DEEP SEA ELECTRONICS PLC

DSE8600 Configuration Suite Software Manual

Document Number 057-119

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DSE8600 Series configuration suite

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.

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1 BIBLIOGRAPHY

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

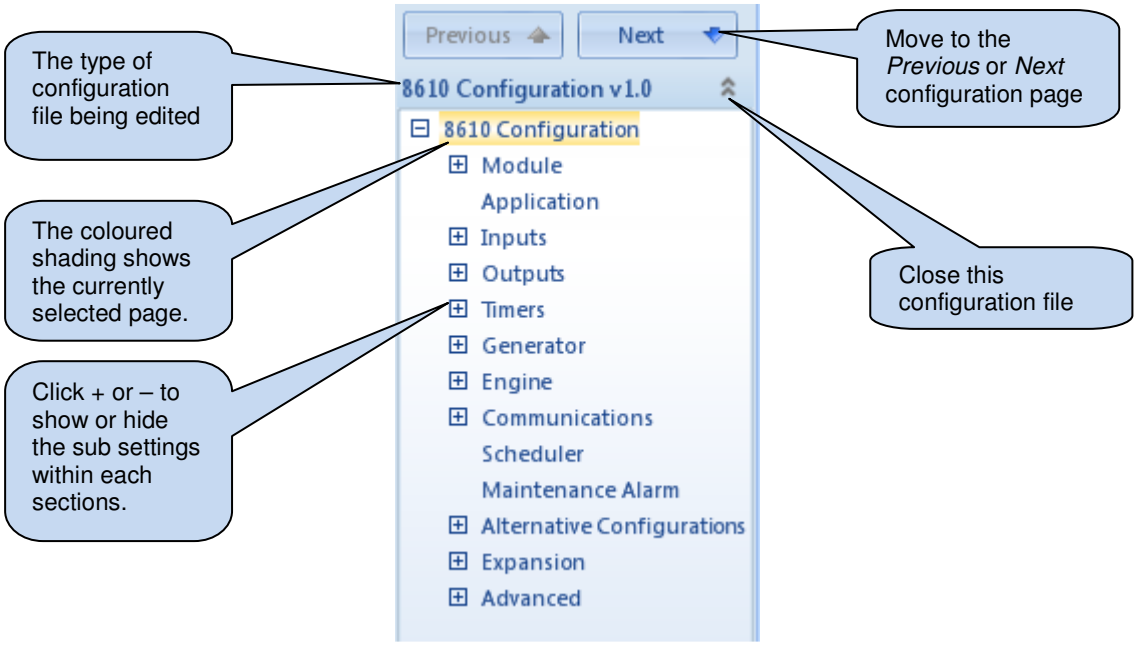
3 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

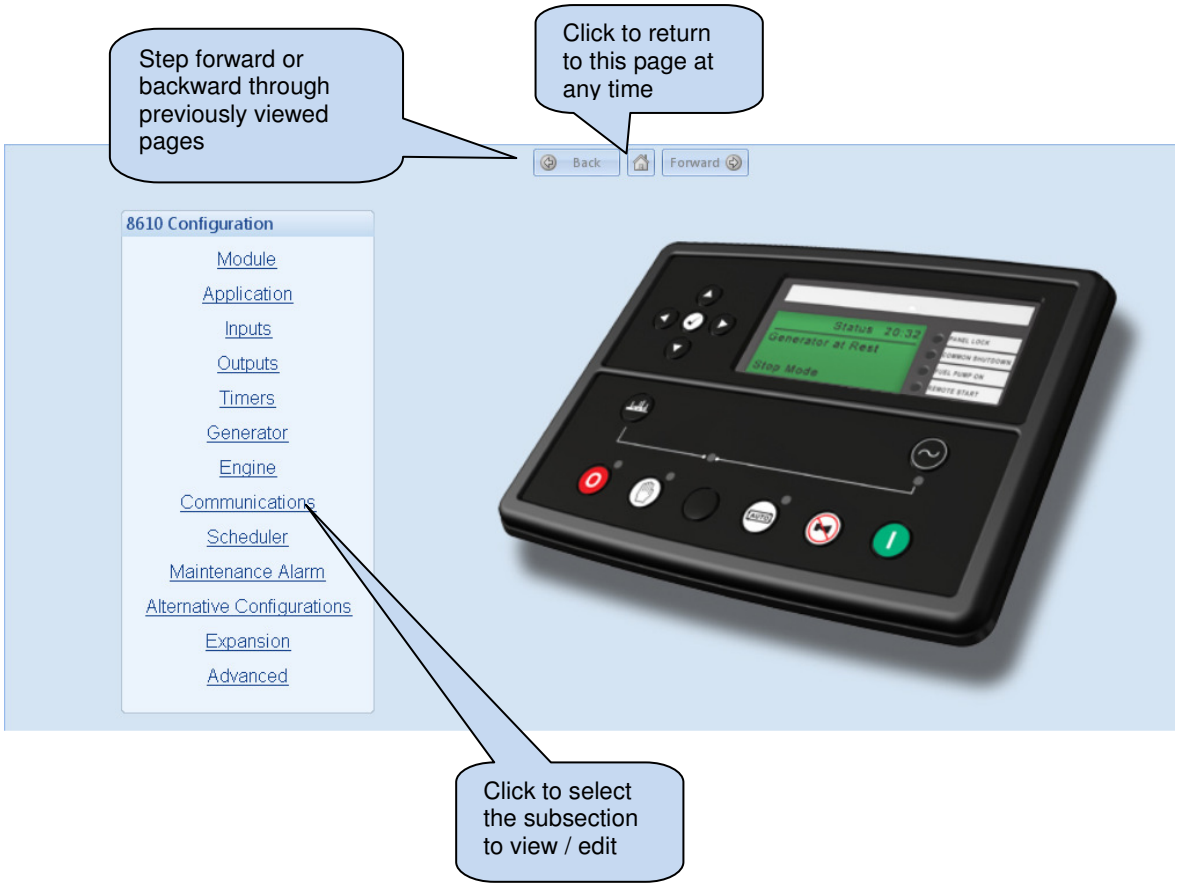
For information in regards to instating and using the DSE Configuration Suite Software please refer to DSE publication: ***057-151 DSE Configuration Suite PC Software Installation & Operation Manual*** which can be found on our website: ***www.deepseaplc.com***

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

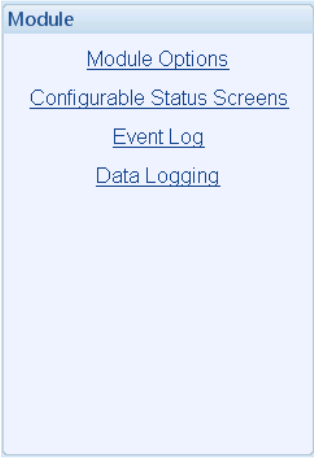




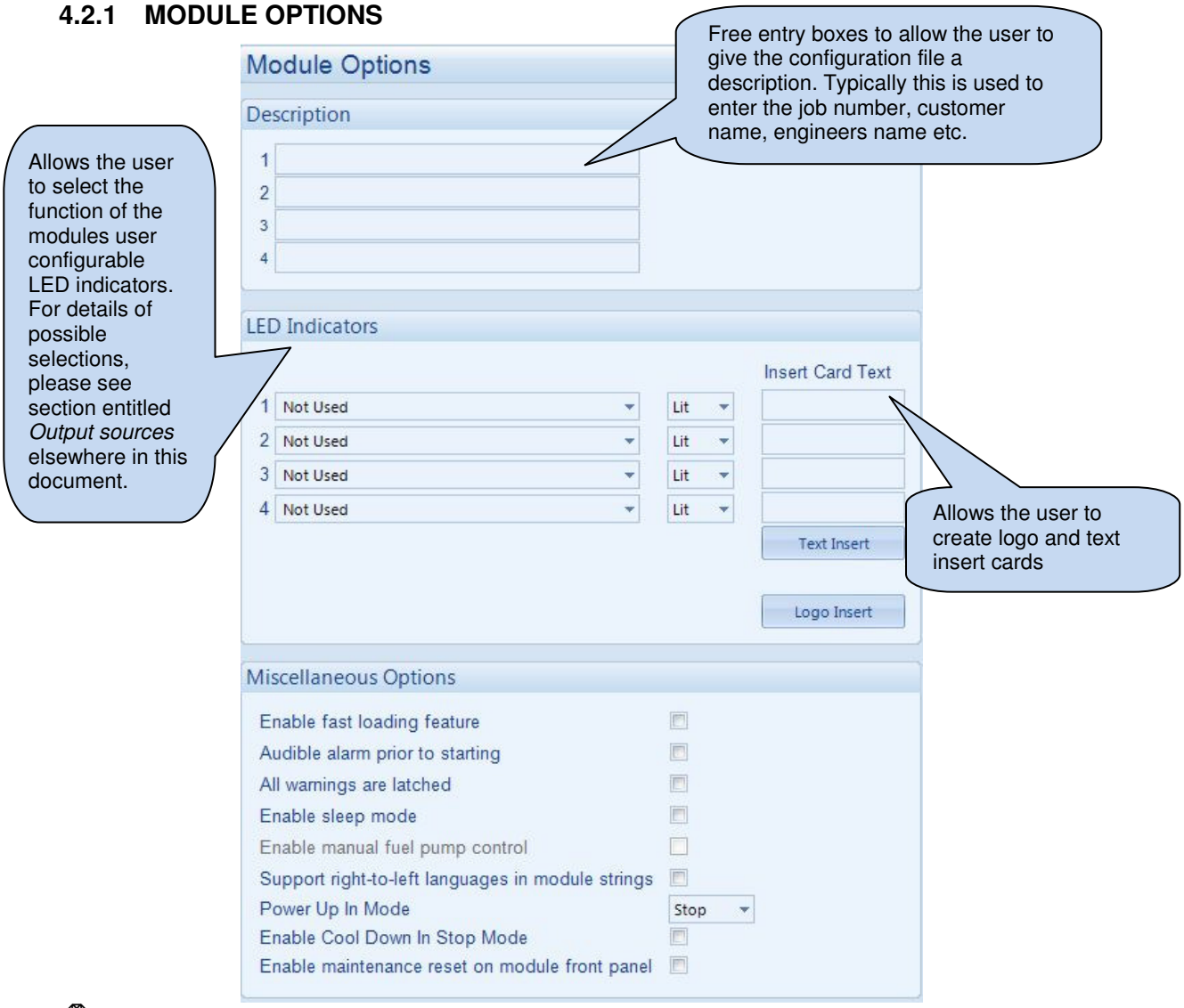
4.2 MODULE

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



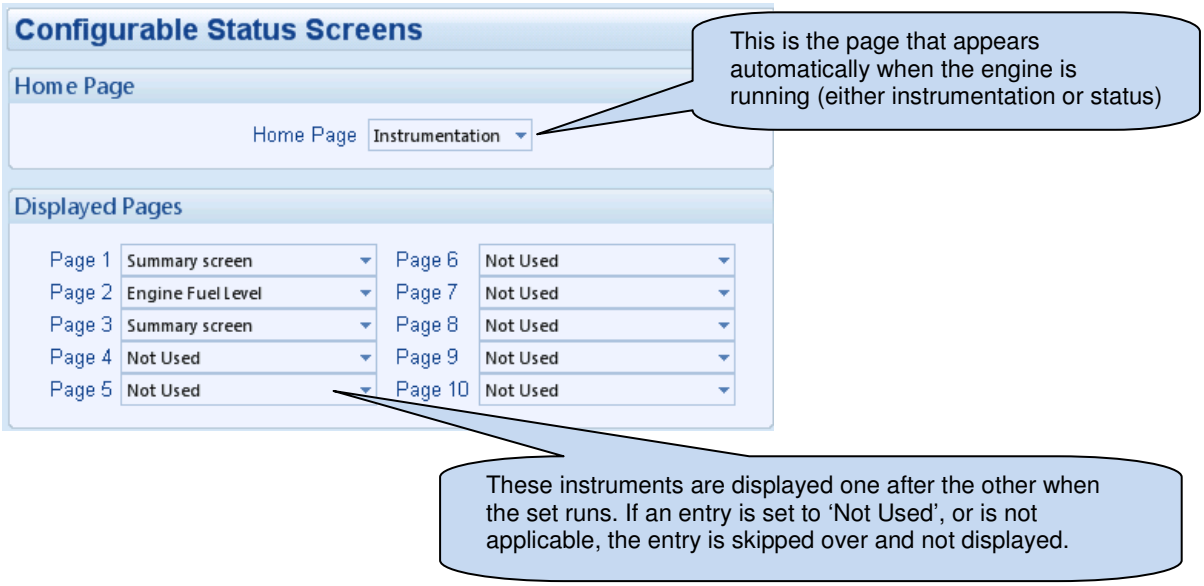
= DSE8660/DSE8620

Miscellaneous Options	
Enable running on load demand IEEE 37.2 - 44 Unit sequence starting 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	☐ = 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. ☑ = 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. **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.)**
Audible alarm prior to starting	☐ = The module will start with no audible indication ☑ = 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.

Miscellaneous Options	
Enable Immediate Mains Dropout	☐ = 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. ☑ = 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	☐ = Normal Operation, the warnings and pre-alarms will automatically reset once the triggering condition has cleared. ☑ = Warnings and pre-alarms latch when triggered. Resetting the alarm is performed by either an external reset applied to one of the inputs or, the 'Stop/Reset' pushbutton must be operated (once the triggering condition has been cleared).
Inhibit Retransfer To Mains DSE8660 only IEEE 37.2 - 3 Checking or interlocking relay	☐ = When the mains supply is reinstated after a failure, the re-transfer back to mains will take place. ☑ = 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. ☑ = 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) ☐ = 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	☐ =Normal operation ☑ =The module goes into "sleep mode" if left in manual mode for a prolonged time with no button presses.
Enable manual fuel pump control	☐ =Normal operation ☑ =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) ☐ =left to right language support ☑ =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	☐ =Normal operation ☑ =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	☐ =Maintenance alarms can be reset either through a digital input or scada ☑ =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.



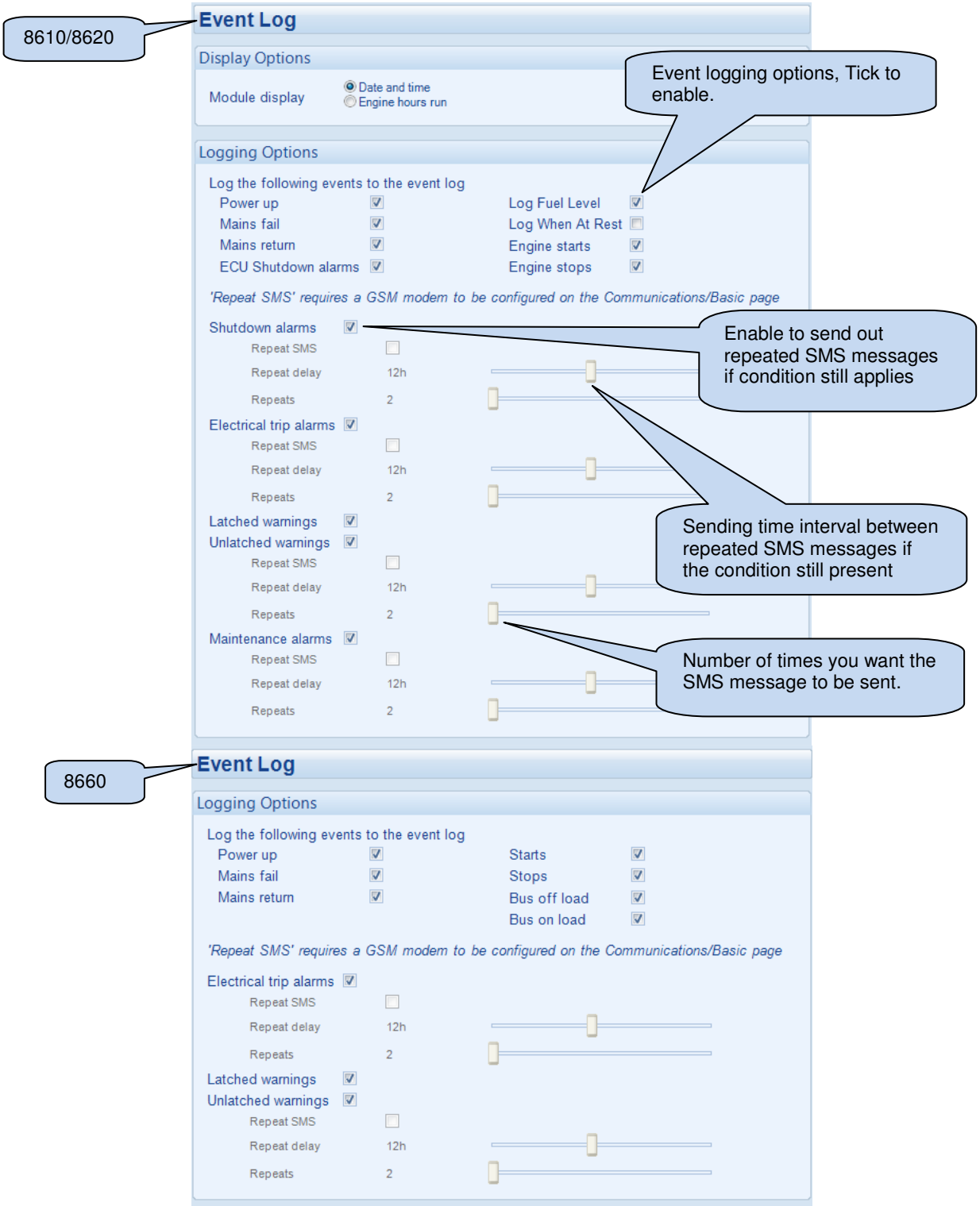
4.2.3 EVENT LOG

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.



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

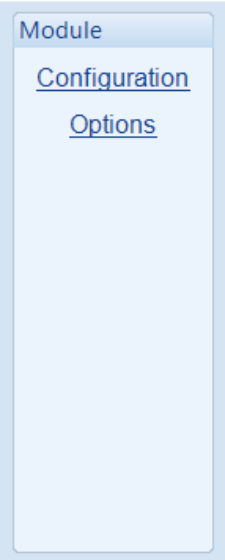
4.2.3.3 SMS MESSAGING

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.

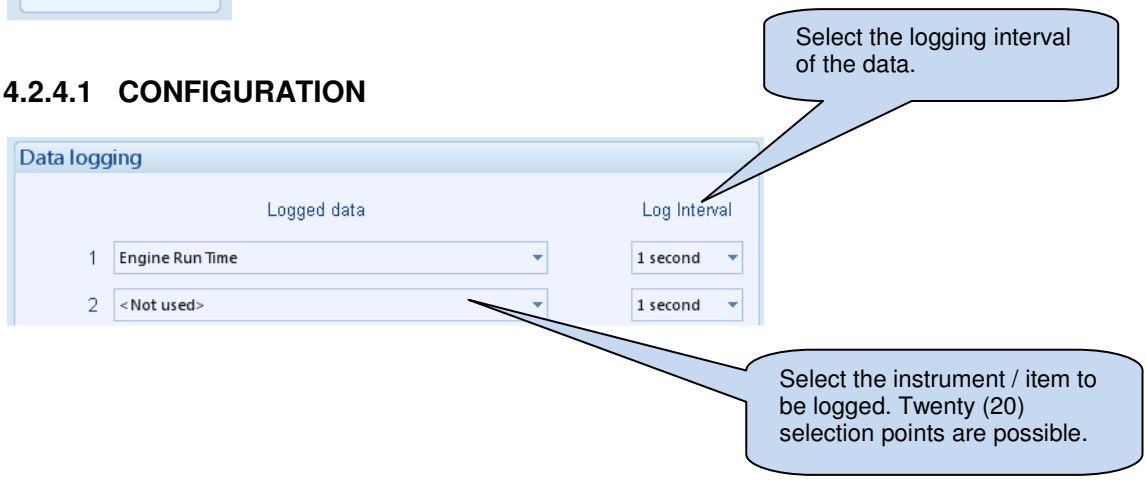
4.2.4 DATA LOGGING

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.

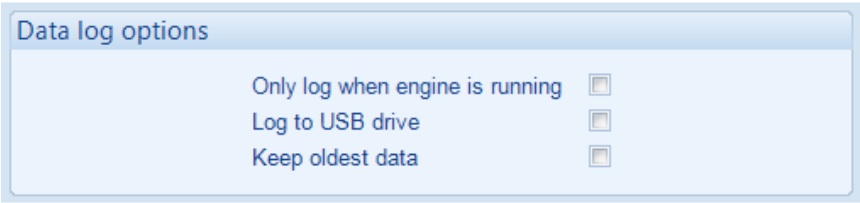
The Data Logging page is subdivided into smaller sections.
Select the required section with the mouse.



4.2.4.1 CONFIGURATION



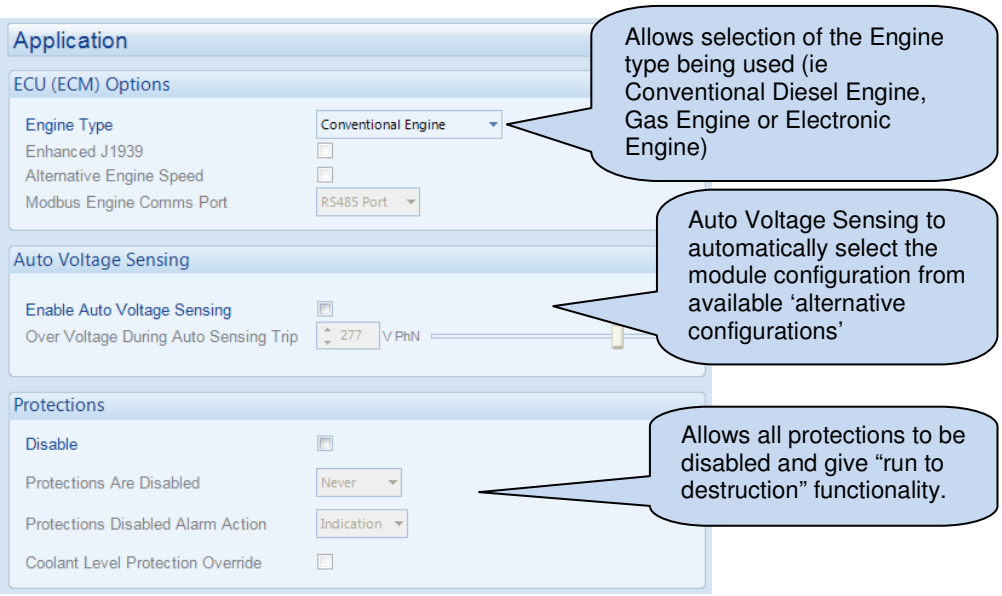
4.2.4.2 OPTIONS



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

4.3 APPLICATION

4.3.1 DSE8610/DSE8620 APPLICATION



See overleaf for description of the parameters....

4.3.2 ECU (ECM) OPTIONS

Parameter	Description
Engine type	Select the engine type appropriate to your system *Conventional Engine:* Select this if you have a traditional (non ECU) engine, either Energise to Run or Energise to Stop. *Conventional Gas Engine:* Select this if you have a traditional (non ECU) engine and require GAS engine functionality. This enables control of configurable outputs for *Gas Choke and Gas Ignition* and instructs the module to follow the gas engine timers. *Other Engines:* The list of supported CAN (or Modbus) engines is constantly updated, check the DSE website at www.deepseaplc.com for the latest version of Configuration Suite software.
Enhanced J1939	☐ = The module will read 'Basic' instrumentation from the engine ECU and display (where supported by the engine) : • Engine Speed • Oil Pressure • Engine Coolant Temperature • Hours Run ☑ = The module will read and display an 'Enhanced' instrumentation list (where supported by the engine) : • 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 Where an instrument is not supported by the engine ECU, the instrument is not displayed. DSE Reserve the right to change these lists in keeping with our policy of continual development.
Alternative Engine Speed	☐ = The engine is instructed to run at its *Nominal Speed* as configured by the Engine Manufacturer. ☑ = The engine is instructed to run at its *Alternative Speed* as configured by the Engine Manufacturer.
Modbus Engine Comms Port	*RS485 Port:* The modules RS485 port is used to communicate to the engine (when a Modbus engine type is selected. *DSENet Port:* The modules DSENet port is used to communicate to the engine (when a Modbus engine type is selected. This 'frees' the RS485 port in case connection to BMS or other RS485 compatible equipment is required.

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	☐ = The module will operate as normal and provide engine shutdown if required. ☑ = *Protections disabled* function is activated. Operation depends upon the following configuration. **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.**
Disable All Protections	*Never* : The protections are not disabled *Always* : Protections are always overridden by the DSE controller. *On Input* : Protections are disabled whenever a configurable input set to *Protections Disabled* is activated
Protections Disabled Alarm Action	If *Disable All Protections* is set to *On Input*, this selection allows configuration of an alarm to highlight that the protections have been disabled on the engine. *Indication :* Any output or LCD display indicator configured to *Protections Disabled* will be made active, however the internal alarm sound will not operate. Warning *:* Any output or LCD display indicator configured to *Protections Disabled* will be made active, and the internal alarm sound will operate. When protections are disabled, *Protections Disabled* will appear on the module display to inform the operator of this status.

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.

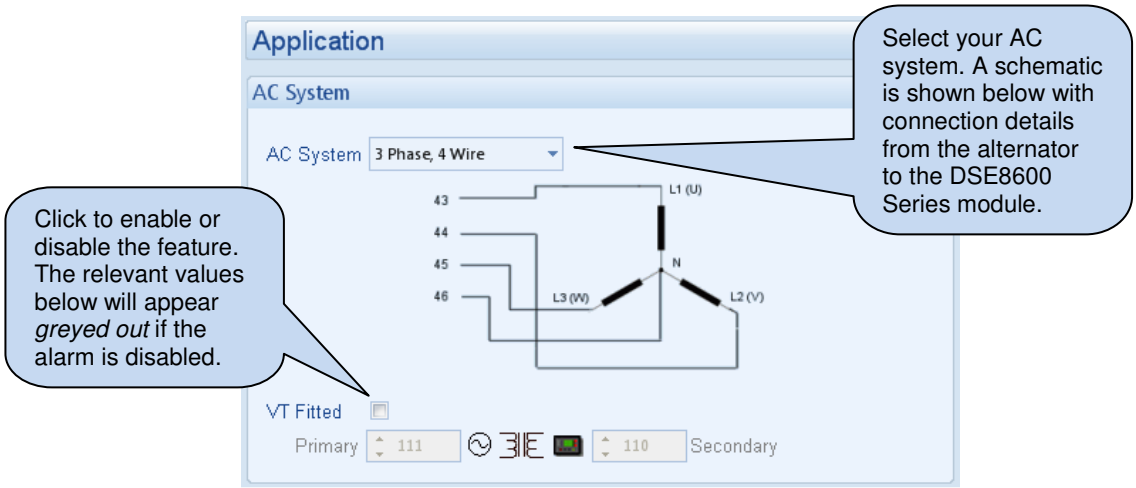
DSE 8610 only

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	☐ = The module will operate as normal. ☑ = *Auto voltage sensing* 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.

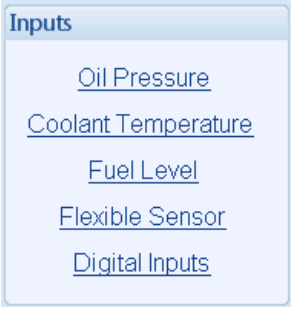
4.3.5 DSE8660 / DSE8620 APPLICATION



4.4 INPUTS

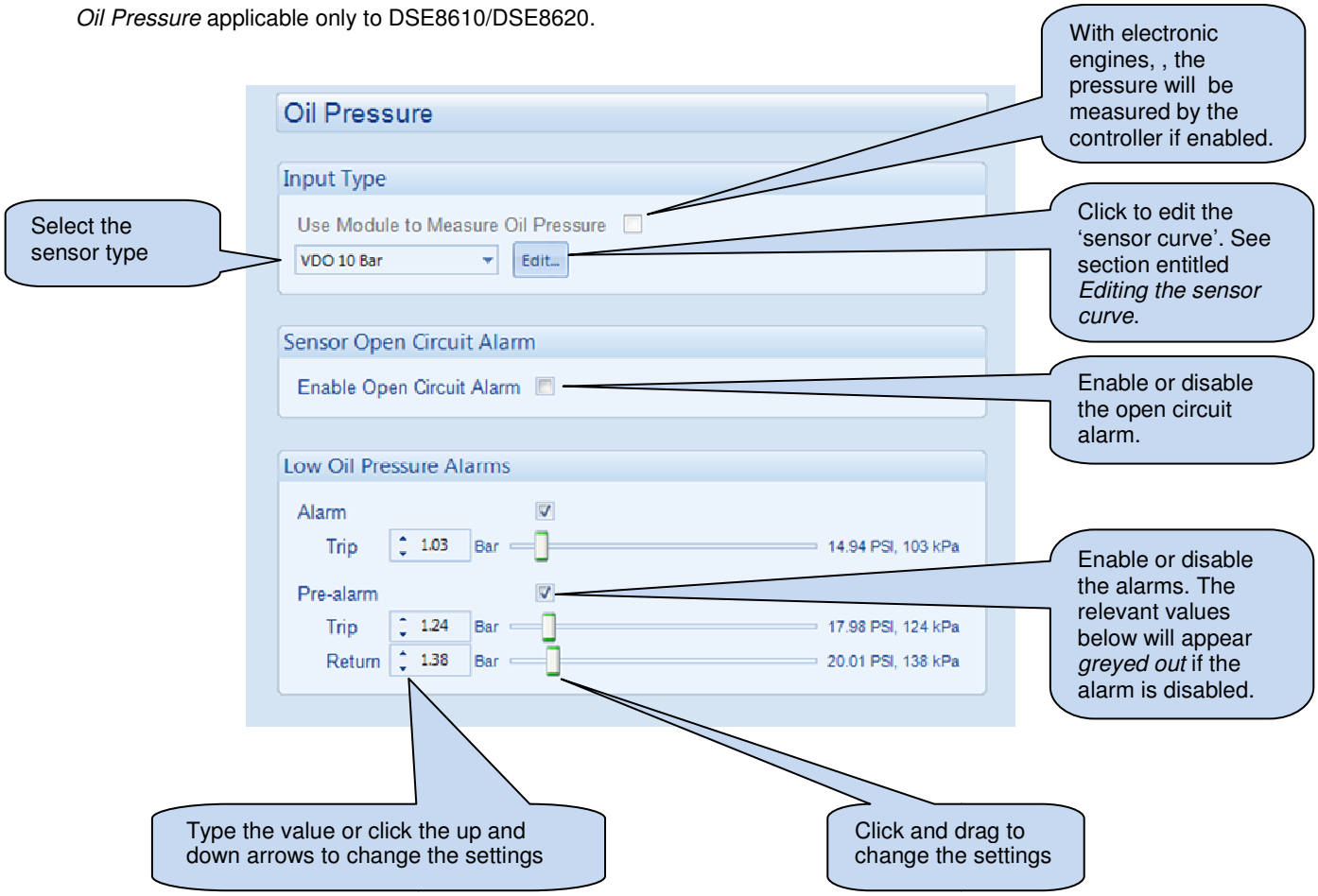
The inputs page is subdivided into smaller sections.
Select the required section with the mouse.

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



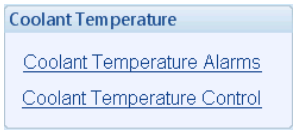
4.4.1 OIL PRESSURE

Oil Pressure applicable only to DSE8610/DSE8620.

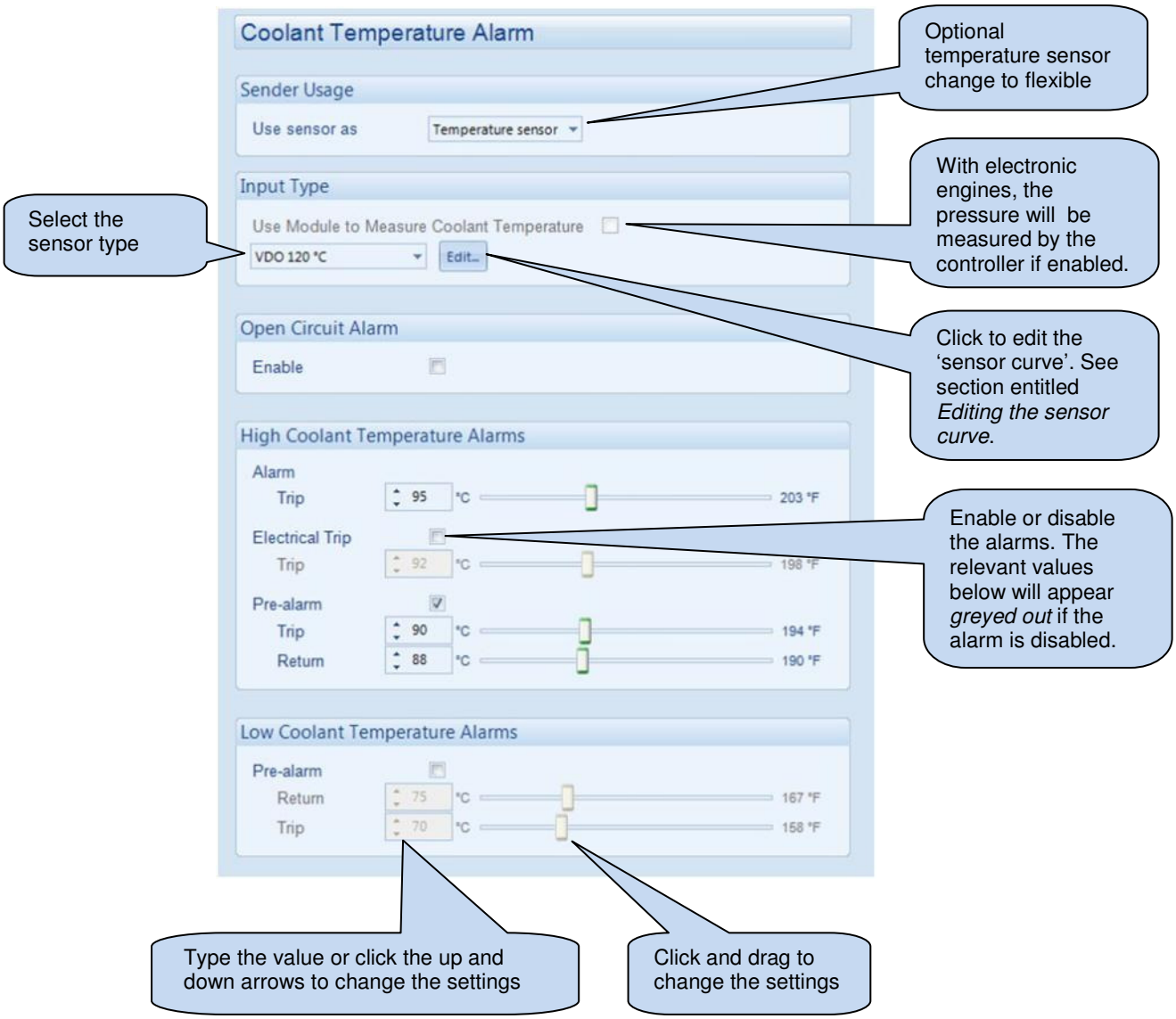


4.4.2 COOLANT TEMPERATURE

Coolant Temperature applicable only to DSE8610/DSE8620.



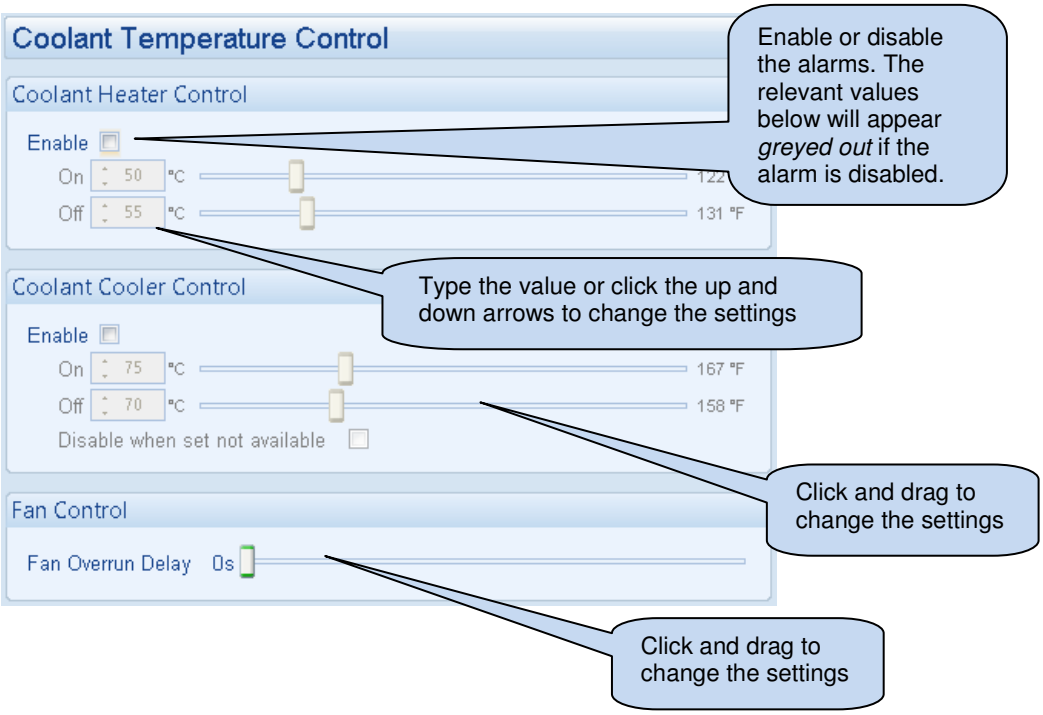
4.4.2.1 COOLANT TEMPERATURE ALARMS



Options	Description
Pre alarm	☐ = Pre-alarm is disabled ☑ = If the temperature exceeds the *trip* setting, an alarm is generated. The temperature must fall below the *return* setting to cease the alarm.
Electrical Trip	☐ = Electrical trip is disabled ☑ = If the temperature exceeds the *trip* 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 *trip* setting, an alarm is generated, the load switch is opened and the set is immediately stopped.

4.4.2.2 COOLANT TEMPERATURE CONTROL

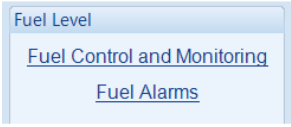
The Coolant temperature control settings provide for control of coolant heaters / coolers using the Coolant Temperature Sensor as the control input.
Outputs should be configured to *Coolant Cooler Control* and/or *Coolant Heater Control* to achieve this.



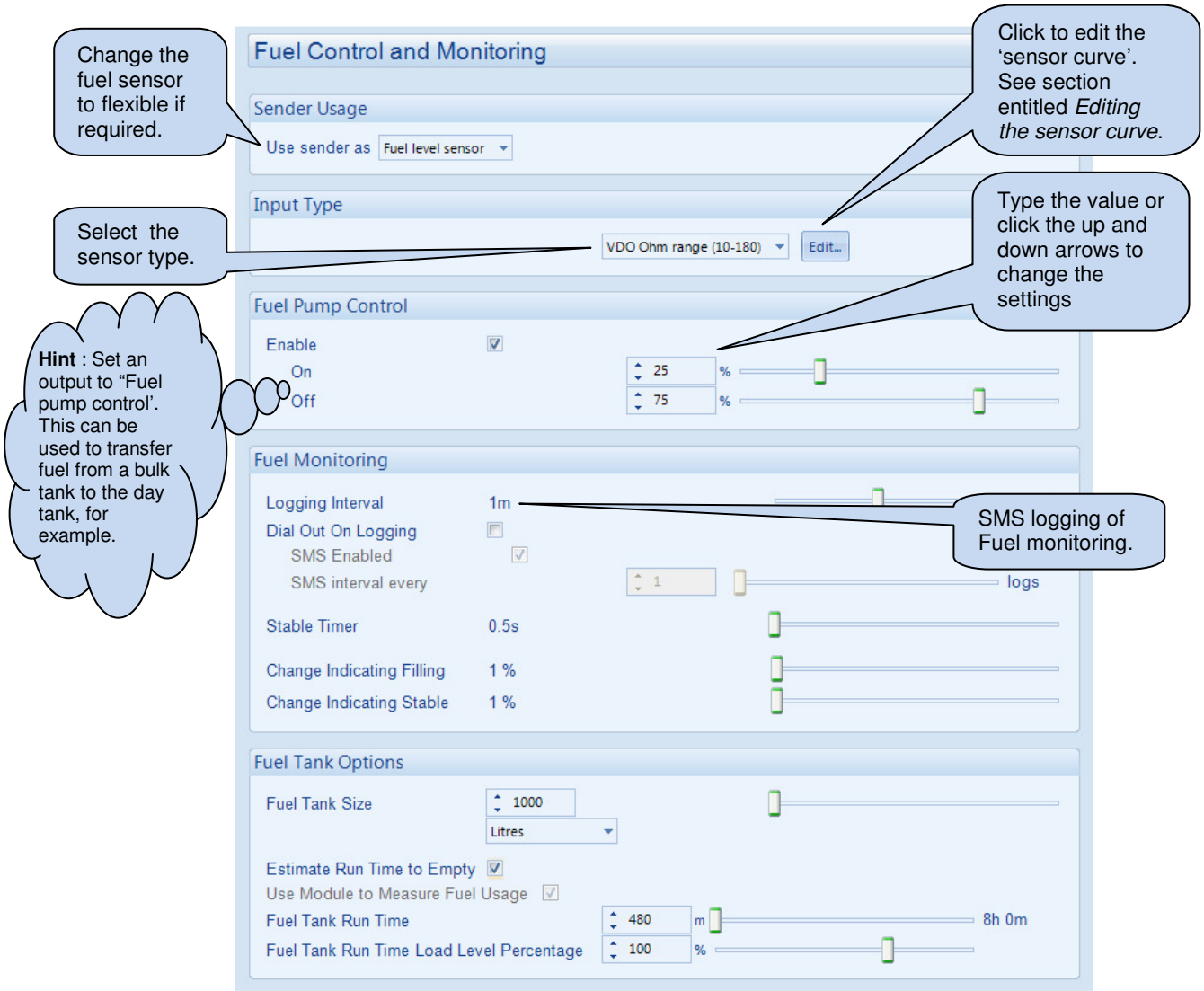
Coolant temperature control	
Coolant heater control	☐ = Coolant Heater Control function is disabled ☑ = Coolant Heater Control function is enabled. If the engine coolant temperature falls below the *On* setting, any output configured to *Coolant Heater Control* will be energised. This is designed to control an external engine heater. If the coolant temperature rises above the *Off* setting, the output is de-energised.
Coolant Cooler control	☐ = Coolant Cooler Control function is disabled ☑ = Coolant Cooler Control function is enabled. If the engine coolant temperature rises above the *On* setting, any output configured to *Coolant Cooler Control* 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 *On* setting, the output is de-energised.
Fan Control	An output configured to *Fan Control* 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 *Fan Overrun Delay.*

4.4.3 FUEL LEVEL

Fuel Level applicable only to DSE8610/DSE8620.

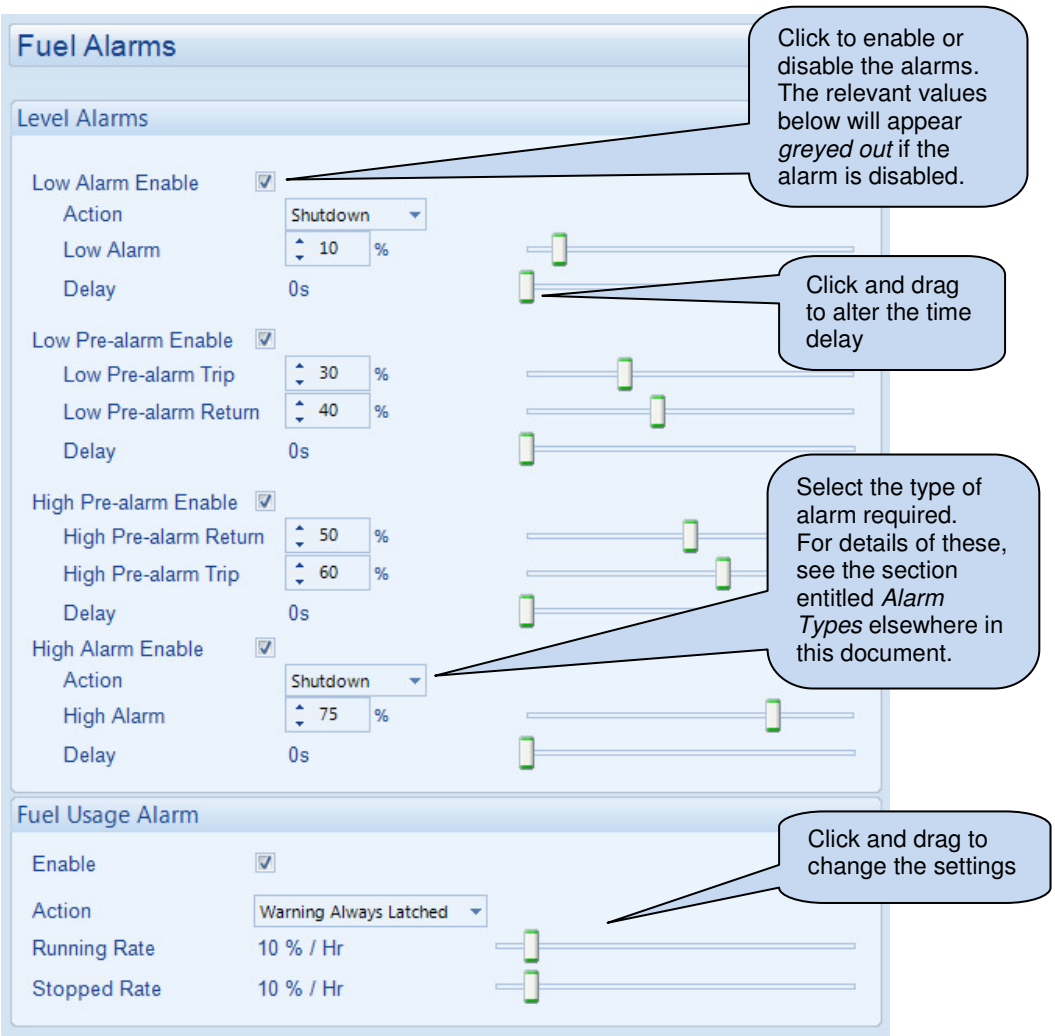


4.4.3.1 FUEL CONTROL AND MONITORING



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	☐ = Normal operation ☑ = 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 *Fuel Tank Run Time*.

