DEEP SEA ELECTRONICS

DSE7310 MKII & DSE7320 MKII
Configuration Suite PC Software Manual

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DSE7310 MKII / DSE7320 MKII Configuration Suite PC Software Manual

Amendments List

Issue	Comments
1	Initial release
2	Configurable Front Panel Editor access added DEF Level added for electronic engines
3	Update to Fuel Usage alarm. Added Fuel Use and Efficiency, Additional Alternative configurations, DSE2131, DSE2133, DSE2152 and Battery Charger expansion support.
4	Added missing options and correction of typos.
5	Updated for the DSE2500 MKII Remote Display.

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

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1 INTRODUCTION

The **DSE Configuration Suite PC Software** allows the DSE73xx MKII modules to be connected to a PC via USB A –USB B cable. Once connected the various operating parameters within the module are viewed or edited as required by the engineer. This software allows easy controlled access to these values.

This manual details the configuration of the DSE7310 MKII & DSE7320 MKII series controllers.
A separate document covers the older DSE7310 and DSE7320 modules configuration.
The DSE Configuration Suite PC Software must only be used by competent, qualified personnel, as changes to the operation of the module may have safety implications on the panel / generating set to which it is fitted. Access to critical operational sequences and settings for use by qualified engineers, may be barred by a security code set by the generator provider.
The information contained in this manual must be read in conjunction with the information contained in the appropriate module documentation. This manual only details which settings are available and how they may be used. A separate manual deals with the operation of the individual module (See section entitled *Bibliography* elsewhere in this document).

1.1 BIBLIOGRAPHY

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

1.1.1 INSTALLATION INSTRUCTIONS

DSE PART	DESCRIPTION
053-181	7310 MKII & 7320 MKII installation instructions sheet

1.1.2 MANUALS

DSE PART	DESCRIPTION
057-151	DSE Configuration Suite PC Software Installation & Operation Manual
057-004	Electronic Engines and DSE wiring
057-253	DSE7310 MKII & DSE7320 MKII Operator Manual
057-077	DSE7300 Software Manual
057-278	DSE2510 MKII & DSE2520 MKII Operator Manual
057-279	DSE2510 MKII & DSE2520 MKII Software Manual

1.1.3 OTHER

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

1.1.4 CLARIFICATION OF NOTATION

Clarification of notation used within this publication.

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

1.1.5 GLOSSARY OF TERMS

Term	Description
DSE7xxx MKII	All modules in the DSE7xxx MKII range.
DSE7300 MKII, DSE73xx MKII	All modules in the DSE73xx MKII range.
DSE7310 MKII	DSE7310 MKII module/controller
DSE7320 MKII	DSE7320 MKII module/controller
DSE2510 MKII	DSE2510 MKII remote display module
DSE2520 MKII	DSE2520 MKII remote display module
DSE2500 MKII, DSE25xx MKII	DSE25xx MKII range remote display modules.
CAN	Controller Area Network Vehicle standard to allow digital devices to communicate to one another.
CDMA	Code Division Multiple Access. Cell phone access used in small number of world areas including parts of the USA and Australia.
CT	Current Transformer An electrical device that takes a large AC current and scales it down by a fixed ratio to a smaller scale.
BMS	Building Management System A digital/computer based control system for a building's infrastructure.
DEF	Diesel Exhaust Fluid (AdBlue) A liquid used as a consumable in the SCR process to lower nitric oxide and nitrogen dioxide concentration in engine exhaust emissions.
DM1	Diagnostic Message 1 A DTC that is currently active on the engine ECU (ECM).
DM2	Diagnostic Message 2 A DTC that was previously active on the engine ECU (ECM) and has been stored in the ECU's (ECM) internal memory.
DPF	Diesel Particulate Filter A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas.
DPTC	Diesel Particulate Temperature Controlled Filter A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas which is temperature controlled.
DTC	Diagnostic Trouble Code The name for the entire fault code sent by an engine ECU (ECM).
ECU/ECM	Engine Control Unit/Management An electronic device that monitors engine parameters and regulates the fuelling.
FMI	Failure Mode Indicator A part of DTC that indicates the type of failure, e.g. high, low, open circuit etc.
GSM	Global System for Mobile communications. Cell phone technology used in most of the World.

Continued over page…

Term	Description
HEST	High Exhaust System Temperature Initiates when DPF filter is full in conjunction with an extra fuel injector in the exhaust system to burn off accumulated diesel particulate matter or soot.
HMI	Human Machine Interface A device that provides a control and visualisation interface between a human and a process or machine.
IDMT	Inverse Definite Minimum Time
MSC	Multi-Set Communication
OC	Occurrence Count A part of DTC that indicates the number of times that failure has occurred.
PGN	Parameter Group Number A CAN address for a set of parameters that relate to the same topic and share the same transmission rate.
PLC	Programmable Logic Controller A programmable digital device used to create logic for a specific purpose.
SCADA	Supervisory Control And Data Acquisition A system that operates with coded signals over communication channels to provide control and monitoring of remote equipment
SCR	Selective Catalytic Reduction A process that uses DEF with the aid of a catalyst to convert nitric oxide and nitrogen dioxide into nitrogen and water to reduce engine exhaust emission.
SIM	Subscriber Identity Module. The small card supplied by the GSM/CDMA provider that is inserted into the cell phone, GSM modem or DSEGateway device to give GSM/GPRS connection.
SMS	Short Message Service The text messaging service of mobile/cell phones.
SPN	Suspect Parameter Number A part of DTC that indicates what the failure is, e.g. oil pressure, coolant temperature, turbo pressure etc.

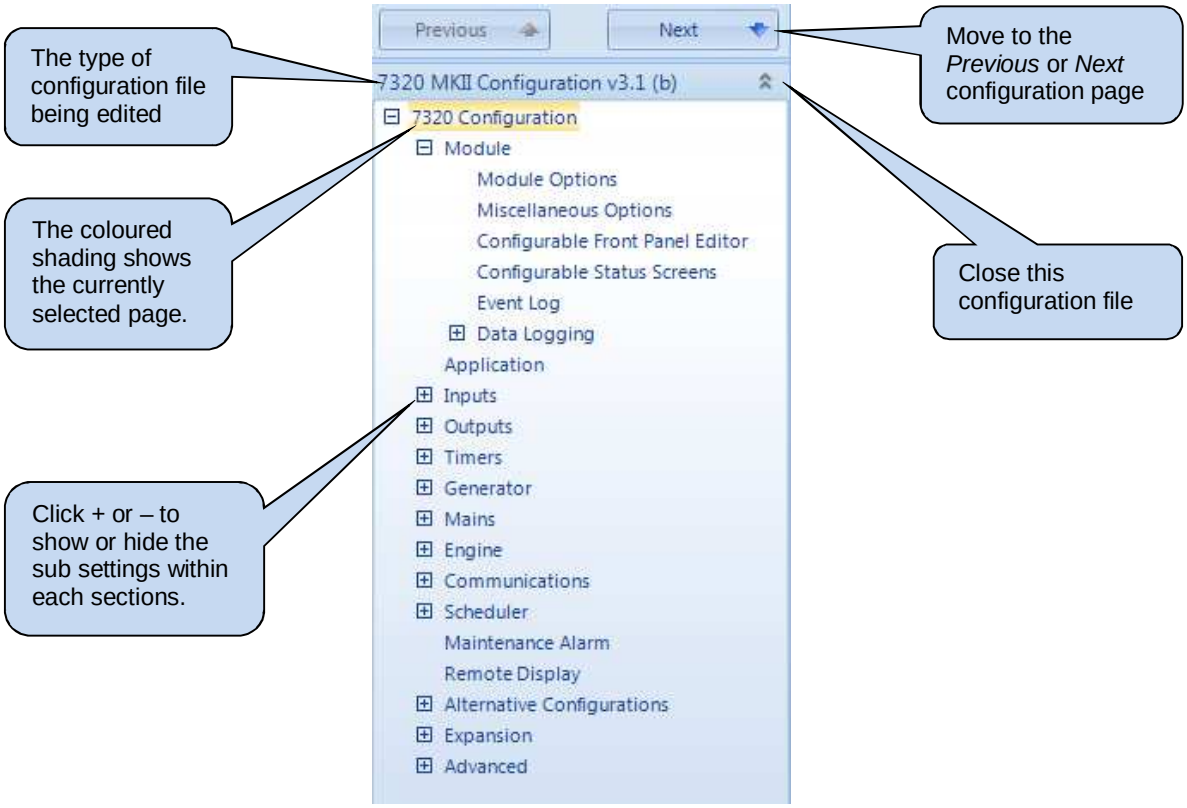
1.2 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

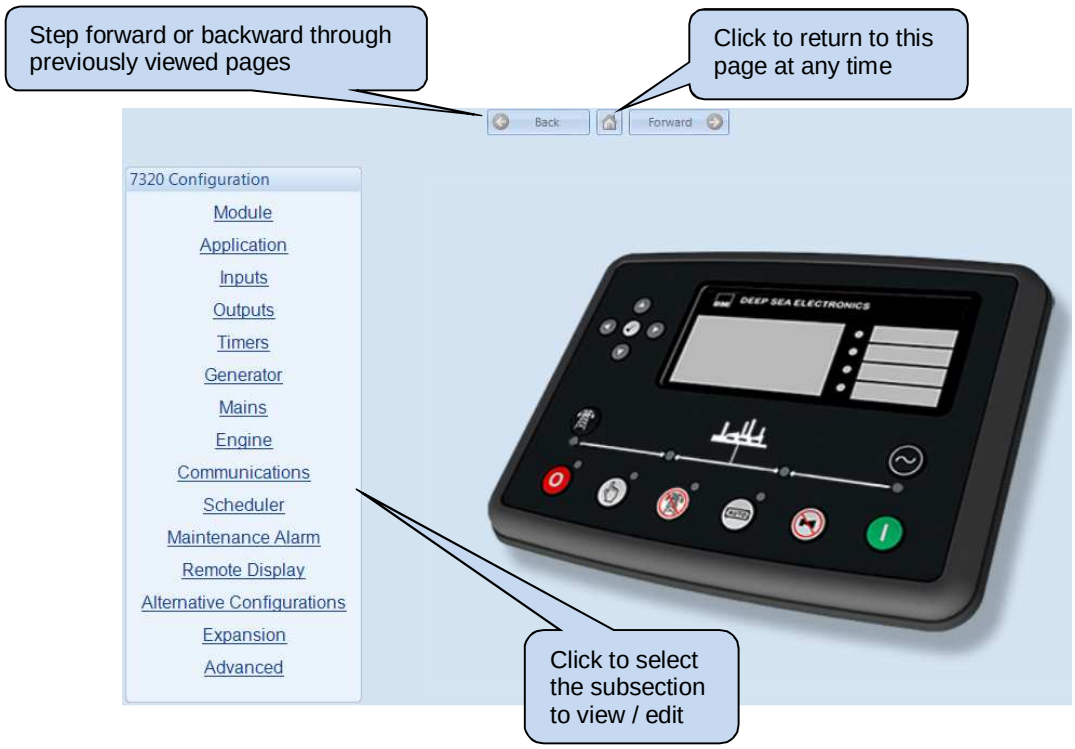
For information in regards to instating and using the DSE Configuration Suite Software please refer to DSE publication: ***057-151 DSE Configuration Suite PC Software Installation & Operation Manual*** which is found on our website: www.deepseaplc.com

