is required before the set can transfer back to the mains supply.	
Working Adjusted Nominal Volts	Active when the nominal voltage is different than the configured nominal voltage. Indicates that the nominal voltage was changed through the module FPE and set to a different voltage than the configured nominal voltage.	

4.6 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.

Timers

[Start Timers](#)

[Load/Stopping Timers](#)

[Module Timers](#)

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

4.6.1 START TIMERS

Start Timers

Start Delay

Remote Start Off Load	5s	<input type="range"/>
Remote Start On Load	5s	<input type="range"/>
Telemetry Start	5s	<input type="range"/>
Mains Fail	5s	<input type="range"/>
Mains Transient Delay	2.0s	<input type="range"/>

 = Only available on DSE8660/20 controllers

Timer	Description
Remote Start Off Load	Used to give a delay before starting in AUTO mode. This timer is activated upon the respective start command being issued. Typically this timer is applied to prevent starting upon fleeting remote start signals or short term mains failures.
Remote Start On Load	
Mains fail 	
Telemetry Start	
Mains Transient Delay 	Used to delay the detection of mains failure. This is normally used to prevent short term transients or <i>brownout</i> conditions from being classified as a Mains Failure and opening the breaker.

Start Timers

Pre-heat	0s	<input type="range"/>
Pre-heat Bypass	0s	<input type="range"/>
Engage Attempt	2.0s	<input type="range"/>
Engage Rest	1.6s	<input type="range"/>
Delay Crank	0.5s	<input type="range"/>
Cranking Time	10s	<input type="range"/>
Crank Rest Time	10s	<input type="range"/>
Smoke Limit	0s	<input type="range"/>
Smoke Limit Off	0s	<input type="range"/>
DPF Ramp	5.0s	<input type="range"/>
Safety On Delay	10s	<input type="range"/>
Warming Up Time	0s	<input type="range"/>
Sensor Fail Delay	2.0s	<input type="range"/>

Parameters detailed overleaf...

Edit Configuration - Timers

Timer	Description
Pre-heat	Give a 'pre start' time during which the <i>Preheat</i> output and <i>Starting alarm</i> will become active (if configured)
Pre-heat bypass	Should the set be stopped, the <i>Pre-heat</i> bypass timer begins. Should the set be called to start again, before the timer expires, the pre-heat sequence is bypassed as heating is not required since the set is still warm after the last run.
Cranking time	The length of each crank attempt
Crank rest time	The time between multiple crank attempts.
Engage Attempt time Not applicable to 8660	(Only available if using Magnetic pick-up and multiple engage attempts) This timer dictates the duration that the module will attempt 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 will terminate. Once all engage attempts have been made, the next start attempt begins.
Engage Rest Time Not applicable to 8660	(Only available if using Magnetic pick-up and multiple engage attempts) This timer dictates the duration that the module will wait between attempts to engage to starter.
Delay Crank Not applicable to 8660	(Only available if using Magnetic pick-up and multiple engage attempts) This is the difference in time when the fuel relay energises and the crank relay energises.
Smoke limit	The amount of time that the engine will be requested to run at <i>idle</i> speed upon starting. This is typically used to limit emissions at start up.
Smoke limit off	This should be set to a little longer than the amount of time that the set takes to run up to rated speed after removal of the command to run at <i>idle</i> speed. If this time is too short, the set could be stopped due to <i>under speed</i> failure. If the time is too long, <i>under speed</i> protection is disabled until the <i>Smoke limit time off</i> time has expired.
DPF Ramp	After terminating the DPF stage at <i>idle</i> speed, the amount of time required to disable the voltage and speed protections till the generator reaches to its nominal values.
Safety on delay	The amount of time at start up that the controller will ignore oil pressure, engine speed, alternator voltage and other <i>delayed</i> alarms. This is used to allow the engine to run up to speed before protections are activated.
Warming up time	The amount of time that the set will run BEFORE being allowed to take load. This is used to warm the engine to prevent excessive wear.
Sensor fail delay Not applicable to 8660	(Only available if using Magnetic pick-up) This is only used if magnetic pick speed sensing is selected. Once cranking has commenced the module must receive a speed signal within this time. If no signal is present, the generator will be shutdown and a Loss of Speed Sensing alarm given.

4.6.2 LOAD / STOPPING TIMERS

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

 = Only available on DSE8660/20 AMF Modules

Timer	Description
Transfer time/ Load Delay	This timer has two functions  1: The time between the mains load switch being opened and the generator load switch being closed (and vice versa). 2: The time between the Load Shed Control outputs (if configured) being energised and the generator being placed on load (at start up).
Breaker close pulse	The amount of time that <i>Breaker Close Pulse</i> signals will be present when the request to close a breaker is given.
Breaker Trip pulse	The amount of time that <i>Breaker Open Pulse</i> signals will be present when the request to open a breaker is given.
Parallel Run Time DSE8660/20 only	This timer dictates how long the generator will run in parallel with the mains supply.
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 time	The amount of time that the set will be 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.
ETS Solenoid hold	The amount of time the <i>Energise to stop</i> solenoid will be 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.
Generator transient delay	Used to delay the generator under/over volts/frequency alarms. Typically this is used to prevent spurious shutdown alarms caused by large changes in load levels.

4.6.3 MODULE TIMERS

Timer	Description
LCD Page timer	If the module is left unattended for the duration of the <i>LCD Page Timer</i> it will revert to show the <i>Status</i> page.
LCD Scroll Timer	The scroll time between parameters on a selected page

4.7 MAINS



= Only available on DSE8660/DSE8620 Modules

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

Mains

[Mains Options](#)

[Mains Alarms](#)

4.7.1 MAINS OPTIONS

Mains Options

Mains Options

Mains Failure Detection

Immediate Mains Dropout

AC System 3 Phase, 4 Wire

VT fitted

Primary 111 ⊕ ⊖ ⊕ ⊖ 110 Secondary vPhPh

Mains Phase Rotation

Enable

Phase Rotation L1-L2-L3

Breaker Control

Enable Breaker Alarms

Fail to Open Delay 1.0s

Fail to Close Delay 1.0s

Phase Offset

Allow Editing

Phase Offset 0

If three phase loads are present, it is usually desirable to set this parameter to to enable *Immediate Mains Dropout*.

This is 'read only' for information purposes. The AC system is configured in the 'Generator Options' page.

Timer	Description
Mains failure detection 	<input type="checkbox"/> = The module will ignore the status of the mains supply. <input checked="" type="checkbox"/> = The module will monitor the mains supply and use this status for automatically starting and stopping the set in auto mode.
Immediate Mains Dropout 	<input type="checkbox"/> = Upon mains failure, the mains load switch will be kept closed until the generator is up to speed and volts. <input checked="" type="checkbox"/> = Upon mains failure, the mains load switch will be opened immediately, subject to the setting of the <i>mains transient</i> timer.
AC System 	These settings are used to detail the type of AC system to which the module is connected: 3 phase 4 wire, 1 phase 2 wire, 2 phase 3 wire – L1-L2, 2 phase 3 wire – L1-L3, 3 phase 3 wire, 3 phase 4 wire delta This list is not exhaustive. DSE reserve the right to add to this list as part of our policy of continual development

Parameter	Description
Phase Rotation	Enables alternative L3-L2-L1 configuration
Breaker Control	Timer before the fail to close alarm is activated
Phase Offset	This setting is to enable an offset of phase to compensate for a transformer with a phase shift in the system. i.e. Mains supply at 11kv to the load : Generator through a step up transformer to 11kV (Enable the DSE controller to see both mains and Generator at the same phase)
VT Fitted 	<input type="checkbox"/> = The voltage sensing to the controller is direct from the mains <input checked="" type="checkbox"/> = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the supplied voltage to be within the 8600 Series controller voltage specification. By entering the <i>Primary</i> and <i>Secondary</i> voltages of the transformer, the controller will display the <i>Primary</i> voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (ie 11kV) but can also be used on systems such as 600V ph-ph.

4.7.1.1 MAINS PHASE ROTATION

Parameter	Description
Mains Phase Rotation  IEEE 37.2 – 47 phase sequence relay	<input type="checkbox"/> = Mains phase rotation is not checked. <input checked="" type="checkbox"/> = A 'mains failure' situation is generated if the phase rotation is not as configured.

4.7.2 MAINS VOLTAGE ALARMS

 = Only available on DSE8660/DSE8620 Modules

Mains Voltage Alarms

Under Voltage Alarms

Enable

Trip V PhN

Return V PhN

Nominal Voltage

V PhN

Over Voltage Alarms

Enable

Return V PhN

Trip V PhN

Click to enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.

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

Click and drag to change the setting.

Alarm	IEEE designation
Mains Under voltage	IEEE 37.2 - 27AC Under voltage relay
Mains Over voltage	IEEE 37.2 - 59AC Over voltage relay

4.7.3 MAINS FREQUENCY ALARMS

Mains Frequency Alarms

Under Frequency Alarms

Enable

Trip Hz

Return Hz

Over Frequency Alarms

Enable

Return Hz

Trip Hz

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

Click to enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.

Click and drag to change the setting.

Alarm	IEEE designation
Mains Under Frequency 	IEEE 37.2 -81 Frequency relay
Mains Over Frequency 	IEEE 37.2 -81 Frequency relay

4.7.3.1 MAINS CURRENT

 = Only available on DSE8660/DSE8620 Modules

Click when only using one CT for measuring mains current. The system assumes a balance load and all phases mirror L1

Timer	Description
CT Primary	Primary rating of the Current Transformers
CT Secondary	Secondary rating of the Current Transformers
Full Load Rating Full kVAr Rating	Full load rating (100% rating) of the mains supply The kW and kVAr rating must be correctly set. The values you set here are the kW and kVAr, NOT the kVA or Power Factor! These values are used for many functions including <i>Mains Power</i> and <i>Load Share</i> functions.
Export Power	Measures power exported to the mains supply and provides an alarm condition if the configured value is exceeded.

4.7.4 MAINS DECOUPLING

DSE8600 series controllers include “Mains decoupling” detection to be used with generating sets paralleling with the mains (utility) supply.

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

Because of this and other possible dangerous situations, the power supply companies impose regulations when generators are in parallel. This is to detect mains failure during parallel operation and to remove the generator from the grid in this situation. In the UK a common regulation requirement is G59. Other countries have different names for these regulations.

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

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

The screenshot shows the 'Mains Decoupling' configuration page. It includes sections for 'Options', 'R.O.C.O.F. Alarm', 'Vector Shift Alarm', 'Voltage Alarms', and 'Frequency Alarms'. Callouts provide the following information:

- Mains Decoupling:** A callout states that this feature is not available on DSE8610/DSE8620 unless a digital input is configured to 'Mains Parallel Mode'. If not configured, the parameters are greyed out.
- R.O.C.O.F. Alarm:** A callout explains that the 'Enable' checkbox must be clicked to activate the alarm. If disabled, the trip and delay settings below will be greyed out.
- Vector Shift Alarm:** A callout indicates that the 'Enable' checkbox and its associated settings can be clicked and dragged to change the value.
- Voltage Alarms:** The interface shows 'Undervolts' and 'Overvolts' settings, each with a 'Trip' value (362 v PhPh and 438 v PhPh respectively) and a 'Delay' in seconds, both adjustable via sliders.
- Frequency Alarms:** The interface shows 'Under Freq.' and 'Over Freq.' settings, each with a 'Trip' value (47.1 Hz and 50.5 Hz respectively) and a 'Delay' in seconds, both adjustable via sliders.

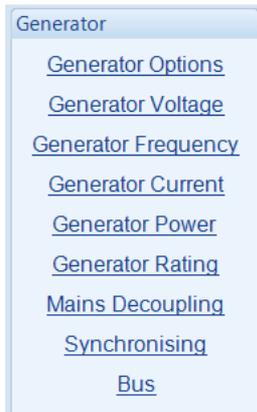
Parameters detailed overleaf...

Parameter	Function
Alarm action	Used to select what happens when a Mains Decoupling trip is detected : Electrical Trip – The generator load switch is opened and the set is allowed to perform a cooling run before being stopped. Auxiliary mains fail – Opens the mains load switch and allows the generator to continue providing power to the load.
R.O.C.O.F. IEEE 37.2 - 81 Frequency relay	<input type="checkbox"/> : ROCOF protection is disabled <input checked="" type="checkbox"/> : ROCOF protection is enabled when the generator is in parallel with the mains supply. R.O.C.O.F. (Rate Of Change Of Frequency) detection senses sudden, fast changes in the frequency of the waveform. During the failure of the mains supply when in parallel with the generator, the frequency will change faster than is usual by either the on load generator, or by the mains supply.
Vector Shift	<input type="checkbox"/> : Vector Shift protection is disabled <input checked="" type="checkbox"/> : Vector Shift protection is enabled when the generator is in parallel with the mains supply. Vector Shift detection measures the length of each cycle of the voltage wave. When the mains fails in parallel with the generator, the sudden change in load creates a change in the length of the cycle length.
Mains under voltage IEEE 37.2 - 27 under voltage relay Mains over voltage IEEE 37.2 - 59 Frequency relay Mains under frequency IEEE 37.2 - 81 Frequency relay Mains over frequency IEEE 37.2 - 81 Frequency relay	Used to enable and set the levels at which mains failure is detected when in parallel with the generator set. Delay: Provides a reaction time on the mains level alarms. Under/Over voltage and Under/Over frequency detection relies on the premise that the generator voltage/frequency will drift more when not in parallel, than it does when it is in parallel with the mains supply. This may not be true if the generator is only lightly loaded upon the failure of the mains supply.

4.8 GENERATOR

Not applicable to DSE8660.

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



4.8.1 GENERATOR OPTIONS

Not applicable to DSE8660

The screenshot shows the 'Generator Options' configuration page. It includes the following sections and callouts:

- Generator Options:**
 - Alternator Fitted:** A checked checkbox. Callout: "Click to enable or disable the alternator. The relevant values below appear *greyed out* if it is disabled."
 - Poles:** A dropdown menu set to '4'.
 - AC System:** A dropdown menu set to '3 Phase, 4 Wire'. Callout: "Select your AC system. A schematic is shown below with connection details from the alternator to the DSE8600 Series module."
 - Schematic:** A diagram showing a 3-phase star connection with phases L1, L2, and L3, and a neutral line N. Terminals 43, 44, 45, and 46 are connected to the phases.
 - VT fitted:** An unchecked checkbox. Callout: "Click to enable or disable the feature. The relevant values below appear *greyed out* if the VT is disabled."
 - Primary:** A dropdown menu set to '111'.
 - Secondary vPhPh:** A dropdown menu set to '110'.
- Generator Phase Rotation:**
 - Enable:** A checked checkbox.
 - Phase Rotation:** A dropdown menu set to 'L1-L2-L3'.
- Breaker Control:**
 - Enable Breaker Alarms:** A checked checkbox.
 - Fail to Open Delay:** A slider set to '1.0s'.
 - Fail to Close Delay:** A slider set to '1.0s'.

Callout for Breaker Control: "If there is no input configured to *Generator Closed Auxiliary* this option is *greyed out*".

These parameters are described overleaf...

Parameter	Description
Alternator fitted	<input type="checkbox"/> = There is no alternator in the system, it is an <i>engine only</i> application <input checked="" type="checkbox"/> = An alternator is fitted to the engine, it is a generator application.
Poles	The number of poles on the alternator
VT Fitted	<input type="checkbox"/> = The voltage sensing to the controller is direct from the alternator <input checked="" type="checkbox"/> = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the generated voltage to be within the DSE8600 Series controller voltage specification. By entering the <i>Primary</i> and <i>Secondary</i> voltages of the transformer, the controller will display the <i>Primary</i> voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (ie 11kV) but can also be used on systems such as 600V ph-ph.
AC System	Select the AC system topology from the list: 2 Phase, 3 Wire L1 - L2 2 Phase, 3 Wire L1 – L3 3 Phase, 3 Wire 3 Phase, 4 Wire 3 Phase, 4 Wire Delta L1-N-L2 3 Phase, 4 Wire Delta L1-N-L3 3 Phase, 4 Wire Delta L2-N-L3 Single Phase, 2 Wire Single Phase, 3 Wire L1 – L2 Single Phase, 3 Wire L1 – L3 <div style="border: 1px solid black; padding: 5px;">  NOTE: For further information on the wiring for the different topologies, please refer to the DSE module operator manual. </div>

4.8.1.1 GENERATOR CONTACTOR ALARM

Parameter	Description
Generator Contactor Alarm	<input type="checkbox"/> = Generator fail to close alarm is disabled <input checked="" type="checkbox"/> = If the generator breaker does not close, within the time alarm an alarm is raised.

4.8.1.2 GENERATOR PHASE ROTATION

Parameter	Description
Generator Phase Rotation IEEE 37.2 – 47 phase sequence relay	<input type="checkbox"/> = Generator phase rotation is not checked. <input checked="" type="checkbox"/> = An electrical trip alarm is generated if the phase rotation is not as configured.

4.8.2 GENERATOR VOLTAGE ALARMS

Not applicable to DSE8660

The screenshot shows the 'Generator Voltage Alarms' configuration page. It is divided into several sections: 'Under Voltage Alarms', 'Loading Voltage', 'Nominal Voltage', and 'Over Voltage Alarms'. Each section contains various settings like 'Alarm', 'Action', 'Trip', 'Pre-alarm', and 'Return' with associated numerical values and percentage indicators. Callouts provide instructions: 'Click to enable or disable the alarms. The relevant values below appear greyed out if the alarm is disabled.' (pointing to the 'Alarm' checkbox), 'Type the value or click the up and down arrows to change the settings' (pointing to the 'Trip' input field), '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), 'Click and drag to change the setting.' (pointing to a slider), and 'Click to enable alarm upon failure to reach loading voltage.' (pointing to the 'Enable Alarm' checkbox).

Alarm	IEEE designation
Generator Under voltage	IEEE 37.2 - 27AC Under voltage relay
Generator Over voltage	IEEE 37.2 - 59AC Over voltage relay

4.8.3 GENERATOR FREQUENCY ALARMS

Not applicable to DSE8660

The screenshot displays the configuration interface for generator frequency alarms, organized into four main sections:

- Under Frequency Alarms:** Contains 'Shutdown' and 'Pre-alarm' sections. Each has a checked checkbox and a 'Trip' value (40.0 Hz and 42.0 Hz respectively) with a slider set to 80.0% and 84.0%.
- Loading Frequency:** Features a 'Loading Frequency' slider at 45.0 Hz (90.0%) and an 'Enable Alarm' checkbox (unchecked). The 'Action' is set to 'Warning'.
- Nominal Frequency:** Shows a 'Nominal Frequency' slider at 50.0 Hz.
- Over Frequency Alarms:** Includes 'Pre-alarm', 'Return', and 'Shutdown' sections. 'Return' and 'Shutdown' have checked checkboxes. 'Return' has a value of 54.0 Hz (108.0%) and a slider. 'Trip' has a value of 55.0 Hz (110.0%) and a slider. 'Shutdown' has a value of 57.0 Hz (114.0%) and a slider.

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

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

Click and drag to change the setting.

Click to enable alarm upon failure to reach loading frequency

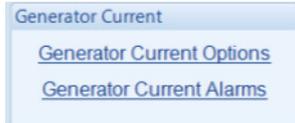
Over frequency Shutdown can only be disabled if another method of speed protection is available (i.e. CAN or Magnetic Pickup). Hence the checkbox is *greyed out*

Alarm	IEEE designation
Generator Under Frequency	IEEE 37.2 -81 Frequency relay
Generator Over Frequency	IEEE 37.2 -81 Frequency relay

4.8.4 GENERATOR CURRENT

Not applicable to DSE8660

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



4.8.4.1 GENERATOR CURRENT OPTIONS

Timer	Description
CT Primary	Primary rating of the Current Transformers
CT Secondary	Secondary rating of the Current Transformers
Full Load Rating	Full load rating (100% rating) of the generator
Earth CT Primary	Primary rating of the Current Transformer used for earth fault (optional) Where No Earth Fault CT is fitted, ensure the Earth Fault Alarm is disabled and the CT common is wired correctly.

4.8.4.2 GENERATOR CURRENT ALARMS

Parameters detailed overleaf....

Overcurrent Alarm

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

Immediate warning

IEEE 37.2 -50 instantaneous overcurrent relay

If the current exceeds the *Trip* level the *Immediate Warning* activates.

IDMT Alarm

IEEE 37.2 -51 AC time overcurrent relay (shutdown / electrical trip)

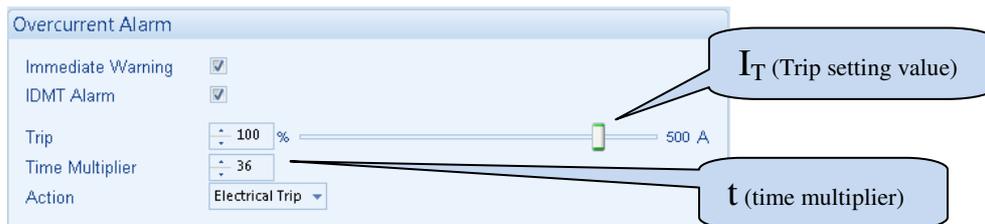
If the *IDMT Alarm* is enabled, the 8600 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the *IDMT Alarm* triggers (*Shutdown* or *Electric trip* as selected in *Action*).

The higher the overload, the faster the trip. The speed of the trip is dependent upon the fixed formula:

$$T = t / ((I_A / I_T) - 1)^2$$

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

Typical settings for the *IDMT Alarm* when used on a brushless alternator are:



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, the set continues to run.