4.4.3.2 FUEL ALARMS

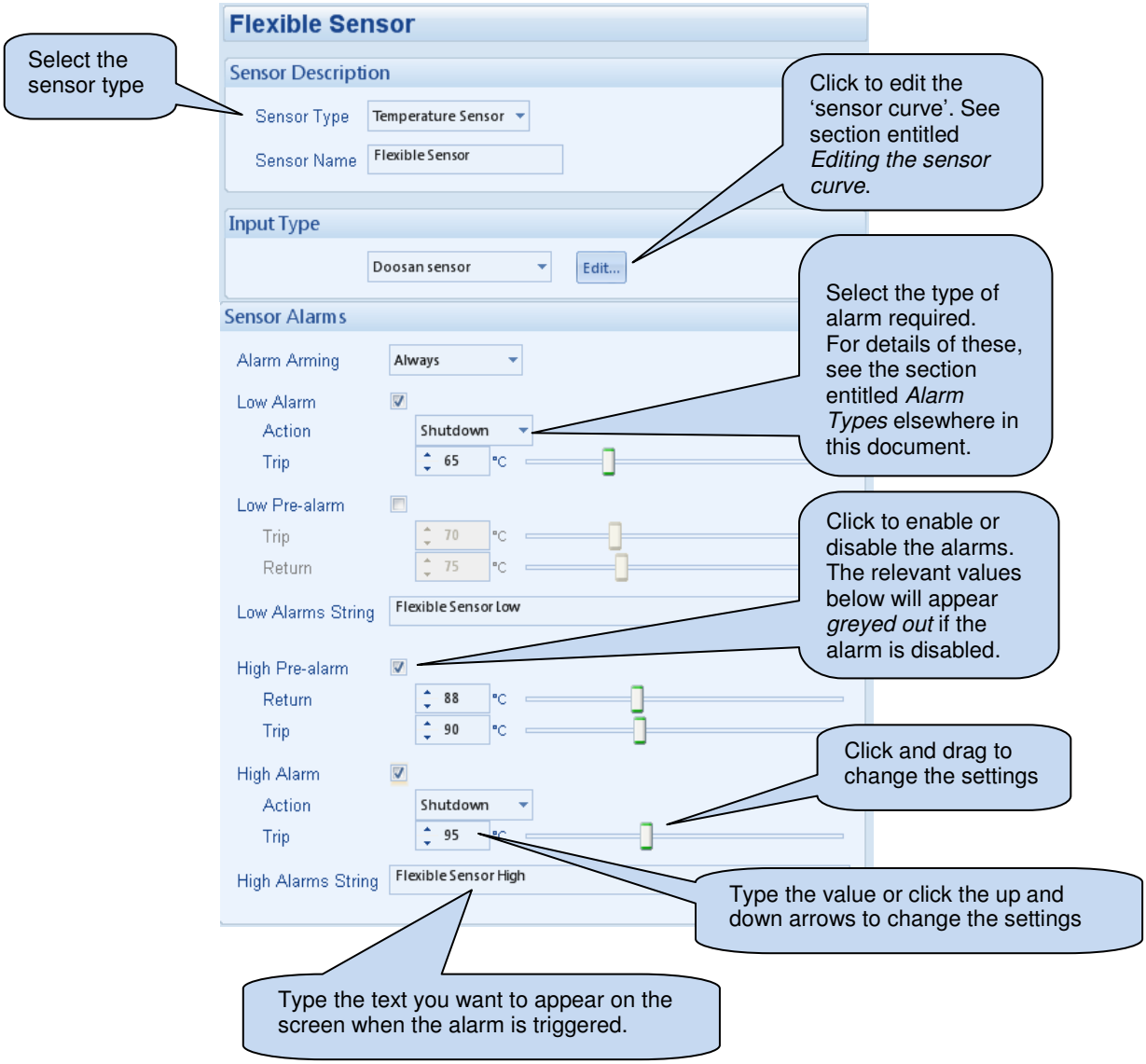


Fuel Usage Alarm	
Fuel Usage Alarm	Provides an alarm to monitor the usage of the generator set's fuel. There are two settings, one to monitor fuel usage when the set is running and another to monitor the fuel usage when the set is stopped. These alarms are provided to check for fuel leakage problems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

4.4.4 FLEXIBLE SENSOR

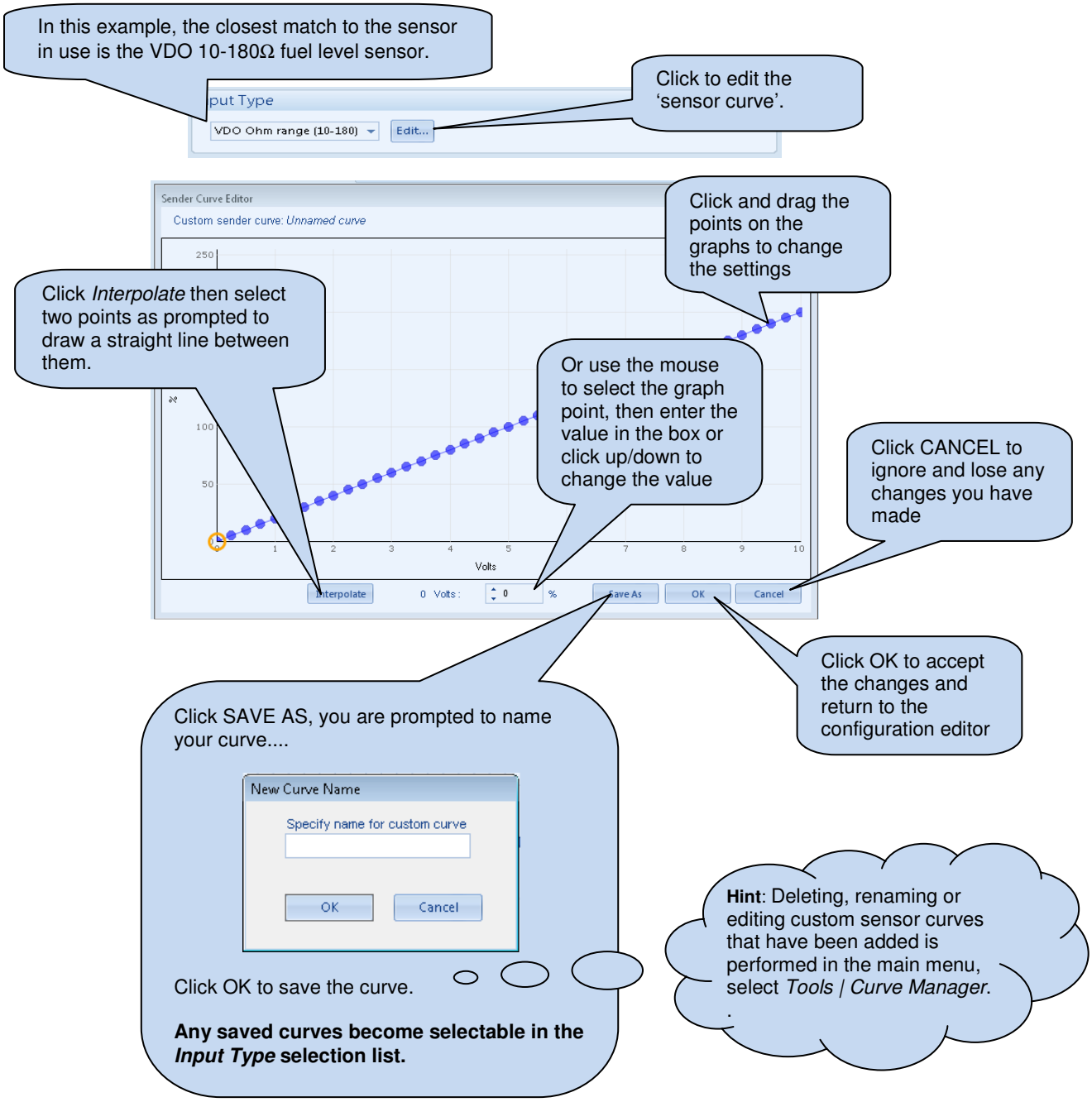
Flexible Sensor applicable only to DSE8610/DSE8620.

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)



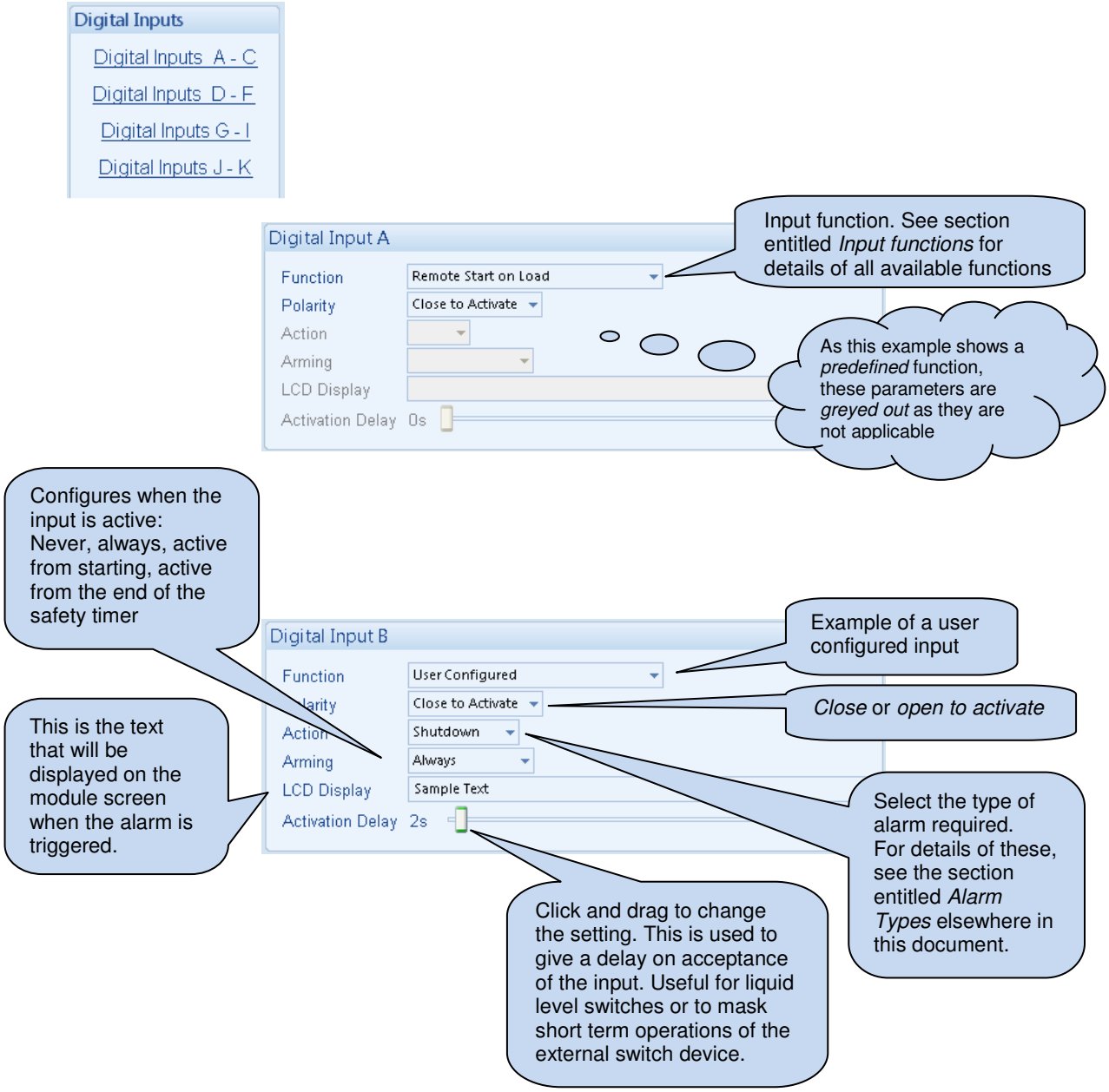
4.4.5 EDITING THE SENSOR CURVES

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*.



4.4.6 DIGITAL INPUTS

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



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 *alternative* configuration settings instead of the *main* 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 *Auto Restore Inhibit* input is removed. This input allows the controller to be fitted as part of a system where the restoration to mains is controlled remotely or by an automated system.
Auto Start Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide an over-ride function to prevent the controller from starting the generator in the event of a remote start/mains out of limits condition occurring. If this input is active and a remote start signal/mains failure occurs the module 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** *(Alarm only, No shutdown)*

Function	Description
Bus Load Inhibit IEEE 37.2 - 3 Checking or interlocking relay	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. **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.**
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 *Coolant Temperature Hig*h 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	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. 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)
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	For the French EJP (Effacement Jours de Pointe) tarrif system. This input is functionally identical to *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.
EJP2	For the French EJP (Effacement Jours de Pointe) tarrif system. This input is functionally identical to *Remote Start On Load.* 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.

Function	Description
External Panel Lock	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. (*Front panel configuration access is still possible while the system lock is active*). **NOTE: - External control sources (i.e. Simulate Start Button) are not affected by the external panel lock input and will continue to operate normally.**
Generator Closed Auxiliary IEEE 37.2 - 3 Checking or interlocking relay	This input is used to provide feedback to allow the DSE8600 to give true indication of the contactor or circuit breaker switching status. It should be connected to the generator load switching device auxiliary contact. **Action:** **Warning** *(Alarm only, No shutdown)*
Generator Load Inhibit IEEE 37.2 - 52 AC circuit breaker	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. **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.**
Inhibit Retransfer To Mains IEEE 37.2 - 3 Checking Or Interlocking Relay	When active, this input prevents the load being transferred back to the mains supply, even in the event of the generators failing. This 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.
Inhibit Scheduled Run IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide a means of disabling a scheduled run.
Inhibit SMS Remote Start	This input is used to provide a means of disabling remote starts by SMS
Keep Control Of 8610s	This input is used to 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.
Lamp Test	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.
Load Share Inhibit	When active, this input disables the VAr share control when in parallel
Low Fuel Level Switch	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.
Main Config Select	This input is used to select the *Main* configuration when *Alternative* configurations are enabled.
Mains Parallel Mode DSE8610 only	This input is used to configure the DSE8610 load-sharing module as to how it will operate when in parallel. If the input is not active, the DSE8610 will communicate with other DSE8610 controllers to maintain equal share of the load between systems. 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.
Mains Closed Auxiliary IEEE 37.2 - 3 Checking or interlocking relay	This input is used to provide feedback to allow the DSE8600 to give true indication of the contactor or circuit breaker switching status. It should be connected to the mains load switching device auxiliary contact. Incorrect application of this signal does not trigger an alarm condition, it is used solely for indication of the breaker status.

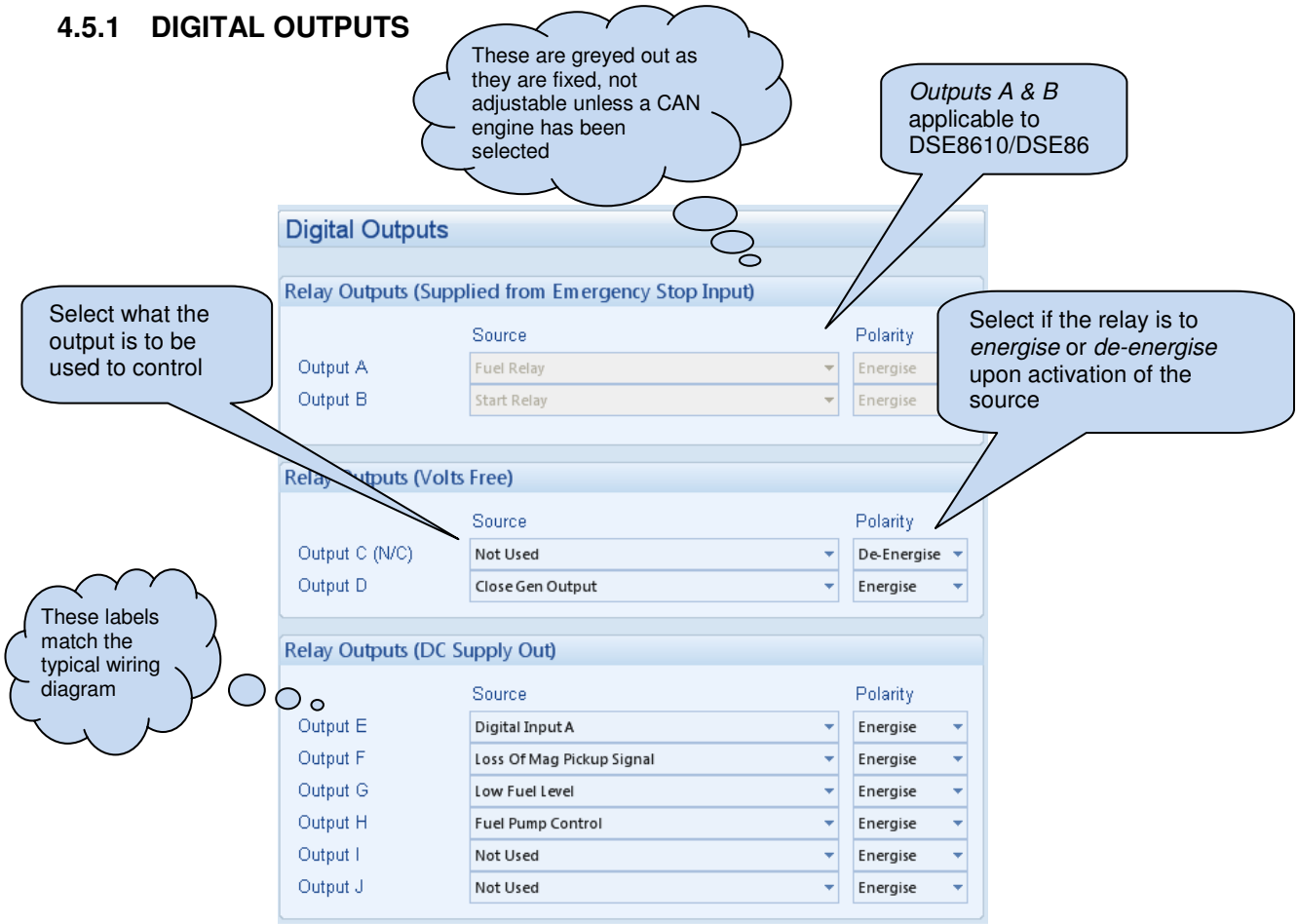
Function	Description
Mains Load Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to prevent the DSE8600 from loading the mains supply. If the mains supply is already on load activating this input will cause the DSE8600 to unload the mains supply. Removing the input will allow the mains to be loaded again. **NOTE: This input only operates to control the mains switching device if the DSE8600 load switching logic is attempting to load the mains. It will not control the mains switching device when the generator is on load.**
Manual Restore Contact 8620/8660 Only	This input is used to manually allow back-sync to the mains without removing the *Auto-Restore Inhibit* input.
MSC Alarms Inhibit	This input is used to prevent MSC alarms. It is particularly useful when a set is being removed from duty for maintenance. **NOTE: For further details on MSC alarms, refer to the DSE Guide to Synchronising and Load Sharing.**
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	When Dead Bus Synchronising is configured, this input is used to start the set in Dead Bus Synchronising scheme. **NOTE: For further details, please refer to the section titled Dead Bus Synchronising elsewhere in this document.**
Remote Start In Island Mode 8620/8660 Only	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. 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.
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	When in auto mode, the module will perform the start sequence and transfer load to the generator. 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.
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	**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.** This input mimic's the operation of the 'Auto' button and is used to provide a remotely located Auto mode push button.
Simulate Lamp test \ Alarm Mute Button	This input is used to provide a test facility for the front panel indicators fitted to the module. When the input is activated all LED's 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 mimic's the operation of the 'Manual' button and is used to provide a remotely located Manual mode push button.
Simulate Start Button	This input mimic's the operation of the 'Start' button and is used to provide a remotely located start push button.
Simulate Stop Button	This input mimic's the operation of the 'Stop' button and is used to provide a remotely located stop/reset push button.
Simulate Test On Load Button	This input mimics the operation of the 'Test' button and is used to provide a remotely located Test on load mode push button.
Smoke Limiting IEEE 37.2 – 18 Accelerating or Decelerating Device	This input instructs the module to give a *run at idle speed* command to the engine either via an output configured to *smoke limit* or by data commands when used with supported electronic engines.
Speed Lower	This is operational in Manual Mode only, when the breaker is open. On **DSE8610/DSE8620** systems where internal relays are used to control the governor, this input can be used to decrease the speed. **NOTE: -This input has no effect when utilising the internal analogue system to control the governor.**
Speed Raise	This is operational in Manual Mode only, when the breaker is open. On **DSE8610/DSE8620** systems where internal relays are used to control the governor, this input can be used to increase the speed. **NOTE: -This input has no effect when utilising the internal analogue to control the governor.**
Start Pause IEEE 37.2 - 3 Checking or Interlocking Relay	This input is intended to be used to allow the generator start sequence to commence, but not to complete. This feature 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: - The pre-heat output (if used) will be activated for the duration of the pre-heat timer. 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. 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.

Function	Description
Stop and Panel Lock	Combined function input that instructs the module to enter **STOP MODE** and also perform the *Panel Lock* function. Once the input is active, the module will not respond to operation of the Mode select or start buttons. The operator will still be able to view the various instrumentation pages etc. (*Front panel configuration access is still possible while the system lock is active*).
Transfer To Generator (Bus)/Open Mains IEEE 37.2 - 52 AC Circuit Breaker 8620/8660 Only	This input is used to transfer the load to the generator when running in **MANUAL MODE** 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.
Transfer to Mains/ Open Generator (Bus) IEEE 37.2 - 52 AC Circuit Breaker 8620/8660 Only	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.)
Volts Raise	This is operational in Manual Mode only, when the breaker is open. On **DSE8610/DSE8620** systems where internal relays are used to control the AVR, this input can be used to decrease the volts. **NOTE: -This input has no effect when utilising the internal analogue system to control the AVR**
Volts Lower	This is operational in Manual Mode only, when the breaker is open. On **DSE8610/DSE8620** systems where internal relays are used to control the AVR, this input can be used to increase the volts. **NOTE: -This input has no effect when utilising the internal analogue system to control the AVR**

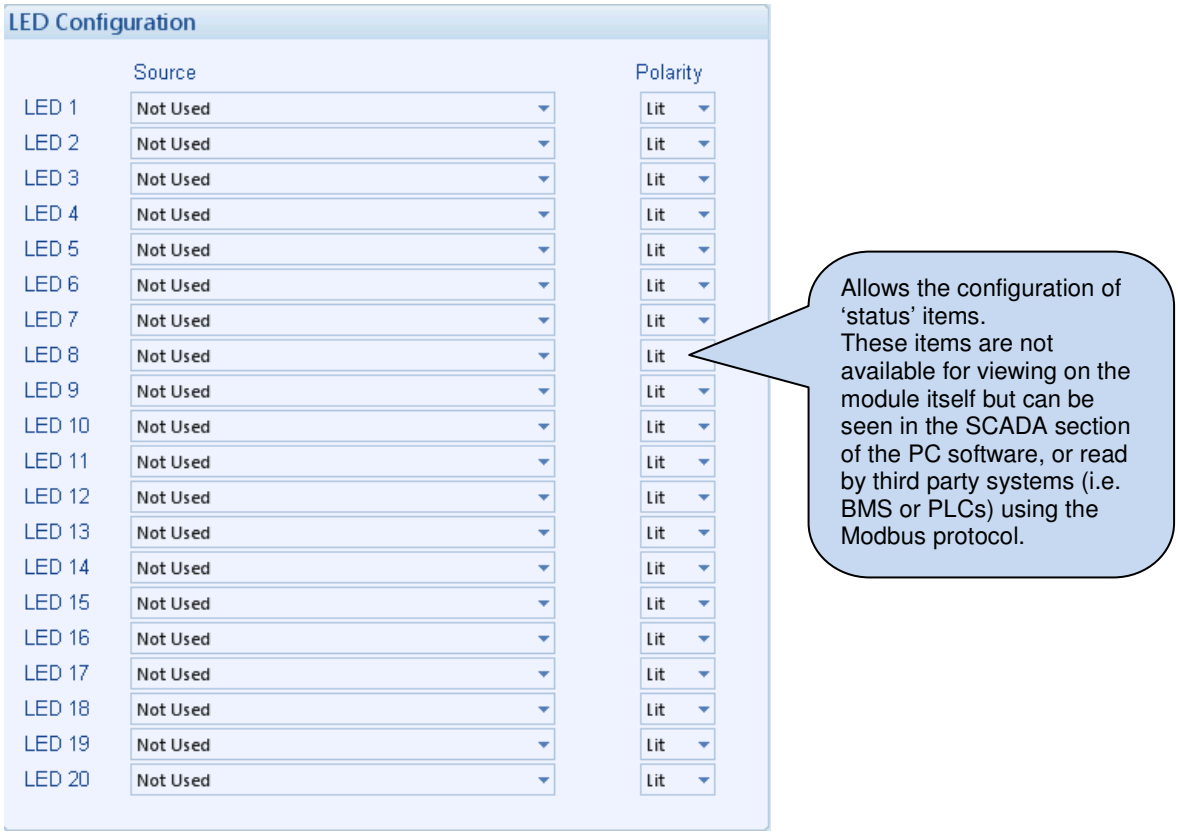
4.5 OUTPUTS

4.5.1 DIGITAL OUTPUTS



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



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 *safety delay* timer whereupon all alarms configured to 'From Safety On' become active	Inactive when : • When the set is at rest • In the starting sequence before the Safety Delay timer has expired
Audible Alarm IEEE 37.2 – 74 Alarm Relay	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 *Auto Restore Inhibit* 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 *Auxiliary Mains Failure* 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 *Bus closed auxiliary* input is active	
Bus Failed To Close IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the Bus contactor or breaker. It 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 *scheduled run* 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: • 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	• 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 *Clear Mains Decoupling Alarms* digital input is active.	
Close Bus Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the 8600 module selects the bus to be on load this control source 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 E*lectrical trip* 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 *Shutdown* alarms are active	The output is inactive when no shutdown alarms are present
Common Warning IEEE 37.2 – 74 Alarm Relay	Active when one or more *Warning* alarms are active	The output is inactive when no warning alarms are present
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: • Data logging is disabled • The engine is at rest and the option *Only Log When Engine Is Running* is enabled • The USB drive becomes full and the option *Log To USB Drive* is enabled • The internal memory of the module becomes full and the option *Keep Oldest Datai* 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 *Load Demand Scheme* 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 *Excitation Delay* timer expires	
Digital Input A - K	Active when the digital input is active	Inactive when : • If the input is not active • If the input is active but conditioned by *activation delay*, *safety timer* or *Arming* requirements.
DPF Auto Regen Inhibit Request	Active when the *DPF Auto-Regen Inhibit* is active.	
DPF Forced Regeneration Requested	Active when the *DPF Force Regeneration* is active.	
DPF Non-Mission State	Active when the *DPF Non-Mission State* is active.	
DPF Regeneration In Progress	Active when the *DPF Regeneration* is in progress.	
DPF Regeneration Interlock Active	Active when the *DPF Regeneration Interlock* is active.	
DPTC Filter	Active when the diesel particulate filter CAN alarm is active	
Droop Enable	Becomes active when an input configured to *Droop enable* is active or if *Droop Enable* has been activated in the module configuration (CAN engine only)	
Dummy Load Control (1-5)	Becomes active when the engine kW falls below the Dummy Load Control Trip Setting.	Inactive when the engine kW returns to above the Dummy Load Control Return setting.
Duty Select	Indicates that a digital input configured to *Duty Select* 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 *Energise to Stop* solenoid, this output becomes active when the controller wants the set to stop running.	Becomes inactive a configurable amount of time after the set has stopped. This is the *ETS hold time*.
Fail to Start IEEE 37.2 - 48 Incomplete Sequence Relay	Becomes active if the set is not seen to be running after the configurable number of start attempts.	
Fail to Stop IEEE 37.2 - 48 Incomplete Sequence Relay	If the set is still running a configurable amount of time after it has been given the stop command, the output will become active. This is the *Fail to stop* timer.	
Fail to Synchronise IEEE 37.2 - 48 Incomplete Sequence Relay	Becomes active if the module fails to synchronise after the *fail to sync* timer.	
Fan Control	Energises when the engine becomes available (up to speed and volts). This output is designed to control an external cooling fan. When the engine stops, the cooling fan 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 *Fuel level* falls below the *Fuel Pump Control ON* setting and is normally used to transfer fuel from the bulk tank to the day tank.	If the output is already active it will become inactive when the *Fuel level* is above the *Fuel Pump Control OFF* settings.
Fuel Relay	Becomes active when the controller requires the governor/fuel system to be active.	Becomes inactive whenever the set 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 *fuel relay* becomes inactive. This is the *Gas ignition off* 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 *Over-Frequency Overshoot Shutdown* is active.	
Gen Over Frequency Overshoot Warning	Becomes active when the *Over-Frequency Overshoot Warning* 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 • *Loading voltage* and *loading frequency* have not been reached • After *electrical trip* alarm • During the starting sequence before the end of the warming timer.
Generator Closed Aux	Active when the *Generator closed auxiliary* input is active	
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 *High Voltage Shutdown* setting	
Generator High Voltage Warning IEEE 37.2 – 59AC Over Voltage Relay	Active when the generator voltage exceeds the *High Voltage Warning* setting	
Generator Load Inhibited	This output indicates that a digital input that has been configured as '*Generator Load Inhibit'* is active. Refer to the '*Edit Inputs*' 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 *Low Voltage Shutdown*	Inactive when • 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 *Low Voltage Warning* setting	Inactive when • 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 *high frequency Warning/ Shutdown* setting	Inactive when • 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 *low frequency Warning/ Shutdown* setting	Inactive when • 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 *Coolant Temperature* exceeds the *High Coolant Temperature Electrical Trip* setting	
High Coolant Temperature Shutdown	Active when the *Coolant Temperature* exceeds the *High Coolant Temperature Shutdown* setting	
High Coolant Temperature Warning	Active when the *Coolant Temperature* exceeds the *High Coolant Temperature Warning* setting	
High Inlet Temperature Shutdown	Active when the *Inlet Temperature* exceeds the *High Inlet Temperature Shutdown* setting	
High Inlet Temperature Warning	Active when the *Inlet Temperature* exceeds the *High Inlet Temperature Warning* setting	
Inhibit Scheduled Run	Active when the digital input configured for *Inhibit Scheduled Run* is active	
Inhibit SMS Start	Active when the digital input configured for *Inhibit SMS Start* 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 *kW overload alarm / warning*. 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 *Load Share Inhibit* 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 *loading frequency* during the starting process.	
Loading Voltage Not Reached	Indicates that the generator voltage has not reached the configured *loading voltage* 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 *Coolant Temperature* falls below the *Low Coolant Temperature alarm* setting	
Low kW Load	Active when the kW level falls below configured *Low Load* alarm.	
Low Load	Indicates that the stopping sequence is beginning due to low load levels. (*Load Demand Scheme*)	
Low Oil Pressure Shutdown IEEE 37.2 - 63 Pressure Switch	Active when the *Oil Pressure* falls below the *Low Oil Pressure Shutdown* setting	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
Low Oil Pressure Warning IEEE 37.2 - 63 Pressure Switch	Active when the *Oil Pressure* falls below the *Low Oil Pressure Warning* setting	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
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 *Mains closed auxiliary* input is active	
Mains Decoupling High Frequency	This output indicates that the mains decoupling high frequency alarm has been triggered.	
Mains Decoupling High Voltage	This output indicates that the mains decoupling high voltage alarm has been triggered.	
Mains Decoupling Low Frequency	This output indicates that the mains decoupling low frequency alarm has been triggered.	
Mains Decoupling Low Voltage	This output indicates that the mains decoupling low voltage alarm has been triggered.	
Mains Failed To Close	This output indicates the mains breaker failed to close	
Mains Failed To Open	This output indicates the mains breaker failed to open	
Mains Failure IEEE 37.2 - 81 Frequency Relay IEEE 37.2 – 27AC Under Voltage Relay IEEE 37.2 – 59AC Over Voltage Relay	The output indicates that one or more of the module's sources of determining mains failure is active. The output is inactive when the mains supply is healthy	
Mains Load Inhibited	Active when the *Mains Load Inhibit* digital input is active.	
Mains Over Frequency IEEE 37.2 - 81 Frequency Relay	Active when the mains frequency exceeds the *High Frequency* setting	
Mains Over Voltage IEEE 37.2 – 59AC Overvoltage Relay	Active when the mains voltage exceeds the *High Voltage* setting	
Mains Phase Rotation Alarm	Active when the *Mains Phase Rotation Alarm* is active	
Mains Parallel Mode Input	Active when the *Mains Parallel Mode* 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 *Low Frequency* setting	
Mains Under Voltage IEEE 37.2 – 27AC Under Voltage Relay	Active when the mains voltage falls below the *Low Voltage* 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 *Manual Restore Contact* 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 *Minimum sets required* setting.	

Output source	Activates…	Is not active….
MPU Open Circuit	Active when the *MPU Open Circuit* 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 *Minimum sets required* 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	**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. **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.	
Oil Pressure Sender Open Circuit	Active when the *Oil Pressure Sensor* is detected as being *open circuit*.	
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 *Out of Sync* 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 *Overcurrent IDMT* alarm to trigger	
Over Current Immediate Warning IEEE 37.2 – 50 Instantaneous overcurrent relay	Active when an overcurrent condition exceeds the *Overcurrent alarm Trip* setting. At the same time, the controller begins following the *IDMT curve*. If the overload condition exists for an excess time, the *Overcurrent IDMT* 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 *High Frequency Warning* setting	
Generator Over Frequency Shutdown IEEE 37.2 - 81 Frequency Relay	Active when the generator frequency exceeds the *High Frequency Shutdown* setting	
Over Speed Shutdown IEEE 37.2 – 12 Over Speed Device	Active if the engine speed exceeds the *Over Speed Shutdown* setting	
Over Speed Warning IEEE 37.2 – 12 Over Speed Device	Active if the engine speed exceeds the *Over Speed Warning* setting	
Overspeed Overshoot Alarm IEEE 37.2 – 12 Over Speed Device	Active when the *Overspeed Overshoot Alarm* is active.	
Overspeed Overshoot Warning IEEE 37.2 – 12 Over Speed Device	Active when the *Overspeed Overshoot Warning* is active.	
Panel Locked	This output indicates that the module '*Panel Lock*' 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. (*Front panel configuration access is barred while system lock is active*).	
Panel Lock By Digital Input	This output indicates that a digital input that has been configured as '*Panel Lock*' is active. If the Panel lock input is active, the module 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. (*Front panel configuration access is barred while system lock is active*). Refer to the '*Edit Inputs*' section of this manual for details.	
Panel Lock By Telemetry	This output indicates that remote '*Panel Lock*' 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. (*Front panel configuration access is barred while system lock is active*).	
Parallel Inhibit	Active when the *Parallel Inhibit* digital input is active.	
PLC Output Flag 1-40	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 : • The set is stopped • The preheat timer has expired
Preheat Until End Of Cranking	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached *crank disconnect* 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 : • The set is stopped • The set has reached the end of the *safety delay* 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 : • The set is stopped • The set has reached the end of the *warming* 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 *control logic* section of the configuration suite.	

Output source	Activates…	Is not active….
Remote Start From Digital Input	Active when any configured *Remote Start* digital input is active.	
Remote Start In Island Mode	This output indicates that a digital input that has been configured as '*Remote Start in island mode*' is active. This output could be used to pass the start signal on to elsewhere in the control system.	
Remote Start Off Load	This output indicates that a digital input that has been configured as '*Remote Start off load*' 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 '*Remote Start on load*' 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 *Reset Maintenance Alarm* 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 *Shutdown* type alarm is active but that the shutdown function has been blocked because the *Protections Disabled* function is active.	
Simulate Auto Button	Active when the *Simulate Auto Button* digital input is active.	
Simulate Mains Available	Active when the *Simulate Mains Available* digital input is active.	
Simulate Start Button	Active when the *Simulate Start Button* digital input is active.	
Simulate Stop Button	Active when the *Simulate Stop Button* digital input is active.	
Simulate Test On Load Button	Active when the *Simulate Test On Load Button* digital input is active.	
Simulate Transfer to Generator Button	Active when the *Simulate Transfer To Generator Button* digital input is active.	
Simulate Transfer to Mains Button	Active when the *Simulate Transfer To Mains Button* digital input is active.	
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 *Idle input* 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 with initiate its start sequence.	
Start Paused	Active when the *Start Pause* digital input is active.	
Start Relay IEEE 37.2 – 54 Turning Gear Engaging Device	Active when the controller requires the cranking of the engine.	
Starting Alarm	This output is used to supply an external sounder with a signal that the engine is about to start. The output 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.	

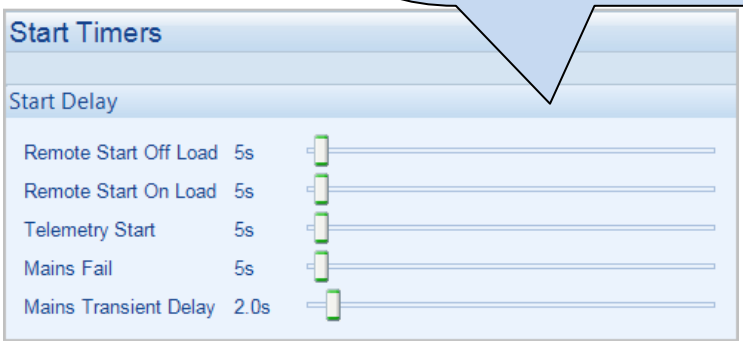
Output source	Activates…	Is not active….
Stop And Panel Lock	Active when the *Stop And Panel Lock* digital input is active.	
Stop Button Pressed	This output indicates that the stop pushbutton is being operated. Once the button is released, the output will become inactive.	
Stop Mode	Active when the controller 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 *Auto* 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 *Telemetry Active*.	
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 *Enable forced 'peak lop inhibit'* has been selected on the 'misc' tab.	
Under Frequency Warning IEEE 37.2 - 81 Frequency Relay	Active when the generator frequency falls below the *Low Frequency Warning*	Inactive when • 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 *Low Frequency Shutdown*	Inactive when • 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 *Under speed Shutdown* setting	
Under Speed Warning IEEE 37.2 - 14 Under Speed Relay	Active when the engine speed falls below the *Under speed Warning* setting	
User Defined Control 1-3 Active	Indicates that the specified User Defined Control (Control Logic) is active	
Voltage Lower Relay	Used when the *internal relays* 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 *internal relays* 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 '*Loading*' 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.

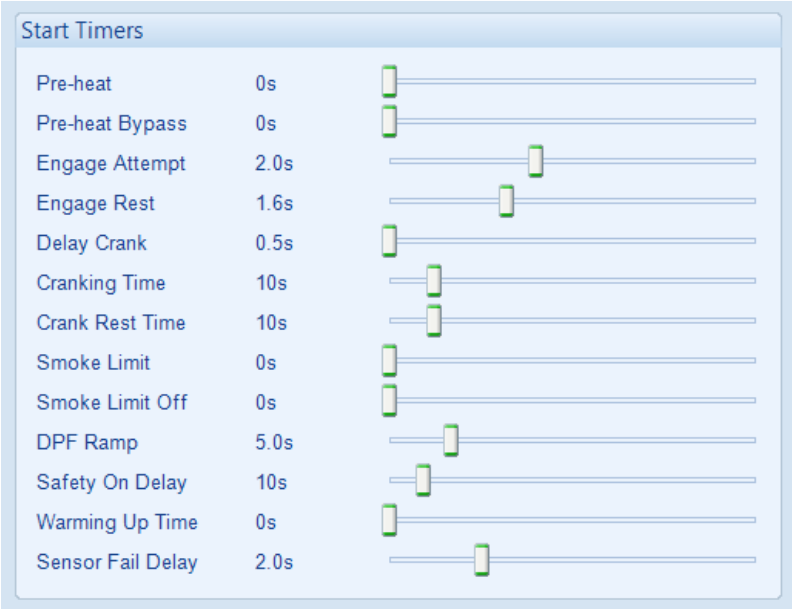
Click and drag to change the setting. Timers increment in steps of 1 second up to one minute, then in steps of 30 seconds up to 30 minutes, then in steps of 30 minutes thereafter (where allowed by the limits of the timer).

4.6.1 START TIMERS



= Only available on DSE8660/20 controllers

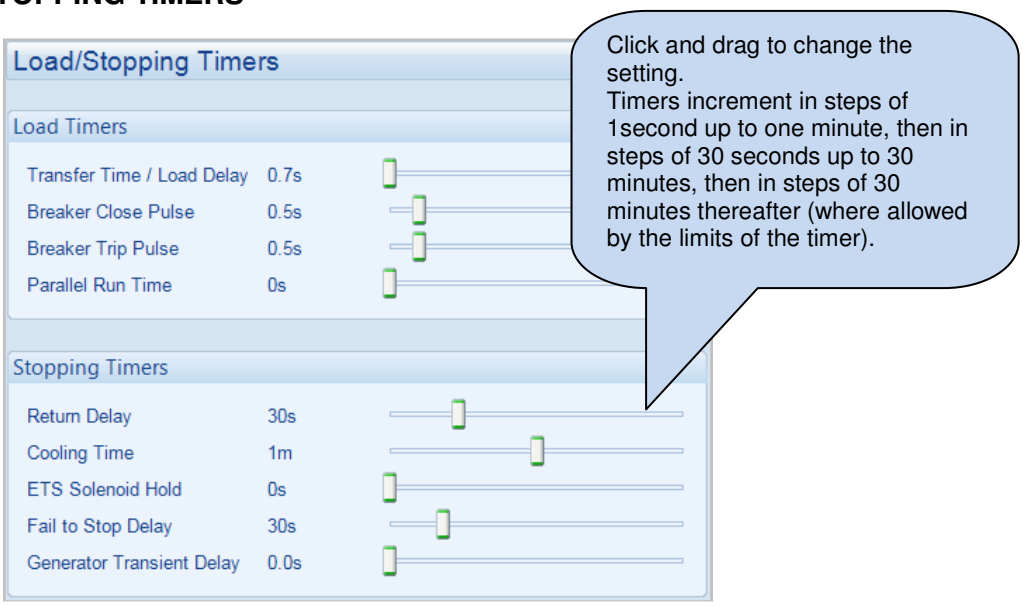
Timer	Description
Remote Start Off Load Remote Start On Load Mains fail Telemetry Start	Used to give a delay before starting in AUTO mode. This timer is activated upon the respective start command being issued. Typically this timer is applied to prevent starting upon fleeting remote start signals or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



Parameters detailed overleaf...

Timer	Description
Pre-heat	Give a 'pre start' time during which the *Preheat* output and *Starting alarm* will become active (if configured)
Pre-heat bypass	Should the set be stopped, the *Pre-heat* 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 *idle* 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 *idle* speed. If this time is too short, the set could be stopped due to *under speed* failure. If the time is too long, *under speed* protection is disabled until the *Smoke limit time off* time has expired.
DPF Ramp	After terminating the DPF stage at idle 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 *delayed* 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.