2 EDITING THE CONFIGURATION

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

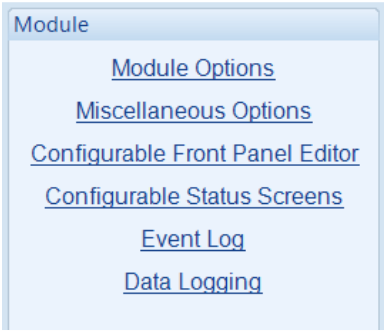
2.1 SCREEN LAYOUT



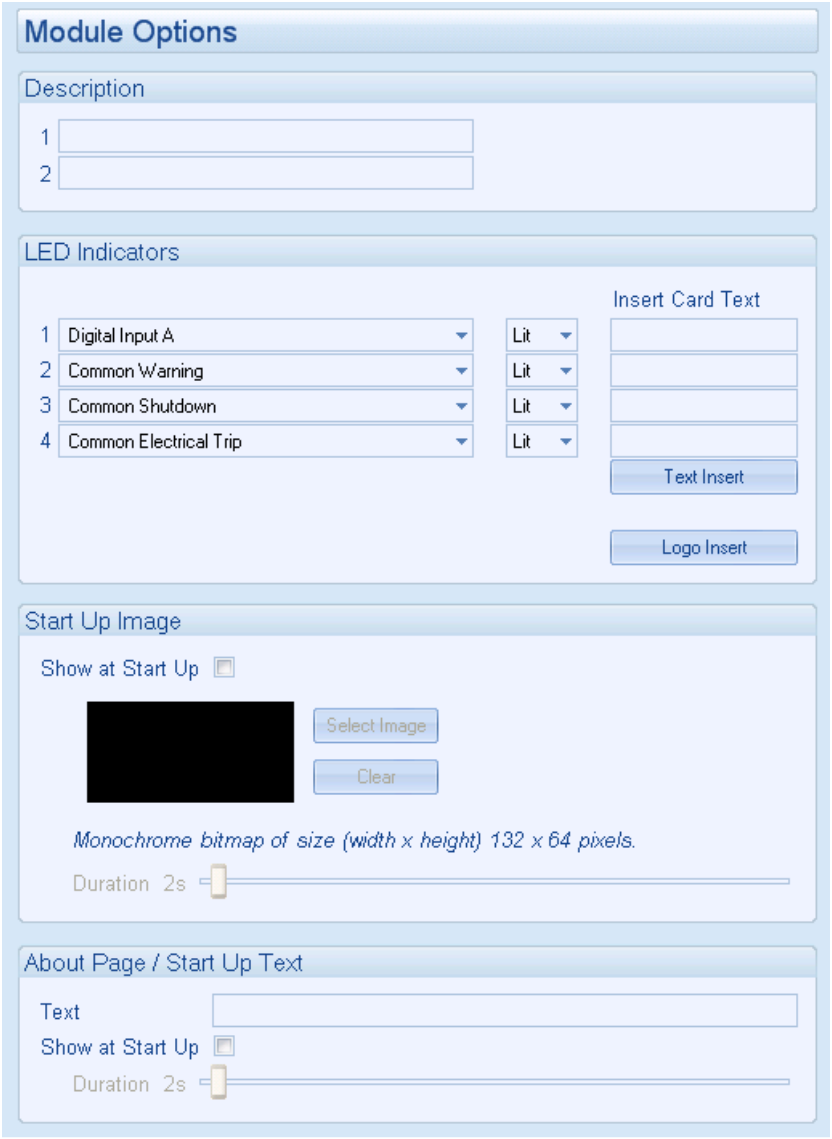


2.2 MODULE

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



2.2.1 MODULE OPTIONS



Parameters are detailed overleaf…

2.2.1.1 DESCRIPTION

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

2.2.1.2 LED INDICATORS

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

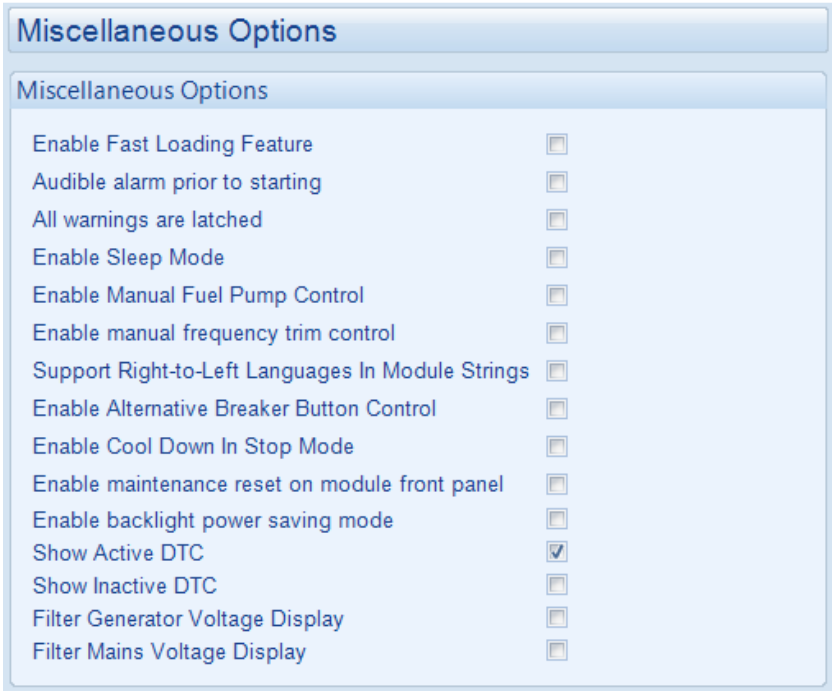
2.2.1.3 START UP IMAGE

Parameter	Description
Show at Start Up	☐ = Start Up screen is disabled ☑ = Enable a *Start Up Text* or *Image* to be displayed on the module's LCD at power up. 
Select Image	Browse and select the image file to display at power up. The file required has to be a monochrome bitmap image of size 132 pixels in width by 64 pixels in height.
Clear	Clears the image file selection
Duration	Set the duration for which the *Start Up Image* is displayed at power up

2.2.1.4 ABOUT PAGE / START UP TEXT

Parameter	Description
Text	Enter custom text to show under the *About* screen on the module's display
Show at Start Up	☐ = *Start Up Text* is disabled ☑ = Enable to display the *Start Up Text* on the module's LCD at power up. When the *Start Up Image* is enabled, this text is shown after the *Start Up Image.*
Duration	Set the duration for which the *Start Up Text* is displayed when the module is powered up.

2.2.2 MISCELLANEOUS OPTIONS



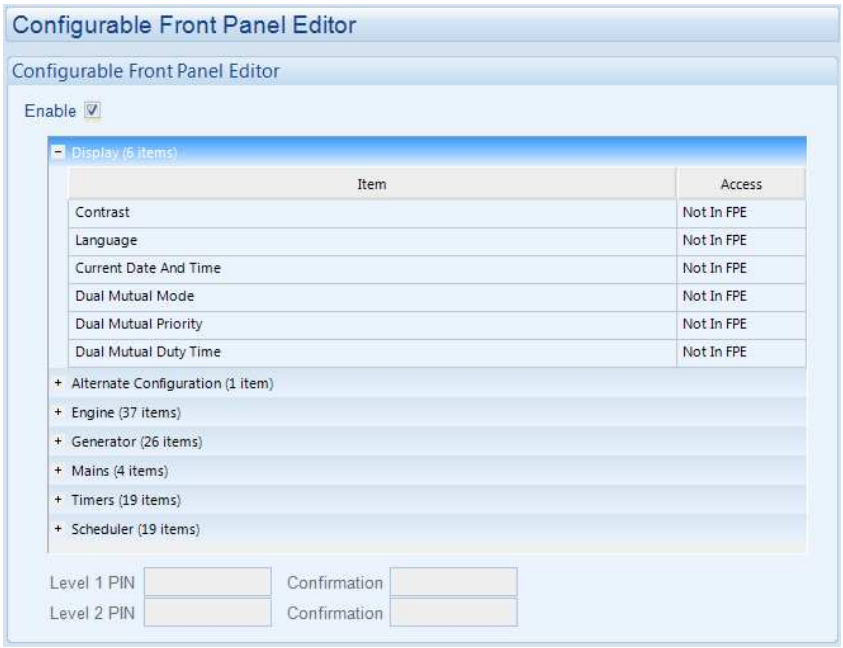
Parameter	Description
Enable Fast Loading	**NOTE: Enabling Fast Loading is only recommended where steps have been taken to ensure rapid start up of the engine is possible. (For example when fitted with engine heaters, electronic governors etc.)** ☐ = Normal Operation, the safety on timer is observed 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 leads to overspeed alarms on start up. ☑ = The module terminates 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.
Audible alarm prior to starting	☐ = The module start the engine with no audible indication ☑ = The module gives an audible warning during the pre-start sequence as an indicator that the set is about to run. This is often a site's specification requirement of AUTO mode operation.
All warnings are latched	☐ = Normal Operation, the warnings and pre-alarms automatically reset once the triggering condition has cleared. ☑ = Warnings and pre-alarms latch when triggered. Resetting the alarm is performed by either an external reset applied to one of the inputs or, the 'Stop/Reset' pushbutton operated (once the triggering condition has been cleared).
Enable Sleep Mode	☐ =Normal operation ☑ = Module goes into sleep (low current) mode after inactivity in STOP mode for the configured *Sleep Timer* time in *Module Timers* section. Press any button to 'wake' the module. **NOTE: When the Sleep Mode on the DSE73xx MKII is enabled and connected to the DSE25xxMKII Remote Display, pressing any button on the Remote Display module causes the DSE73xx MKII to go out from the Sleep Mode.**