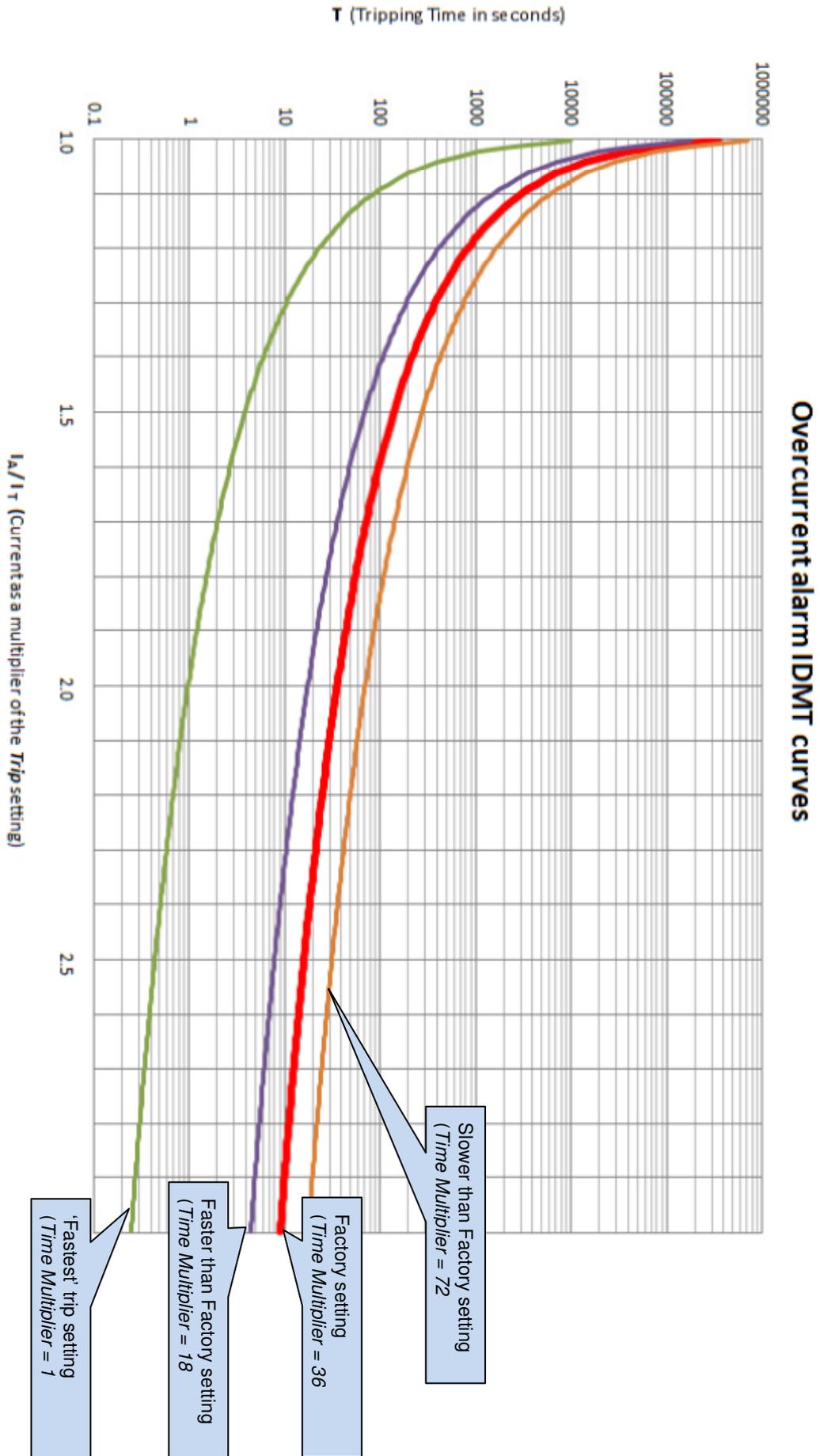
The effect of an overload on the generator is that the alternator windings begin to overheat; the aim of the *IDMT alarm* is to prevent the windings being overload (heated) too much. The amount of time that the set can be safely overloaded is governed by how high the overload condition is.

See overleaf for details of the IDMT alarm factory settings and examples of different settings for the *Time Multiplier (t)*.

The IDMT alarm factory settings, allows for overload of the set to the limits of the *Typical Brushless Alternator* whereby 110% overload is permitted for 1 hour.

If the set load is reduced, the controller then *follows* a cooling curve. This means that a second overload condition may trip much sooner than the first as the controller *knows* if the windings have not cooled sufficiently.

For further details on the *Thermal damage curve* of your alternator, you are referred to your alternator manufacturer.



Creating an Excel spreadsheet of the IDMT curve.

The formula used: $T = t / ((I_A / I_T) - 1)^2$

Can be simplified for addition into a spreadsheet. This can be useful for 'trying out' differering values of *t* (*Time Multiplier*) and viewing the results, without actually testing this on the engine.

	A	B	C	D	E	F	G
1		1.01	1.02	1.03	1.04	1.05	1.06
2	36	360000	90000	40000	22500	14400	10000

t – Time Multiplier
Factory setting is 36

T – Tripping time (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:

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

4.8.4.3 SHORT CIRCUIT

IEEE 37.2 -51 AC time overcurrent relay (shutdown / electrical trip)

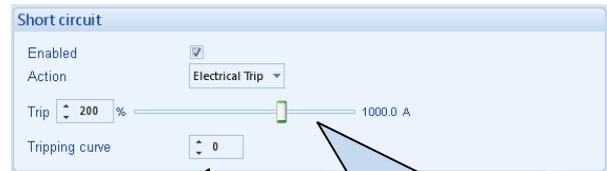
For overload conditions caused by a short circuit, the overcurrent alarm is not fast enough to protect the system. The Short Circuit alarm performs this protection.

If the *Short Circuit alarm* is enabled, and the current is excessive, the DSE8610/DSE8620 controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the Alarm triggers (*Shutdown* or *Electric trip* as selected in *Action*).

The higher the short circuit current, the faster the trip. The speed of the trip is dependent upon the fixed formula:

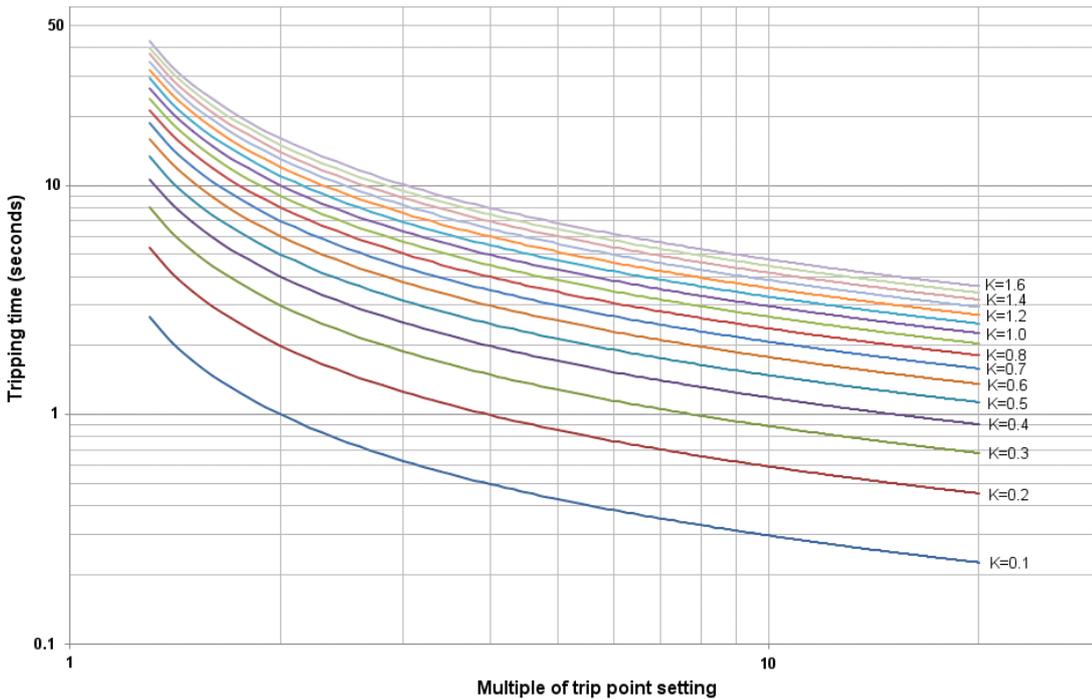
$$T = K \times 0.14 / ((I / I_s)^{0.02} - 1)$$

Where: T is the tripping time in seconds (accurate to +/- 5% or +/- 50ms (whichever is the greater)
 K is the time multiplier setting
 I is the actual current measured
 I_s is the trip setting value



K (time multiplier setting)

I_s (Trip setting value)

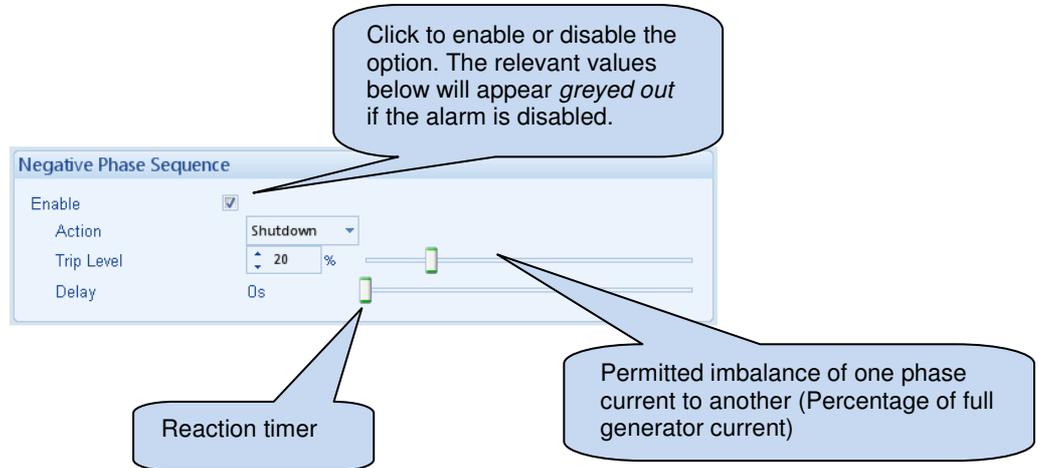


4.8.4.4 NEGATIVE PHASE SEQUENCE

(Negative Sequence Current / Unbalanced Load)

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

For recommended settings you should contact your alternator manufacturer.



4.8.4.5 EARTH FAULT

IEEE 37.2 -51 AC time overcurrent relay (shutdown / electrical trip)

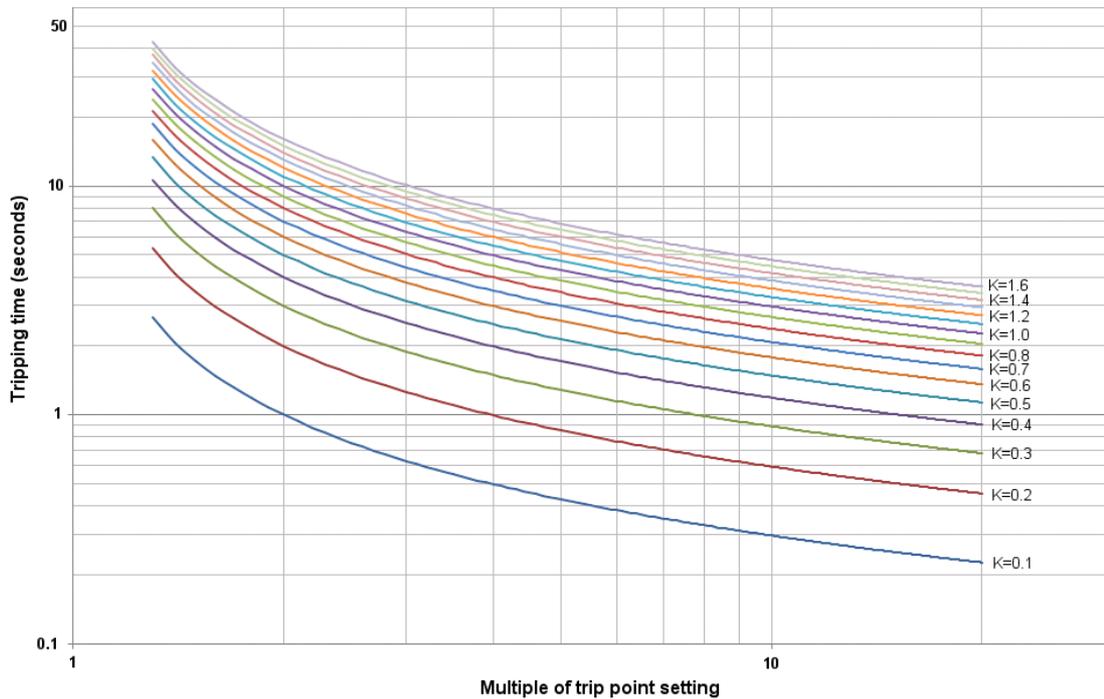
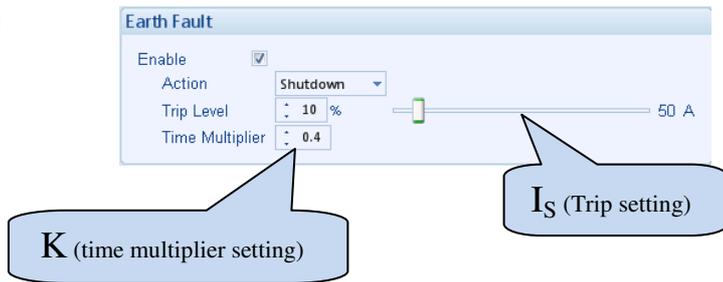
When the module is suitably connected using the 'Earth Fault CT'. The module measures Earth Fault and can optionally be configured to generate an alarm condition when a specified level is surpassed.

If the *Earth Fault alarm* is enabled, the DSE8600 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the Alarm triggers (*Shutdown* or *Electric trip* as selected in *Action*).

The higher the Earth Fault, the faster the trip. The speed of the trip is dependent upon the fixed formula:

$$T = K \times 0.14 / ((I / I_s)^{0.02} - 1)$$

Where: T is the tripping time in seconds (accurate to +/- 5% or +/- 50ms (whichever is the greater))
 K is the time multiplier setting
 I is the actual earth current measured
 I_s is the trip setting



4.8.5 GENERATOR POWER

Applicable to DSE8610/DSE8620 only.

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



4.8.5.1 OVERLOAD PROTECTION

Overload protection is a subpage of the Generator Power page.

The screenshot shows the 'Overload Protection' configuration page. It includes sections for 'Pre-alarm' and 'Alarm'. The 'Pre-alarm' section has a checked checkbox, a 'Trip' slider set to 90% (310 kW), a 'Return' slider set to 80% (276 kW), and a 'Delay' of 5s. The 'Alarm' section has a checked checkbox, an 'Action' dropdown set to 'Shutdown', a 'Trip' slider set to 100% (345 kW), and a 'Delay' of 5s. Two callout boxes provide instructions: one points to the 'Pre-alarm' checkbox with the text 'Click to enable or disable the option. The relevant values below will appear greyed out if the alarm is disabled.' The other points to the 'Return' slider with the text 'Click and drag to change the setting.'

Setting	Description
Overload Protection	<p><input type="checkbox"/> = Overload Protection function is disabled. <input checked="" type="checkbox"/> = The module will monitor the kW load level and provide an alarm function if the level exceeds the <i>Trip</i> setting for the configured amount of time in the <i>Delay</i> setting.</p> <p>Action <i>Electrical Trip:</i> The generator is taken off load and the set stopped after the <i>Cooling timer</i>. Any output or LCD display set to <i>kW Overload Protection</i> is energised. <i>Indication:</i> No alarm is generated; however any output or LCD display set to <i>kW Overload Protection</i> is energised. The kW load must fall below the <i>Return</i> level in order to cancel the output source. <i>Shutdown:</i> The generator is taken off load and the set stopped immediately. <i>Warning:</i> An alarm is generated but the set continues to run. Any output or LCD display set to <i>kW Overload Protection</i> is energised. The kW load must fall below the <i>Return</i> level in order to cancel the output source.</p>

4.8.5.2 LOAD CONTROL

Load Control

Dummy Load Control

Enable

Outputs in Scheme

Trip % 40 kW

Trip Delay s

Return % 100 kW

Return Delay s

Transfer Time / Load Delay 0.7s

Load Shedding Control

Enable

Outputs in Scheme

Outputs at Start

Trip % 160 kW

Trip Delay s

Return % 140 kW

Return Delay s

Transfer Time / Load Delay 0.7s

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

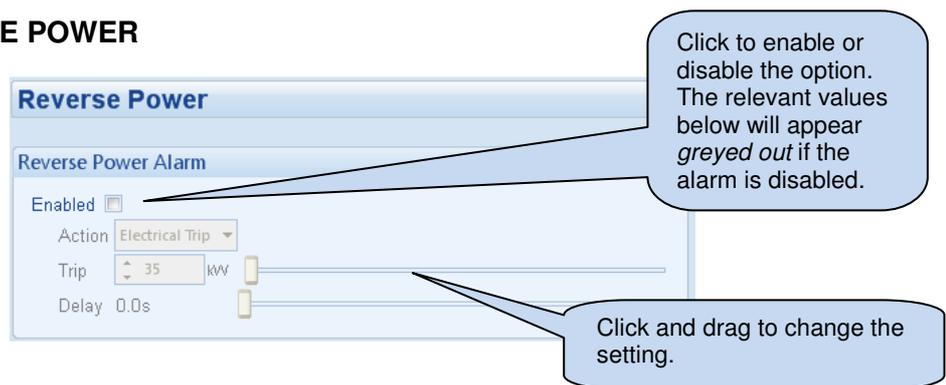
Click to enable or disable the option. The relevant values below will appear greyed out if the alarm is disabled.

Setting	Description
Dummy Load Control	<p>Provides control of configurable outputs set to <i>Dummy Load Control</i>.</p> <p><input type="checkbox"/> = Dummy Load Control is disabled. <input checked="" type="checkbox"/> = The module will monitor the load and control any outputs configured to <i>Dummy Load Control (1-5)</i></p> <p>Outputs in scheme: The amount of <i>Dummy Load Control</i> outputs that will be included in the function.</p> <p>Trip / Trip Delay: If 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)</p> <p>Return / Return Delay: If the load level is above the <i>Return</i> setting 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.</p>

Continued overleaf...

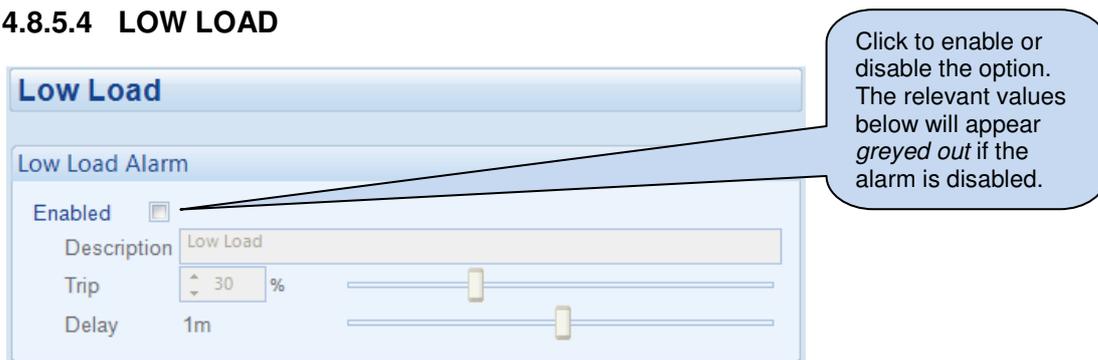
Setting	Description
Load Shedding Control	<p>Provides control of configurable outputs set to <i>Load shedding control</i>.</p> <p><input type="checkbox"/> = Load Shedding Control is disabled. <input checked="" type="checkbox"/> = The module will monitor the load and control any outputs configured to Load Shedding Control (1-5)</p> <p>Outputs in Scheme: The number of outputs (max 5) that will be included in the function.</p> <p>Outputs at Start: The number of outputs configured to <i>Load Shedding Control 1-5</i> that will be 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.</p> <p>Trip / Trip Delay: If 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)</p> <p>Return / Return Delay: If 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.</p> <p>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.</p>

4.8.5.3 REVERSE POWER

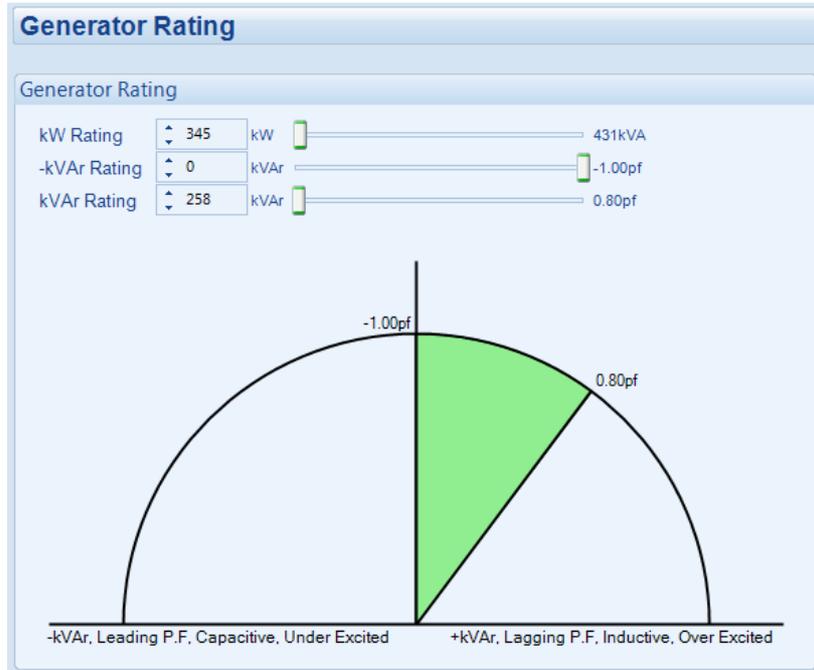


Setting	Description
Reverse Power IEEE 37.2 -32 Directional power relay	<p>This setting is used to configure the generator reverse power alarm: -</p> <p><input type="checkbox"/> = Generator reverse power will NOT give an electrical trip alarm. <input checked="" type="checkbox"/> = Generator reverse power WILL give an electrical trip alarm in the event of the reverse power exceeding the displayed '<i>reverse power trip</i>' values for the configured time.</p> <p>Actions Warning (<i>Alarm only, No shutdown</i>) Shutdown (<i>Alarm and shutdown</i>) Electrical Trip (<i>Alarm/off-load generator followed by shutdown after cooling</i>)</p>
Not applicable to DSE8660	

4.8.5.4 LOW LOAD



4.8.6 GENERATOR RATING



The Generator kW, kVAr and -kVAr rating must be correctly set.
 The values set here are the kW, kVAr and -kVAr, NOT the kVA or Power Factor!

These values are used for many functions including *Generator Power* functions and *Load Share* functions.

Calculating the VAR rating of a genset

- Most generators are rated for a power factor (W \ VA) of 0.8
- From Pythagoras :
 - $\text{Cos } \phi = W / VA$
 - $\text{Cos } \phi = 0.8$
 - $\phi = \text{Cos}^{-1} 0.8 = 36.87^\circ$
- From this we can calculate the VAR rating of the typical 0.8 pf rated generator as :
 - $\text{Tan } \phi = \text{VAR} / W$
 - $\text{VAR} = \text{Tan } 36.87 \times W$
 - $\text{VAR} = 0.75 \times W$
- Or to simplify this, the VAR rating of a 0.8 pf rated generator is ¾ of the W rating
 (kVAr rating = 75% of kW rating)

Timer	Description
kW Rating	kW rating of the generator
-kVAr Rating	The negative kVAr rating of the generator, supported by some alternators
kVAr Rating	kVAr rating of the generator

4.8.7 MAINS DECOUPLING

DSE8600 series controllers include “Mains decoupling” detection to be used with generating sets paralleling with the mains (utility) supply.

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

Because of this and other possible dangerous situations, the power supply companies impose regulations when generators are in parallel. This is to detect mains failure during parallel operation and to remove the generator from the grid in this situation. In the UK a common regulation requirement is G59. Other countries have different names for these regulations.