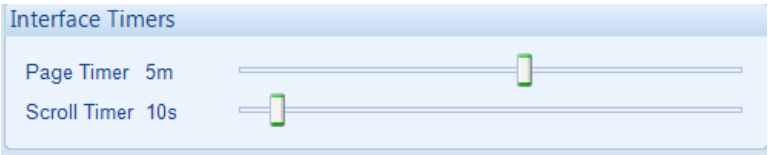
4.6.2 LOAD / STOPPING TIMERS



= 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 *Breaker Close Pulse* signals will be present when the request to close a breaker is given.
Breaker Trip pulse	The amount of time that *Breaker Open Pulse* 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 *Energise to stop* 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 *fail to stop* delay, a *Fail to Stop* 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

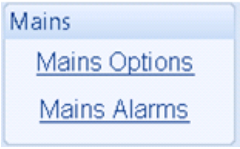


Timer	Description
LCD Page timer	If the module is left unattended for the duration of the *LCD Page Timer* it will revert to show the *Status* page.
LCD Scroll Timer	The scroll time between parameters on a selected page

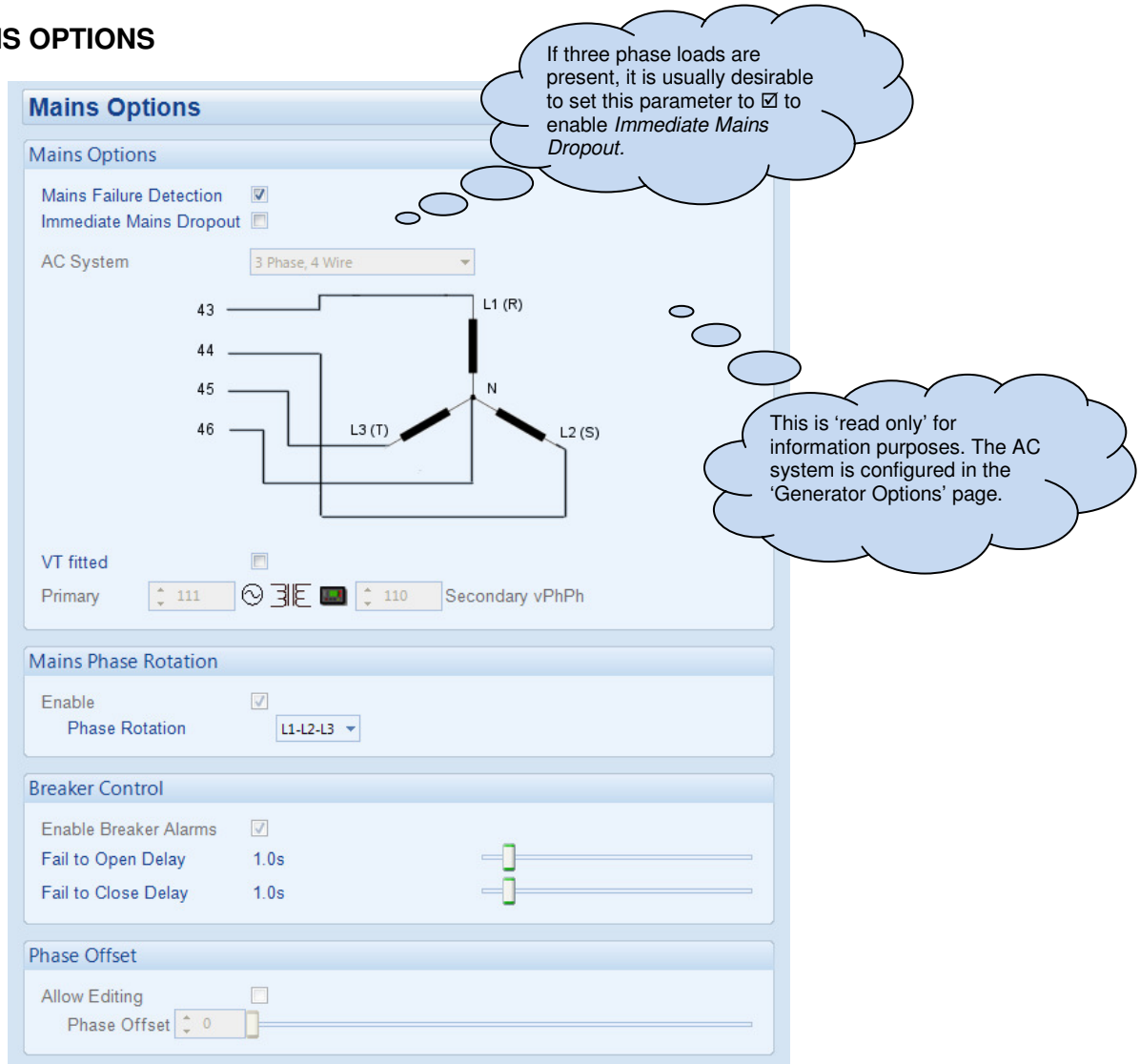
4.7 MAINS

= Only available on DSE8660/DSE8620 Modules

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



4.7.1 MAINS OPTIONS



Timer	Description
Mains failure detection	☐ = The module will ignore the status of the mains supply. ☑ = The module will monitor the mains supply and use this status for automatically starting and stopping the set in auto mode.
Immediate Mains Dropout	☐ = Upon mains failure, the mains load switch will be kept closed until the generator is up to speed and volts. ☑ = Upon mains failure, the mains load switch will be opened immediately, subject to the setting of the *mains transient* 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

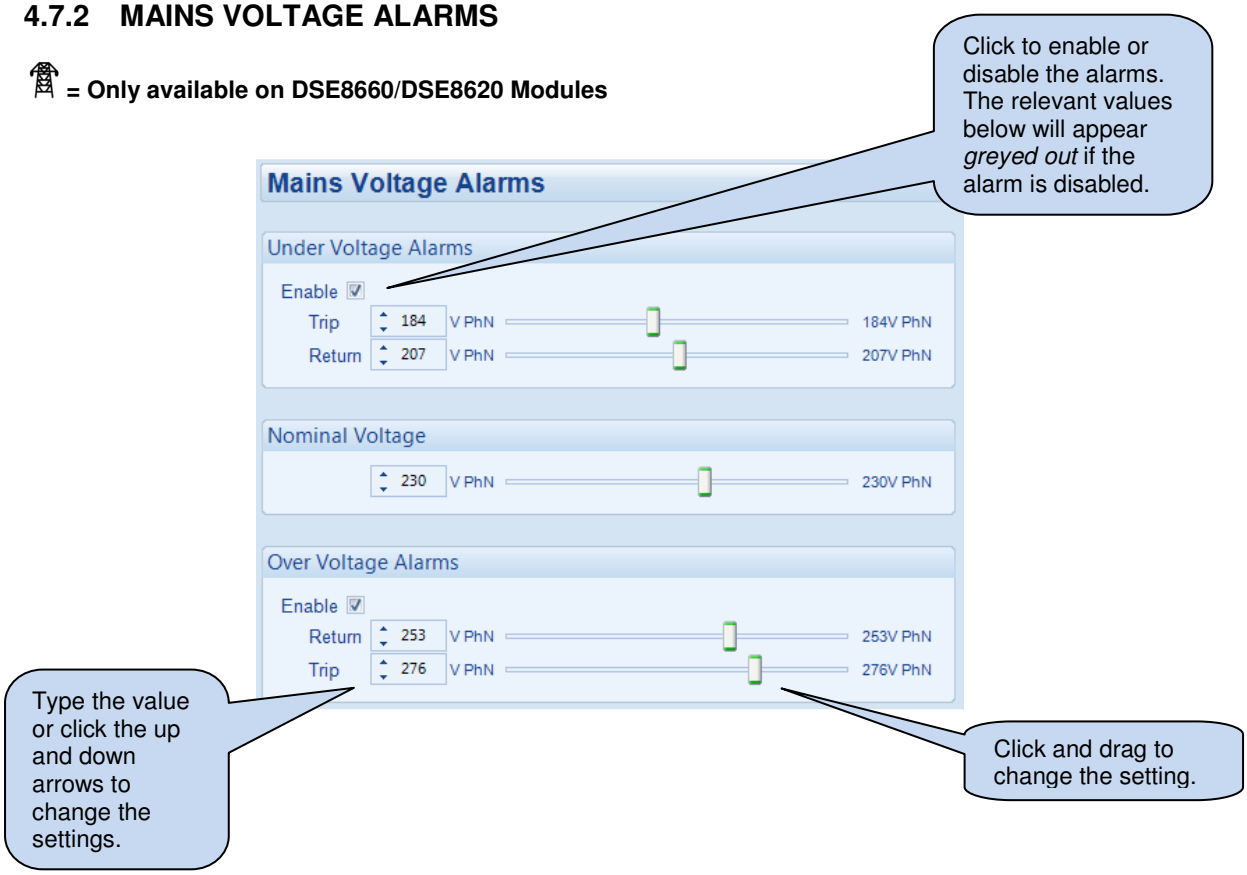
Parameter	Description
Phase Rotation	Enables alternative L3-L2-L1 configuration
Breaker Control	Timer before the fail to close alarm is activated
Phase Offset	This setting is to enable an offset of phase to compensate for a transformer with a phase shift in the system. i.e. Mains supply at 11kv to the 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	☐ = The voltage sensing to the controller is direct from the mains ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the supplied voltage to be within the 8600 Series controller voltage specification. By entering the *Primary* and *Secondary* voltages of the transformer, the controller will display the *Primary* voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (ie 11kV) but 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	☐ = Mains phase rotation is not checked. ☑ = A 'mains failure' situation is generated if the phase rotation is not as configured.

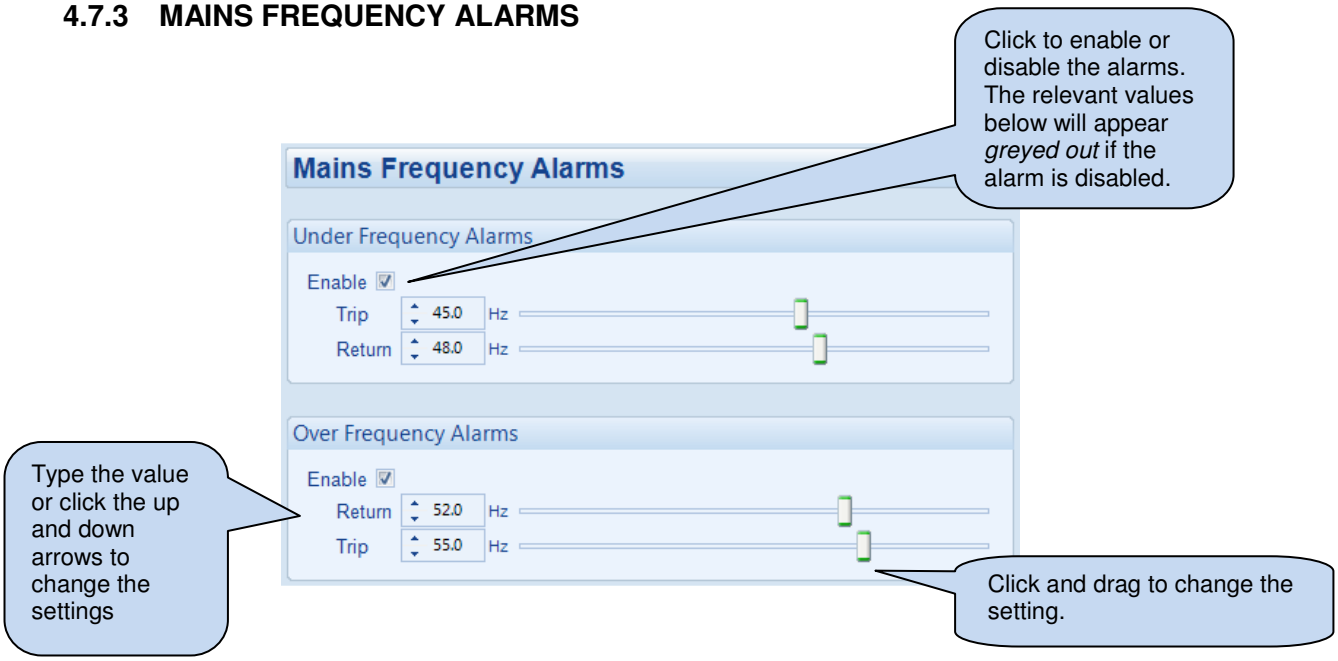
4.7.2 MAINS VOLTAGE ALARMS

= Only available on DSE8660/DSE8620 Modules



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

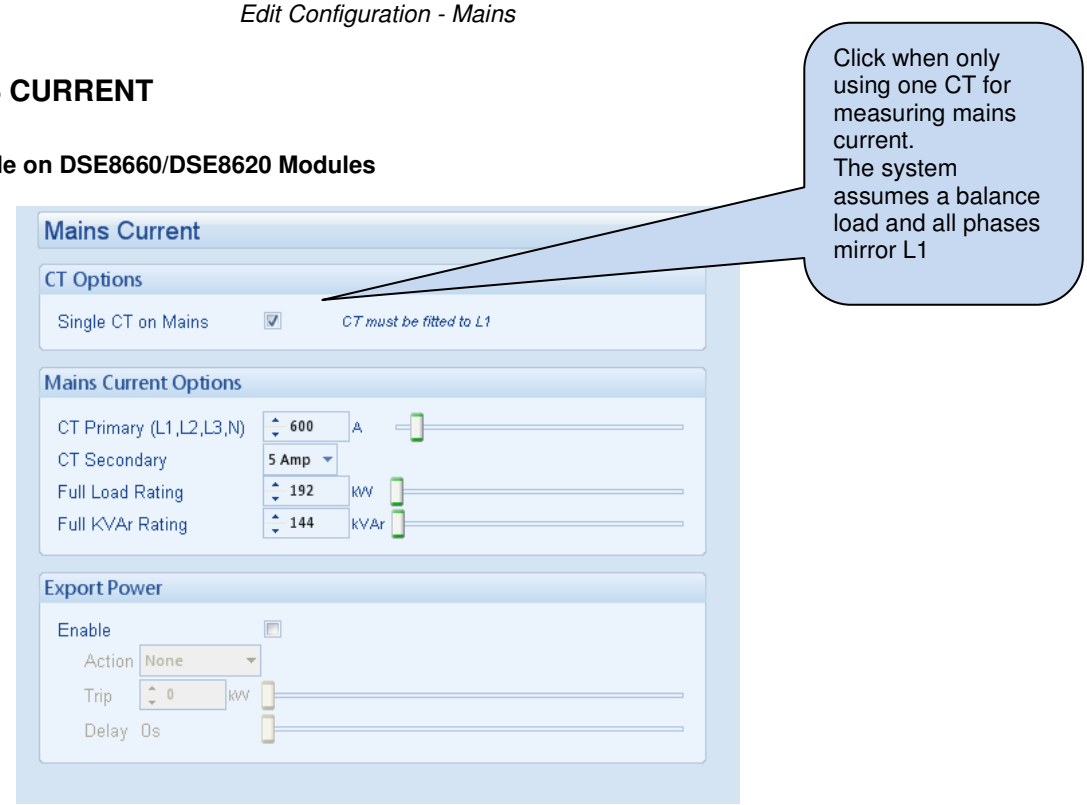
4.7.3 MAINS FREQUENCY ALARMS



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



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 *Mains Power* and *Load Share* 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

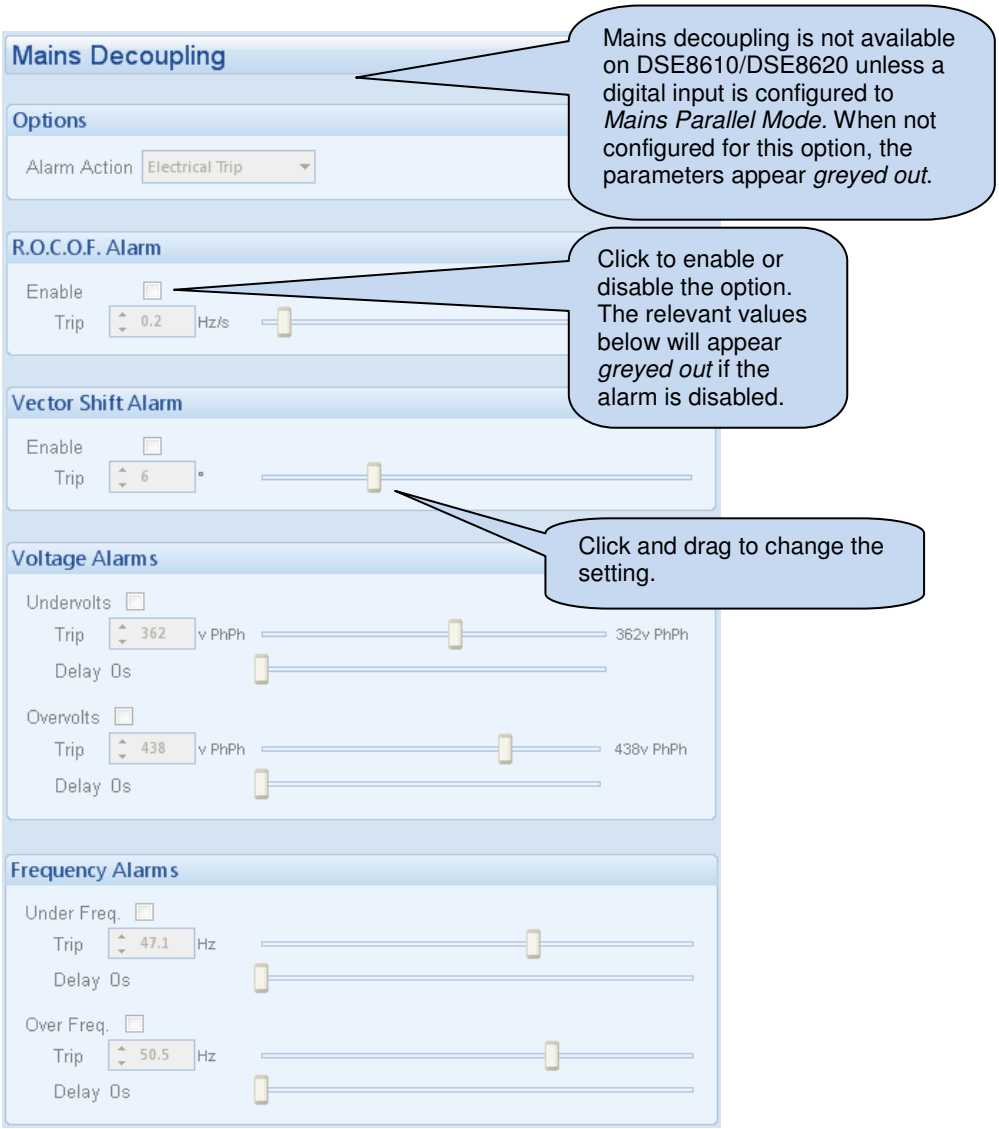
DSE8600 series controllers include “Mains decoupling” detection to be used with generating sets paralleling with the mains (utility) supply.

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)



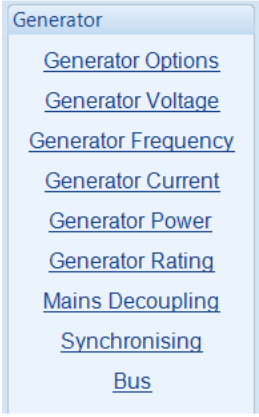
Parameters detailed overleaf...

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	☐ : ROCOF protection is disabled ☑ : 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	☐ : Vector Shift protection is disabled ☑ : 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

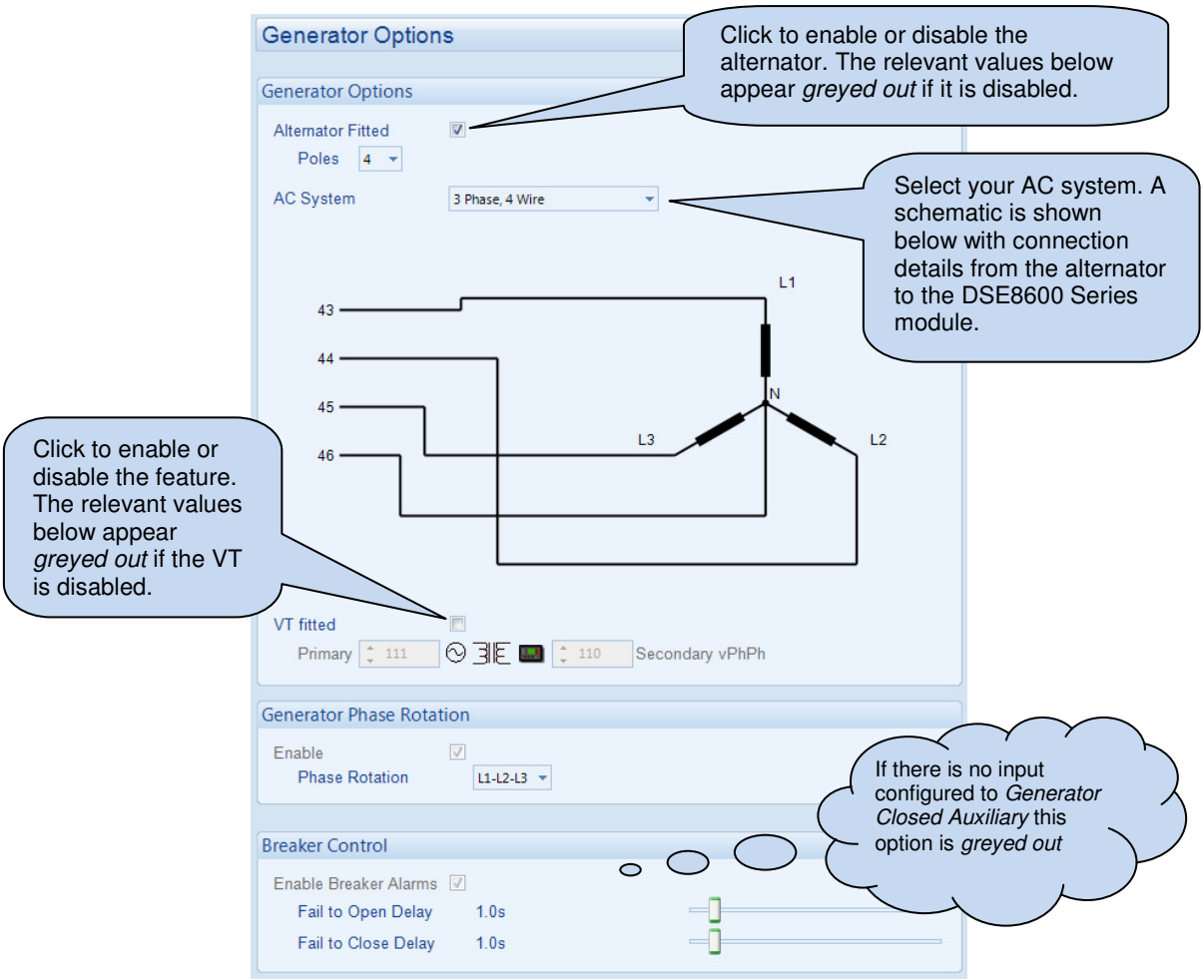
Not applicable to DSE8660.

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



4.8.1 GENERATOR OPTIONS

Not applicable to DSE8660



These parameters are described overleaf...

Parameter	Description
Alternator fitted	☐ = There is no alternator in the system, it is an *engine only* application ☑ = An alternator is fitted to the engine, it is a generator application.
Poles	The number of poles on the alternator
VT Fitted	☐ = The voltage sensing to the controller is direct from the alternator ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the generated voltage to be within the DSE8600 Series controller voltage specification. By entering the *Primary* and *Secondary* voltages of the transformer, the controller will display the *Primary* voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (ie 11kV) but 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* **NOTE: For further information on the wiring for the different topologies, please refer to the DSE module operator manual.**

4.8.1.1 GENERATOR CONTACTOR ALARM

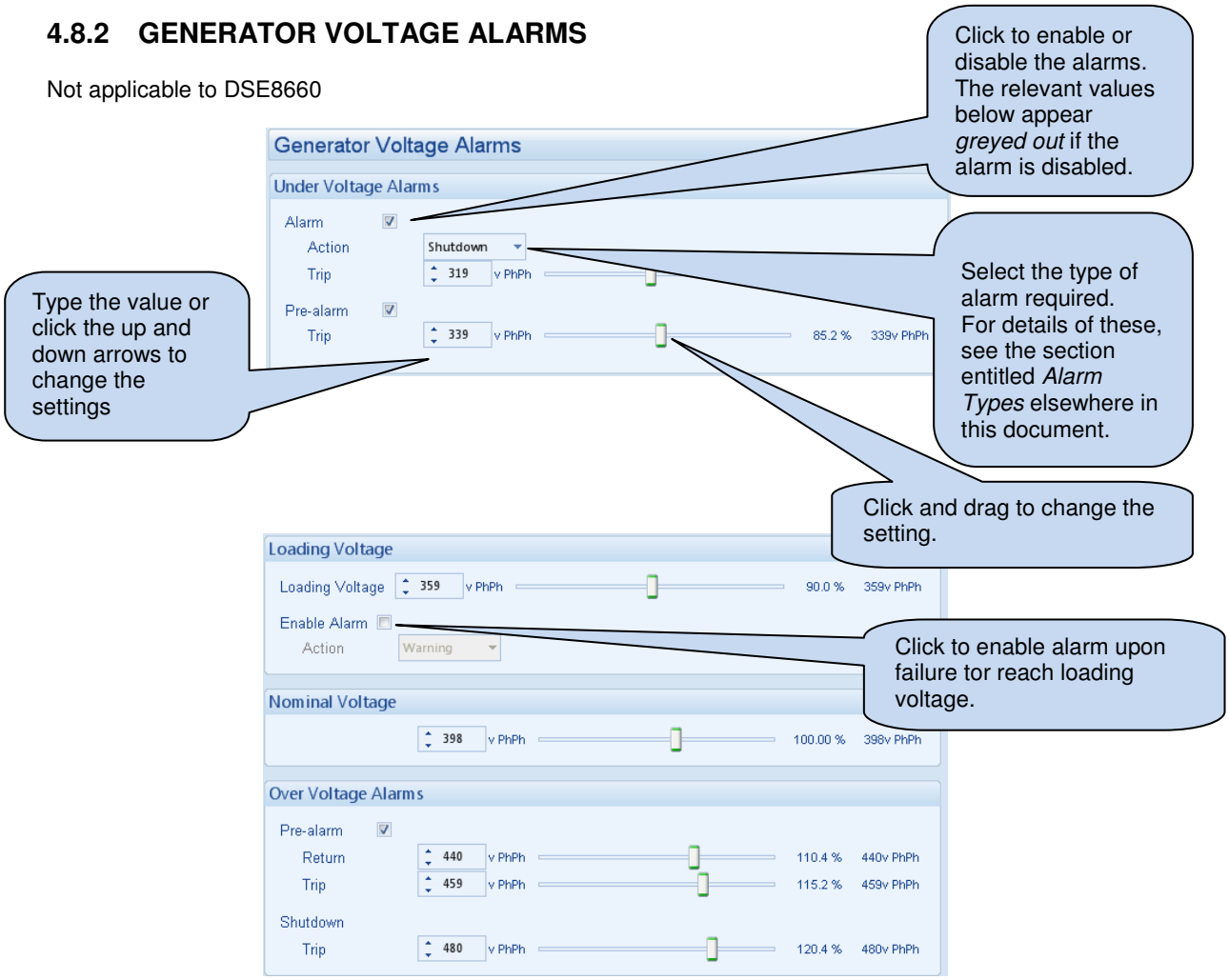
Parameter	Description
Generator Contactor Alarm	☐ = Generator fail to close alarm is disabled ☑ = If the generator breaker does not close, within the time alarm an alarm is raised.

4.8.1.2 GENERATOR PHASE ROTATION

Parameter	Description
Generator Phase Rotation IEEE 37.2 – 47 phase sequence relay	☐ = Generator phase rotation is not checked. ☑ = An electrical trip alarm is generated if the phase rotation is not as configured.

4.8.2 GENERATOR VOLTAGE ALARMS

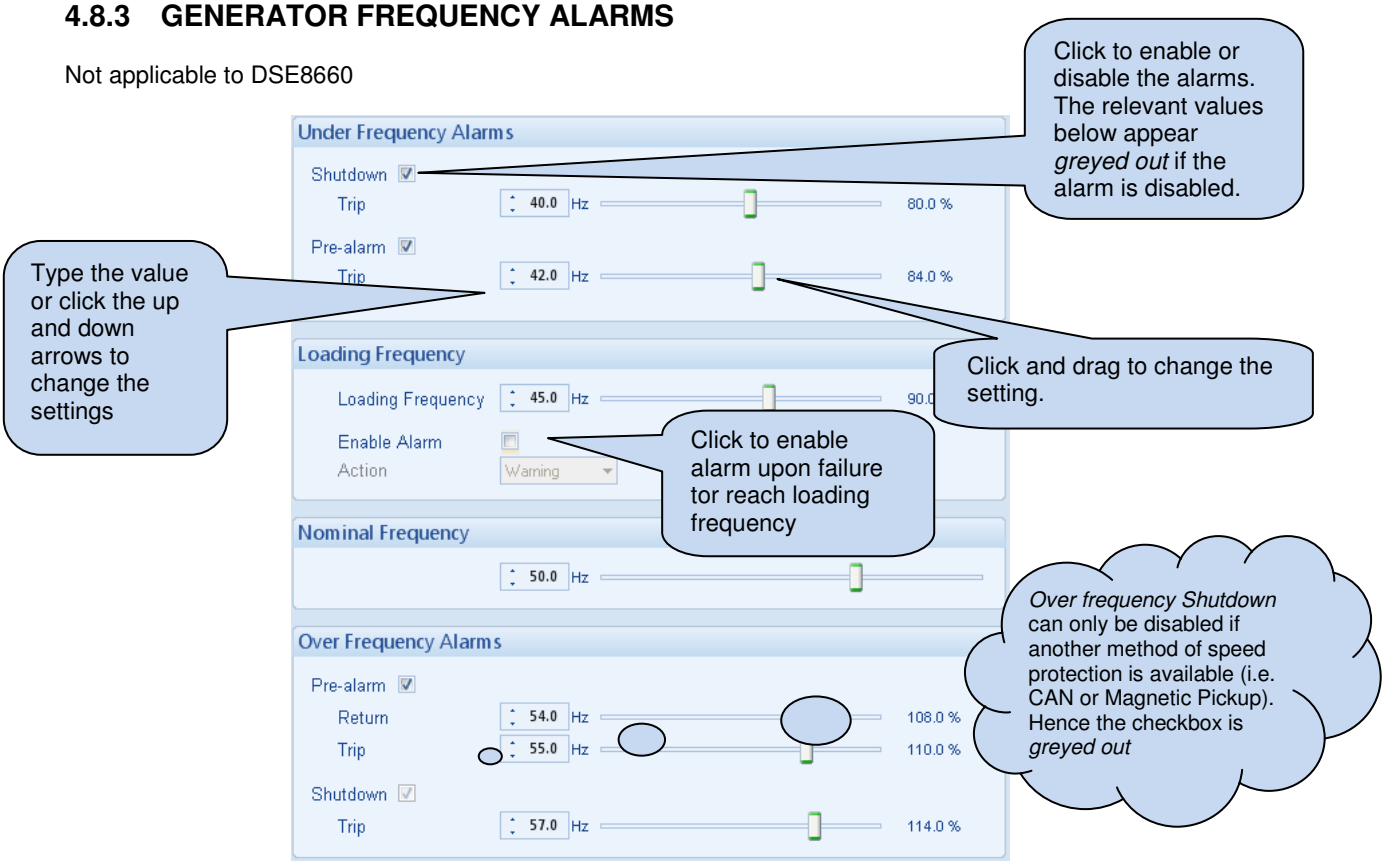
Not applicable to DSE8660



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



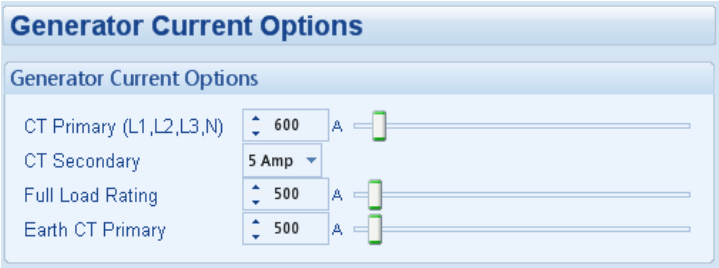
Alarm	IEEE designation
Generator Under Frequency	IEEE 37.2 -81 Frequency relay
Generator Over Frequency	IEEE 37.2 -81 Frequency relay

4.8.4 GENERATOR CURRENT

Not applicable to DSE8660

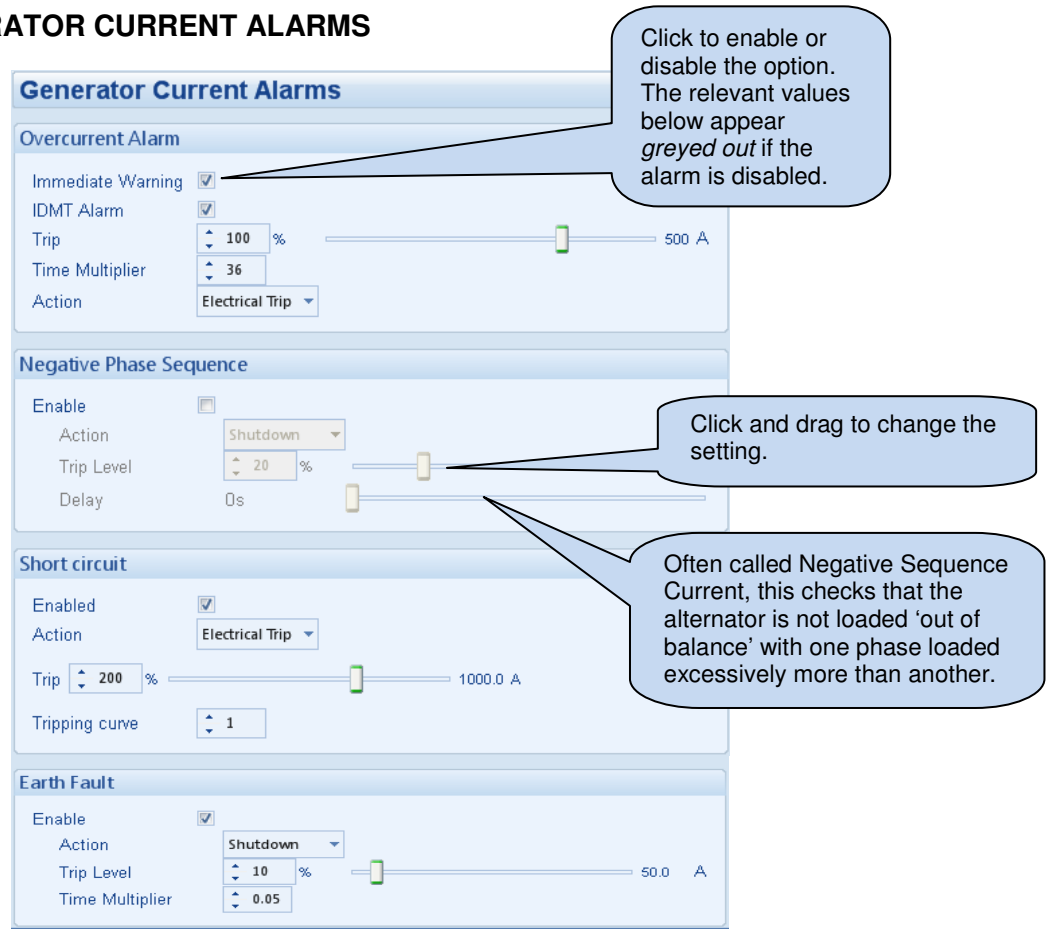
The *Generator Current* page is subdivided into smaller sections.
Select the required section with the mouse.

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)

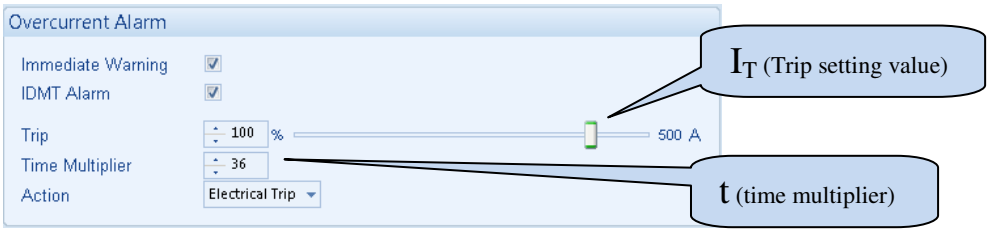
If the *IDMT Alarm* is enabled, the 8600 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the *IDMT Alarm* triggers (*Shutdown* or *Electric trip* as selected in *Action*).

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

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

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.

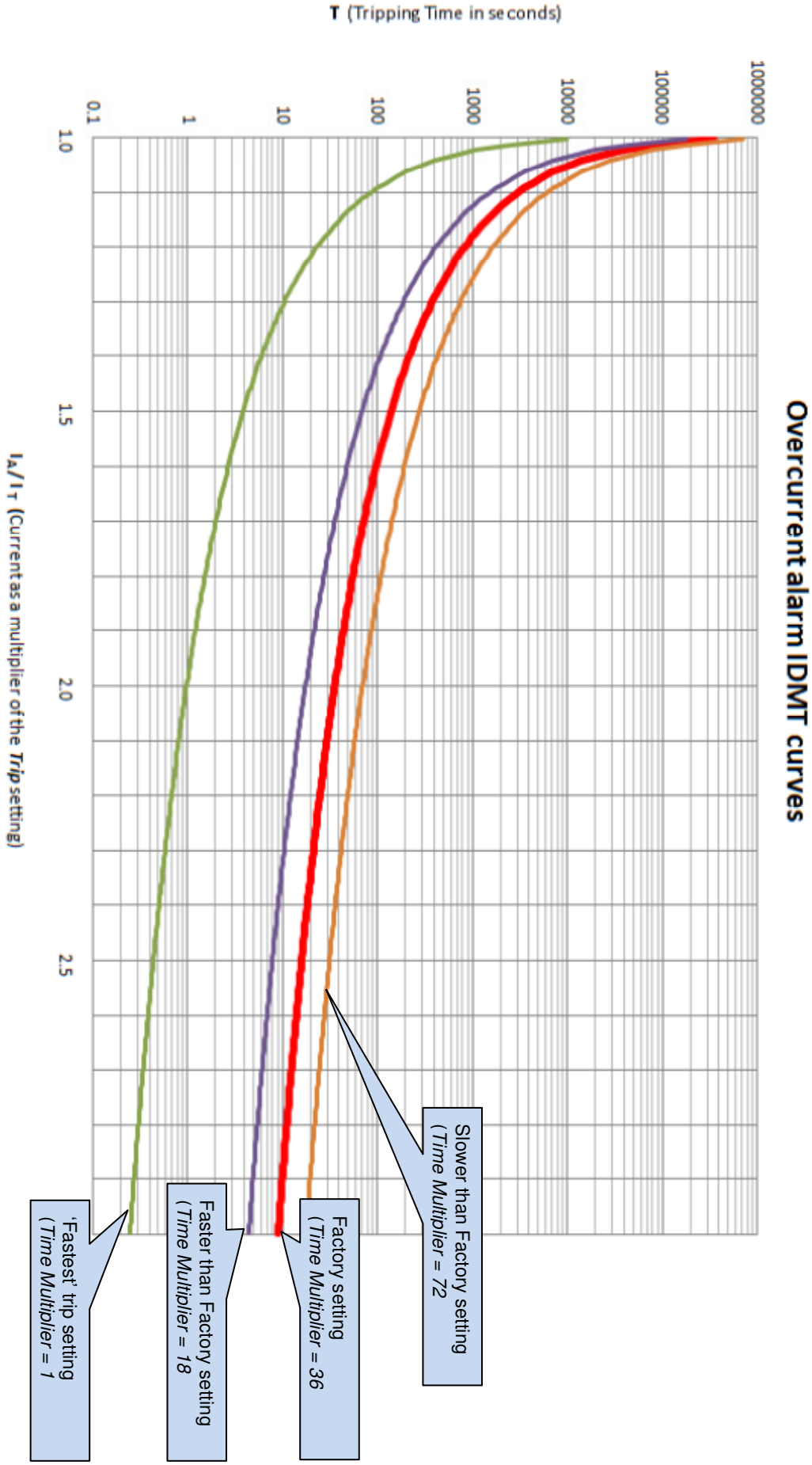
The effect of an overload on the generator is that the alternator windings begin to overheat; the aim of the *IDMT alarm* is to prevent the windings being overload (heated) too much. The amount of time that the set can be safely overloaded is governed by how high the overload condition is.

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.


Overcurrent alarm IDMT curves
T (Tripping Time in seconds)
1000000
100000
10000
1000
100
10
1
0.1
1.0
1.5
2.0
2.5
I_A / I_T (Current as a multiplier of the *Trip* setting)
Slower than Factory setting
(*Time Multiplier = 72*
Factory setting
(*Time Multiplier = 36*
Faster than Factory setting
(*Time Multiplier = 18*
'Fastest' trip setting
(*Time Multiplier = 1*

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

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

T – Tripping time (seconds)

t – Time Multiplier
Factory setting is 36

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:

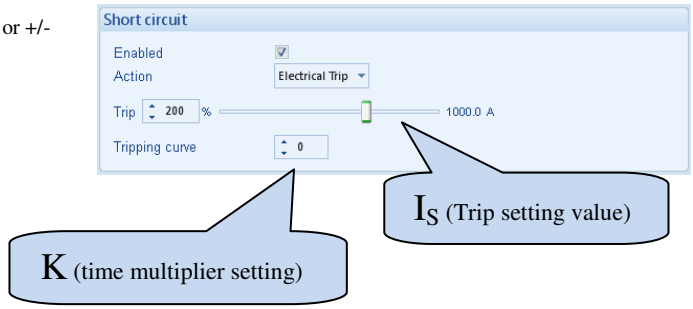
$$T = K \times 0.14 / ((I / I_s)^{0.02} - 1)$$

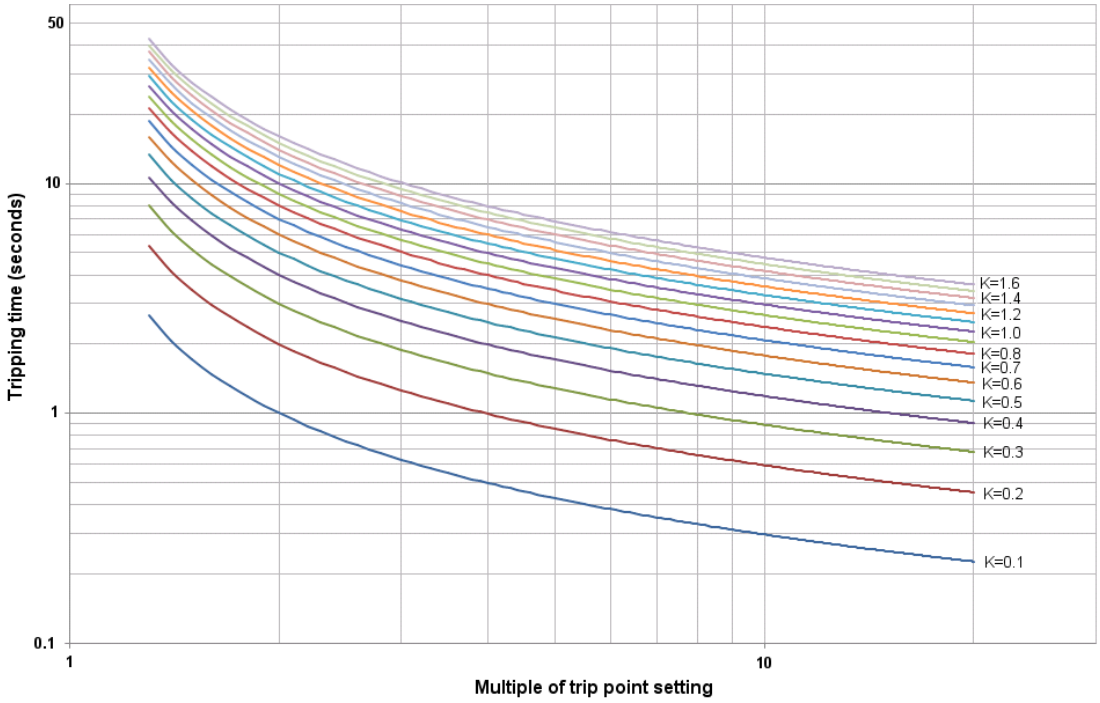
Where: T is the tripping time in seconds (accurate to +/- 5% or +/- 50ms (whichever is the greater)

K is the time multiplier setting

I is the actual current measured

I_s is the trip setting value



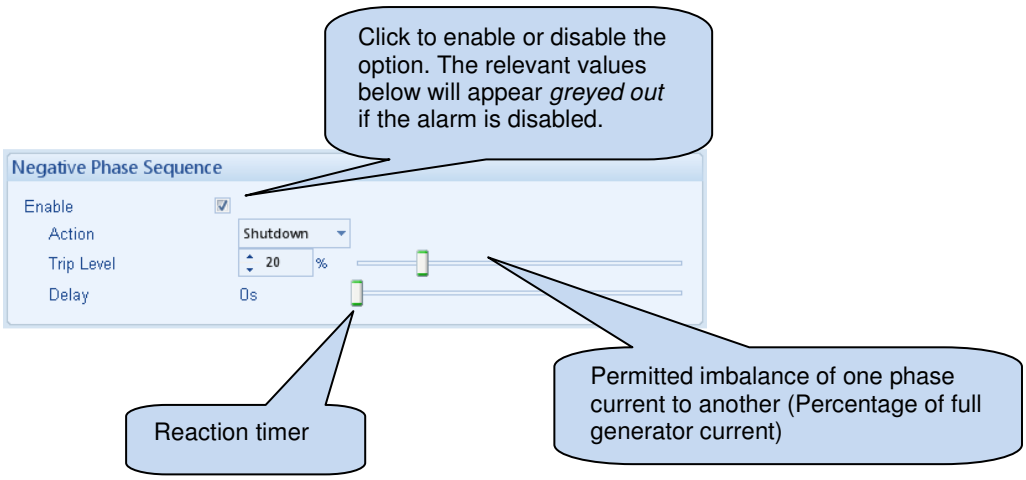


4.8.4.4 NEGATIVE PHASE SEQUENCE

(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)

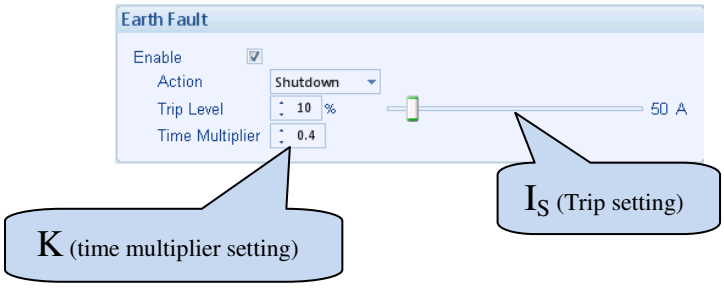
When the module is suitably connected using the 'Earth Fault CT'. The module measures Earth Fault and can optionally be configured to generate an alarm condition when a specified level is surpassed.