Parameters are continued overleaf…

Parameter	Description
Enable Manual Fuel Pump Control	☐ =Normal operation ☑ =Allows manual fuel pump control when the “fuel level” instrument is being viewed.
Enable manual frequency trim control	☐ = Normal operation ☑ = When speed control over CAN is available, this allows manual speed trim control through the *Front Panel Running Editor*.
Support Right-To-Left Languages in Module Strings	Determines the direction of text input where supported (i.e. configurable input text) ☐ =left to right language support ☑ =right to left language support
Enable Alternative Breaker Control Button	Controls the operation of the fascia mounted load switch control buttons (manual mode only) ☐ =Normal operation, pressing the respective load switch control button causes the supply to go on load, if it was available. Only a transfer is possible without the ability to open both breakers. ☑ =Alternative operation. If a supply is on load and that supply’s load switch button is pressed, the load switch opens. Pressing the button again closes the button. Pressing the ‘other’ button when a supply is on load causes a transfer to the ‘other’ supply (if available).
Enable Cooldown in Stop Mode	☐ =Normal operation. Pressing the Stop button instantly opens the load switch and stops the generator. ☑ =Alternative operation. Pressing the Stop button instantly opens the load switch and puts the generator into a cooling run. Pressing the Stop button again instantly stops the generator.
Enable Maintenance Reset on Module Front Panel	☐ = The maintenance alarms are only reset through the SCADA section of the DSE Configuration Suite software or digital input if configured. ☑ = The maintenance alarms are also reset by scrolling to the maintenance page on the module. By pressing and holding the *Stop / Reset* button on each alarm, the operator is able to reset each individual alarm.
Enable Backlight Power Saving Mode	Enables DC power saving by turning off the LCD Backlight when the module is not operated for the duration of the *Backlight Timer*.
Show Active DTC **ECU / ECM Only**	Enable this option to show the active ECU / ECM fault codes on the module display. (Active DTC are also called DM1 in J1939 ECU)
Show Inactive DTC **ECU / ECM Only**	Enable this option to show the in-active ECU (ECM) DTC on the module display. Inactive DTCs are the historical log of the ECU, where previous alarms have been cleared from the active DTC list. (Inactive DTC are called DM2 in J1939).
Filter Generator Voltage Display	☐ = The Generator Voltage Display is refreshed quickly in order to display all voltage flucutations. ☑ = The Generator Voltage Display is filtered, slowing down the refresh rate. Ths is in order to provide a smooth and stable reading during voltage flucations.
Filter Mains Voltage Display	☐ = The Mains Voltage Display is refreshed quickly in order to display all voltage flucutations. ☑ = The Mains Voltage Display is filtered, slowing down the refresh rate. Ths is in order to provide a smooth and stable reading during voltage flucations.

2.2.3 CONFIGURABLE FRONT PANEL EDITOR

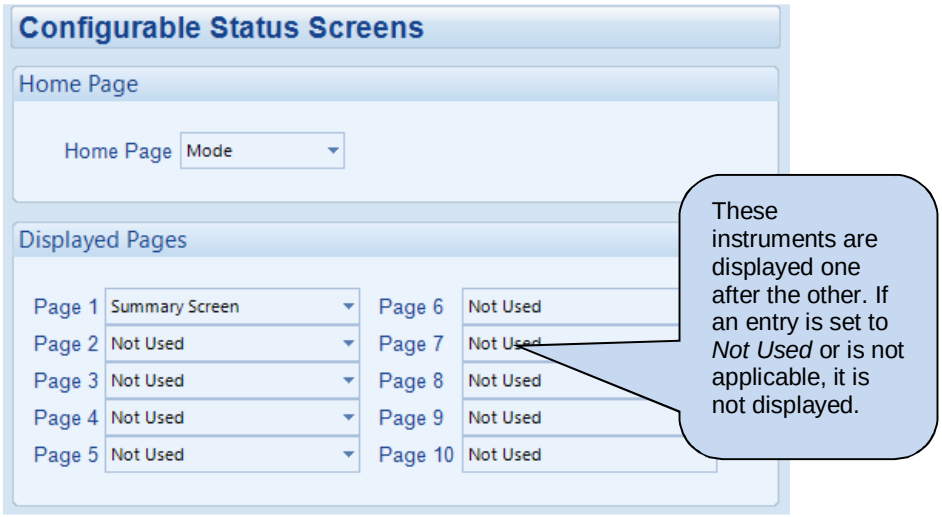
The Configurable Front Panel Editor allows generator OEMs to create a PIN protected, customised Front Panel Editor with up to two security access levels. Items may be added or removed as required by the generator supplier.



Items	Description
Access	Permits the relevant item to be edited through the Front Panel Editor of the DSE73xx MKII controller. **Not in FPE:** The item cannot be edited through the Front Panel Editor **No PIN:** Allowing access to edit the item with no PIN **Level 1 PIN:** The Front Panel Editor asks for the configured *Level 1 PIN* to allow access to the relevant item. **Level 2 PIN:** The Front Panel Editor asks for the configured *Level 2 PIN* to allow access to the relevant item.
Level 1 PIN	Set four digit PIN number, then repeat the PIN in the *Confirmation* to configure *Level 1 PIN* for this access level.
Level 2 PIN	Set four digit PIN number, then repeat the PIN in the *Confirmation* to configure *Level 2 PIN* for this access level.

2.2.4 CONFIGURABLE STATUS SCREENS

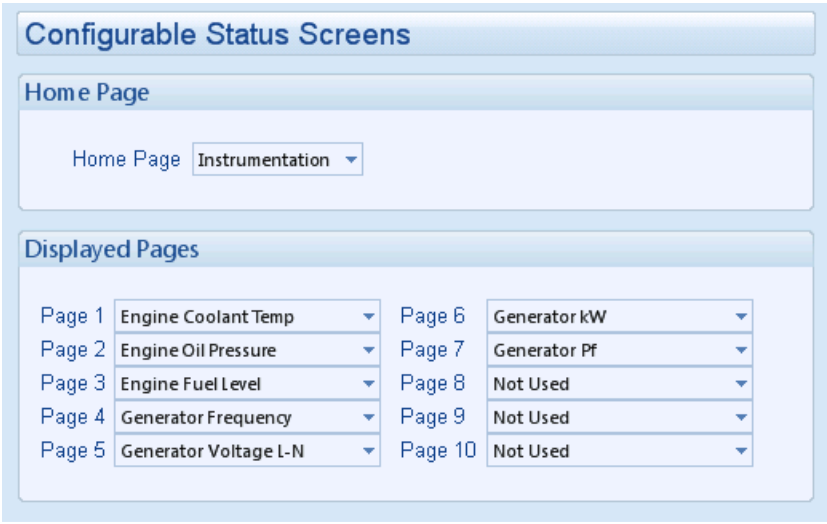
Configurable Status Screens allow the operator to design the default screen to match the requirements of the application.



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

Example

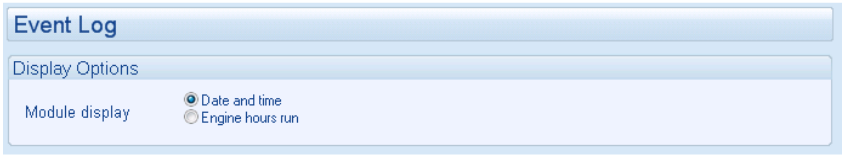
In the example below, the home page is configured to scroll through a preset of parameters. Depending on the application, the system designer selects the instrumentation parameters that are most important to constantly show on the module.



2.2.5 EVENT LOG

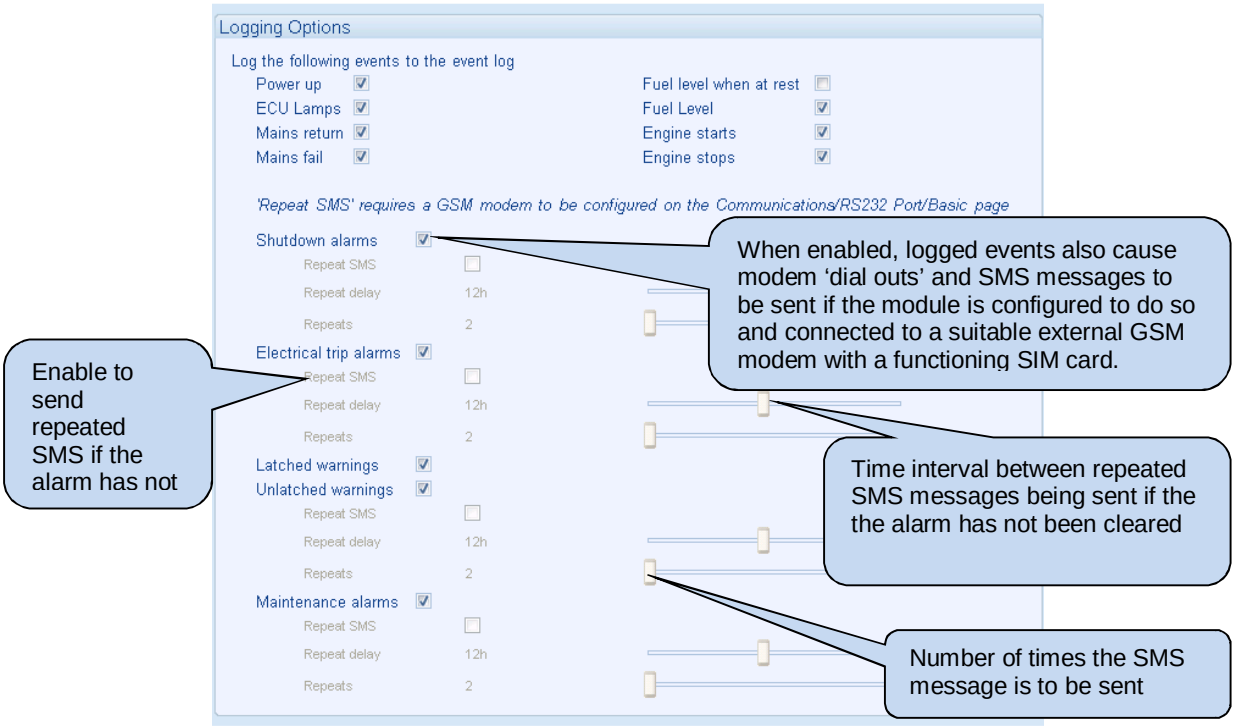
2.2.5.1 DISPLAY OPTIONS

The *Module Display* option allows the operator to choose between `Date and Time` or `Engine Hours` displayed on the screen.