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

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

The screenshot shows the 'Mains Decoupling' configuration page. It includes sections for 'Options', 'R.O.C.O.F. Alarm', 'Vector Shift Alarm', 'Voltage Alarms', and 'Frequency Alarms'. Callouts provide the following information:

- Mains Decoupling:** A callout explains that this feature is not available on DSE8610/DSE8620 unless a digital input is configured to 'Mains Parallel Mode'. When not configured, parameters are greyed out.
- R.O.C.O.F. Alarm:** A callout indicates that clicking the 'Enable' checkbox will enable or disable the option, and that other values will be greyed out if disabled.
- Vector Shift Alarm:** A callout shows that the 'Trip' value (6.0) can be changed by clicking and dragging the slider.
- Voltage Alarms:** Callouts show the 'Undervolts' and 'Overvolts' sections, each with 'Trip' and 'Delay' settings and sliders.
- Frequency Alarms:** Callouts show the 'Under Freq.' and 'Over Freq.' sections, each with 'Trip' and 'Delay' settings and sliders.

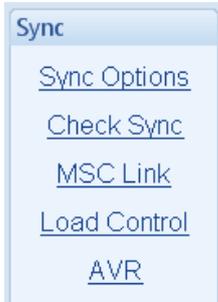
Parameters detailed overleaf...

Parameter	Function
Alarm action	Used to select what happens when a Mains Decoupling trip is detected : Electrical Trip – The generator load switch is opened and the set is allowed to perform a cooling run before being stopped. Auxiliary mains fail – Opens the mains load switch and allows the generator to continue providing power to the load. Warning – The controller triggers a Warning Alarm, the set continues to run and the generator load switch remains closed.
R.O.C.O.F. IEEE 37.2 - 81 Frequency relay	<input type="checkbox"/> : ROCOF protection is disabled <input checked="" type="checkbox"/> : ROCOF protection is enabled when the generator is in parallel with the mains supply. R.O.C.O.F. detection senses sudden, fast changes in the frequency of the waveform. During the failure of the mains supply when in parallel with the generator, the frequency will change faster than is usual by either the on load generator, or by the mains supply.
Vector Shift	<input type="checkbox"/> : Vector Shift protection is disabled <input checked="" type="checkbox"/> : Vector Shift protection is enabled when the generator is in parallel with the mains supply. Vector Shift detection measures the length of each cycle of the voltage wave. When the mains fails in parallel with the generator, the sudden change in load creates a change in the length of the cycle length.
Mains under voltage IEEE 37.2 - 27 under voltage relay Mains over voltage IEEE 37.2 - 59 Frequency relay Mains under frequency IEEE 37.2 - 81 Frequency relay Mains over frequency IEEE 37.2 - 81 Frequency relay	Used to enable and set the levels at which mains failure is detected when in parallel with the generator set. Delay: Provides a reaction time on the mains level alarms. Under/Over voltage and Under/Over frequency detection relies on the premise that the generator voltage/frequency will drift more when not in parallel, than it does when it is in parallel with the mains supply. This may not be true if the generator is only lightly loaded upon the failure of the mains supply.

4.8.8 SYNCHRONISING

Not applicable to DSE8660

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



4.8.8.1 SYNC OPTIONS

The screenshot shows the "Sync Options" configuration page with several sections and callouts:

- Options:** "Enable Synchronising" . Callout: "Check the box to enable the setting."
- Governor:** "Interface" dropdown set to "Internal Analogue". Callout: "Governor interface method". "Output Reversed" . "Action" dropdown set to "Adjust To Nominal Frequency".
- AVR:** "Output" dropdown set to "Internal Analogue". Callout: "AVR Interface method". "Output Reversed" . "Action" dropdown set to "Adjust To Nominal Voltage".
- MSC Compatibility:** "MSC Compatibility" . Callout: "MSC Link compatibility with 7510/5510 modules." "P123 Ramp Enabled" . "P123 Frequency Trip" set to 0.1 Hz.

Parameters detailed overleaf...

Governor

IEEE 37.2 -90 regulating device
(Not applicable to 8660)

These settings configure the method of interface between the DSE8610/DSE8620 controller and the engine speed governor.

Parameter	Description
Governor Interface	<p>Internal Relays –The governor or motorised potentiometer is controlled by the 8610/20 modules' own internal relays.</p> <div style="border: 1px solid black; padding: 5px;"> <p> NOTE: - It will be necessary to configure two of the module relays to provide the required 'Speed raise' and 'Speed Lower' signals.</p> </div> <p>Internal Analogue module – This is used to provide a DC voltage output to interface with many engine speed governors remote speed adjust or load sharing controller inputs.</p>
Governor Output Reversed	<p>Only available in conjunction with internal analogue selected This allows the module to interface with a greater diversity of governors.</p> <p><input type="checkbox"/> = Lower voltage equates to lower speed. <input checked="" type="checkbox"/> = Lower voltage equates to higher speed.</p>
Adjust to nominal frequency	<p>This option determines the action that will be taken by the 8600 synchroniser during the period that the set is running on load.</p> <p>Adjust to Centre Point – Whenever generators are required to run in parallel, then active load sharing is recommended. However, this may not be essential when the accuracy of the load sharing is not critical and is only required for short periods. In this case 'droop' governors must be used in conjunction with the 'synchronising reset option – reset to datum on load' feature. This works on the principal that the governed frequency of each generator for any given load will be the same when at its datum setting. This approach is generally unsuitable for mains connected systems but will provide rudimentary load sharing between two or more generators.</p> <p>Adjust to Nominal – When on load as a single set (but not in parallel) the 8610 load sharing module will effect changes to the governor and to keep the system frequency at nominal levels. These levels are user adjustable on the 'generator' tab accessible via Config Suite PC software. This is used to ensure the nominal frequency of the system is maintained even if droop is configured.</p> <p>None – Adjustment will not take place; the speed will remain at current levels.</p> <p>When in parallel with other sets, the DSE8600 load share controller will automatically keep the system frequency at nominal levels regardless of the selection of this parameter.</p>

AVR

IEEE 37.2 -90 regulating device
(Not applicable to 8660)

These settings configure the method of interface between the DSE8610/DSE8620 controller and the Automatic Voltage Regulator (AVR)

Parameter	Description
AVR Interface	<p>None – No external interface is fitted between 86xx controller and the AVR and no control over voltage matching or VAr sharing will be made. Internal Relays – The AVR or motorised potentiometer is controlled by the 75xx modules own internal relays.</p> <div style="border: 1px solid black; padding: 5px;"> <p> NOTE: - It will be necessary to configure two of the module relays to provide the required 'Voltage raise' and 'Voltage Lower' signals.</p> </div> <p>Internal Analogue - This external interface is used to provide a DC voltage output to interface with many AVRs remote voltage adjust or load sharing controller inputs.</p>
AVR Output Reversed	<p>Only available in conjunction with internal analogue selected This allows the module to interface with a greater diversity of AVRs.</p> <p><input type="checkbox"/> = Lower voltage equates to lower voltage. <input checked="" type="checkbox"/> = Lower voltage equates to higher voltage.</p>
Adjust to nominal voltage	<p>This option determines the action that will be taken by the 8600 synchroniser during the period that the set is running on load.</p> <p>Adjust to Centre Point – Whenever generators are required to run in parallel, then active load sharing is recommended. However, this may not be essential when the accuracy of the load sharing is not critical and is only required for short periods. In this case 'droop' AVRs must be used in conjunction with the 'synchronising reset option – reset to datum on load' feature. This works on the principal that the governed voltage of each generator for any given load will be the same when at its datum setting. This approach is generally unsuitable for mains connected systems but will provide rudimentary load sharing between two or more generators.</p> <p>Adjust to Nominal – When on load as a single set (but not in parallel) the 8610 load sharing module will effect changes to the AVR to keep the system voltage at nominal levels. These levels are user adjustable on the 'generator' tab accessible via Config Suite PC software. This is used to ensure the nominal voltage of the system is maintained even if droop is configured.</p> <p>None – Adjustment will not take place; the speed and voltage will remain at current levels.</p> <p>When in parallel with other sets, the DSE8600 load share controller will automatically keep the system voltage at nominal levels regardless of the selection of this parameter.</p>

MSC Compatibility

(Not applicable to 8620)

These settings configure the method of interface between the DSE8600 series controllers and the DSE5500 and DSE7500 series controllers.

Parameter	Description
MSC Compatibility	<p><input type="checkbox"/> = The DSE8600 will not be able to communicate with the DSE5500 and DSE7500 series modules on the MSC Link</p> <p><input checked="" type="checkbox"/> = Communication between DSE8600 and DSE5500 and DSE7500 is enabled. The maximum number of generator controllers is reduced to 16 and the maximum number of mains controllers is reduced to 8.</p> <p>⚠ NOTE: The DSE5560 and DSE7560 are not compatible with the DSE8660, only one type of DSExx60 can be connected on the MSC at any time (DSE55xx/DSE75xx OR DSE8660).</p>
P123 Ramp Enabled	<p><input type="checkbox"/> = The DSE8610 will use MSC link for ramping and load sharing.</p> <p><input checked="" type="checkbox"/> = The DSE8610 is connected to a DSE123 to convert the MSC link to interface with Analogue Load Share lines</p> <p>⚠ NOTE: The P123 is only available for DSExx10 modules.</p>
P123 Frequency Trip	<p>(Only Available when P123 Ramp option is enabled)</p> <p>If the frequency changes by this amount when ramping down, the module will open the generator breaker.</p>

4.8.8.2 CHECK SYNC

Parameter	Description
Check Sync	<p>During the synchronising process, the DSE86xx will adjust the frequency of the generator to closely match the existing bus. Typically the oncoming set will be adjusted to be 0.1Hz faster than the existing supply. This causes the phase of the two supplies to change continuously. Before the breaker can be closed, the following conditions must be met:</p> <ul style="list-style-type: none"> • The difference between the two supplies frequencies must be between the <i>Check Sync Low Frequency</i> and <i>Check Sync High Frequency</i> • The difference between the two supplies voltages must be equal to or below the <i>Check Sync Voltage</i> • The phase of the two supplies must be equal to or below the <i>Check Sync Phase Angle</i>
Dead Bus	<p>The bus is measured when the set is to be loaded. If the bus is measured to be below the <i>Dead Bus Voltage</i>, the bus is assumed to be 'dead' and the breaker can be closed immediately.</p> <p>If the bus is measured to be above the <i>Dead Bus Voltage</i>, the oncoming generator must be synchronised before the breaker can be closed.</p>
Fail to sync Alarm	<p>If the synchronising process continues longer than the <i>Fail to Sync Alarm Delay</i>, the alarm is triggered.</p> <p>This may occur if changes in the load are making the set control difficult due to changes in voltage and frequency.</p> <p>Electrical Trip : The set is stopped. In a <i>Load Demand</i> scheme, other generators may start if available.</p> <p>Warning: The set continues to synchronise.</p>

4.8.8.3 MSC LINK

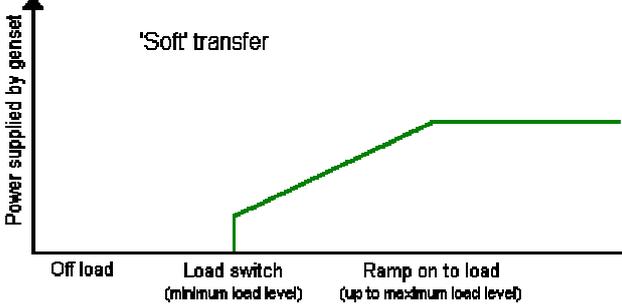
DSE8610 / DSE8660 Modules only.

The screenshot shows the 'MSC Link' configuration page. It contains four settings:

- MSC Failure Action:** Set to 'Warning'. Callout: 'Action upon MSC Link Failure'.
- MSC Alarms Disabled Action:** Set to 'None'. Callout: 'Action to take when the MSC alarm is disabled by digital input'.
- Too few modules action:** Set to 'None'. Callout: 'Action to take when the number of modules active on the MSC link is lower than the *Minimum modules on comms link* setting'.
- Minimum modules on MSC link:** Set to 1.

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

4.8.8.4 LOAD CONTROL

Soft transfer	Description
 <p>The graph illustrates the power supplied by a genset during a 'Soft transfer' operation. The vertical axis represents 'Power supplied by genset'. The horizontal axis is divided into three stages: 'Off load', 'Load switch (minimum load level)', and 'Ramp on to load (up to maximum load level)'. The power starts at zero during the 'Off load' phase. At the 'Load switch' point, the power immediately jumps to a minimum level. During the 'Ramp on to load' phase, the power is gradually increased until it reaches its maximum level.</p>	<p>When either of the load sharing modes are selected (see below), the 86xx controller will perform a 'soft' load transfer when taking up or shedding load.</p> <p>Upon activation of the load-switching device, the 86xx load sharing system controls the generating set to take up the minimum load. Load is then ramped up to either the set's share of the load (<i>Load share mode</i>) or to the maximum load level (<i>Load level control mode</i>).</p> <p>When a paralleled set is to shed its load, first the load is ramped down to the minimum load level, and then the load switch is deactivated, removing the generator from the bus.</p>

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

- When the generator is removed from the bus, other sets in the system are not suddenly loaded with the load share that was being supplied by the generator being removed. Instead, the load is slowly ramped, allowing time for the remaining sets to take up their share of the load.
- Opening of the load switch occurs at a much lower load level, helping to reduce arcing of the contacts.

Load Control

Load Options

Load Control Mode kW Share ▾

Reactive Load Control Mode kVAr Share ▾

Ramp

Ramp Speed 3.0 % ▬ %/s

Load Demand

Starting options Start all sets initially ▾

Start next set on Warning

Allow set to start with warning

Balance engine hours

Hours 6 ▬

Calling for less sets 70 % ▬

Calling for more sets 80 % ▬

Insufficient Capacity

Action None ▾

Delay 1s ▬

Parameters detailed overleaf...

LOAD OPTIONS

Item	Function
Load Control Mode IEEE 37.2 -90 Regulating device	<p>None: No load sharing will take place. KW Share (8610 only): The load will be shared between all the sets in the system. KW fixed export: The generator will export a fixed amount of active (kW) power.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> NOTE: - On model DSE8610 kW fixed export is only used in conjunction with generating sets in parallel with the mains supply.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> NOTE: - The 8610 will automatically switch from load share mode to kW fixed export mode when an input configured for <i>Mains parallel mode</i> is active.</p> </div>
Reactive load control mode IEEE 37.2 -90 Regulating device	<p>Not available when Active (kW) load share mode is set to <i>None</i>.</p> <p>Options: None: No reactive power (VAr/pf) sharing will take place. VAr Share: Reactive power (VAr) will be shared between all the sets in the system. VAr fixed export: The generator will produce a fixed amount of reactive power (VAr) for use when in parallel with the mains supply.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> NOTE: - The 8610 will automatically switch from VAr share mode to VAr fixed export mode when an input configured for <i>Mains parallel mode</i> is active.</p> </div>

RAMP

Item	Function
Ramp Speed	<p>The rate at which the generator will be ramped onto and off the load.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> NOTE: - The set will initially take load at the level set by load ramp minimum and will then increase it's load share at this rate until either:</p> <ul style="list-style-type: none"> • All the sets have an equal share of the load (8610 module only) • The generated power is equal to the setting for 'load parallel power' <p>When the set is unloaded it will ramp down at this rate from the current load level to the level set by load parallel ramp minimum before being removed from the bus (or mains supply).</p> </div>

LOAD DEMAND

Not DSE8620 Modules

Item	Function
Starting options	<p>Used to configure how the load demand scheme will operate upon start-up.</p> <p>Start all sets initially: Upon activation of the load demand scheme, all sets in the system will start up and parallel onto the generator bus. Then they will stop / start according to load demands. This option is particularly recommended in Multiset mains standby applications where the load is likely to be greater than the capacity of a single set.</p> <p>Start sets as load requires: Upon activation of the load demand scheme, only one set will start initially. Other sets in the system will only be started according to demand. This option is recommended for mutual standby systems where the load is likely to be less than the capacity of a single set.</p>
Start Next Set on Warning	Whenever a warning occurs, a start command will be issued over the MSC link to start the next highest priority set.
Allow Set to Start with Warning	<p><input type="checkbox"/> : If the MSC calls to start another set, generators having warning alarm remain at rest, only generators with no warning alarm can start according to their priority number.</p> <p><input checked="" type="checkbox"/> : Allows a stationary generator with a warning alarm to start if requested.</p>
Balance engine hours	<p>Used in a Multiset system so that the engine's priority changes according to the amount of usage of the set.</p> <p>For instance in a two set system.</p> <p>Set 1 has logged 100 running hours Set 2 has logged 20 running hours Balance engine hours are configured to 75 hours.</p> <p>As Set 2 has logged 80 hours less than Set 1. As this is greater than the configured 75 hours, Set 2 will be the highest priority set.</p> <p>If all sets are within the configured Balance Engine Hours value, then the set Priority Number (See SCADA Maintenance page) is followed.</p>
Calling for less sets	<p>Load level for less sets to run: The load level at which the 8610 controller decides that generating set capacity can be reduced by dropping sets off the bus.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p> NOTE: - The module will calculate the load levels left on the remaining sets if it should remove a set. This prevents the system from reaching a point where the load is such that one sets starts and stops repeatedly. As a result, the system will not take action when the % on each generator is slightly below the setting for less sets, but instead the level will need to fall much lower until the excess set is called to stop.</p> </div> <p>Once the load is below this level, the lowest priority set in the sequence (determined using the Genset Run Priority) will begin its stop delay timer. Once this has expired, the set will ramp off load and stop. Should the load level rise above this set point during the stop delay timer, then the timer is cancelled and the set will continue to supply power to the load.</p> <p>This allows for short term drops in load, without decreasing supply capacity, only for it to be increased again a short while later.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p> NOTE: - It is recommended that each set in the system have the same value configured for this parameter.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p> NOTE: - When the module assumes that the load is at the bottom of the ramp the breaker will open.</p> </div>

Item	Function
Calling for more sets	<p>Load level for more sets to run: The load level at which the 86xx controller decides that additional generating set capacity is required to supply power to the load.</p> <p>Once this load level is exceeded, the next highest priority set in the sequence (determined using the Genset Run Priority) will begin its start delay timer. Once this has expired, the set will run up, synchronise and take load. Should the set fail to become available, it will communicate this using the MultiSet Communications Link which will signal the next generating set in the sequence to take its place. The starting sequence will be terminated should the load level drop below the <i>Load level for more sets to run</i> while the start delay timer is in progress. This allows for short term increases in load.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  NOTE: - It is recommended that each set in the system has the same value configured for this parameter. </div>

INSUFFICIENT CAPACITY

Item	Function
Action	<p>Activates if the internal governor output reaches maximum to indicate that the set does not have enough capacity to perform as configured.</p> <p>Actions</p> <p>Warning (<i>Alarm only, No shutdown</i>)</p> <p>Shutdown (<i>Alarm and shutdown</i>)</p> <p>Electrical Trip (<i>Alarm/off-load generator followed by shutdown after cooling</i>)</p> <p>Delay</p> <p>Activation delay timer</p>

4.8.8.5 AVR

The screenshot shows the AVR configuration interface. It is divided into two main sections: 'Loss Of Excitation' and 'AVR Trim Alarm'.

Loss Of Excitation Section:

- Arming:** A dropdown menu set to 'Active from Parallel'.
- Pre-alarm:** A checkbox that is currently unchecked.
- Trip:** A numeric input field set to '25.0' with a '%' sign, accompanied by a slider control.
- Return:** A numeric input field set to '20.0' with a '%' sign, accompanied by a slider control.
- Alarm:** A checkbox that is currently unchecked.
- Action:** A dropdown menu set to 'Shutdown'.
- Trip:** A numeric input field set to '35.0' with a '%' sign, accompanied by a slider control.
- Delay:** A text input field set to '1s' with a slider control.

AVR Trim Alarm Section:

- Action:** A dropdown menu set to 'None'.
- Delay:** A text input field set to '0s' with a slider control.

Item	Function
Loss Of Excitation IEEE 37.2 -90 Regulating device (Not applicable to 8660)	<p>Pre-alarm -</p> <p><input type="checkbox"/> = Loss of excitation will NOT give a pre-alarm warning</p> <p><input checked="" type="checkbox"/> = Loss of excitation WILL give a pre-alarm warning in the event of negative VAr rising above the displayed 'Loss of excitation <i>pre-alarm</i>' value. The 'Loss of excitation <i>pre-alarm</i>' value can be adjusted to suit user requirements.</p> <p>Negative VAr must return to below the 'Loss of excitation <i>return</i>' setting before the 8610 module will consider that negative VAr is back with in limits</p> <p>Alarm -</p> <p><input type="checkbox"/> = Loss of excitation will NOT give a Shutdown alarm</p> <p><input checked="" type="checkbox"/> = Loss of excitation WILL give a shutdown alarm in the event of negative VAr rising above the displayed 'Loss of excitation <i>trip</i>' value. The 'displayed 'Loss of excitation <i>trip</i>' value can be adjusted to suit user requirements.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>NOTE: Graphs can be obtained from the alternator suppliers to assist in these settings.</p> </div>
AVR Maximum Trim Limit Alarm	Provides an alarm (when configured) to indicate that the analogue AVR output is being driven to its maximum level for more than the configured amount of time.

4.8.9 BUS

Applicable to DSE8660 only.

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



4.8.9.1 BUS OPTIONS

This is 'read only' for information purposes. The AC system is configured in the 'Generator Options' page.

This is fixed to *enable* if synchronising is enabled. It can only be disabled on a DSE8610/DSE8620 when synchronising is disabled on the *Sync Options* page.

Phase rotation cannot be disabled...

4.8.9.2 BUS NOMINALS

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

Click and drag to change the setting.

4.8.9.3 CHECK SYNC

Check Sync

Dead Bus

Voltage: 30 V PhN

Check Sync

Low Frequency: -0.1 Hz

High Frequency: 0.2 Hz

Voltage: 2 V PhN

Phase Angle: 5 °

Fail To Sync Alarm

Action: Electrical Trip

Delay: 1m

4.8.9.4 MULTISSET

Multiset

MSC Link

MSC Failure Action: Warning

MSC Alarms Disabled Action: None

Too few modules action: None

Minimum modules on MSC link: 1

MSC Compatibility:

Load Demand

Starting options: Start all sets initially

Start next set on Warning:

Allow set to start with warning:

Balance engine hours:

Hours: 167

Calling for less sets: 70 %

Calling for more sets: 80 %

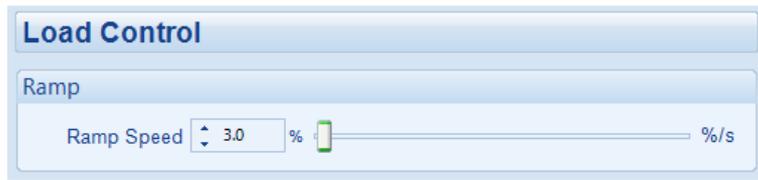
Whenever the 8660 issues to start the 8610s the system will run according to these parameters. See the section entitled *Load Demand* elsewhere in this manual.