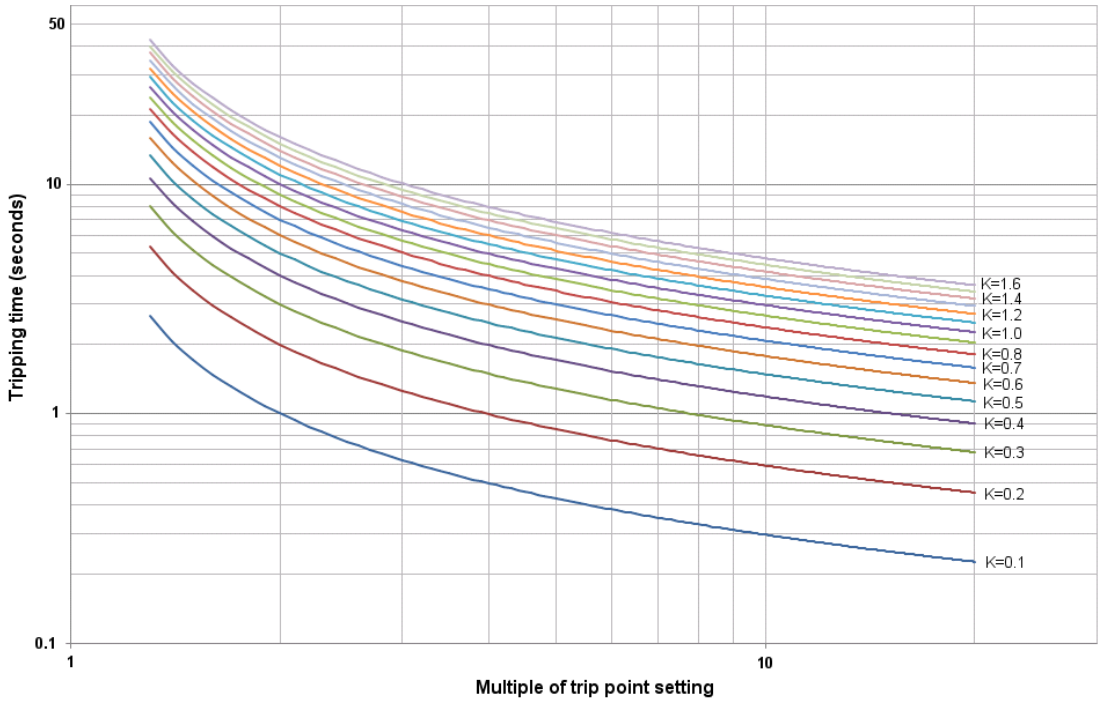
If the *Earth Fault alarm* is enabled, the DSE8600 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the Alarm triggers (*Shutdown* or *Electric trip* as selected in *Action*).

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





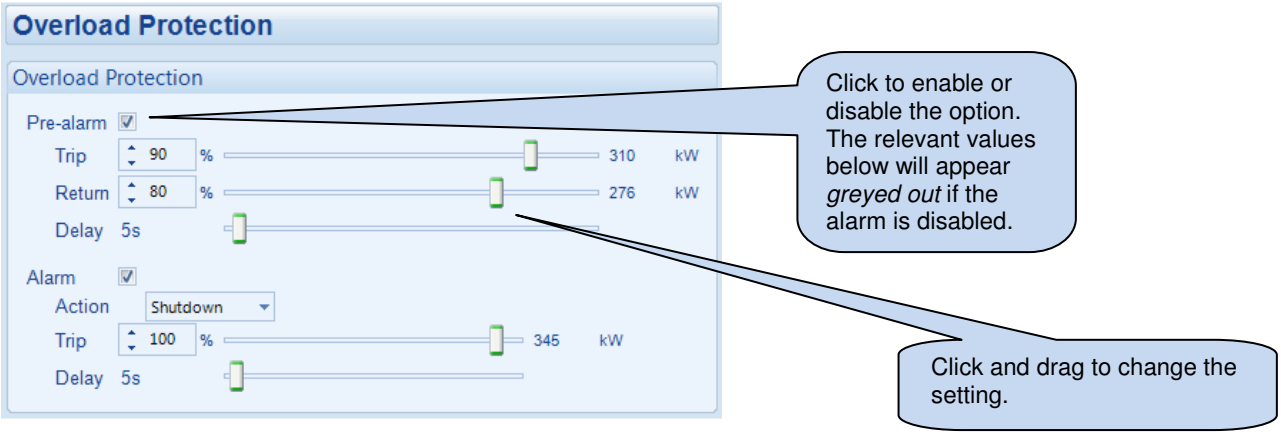
4.8.5 GENERATOR POWER

Applicable to DSE8610/DSE8620 only.

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

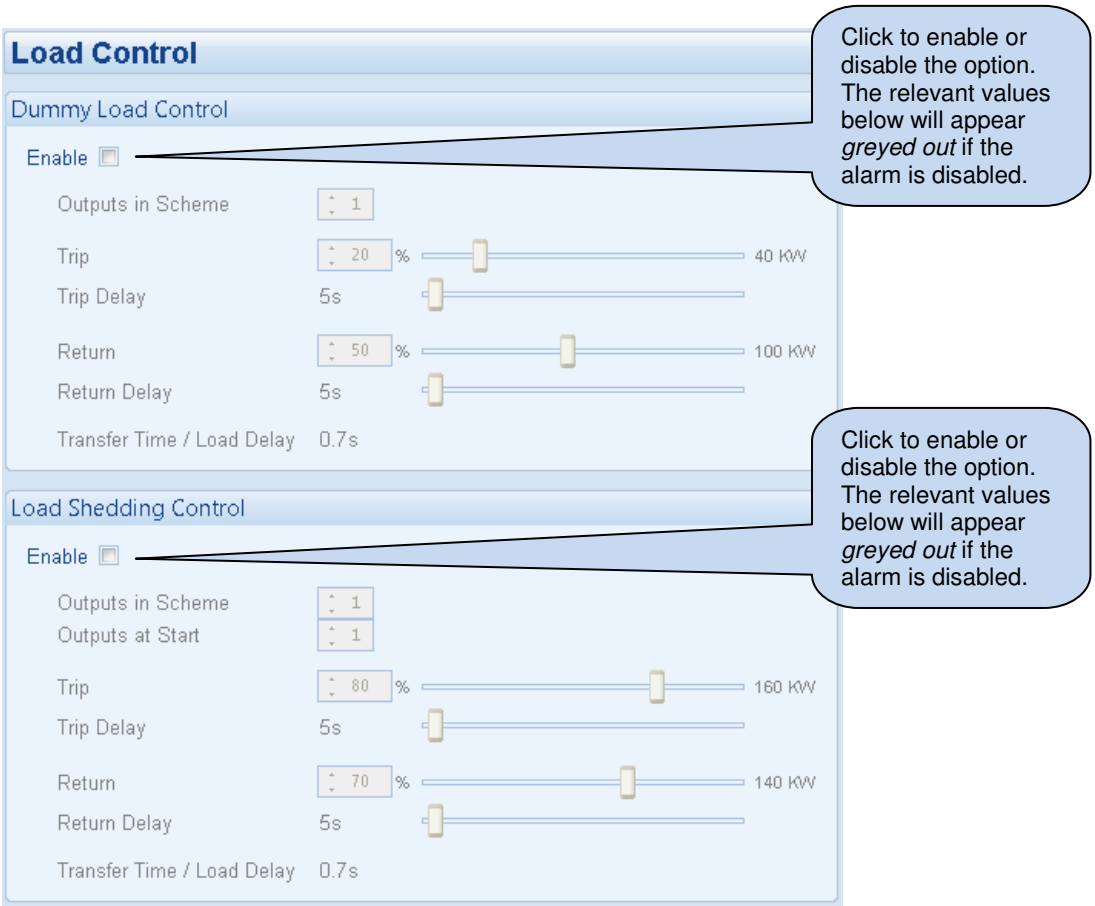
4.8.5.1 OVERLOAD PROTECTION

Overload protection is a subpage of the Generator Power page.



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

4.8.5.2 LOAD CONTROL

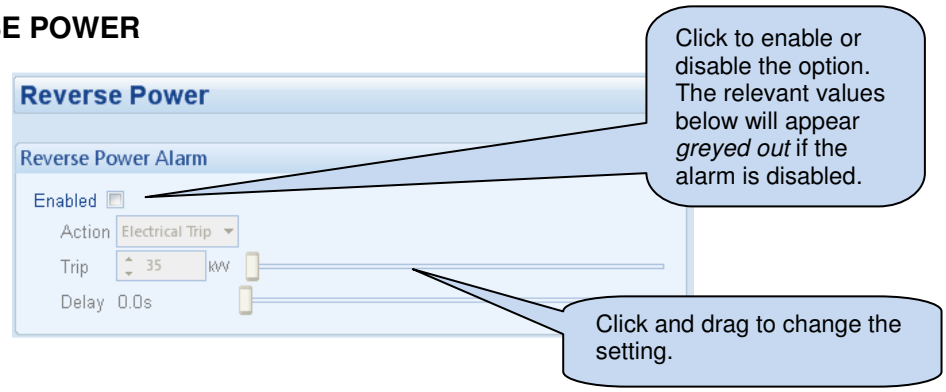


Setting	Description
Dummy Load Control	Provides control of configurable outputs set to *Dummy Load Control*. ☐ = Dummy Load Control is disabled. ☑ = The module will monitor the load and control any outputs configured to Dummy *Load Control (1-5)* **Outputs in scheme:** The amount of Dummy Load Control outputs that will be included in the function. **Trip** / **Trip Delay:** If the load level is below the *Trip* setting for the duration of the *Trip Delay*, then the 'next' output configured to *Dummy Load Control* is activated (max 5) **Return** / **Return Delay:** If the load level is above the *Return* setting for the duration of the *Return Delay*, then the 'highest numbered' output configured to *Dummy Load Control* is de-activated and the timer is reset.

Continued overleaf...

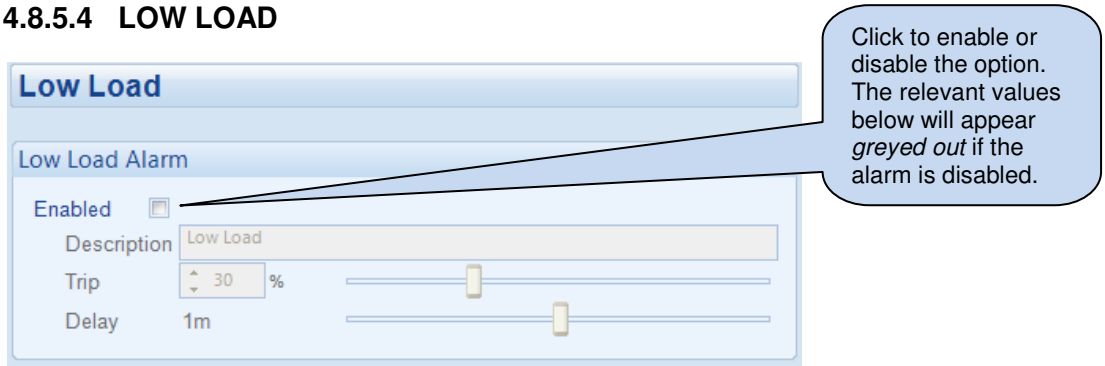
Setting	Description
Load Shedding Control	Provides control of configurable outputs set to *Load shedding control*. ☐ = Load Shedding Control is disabled. ☑ = The module will monitor the load and control any outputs configured to Load Shedding Control *(1-5)* **Outputs in Scheme:** The number of outputs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

4.8.5.3 REVERSE POWER

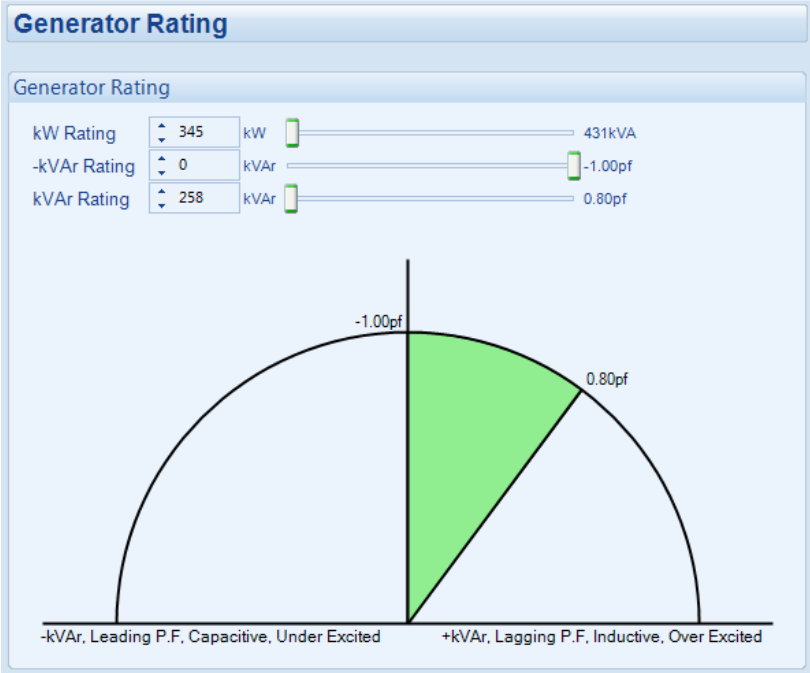


Setting	Description
Reverse Power IEEE 37.2 -32 Directional power relay Not applicable to DSE8660	This setting is used to configure the generator reverse power alarm: - ☐ = Generator reverse power will NOT give an electrical trip alarm. ☑ = Generator reverse power WILL give an electrical trip alarm in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

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 :

```
Cos Φ = W / VA
Cos Φ = 0.8
Φ = Cos-1 0.8 = 36.87°
```