2.2.5.2 LOGGING OPTIONS

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



Parameter	Description
Power Up	☐ = Power up events are not logged in the module's event log ☑ = Power up events are logged when the DC Supply is applied to the module or whenever the module is rebooted
ECU (ECM) Lamps	☐ = The ECU (ECM) alarm lamps signals are not logged in the module's event log ☑ = Logs the alarm lamp signals generated by the ECU (ECM)
Mains Fail	☐ = The Mains Fail events are not logged in the module's event log ☑ = Logs the Mains Failure events
Mains Return	☐ = The Mains Return events are not logged in the module's event log ☑ = Logs the Mains Return events
Shutdown Alarms	☐ = The Shutdown Alarms are not logged in the module's event log ☑ = Logs the Shutdown alarms
Electrical Trip Alarms	☐ = The Electrical Trip Alarms are not logged in the module's event log ☑ = Logs the Electrical Trip alarms
Warning Alarms	☐ = The Warning Alarms are not logged in the module's event log ☑ = Logs the Warning Alarms
Maintenance Alarms	☐ = The Maintenance Alarms are not logged in the module's event log ☑ = Logs the Maintenance alarms

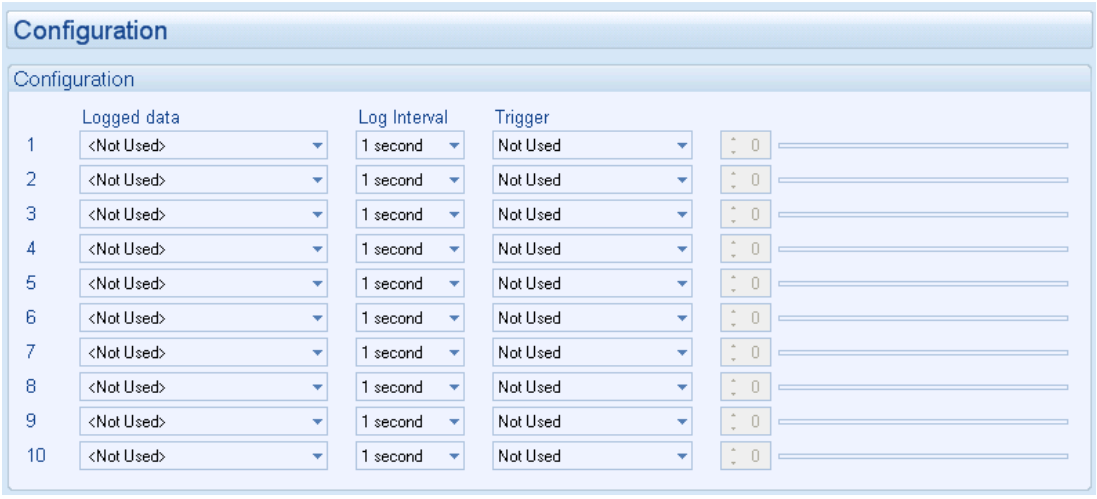
2.2.5.3 ENGINE DTC LOGGING

Parameter	Description
Always	When selected, DTCs are immediately logged upon occurrence
Never	Select to disable Engine DTC logging
Shutdowns and Warnings	When selected, Engine DTCs are logged when an ECU Shutdown or ECU Warning occurs, the timestamp for the DTC in the event log is that of the Shutdown or Warning
Shutdowns Only	When selected, Engine DTCs are logged when an ECU Shutdown occurs, the timestamp for the DTC in the event log is that of the Shutdown

2.2.6 DATA LOGGING

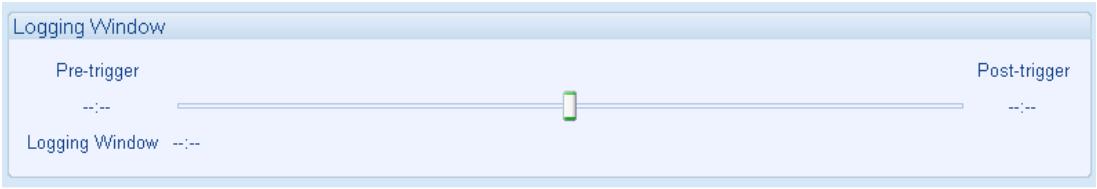
The module holds a rolling temporary store of up to ten parameters. This is saved to the *Data Log* when any of the parameters exceed its configurable *Trigger* or on an *External Trigger* such as an alarm.
A configurable trigger point allows the logged data to be both *Pre-Trigger* and *Post-Trigger*.
The size of the *Data Logging Window* varies upon the number of selected parameters and their *Logging Interval*.
The *Data Logging* is viewed using the *Data Log Viewer* application, which is accessed from the DSE Configuration Suite PC Software under the *Tools* menu.

2.2.6.1 CONFIGURATION



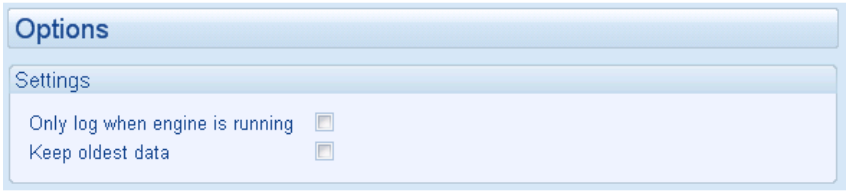
Parameter	Description
Logged Data	Select the instrument required to be logged
Log Interval	Select the logging interval of the data
Trigger	Select when the instrument is logged compared to the configurable value of the slider

2.2.6.2 LOGGING WINDOW



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

2.2.6.3 OPTIONS



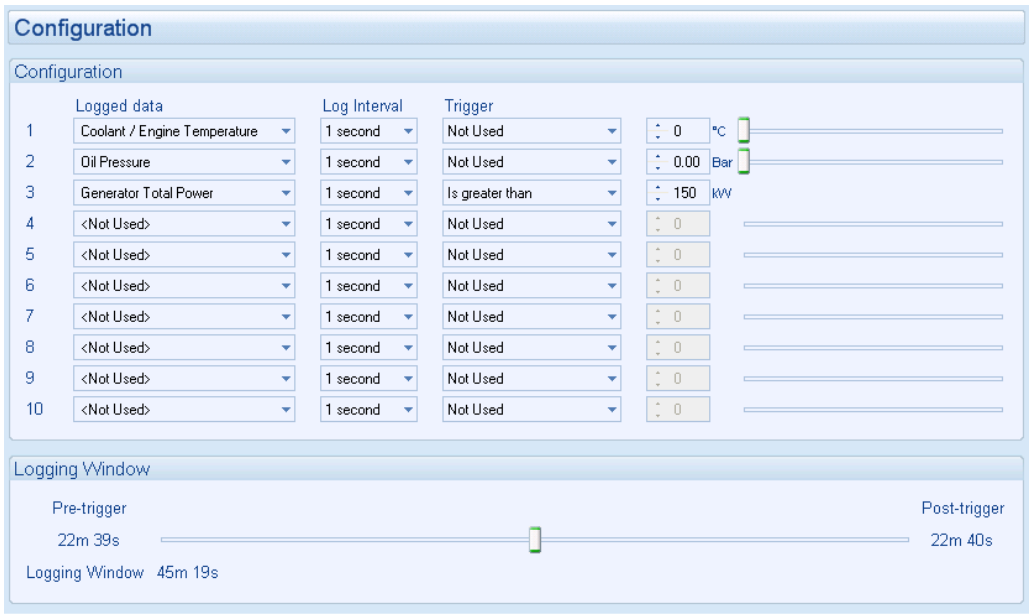
Parameter	Description
Only Log When Engine is Running	☐ = The module logs data regardless of engine running state. ☑ = The module only logs data when the engine is running.
Keep Oldest Data	☐ = When the logging memory is full, the module overwrites the oldest data first with the new data. ☑ = When the logging memory is full, the module stops recording new data.

2.2.6.4 EXTERNAL TRIGGERS

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

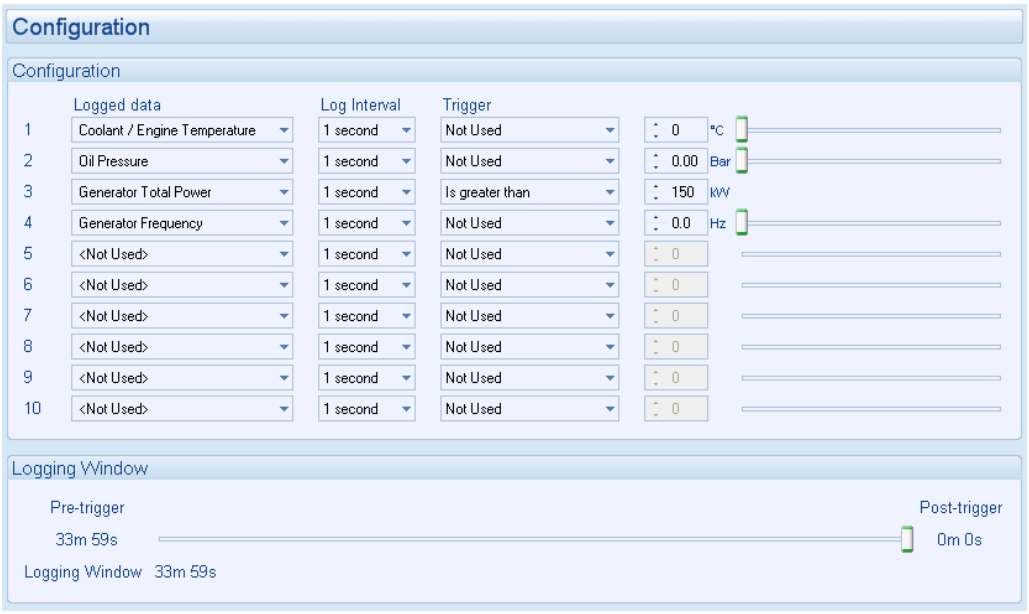
Example 1

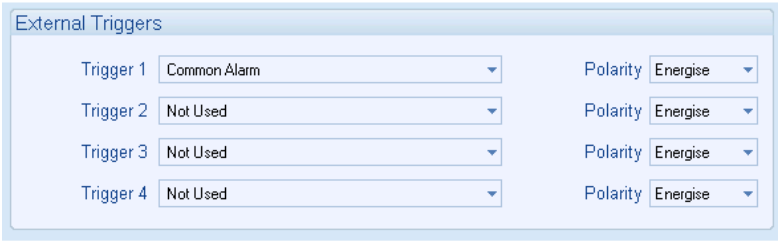
In the example below, the selected three parameters are logged when the *Generator Total Power* exceeds the set trip level of 150 kW.
The *Data Log* in the module contains the values of these three parameters for the duration of the *Logging Window*, that is 22 m 39 s before the *Generator Total Power* exceeded 150 kW and 22 m 40 s after that.



Example 2

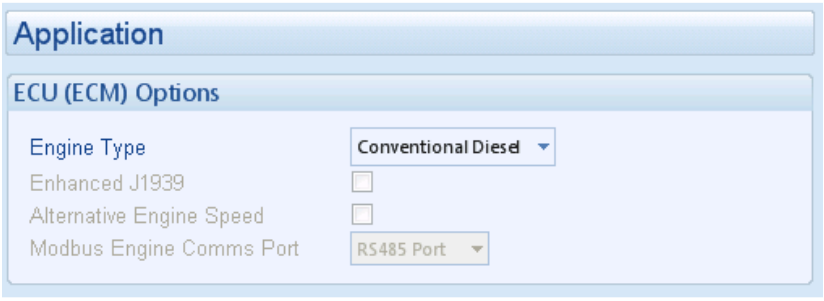
In the example below, the selected four parameters are logged when a *Common Alarm* occurs on the controller. The *Data Log* in the module contains the values of these four parameters for the duration of the *Logging Window*, that is 33 m 59 s before the *Alarm* ocurred.