Action upon MSC Link Failure

Action to take when the MSC alarm is disabled by digital input

Action to take when the number of modules active on the MSC link is lower than the *Minimum modules on comms link* setting

4.8.9.5 LOAD CONTROL



RAMP

Item	Function
Ramp Speed	See the section entitled <i>Ramp</i> elsewhere in this manual.

4.9 SYSTEM

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

[System Options](#)

[Plant Battery](#)

4.9.1 SYSTEM OPTIONS

The screenshot shows the 'System Options' configuration page with three sections: 'Minimum Number of Sets Not Reached', 'Insufficient Capacity', and 'Load CT'. Each section has a callout box explaining its function.

- Minimum Number of Sets Not Reached:** Action is 'LatchedIndication', Minimum number of sets is 1, and Delay is 1s. Callout: "Determine minimum number of sets and the action take if the minimum number of sets are not closed onto the bus in the required *delay* time."
- Insufficient Capacity:** Action is 'None', and Delay is 1s. Callout: "Action to take when peak lopping (mains mode) if the set(s) are producing 100% power and this is not enough power to peak lop at the configured level."
- Load CT:** Includes 'Load CT Enable' (checked), 'CT Primary' (600 A), 'CT Secondary' (5 Amp), 'CT Voltage' (Bus), 'CT Location' (Bus), and 'Min Mains Power to Open Bus' (0 W). Callout: "In a multimains (multiple 8660) system, a load CT is used to determine the mains load during ramping. See below for additional information."

4.9.1.1 ADVANTAGES OF A LOAD CT

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

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

Without the load C.T., the Mains Controller does not know how much load to transfer to the grid when other Controllers are still in island mode. This results in the Mains Controller transferring a pre determined amount of load before disconnecting the generators from the grid. This amount is configured by the *Min Mains Power to Open Bus* setting.

Hence, there is either too much load, or not enough load transferred, and the generators are 'shock loaded' as they are disconnected from the grid.

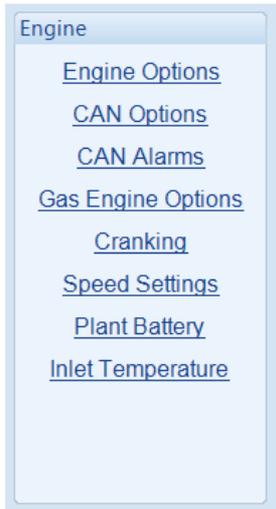
4.9.2 PLANT BATTERY

The screenshot shows the 'Plant Battery' configuration page with 'Voltage Alarms' settings:

- Undervolts:** Checked. Pre-alarm at 10.0 V DC, Return at 10.5 V DC, Delay at 1m.
- Overvolts:** Checked. Return at 29.5 V DC, Pre-alarm at 30.0 V DC, Delay at 1m.

4.10 ENGINE

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



4.10.1 ENGINE OPTIONS

The 'Engine Options' configuration page is divided into several sections:

- ECU (ECM) Options:** Engine Type (Conventional Engine), Enhanced J1939 (checkbox), Alternative Engine Speed (checkbox), Modbus Engine Comms Port (RS485 Port), Disable ECM Speed Control (checkbox).
- Sensing Options:** Disable ECM Speed Sensing (checkbox), Magnetic Pickup Fitted (checkbox), Flywheel Teeth (190).
- Startup Options:** Enable Multiple Engage Attempts (checkbox), Engage Attempts (2), Start Attempts (3), Loss of Sensing Signal (Shutdown), Magnetic pickup open circuit (Shutdown).
- Overspeed Options:** Overspeed Overshoot % (0), Overshoot Delay (0s).
- Droop:** Enable (checkbox), Droop value (4.0%).

Callouts provide additional information:

- ECU (ECM) Options:** This item is not adjustable here, it's read only. To change this item, visit the *Module / Application* menu.
- Sensing Options:** Click to enable or disable the option. The relevant values below will appear *greyed out* if the alarm is disabled.
- Overspeed Options:** *Overspeed* setting is temporarily raised by the *Overspeed Overshoot* amount during the *Overshoot timer* at start up.
- Droop:** Enables Engine Droop on supported electronic (ECU) engines.

Parameters detailed overleaf...

4.10.1.1 SENSING OPTIONS

Parameter	Description
Disable ECM Speed Sensing	<input type="checkbox"/> = An ECM is fitted to the DSE module and being used for speed sensing. <input checked="" type="checkbox"/> = An ECM is fitted to the DSE module but another form of speed sensing fitted to the DSE module is being used.
Magnetic pickup fitted	<input type="checkbox"/> = Magnetic pickup device is not fitted to the DSE module. <input checked="" type="checkbox"/> = A low impedance magnetic pickup device is fitted to the DSE module to measure engine speed. Specifications of the DSE module Magnetic Pickup Input are contained within DSE publication 057-074 8600 Series Operator Manual.
Flywheel teeth	The number of teeth on the engine flywheel. This is read by the magnetic pickup device.

4.10.1.2 STARTUP OPTIONS

Parameter	Description
Enable Multiple Engage Attempts	<input type="checkbox"/> = Only one engage attempt per start attempt is given. If no magnetic pickup pulses are detected during cranking, the <i>Loss of Sensing</i> alarm is given. <input checked="" type="checkbox"/> = 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>
Start Attempts	The number of starting attempts the module will make. 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.
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 : <i>Shutdown:</i> The generator is removed from load and the set is immediately stopped. <i>Warning:</i> The generator continues to run, however a warning alarm is raised.
Magnetic Pickup Open Circuit	If the magnetic pickup device is not detected, an alarm is generated : <i>Shutdown:</i> The generator is removed from load and the set is immediately stopped. <i>Warning:</i> The generator continues to run, however a warning alarm is raised.

4.10.1.3 OVERSPEED OPTIONS

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

4.10.1.4 DROOP

 **NOTE:** Droop options are available only where supported by the Engine ECU over the CAN or Modbus datalink. Contact engine manufacturer for further details.

Parameter	Description
Enable	<input type="checkbox"/> = Engine droop is not enabled.
Droop %	<input checked="" type="checkbox"/> = Where supported by the electronic engine ECU, the DSE 8600 series modules enables droop in the engine ECU governor at the %age configured.

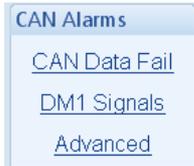
4.10.2 CAN OPTIONS

The screenshot displays the 'CAN Options' configuration window, which is organized into several sections:

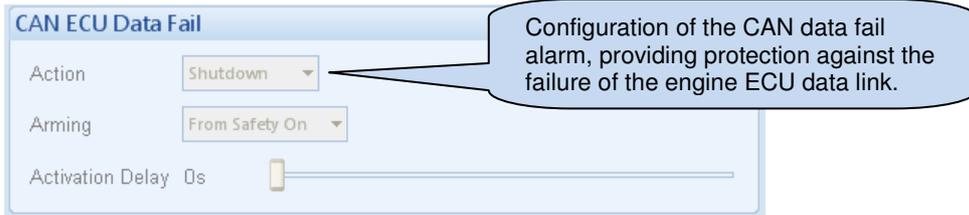
- Engine Hours:** Contains a checkbox for 'Module to Record Engine Hours'. A callout explains: "When enabled, DSE module counts Engine Run Hours. When disabled, Engine ECU provides Run Hours."
- DPF Regeneration Control:** Contains a checkbox for 'Allow Non-Mission Regeneration'. A callout explains: "Available for ECUs which require the engine speed to drop during a manual regeneration cycle. During this period, the generator will not be available to supply power and the under speed and under frequency alarms will not be active."
- Speed Switch:** Contains an 'Enable' checkbox and a dropdown menu currently set to 'Default Dataset ECU'. A callout explains: "Method for speed control over CAN if supported by the ECU."
- ECU Wakeup:** Contains three settings: 'Enable' (checkbox), 'Periodic Wakeup Time' (set to '1h'), and 'Coolant Measurement Persistence' (checkbox). A callout explains: "When enabled, DSE module periodically 'powers up' the engine ECU when the engine is stopped. This can be utilised to provide coolant temperature measurement when the engine is stopped."

4.10.3 CAN ALARMS

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

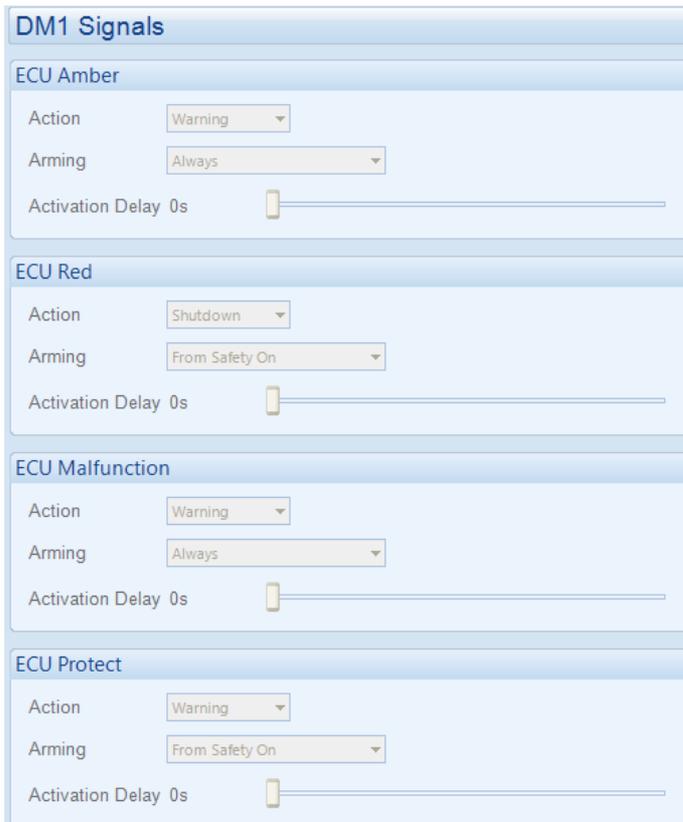


4.10.3.1 CAN DATA FAIL



4.10.3.2 DM1 SIGNALS

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



4.10.3.3 ADVANCED

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

Other Specific Signals

Water In Fuel

Action: Warning

Arming: Always

Activation Delay: 0s

DPTC Filter

Enabled:

Action: Warning

Arming: From Safety On

HEST Active

Enabled:

Action: Warning

Arming: From Safety On

4.10.4 GAS ENGINE OPTIONS

Gas Engine Options		
Gas Engine Timers		
Choke Timer	2s	
Gas On Delay	2s	
Ignition Off Delay	2s	

Controls the amount of time that the Gas Choke output will be active during the starting sequence.

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.

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.

For these timers to have any meaning, outputs are required for Gas Choke, Gas Ignition and Fuel.

4.10.5 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 its *crank disconnect* setting will result 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.

The screenshot shows the 'Cranking' configuration panel with three main sections: Options, Crank Disconnect, and Manual Crank. Callouts provide detailed explanations for specific settings.

Options:

- Crank disconnect on oil pressure
- Check oil pressure prior to starting

Crank Disconnect:

Parameter	Value	Unit
Generator Frequency	21.0	Hz
Engine Speed	600	RPM
Oil Pressure	1.03	Bar
Charge Alternator	<input type="checkbox"/>	
Generator Voltage	6.0	V DC
Generator Voltage	186	v PhN

Manual Crank:

- Hold Start Button To Crank
- Manual Crank Limit: 30s

Callouts:

- Top:** If *check oil pressure prior to starting* is enabled, the cranking will not be allowed if the oil pressure is not seen as being low. This used as a *double check* that the engine is stopped before the starter is engaged.
- Generator Frequency:** Click and drag to change the setting.
- Generator Voltage (186 v PhN):** Type the value or click the up and down arrows to change the settings
- Manual Crank Limit:** When enabled, releasing the start button during a manual start will also disconnect the crank. Manual Crank Limit is provided to protect the engine from being cranked too long in case of a start failure.

4.10.6 SPEED SETTINGS

The screenshot displays the 'Speed Settings' configuration window, divided into 'Under Speed' and 'Over Speed' sections. Callouts provide instructions on how to interact with the settings:

- Under Speed Alarm:** A callout points to the 'Alarm' checkbox, stating: "Click to enable or disable the option. The relevant values below will appear *greyed out* if the alarm is disabled."
- Under Speed Action:** A callout points to the 'Action' dropdown menu, stating: "Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document."
- Under Speed Trip:** A callout points to the 'Trip' value (1200 RPM), stating: "Type the value or click the up and down arrows to change the settings."
- Under Speed Pre-alarm:** A callout points to the 'Pre-alarm' checkbox, stating: "Type the value or click the up and down arrows to change the settings."
- Over Speed Return:** A callout points to the 'Return' value (1620 RPM), stating: "Click and drag to change the setting."
- Over Speed Trip:** A callout points to the 'Trip' value (1710 RPM), stating: "Click and drag to change the setting."

A thought bubble at the bottom left contains the text: "Overspeed shutdown cannot be disabled."

4.10.7 PLANT BATTERY

The screenshot displays the configuration interface for the Plant Battery. It is divided into two main sections: Voltage Alarms and Charge Alternator Alarm.

Voltage Alarms:

- Undervolts:** This section is currently enabled (checked). It includes:
 - Pre-alarm: 10.0 VDC
 - Return: 10.5 VDC
 - Delay: 1m
- Overvolts:** This section is also enabled (checked). It includes:
 - Return: 29.5 VDC
 - Pre-alarm: 30.0 VDC
 - Delay: 1m

Charge Alternator Alarm:

- Use Module for Charge Alternator:** This checkbox is currently unchecked.
- Alarm:** This section is enabled (checked) and includes:
 - Trip: 4.0 VDC
 - Delay: 5s
- Pre-alarm:** This section is enabled (checked) and includes:
 - Trip: 6.0 VDC
 - Delay: 5s

Callouts provide additional instructions:

- Click to enable or disable the option. The relevant values below will appear greyed out if the alarm is disabled.
- Click and drag to change the setting.
- Type the value or click the up and down arrows to change the settings.

Alarm	IEEE designation
Plant Battery Under volts	IEEE 37.2 -27 DC Under voltage relay
Plant Battery Over volts	IEEE 37.2 -59 DC Over voltage relay

4.10.8 INLET TEMPERATURE

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

The screenshot shows the 'Inlet Temperature' configuration page. It features a section titled 'Inlet Temperature Alarms' with the following controls:

- Alarm:** A checkbox that is currently unchecked. A callout explains: 'Click to enable or disable the option. The relevant values below will appear *greyed out* if the alarm is disabled.'
- Action:** A dropdown menu set to 'Shutdown'.
- Trip:** A numeric input field with up and down arrows, currently set to '95 °C'. A callout points to this field: 'Type the value or click the up and down arrows to change the settings'. To the right of the input is a slider control with a yellow knob, and further right is the text '203 °F'.
- Pre-alarm:** A checkbox that is currently unchecked.
- Trip:** A numeric input field with up and down arrows, currently set to '85 °C'. A callout points to this field: 'Click and drag to change the setting.' To the right is a slider control with a yellow knob.
- Return:** A numeric input field with up and down arrows, currently set to '80 °C'. A callout points to this field: 'Click and drag to change the setting.' To the right is a slider control with a yellow knob.

A large callout at the top left explains: 'If a supported ECU engine is not selected on the *Application* page of the configuration, the whole page is *greyed out* and cannot be enabled.'

4.11 COMMUNICATIONS



4.11.1 COMMUNICATION OPTIONS

Provides a means of giving the control an identity name. This is used in the SCADA section to allow the operator to see the site name and genset identity that is currently connected to the SCADA. As this could be a remote module connected over modem or Ethernet connection this is a very useful feature.

A screenshot of the "Communications Options" configuration screen. The screen has a title bar "Communications Options" and a sub-section "Module Identification". Below this, there are two text input fields: "Site identity" and "Genset identity". A callout box with a pointer to the "Genset identity" field contains the following text: "Free text entries to identify the generator set. This text is displayed on the SCADA screen when the module is connected to the PC."

4.11.2 RS232 PORT



4.11.2.1 BASIC

Modbus Slave ID points to the Slave ID field (value: 10).

Baud rate adjustable from 1200-115200 points to the Baud Rate dropdown (value: 19200).

Selects how the port is to be used points to the Port Usage dropdown (value: No Modem).

Select for GSM modem type points to the GSM Modem checkbox.

Sends extended instrumentation with the Alarm code (Oil pressure / Coolant temp / HRS run) points to the Send extended instrumentation checkbox.

Sends Alarm messages as flash instant messages. points to the Send as flash message checkbox.

These items are greyed out until a relevant option in Port Usage is selected. points to the Alarm numbers, SMS Message centre number, and SMS Recipient numbers fields.

4.11.2.1.1 SERIAL PORT CONFIGURATION

Timer	Description
Port usage	<p>The options are :</p> <p>No Modem – RS232 ports is used for direct RS232 connection to PLC, BMS etc</p> <p>Incoming modem calls – RS232 port connected to modem, used to accept incoming calls only.</p> <p>Incoming and outgoing modem (Sequence) – RS232 port connected to modem used to accept incoming calls and also make calls upon shutdown alarms.</p> <p>Outgoing modem alarms (Sequence) - RS232 port connected to modem, used to make calls upon shutdown alarms.</p> <p>Incoming and outgoing modem (Cyclic) – RS232 port connected to modem used to accept incoming calls and also make calls upon shutdown alarms.</p> <p>Outgoing modem alarms (Cyclic) - RS232 port connected to modem, used to make calls upon shutdown alarms.</p>

4.11.2.1.2 MODEM SETTINGS

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

4.11.2.1.3 RECOMMENDED MODEMS

DSE stock and supply the following recommended modems:

PSTN (fixed line) modem

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

Other Localisation Kits can be obtained from www.multitech.com

GSM modem

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

Description	DSE Part Number
Wavecom Fastrak Supreme GSM Modem supplied with power supply cable, RS232 connection cable and GSM antenna. Suitable for GSM operating on 900/1800 MHz bands.	0830-001-01
<div style="border: 1px solid black; padding: 5px;">  NOTE : This modem is supplied ready configured to operate with the DSE module. When purchasing from a third party, the modem is not configured to communicate with the DSE8600 series module. </div>	

4.11.2.2 ADVANCED

4.11.2.2.1 INITIALISATION STRINGS

The initialisation strings are commands that are sent to the modem upon powering up the DSE module and additionally at regular intervals subsequently, whenever the DSE8600 series module *initialises* (resets) the modem.

Factory set initialisation strings

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

Silent operation

The modem connected to the DSE8610/DSE8620 controller will usually make dialling noises and ‘squeal’ in the initial stages of making a data call. To control this noise, add the following command to the end of the initialisation string:

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

Multitech ZBA Global Modem initialisation strings

The DSE8600 series module factory settings for the initialisation strings are suited to the Multitech ZBA Global Modem:

Wavecom Fastrak Supreme GSM Modem initialisation strings

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

Setting	Description
&D2 (required for Wavecom Fastrak Supreme)	Hang up on DTR-drop
&D3 (DSE7300 series factory settings)	Reset on DTR-drop

Initialisation strings	
Init (not auto answer)	E0S7=60S0=0&S0&C1&D2
Init (auto answer)	E0S7=60S0=2&S0&C1&D2
Hangup	H0

OTHER MODEMS

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

4.11.2.2 CONNECTION SETTINGS

Timer	Description
Master inactivity timeout	The module <i>looks</i> by default at the USB port for communications. When activity is detected on the RS232 or RS485 port, the module <i>switches</i> to look at the relevant port for further data. If no data activity is detected on the port for the duration of the <i>master inactivity timer</i> , it reverts to looking at the USB port. This should be set longer than the time between modbus polls from the master.
Connect delay	The amount of time that is allowed to elapse between the alarm being registered and the controller dialling out with the fault.
Retries	The number of times the module will attempt to contact the remote PC by modem.
Retry delay	The amount of time between retries.
Repeat Cycle Delay	The amount of time before attempting the next dial out cycle if all dial outs fail.
Inter-Frame Delay	Module responde and communication delay timer. This is useful when the Modbus Master device is too fast, causing to lose the responses from the DSE module.

4.11.3 TROUBLESHOOTING MODEM COMMUNICATIONS

4.11.3.1 MODEM COMMUNICATION SPEED SETTING

First ensure the modem is set to communication with the DSE module at 9600 baud – Modems supplied by DSE are factory adjusted to operate with the DSE8600 series module. Only modems purchased from a third party may require adjustment.

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

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

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

When connected, enter the following command:

AT+IPR=9600 and press <ENTER>

This sets the modem to 9600 baud.

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

Enter the following command:

AT&W and press <ENTER>

This saves the new setting in the modem. Power can now be removed. The next time power is applied, the modem starts with the new settings (Baud rate = 9600), suitable to communicate with the DSE8600 series module.

4.11.3.2 GSM MODEM CONNECTION

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

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

4.11.4 SMS MODULE CONTROL

The screenshot shows the 'SMS Control' configuration window. Under 'SMS Module Control', there is a 'Require PIN' checkbox, a 'PIN prefix' field with three spinners (each showing '0'), and a list of 'Enabled commands' with checkboxes: 'Start off load (code 1)', 'Start on load (code 2)', 'Cancel (code 3)', 'Stop mode (code 4)', and 'Auto mode (code 5)'. Two callout boxes provide additional information: one points to the 'Require PIN' checkbox and the other points to the 'Enabled commands' list.

Tick to enable a pin code .This code would be required at the start of each SMS message for the generator controller to take any action for any commands .

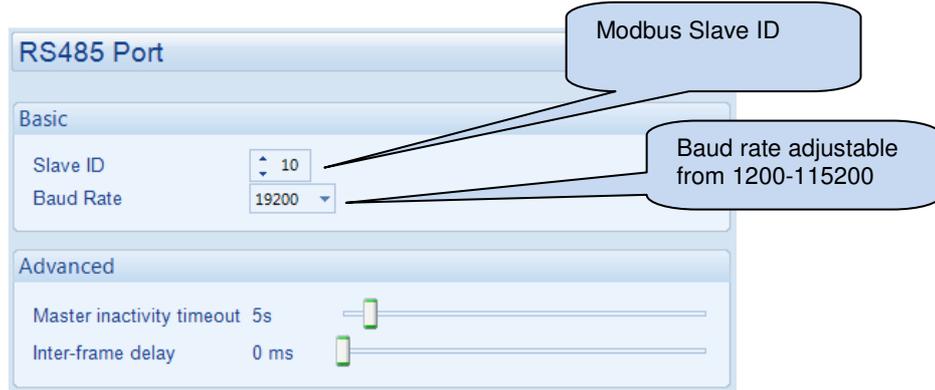
Example
Pin prefix 1234 and a Remote start on load command.
" 1234 1"
1234 pin + (space) + (Code)

Tick to enable the commands that can be implemented upon receiving a SMS message

The SMS commands listed below.