- From this we can calculate the VAr rating of the typical 0.8 pf rated generator as :

```
Tan Φ = VAr / W
VAr = Tan 36.87 x W
VAr = 0.75 x 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

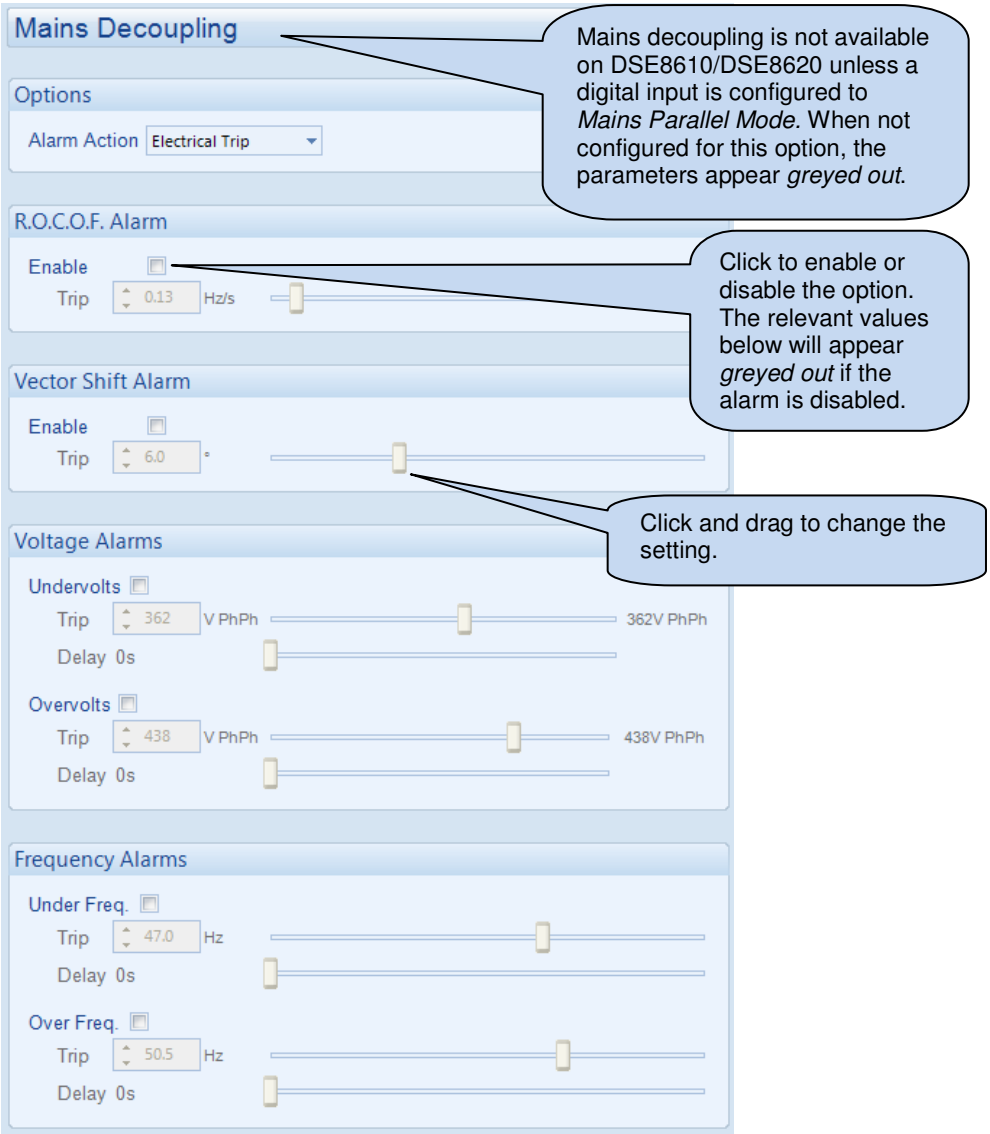
DSE8600 series controllers include “Mains decoupling” detection to be used with generating sets paralleling with the mains (utility) supply.

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)



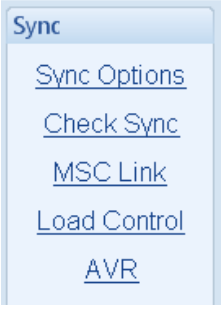
Parameters detailed overleaf...

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	☐ : ROCOF protection is disabled ☑ : 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	☐ : Vector Shift protection is disabled ☑ : 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.

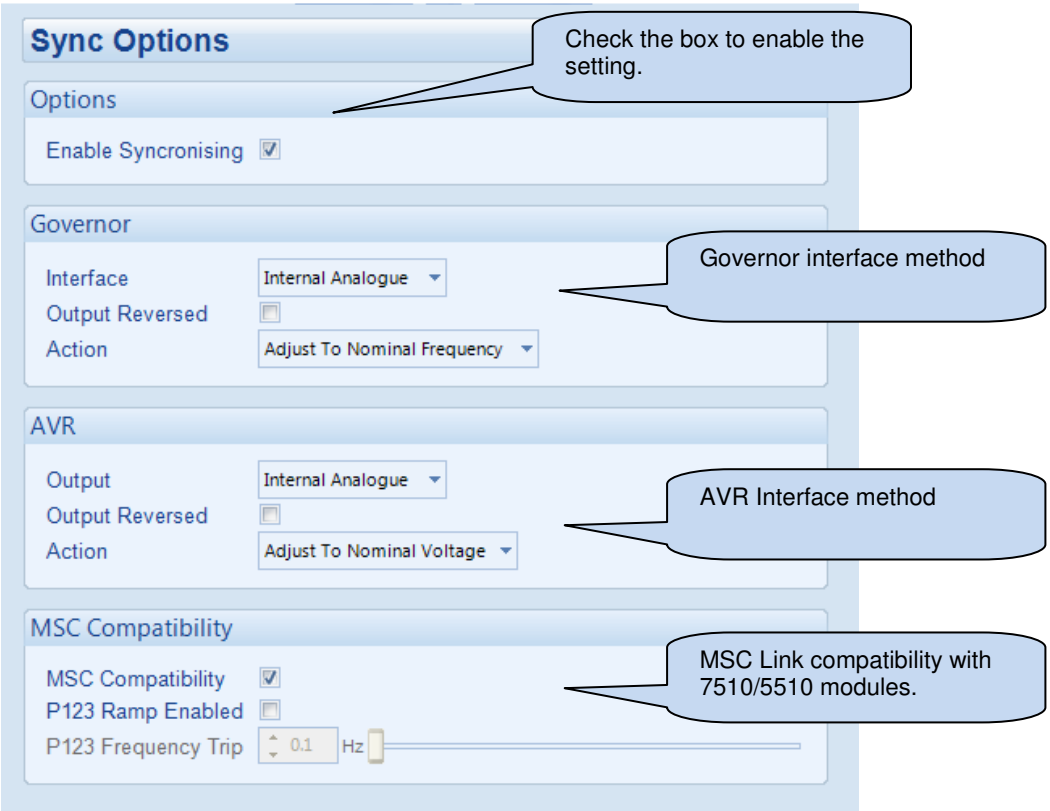
4.8.8 SYNCHRONISING

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



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	**Internal Relays** –The governor or motorised potentiometer is controlled by the 8610/20 modules' own internal relays. **NOTE: - It will be necessary to configure two of the module relays to provide the required 'Speed raise' and 'Speed Lower' signals.** **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.
Governor Output Reversed	**Only available in conjunction with internal analogue selected** **This allows the module to interface with a greater diversity of governors.** ☐ = Lower voltage equates to lower speed. ☑ = Lower voltage equates to higher speed.
Adjust to nominal frequency	**This option determines the action that will be taken by the 8600 synchroniser during the period that the set is running on load.** ***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. ***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. ***None –*** Adjustment will not take place; the speed will remain at current levels. 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.

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	**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. **NOTE: - It will be necessary to configure two of the module relays to provide the required 'Voltage raise' and 'Voltage Lower' signals.** **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.
AVR Output Reversed	**Only available in conjunction with internal analogue selected** **This allows the module to interface with a greater diversity of AVRs.** ☐ = Lower voltage equates to lower voltage. ☑ = Lower voltage equates to higher voltage.
Adjust to nominal voltage	**This option determines the action that will be taken by the 8600 synchroniser during the period that the set is running on load.** ***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. ***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. ***None –*** Adjustment will not take place; the speed and voltage will remain at current levels. 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.

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.

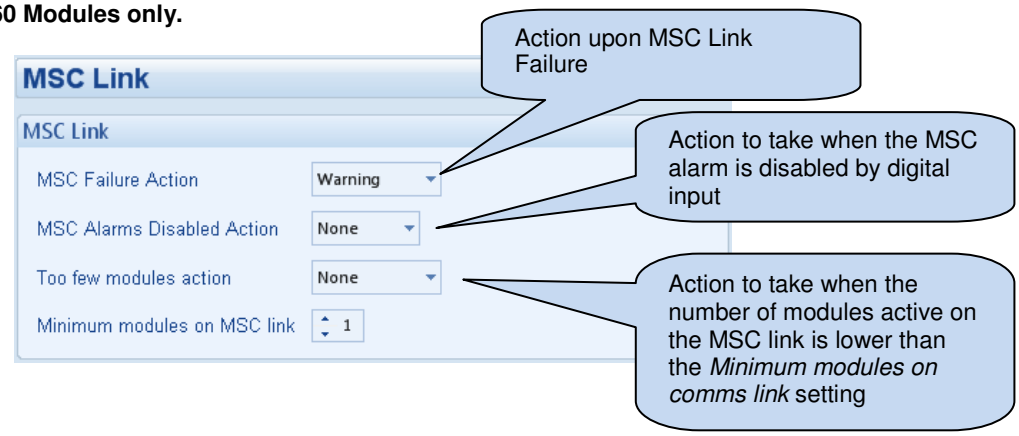
Parameter	Description
MSC Compatibility	☐ = The DSE8600 will not be able to communicate with the DSE5500 and DSE7500 series modules on the MSC Link ☑ = Communication between DSE8600 and DSE5500 and DSE7500 is enabled. The maximum number of generator controllers is reduced to 16 and the maximum number of mains controllers is reduced to 8. **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).**
P123 Ramp Enabled	☐ = The DSE8610 will use MSC link for ramping and load sharing. ☑ = The DSE8610 is connected to a DSE123 to convert the MSC link to interface with Analogue Load Share lines **NOTE: The P123 is only available for DSExx10 modules.**
P123 Frequency Trip	**(Only Available when P123 Ramp option is enabled)** If the frequency changes by this amount when ramping down, the module will open the generator breaker.

4.8.8.2 CHECK SYNC

Parameter	Description
Check Sync	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: • The difference between the two supplies frequencies must be between the *Check Sync Low Frequency* and *Check Sync High Frequency* • The difference between the two supplies voltages must be equal to or below the *Check Sync Voltage* • The phase of the two supplies must be equal to or below the *Check Sync Phase Angle*
Dead Bus	The bus is measured when the set is to be loaded. If the bus is measured to be below the *Dead Bus Voltage*, the bus is assumed to be 'dead' and the breaker can be closed immediately. If the bus is measured to be above the *Dead Bus Voltage*, the oncoming generator must be synchronised before the breaker can be closed.
Fail to sync Alarm	If the synchronising process continues longer that the *Fail to Sync Alarm Delay*, the alarm is triggered. This may occur if changes in the load are making the set control difficult due to changes in voltage and frequency. **Electrical Trip** : The set is stopped. In a *Load Demand* scheme, other generators may start if available. **Warning**: The set continues to synchronise.

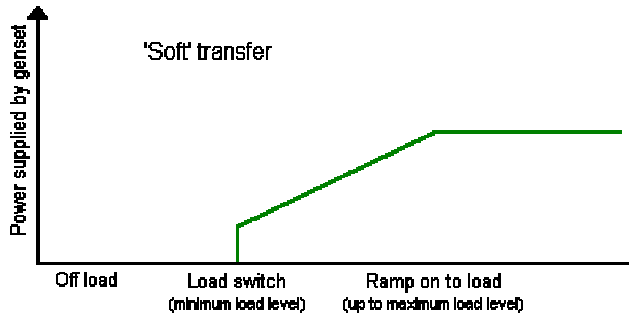
4.8.8.3 MSC LINK

DSE8610 / DSE8660 Modules only.



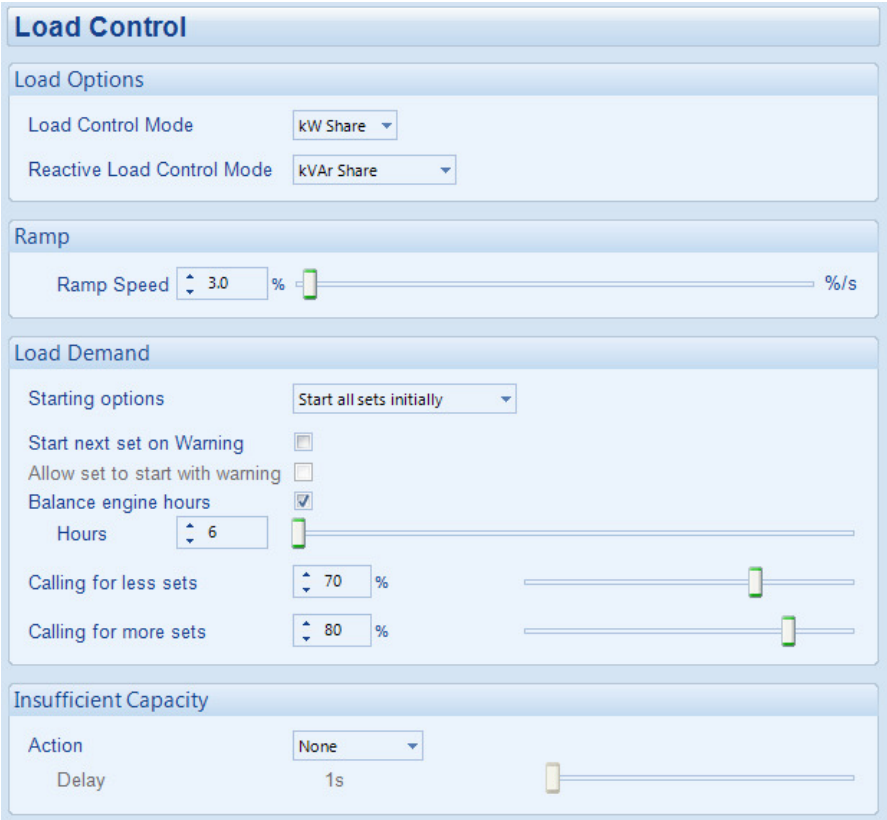
NOTE: - The MSC Link Alarms can be disabled by a digital input configured to *MSC Alarms Inhibit* if required.

4.8.8.4 LOAD CONTROL

Soft transfer	Description
	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. 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 (Load share* mode) or to the maximum load level (*Load level control* mode). 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.

'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.



Parameters detailed overleaf...

LOAD OPTIONS

Item	Function
Load Control Mode IEEE 37.2 -90 Regulating device	**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. **NOTE: - On model DSE8610 kW fixed export is only used in conjunction with generating sets in parallel with the mains supply.** **NOTE: - The 8610 will automatically switch from load share mode to kW fixed export mode when an input configured for *Mains parallel mode* is active.**
Reactive load control mode IEEE 37.2 -90 Regulating device	Not available when Active (kW) load share mode is set to *None*. 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. **NOTE: - The 8610 will automatically switch from VAr share mode to VAr fixed export mode when an input configured for *Mains parallel mode* is active.**

RAMP

Item	Function
Ramp Speed	The rate at which the generator will be ramped onto and off the load. **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:** • **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'** **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).**

LOAD DEMAND

Not DSE8620 Modules

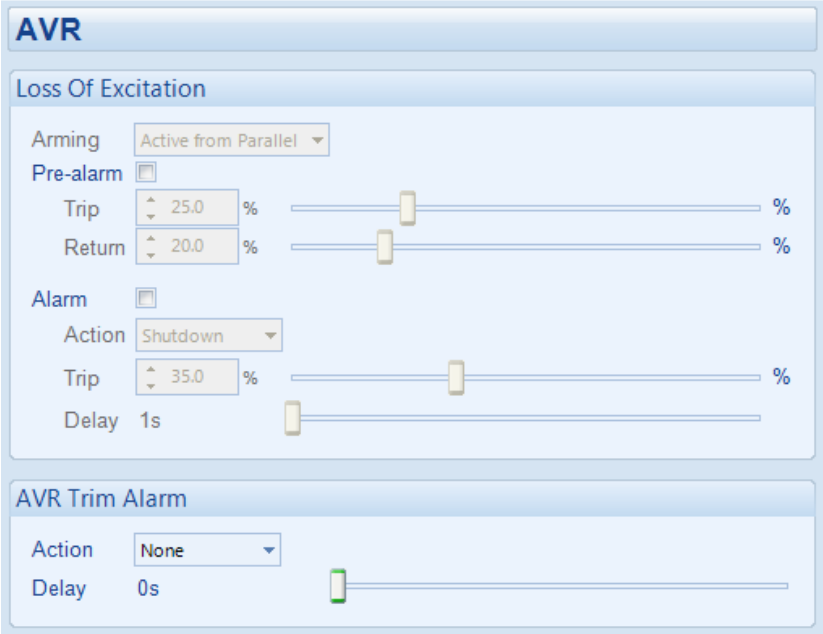
Item	Function
Starting options	Used to configure how the load demand scheme will operate upon start-up. **Start all sets initially:** Upon activation of the load demand scheme, all sets in the system will start up and parallel onto the generator bus. Then they will stop / start according to load demands. 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. **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.
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	☐ : 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. ☑ : Allows a stationary generator with a warning alarm to start if requested.
Balance engine hours	Used in a Multiset system so that the engine's priority changes according to the amount of usage of the set. For instance in a two set system. Set 1 has logged 100 running hours Set 2 has logged 20 running hours Balance engine hours are configured to 75 hours. As Set 2 has logged 80 hours less than Set 1. As this is greater than the configured 75 hours, Set 2 will be the highest priority set. If all sets are within the configured Balance Engine Hours value, then the set Priority Number (See SCADA | Maintenance page) is followed.
Calling for less sets	**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. **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.** 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. This allows for short term drops in load, without decreasing supply capacity, only for it to be increased again a short while later. **NOTE: - It is recommended that each set in the system have the same value configured for this parameter.** **NOTE: - When the module assumes that the load is at the bottom of the ramp the breaker will open.**

Item	Function
Calling for more sets	**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. 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 *Load level for more sets to run* while the start delay timer is in progress. This allows for short term increases in load. **NOTE: - It is recommended that each set in the system has the same value configured for this parameter.**

INSUFFICIENT CAPACITY

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

4.8.8.5 AVR

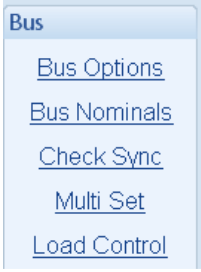


Item	Function