2.3 APPLICATION

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



Parameter	Description
Engine Type	Select the appropriate engine type ***Conventional Engine:*** Select this for a traditional (non-electronic) engine, either Energise to Run or Energise to Stop. ***Conventional Gas Engine:*** Select this for a traditional (non-electronic) engine and require Gas engine functionality. This enables control of configurable outputs for *Gas Choke and Gas Ignition* and instructs the module to follow the gas engine timers. ***Other Engines:*** The list of supported CAN (or MODBUS) engines is constantly updated, check the DSE website at www.deepseaplc.com for the latest version of Configuration Suite software.
Enhanced J1939	☐ = The module reads 'Basic' instrumentation from the engine ECU (ECM) and display (where supported by the engine) : • Engine Speed • Oil Pressure • Engine Coolant Temperature • Hours Run ☑ = The module reads and display an 'Enhanced' instrumentation list (where supported by the engine) : • Engine Speed • Engine Speed Biasing (Subject to *ECM Speed Control* setting) • Oil Pressure • Engine Coolant Temperature • Hours Run • Engine Oil Temperature • Exhaust Temperature • Fuel Pressure • Total Fuel used • Fuel Consumption • Inlet Manifold Temperature • Coolant Pressure • Turbo Pressure Where an instrument is not supported by the engine ECU (ECM), the instrument is not displayed. DSE Reserve the right to change these lists in keeping with our policy of continual development.

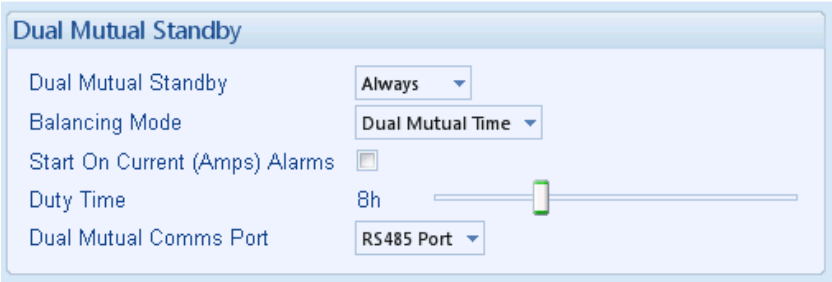
Parameters are continued overleaf…

Parameter	Description
Alternative Engine Speed	☐ = The engine is instructed to run at its *Nominal Speed* as configured by the Engine Manufacturer. ☑ = The engine is instructed to run at its *Alternative Speed* as configured by the Engine Manufacturer.
MODBUS Engine Comms Port	***RS485 Port :*** The modules RS485 port is used to communicate to the engine (when a MODBUS engine type is selected. ***DSENet Port :*** The modules DSENet port is used to communicate to the engine (when a MODBUS engine type is selected. This 'frees' the RS485 port in case connection to BMS or other RS485 compatible equipment is required.

2.3.1 DUAL MUTUAL STANDBY

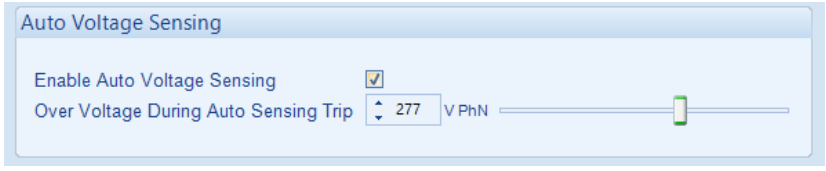
When a start request is available, the module in duty starts the generator set to supply power to the load. The start request is initiated by one of the following:
Activation of a digital input configured as *Remote Start on Load*
Mains Failure **(DSE7320MKII Only)**

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



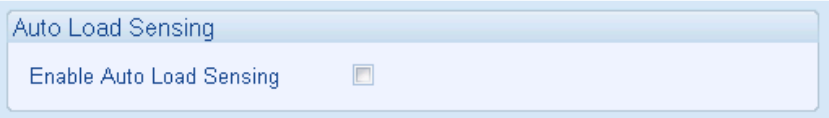
Parameter	Description
Dual Mutual Standby	Select when the feature is active ***Disabled***: The module operates as a standalone controller ***Always:*** The *Dual Mutual Standby* is always active ***On Input:*** The *Dual Mutual Standby* is only active when a digital input configured for *Dual Mutual Standby* is active. This allows an external device or switch to enable/disable the feature.
Balancing Mode	Select how the modules are chosen for *Dual Mutual Standby* duty run ***Dual Mutual Time:*** Load balancing is based upon the configuration of the *DutyTime*, the modules duty runs change over at the configured *Duty Time* intervals. ***Engine Hours:*** The *Dual Mutual Standby* is based upon the difference in engine run hours, the modules change over when the difference in *Engine Hours* is higher than the configured *Duty Time* ***Set Priority:*** The *Dual Mutual Standby* is based upon the *MSC Priority* set in the *SCADA*
Start On Current (Amps) Alarms	When a *Current Alarm* occurs on the module in duty, this controller initiates the starting sequence. The alarms are: ***Generator Overcurrent IDMT*** ***Generator Earth Fault*** ***Generator Short Circuit***
Duty Time	Defines the hours difference the module maintains with the other controllers in *Dual Mutual Standby.*Based on the *Balancing Mode* selection, this defines *DutyTime* or the *Engine Hours* difference. The modules change over when the difference in hour meters is higher than the configured *Duty Time* or *Engine Hours* (whichever is selected).
Dual Mutual Comms Port	Select the communication port used for the *Dual Mutual Standby:* ***RS485*** ***RS232***

2.3.2 AUTO VOLTAGE SENSING



Option	Description
Enable Auto Voltage Sensing	☐ = The module operates as normal. ☑ = *Auto Votlage sensing* is enabled. When the generator is called to run, if alternative configurations are enabled, the module detects the most suitable configuration based on the voltage output of the set.

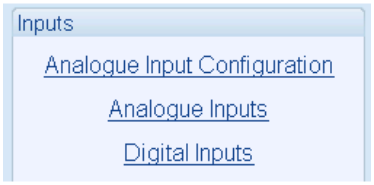
2.3.3 AUTO LOAD SENSING



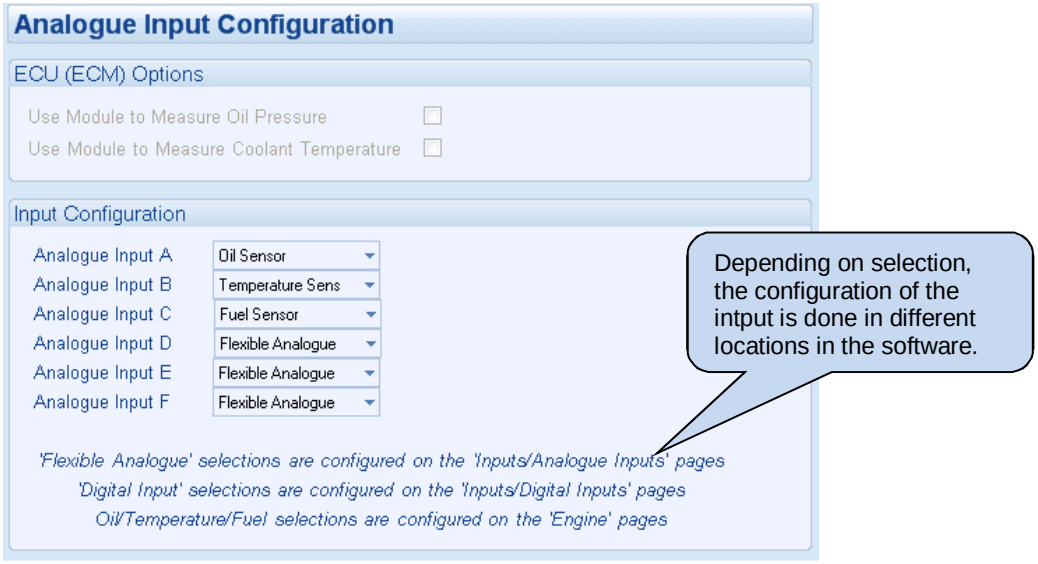
Option	Description
Enable Auto Load Sensing	☐ = The module operates as normal. ☑ = *Auto load sensing* is enabled. When called to run off load, if a load is detected, the module forces the load switch to close (if connected) and enables the cooldown timer when the set is requested to stop. This is to ensure the set is cooled down before stopping after running with an unexpected load(ie. In a manual load switch system).

2.4 INPUTS

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



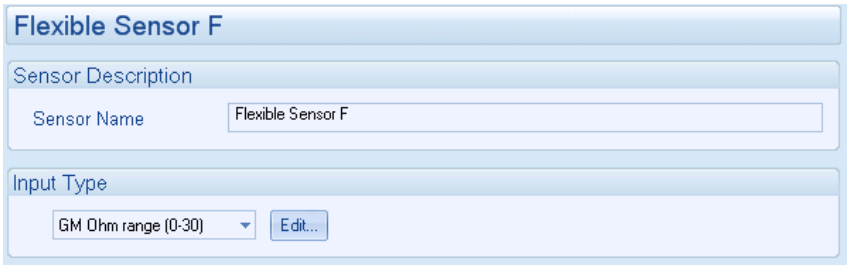
2.4.1 ANALOGUE INPUT CONFIGURATION



Parameter	Description
Module To Measure Oil Pressure	(Available only when the module is configured for connection to a CAN engine.) ☐ = The measurements are taken from the ECU (ECM). ☑ = The module ignores the CAN measurement and uses the analogue sensor input.
Module To Measure Coolant Temperature	(Available only when the module is configured for connection to a CAN engine.) ☐ = The measurements are taken from the ECU. ☑ = The module ignores the CAN measurement and uses the analogue sensor input.
Analogue Input A	Select what the analogue input is to be used for: ***Digital Input:*** Configured on the *Inputs/Digital Inputs* pages ***Flexible Analogue:*** Configured on the *Inputs/Analogue Inputs* pages ***Fuel Sensor:*** Configured on the *Engine* pages ***Not Used:*** The input is disabled ***Oil Sensor:*** Configured on the *Engine* pages ***Temperature Sensor:*** Configured on the *Engine* pages
Analogue Input B, C, D, E, and F	Select what the analogue input is to be used for: ***Digital Input:*** Configured on the *Inputs/Digital Inputs* pages ***Flexible Analogue:*** Configured on the *Inputs/Analogue Inputs* pages ***Fuel Sensor:*** Configured on the *Engine* pages ***Not Used:*** The input is disabled ***Temperature Sensor:*** Configured on the *Engine* pages