Parameter	Code	Description
Remote Start off load	1	If this input is active, operation will be similar to the 'Remote Start on load' function except that the generator will not be instructed to take the load. This function can be used where an engine only run is required e.g. for exercise.
Remote Start on load	2	When in auto mode, the module will perform the start sequence and transfer load to the generator.
Cancel	3	By sending cancel code will cancel SMS remote start off load or SMS Remote start on load, If the unit was in Auto mode the unit will stop and the module with remain in Auto mode
Stop mode	4	This input mimic's the operation of the 'Stop' button and is used to provide a remote SMS stop command.
Auto Mode	5	This input mimics the operation of the "AUTO" button

4.11.5 RS485 PORT



Parameter	Description
Master inactivity timeout	The module <i>looks</i> by default at the USB port for communications. When activity is detected on the RS232 or RS485 port, the module <i>switches</i> to look at the relevant port for further data. If no data activity is detected on the port for the duration of the <i>master inactivity timer</i> , it reverts to looking at the USB port. This should be set longer than the time between modbus polls from the master.
Inter-Frame Delay	Module responde and communication delay timer. This is useful when the Modbus Master device is too fast, causing to lose the responses from the DSE module.

4.11.6 ETHERNET PORT

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

After the IP address is changed by writing the configuration, the controller must be power cycled before the change takes effect.

Network port number that the modbus TCP communications will operate over. Ensure any firewall in the system (for instance within the router) is configured to allow traffic on this port.

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 DSE8600 series. However it is possible to give a description of the requirements in generic terms. For details of how to achieve the connection to your modem/router you are referred to the supplier of your modem/router equipment.

The DSE8600 module makes its data available to a configurable TCP port number.

You must configure your modem/router to allow inbound traffic on this port. For more information you are referred to your WAN interface device (modem/router) manufacturer.

Incoming traffic (virtual server)

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

For our DSE8600 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 DSE8600 series module.

Example

Virtual Servers			
Filter Name	Source Port	Destination (LAN)	Address
DSE8610/DSE8620	1003	192.168.1.3	

User provided name for the Port Forwarding rule

Port number of the communications (must match the configuration of the DSE8600 controller)

IP Address of the DSE8600 series controller connected to the LAN

Result : Traffic arriving from the WAN (internet) on port 1003 is automatically sent to IP address 192.168.1.3 on the LAN (DSE8600) for handling.

4.12 SCHEDULER

The Exercise Scheduler is used to give up to 16 scheduled runs. This run schedule is configurable to repeat every 7 days (weekly) or every 28 days (monthly). The run can be *on load* or *off load*.

Scheduler

Exercise Scheduler

Enabled

Run Mode Off Load

Schedule Period Weekly

Click to enable or disable the option. The relevant values below will appear *greyed out* if this option is disabled.

Configure the required start time and run duration.

Week	Day	Start Time	Duration	Clear	Week	Day	Start Time	Duration	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear
▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear	▼	Monday	▲ 00:00 ▼	▲ 00:00 ▼	Clear

4.13 MAINTENANCE ALARM

Three maintenance alarms are available to provide maintenance schedules to the end user. For instance Maintenance Alarm 1 can be used for an oil change schedule, Maintenance Alarm 2 for a battery change schedule etc.

Maintenance alarm 1

Enable

Description Maintenance alarm 1

Action Warning

Engine run hours ▲ 10 ▼ hrs

Enable alarm on due date

Maintenance interval ▲ 1 ▼ months

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

Maintenance Alarm will occur when the engine has run for the specified number of hours OR the specified date interval has passed (whichever occurs soonest)

There are two ways to reset the maintenance alarm:

- 1) Activate a digital input configured to “Reset Maintenance Alarm”.
- 2) Use the SCADA | Maintenance | Maintenance Alarm section of this PC Software

4.14 ALTERNATIVE CONFIGURATIONS

Alternative Configurations are provided to allow the system designer to cater for different AC requirements utilising the same generator system. Typically this feature is used by Rental Set Manufacturers where the set is capable of being operated at (for instance) 120V 50Hz and 240V 50Hz using a selector switch, or by taking advantage of the “auto voltage sensing” option of the DSE8600 Series.

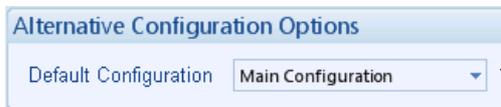
There are four configurations within the module, the main configuration file, and three selectable Alternative Configurations.

Selecting between the main and alternative configurations is achieved using either:

- Configuration Suite Software (Selection for 'Default Configuration)
- DSE8600 Series Fascia Editor
- Via external signal to DSE8600 Series module input configured to “Alt Config x” select.
- Auto Voltage Sensing. Whereby during the starting sequence, the AC system, voltage and frequency of the connected supply is monitored. The module selects the most appropriate configuration (alternative 1, 2 or 3 or the main configuration) to suit the connected supply.



4.14.1 ALTERNATIVE CONFIGURATION OPTIONS



Select the 'default' configuration that will be used when there is no instruction to use an 'alternative configuration'.

4.14.2 ALTERNATIVE CONFIGURATIONS EDITOR

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

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.



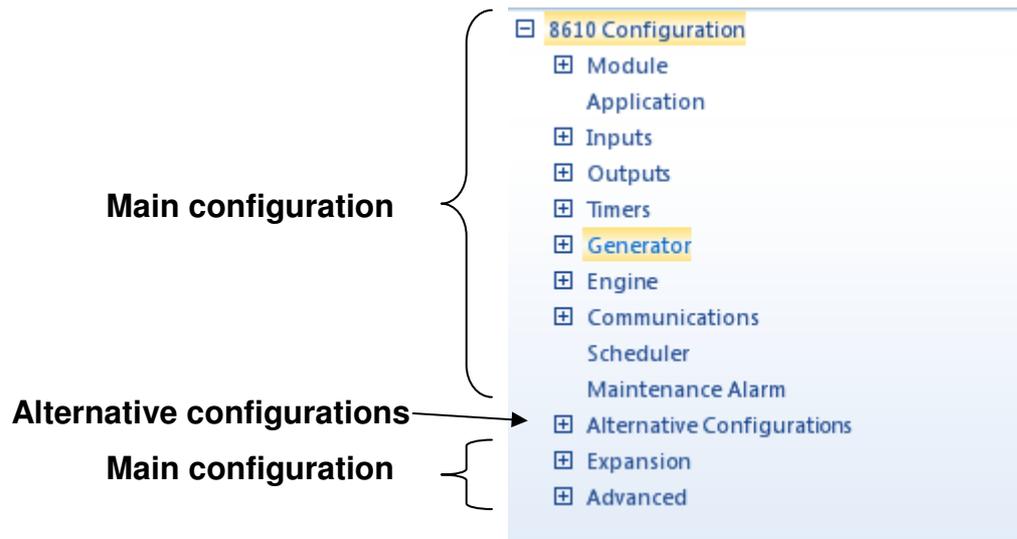
4.14.3 EXAMPLE OF USAGE

The DSE module contains a configuration file, holding the settings for inputs, outputs, timers, voltage and frequency trip points etc. This is called the 'main configuration'.

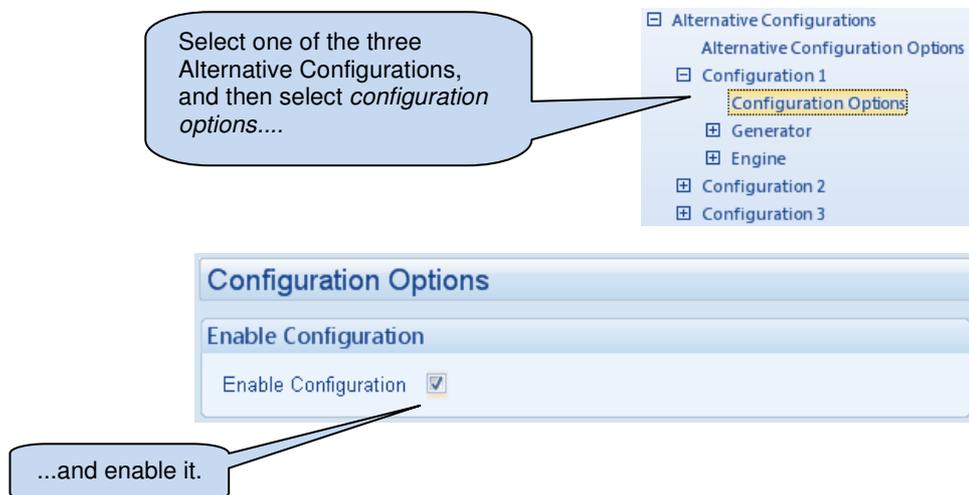
Additionally 'alternative configuration' files are present, holding a subset of the main configuration file. This allows another collection of settings for items such as voltage and frequency trip points.

By PC software, external switch or by front panel configuration we can select either the 'main' or the 'alternative' configuration. This informs the module which set of parameters to use.

4.14.3.1 ENABLING THE DEFAULT CONFIGURATION



Click the  symbol alongside Alternative Configurations to make further choices:



4.14.3.2 USING THE ALTERNATIVE CONFIGURATION TO HANDLE SPEED CHANGE

This shows how to use the default configuration to handle automatic speed change of a CAN engine. The same process is also used to select different configurations for other purposes.

The 'main configuration' is set to suit a 50Hz generator. The engine is a 1500RPM Volvo TAD9 with EMS2b ECU.

ECU (ECM) Options

Engine Type Volvo EMS2b ▾

Enhanced J1939

Alternative Engine Speed

The alternative configure has been enabled,

Enable Configuration

Enable Configuration

And the alternative engine speed has been selected. When this configuration is activated, the engine will be instructed to run at its configured alternative speed. For a 1500RPM engine, the alternative speed will be 1800RPM.

CAN Options

Engine Type Volvo EMS2b

Enhanced J1939

Alternate CAN Engine Speed

As the engine will be running at a higher speed, we also need to select appropriate settings for the speed and frequency trip points in the alternative configuration.

Under Frequency Alarms

Shutdown

Trip Hz 83.3 %

Loading Frequency Hz 91.7 %

Nominal Frequency

Hz

Over Frequency Alarms

Shutdown

Trip Hz 113.3 %

Over Speed

Shutdown

Trip RPM

Selecting between the main and alternative configurations is achieved using either:

- Configuration Suite Software (Selection for 'Default Configuration)
- DSE8600 Series Fascia Editor
- Via external signal to DSE8600 Series module input configured to "Alt Config x" select.
- Auto Voltage Sensing. Whereby during the starting sequence, the AC system, voltage and frequency of the connected supply is monitored. The module selects the most appropriate configuration (alternative 1, 2 or 3 or the main configuration) to suit the connected supply.

4.15 EXPANSION

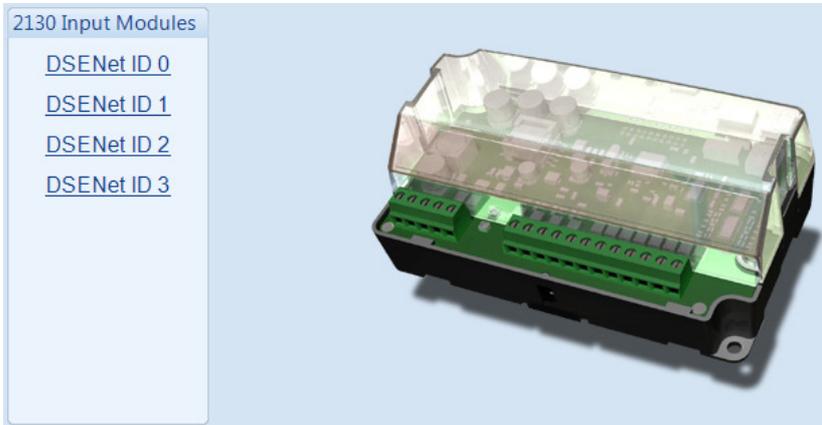
The *Expansion* page is subdivided into smaller sections. Select the required section with the mouse.



See overleaf for description of the different expansion modules.

4.15.1 DSE2130 INPUT MODULES

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



The following is then shown:

4.15.1.1 DIGITAL INPUTS (A-D)

4.15.1.2 ANALOGUE INPUTS (E-H)

NOTE: - DSE8600 series modules prior to V4 support only 'User Configured' (alarm type) digital input functions on expansion inputs A-H. DSE8600 series modules V4 and later support both 'User configured' and 'pre-defined' digital input functions on expansion inputs A-H.

Analogue Input E

Sensor Description

Sensor Type None

Configure the sensor type. Select *Digital Input* to use the analogue input as a digital input

Depending upon your selection above, either the *Analogue Input* or *Digital Input* configuration screen is shown

Used as an Analogue Input

Analogue Input E

Sensor Description

Sensor Type Pressure Sensor

Sensor Name 2130 ID0 Flexible Sensor E

Input Type

VDO 10 Bar Edit...

Sensor Alarms

Alarm Arming Always

Low Alarm Enable

 Action Shutdown

 Low Alarm 1.03 Bar

Low Pre-alarm Enable

 Low Pre-alarm Trip 1.17 Bar

 Low Pre-alarm Return 1.24 Bar

Low Alarm String Flexible Sensor Low

High Pre-alarm Enable

 High Pre-alarm Return 1.40 Bar

 High Pre-alarm Trip 1.50 Bar

High Alarm Enable

 Action Shutdown

 High Alarm 1.60 Bar

High Alarm String Flexible Sensor High

Edit the sensor curve if required.

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

Click and drag to change the setting.

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

Used as a Digital Input

Digital Input

Function User Configured

Polarity Close to Activat

Action Warning

Arming Always

LCD Display

Activation Delay 0s

Select the required function of the input and whether it is *open* or *close to activate*.

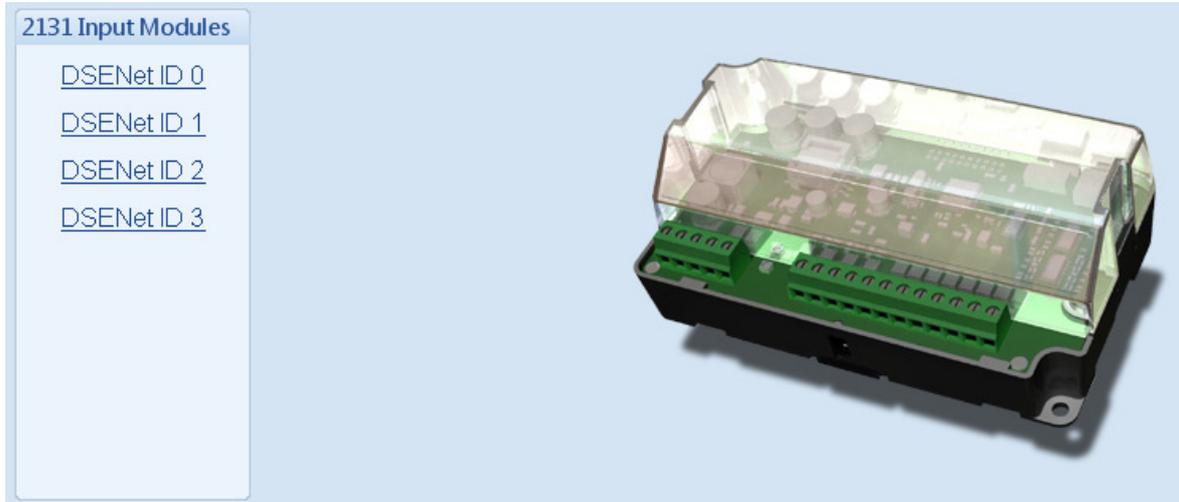
Select the required alarm type of the input and when it is active.

Type the text that is to appear on the module's display when the alarm is active.

Gives a delay upon activation of the input to allow the input to be used as a liquid level switch for example.

4.15.2 DSE2131 RATIOMETRIC EXPANSION INPUT MODULE

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



The following is then shown:

The screenshot shows the configuration page for **DSENet ID 0**. It includes the following sections and callouts:

- 2131 Expansion Enable**:
 - Expansion Enabled**: A checkbox with a callout: "Click to enable or disable the option. The relevant values below will appear *greyed out* if the alarm is disabled."
 - Link Lost Alarm Action**: A dropdown menu currently set to "Warning" with a callout: "Select the alarm type of the *link lost alarm*. This alarm will take action if the expansion module is not detected by the host module."
- 2131 Expansion Inputs**: A section with a link "Inputs A - J" and a callout: "Click to configure the inputs".

Below this is a separate panel for **Analogue Inputs**, which lists links for [Analogue Input A](#) through [Analogue Input J](#). A callout points to this list: "Then select which input you want to configure".

Depending upon your selection of *Sensor Type*, one of the following configuration screens are shown:

Used as a Digital Input

The screenshot shows the 'Digital Input' configuration interface. It includes a 'Sensor Description' section with a 'Sensor Type' dropdown set to 'Digital Input'. Below this is the 'Digital Input' section with several settings: 'Function' (User Configured), 'Polarity' (Close to Activate), 'Action' (Warning), 'Arming' (Always), 'LCD Display' (2131 ID0 Digital Input A), and 'Activation Delay' (0s). Callouts provide the following explanations:

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

Used as an Analogue Input

The screenshot shows the 'Analogue Input A' configuration interface. It includes a 'Sensor Description' section with 'Sensor Type' (Temperature Sensor), 'Measured Quantity' (Voltage), 'Sensor Name' (2131 ID0 Flexible Sensor A), and a 'Wide Range' checkbox. Below is the 'Input Type' section with a dropdown set to '200 °C' and an 'Edit...' button. The 'Sensor Alarms' section includes 'Alarm Arming' (Always), 'Low Alarm Enable' (checked), 'Low Alarm' (103 °C), 'Low Pre-alarm Enable' (checked), 'Low Pre-alarm Trip' (117 °C), 'Low Pre-alarm Return' (124 °C), 'Low Alarm String' (Flexible Sensor Low), 'High Pre-alarm Enable' (checked), 'High Pre-alarm Return' (140 °C), 'High Pre-alarm Trip' (150 °C), 'High Alarm Enable' (checked), 'High Alarm' (160 °C), and 'High Alarm String' (Flexible Sensor High). Callouts provide the following explanations:

- Sensor Type:** Select the required function of the input. *Percentage, Pressure, Temperature or Digital* input.
- Measured Quantity:** Select the required type of the input. *Voltage (0-10V), Current (4-20mA), Resistive*
- Sensor Name:** Name the sensor appropriately to describe the measurements on the module's display
- Edit...:** Edit the sensor curve if required.
- Low Alarm Action:** Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.
- High Alarm Enable:** Click to enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.
- High Alarm:** Click and drag to change the settings
- High Alarm String:** Type the text you want to appear on the screen when the alarm is triggered.

The following screen shot shows the configuration when set for *Temperature Sensor*. When set to other Sensor Type, consult the relevant manual section for details (Digital inputs, Oil Pressure input etc)

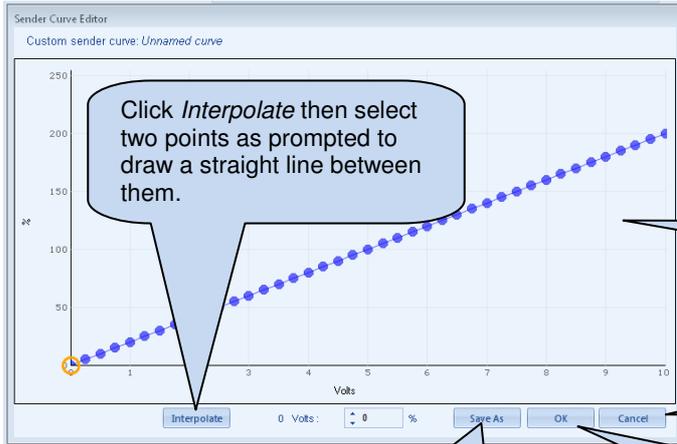
The screenshot shows the configuration for a **Flexible Sensor**. It is divided into several sections:

- Sensor Description:**
 - Sensor Type: Temperature Sensor (selected)
 - Sensor Name: Flexible Sensor
- Input Type:**
 - Doosan sensor (selected)
 - Edit... button
- Sensor Alarms:**
 - Alarm Arming: Always
 - Low Alarm:
 - Enabled (checked)
 - Action: Shutdown
 - Trip: 65 °C
 - Low Pre-alarm:
 - Disabled (unchecked)
 - Trip: 70 °C
 - Return: 75 °C
 - Low Alarms String: Flexible Sensor Low
 - High Pre-alarm:
 - Enabled (checked)
 - Return: 88 °C
 - Trip: 90 °C
 - High Alarm:
 - Enabled (checked)
 - Action: Shutdown
 - Trip: 95 °C
 - High Alarms String: Flexible Sensor High

Callouts provide the following instructions:

- Select the sensor type.
- Click to edit the 'sensor curve'. See section entitled *Editing the sensor curve*.
- Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.
- Click to enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.
- Click and drag to change the settings
- Type the value or click the up and down arrows to change the settings
- Type the text you want to appear on the screen when the alarm is triggered.

4.15.2.1 EDITING THE SENSOR CURVES



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

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

Click CANCEL to ignore and lose any changes you have made

Click OK to accept the changes and return to the configuration editor

Click SAVE AS, you are prompted to name your curve...

The dialog box is titled 'New Curve Name'. It contains a text input field with the placeholder text 'Specify name for custom curve'. Below the input field are two buttons: 'OK' and 'Cancel'.

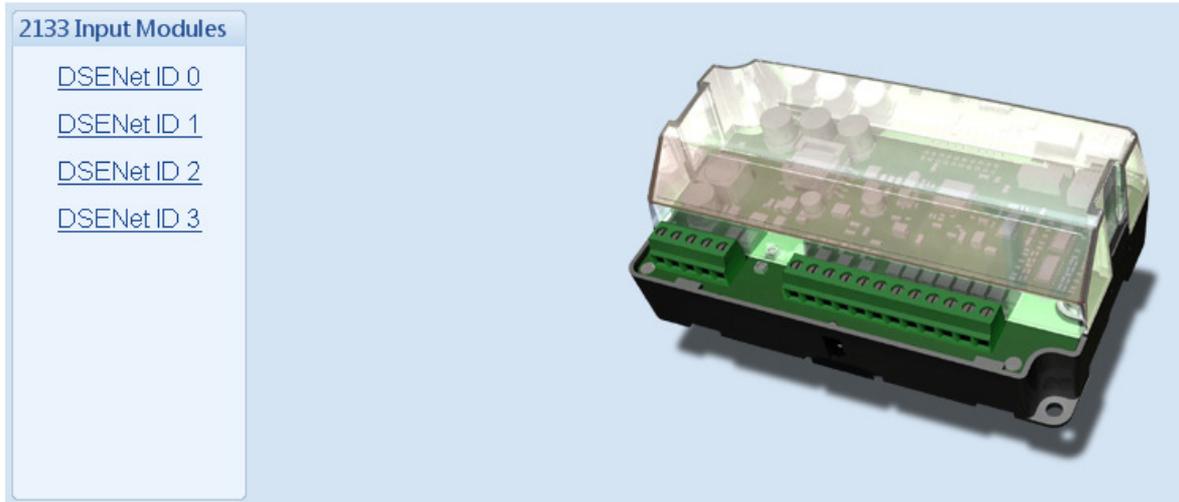
Click OK to save the curve.