Loss Of Excitation IEEE 37.2 -90 Regulating device (Not applicable to 8660)	**Pre-alarm -** ☐ = Loss of excitation will NOT give a pre-alarm warning ☑ = Loss of excitation WILL give a pre-alarm warning in the event of negative VAr rising above the displayed 'Loss of excitation *pre-alarm*' value. The 'Loss of excitation *pre-alarm'* value can be adjusted to suit user requirements. Negative VAr must return to below the 'Loss of excitation *return*' setting before the 8610 module will consider that negative VAr is back with in limits **Alarm -** ☐ = Loss of excitation will NOT give a Shutdown alarm ☑ = Loss of excitation WILL give a shutdown alarm in the event of negative VAr rising above the displayed 'Loss of excitation *trip*' value. The 'displayed 'Loss of excitation *trip*' value can be adjusted to suit user requirements. **NOTE: Graphs can be obtained from the alternator suppliers to assist in these settings.**
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.

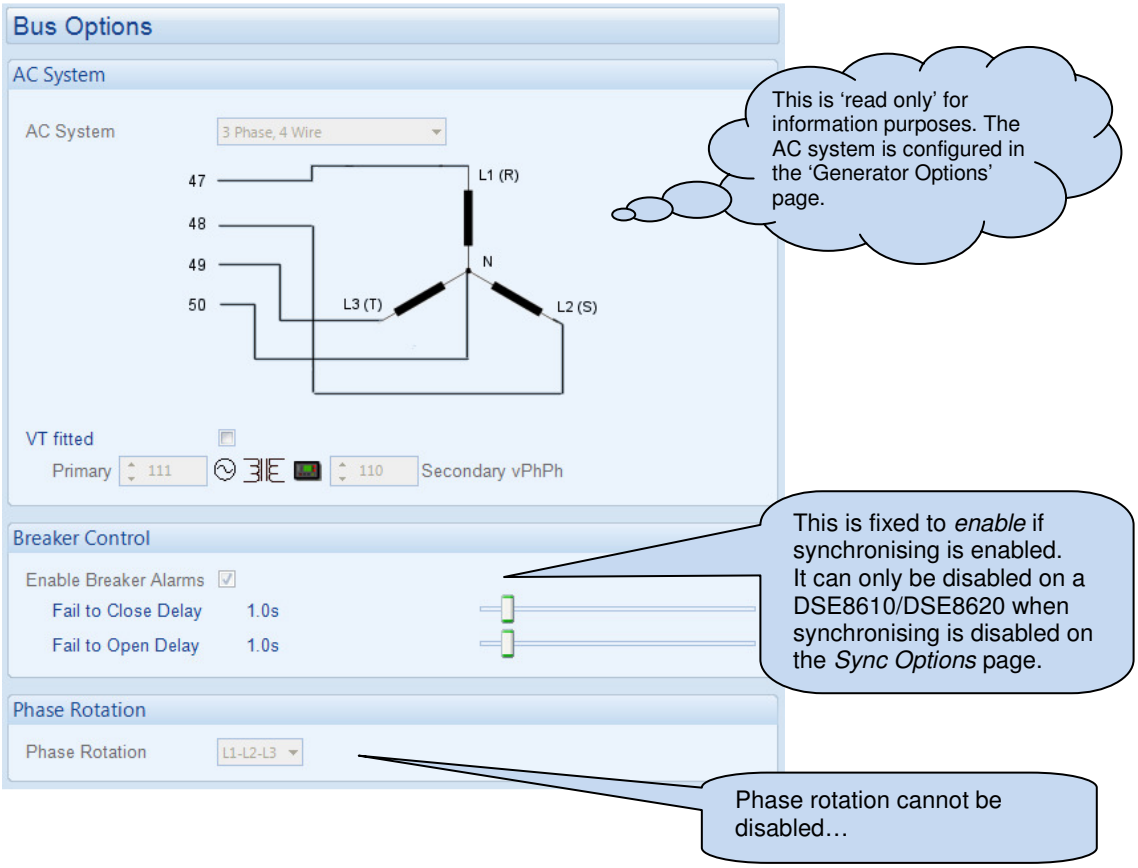
4.8.9 BUS

Applicable to DSE8660 only.

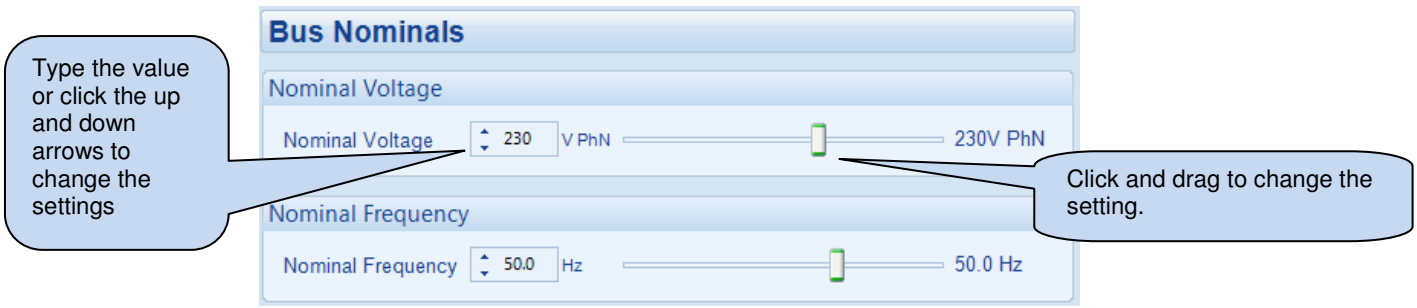
The *Bus* page is subdivided into smaller sections.
Select the required section with the mouse.



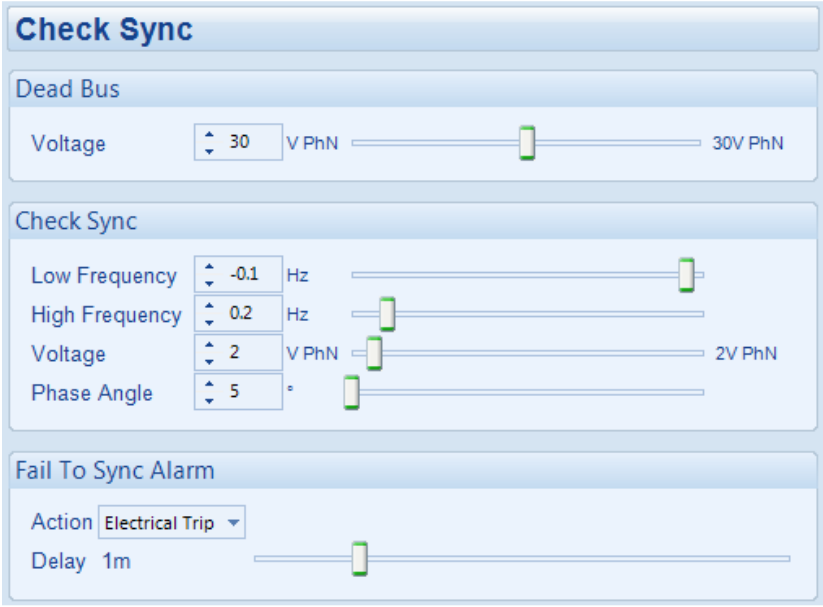
4.8.9.1 BUS OPTIONS



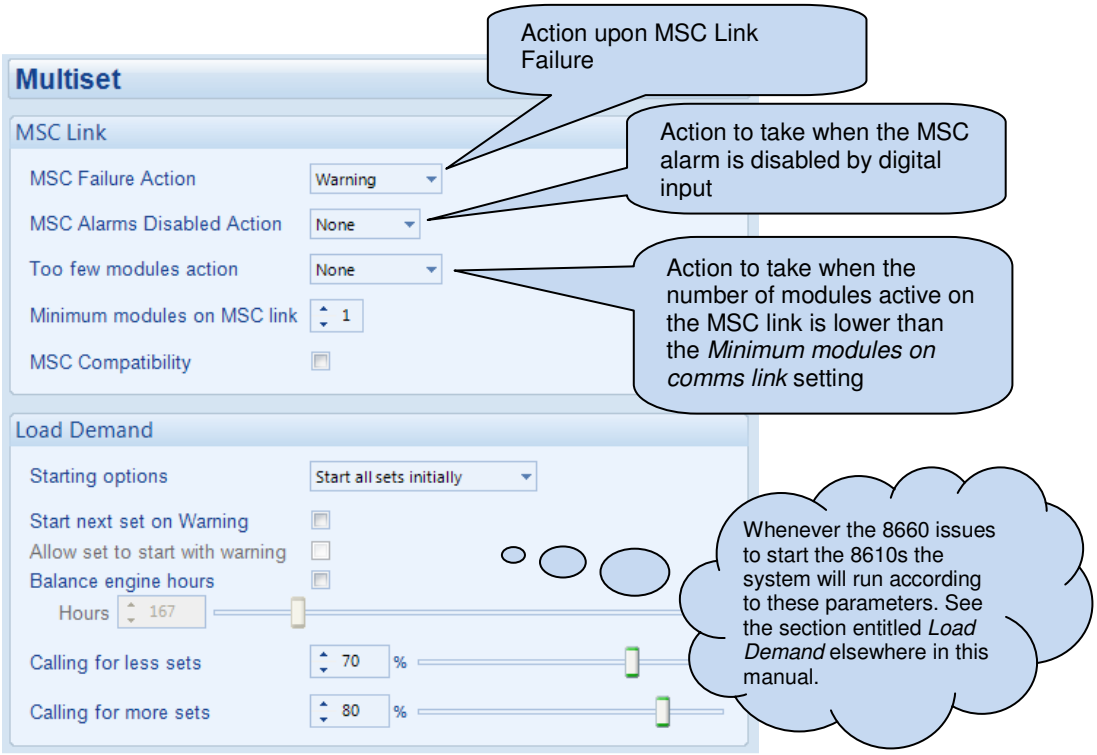
4.8.9.2 BUS NOMINALS



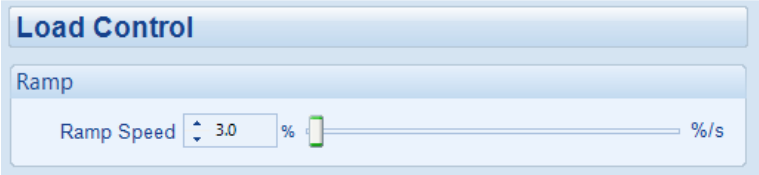
4.8.9.3 CHECK SYNC



4.8.9.4 MULTISET



4.8.9.5 LOAD CONTROL

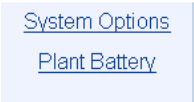


RAMP

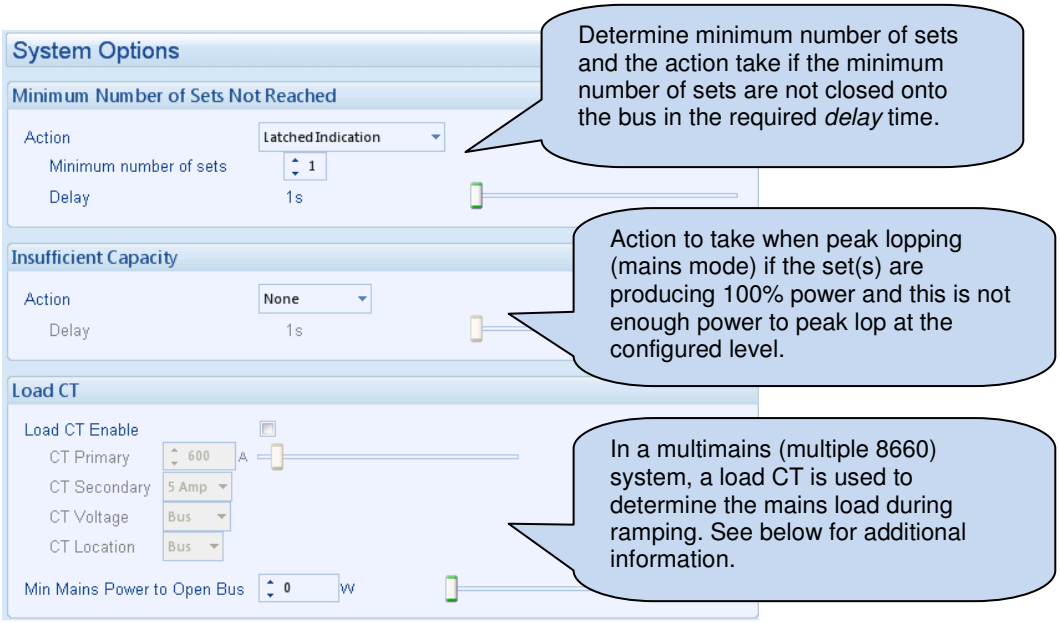
Item	Function
Ramp Speed	See the section entitled *Ramp* elsewhere in this manual.

4.9 SYSTEM

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



4.9.1 SYSTEM OPTIONS



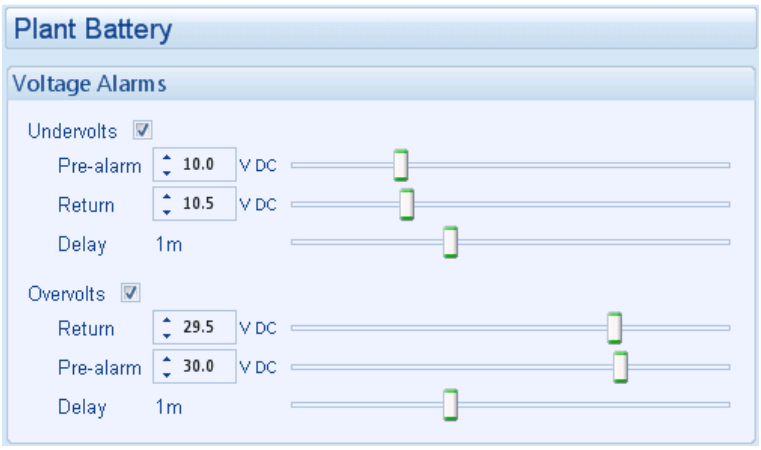
4.9.1.1 ADVANTAGES OF A LOAD CT

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'.

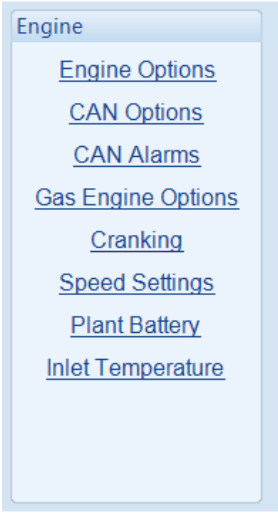
Without the load C.T., the Mains Controller does not know how much load to transfer to the grid when other Controllers are still in island mode. This results in the Mains Controller transferring a pre determined amount of load before disconnecting the generators from the grid. This amount is configured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

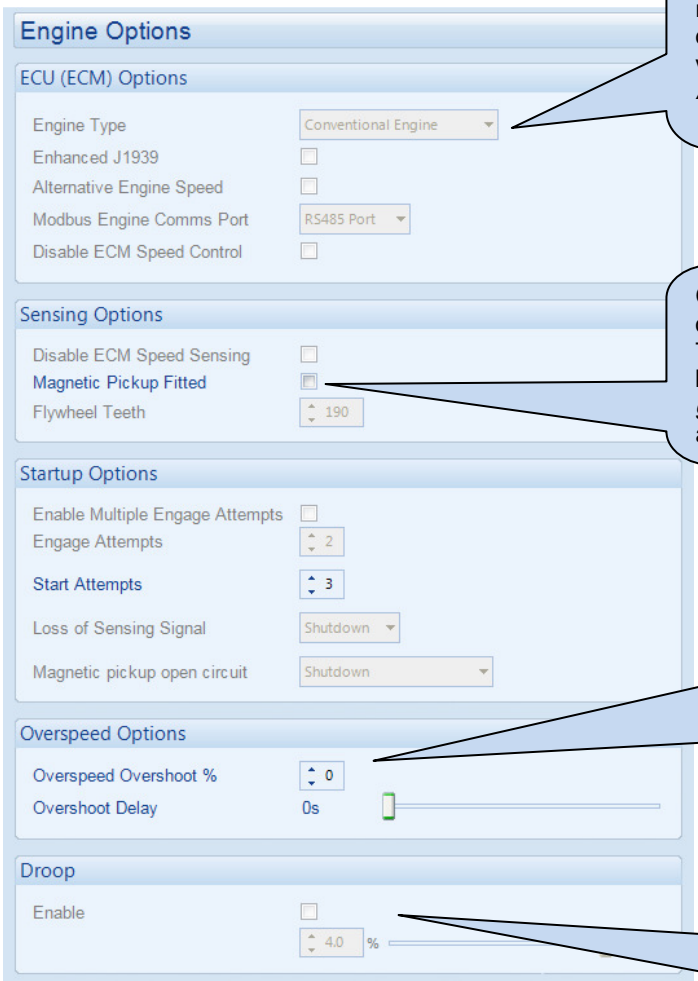


4.10 ENGINE

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



4.10.1 ENGINE OPTIONS



This item is not adjustable here, it's read only. To change this item, visit the *Module | Application* menu.

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

Overspeed setting is temporarily raised by the *Overspeed Overshoot* amount during the *Overshoot timer* at start up

Enables Engine Droop on supported electronic (ECU) engines

Parameters detailed overleaf...

4.10.1.1 SENSING OPTIONS

Parameter	Description
Disable ECM Speed Sensing	☐ = An ECM is fitted to the DSE module and being used for speed sensing. ☑ = 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	☐ = Magnetic pickup device is not fitted to the DSE module. ☑ = 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	☐ = Only one engage attempt per start attempt is given. If no magnetic pickup pulses are detected during cranking, the *Loss of Sensing* alarm is given. ☑ = If no magnetic pickup pulses are detected during cranking, it is assumed that the starter has not engaged to turn the engine. The starter is withdrawn and re-energised for the configured number of *Engage Attempts*
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 *Cranking time*, then the current start attempt is cancelled and the *Crank Rest* time takes place before the next crank attempt begins. If, after all configured *start attempts,* the engine is not detected as running, the *Fail to Start* shutdown alarm is generated. The engine is detected as running by checking all methods of *Crank Disconnect.* For further details, see the section entitled *Crank Disconnect* elsewhere in this document.
Loss of sensing signal	If the speed sensing signal is lost during engine running (or not present during cranking when *Multiple Engage Attempts* is enabled), an alarm is generated : *Shutdown:* The generator is removed from load and the set is immediately stopped. *Warning:* 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 : *Shutdown:* The generator is removed from load and the set is immediately stopped. *Warning:* The generator continues to run, however a warning alarm is raised.

4.10.1.3 OVERSPEED OPTIONS

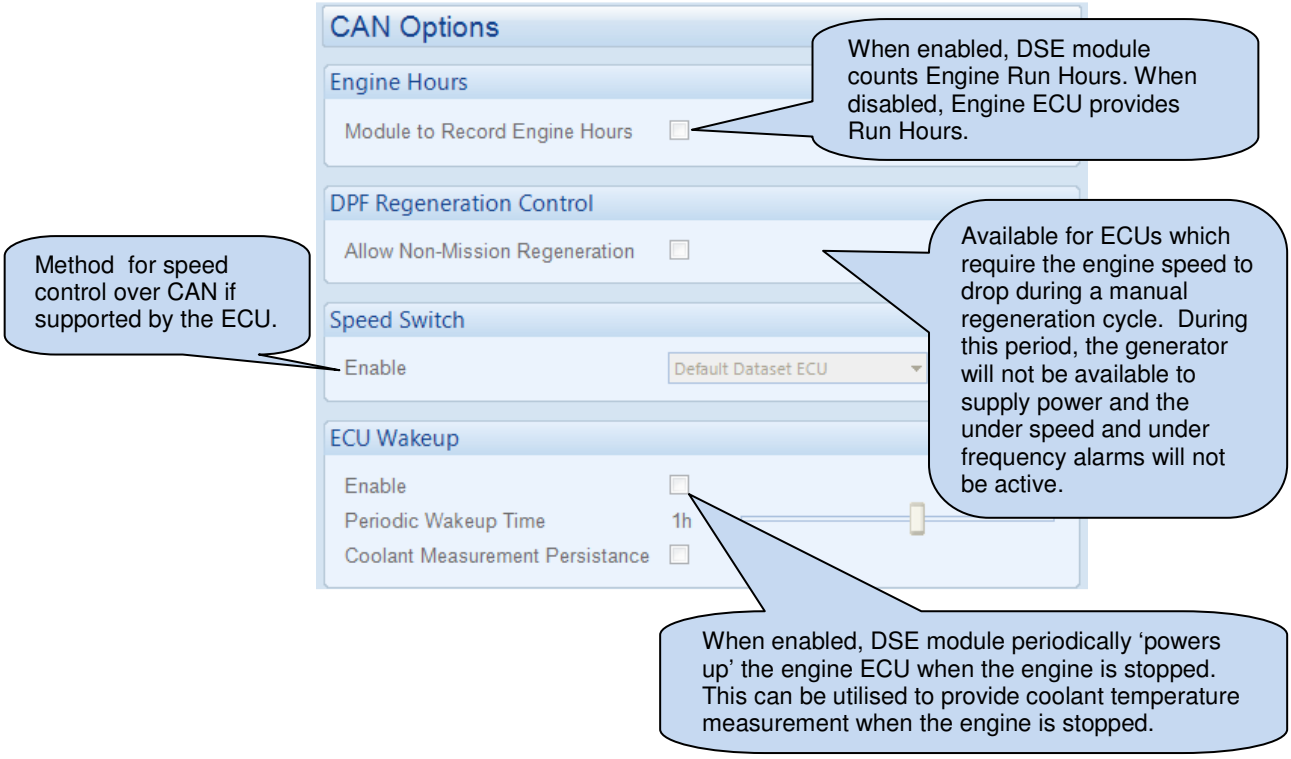
Parameter	Description
Overspeed overshoot % Overspeed overshoot delay	To prevent spurious overspeed alarms at engine start up, the module includes configurable *overspeed overshoot* protection. This allows the engine speed to 'overshoot' the Overspeed / Over frequency setting during the starting process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

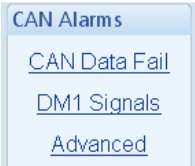
Parameter	Description
Enable Droop %	☐ = Engine droop is not enabled. ☑ = Where supported by the electronic engine ECU, the DSE 8600 series modules enables droop in the engine ECU governor at the %age configured.

4.10.2 CAN OPTIONS

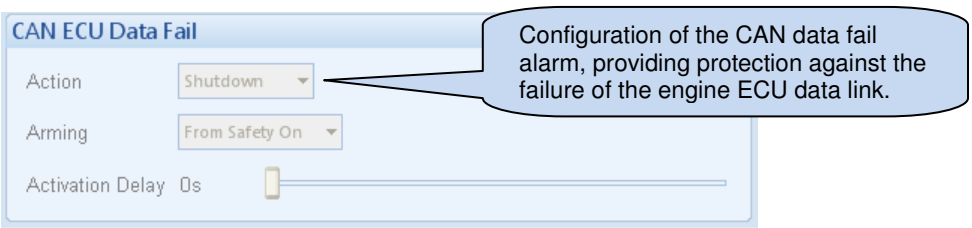


4.10.3 CAN ALARMS

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

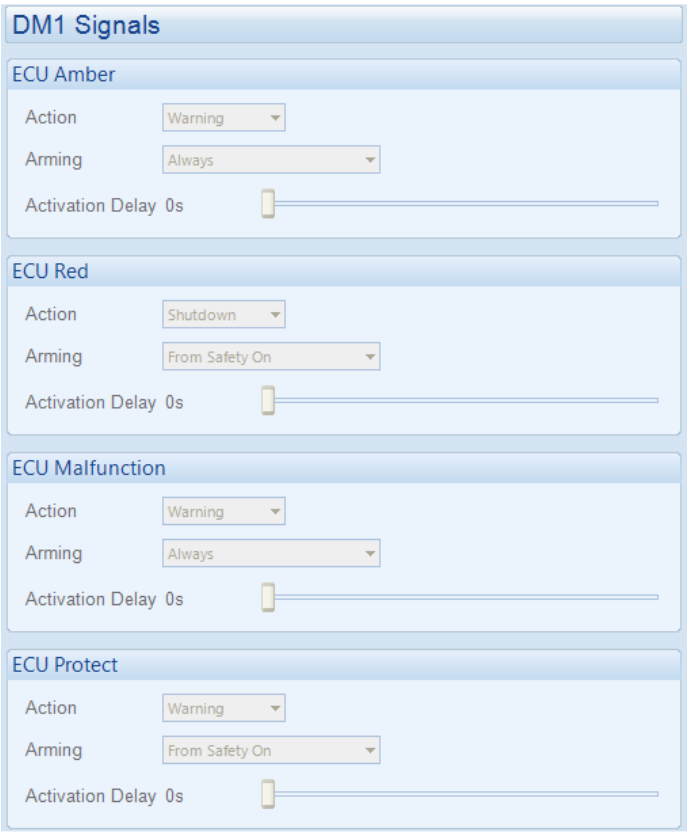


4.10.3.1 CAN DATA FAIL



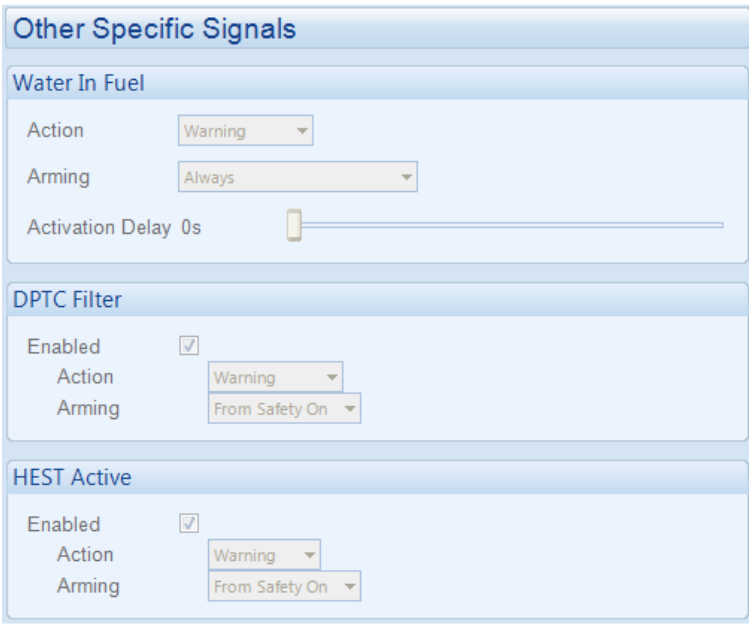
4.10.3.2 DM1 SIGNALS

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

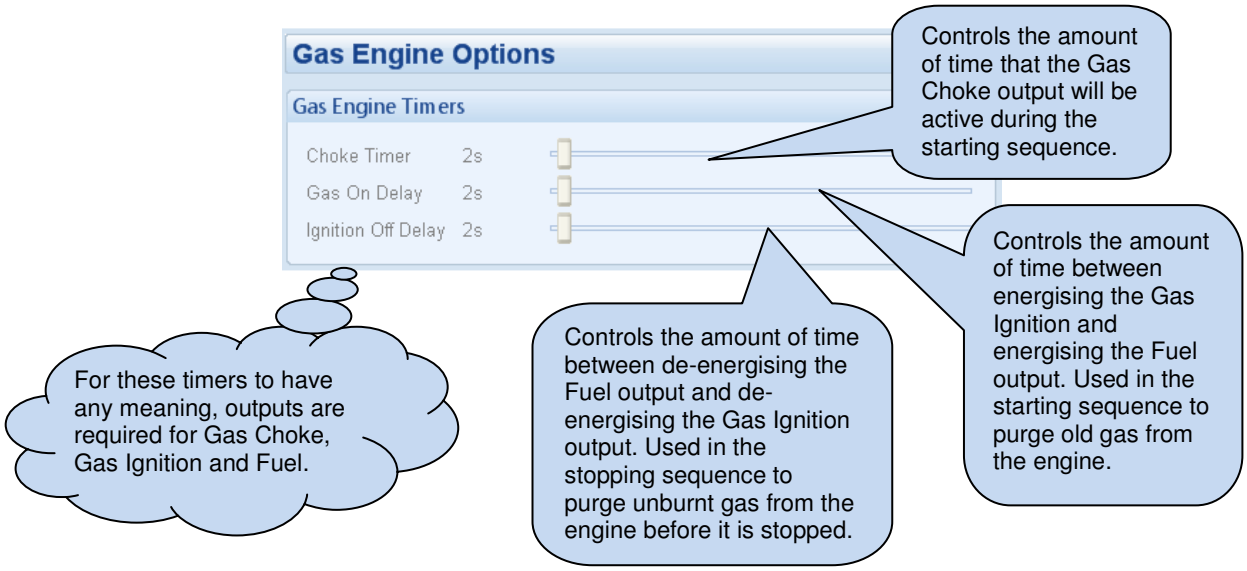


4.10.3.3 ADVANCED

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



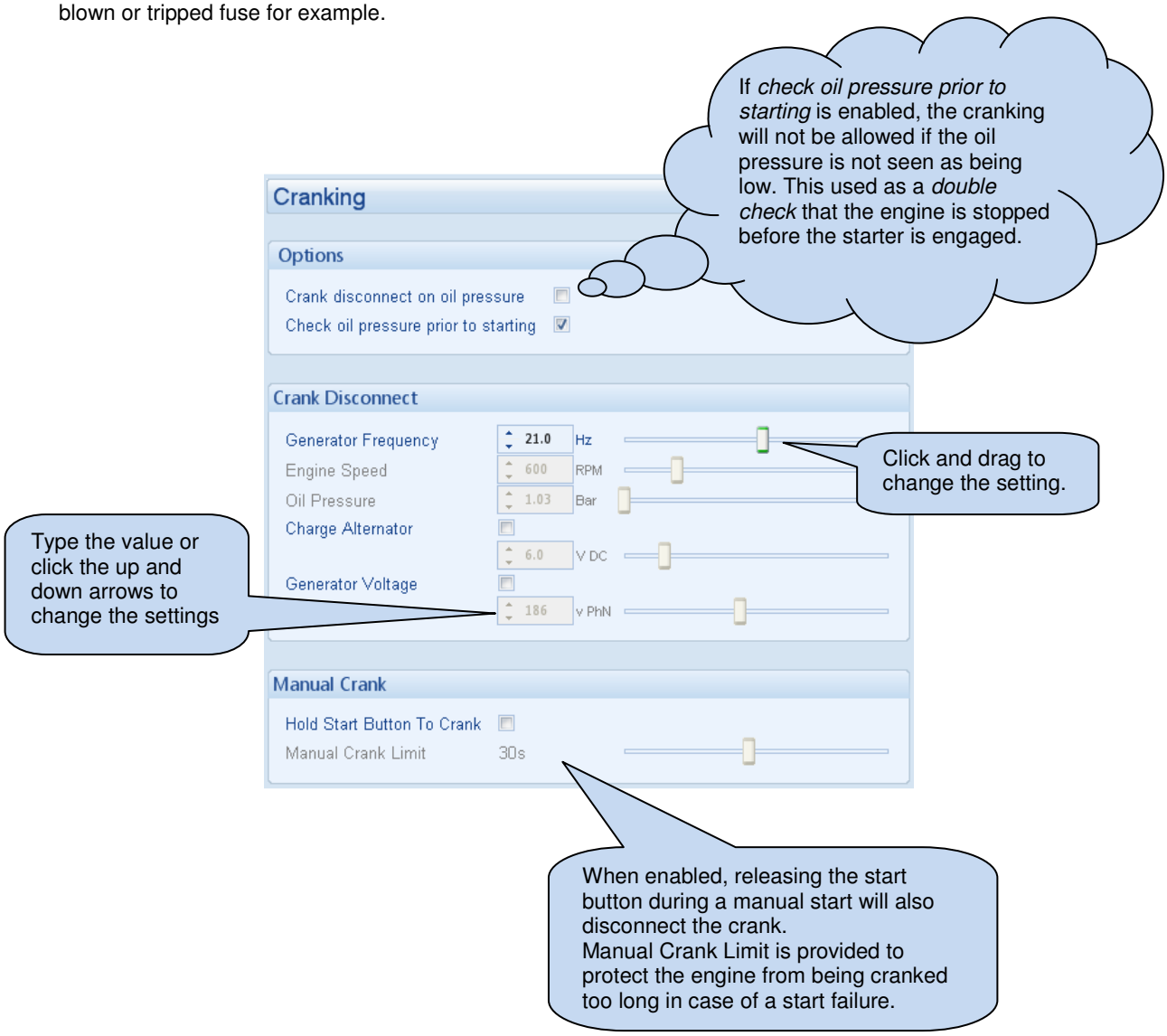
4.10.4 GAS ENGINE OPTIONS



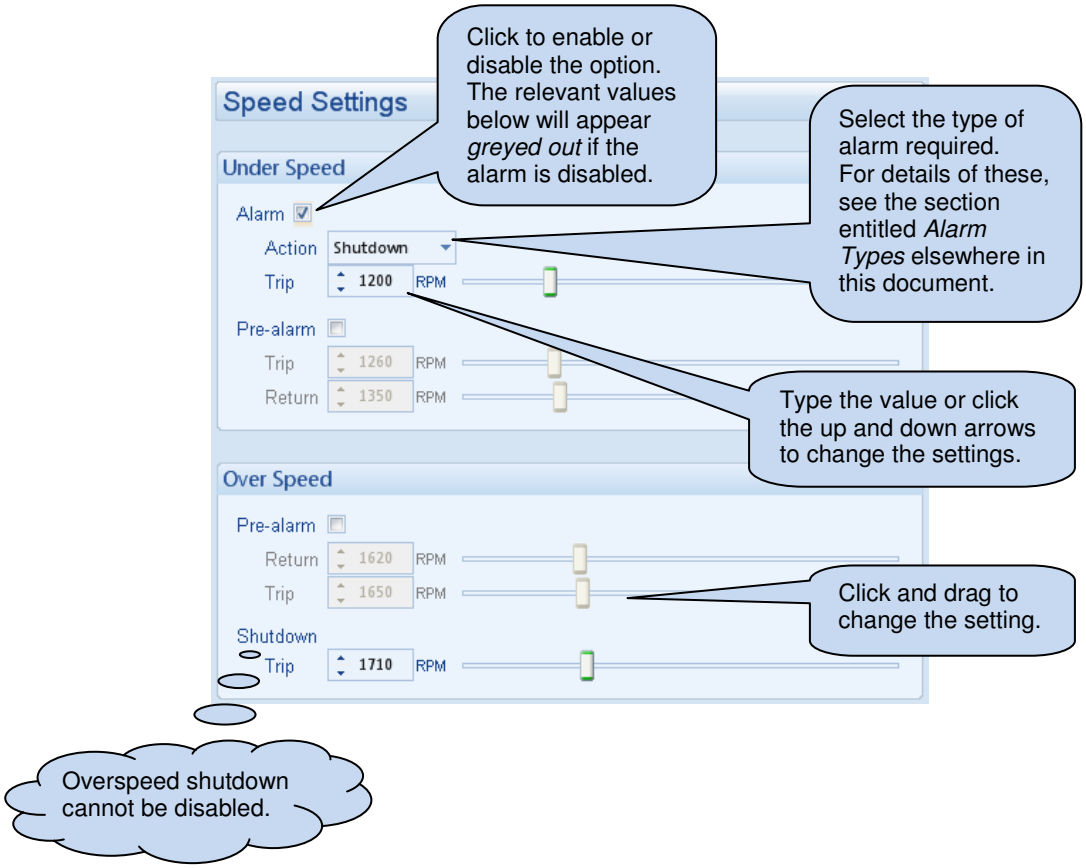
4.10.5 CRANKING

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 it's *crank disconnect* setting will result in the cessation of the cranking signal.

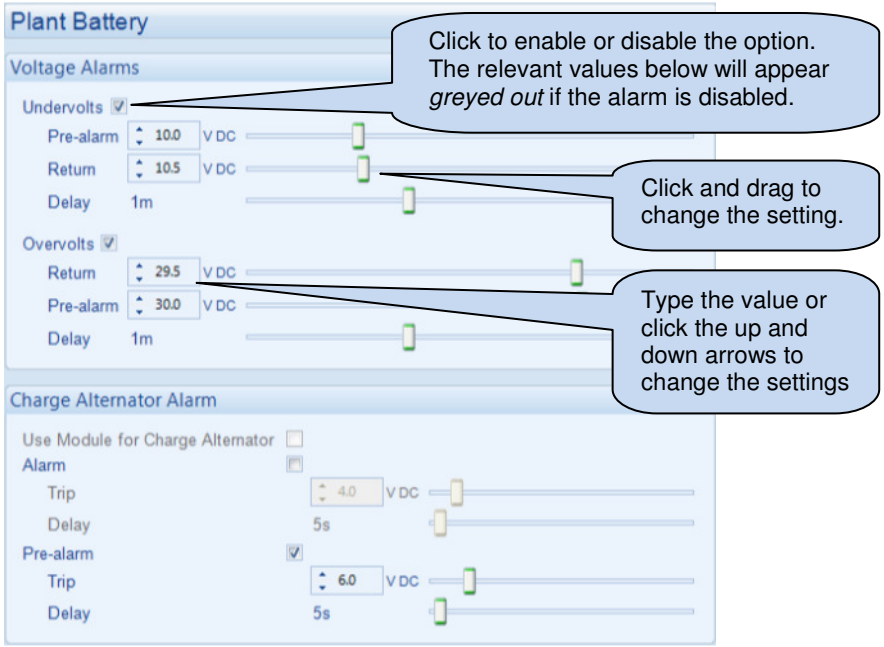
Having more than one *crank disconnect* source allows for a much faster crank disconnect response leading to less wear on the engine and starter components, and provides added safety in case one source is lost, by a blown or tripped fuse for example.



4.10.6 SPEED SETTINGS



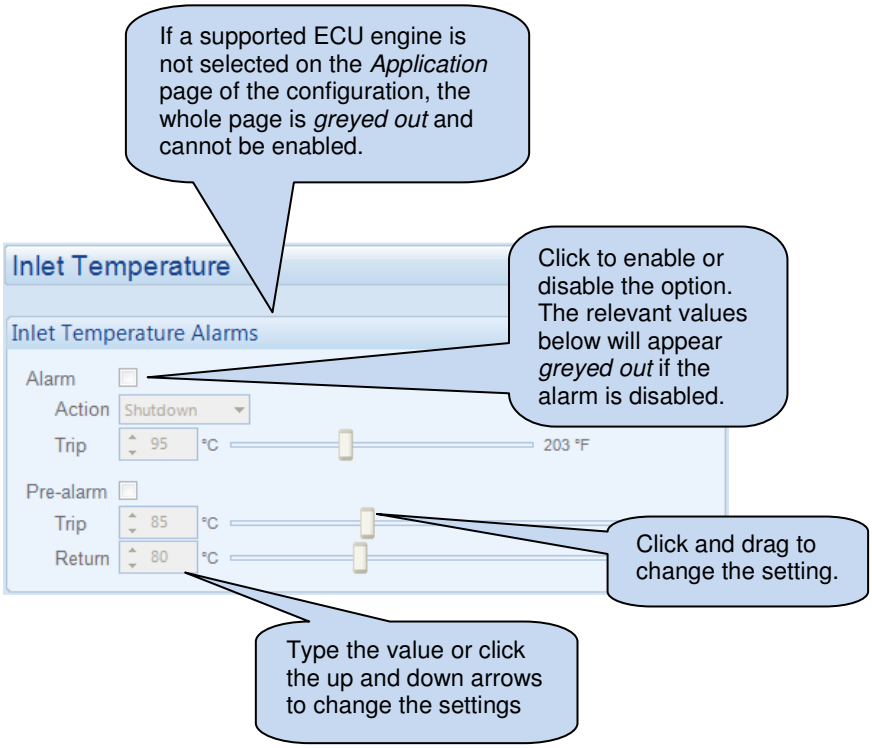
4.10.7 PLANT BATTERY



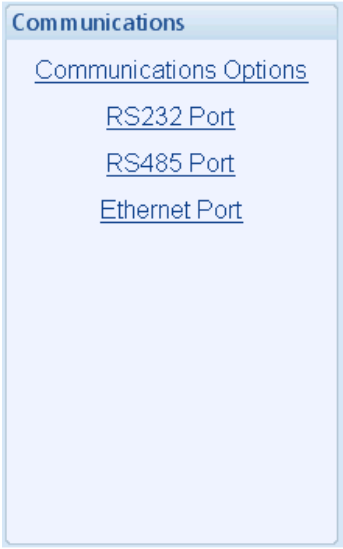
Alarm	IEEE designation
Plant Battery Under volts	IEEE 37.2 -27 DC Under voltage relay
Plant Battery Over volts	IEEE 37.2 -59 DC Over voltage relay

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.

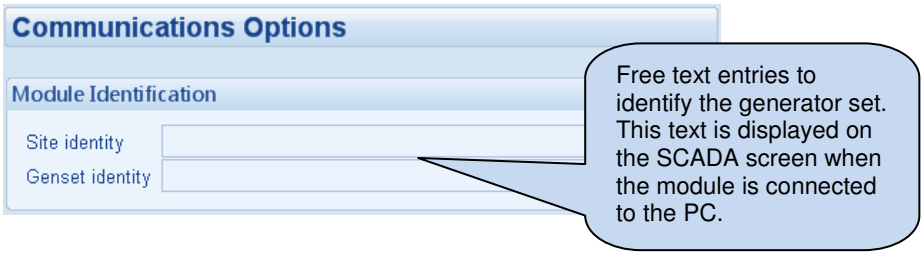


4.11 COMMUNICATIONS

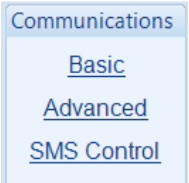


4.11.1 COMMUNICATION OPTIONS

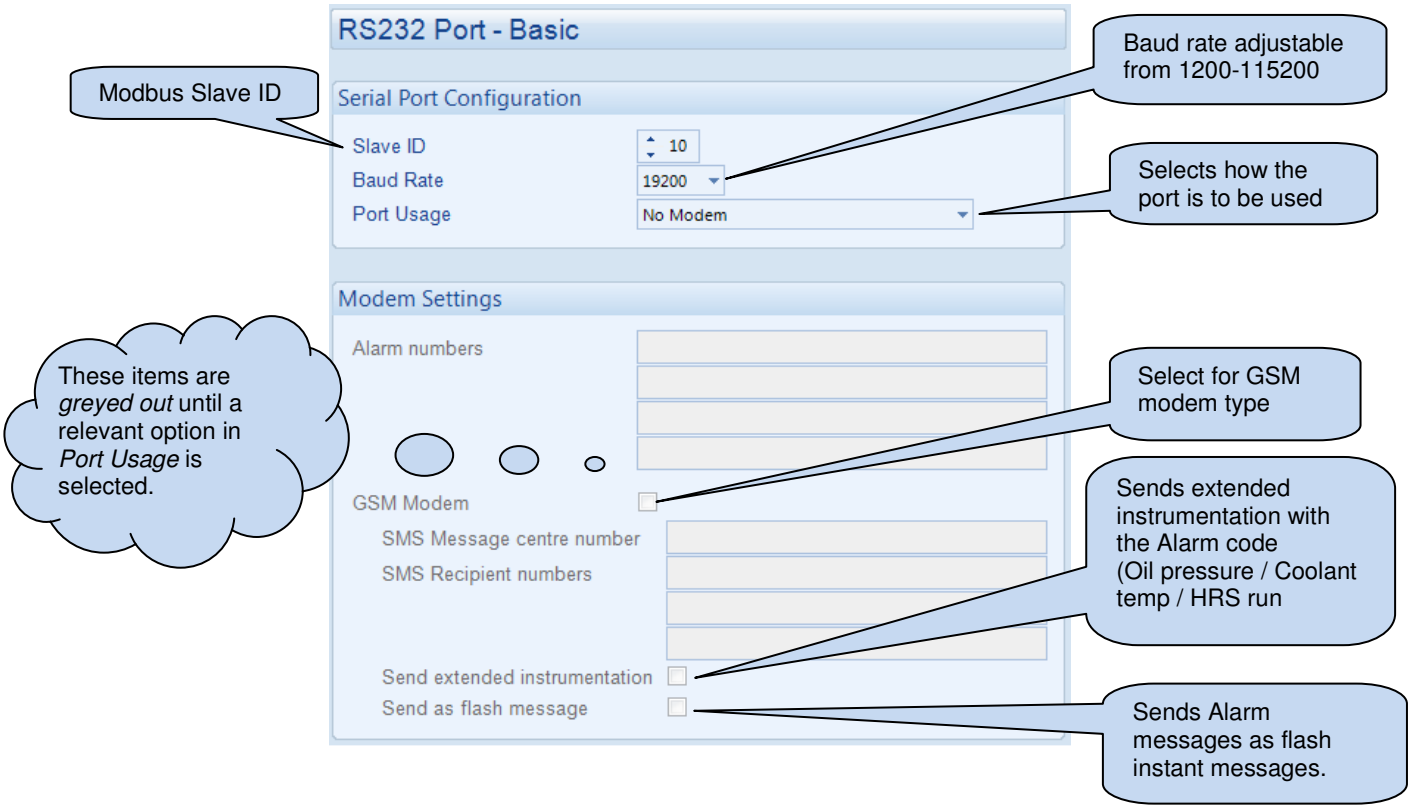
Provides a means of giving the control an identity name. This is used in the SCADA section to allow the operator to see the site name and genset identity that is currently connected to the SCADA. As this could be a remote module connected over modem or Ethernet connection this is a very useful feature.



4.11.2 RS232 PORT



4.11.2.1 BASIC



4.11.2.1.1 SERIAL PORT CONFIGURATION

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

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	☐ = The connected modem is a fixed line telephone modem ☑ = The connected modem is a GSM (cellular) modem. The GSM signal strength meter and GSM operator are shown on the module display.
SMS Message Centre Modem	The Message centre used 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

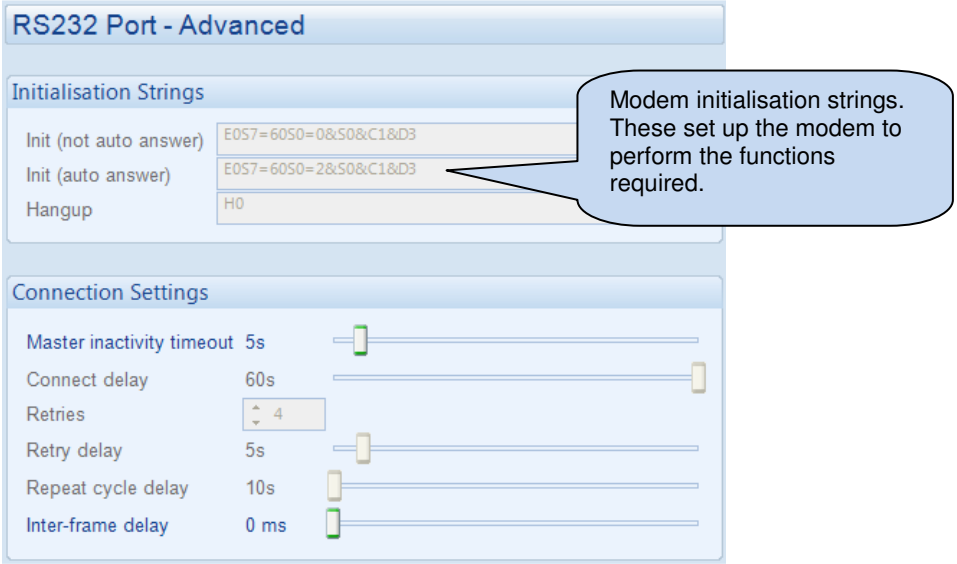
Other Localisation Kits can be obtained from www.multitech.com

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. **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.**	0830-001-01

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) S0=2 (auto answer)	Do not answer Answer after two rings
&S0	DSR always on
&C1	DCD is active if modem is online
&D3	Reset (ATZ) on DTR-drop
H0	Hang up (disconnect)

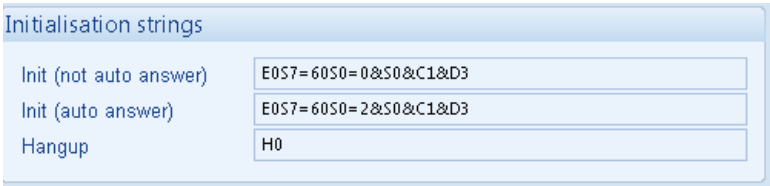
Silent operation

The modem connected to the 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

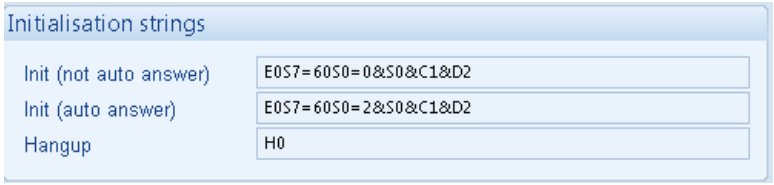
The DSE8600 series module factory settings for the initialisation strings are suited to the Multitech ZBA Global Modem:



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



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.

4.11.2.2.2 CONNECTION SETTINGS

Timer	Description
Master inactivity timeout	The module *looks* by default at the USB port for communications. When activity is detected on the RS232 or RS485 port, the module *switches* to look at the relevant port for further data. If no data activity is detected on the port for the duration of the *master inactivity timer*, it reverts to looking at the USB port. This 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 PCs RS232 port. You may need an additional card in your PC to provide this facility.

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

When connected, enter the following command:

AT+IPR=9600 and press <ENTER>

This sets the modem to 9600 baud.

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

Enter the following command:

AT&W and press <ENTER>

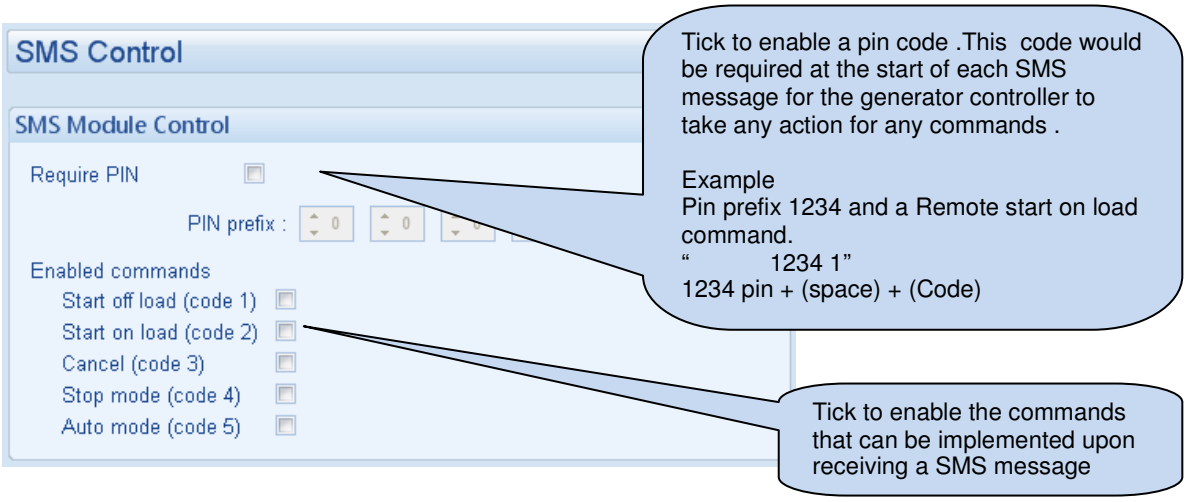
This saves the new setting in the modem. Power can now be removed. The next time power is applied, the modem starts with the new settings (Baud rate = 9600), suitable to communicate with the DSE8600 series module.

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.

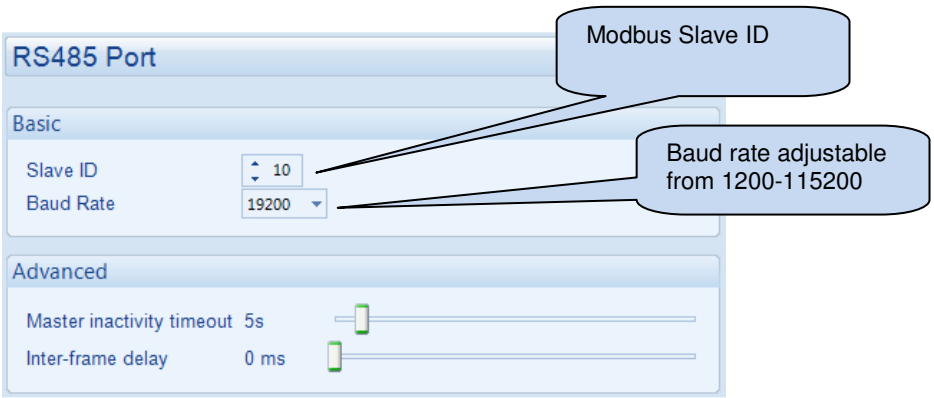
4.11.4 SMS MODULE CONTROL



The 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