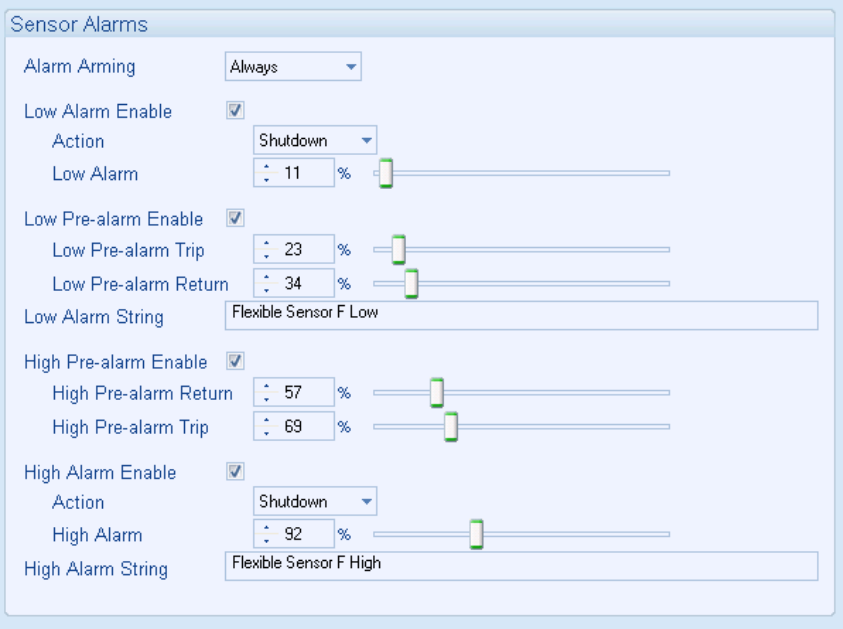
2.4.2 FLEXIBLE SENSOR F

Analogue input D is configured for *Flexible Sensor.*



Parameter	Description
Sensor Name	Enter the *Sensor Name*, this text is shown on the module display when a sensor alarm activates
Input Type	Select the sensor type and curve from a pre-defined list or create a user-defined curve ***Current:*** for sensors with maximum range of 0 mA to 20 mA ***Resistive:*** for sensors with maximum range of 0 Ω to 480 Ω ***Voltage:*** for sensors with maximum range of 0 V to 10 V ***Pressure:*** The input is configured as a pressure sensor ***Percentage:*** The input is configured as a percentage sensor ***Termperature:*** The input is configured as a temperature sensor

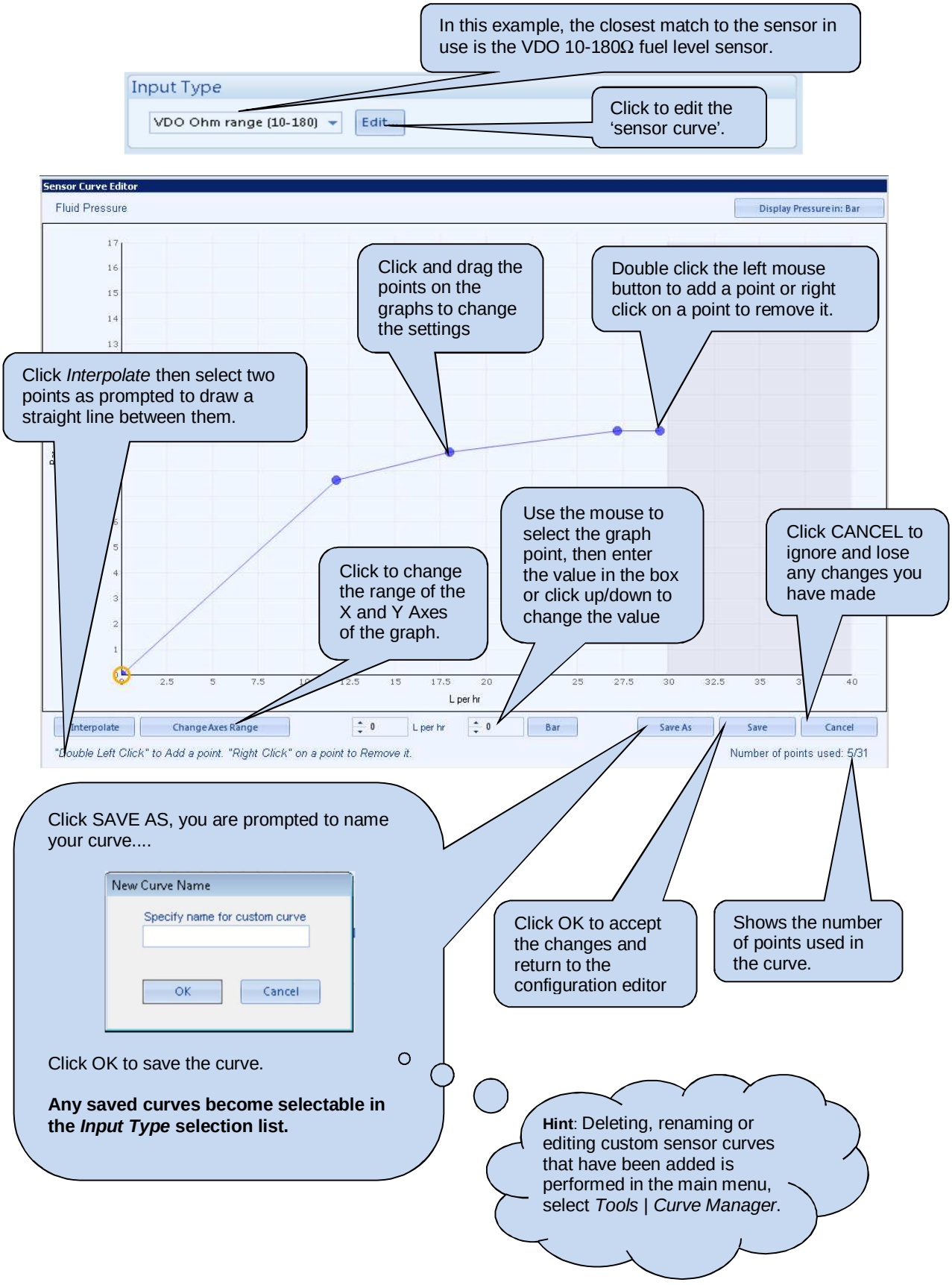
Parameter	Description
Enable Alarm	☐ = The Alarm is disabled. ☑ = The module detects an open circuit when the sensor is disconnected
Alarm String	Enter the text that is shown on the display when the alarm occurs



Parameter	Description
Alarm Arming	Select when the input becomes active: ***Always:*** The input state is always monitored ***From Safety On:*** The state of the input is monitored from the end of the *Safety On Delay* timer ***From Starting:*** The state of the input is only monitored from engaging the crank
Low Alarm Enable	☐ = The Alarm is disabled. ☑ = The *Low Alarm* is active when the measured quantity drops below the *Low Alarm* setting.
Low Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☑ = The *Low Pre-Alarm* is active when the measured quantity drops below the *Low Pre-Alarm* setting. The *Low Pre-Alarm* is automatically reset when the measured quantity rises above the configured *Low Pre-Alarm Return* level.
High Pre-Alarm Enable	☐ = The Pre-Alarm is disabled. ☑ = The *High Pre-Alarm* is active when the measured quantity rises above the *High Pre-Alarm* setting. The *High Pre-Alarm* is automatically reset when the measured quantity falls below the configured *High Pre-Alarm Return* level.
High Alarm Enable	☐ = The Alarm is disabled. ☑ = The *High Alarm* is active when the measured quantity rises above the *High Alarm* setting.