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*.

4.15.3 DSE2133 RTD / THERMOCOUPLE INPUT MODULE

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



The following is then shown:

The screenshot shows the configuration page for **DSENet ID 0**. It includes the following sections and callouts:

- 2133 Expansion Enable**:
 - Expansion Enabled**: A checkbox that is currently checked. Callout: "Click to enable or disable the option. The relevant values below will appear *greyed out* if the alarm is disabled."
 - Link Lost Alarm Action**: A dropdown menu currently set to "Warning". Callout: "Select the alarm type of the *link lost alarm*. This alarm will take action if the expansion module is not detected by the host module."
- 2133 Expansion Inputs**: A section with a link [Inputs A - H](#). Callout: "Click to configure the inputs"
- Analogue Inputs**: A list of links for [Analogue Input A](#) through [Analogue Input H](#). Callout: "Then select which input you want to configure"

Analogue Input A

Sensor Description

Sensor Type: Temperature Sensor

Sensor Name: 2133ID0 Flexible Sensor

Wide Range:

Input Type

Type J

Sensor Alarms

Alarm Arming: Always

Low Alarm Enable:

Low Alarm Action:

Low Alarm: 103 °C

Low Pre-alarm Enable:

Low Pre-alarm Trip: 117 °C

Low Pre-alarm Return: 124 °C

Low Alarm String: Flexible Sensor Low

High Pre-alarm Enable:

High Pre-alarm Return: 140 °C

High Pre-alarm Trip: 150 °C

High Alarm Enable:

High Alarm Action:

High Alarm: 160 °C

High Alarm String: Flexible Sensor High

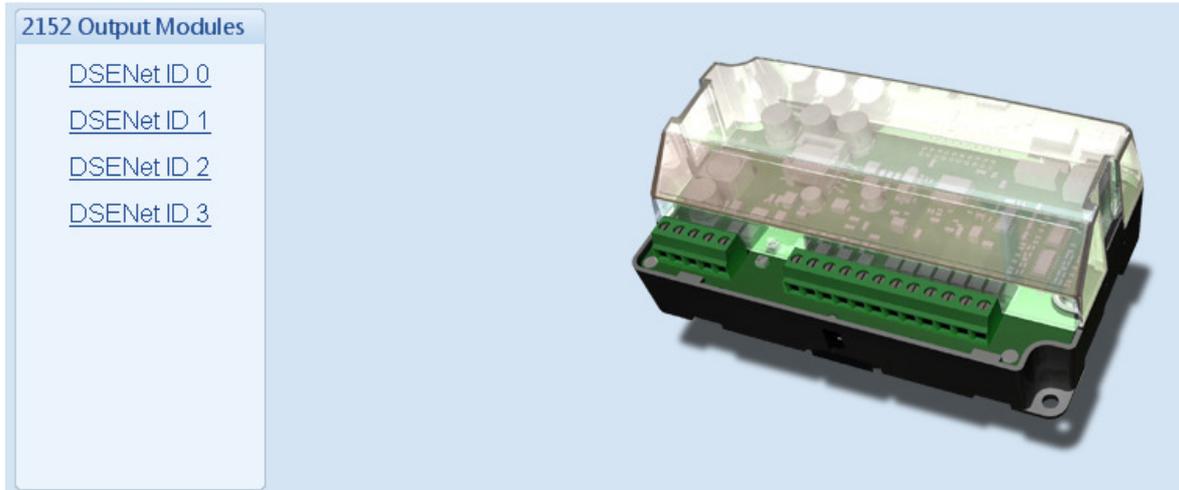
Increases temperature alarms to 1350 deg C

Choose between Type J or Type K thermocouples or RTD (2 Wire PT100 or 3 Wire PT100)

Set the alarm trip points if required.

4.15.4 DSE2152 ANALOGUE OUTPUT MODULE

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



The following is then shown:

DSENet ID 0

2152 Expansion Enable

Expansion Enabled

Link Lost Alarm Action **Warning**

2152 Expansion Outputs

[Outputs A - F](#)

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

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

Click to configure the outputs

Then select the output you want to configure

Analogue Outputs

[Analogue Output A](#)

[Analogue Output B](#)

[Analogue Output C](#)

[Analogue Output D](#)

[Analogue Output E](#)

[Analogue Output F](#)

Then select the output you want to configure

Analogue Output A

Channel Description

Channel Type **0-10 V**

Channel Name **Channel Name**

Output Type

Source **Bus Frequency** Curve **User defined** **Edit...**

Select the required function of the output. 0-10V or 4-20mA

Name the output appropriately

Select which measured parameter is to be used to drive the output channel

Edit the sensor curve if required.

4.15.4.1 EDITING THE OUTPUT CURVE



Choose the x axis start and end points

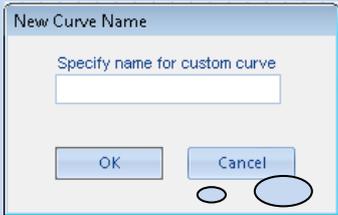
Show and hide the *knee point* (middle point) of the output curve

Click and drag the points on the graphs to change the settings. In this example 0 Hz – 60 Hz will be output as 2 V to 8 V.

Click CANCEL to ignore and lose any changes you have made

Click OK to accept the changes and return to the configuration editor

Click SAVE AS, you are prompted to name your curve....



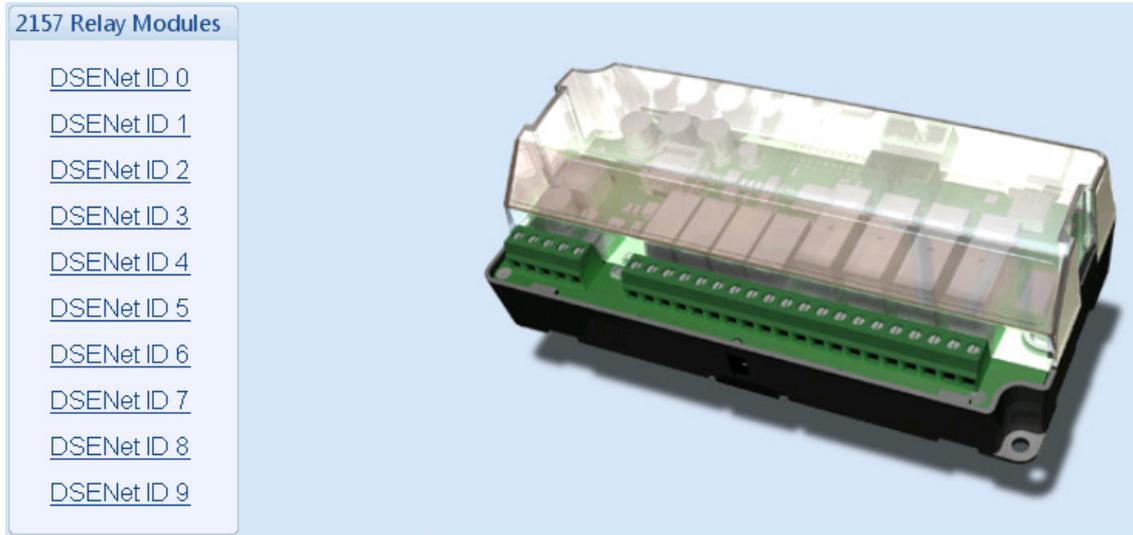
Click OK to save the curve.

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*.

4.15.5 DSE2157 RELAY MODULES

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



The following is then shown:

DSENet ID 0

2157 Enable

Expansion Enabled

Link Lost Alarm Action Warning

Relay Outputs (Normally Open)

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

Relay Outputs (Changeover)

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

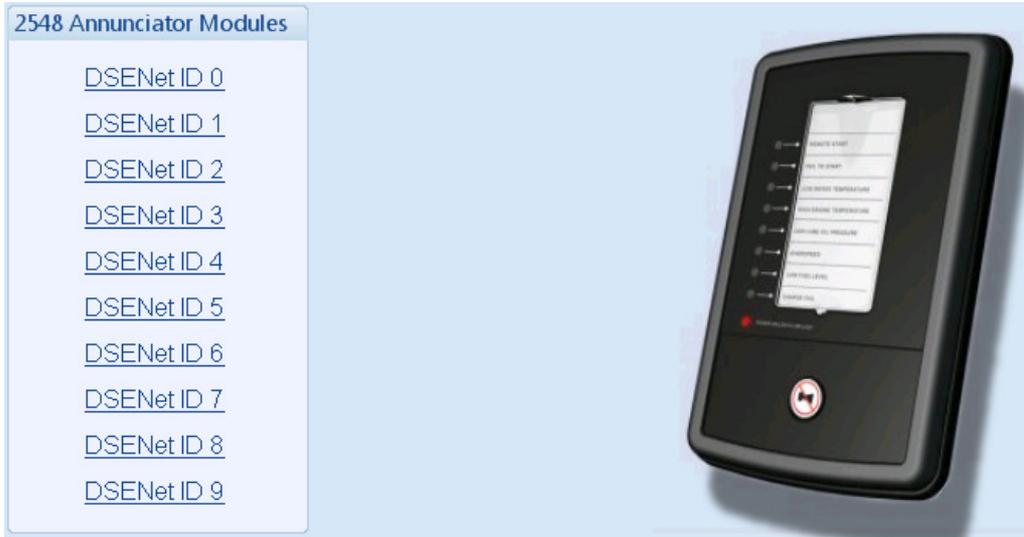
Click to enable or disable the option. The relevant values below will appear *greyed out* if the alarm is disabled.

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

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

4.15.7 DSE2548 LED EXPANSION

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



The following is then shown:

DSENet ID 0

2548 Expansion Enable

Expansion Enabled Link Lost Alarm Action: Warning

Sounder Configuration

Follow main unit
 Sounder enabled

LED Indicators

A	System In Auto Mode	Unlit
B	Not Used	Lit
C	Not Used	Lit
D	Not Used	Lit
E	Not Used	Lit
F	Not Used	Lit
G	Not Used	Lit
H	Not Used	Lit

Annunciator Insert Card

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

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

Enable or disable the expansion module's internal sounder.

- If the *mute / lamp test* button is pressed, other DSE2548 modules configured to *Follow main unit* and the host module will also lamp test / mute their alarm and vice-versa.
 - If the *mute / lamp test* button is pressed, other DSE2548 modules and the host module will not respond to this.

Select the configuration for the LED. For instance this LED is configured to be *unlit* when in *auto mode*. Hence this is a *not in auto* LED.

Click this option to create logo and text insert cards.

4.16 ADVANCED

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



4.16.1 ADVANCED OPTIONS

Advanced Options

Protections

Disable

Protections Are Disabled Never

Protections Disabled Alarm Action Indication

Coolant Level Protection Override

Out Of Sync

Out Of Sync Angle 16 °

Out Of Sync Timer 0.2s

Other Timers

Synchronisation Delay 3s

Dead Bus Run-on 0s

Mains Decoupling Supervision 1.0s

Dead Bus Synchronising

Enable

Sync mode Disabled

Excitation speed 1200 RPM

Start Delay 5s

Excitation delay 5.0s

Excitation ramp time 1.5s

AVR

Allow live nominal voltage adjust

WARNING : Ensure the generator system is adequately designed to cater for voltage adjustment.

Parameters are detailed overleaf...

4.16.1.1 PROTECTIONS

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

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

Options	Description
Disable	<p><input type="checkbox"/> = The module will operate as normal and provide engine shutdown if required. <input checked="" type="checkbox"/> = <i>Protections disabled</i> function is activated. Operation depends upon the following configuration.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> NOTE: Writing a configuration to the controller that has “Protections Disabled” configured, results in a warning message appearing on the PC screen for the user to acknowledge before the controller’s configuration is changed. This prevents inadvertent activation of the feature.</p> </div>
Protections are disabled	<p><i>Never</i> : The protections are not disabled <i>Always</i>: Protections are always overridden by the DSE controller. <i>On Input</i> : Protections are disabled whenever a configurable input set to <i>Protections Disabled</i> is activated</p>
Protections Disabled Alarm Action	<p>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.</p> <p><i>Indication</i>: Any output or LCD display indicator configured to <i>Protections Disabled</i> will be made active; however the internal alarm sound will not operate. <i>Warning</i>: Any output or LCD display indicator configured to <i>Protections Disabled</i> will be made active, and the internal alarm sound will operate.</p> <p>When protections are disabled, <i>Protections Disabled</i> will appear on the module display to inform the operator of this status.</p>

4.16.1.2 OUT OF SYNC

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

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

TROUBLESHOOTING

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

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

4.16.1.3 OTHER TIMERS

Options	Description
Synchronisation Delay	Delays the synchronising process to allow the set to stabilise and power parasitic loads or transformers (for instance) before the synchronising process begins.
Dead Bus Run On	Delays the <i>Load Demand Scheme</i> becoming active upon closing the breaker.
Mains Decoupling Supervision	Delays the activation of the inbuilt 8600 Mains Decoupling detection when generator and mains are in parallel. Upon closing into parallel, the timer is activated. After the timer has expired, the mains decoupling protection becomes live.
Interlock override off	Timer to delay the re-assertion of the interlock override.

4.16.2 DEAD BUS SYNCHRONISING

 **NOTE: Dead Bus synchronising is only available from Version 5.0 +**

Options	Description
Enable	<input type="checkbox"/> = All synchronising is performed 'the traditional' way by achieving a slip frequency and waiting for the voltage, frequency and phase to be within configured windows <input checked="" type="checkbox"/> = The Dead Bus Synchronising feature is activated as configured below.
Sync mode	<p>Always - Dead bus sync is always used when the generators are required to be on line and in the <i>Auto</i> mode (Dead bus sync does not operate in <i>Manual</i> mode in any circumstance. Disabled – The feature is not active On Input - Dead bus sync is used when a digital input is active :</p>  <p>On Request From 8660 – The feature is only used when a start request is received from a DSE8660</p>
Excitation Speed	<p>The speed at which the engine is deemed to be running fast enough for the excitation to be energised :</p>  <p>Any sets not reaching this speed by the end of the <i>excitation delay</i> open their breakers and are removed from the Dead Bus Sync System.</p>
Start Delay	Time delay used at start up to ensure the start request is not simply a fleeting request.
Excitation Delay	During engine run up, if the <i>Excitation Speed</i> is not achieved by the end of the <i>Excitation Delay</i> , the set is removed from the Dead Bus Sync system and will attempt to synchronise in the 'traditional' way.
Excitation Ramp Time	The time allowed for the excitation field to build after being energised. At the end of this time, all frequency and voltage alarms are active.

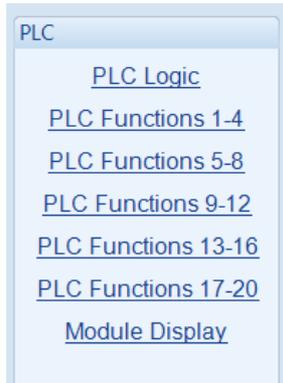
4.16.3 AVR

 **NOTE: Ensure the generator is adequately designed to cater for voltage adjustment.**

Options	Description
Allow Live Nominal Voltage Adjust	<input type="checkbox"/> = Adjustment of nominal voltage is disabled. <input checked="" type="checkbox"/> = The nominal voltage can be adjusted through the running editor on the module display.

4.16.4 PLC

The PLC section is subdivided into smaller sub-sections.

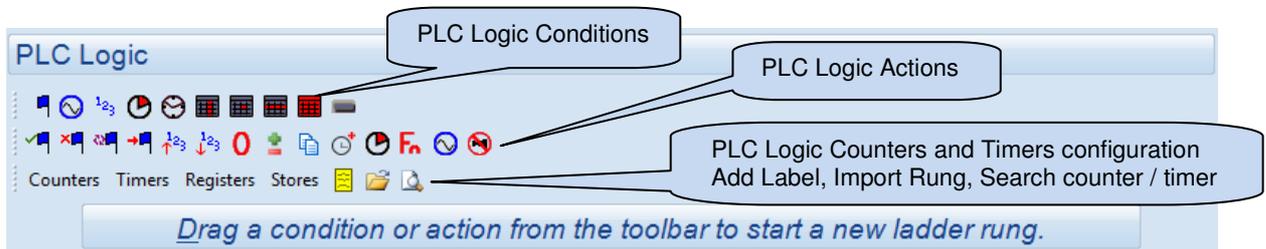


4.16.4.1 PLC LOGIC

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

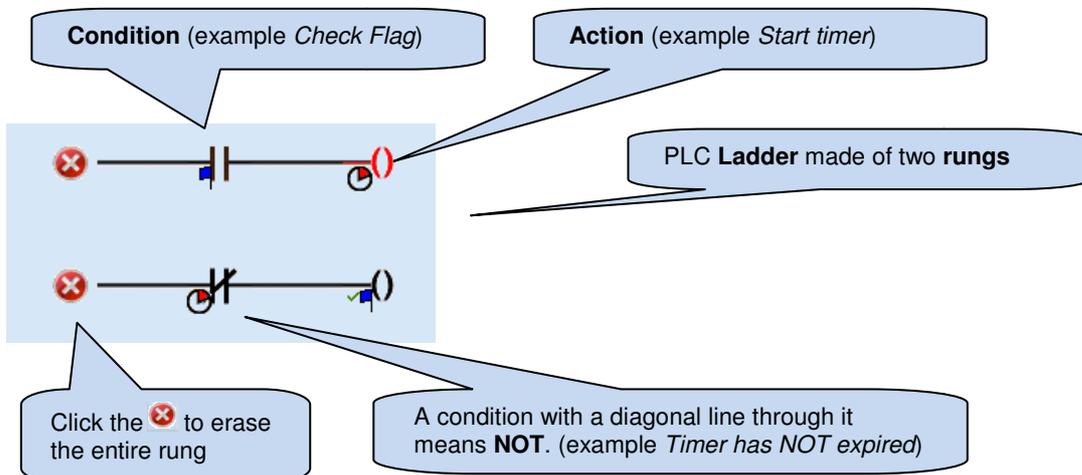
NOTE: PLC logic is available in module version 2.xx and later. Version 1.xx modules include a different system, detailed in the manual section entitled “CONTROL LOGIC” elsewhere in this document.

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



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

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



4.16.4.2 PLC FUNCTIONS

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

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

The screenshot shows a configuration window titled "PLC Functions 1-4". It contains two identical sections for "Function 1" and "Function 2". Each section has the following settings:

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

4.16.4.3 MODULE DISPLAY

Allows selection of PLC parameters to be editable from the module display. Parameters chosen in this section will appear on the module display pages under PLC Editor page.

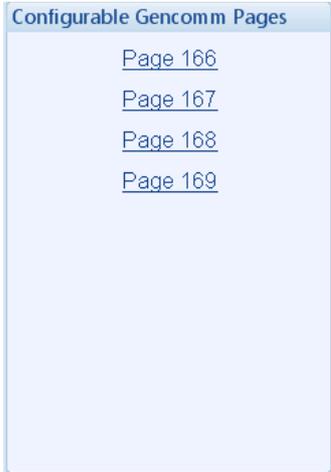
The screenshot shows a configuration window titled "Module Display". It contains a section for "Displayed Pages" with eight entries, each consisting of a page number and a dropdown menu:

- Page 1: Register 1
- Page 2: Timer 3
- Page 3: Store 8
- Page 4: Timer 20
- Page 5: Register 20
- Page 6: Timer 20
- Page 7: Counter 1
- Page 8: Counter 20

4.16.5 CONFIGURABLE GENCOMM PAGES

NOTE: Configurable Gencomm pages are available in module version 3.xx and later.

NOTE: The ability to add specific registers to the configurable gencomm registers list has been added in module version 6.0 and later.

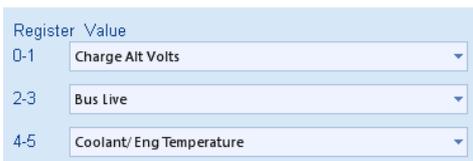


For advanced Modbus users of the controller, configurable Gencomm pages are available. The intention is to allow the user to create personal collections of data in subsequent registers to minimise the number of modbus reads required by the master, and hence speed up data collection.

The configurable modbus pages are:

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

Example of page configuration



4.16.6 CONFIGURABLE EDITOR SCREENS

The screenshot shows a software interface titled "Configurable Editor Screens". Below the title is a section labeled "User Editable Module Parameters". This section contains a list of six items, each with a label and a dropdown menu:

Item Label	Current Selection
Editable Item 1	Not Used
Editable Item 2	Start Delay On Load
Editable Item 3	Droop %
Editable Item 4	Not Used
Editable Item 5	Not Used
Editable Item 6	Not Used

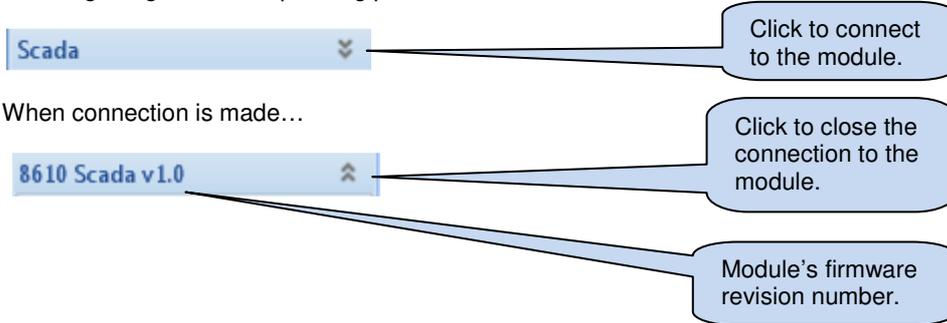
The module's display includes new screens for editing these parameters.

Select parameters to be editable through the module display. The editing of these parameters will not be protected by the PIN (if enabled)

5 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 is to check the operation of the controller'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.