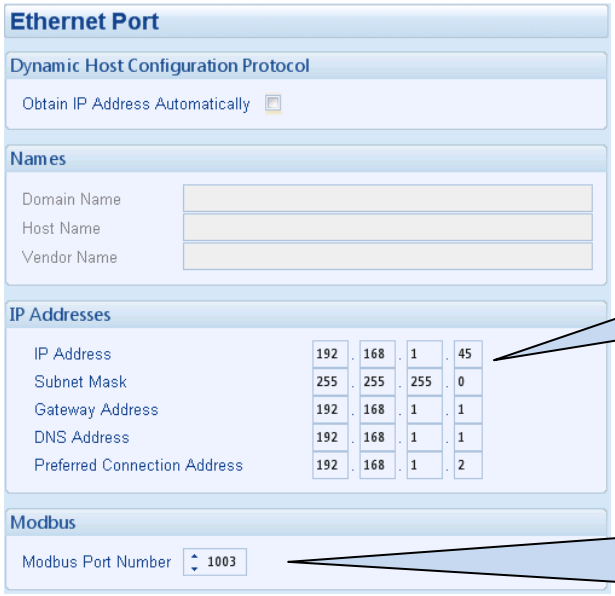
4.11.5 RS485 PORT



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

IP Address of the DSE8600 series controller connected to the LAN

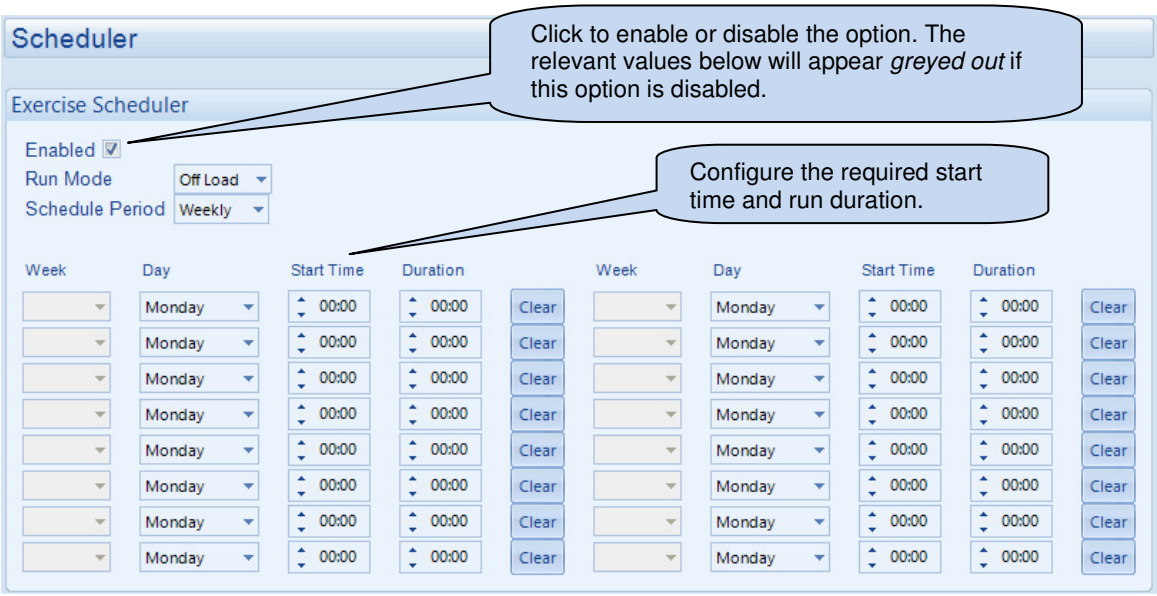
User provided name for the Port Forwarding rule

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

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.

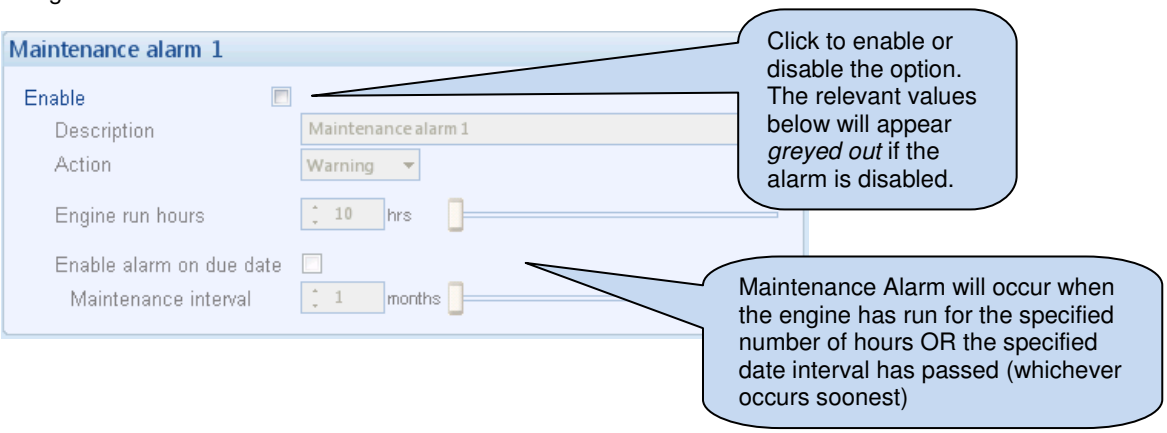
4.12 SCHEDULER

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.*



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.



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

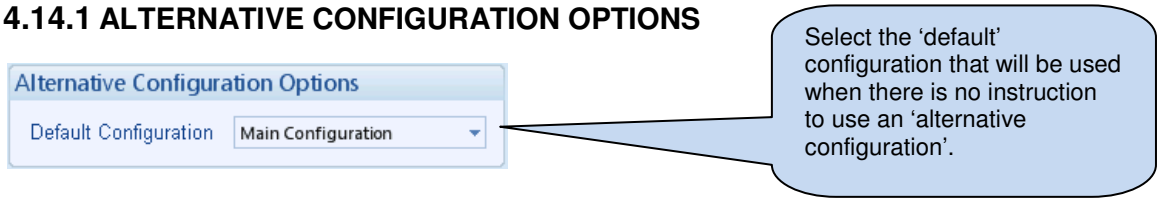
Alternative Configurations are provided to allow the system designer to cater for different AC requirements utilising the same generator system. Typically this feature is used by Rental Set Manufacturers where the set is capable of being operated at (for instance) 120V 50Hz and 240V 50Hz using a selector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



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.

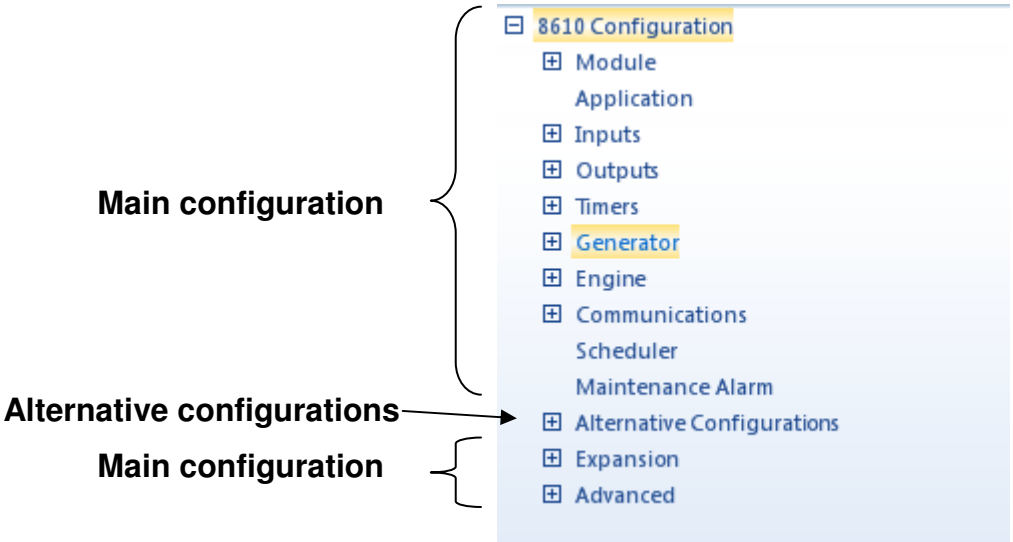
4.14.3 EXAMPLE OF USAGE

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'.

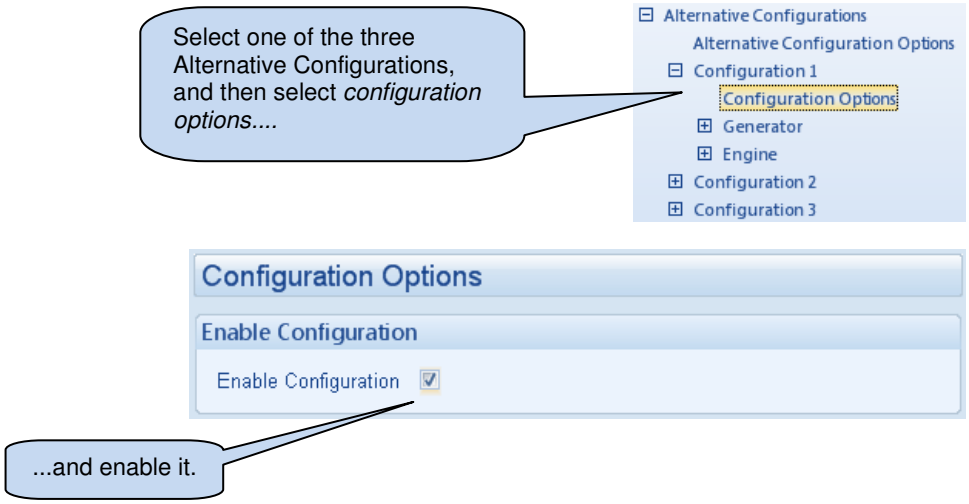
Additionally 'alternative configuration' files are present, holding a subset of the main configuration file. This allows another collection of settings for items such as voltage and frequency trip points.

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



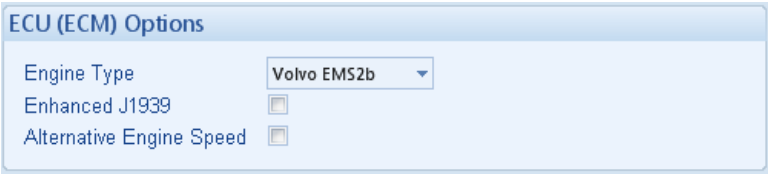
Click the ⊞ symbol alongside Alternative Configurations to make further choices:



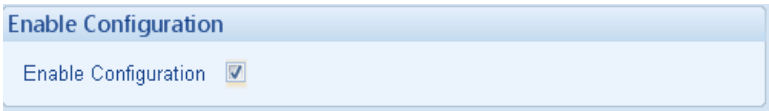
4.14.3.2 USING THE ALTERNATIVE CONFIGURATION TO HANDLE SPEED CHANGE

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.

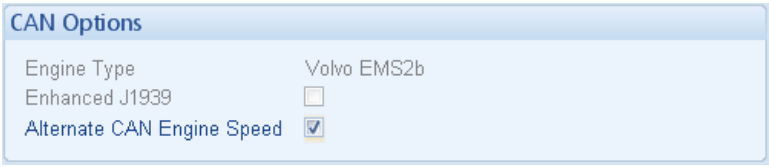
The 'main configuration' is set to suit a 50Hz generator. The engine is a 1500RPM Volvo TAD9 with EMS2b ECU.



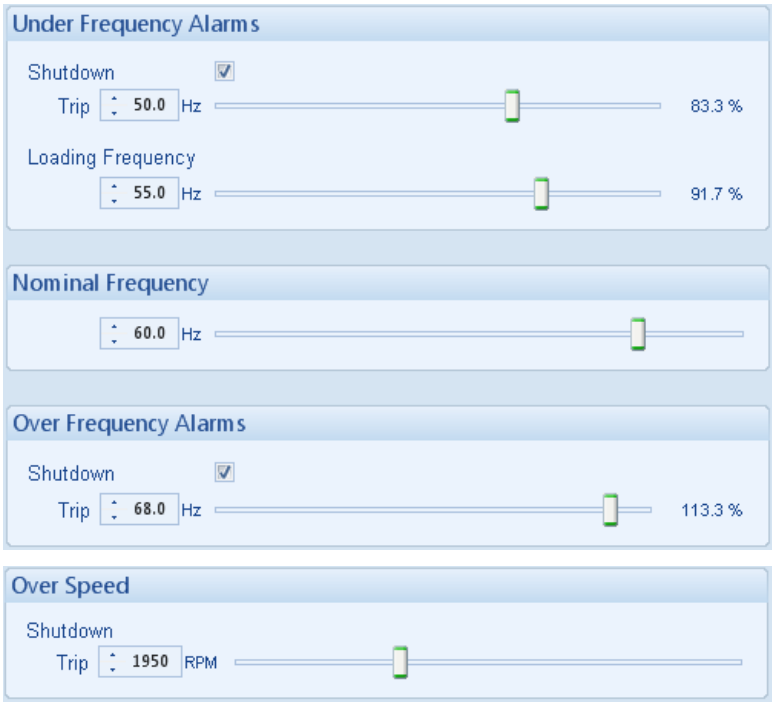
The alternative configure has been enabled,



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.



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.

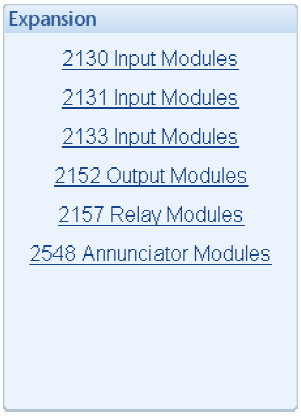


Selecting between the main and alternative configurations is achieved using either:

- 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

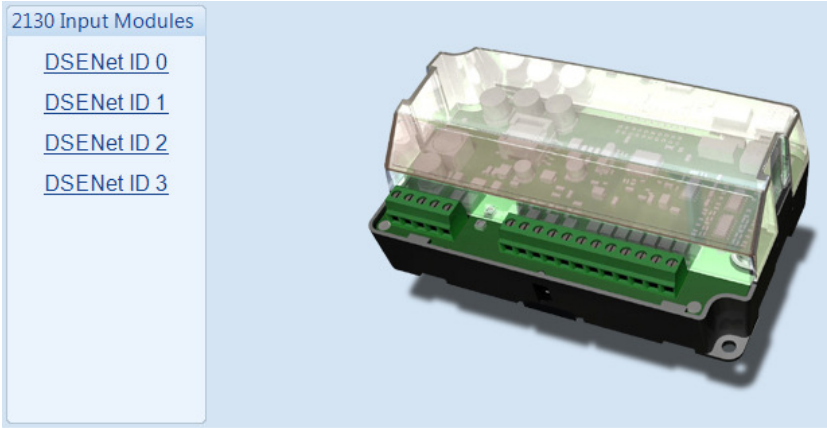
The *Expansion* page is subdivided into smaller sections.
Select the required section with the mouse.



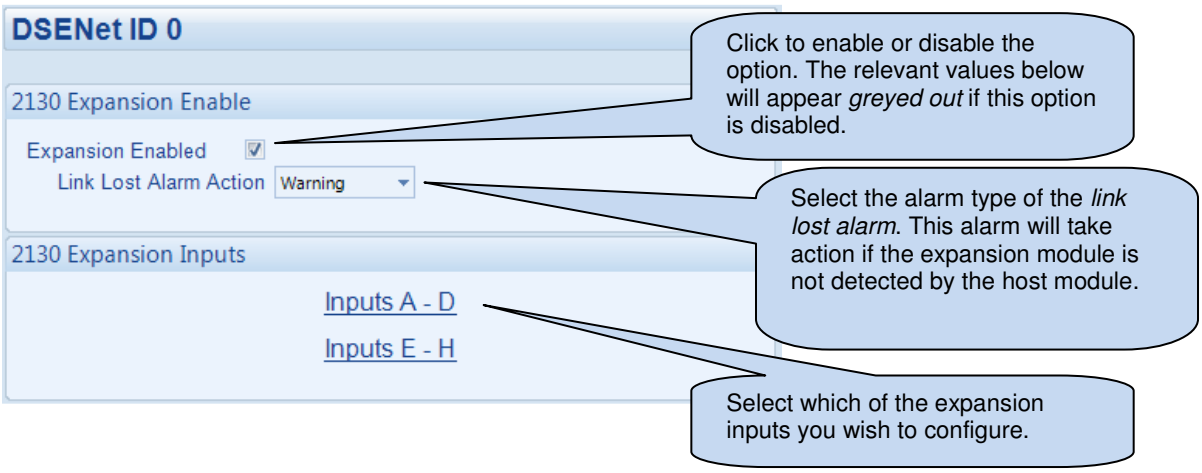
See overleaf for description of the different expansion modules.

4.15.1 DSE2130 INPUT MODULES

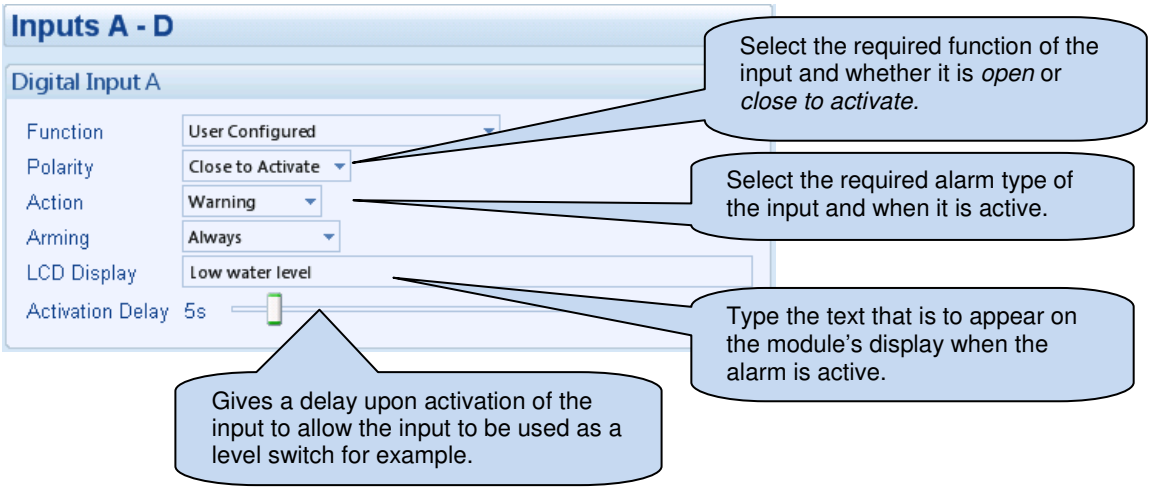
Select the DSENet ID of the input expansion you wish to configure. The ID of the expansion input module is set by rotary decimal switch accessible under the removable cover of the device.



The following is then shown:



4.15.1.1 DIGITAL INPUTS (A-D)

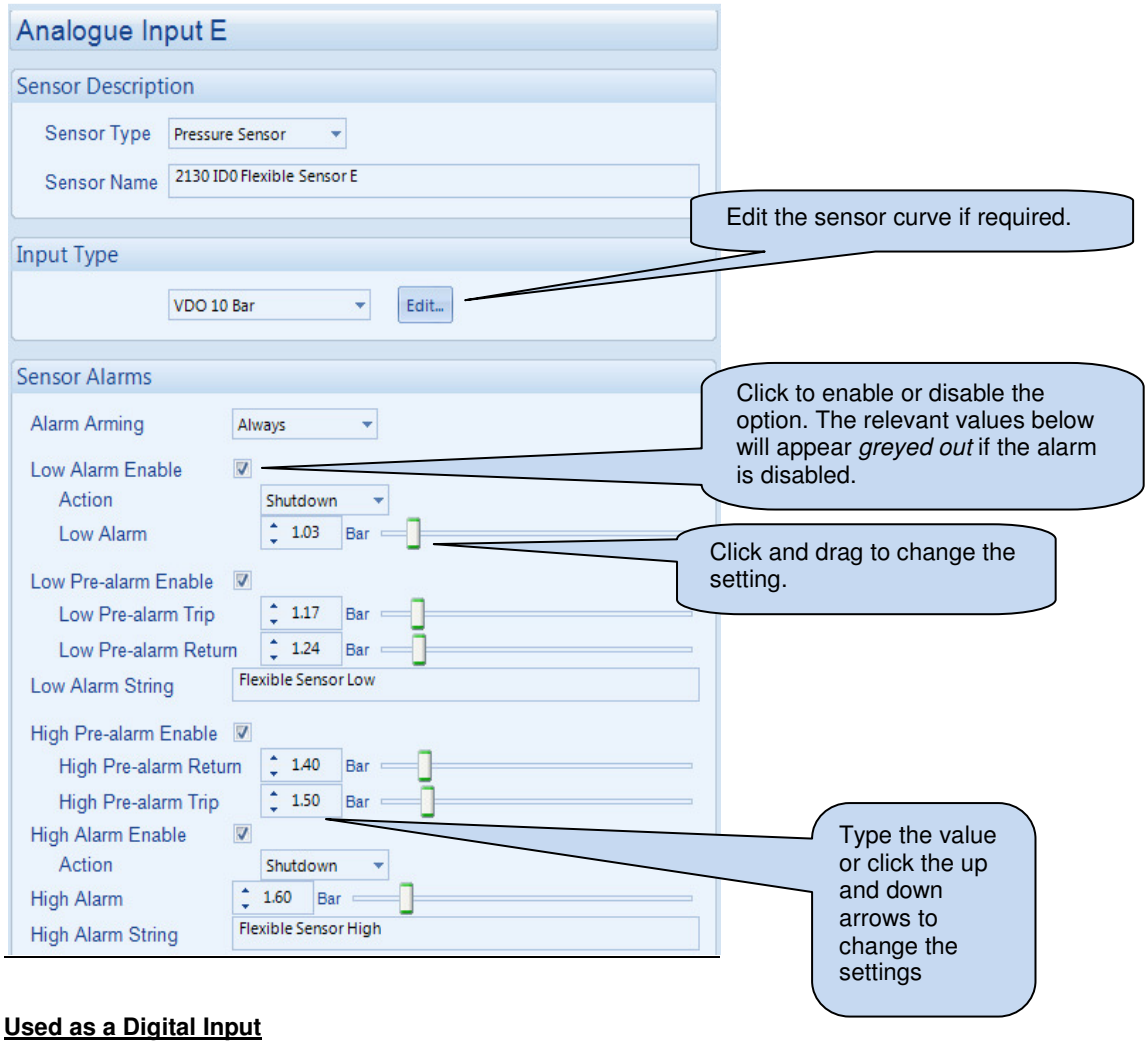


4.15.1.2 ANALOGUE INPUTS (E-H)

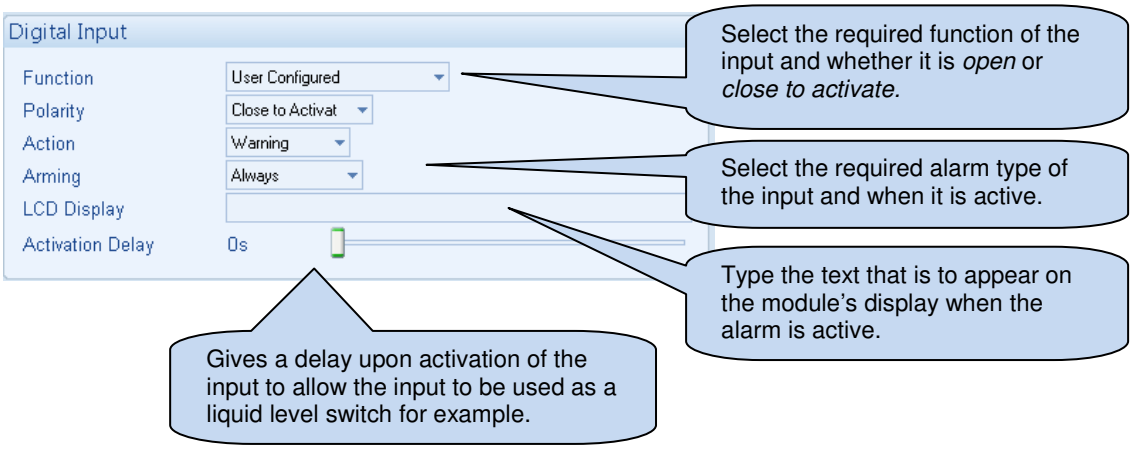
NOTE: - DSE8600 series modules prior to V4 support only 'User Configured' (alarm type) digital input functions on expansion inputs A-H. DSE8600 series modules V4 and later support both 'User configured' and 'pre-defined' digital input functions on expansion inputs A-H.

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

Used as an Analogue Input

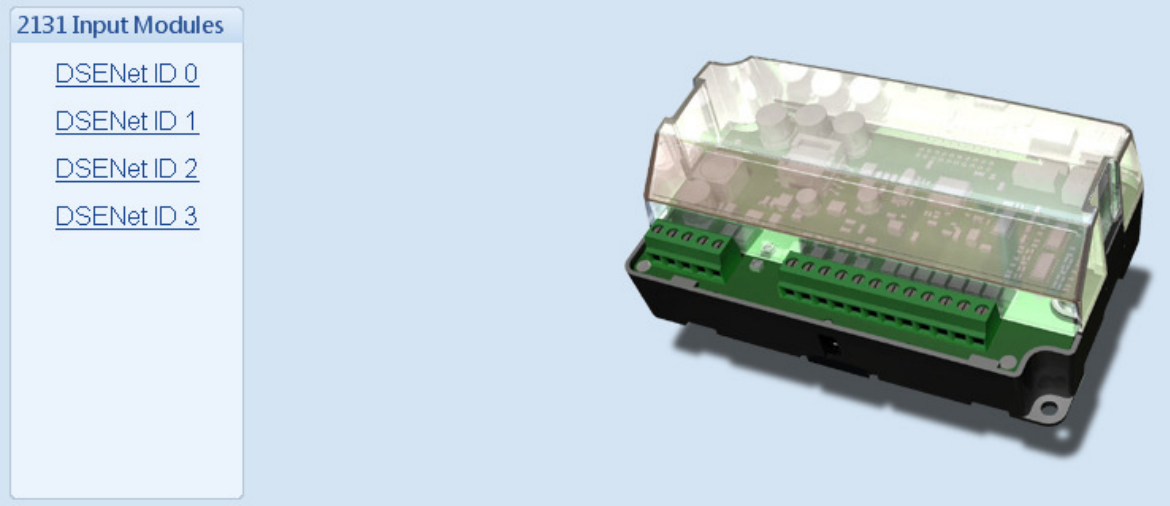


Used as a Digital Input

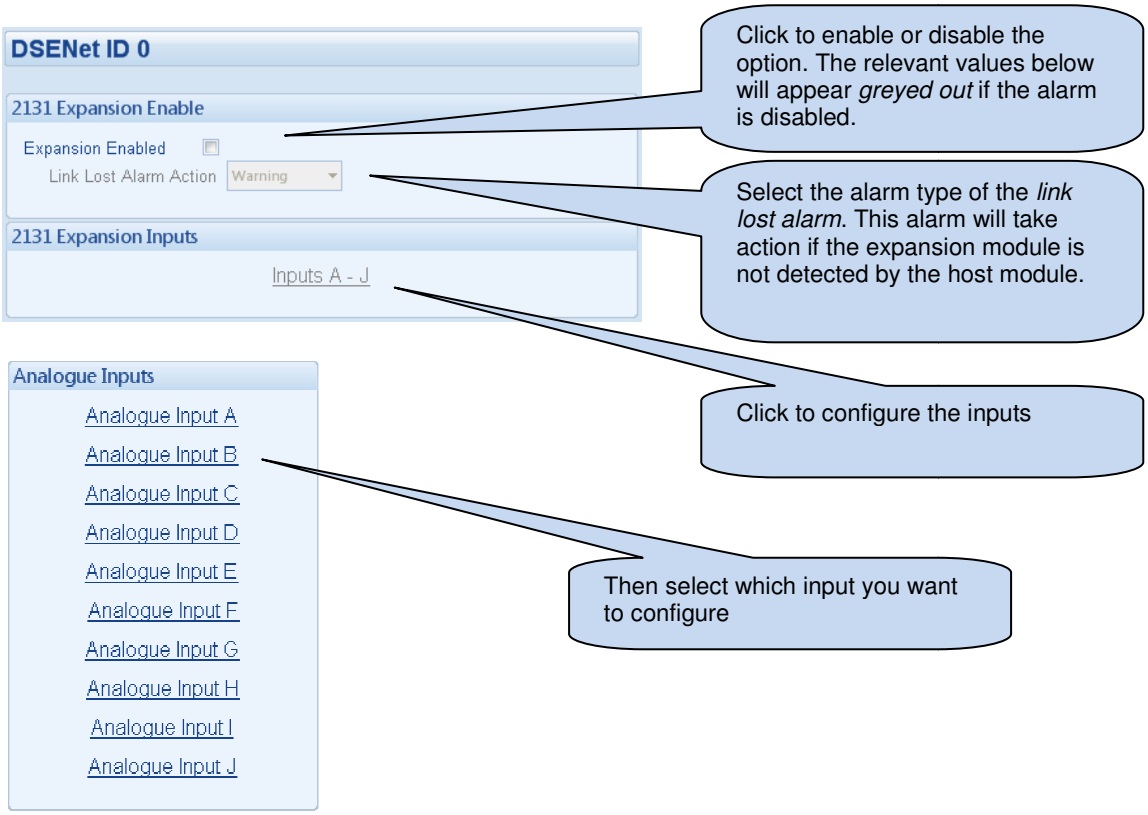


4.15.2 DSE2131 RATIOMETRIC EXPANSION INPUT MODULE

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.

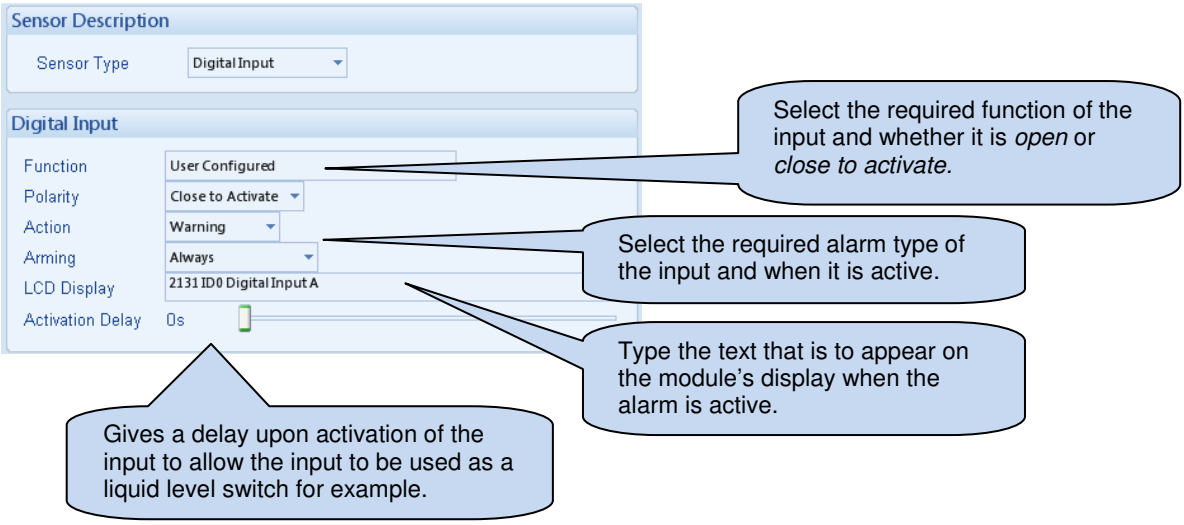


The following is then shown:

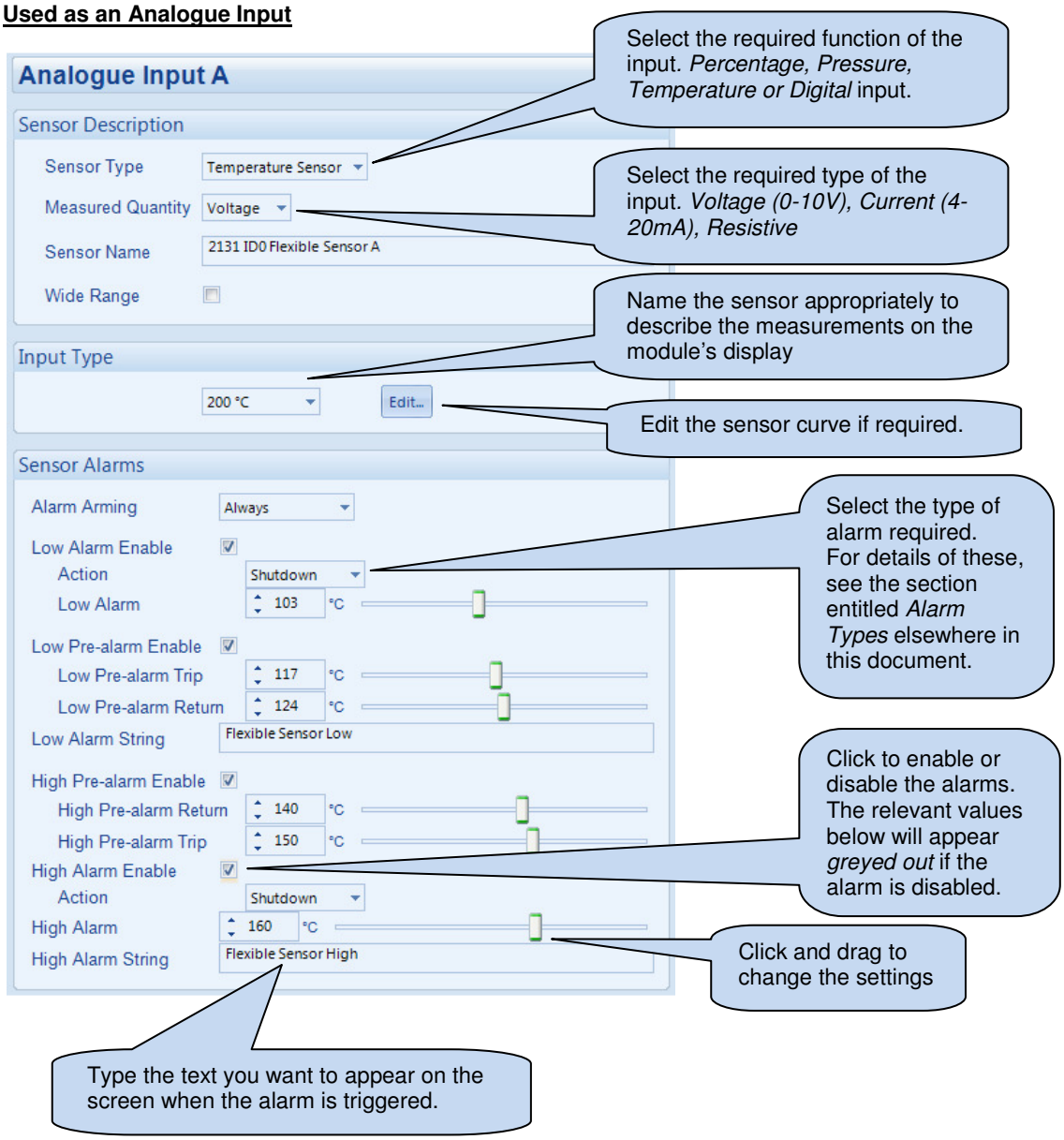


Depending upon your selection of *Sensor Type*, one of the following configuration screens are shown:

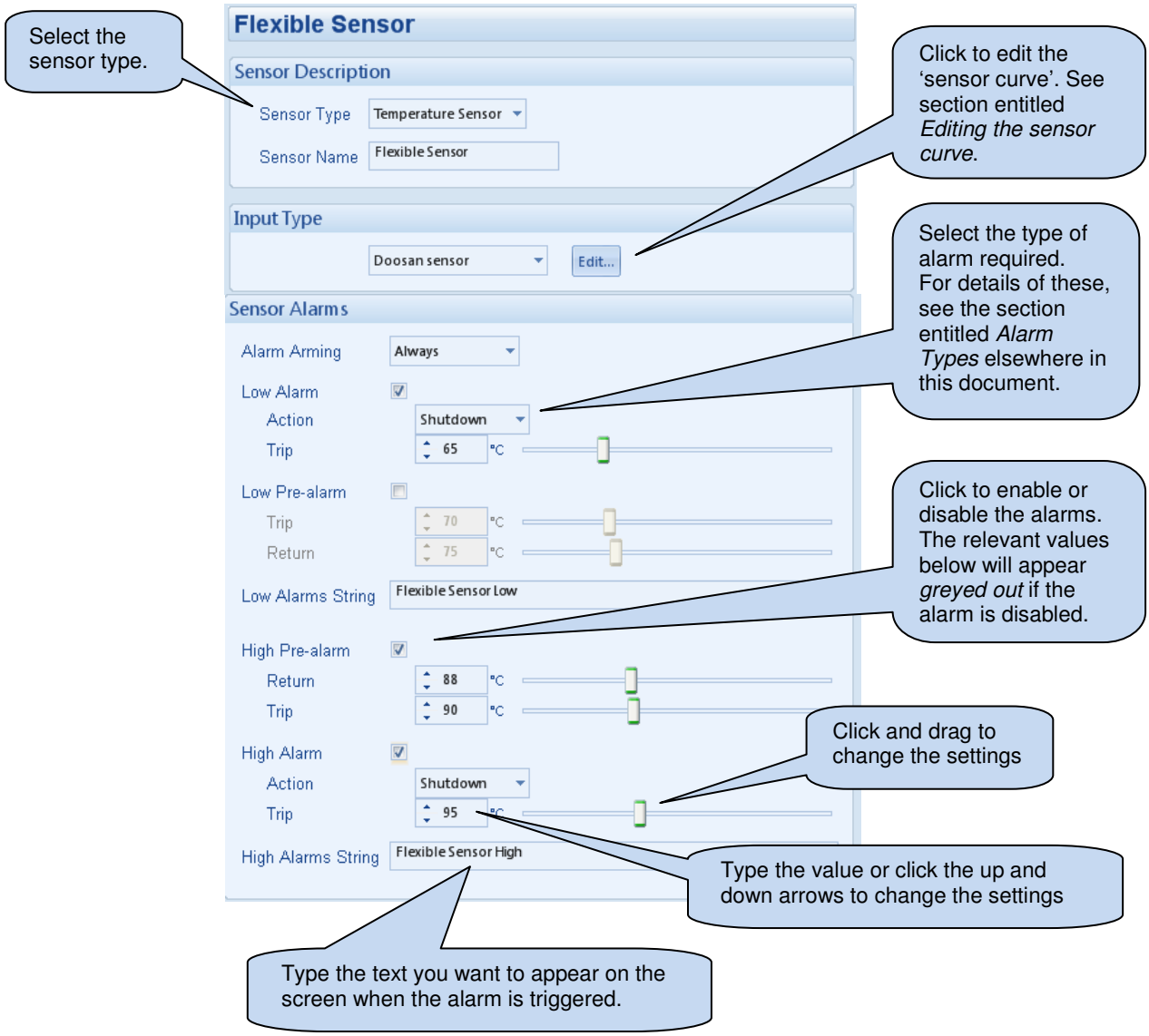
Used as a Digital Input



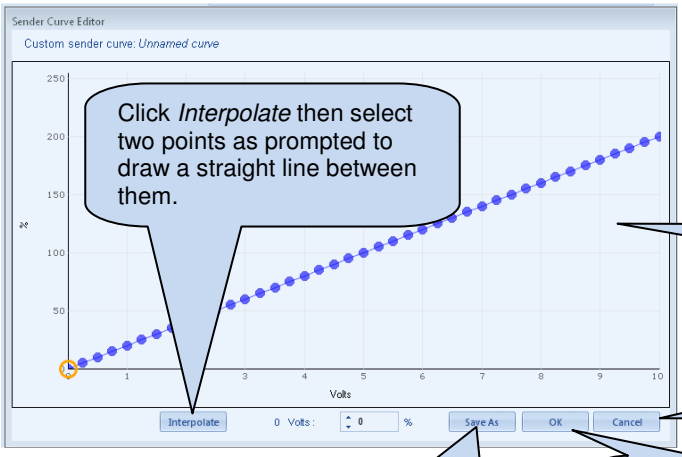
Used as an Analogue Input



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)



4.15.2.1 EDITING THE SENSOR CURVES



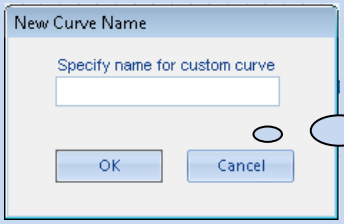
Click *Interpolate* then select two points as prompted to draw a straight line between them.

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....



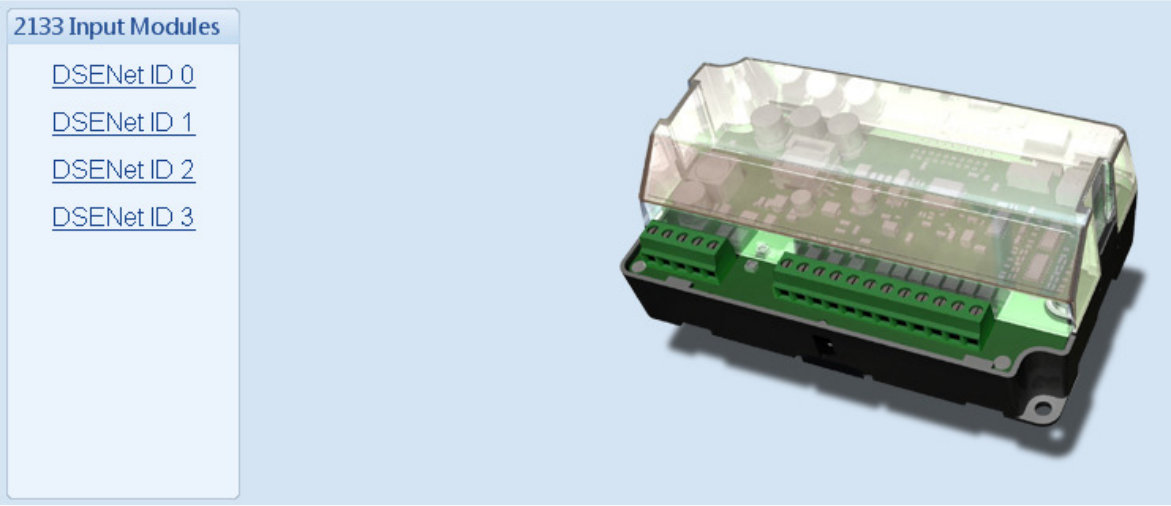
Click OK to save the curve.

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

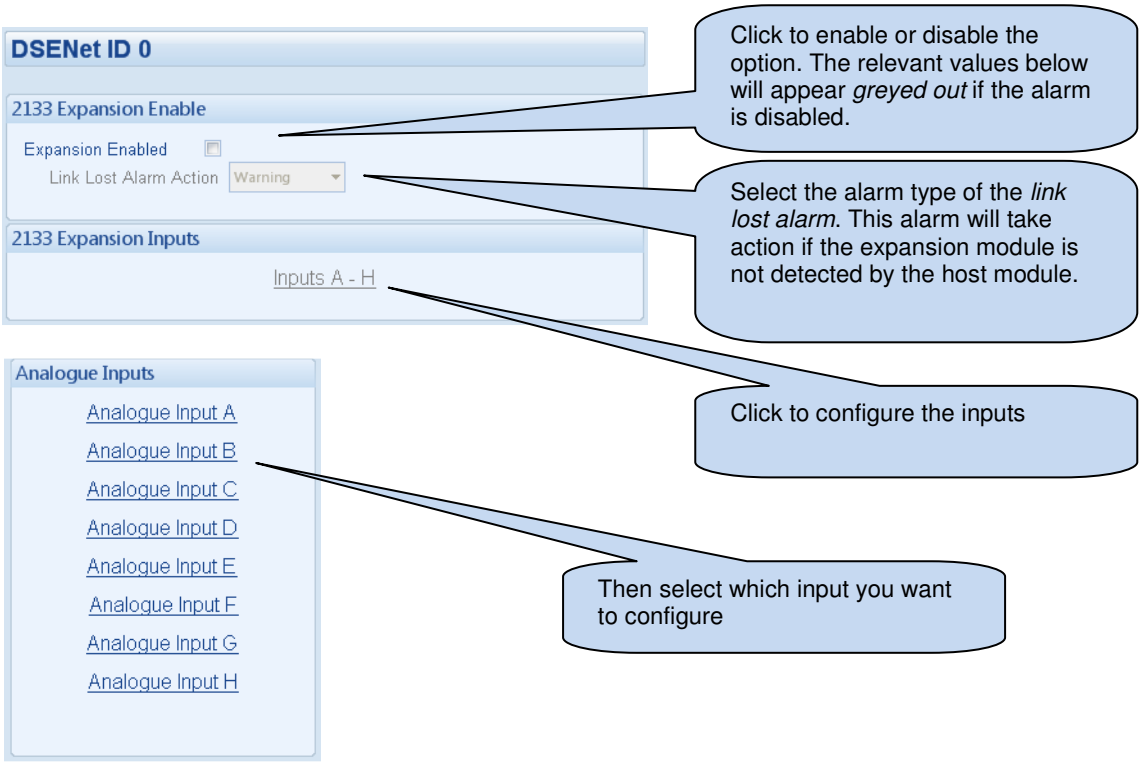
Hint: Deleting, renaming or editing custom sensor curves that have been added is performed in the main menu, select *Tools | Curve Manager*.
.

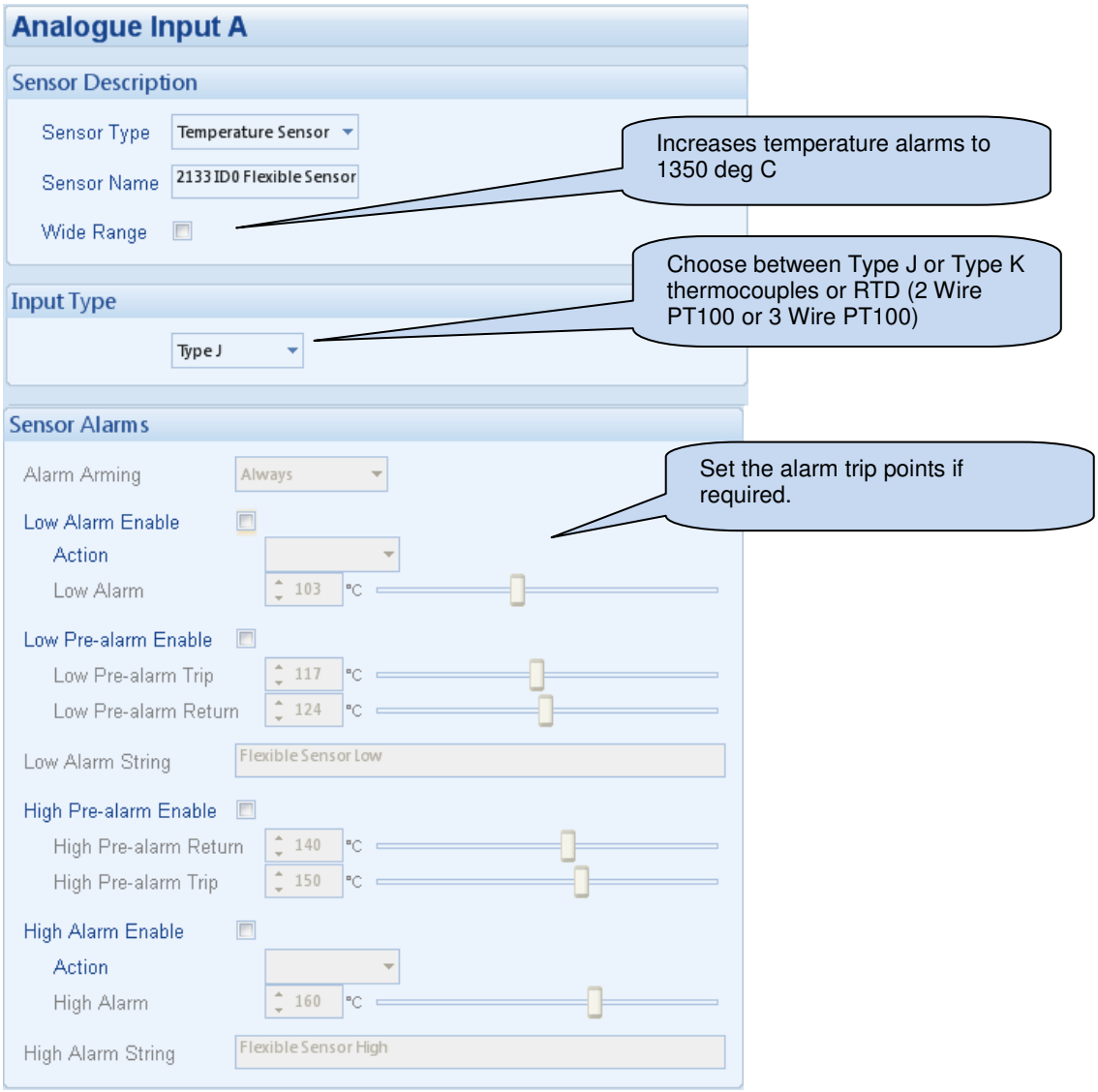
4.15.3 DSE2133 RTD / THERMOCOUPLE INPUT MODULE

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.



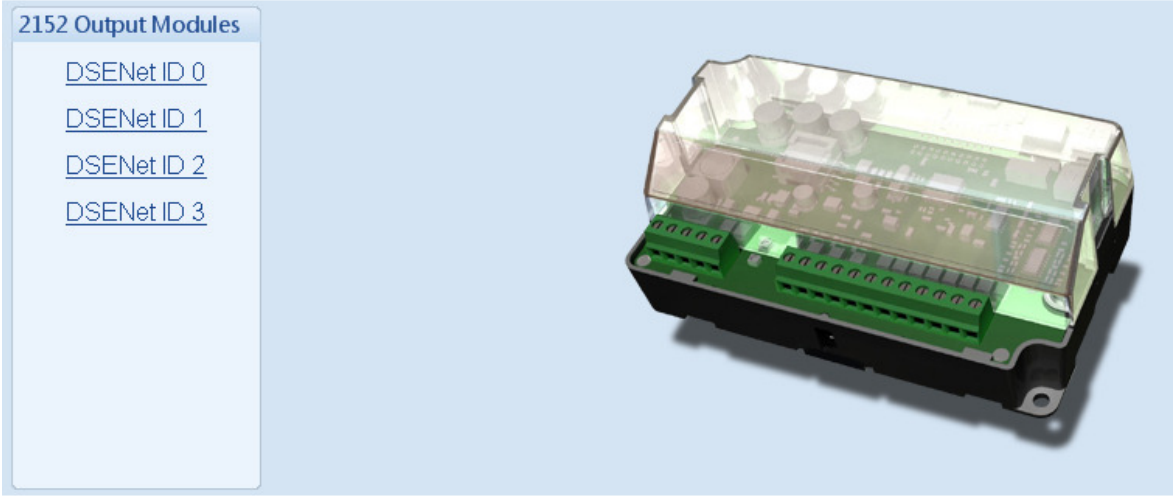
The following is then shown:



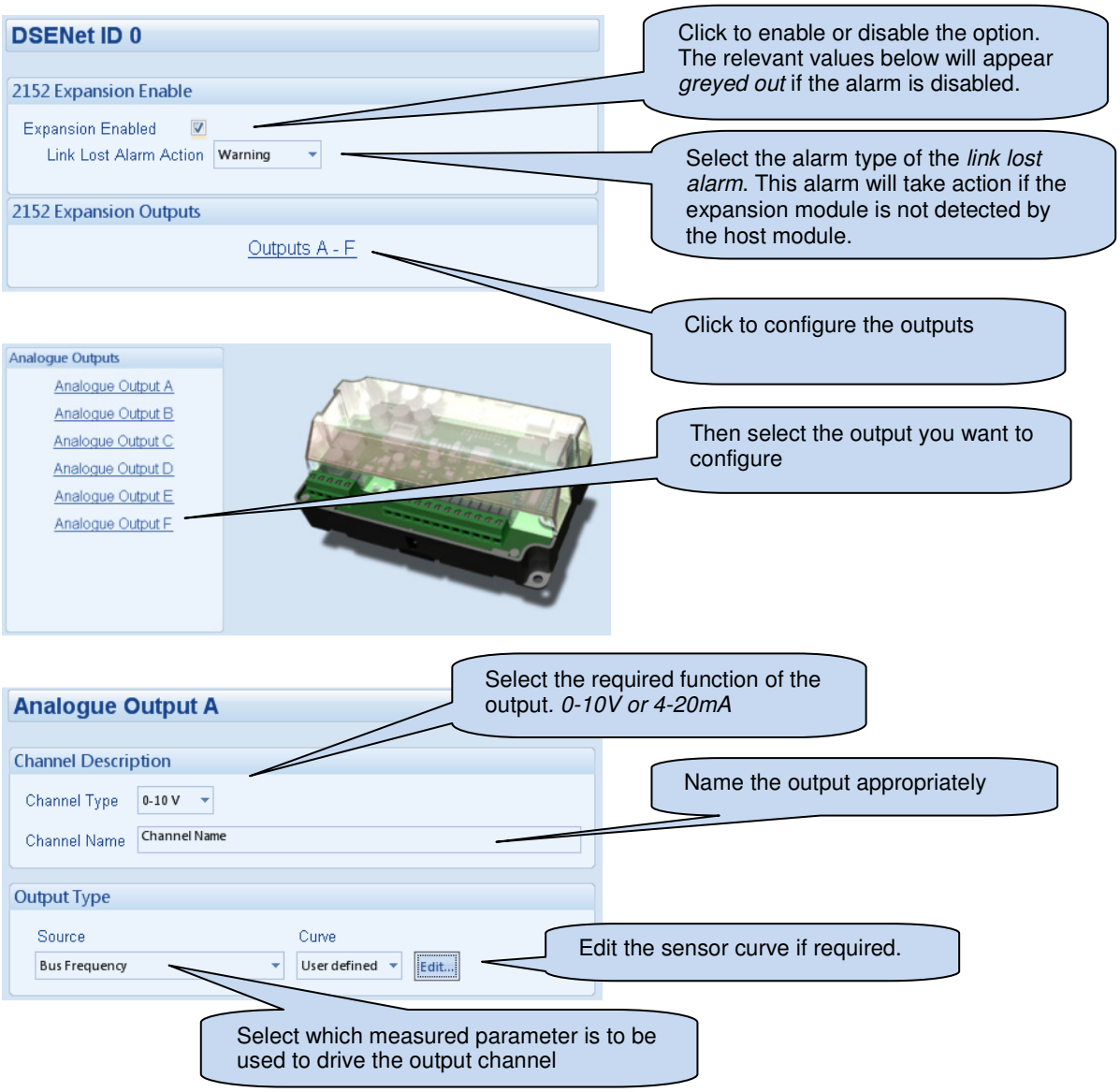

Analogue Input A
Sensor Description
Sensor Type
Temperature Sensor
Sensor Name
2133 ID0 Flexible Sensor
Wide Range
Increases temperature alarms to 1350 deg C
Input Type
Type J
Choose between Type J or Type K thermocouples or RTD (2 Wire PT100 or 3 Wire PT100)
Sensor Alarms
Alarm Arming
Always
Set the alarm trip points if required.
Low Alarm Enable
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
Action
High Alarm
160
°C
High Alarm String
Flexible Sensor High

4.15.4 DSE2152 ANALOGUE OUTPUT MODULE

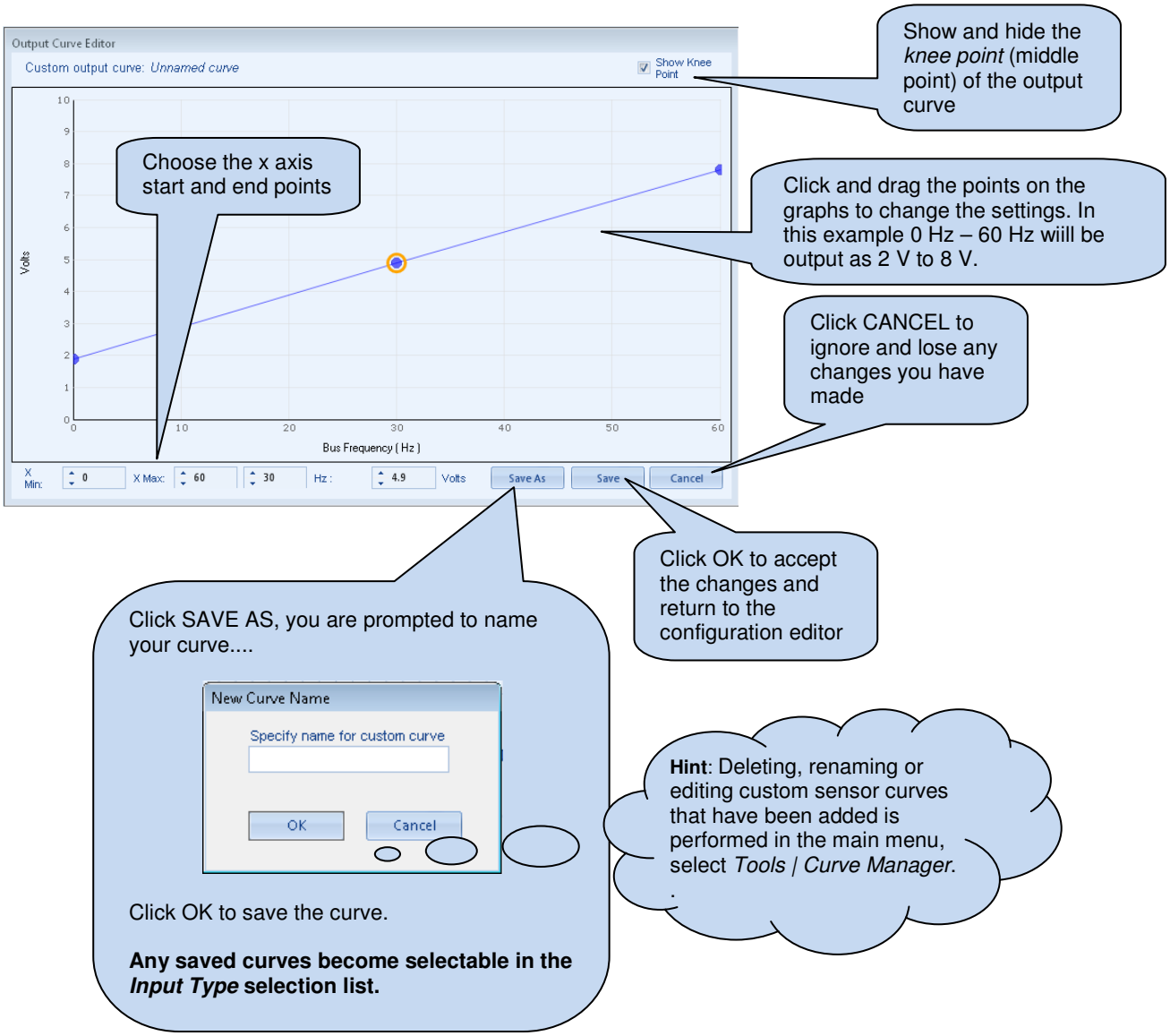
Select the DSENet ID of the output expansion you wish to configure. The ID of the expansion output module is set by rotary decimal switch accessible under the removable cover of the device.



The following is then shown:

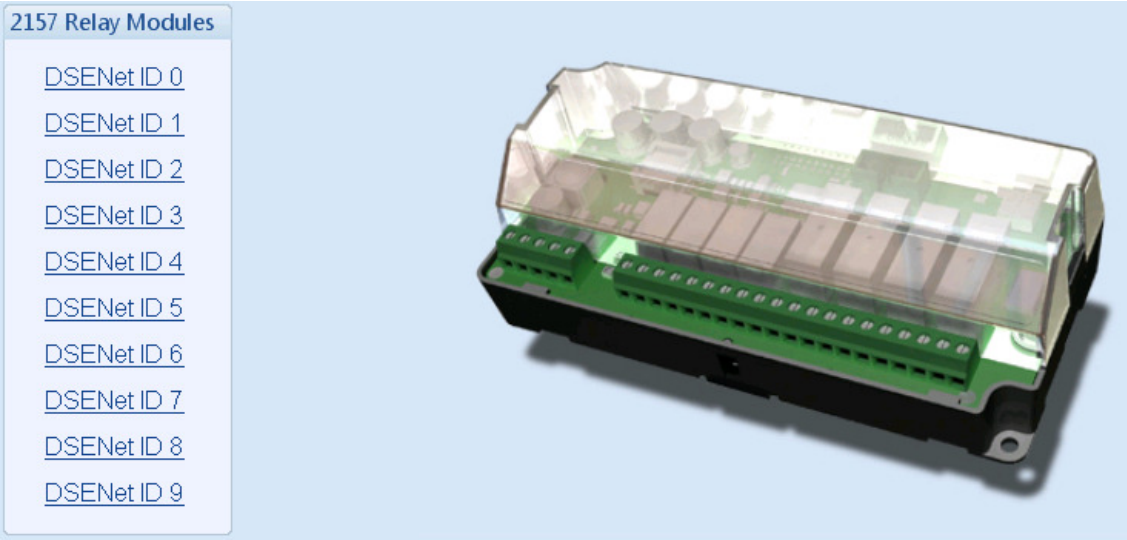


4.15.4.1 EDITING THE OUTPUT CURVE

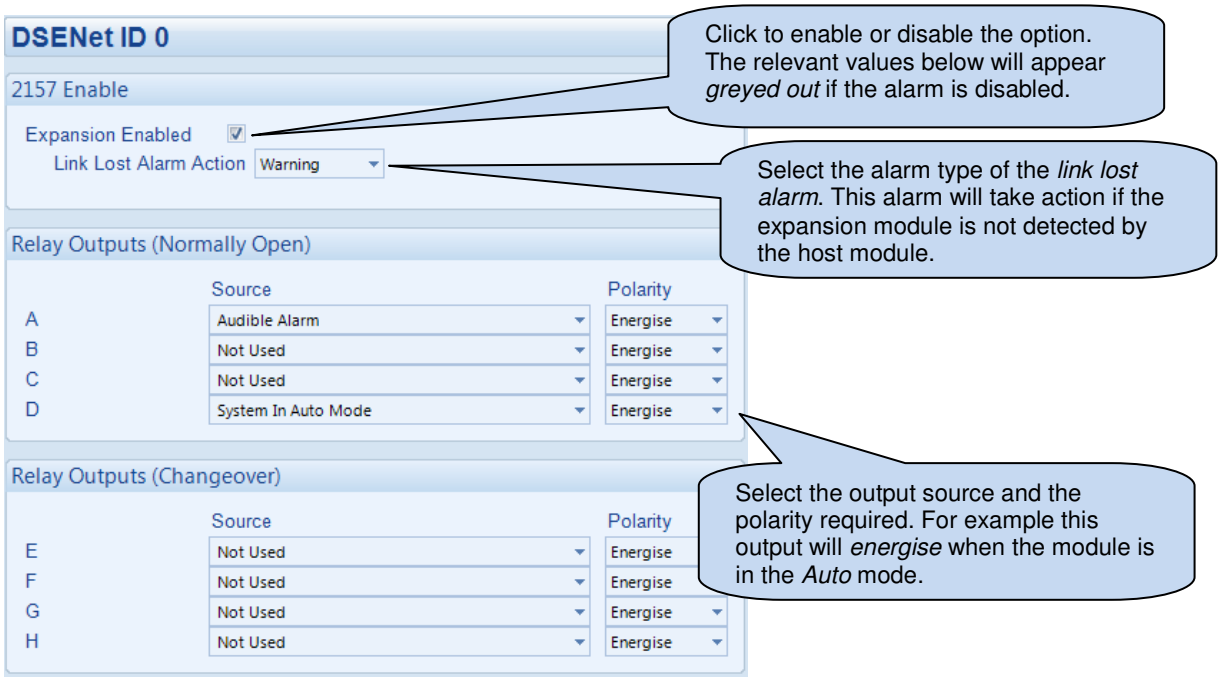


4.15.5 DSE2157 RELAY MODULES

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.



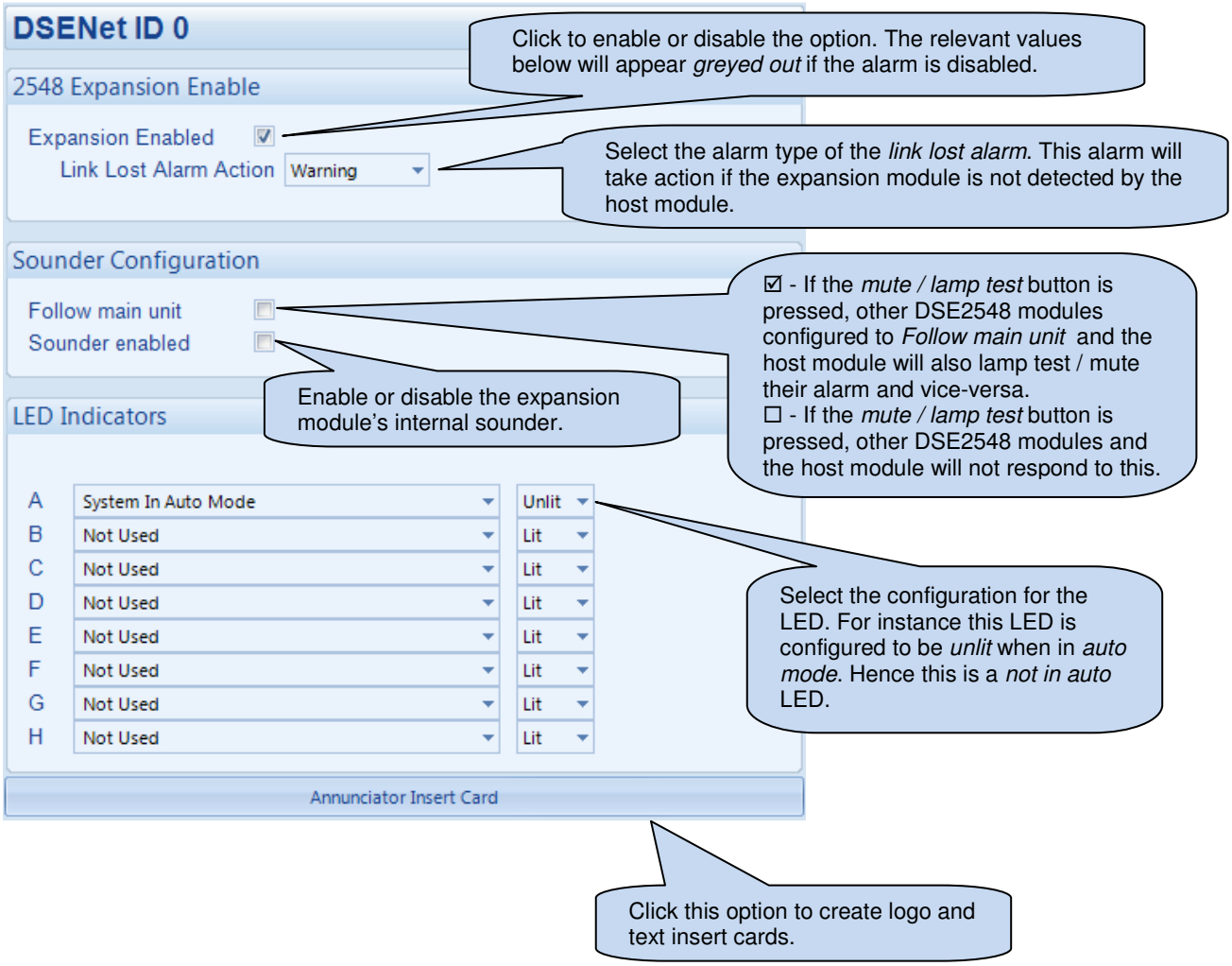
The following is then shown:



4.15.7 DSE2548 LED EXPANSION

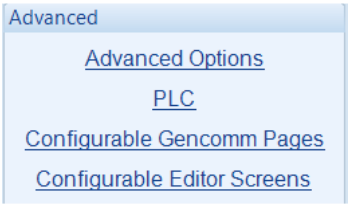
Select the DSENet ID of the LED expansion you wish to configure. The ID of the Annunciator is set by rotary decimal switch accessible on the back of the device.

The following is then shown:



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

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	☐ = The module will operate as normal and provide engine shutdown if required. ☑ = *Protections disabled* function is activated. Operation depends upon the following configuration. **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.**
Protections are disabled	*Never* : The protections are not disabled *Always*: Protections are always overridden by the DSE controller. *On Input* : Protections are disabled whenever a configurable input set to *Protections Disabled* is activated
Protections Disabled Alarm Action	If *Disable All Protections* is set to *On Input*, this selection allows configuration of an alarm to highlight that the protections have been disabled on the engine. *Indication:* Any output or LCD display indicator configured to *Protections Disabled* will be made active; however the internal alarm sound will not operate. Warning*:* Any output or LCD display indicator configured to *Protections Disabled* will be made active, and the internal alarm sound will operate. When protections are disabled, *Protections Disabled* will appear on the module display to inform the operator of this status.

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 (0º).

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

TROUBLESHOOTING

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

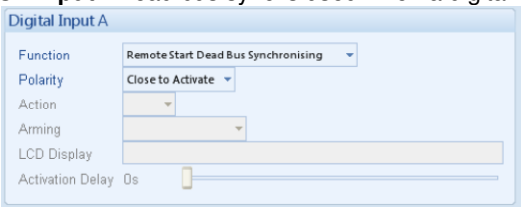
- The *Bus Sensing* connections have not been made between the common generator bus and the DSE module, or the bus sensing fuses have blown or have been removed.
- The load switching device does not close quickly enough. Ensure the breaker closes within 100mS of receiving the close signal.
- The *Out 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 *Load Demand Scheme* 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	☐ = All synchronising is performed 'the traditional' way by achieving a slip frequency and waiting for the voltage, frequency and phase to be within configured windows ☑ = The Dead Bus Synchronising feature is activated as configured below.
Sync mode	**Always** - Dead bus sync is always used when the generators are required to be on line and in the *Auto* mode (Dead bus sync does not operate in *Manual* mode in any circumstance. **Disabled** – The feature is not active **On Input -** Dead bus sync is used when a digital input is active :  **On Request From 8660** – The feature is only used when a start request is received from a DSE8660
Excitation Speed	The speed at which the engine is deemed to be running fast enough for the excitation to be energised :  Any sets not reaching this speed by the end of the *excitation delay* open their breakers and are removed from the Dead Bus Sync System.
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 *Excitation Speed* is not achieved by the end of the *Excitation Delay*, 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.

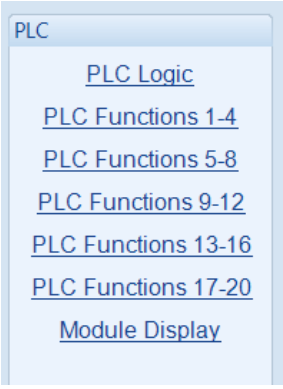
4.16.3 AVR

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

Options	Description