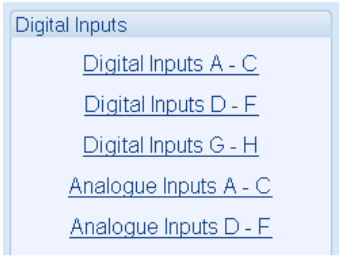
2.4.3 EDITING THE SENSOR CURVE

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

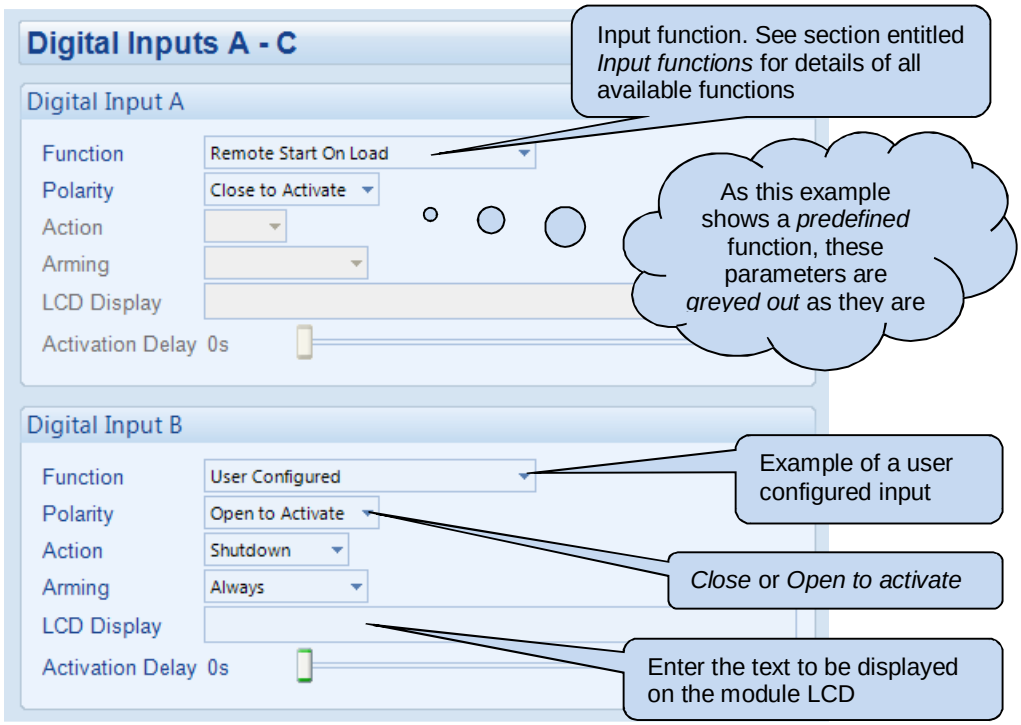


2.4.4 DIGITAL INPUTS

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

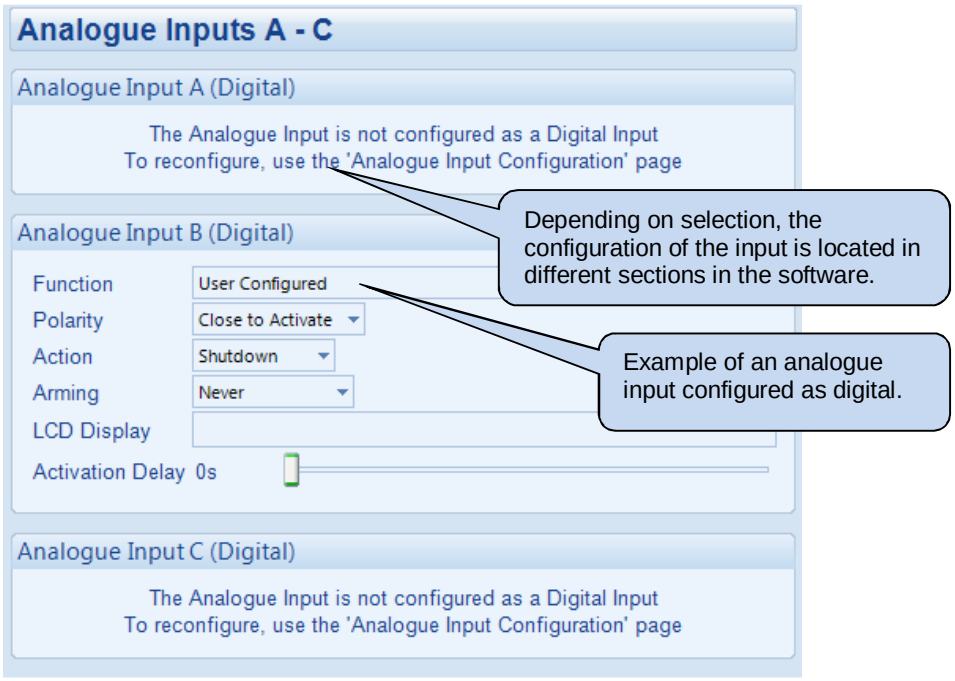


2.4.4.1 DIGITAL INPUTS



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

2.4.5 ANALOGUE INPUTS



2.4.6 INPUT FUNCTIONS

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

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

 **= Only applicable to DSE7320 MKII AMF Modules**

Function	Description
Alarm Mute	This input is used to silence the audible alarm from an external source, such as a remote mute switch.
Alarm Reset	This input is used to reset any latched alarms from a remote location. It is also used to clear any latched warnings which may have occurred (if configured) without having to stop the generator.
Alternative Configuration	These inputs are used to instruct the module to follow the *alternative* configuration settings instead of the *main* configuration settings.
Auto Restore Inhibit  IEEE 37.2 - 3 Checking Or Interlocking Relay	In the event of a remote start/mains failure, the generator is instructed to start and take load. On removal of the remote start signal/mains return the module continues to run the generator on load until the *Auto Restore Inhibit* input is removed. This input allows the controller to be fitted as part of a system where the restoration to mains is controlled remotely or by an automated system.
Auto Start Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide an over-ride function to prevent the controller from starting the generator in the event of a remote start/mains out of limits condition occurring. If this input is active and a remote start signal/mains failure occurs the module does not give a start command to the generator. If this input signal is then removed, the controller operates as if a remote start/mains failure has occurred, starting and loading the generator. This function is used to give an **‘AND’** function so that a generator is only called to start if the mains fails and another condition exists which requires the generator to run. If the ‘Auto start Inhibit’ signal becomes active once more it is ignored until the module has returned the mains supply on load and shutdown. This input does not prevent starting of the engine in MANUAL mode.
Auxiliary Mains Fail 	The module monitors the incoming single or three phase supply for Over voltage, Under Voltage, Over Frequency or Under frequency. It may be required to monitor a different mains supply or some aspect of the incoming mains not monitored by the controller. If the devices providing this additional monitoring are connected to operate this input, the controller operates as if the incoming mains supply has fallen outside of limits, the generator is instructed to start and take the load. Removal of the input signal causes the module to act if the mains has returned to within limits providing that the mains sensing also indicates that the mains is within limits.
Close Generator IEEE 37.2 - 52 AC Circuit Breaker	Closes the Generator load switch when the generator is available. Used to simulate the *Close Generator Breaker* button externally.
Coolant Temperature Switch IEEE 37.2 – 26 Apparatus Thermal Device	This input is used to give a *Coolant Temperature High* shutdown from a digital normally open or closed switch. It allows coolant temperature protection.
Disable Protections	The system designer provides this switch (not DSE) so its location varies depending upon manufacturer, however it normally takes the form of a key operated switch to prevent inadvertent activation. Depending upon configuration, a warning alarm is generated when the switch is operated. When active, and the module is suitably configured (see section entitled ‘Advanced’) this prevents the engine being stopped upon critical alarm (Sometimes called Battle-Short Mode, War Mode or Run to Destruction)

Function	Description
DPF Auto Regen Inhibit	This input is used to override the ECU (ECM) function and prevent the automatic regeneration of the diesel particulate filter
DPF Force Regeneration	This input is used to override the ECU (ECM) function and activate the regeneration of the diesel particulate filter
DPF Regeneration Interlock	This input is used to stop a manual regeneration from occurring
Droop Enable	This input is used to switch the engine into droop mode on CAN engines that support this function.
Dual Mutual Standby	This input activates the *Dual Mutual Standby* functionality. This is described fully in the section entitled *Module* elsewhere in this manual.
EJP1	For the French EJP (Effacement Jours de Pointe) tarrif system. This input is functionally identical to *Remote Start Off Load.* When this input is active, operation is similar to the 'Remote Start on load' function except that the generator is not instructed to take the load. This function is also used where an engine only run is required e.g. for exercise.
EJP2	For the French EJP (Effacement Jours de Pointe) tarrif system. This input is functionally identical to *Remote Start On Load.* In auto mode, the module performs the start sequence and transfers load to the generator. In Manual mode, the load is transferred to the generator if the engine is already running, however in manual mode, this input does not generate start/stop requests of the engine.
External Panel Lock	**NOTE: External control sources (i.e. Simulate Start Button) are not affected by the external panel lock input and continue to operate normally.** This input is used to provide security to the installation. When the External Panel lock input is active, the module does not respond to operation of the Mode select or Start buttons. This allows the module to be placed into a specific mode (such as Auto) and then secured. The operation of the module is not affected and the operator is still able to view the various instrumentation pages etc. (*Front panel configuration access is still possible while the system lock is active*).
Generator Closed Auxiliary IEEE 37.2 - 3 Checking or Interlocking Relay	This input is used to provide feedback to allow the module to give true indication of the contactor or circuit breaker switching status. It must be connected to the generator load switching device auxiliary contact.
Generator Load Inhibit IEEE 37.2 - 52 AC Circuit Breaker	**NOTE: This input only operates to control the generator-switching device if the module load switching logic is attempting to load the generator. It does not control the generator switching device when the mains supply is on load.** This input is used to prevent the module from loading the generator. If the generator is already on load, activating this input causes the module to unload the generator. Removing the input allows the generator to be loaded again.
Inhibit Scheduled Run IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide a mean of disabling a scheduled run.
Inhibit SMS Remote Start	This input is used to provide a means of disabling remote starts by SMS
Lamp Test	This input is used to provide a test facility for the front panel indicators fitted to the module. When the input is activated all LEDs illuminate.
Low Fuel Level Switch IEEE 37.2 - 71 Liquid Level Switch	This input is used to allow feedback for low fuel level.
Main Config Select	This input is used to select the *Main* configuration when *Alternative Configurations* are enabled.

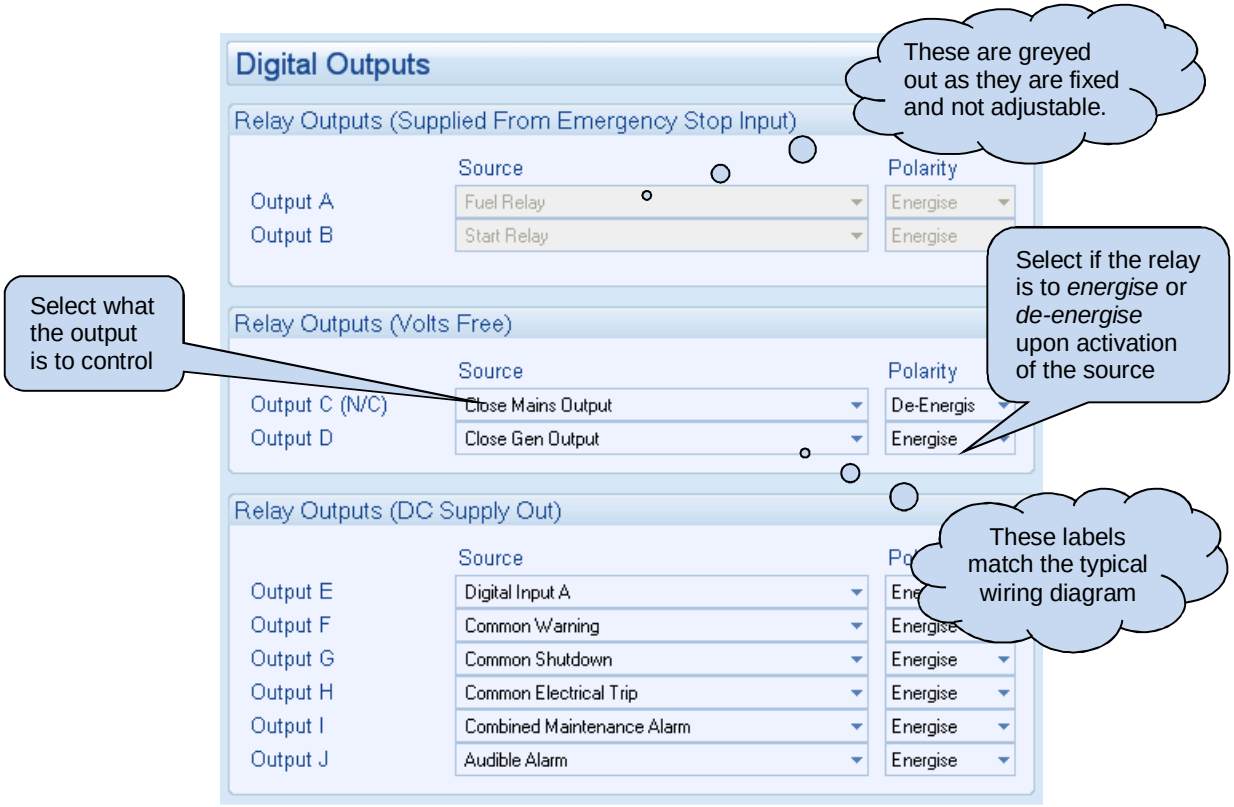
Function	Description
Mains Closed Auxiliary IEEE 37.2 - 3 Checking or Interlocking Relay	This input is used to provide feedback to allow the module to give true indication of the contactor or circuit breaker switching status. It is connected to the mains load switching device auxiliary contact. Incorrect application of this signal does not trigger an alarm condition, it is used solely for indication of the load switch status.
Mains Load Inhibit IEEE 37.2 - 3 Checking or Interlocking Relay	**NOTE: This input only operates to control the mains switching device if the module load switching logic is attempting to load the mains. It does not control the mains switching device when the generator is on load.** This input is used to prevent the module from loading the mains supply. If the mains supply is already on load activating this input causes the module to unload the mains supply. Removing the input allows the mains to be loaded again.
Manual Restore Contact IEEE 37.2 - 3 Checking or Interlocking Relay	Used to 'hold off' transfer back to the mains after a mains failure and keep the generator on load. Transfer back to the mains supply is held off in *Auto mode* while the input is present. Typically, a key switch provides this input with *spring return to closed* functionality.
Oil Pressure Switch IEEE 37.2 – 63 Pressure Switch	A digital normally open or closed oil pressure switch gives this input. It allows low oil pressure protection.
Open Generator IEEE 37.2 - 52 AC circuit breaker	Opens the generator breaker. Used to simulate the *Open Generator Breaker* button externally.
Remote Start Off Load	If this input is active, operation is similar to the 'Remote Start on load' function except that the generator is not instructed to take the load. This function is used where an engine only run is required e.g. for exercise.
Remote Start On Load	When in auto mode, the module performs the start sequence and transfer load to the generator. In Manual mode, the load is transferred to the generator if the engine is already running, however in manual mode, this input does not generate start/stop requests of the engine.
Reset Maintenance Alarm 1	Provides an external digital input to reset the maintenance alarm 1
Reset Maintenance Alarm 2	Provides an external digital input to reset the maintenance alarm 2
Reset Maintenance Alarm 3	Provides an external digital input to reset the maintenance alarm 3
Simulate Auto Button	**NOTE: If a call to start is present when AUTO MODE is entered, the starting sequence begins. Call to Start comes from a number of sources depending upon module type and configuration and includes (but is not limited to) : Remote start input present, Mains failure, Scheduled run, Auxiliary mains failure input present, Telemetry start signal from remote locations.** This input mimic's the operation of the 'Auto' button and is used to provide a remotely located Auto mode push button.
Simulate Lamp Test Button	This input is used to provide a test facility for the front panel indicators fitted to the module. When the input is activated all LED's illuminate. The input also serves a second function, in that it also provides a mute signal to silence the audible alarm. The input is recognised by the module as though it was the Push button on the module itself being operated.
Simulate Mains Available	This function is provided to override the module's internal monitoring function. If this input is active, the module does not respond to the state of the incoming AC mains supply.
Simulate Manual Button	This input mimic's the operation of the 'Manual' button and is used to provide a remotely located Manual mode push button.
Simulate Start Button	This input mimic's the operation of the 'Start' button and is used to provide a remotely located start push button.
Simulate Stop Button	This input mimic's the operation of the 'Stop' button and is used to provide a remotely located stop/reset push button.
Simulate Test on load button	This input mimics the operation of the 'Test' button and is used to provide a remotely located Test on load mode push button.