8610 SCADA

- [Generator Identity](#)
- [Mimic](#)
- [Languages](#)
- [Digital Inputs](#)
- [Digital Outputs](#)
- [Virtual LEDs](#)
- [Bus](#)
- [Generator](#)
- [Engine](#)
- [Flexible Sensor](#)
- [Alarms](#)
- [Status](#)
- [Event Log](#)
- [Enhanced CANbus](#)
- [Remote Control](#)
- [Maintenance](#)
- [Data Log](#)
- [PLC](#)
- [Expansion](#)

5.1 GENERATOR IDENTITY

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

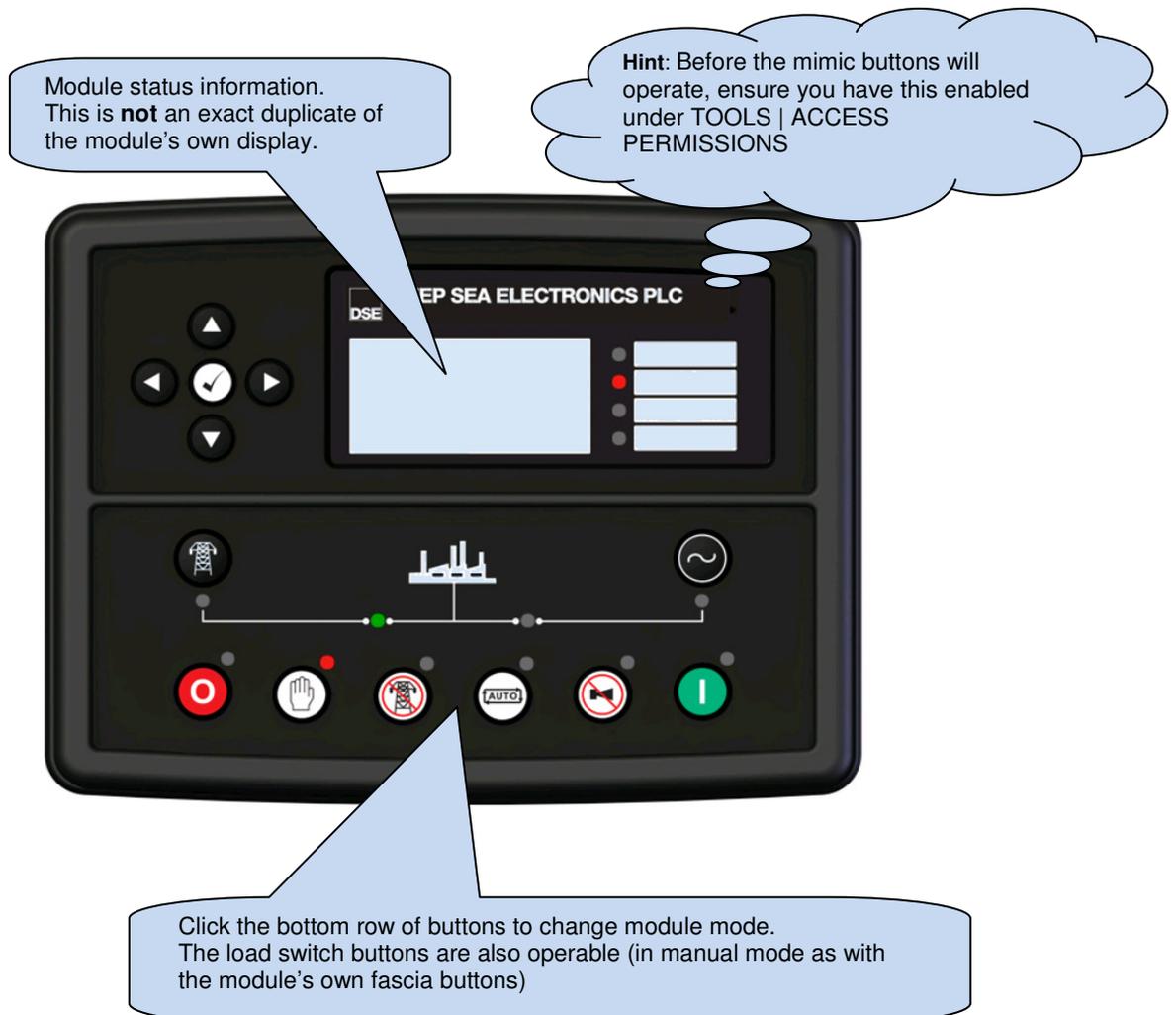
This information is particularly helpful when the current connection is made remotely by modem or internet for example or when the connected set is one of a number of sets on an RS485 data link.

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

5.2 MIMIC

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

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



5.3 LANGUAGES

Languages

Current Module Language
7xxx Chinese (People's Republic) language file - 18-09-2007

To upload: 7xxx Arabic (Saudi Arabia) language file - 03-10-2007

Upload Now

Current language in the module. DSE8600 series use the 7xxx language files.

Select *new* language

Click to send the new language to the module.

Languages

Current Module Language
7xxx Spanish (Spain - Modern) language file - 19-12-2007

To upload: 7xxx Spanish (Spain - Modern) language file - 19-12-2007

Upload Now

File Upload Progress

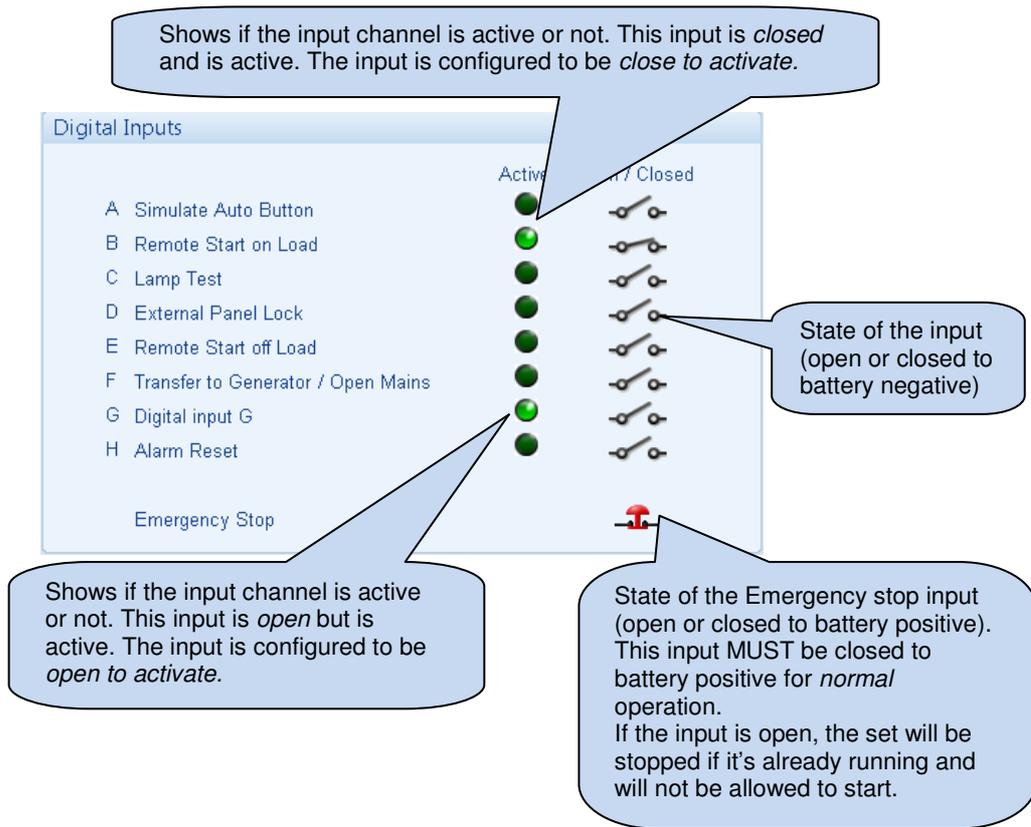
41 %

Uploading language file to module. **Abort**

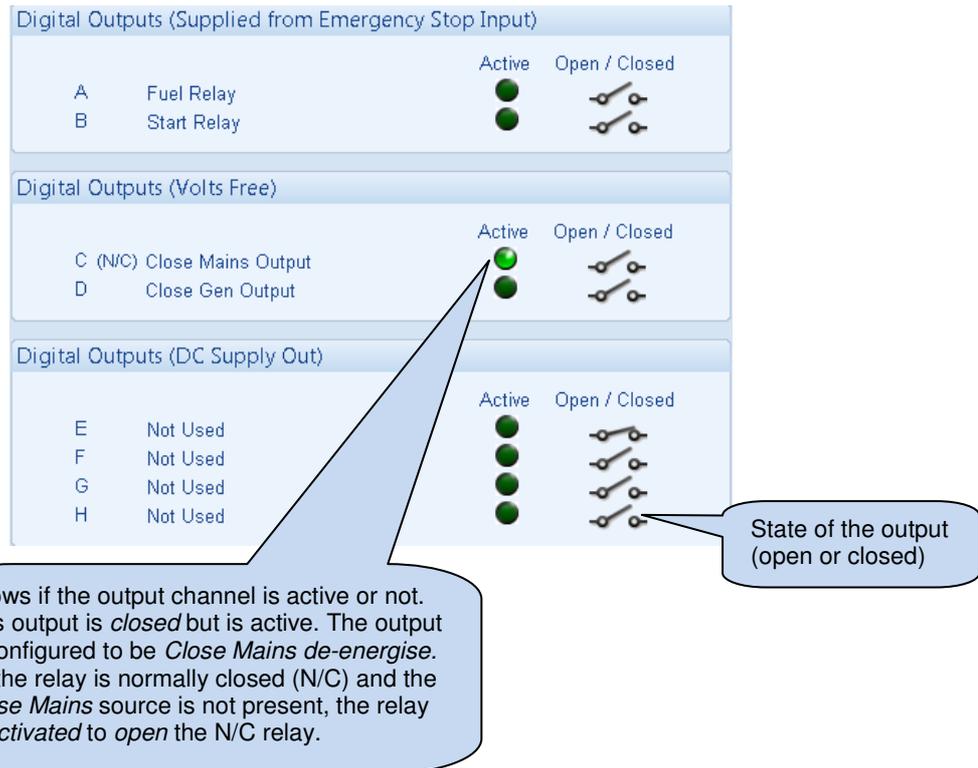
During language upload, the progress is shown. Total transfer time is less than one minute. During this process:

- DO NOT DISCONNECT THE USB LEAD
- DO NOT TURN OFF YOUR PC
- DO NOT DISCONNECT THE MODULE's DC POWER SUPPLY

5.4 DIGITAL INPUTS



5.5 DIGITAL OUTPUTS



5.6 VIRTUAL LEDS

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

The screenshot displays a window titled "Virtual LEDs" with a sub-section "LED Status". It contains a table with 20 rows, each representing an LED. The first column lists "LED 1" through "LED 20". The second column also lists "LED 1" through "LED 20". To the right of the second column is a vertical column of 20 circular indicators, each labeled "Active". Callout boxes provide additional information: one points to the top indicator (LED 1) stating "Shows if the Virtual LED is active or not", and another points to the eighth indicator (LED 8) stating "Shows what the Virtual LED is configured for (shows the LED number if not configured)".

LED 1	LED 1	Active
LED 2	LED 2	
LED 3	LED 3	
LED 4	LED 4	
LED 5	LED 5	
LED 6	LED 6	
LED 7	LED 7	
LED 8	LED 8	
LED 9	LED 9	
LED 10	LED 10	
LED 11	LED 11	
LED 12	LED 12	
LED 13	LED 13	
LED 14	LED 14	
LED 15	LED 15	
LED 16	LED 16	
LED 17	LED 17	
LED 18	LED 18	
LED 19	LED 19	
LED 20	LED 20	

5.7 MAINS



DSE8660/DSE8620 only

Shows the modules measurements of the mains supply

Frequency		
49.90 Hz		
Phase to Neutral Voltages		
L1 - N 226.1 v	L2 - N 225.1 v	L3 - N 225.3 v
Phase to Phase Voltages		
L1 - L2 0.0 v	L2 - L3 0.0 v	L3 - L1 0.0 v

5.8 GENERATOR AND BUS

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

Generator
Frequency, Voltages and Current
Power
Multi-Set
Governor/AVR Interface
Sync

5.8.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the modules measurements of the supply.

Frequency, Voltages and Current			
Frequency			
0.0 Hz			
Phase to Neutral Voltages			
L1 - N	L2 - N	L3 - N	
0.0 v	0.0 v	0.0 v	
Phase to Phase Voltages			
L1 - L2	L2 - L3	L3 - L1	
0.0 v	0.0 v	0.0 v	
Current			
L1	L2	L3	
0.0 A	0.0 A	0.0 A	
Earth Current			
0.0 A			
Phase Rotation			
Indeterminate			

5.8.2 POWER

Shows the modules measurements of the supply power.

Watts			
L1	L2	L3	Total
0.15 kW	0.00 kW	0.00 kW	0.15 kW
VA			
L1	L2	L3	Total
0.0 kVA	0.0 kVA	0.0 kVA	0.0 kVA
VAr			
L1	L2	L3	Total
0.0 kVAr	0.0 kVAr	0.0 kVAr	0.0 kVAr
Power Factor			
		Average	
		1.00	
Accumulated Power			
kWh	kVAh	kVArh	
0 kWh	0 kVAh	0 kVArh	

5.8.3 MULTISSET

Not DSE8620 Modules

NOTE: These settings are not stored in the module configuration. They are stored in a different memory area and not transferred with the configuration. The *Clone Module* feature transfers both the configuration AND the settings of the Multiset, Governor/AVR interface and the Sync page.

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

- Bus:** Shows 'Sets On The Bus' and 'Mains Controller Present' with a value of 1 and a green indicator light. Callout: "The number of modules currently connected to the MSC link."
- GenSet:** Shows 'MSC ID' and 'Priority' both set to 1, each with a 'Set' button. Callout: "Each controller connected to the MSC link must have a unique ID. If all the controllers are powered up 'one at a time', this DeviceID is automatically set. Powering them up together may result in 'ID alarm'. Manually setting the DeviceID"
- Commissioning Screen:** Has an 'Enable' checkbox checked with a green indicator light. Callout: "Enable or disable the module's diagnostic Commissioning Screens."
- Analogue Drive:** Shows 'Governor' and 'AVR' both at 0.0%. Callout: "Governor and AVR Analogue drive Percentage."
- Levels:** Contains sliders for 'Load Level' (Minimum 2%, Maximum 3%), 'VAr Level' (Maximum 0%), and 'Power Factor' (1.00pf). Callout: "Load levels used when 'base load' / 'fixed export' mode is in operation (see below for details)"

Parameters detailed overleaf...

Item	Function
Bus Control (Only applicable to 8660)	<p>The amount of power that the sets will produce when in parallel with the mains. This figure is a percentage of each generators capacity that is connected to the bus. Therefore, the actual kW will vary depending on how many sets are on the bus. The 'load demand start up and shut down scheme' is disabled whilst running in parallel with the mains (utility). E.g. on a multi set system where each generator is rated at 500 kW and the bus power was set to 50%, each set running would produce 250 kW of power.</p> <div style="border: 1px solid black; padding: 5px;"> <p> NOTE: If the load level is below this setting, then the generator will export power to the mains grid. The DSE8660 internal mains protection can be configured to disconnect the generators from the mains.</p> </div>
Mains control (Only applicable to 8660)	<p>The amount of power that the sets produce will vary to ensure that the mains will always supply the desired level. This level can either be an amount of imported power or exported power.</p> <p>E.g. If the mains load level was set to 250 kW the generators would supply the difference between this figure and total connected load. If the load was lower than this figure then the generators come off load and perform a controlled stop. Therefore, this setting is also a start level when remote start on load is active.</p> <div style="border: 1px solid black; padding: 5px;"> <p> NOTE: The generators will never be driven to more than 100% of their full load capability. This will generate an <i>insufficient capacity</i> alarm.</p> </div>

Item	Function
KVAR control	The amount of reactive power that the set will produce when used in 'load level control' mode, when <i>Reactive Load Control Mode</i> is set to <i>Load Level Control</i>
Pf control	The power factor that the set will maintain when used in 'load level control' mode, when <i>Reactive Load Control Mode</i> is set to <i>Load Level Control</i>)
	 NOTE: At low load levels, it may not be possible to maintain the power factor.
	KVAR control: The amount of reactive power that the set will produce when used in 'load level control' mode, when <i>Reactive Load Control Mode</i> is set to <i>Load Level Control</i>
	Pf control: The power factor that the set will maintain when used in 'load level control' mode, when <i>Reactive Load Control Mode</i> is set to <i>Load Level Control</i>
	 NOTE: At low load levels it may not be possible to maintain the power factor.

5.8.4 GOVERNOR/AVR INTERFACE

NOTE: These settings are not stored in the module configuration. They are stored in a different memory area and not transferred with the configuration. The *Clone Module* feature transfers both the configuration AND the settings of the Multiset, Governor/AVR interface and the Sync page.

Interface

Governor

Center (SW1) 6.4

Range (SW2) 0.0

Speed and Frequency

Engine Speed	0 RPM
Generator Frequency	0.0 Hz
Governor Analog	0.0 %
AVR Analog	0.0 %

AVR

Center (SW1) 8.0

Range (SW2) 0.0

Phase to Neutral Voltages

L1 - N	L2 - N	L3 - N
0.0 v	0.0 v	0.0 v

Phase to Phase Voltages

L1 - L2	L2 - L3	L3 - L1
0.0 v	0.0 v	0.0 v

SW1 and SW2 are the configurable settings for the *analogue governor output* and *analogue AVR output* included on the DSE8610/DSE8620 controller.

As the input requirements of governors and AVRs vary from manufacturer to manufacturer, and even from model to model, the DSE module is configurable to allow connection to many devices.

The analogue governor and AVR outputs are both isolated from ground and battery negative, allowing compatibility with devices with inputs that are not referenced to ground or battery negative.

5.8.4.1 SW1

SW1 is also known as Centre. SW1 sets the voltage produced by the DSE module's output for 'nominal'. For example SW1 = 0 for the governor output, means that the analogue governor output will be 0V DC when the engine is required to run at its nominal speed.

5.8.4.2 SW2

SW2 is also known as Range. SW2 sets the range of the 'swing' around the Centre (SW1) voltage produced by the DSE module's output for change. For example SW2 = 1 for the governor output, means that the analogue governor output will be made to change by up to 1V DC either side of the Centre (SW1) voltage to make the engine run at lower or higher speeds or to increase/decrease load share.

5.8.4.3 SETTINGS

SW1 setting	'centre' voltage of analogue output
0	0V
1	0.5V
2	1.0V
3	1.5V
4	2.0V
5	2.5V
6	3.0V
7	3.5V
8	4.0V
9	4.5V

SW2 setting	Voltage range of analogue output
0	±0.5V
1	±1.0V
2	±1.5V
3	±2.0V
4	±2.5V
5	±3.0V
6	±3.5V
7	±4.0V
8	±4.5V
9	±5.0V

Typical wiring diagrams and SW1/SW2 selector settings for many of the most popular governors are included within the DSE guide to synchronising and Load Sharing (Part2).

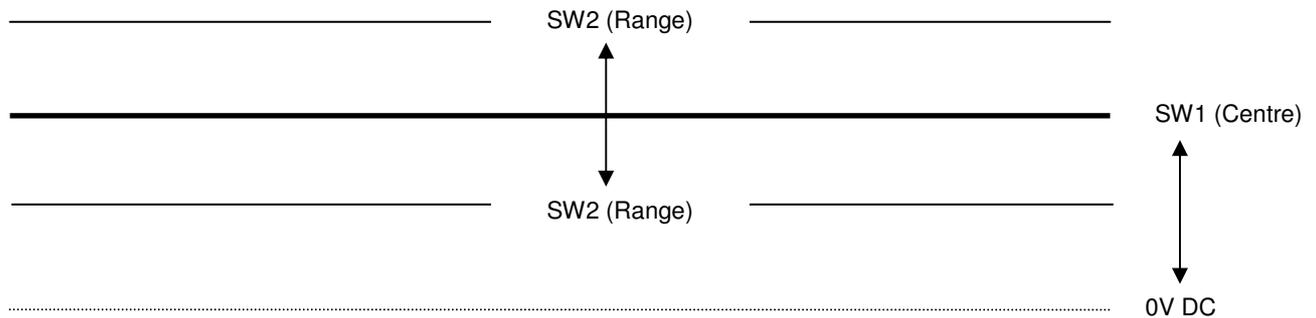
5.8.4.4 SUMMARY

You can think of the settings as Analogue output voltage is $SW1 \pm SW2$

In the example above this means the analogue output is $1.0V \pm 1.5V$ (based upon the settings of $SW1=2$ and $SW2=2$)

SW1 is the voltage above (or below) 0V that the analogue output will produce to instruct 'no change' to the voltage/frequency of the genset.

SW2 is the maximum voltage above (and below) SW1 that the analogue output will produce to instruct the voltage/frequency of the genset to change.



5.8.5 SYNC

NOTE: - These settings are not stored in the module configuration. They are stored in a different memory area and not transferred with the configuration. The *Clone Module* feature transfers both the configuration AND the settings of the Multiset, Governor/AVR interface and the Sync page.

The screenshot shows the 'Sync' configuration page with the following sections and settings:

- Instrumentation:** Governor Is Not Analog, Governor Is Not Relay, AVR Is Not Analog, AVR Is Not Relay (all green indicators).
- Frequency Synchroniser:** Slip Frequency (0.1 Hz), Gain (20%), Pulse Rate (2.5 Hz), Pulse Length (0.5s). Callout: Control loop settings for frequency synchroniser.
- Voltage Matcher:** Gain (20%), Pulse Rate (2.5 Hz), Pulse Length (0.5s). Callout: Control loop settings for voltage matching.
- Load Share:** Gain (20%), Stability (20%), Pulse Rate (2.5 Hz), Pulse Length (0.5s). Callout: Control loop settings for kW load control.
- Reactive Load Control:** Gain (20%), Stability (20%), Pulse Rate (2.5 Hz), Pulse Length (0.5s). Callout: Control loop settings for kVAr load control.

Item	Function
Slip frequency	The difference between generator frequency and the bus/mains frequency. The 75xx controller will adjust engine speed until the frequency difference matches the slip frequency. The phase of the supplies will then drift in and out of synchronism at a rate of 1/slip-frequency times per second. I.e. for Slip frequency of 0.2Hz, the supplies will be in phase once every five seconds.
Pulse rate (Not applicable to DSE8860)	(Not applicable when using internal analogue control system) The number of raise/lower changes per second of the raise / lower relay outputs.
Pulse length (Not applicable to DSE8860)	(Not applicable when using Internal analogue control system) The lengths of raise/lower pulses of the raise / lower relay outputs.
Gain / Stability	(Not applicable when using external relays control system) In general, lower setting results in a slow frequency matching process, but too high a setting may cause instability (hunting). If this occurs, lower the stability setting. If this has no effect, lower the gain setting.

5.8.5.1 ADJUSTING GAIN AND STABILITY

Initial Setup

Typically the DSE factory settings are suitable for most systems. However occasionally it may be necessary to adjust them, but only after checking the gain and stability settings of the speed governor/AVR.

Start with gain and stability at the minimum settings. Increase gain until the engine speed becomes unstable, then half the gain setting.

Now increase the stability setting until the engine speed again becomes unstable, and then lower a little.

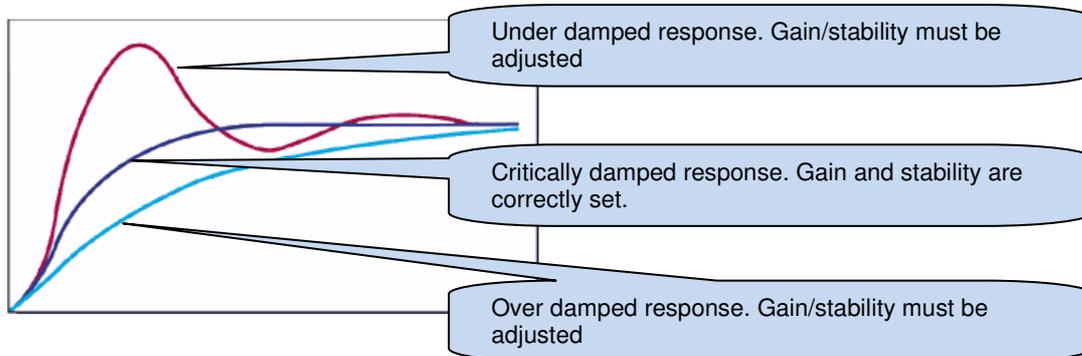
You may need to perform the synchronising process a number of times to see the effect of your changes. You can also 'knock' the governor actuator, or change the 'slip frequency' setting to disturb the engine speed and force the controller into making further changes.