Allow Live Nominal Voltage Adjust	☐ = Adjustment of nominal voltage is disabled. ☑ = 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.

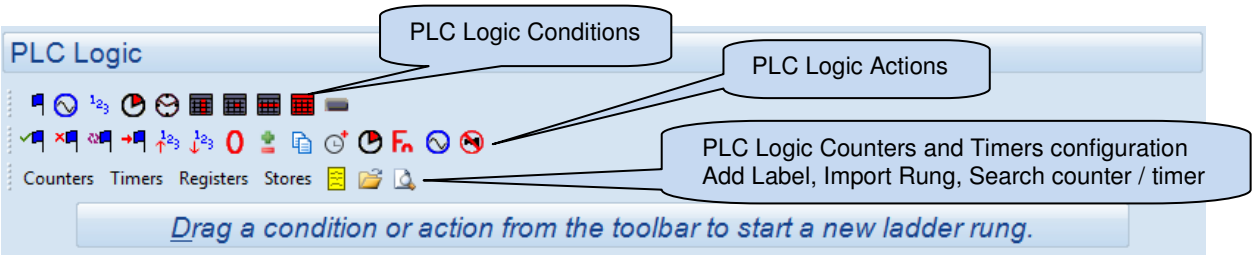


4.16.4.1 PLC LOGIC

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

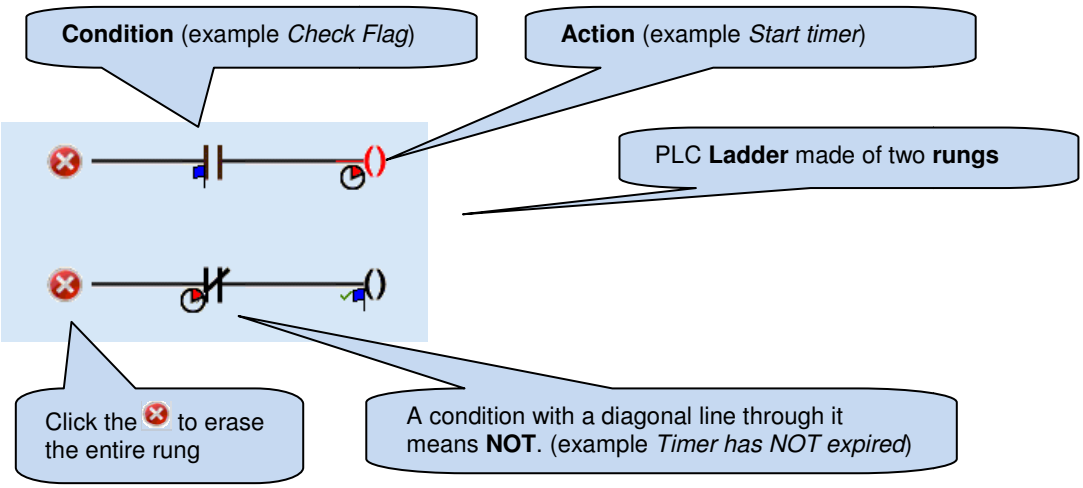
NOTE: PLC logic is available in module version 2.xx and later. Version 1.xx modules include a different system, detailed in the manual section entitled "CONTROL LOGIC" elsewhere in this document.

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*.

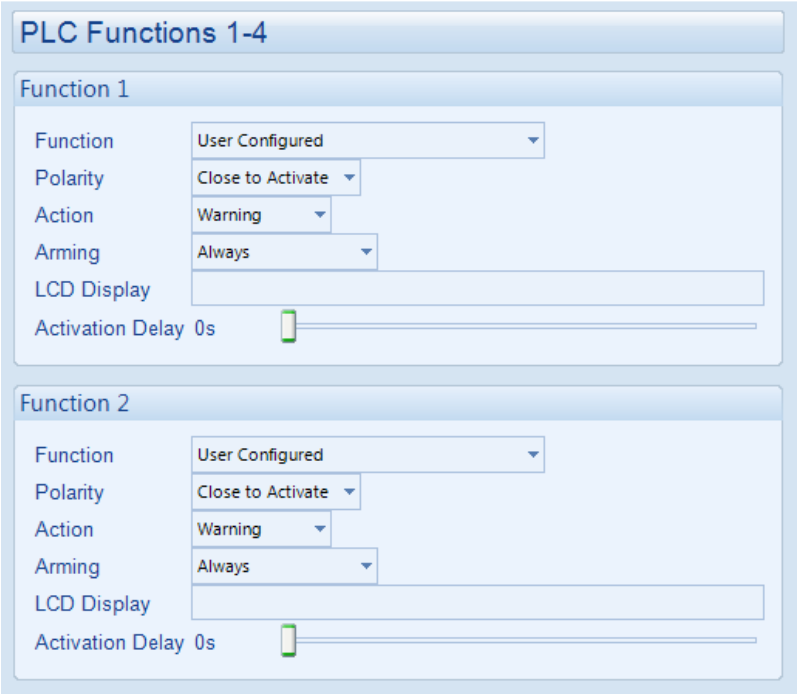
For instance if the conditions in the rung are met, the action takes place.



4.16.4.2 PLC FUNCTIONS

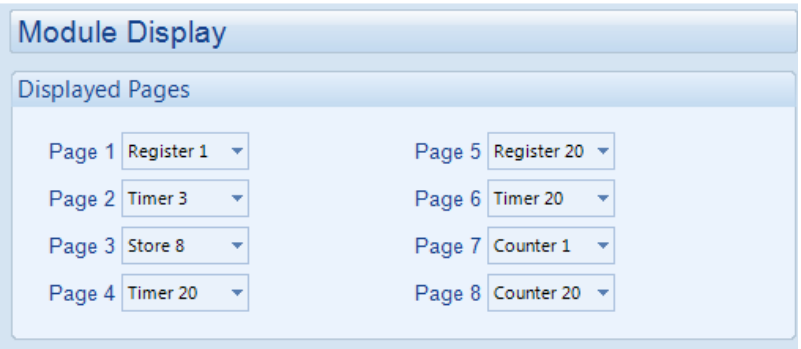
NOTE: For further details and instructions on PLC Logic and PLC Functions, refer to the DSE PLC PROGRAMMING GUIDE, document part number 057-175.

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.



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.



4.16.5 CONFIGURABLE GENCOMM PAGES

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

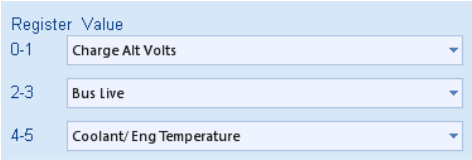
NOTE: The ability to add specific registers to the configurable gencomm registers list has been added in module version 6.0 and later.

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.

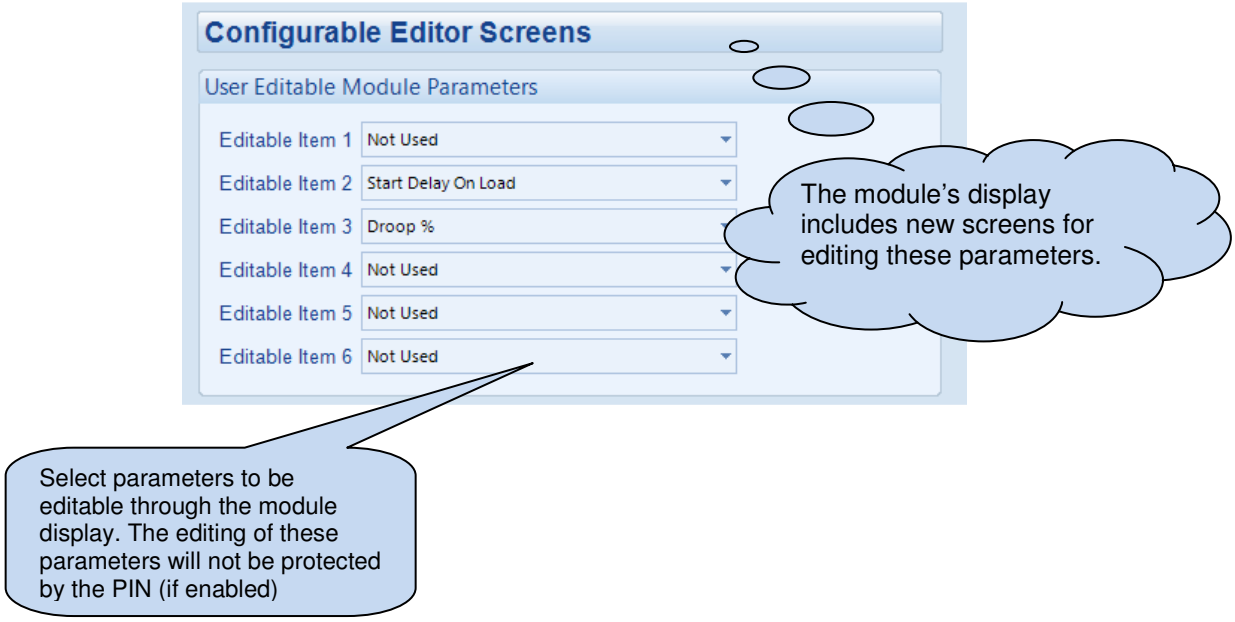
The configurable modbus pages are:

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

Example of page configuration

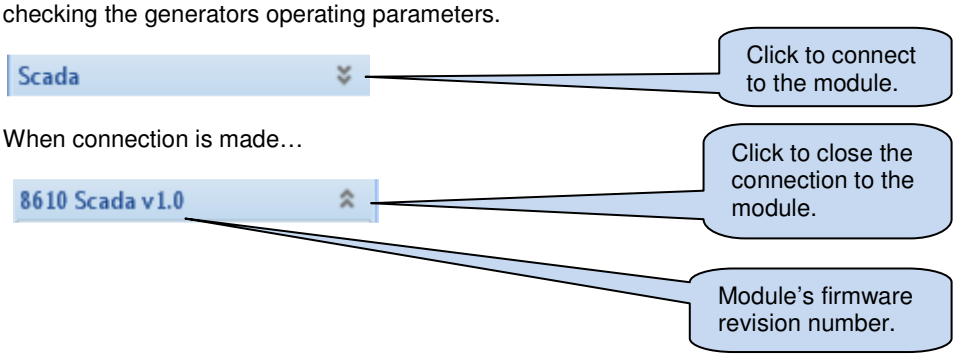


4.16.6 CONFIGURABLE EDITOR SCREENS

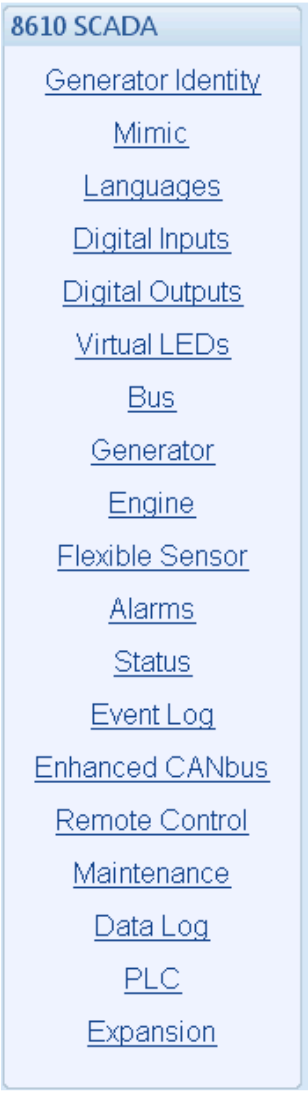


5 SCADA

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.

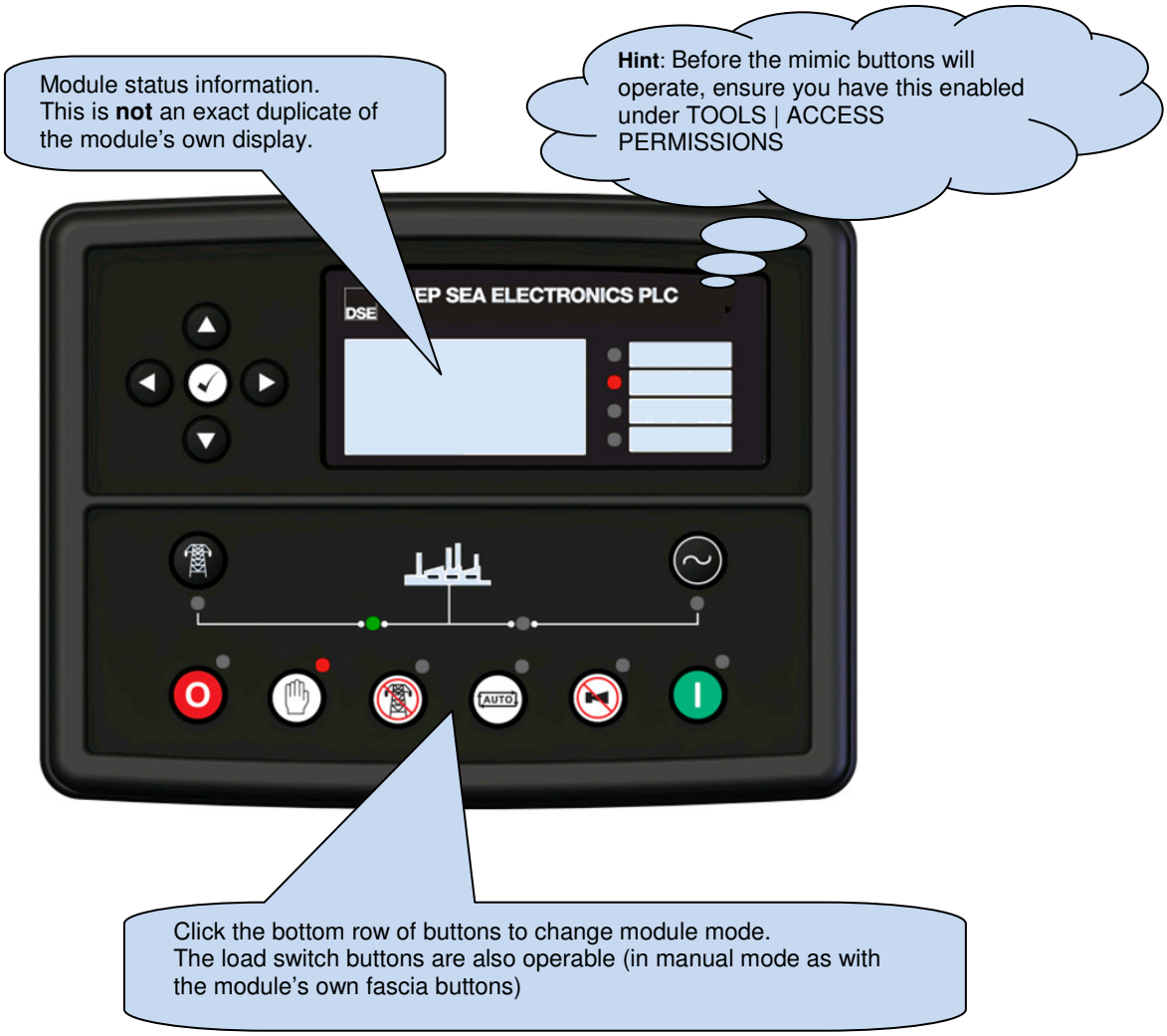


5.1 GENERATOR IDENTITY

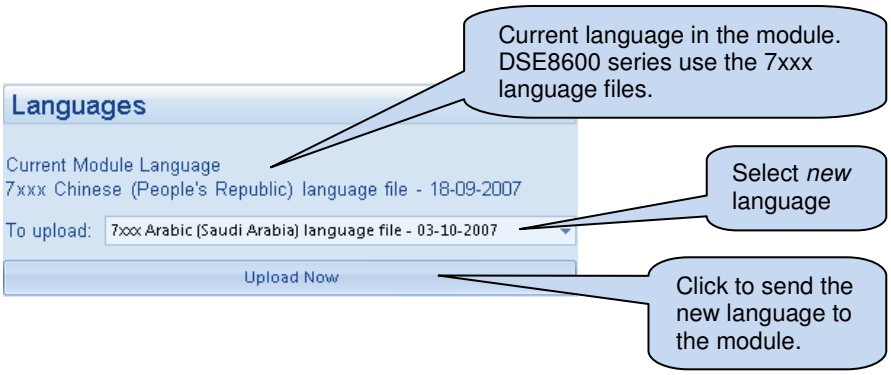
Shows the module's current settings for *Site ID* and *Genset ID.*
This information is particularly helpful when the current connection is made remotely by modem or internet for example or when the connected set is one of a number of sets on an RS485 data link.

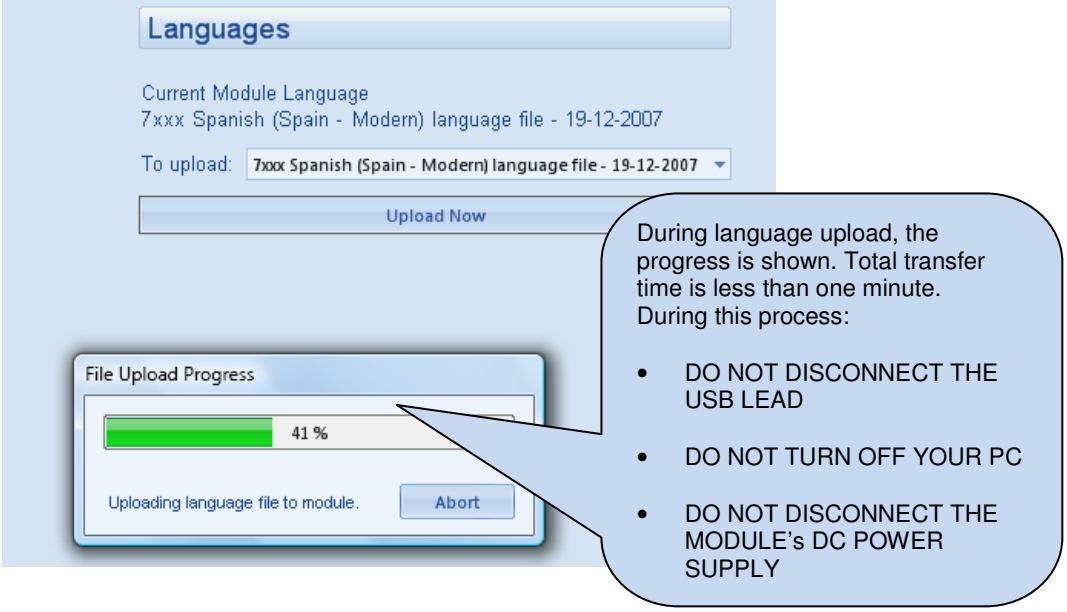
5.2 MIMIC

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.

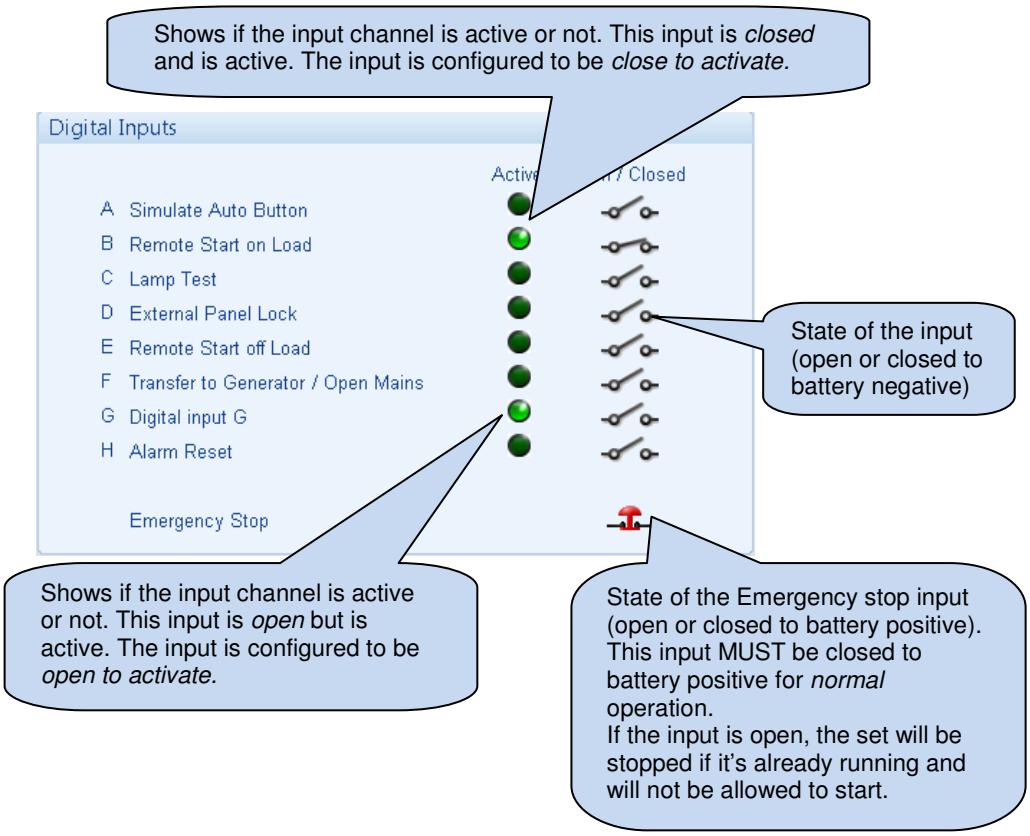


5.3 LANGUAGES

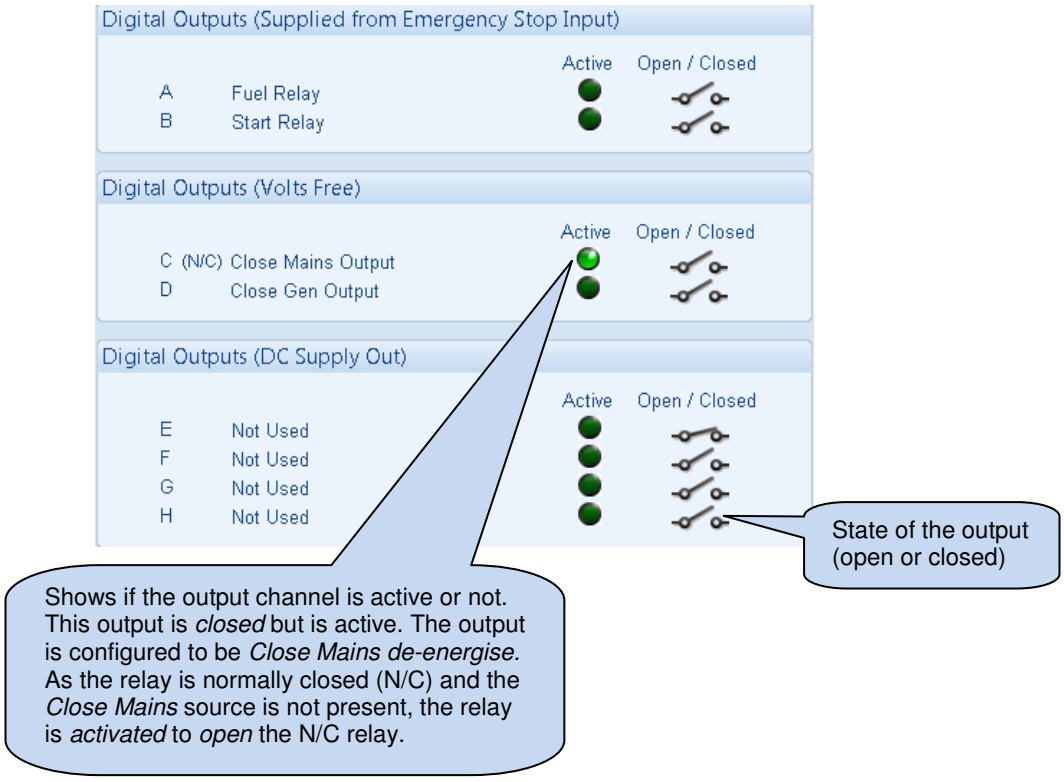




5.4 DIGITAL INPUTS

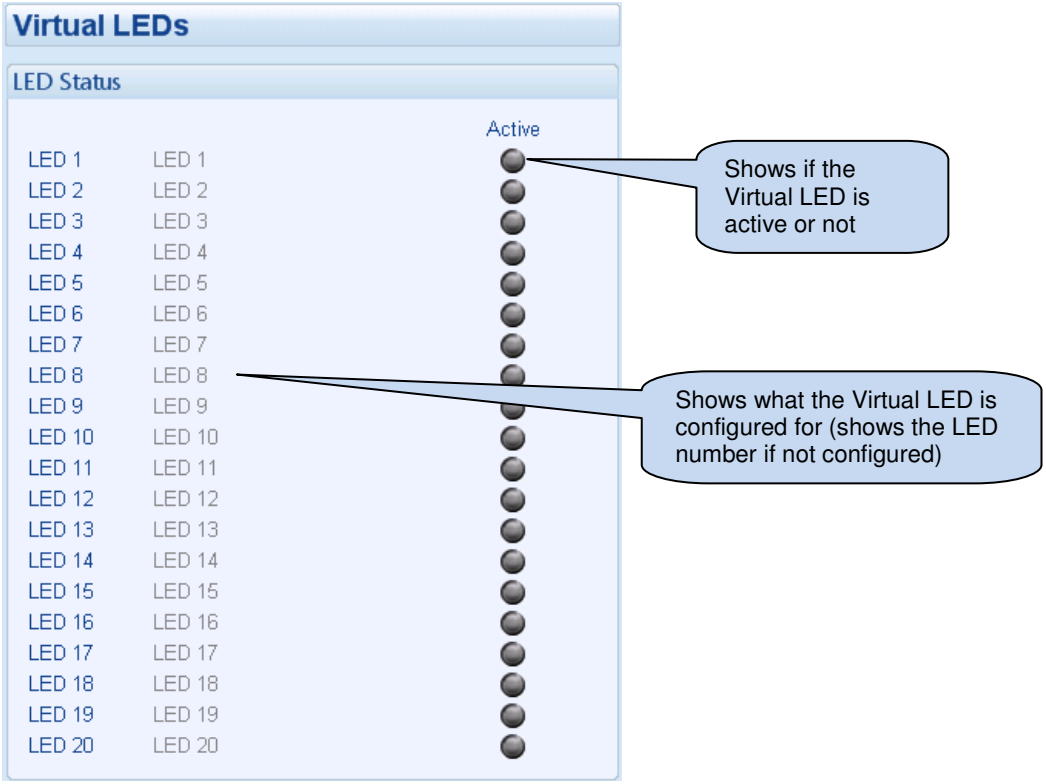


5.5 DIGITAL OUTPUTS



5.6 VIRTUAL LEDS

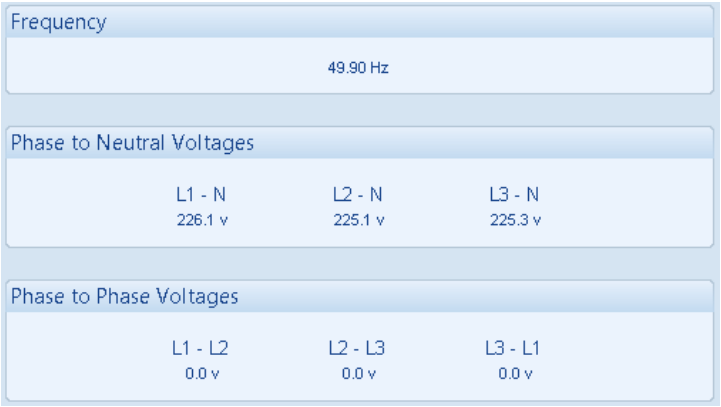
Shows the state of the *virtual LEDs*. These LEDs are not fitted to the module or expansion modules, they are not physical LEDs. They are provided to show status and appear only in the SCADA section of the configuration suite, or can be read by third party PLC or Building Management Systems (for example)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



5.7 MAINS

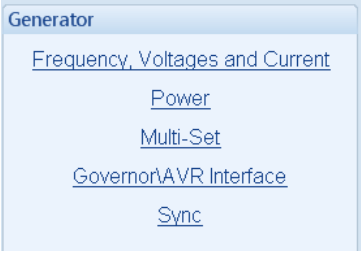
DSE8660/DSE8620 only

Shows the modules measurements of the mains supply



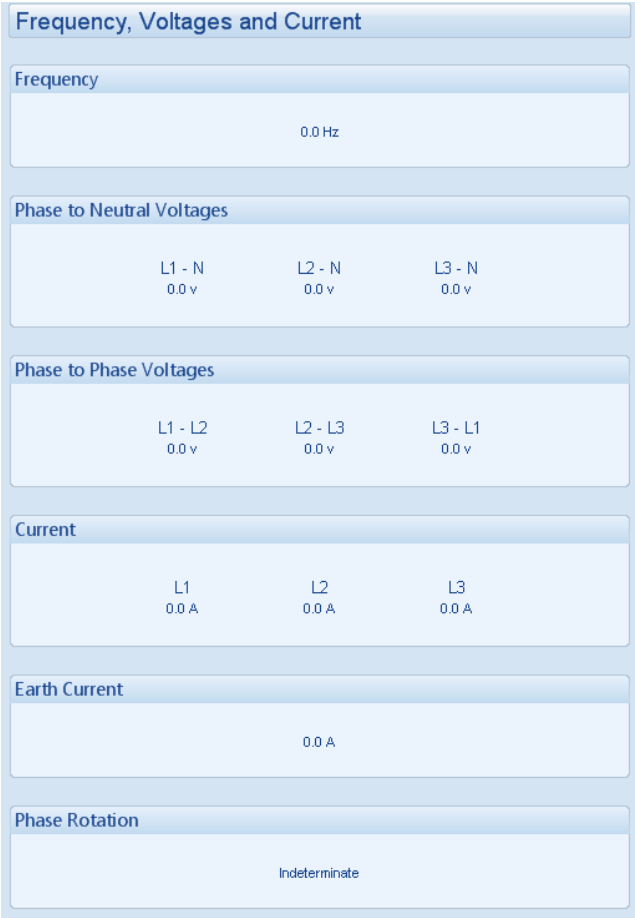
5.8 GENERATOR AND BUS

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



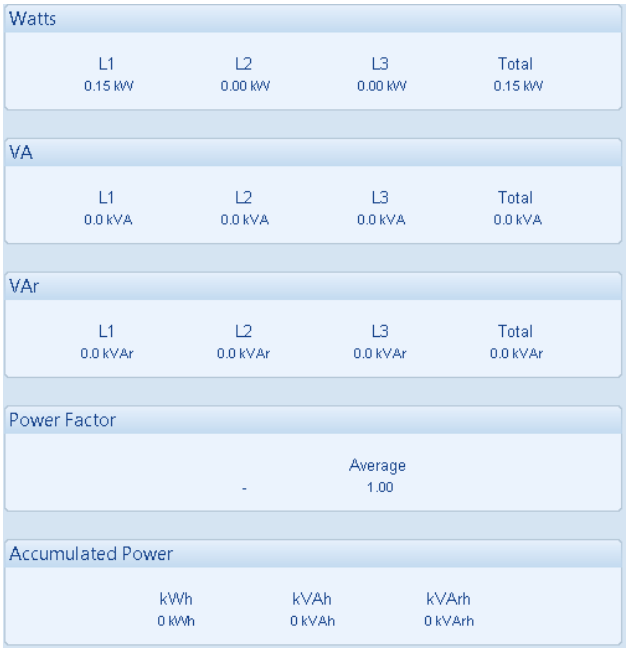
5.8.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the modules measurements of the supply.



5.8.2 POWER

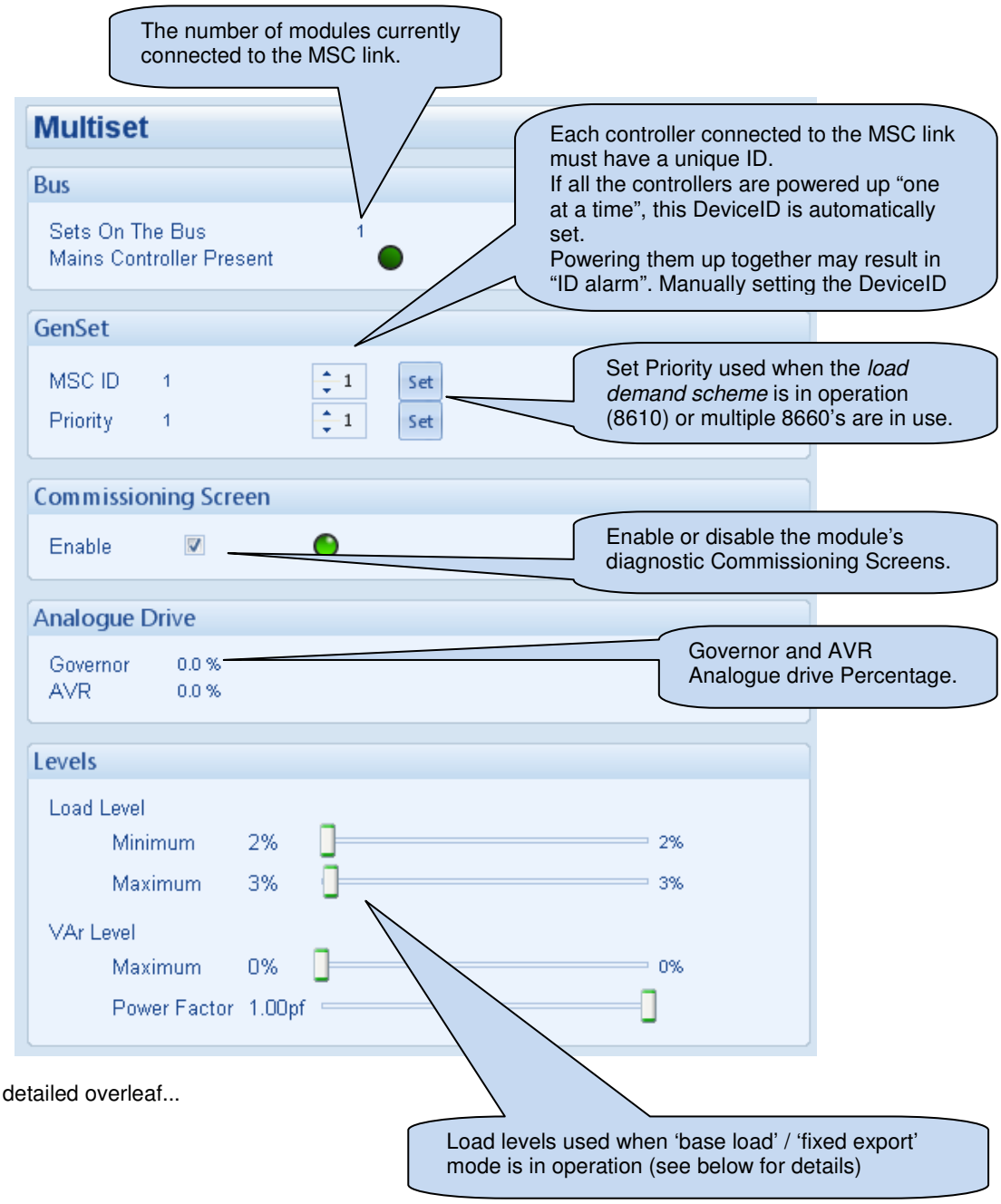
Shows the modules measurements of the supply power.



5.8.3 MULTISET

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.



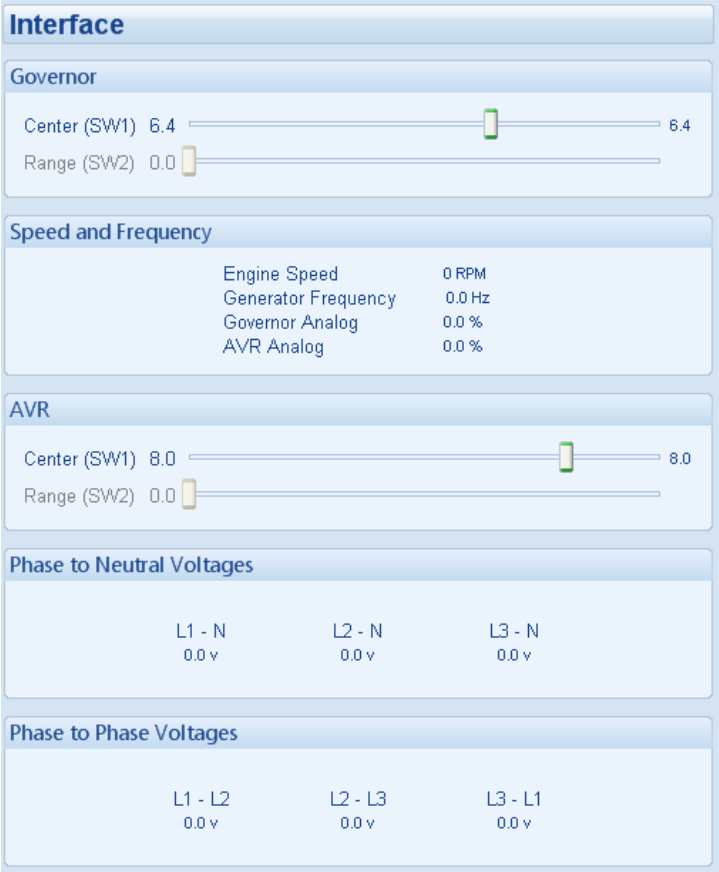
Parameters detailed overleaf...

Item	Function
Bus Control (Only applicable to 8660)	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. **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.**
Mains control (Only applicable to 8660)	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. 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. **NOTE: The generators will never be driven to more than 100% of their full load capability. This will generate an *insufficient capacity* alarm.**

Item	Function
KVAr control	The amount of reactive power that the set will produce when used in 'load level control' mode, when Reactive *Load Control Mode* is set to *Load Level Control*
Pf control	The power factor that the set will maintain when used in 'load level control' mode, when Reactive *Load Control Mode* is set to *Load Level Control*) **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 Reactive *Load Control Mode* is set to *Load Level Control*
	Pf control: The power factor that the set will maintain when used in 'load level control' mode, when Reactive *Load Control Mode* is set to *Load Level Control* **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.



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 it's 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

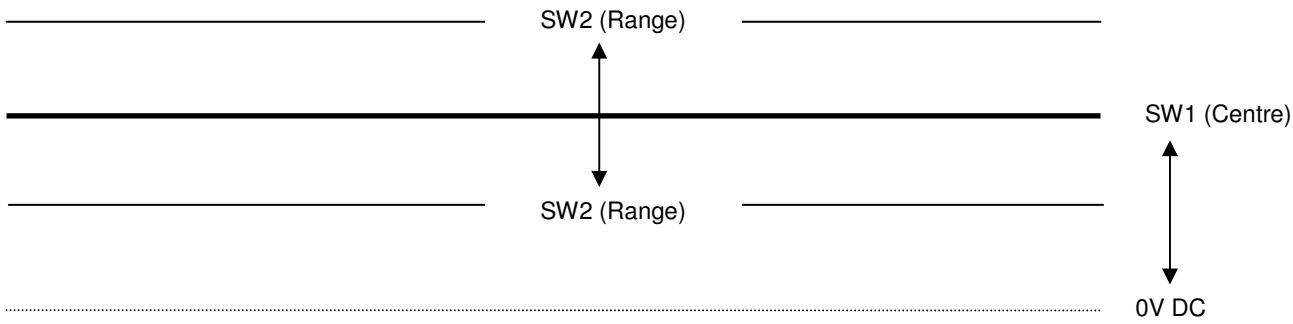
Typical wiring diagrams and SW1/SW2 selector settings for many of the most popular governors are included within the DSE guide to synchronising and Load Sharing (Part2).

5.8.4.4 SUMMARY

You can think of the settings as Analogue output voltage is SW1 ± SW2

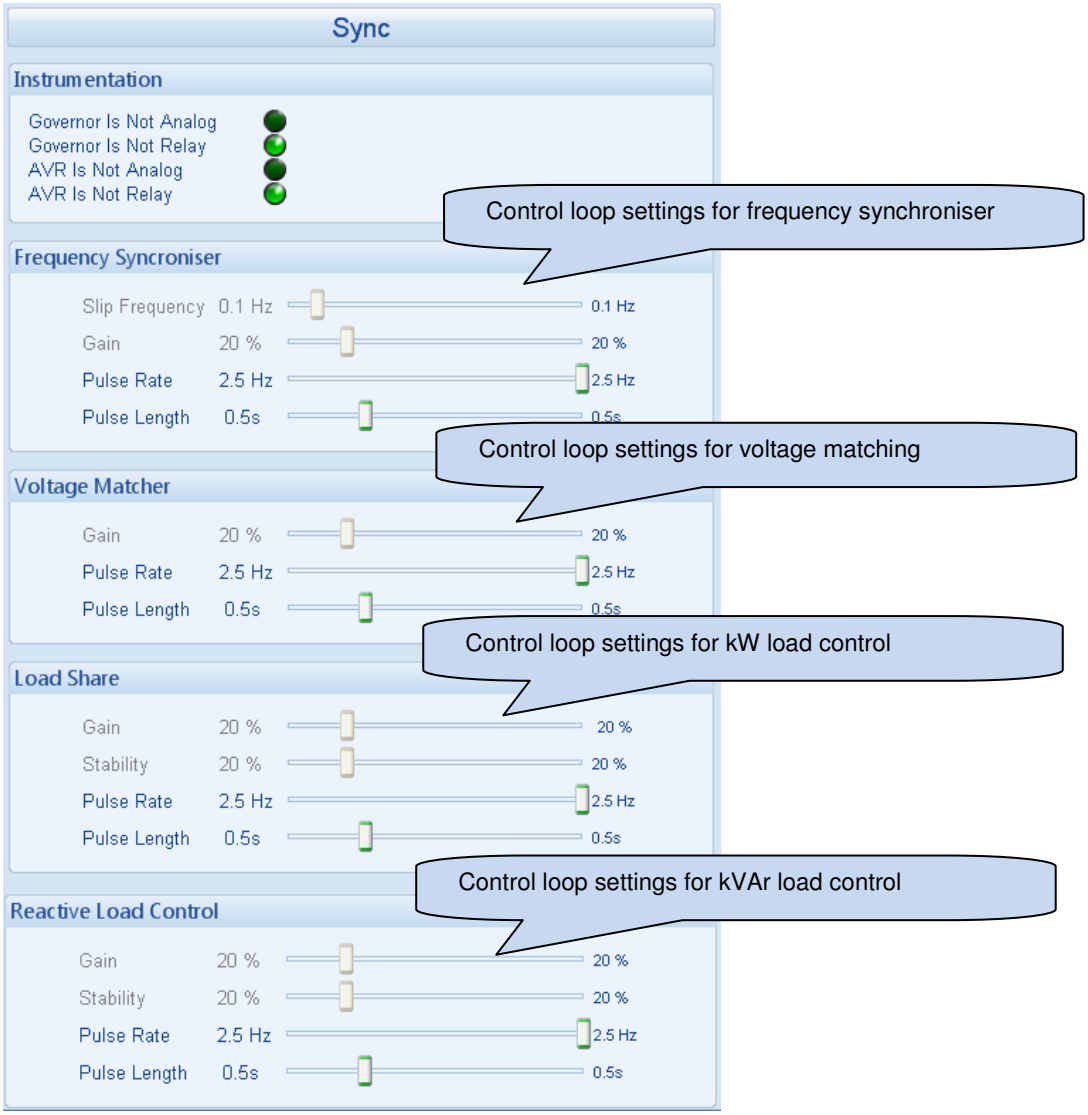
In the example above this means the analogue output is 1.0V ± 1.5V (based upon the settings of SW1=2 and SW2=2

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.



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

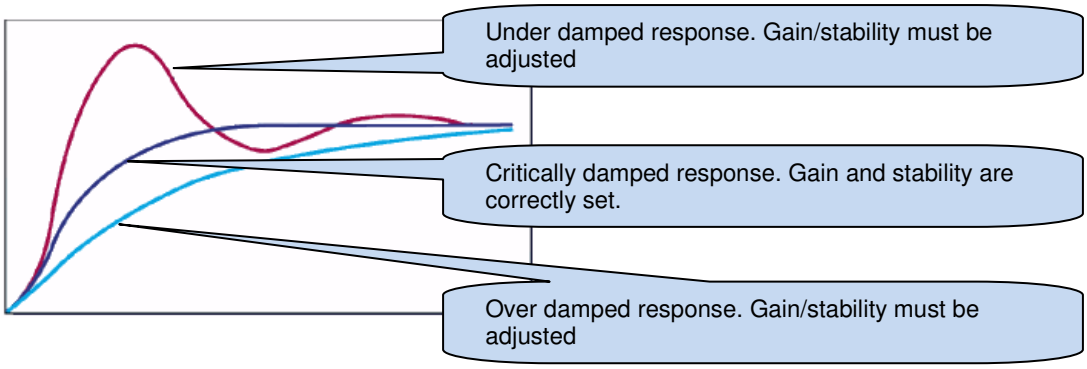
Initial Setup

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.

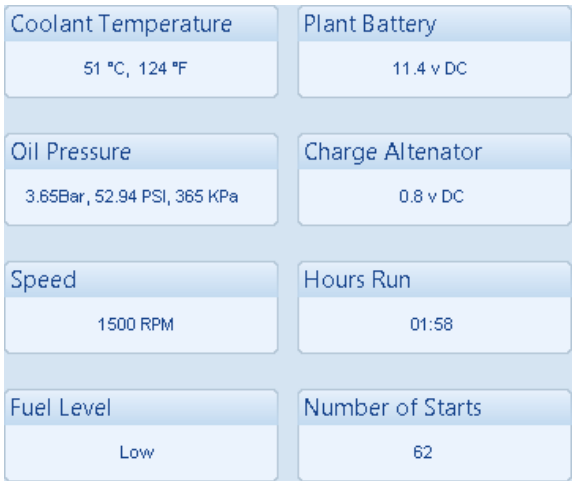


NOTE: - An over damped response will result in a slower control process. An under damped response (overshooting the target) will lead to an unstable control process.

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

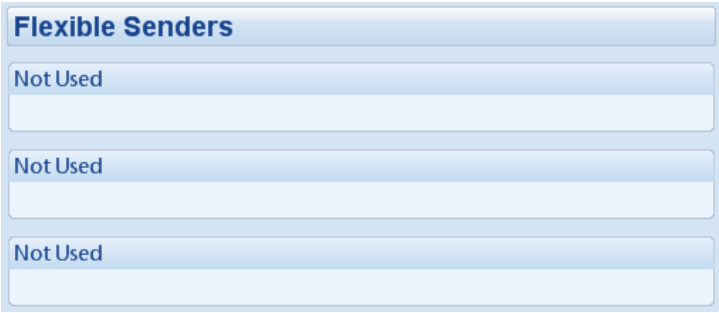
5.9 ENGINE

Shows the modules measurements of the engine parameters.



5.10 FLEXIBLE SENSOR

Shows the measurement of the Flexible Sensor (If configured)



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.

5.12 STATUS

Shows the module's current status.

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

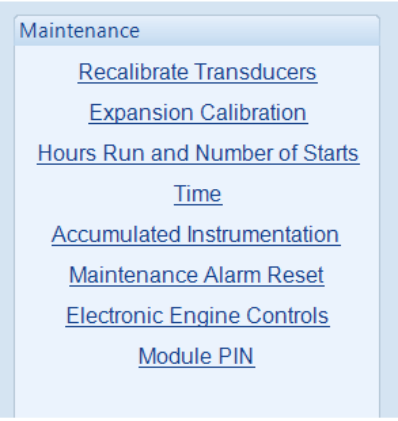
If the module is connected to a compatible electronic engine, the following information is read from the ECU (if supported by the engine ECU).

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.

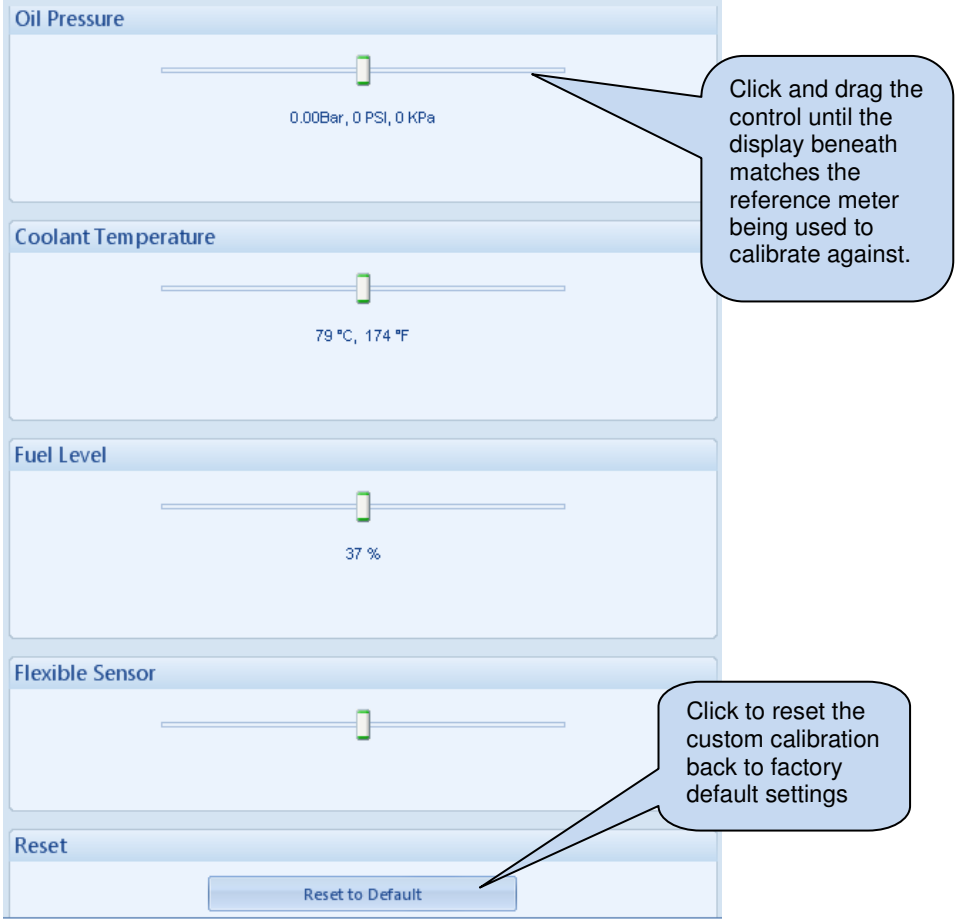
5.16 MAINTENANCE

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



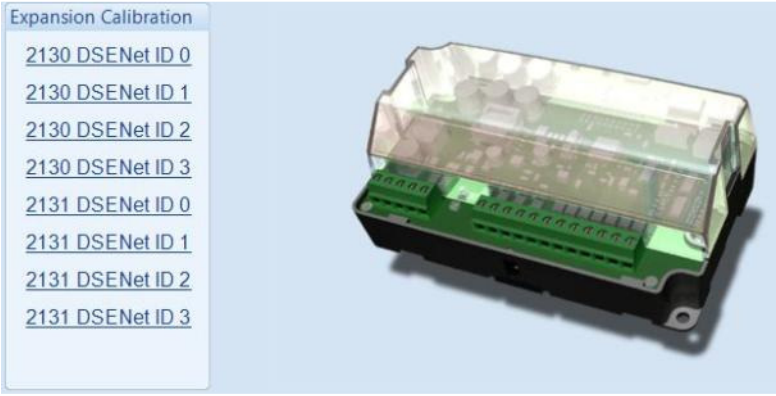
5.16.1 RECALIBRATE TRANSDUCERS

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.



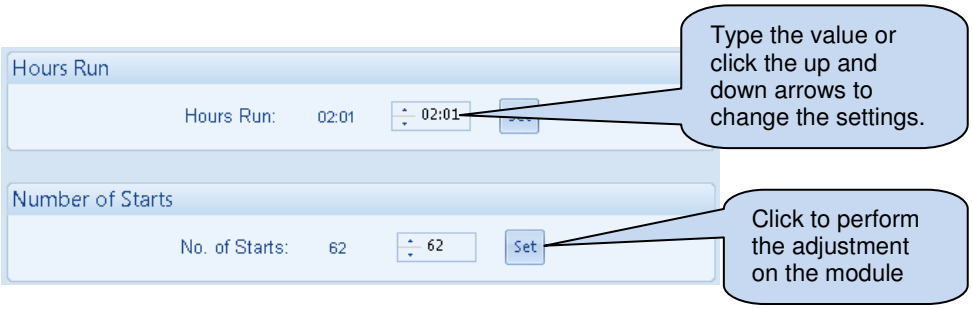
5.16.3 EXPANSION CALIBRATION

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.

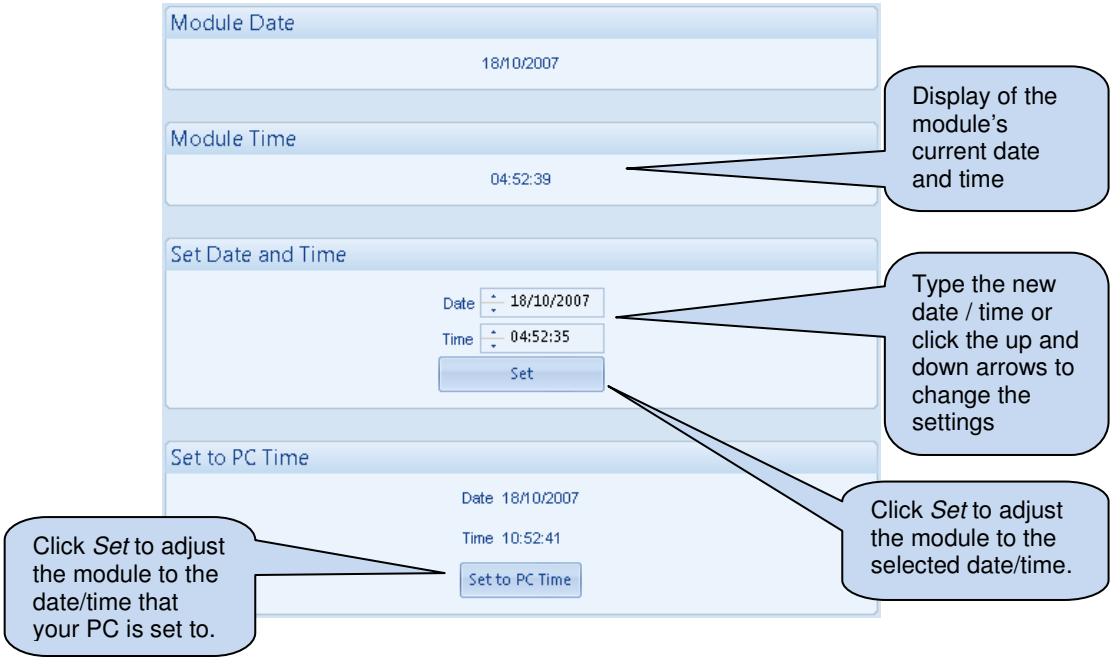


5.16.4 HOURS RUN AND NUMBER OF STARTS

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.

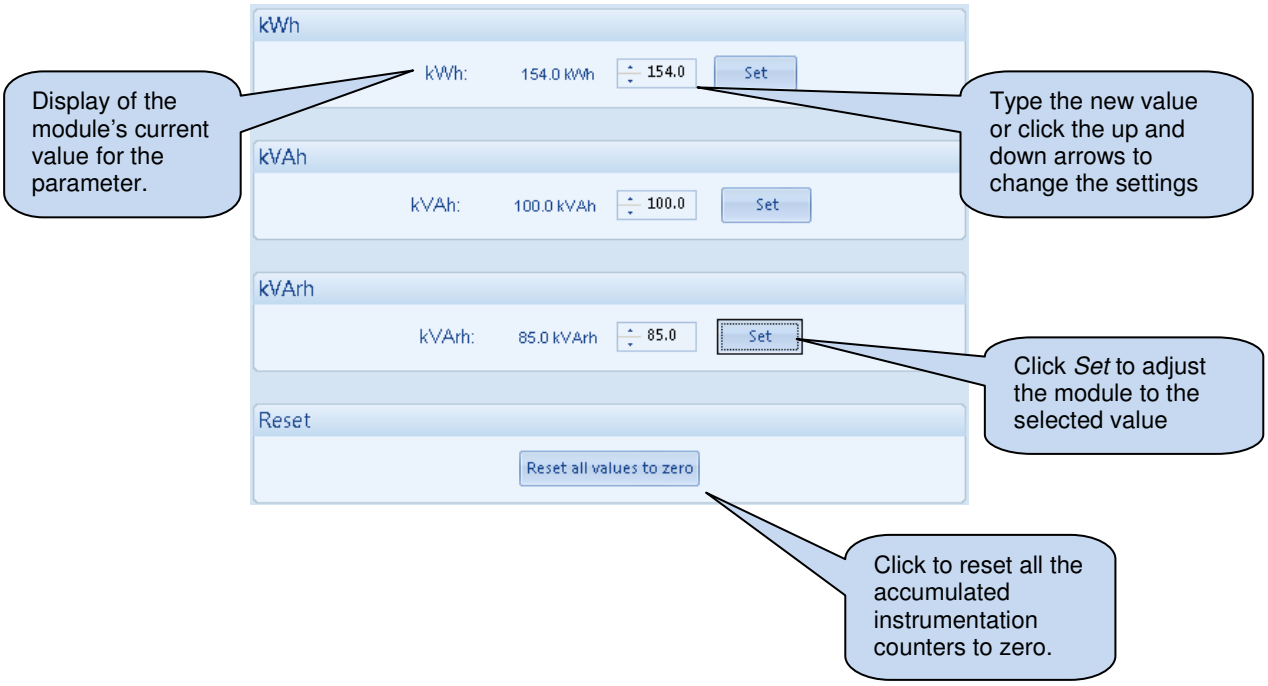


5.16.5 TIME



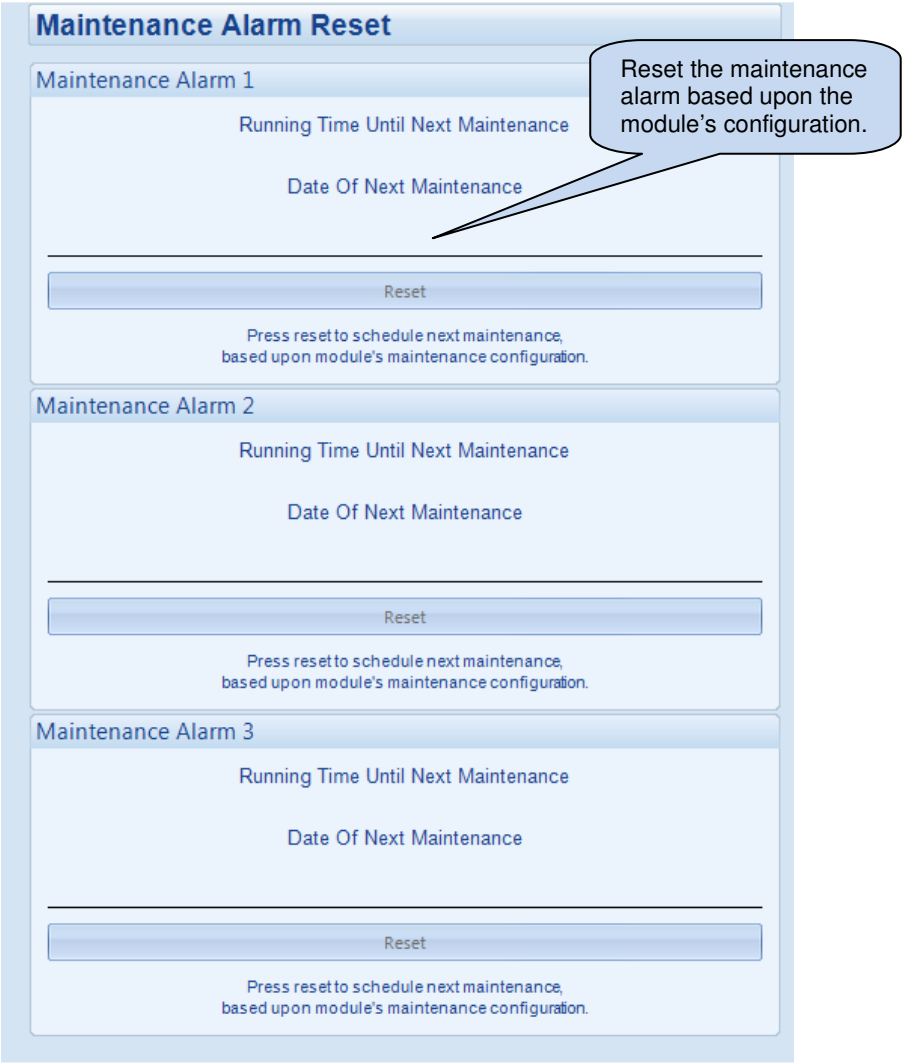
5.16.6 ACCUMULATED INSTRUMENTATION

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



5.16.7 MAINTENANCE ALARM RESET

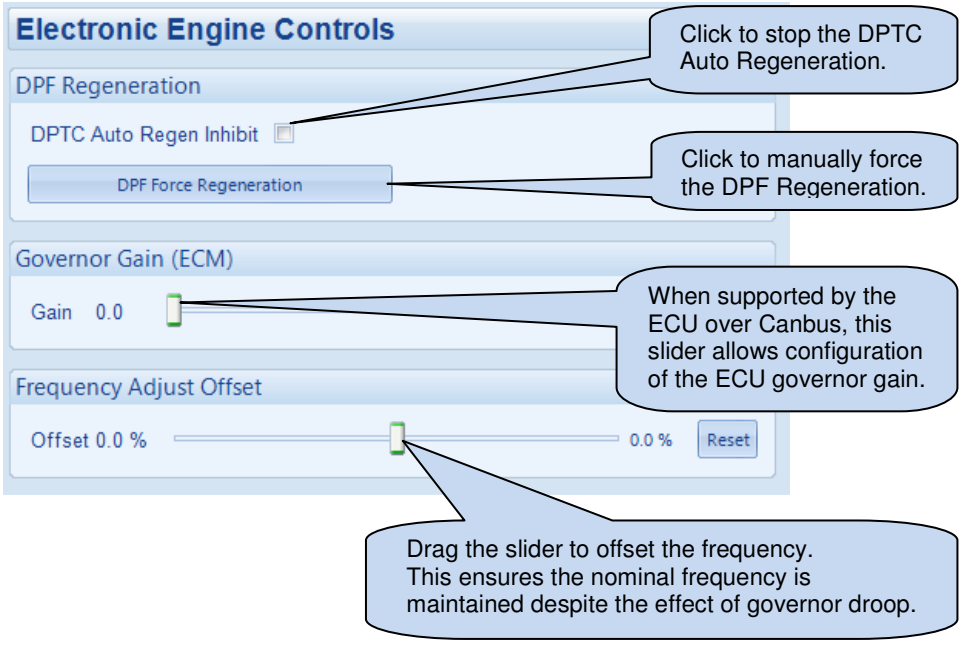
Three maintenance alarms active in the control module. Each is reset individually; only one alarm is shown below for clarity.



5.16.8 ELECTRONIC ENGINE CONTROLS

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

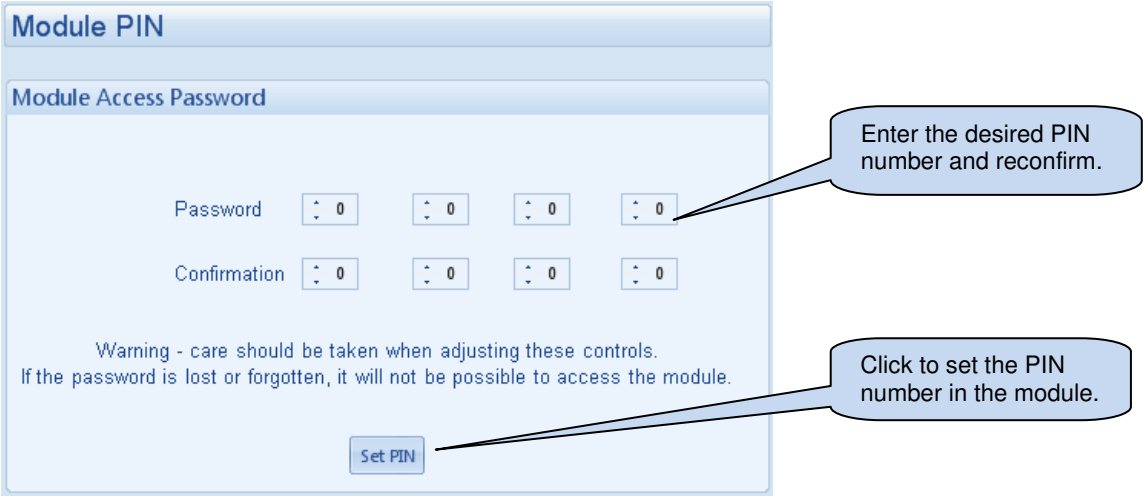
NOTE: *Electronic Engine Controls* parameters are only available when the DSE module is connected and configured for operation on an electronic engines.



5.16.9 MODULE PIN

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

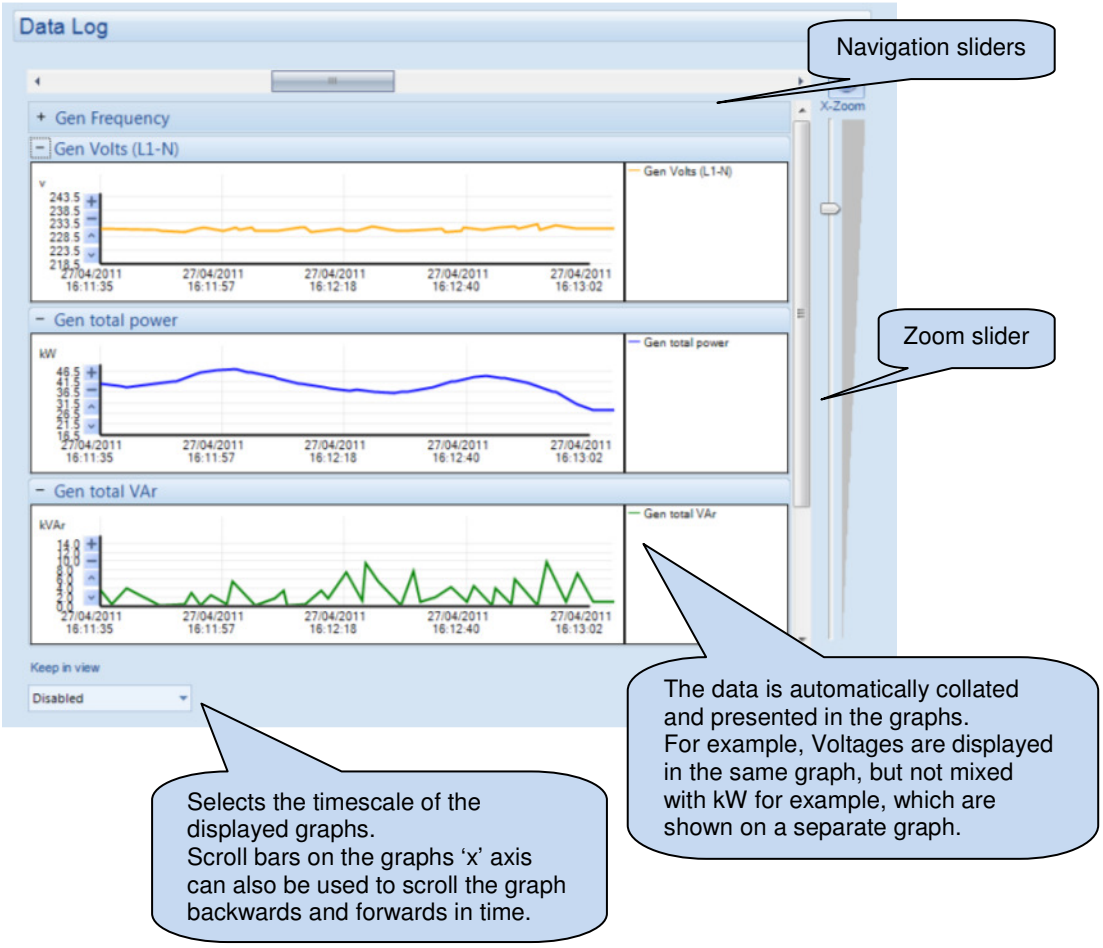
Allows a PIN (Personal Identification Number) to be set in the controller. This PIN must be entered to either access the front panel configuration editor or before a configuration file can be sent to the controller from the PC software.



5.17 DATALOG

Allows viewing of the module datalog (if configured).

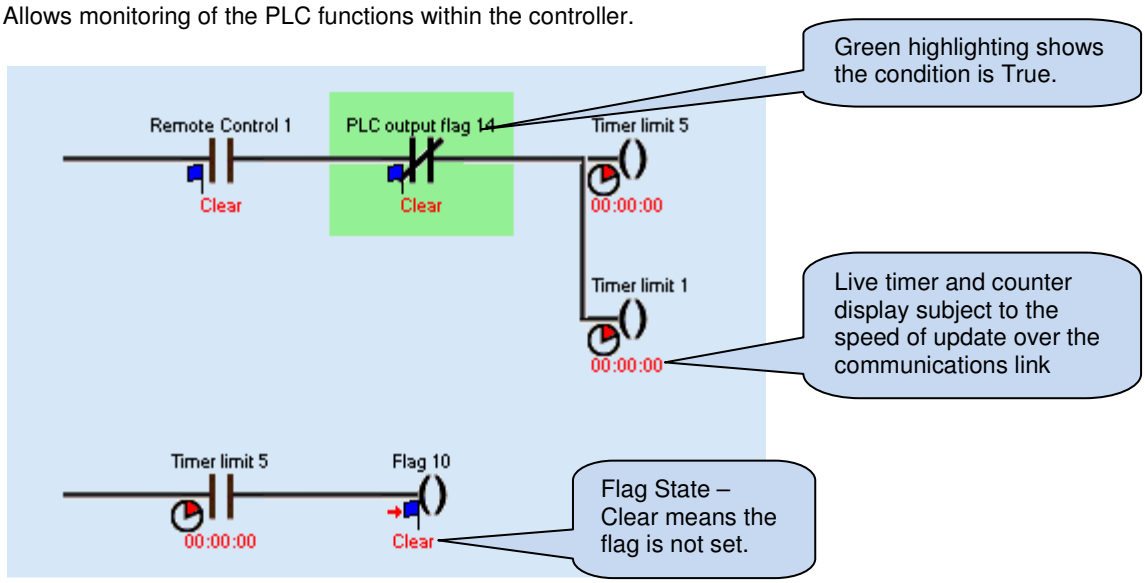
NOTE: Data Logging is available in module version 3.xx and later.
Data logging is a 'live' function – Maximum 8hrs duration is shown so long as the PC is left connected to the controller.



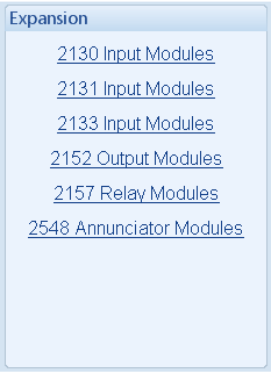
5.18 PLC

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.

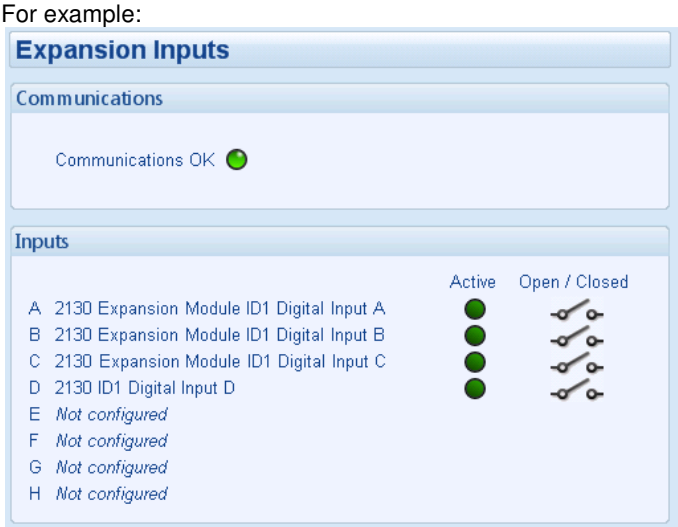


5.19 EXPANSION



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

For example:



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. *Indication* alarms are only used to illuminate indicators or to activate outputs.
Warning	Audible alarm and common alarm signal is generated. The set continues to run. *Warning alarms* are used to draw the operator's attention to a minor issue or to a problem that may escalate to an Electrical Trip or Shutdown Alarm if left untreated.
Electrical Trip	Audible alarm and common alarm signal is generated. The set is taken off load and the cooling timer begins, after which the set is stopped. *Electrical Trip alarms* are series issues that require the set to be taken off load. As the name implies, this is often electrical faults that occur 'after' the load 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. *Shutdown alarms* are serious issues that demand immediate stopping of the generator. For instance Emergency Stop or Overspeed alarms require immediate shutdown.

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