Troubleshooting

Generally a problem with the gain (too high or too low) will result in a fast oscillation of the parameter being controlled. A slow rolling oscillation usually indicates that the stability is too high or too low.

Remember that the DSE module is not the only device with gain/stability. The engine governor and AVR also have these settings. An incorrectly set governor/AVR cannot be corrected by the DSE controller. You must ensure correct settings for these devices before changing the DSE module settings.

In general, engine governors need lower gain when in parallel with the mains supply than they do for single set operation or paralleling with other generators.



NOTE: - An over damped response will result in a slower control process. An under damped response (overshooting the target) will lead to an unstable control process.

Either case could lead to undesirable consequences such as overcurrent or reverse power, resulting in generator shutdown, and loss of supply to the load.

5.9 ENGINE

Shows the modules measurements of the engine parameters.

Coolant Temperature	Plant Battery
51 °C, 124 °F	11.4 v DC
Oil Pressure	Charge Alternator
3.65Bar, 52.94 PSI, 365 KPa	0.8 v DC
Speed	Hours Run
1500 RPM	01:58
Fuel Level	Number of Starts
Low	62

5.10 FLEXIBLE SENSOR

Shows the measurement of the Flexible Sensor (If configured)

Flexible Senders
Not Used
Not Used
Not Used

5.11 ALARMS

Shows any present alarm conditions.

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

The image shows a screenshot of a control panel interface for monitoring alarms. It is organized into four distinct sections, each with a blue header and a light blue content area. The sections are: 'Alarms' (the overall title), 'Shutdown alarms', 'Engine Alarms', 'Electrical trip alarms', and 'Warning Alarms'. Each section contains an empty rectangular box, indicating that no alarm conditions are currently present or that the display is blank.

5.12 STATUS

Shows the module's current status.

Status	
Supervisor State At Rest Alarm	Software Version 1.0
Engine/Generator State Engine At Rest	Module ID BC614E
Load Switching State Neutral	Mode 
Protections Enabled	

5.13 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

5.14 ENHANCED CANBUS

If the module is connected to a compatible electronic engine, the following information is read from the ECU (if supported by the engine ECU).

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
Total Fuel Used	Fuel Consumption

5.15 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 can 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.

Remote Control		
Remote Control Sources		
Control	Activate	Active
1	<input checked="" type="checkbox"/>	
2	<input type="checkbox"/>	
3	<input type="checkbox"/>	
4	<input checked="" type="checkbox"/>	
5	<input type="checkbox"/>	
6	<input type="checkbox"/>	
7	<input checked="" type="checkbox"/>	
8	<input type="checkbox"/>	
9	<input type="checkbox"/>	
10	<input type="checkbox"/>	

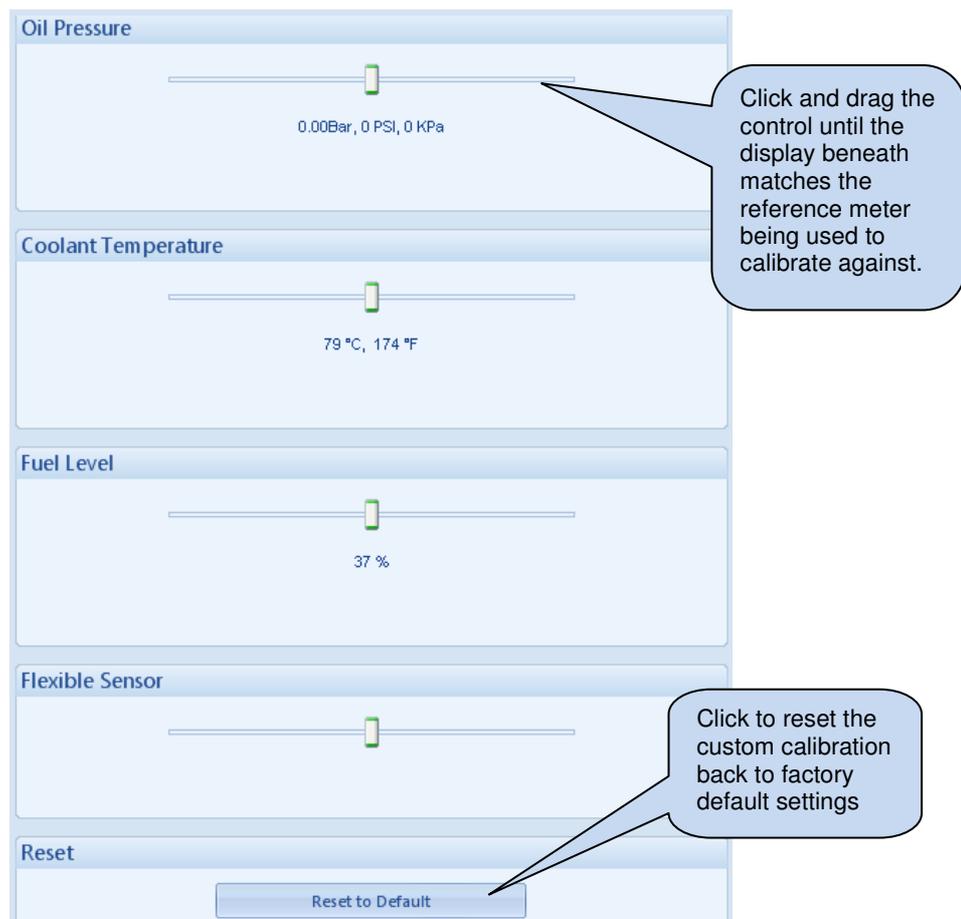
5.16 MAINTENANCE

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



5.16.1 RECALIBRATE TRANSDUCERS

This section allows the analogue sensor inputs to be calibrated to remove inaccuracies caused by the tolerance of the sensor devices. The engine can be running when the instruments are calibrated and reference should be made to a third party accurate sensing device to ensure accurate recalibration.



Oil Pressure

0.00Bar, 0 PSI, 0 KPa

Coolant Temperature

79 °C, 174 °F

Fuel Level

37 %

Flexible Sensor

Reset

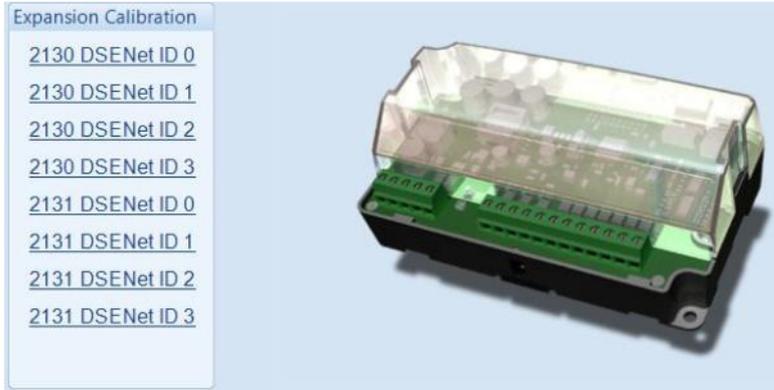
Reset to Default

Click and drag the control until the display beneath matches the reference meter being used to calibrate against.

Click to reset the custom calibration back to factory default settings

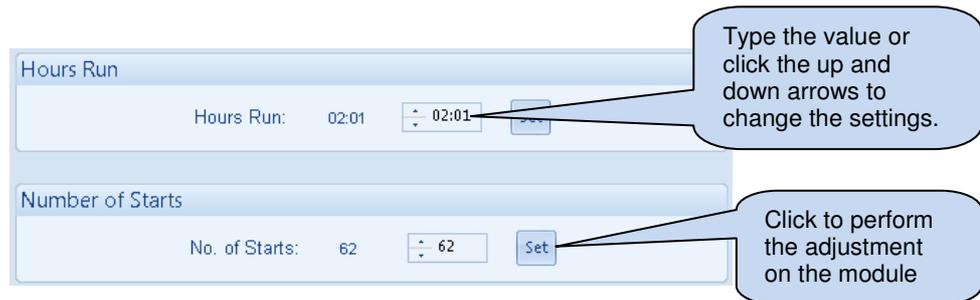
5.16.3 EXPANSION CALIBRATION

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. The engine can be running when the instruments are calibrated and reference should be made to a third party accurate sensing device to ensure accurate recalibration.

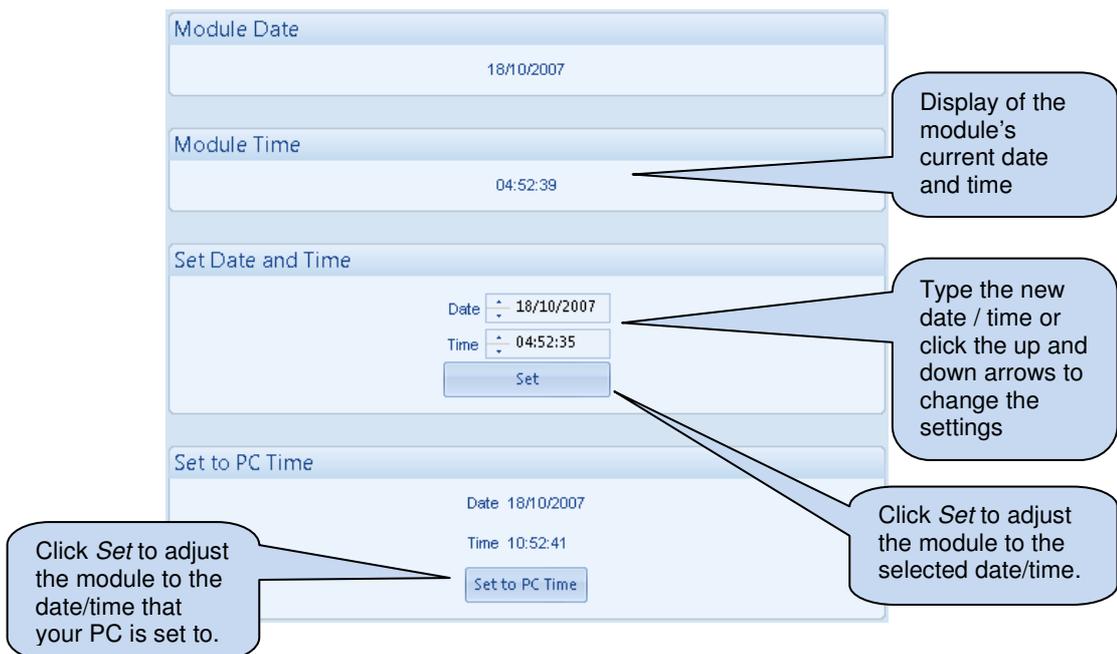


5.16.4 HOURS RUN AND NUMBER OF STARTS

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



5.16.5 TIME



5.16.6 ACCUMULATED INSTRUMENTATION

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

The screenshot shows a web interface for managing accumulated instrumentation. It consists of four main sections: kWh, kVAh, kVArh, and a Reset section. Each section displays a current value and a control for setting a new value. Callouts provide instructions on how to interact with these elements.

Parameter	Current Value	Control
kWh	154.0 kWh	Input field with 154.0 and Set button
kVAh	100.0 kVAh	Input field with 100.0 and Set button
kVArh	85.0 kVArh	Input field with 85.0 and Set button
Reset		Reset all values to zero button

Callout 1: Display of the module's current value for the parameter.

Callout 2: Type the new value or click the up and down arrows to change the settings

Callout 3: Click *Set* to adjust the module to the selected value

Callout 4: Click to reset all the accumulated instrumentation counters to zero.

5.16.7 MAINTENANCE ALARM RESET

Three maintenance alarms active in the control module. Each is reset individually; only one alarm is shown below for clarity.

The screenshot displays a user interface titled "Maintenance Alarm Reset" with three vertically stacked panels, each representing a maintenance alarm. Each panel contains the following elements:

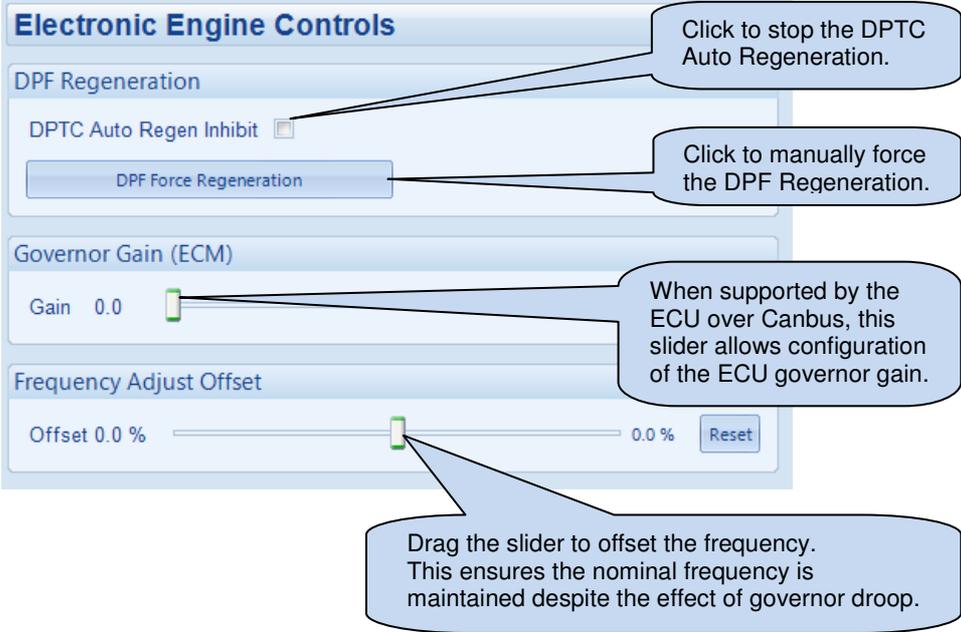
- Maintenance Alarm 1:** Includes labels for "Running Time Until Next Maintenance" and "Date Of Next Maintenance". Below these is a "Reset" button and a note: "Press reset to schedule next maintenance, based upon module's maintenance configuration."
- Maintenance Alarm 2:** Includes labels for "Running Time Until Next Maintenance" and "Date Of Next Maintenance". Below these is a "Reset" button and a note: "Press reset to schedule next maintenance, based upon module's maintenance configuration."
- Maintenance Alarm 3:** Includes labels for "Running Time Until Next Maintenance" and "Date Of Next Maintenance". Below these is a "Reset" button and a note: "Press reset to schedule next maintenance, based upon module's maintenance configuration."

A callout box with a pointer to the "Date Of Next Maintenance" label in the first panel contains the text: "Reset the maintenance alarm based upon the module's configuration."

5.16.8 ELECTRONIC ENGINE CONTROLS

 NOTE: This feature is available only on DSE8610 V6.3 and above.

 NOTE: *Electronic Engine Controls* parameters are only available when the DSE module is connected and configured for operation on an electronic engines.



The screenshot displays the 'Electronic Engine Controls' interface with the following sections and callouts:

- DPF Regeneration**
 - DPTC Auto Regen Inhibit**: A checkbox. Callout: "Click to stop the DPTC Auto Regeneration."
 - DPF Force Regeneration**: A button. Callout: "Click to manually force the DPF Regeneration."
- Governor Gain (ECM)**
 - Gain 0.0**: A slider control. Callout: "When supported by the ECU over Canbus, this slider allows configuration of the ECU governor gain."
- Frequency Adjust Offset**
 - Offset 0.0 %**: A slider control with a 'Reset' button. Callout: "Drag the slider to offset the frequency. This ensures the nominal frequency is maintained despite the effect of governor droop."

5.16.9 MODULE PIN

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

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

The screenshot shows a web-based configuration interface for setting a PIN. The interface is titled "Module PIN" and contains a sub-section "Module Access Password". It features two rows of four spinners each, labeled "Password" and "Confirmation". A "Set PIN" button is located at the bottom. A warning message is displayed below the spinners. Two callout boxes provide instructions: one points to the spinners, and another points to the "Set PIN" button.

Module PIN

Module Access Password

Password

Confirmation

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

Set PIN

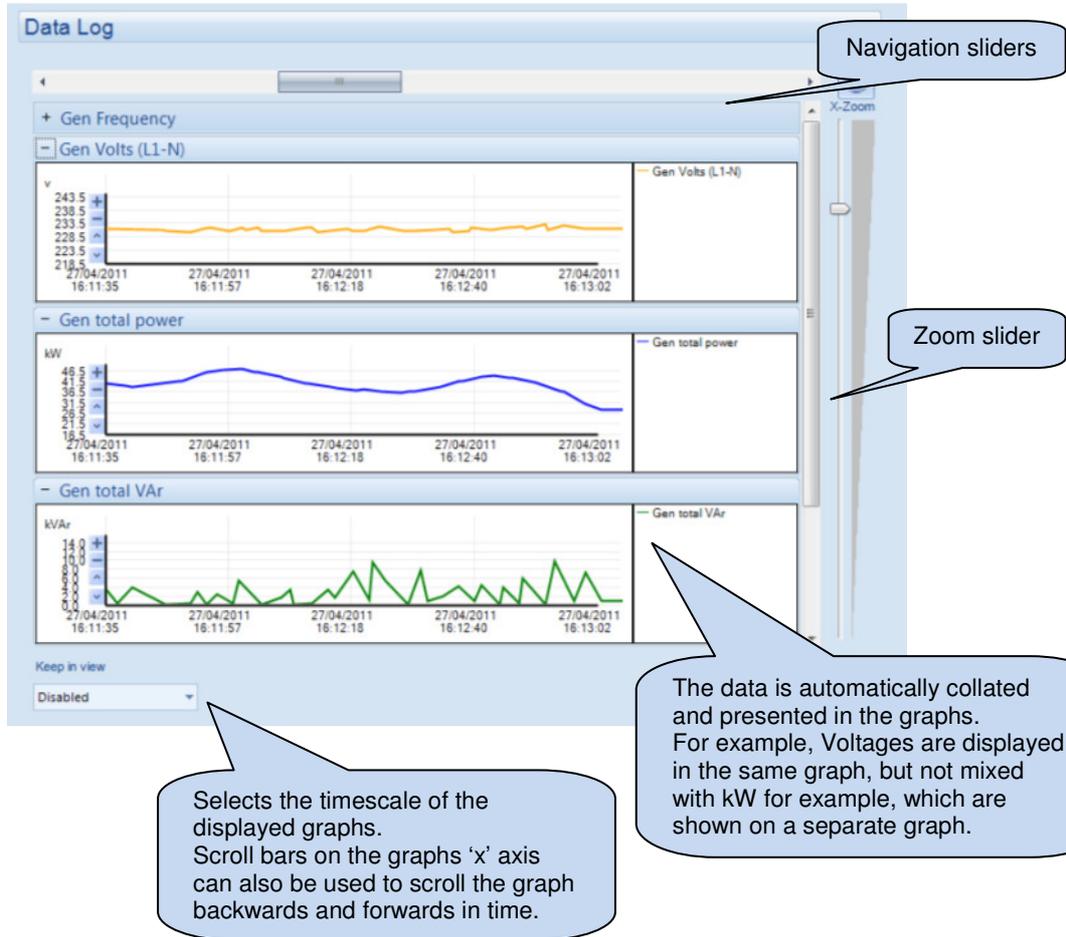
Enter the desired PIN number and reconfirm.

Click to set the PIN number in the module.

5.17 DATALOG

Allows viewing of the module datalog (if configured).

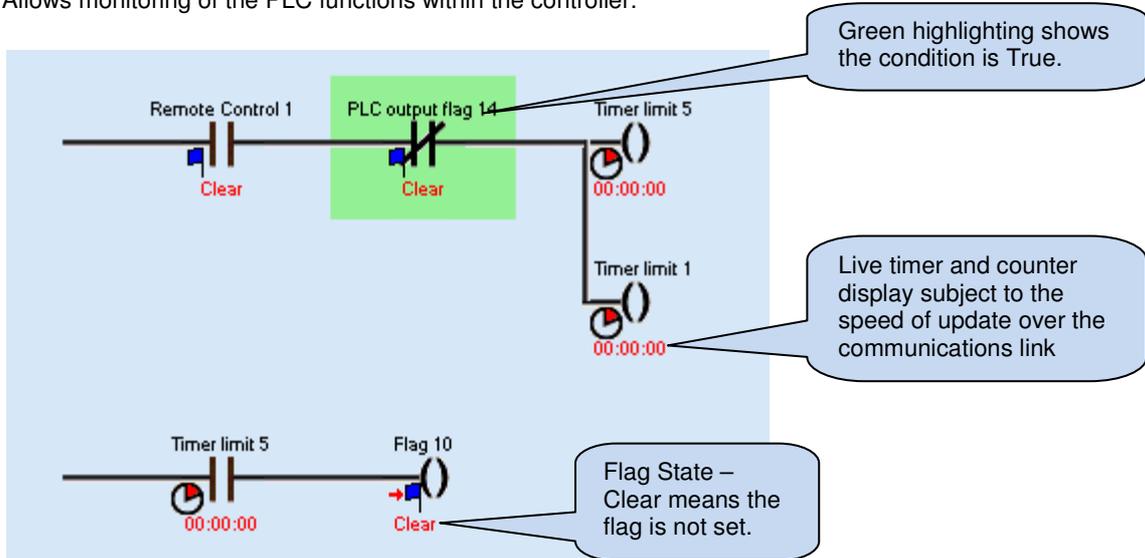
NOTE: Data Logging is available in module version 3.xx and later.
Data logging is a 'live' function – Maximum 8hrs duration is shown so long as the PC is left connected to the controller.



5.18 PLC

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

Allows monitoring of the PLC functions within the controller.



5.19 EXPANSION

Expansion

- [2130 Input Modules](#)
- [2131 Input Modules](#)
- [2133 Input Modules](#)
- [2152 Output Modules](#)
- [2157 Relay Modules](#)
- [2548 Annunciator Modules](#)

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

For example:

Expansion Inputs

Communications

Communications OK 

Inputs

	Active	Open / Closed
A 2130 Expansion Module ID1 Digital Input A		
B 2130 Expansion Module ID1 Digital Input B		
C 2130 Expansion Module ID1 Digital Input C		
D 2130 ID1 Digital Input D		
E <i>Not configured</i>		
F <i>Not configured</i>		
G <i>Not configured</i>		
H <i>Not configured</i>		

6 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 breaker. The set is allowed to cool before stopping.
Shutdown DSE8610/8620 Only	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.

This Page Intentionally Blank

This Page Intentionally Blank