Function	Description
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.
Start in Manual Mode	Combined function input that instructs the module to enter **MANUAL MODE** and also perform the *START* function. Once the input is active, the module is placed into manual mode and the generator starts.
Stop and Panel Lock	Combined function input that instructs the module to enter *STOP* **mode** and also perform the *Panel Lock* function. Once the input is active, the module does not respond to operation of the mode select or start buttons. The operator is still able to view the various instrumentation pages etc. (*Front panel configuration access is still possible while the system lock is active*).
Transfer To Generator/Open Mains IEEE 37.2 - 52 AC Circuit Breaker	This input is used to transfer the load to the generator when running in MANUAL MODE
Transfer To Mains/ Open Generator IEEE 37.2-52 AC Circuit Breaker	This input is used to transfer the load to the mains supply when running in MANUAL MODE

2.5 OUTPUTS

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

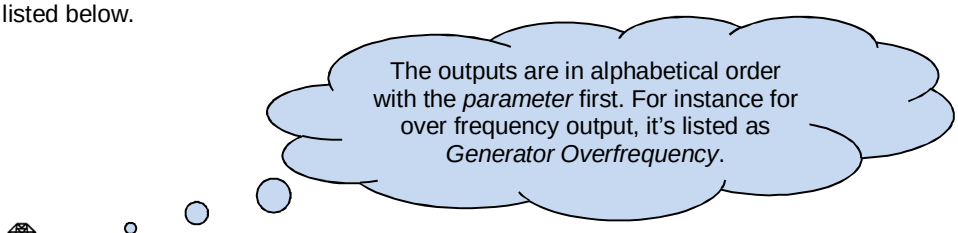
2.5.1 DIGITAL OUTPUTS



2.5.1.1 OUTPUT SOURCES

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

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



= Only available on DSE7320 MKII AMF Modules

Output Source	Activates…	Is Not Active….
Not Used	The output does not change state (Unused)	
Air Flap Relay	Normally used to control an air flap, this output becomes active upon an Emergency Stop or Over-speed situation.	Inactive when the set has come to rest
Alarm Mute	This input is used to silence the audible alarm from an external source such as a remote mute switch.	
Alarm Reset	This input is used to reset any latched alarms from a remote location. It is also used to clear any latched warnings which may have occurred (if configured) without having to stop the engine.	
Alternative Config 1, 2, 3, 4, 5 Selected	Active when the alternative configuration is selected.	
Analogue Input A,B,C,D,E,F (Digital)	Active when the analogue input A,B,C,D,E,F configured to digital is active.	
Arm Safety On Alarms	Becomes active at the end of the *safety delay* timer whereupon all alarms configured to 'From Safety On' become active	Inactive when : • When the set is at rest • In the starting sequence before the Safety Delay timer has expired
Audible Alarm IEEE 37.2 – 74 Alarm Relay	Use this output to activate an external sounder or external alarm indicator. Operation of the Mute pushbutton resets this output once activated	Inactive if no alarm condition is active or if the Mute pushbutton was pressed
Auto Restore Inhibit	Active when the *Auto Restore Inhibit* digital input is active	
Auto Start Inhibit	Active when the *Auto-Start Inhibit* function is active	
Auxiliary Mains Fail	Active when the *Auxiliary Mains Fail* input function is active	
Battery High Voltage IEEE 37.2 – 59 DC Overvoltage Relay	This output indicates that a Battery Over voltage alarm has occurred	Inactive when battery voltage is not High
Battery Low Voltage IEEE 37.2 – 27 DC Undervoltage Relay	This output indicates that a Battery Under Voltage alarm has occurred.	Inactive when battery voltage is not Low
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 (ECM). Exact timing of this output is dependent upon the type of the engine ECU (ECM)	
CAN ECU Shutdown	The engine ECU (ECM) has indicated that a Shutdown alarm is present.	Inactive when no Shutdown alarm from the ECU (ECM) is present
CAN ECU Stop	Active when the DSE controller is requesting that the CAN ECU (ECM) stops the engine.	
CAN ECU Warning	The engine ECU (ECM) has indicated that a Warning alarm is present.	Inactive when no Warning alarm from the ECU (ECM) is present

Output Source	Activates…	Is Not Active….
Charge Alternator Failure Shutdown	Active when the charge alternator shutdown alarm is active	
Charge Alternator Failure Warning	Active when the charge alternator warning alarm is active	
Close Gen Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the generator to be on load this control source is activated.	Inactive whenever the generator is not required to be on load
Close Gen Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the generator to be on load this control source is activated for the duration of the Breaker Close Pulse timer, after which it becomes inactive again.	
Close Mains Output IEEE 37.2 – 52 AC Circuit Breaker 	Used to control the load switching device. Whenever the module selects the mains to be on load this control source is activated.	The output is inactive whenever the mains is not required to be on load
Close Mains Output Pulse IEEE 37.2 – 52 AC Circuit Breaker 	Used to control the load switching device. Whenever the module selects the mains to be on load this control source is activated for the duration of the Breaker Close Pulse timer, after which it becomes inactive again.	
Combined Mains Failure 	Active when the mains supply is out of limits OR the input for Auxiliary Mains Failure is active	
Combined Maintenance Alarm	Active when any of the maintenance alarm is active.	
Combined Under and Over Frequency Alarm	Active when an *Under-Frequency* or *Over-Frequency Shutdown* alarm is active	
Combined Under and Over Frequency Warning	Active when an *Under-Frequency* or *Over-Frequency Warning* alarm is active	
Combined Under and Over Voltage Alarm	Active when an *Under-Voltage* or *Over-Voltage Shutdown* alarm is active	
Combined Under and Over Voltage Warning	Active when an *Under-Voltage* or *Over-Voltage Warning* alarm is active	
Common Alarm	Active when one or more alarms (of any type) are active	The output is inactive when no alarms are present
Common Electrical Trip	Active when one or more *Electrical Trip* alarms are active	The output is inactive when no shutdown alarms are present
Common Shutdown	Active when one or more *Shutdown* alarms are active	The output is inactive when no shutdown alarms are present
Common Warning	Active when one or more *Warning* alarms are active	The output is inactive when no warning alarms are present
Coolant Cooler Control	Active by the *Coolant Cooler Control* in conjunction with the Coolant Temperature Sensor	
Coolant Heater	Active by the *Coolant Heater Control* in conjunction with the Coolant Temperature Sensor	
Coolant Temperature Switch IEEE 37.2 – 26 Apparatus Thermal Device	Active when the *Coolant Temperature Switch* input is active	
Cooling Down	Active when the Cooling timer is in progress	
Data Logging Active	Active when data is being logged	Inactive when: • Data logging is disabled • The engine is at rest and the option *Only Log When Engine Is Running* is enabled • The internal memory of the module becomes full and the option *Keep Oldest Data* is enabled
DEF Level Low	Active when *DEF Level Low* CAN alarm is active.	
DEF Level Low Alarm	Active when *DEF Level Low Alarm* is active.	
Digital Input A, B, C, D, E, F, G & H	Active when the relevant digital input is active	

Output Source	Activates…	Is Not Active….
Display Heater Fitted and On	Active when the display heater is on	
DPF Forced Regeneration Interlock Active	Active when the *DPF Force Regeneration Interlock* 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	
DPTC Filter	Active when the diesel particulate filter CAN alarm is active	
Droop Enable	Active when an input configured to *Droop Enable* is active or if *Droop Enable* has been activated in the module configuration (CAN engine only)	
Dual Mutual Active	Active when the *Dual Mutual Standby* is active	
Dual Mutual Input	Active when the *Dual Mutual Standby* digital input is active	
Dual Mutual On Load	Active when the generator is running due to *Dual Mutual Standby*	
Dual Mutual Standby	Active when the generator is in standby in *Dual Mutual Standby*	
Dummy Load Control (1-5)	Becomes active when the engine kW falls below the Dummy Load Control Trip Setting.	Inactive when the engine kW returns to above the Dummy Load Control Return setting.
Earth Fault Trip Alarm IEEE 37.2 – 51G or 51N Generator IDMT Earth Fault Relay	Active when the *Earth Fault Protection Alarm* is active.	
EJP1 / EJP2	Active when an input configured for *EJP1* or *EJP2* is active	
Emergency Stop IEEE 37.2 – 5 Stopping Device	Active when the *Emergency Stop* input has been activated	
Energise To Stop	Normally used to control an *Energise to Stop* solenoid, this output becomes active when the controller wants the set to stop running.	Becomes inactive a configurable amount of time after the set has stopped. This is the *ETS hold time*.
External Panel Lock	Active when the *External Panel Lock* digital input is active	
Fail to Close Generator IEEE 37.2 – 52B AC Circuit Breaker Postion (Contact Open When Breaker Closed)	Active when the *Generator Closed Auxiliary* input fails to become active after the *Close Generator Output* or *Close Generator Output Pulse* becomes active	
Fail to Close Mains IEEE 37.2 – 52B AC Circuit Breaker Postion (Contact Open When Breaker Closed)	Active when the *Mains Closed Auxiliary* input fails to become active after the *Close Mains Output* or *Close Mains Output Pulse* becomes active	
Fail To Start IEEE 37.2 - 48 Incomplete Sequence Relay	Becomes active if the set is not seen to be running after the configurable number of start attempts	
Fail To Stop IEEE 37.2 - 48 Incomplete Sequence Relay	If the set is still running a configurable amount of time after it has been given the stop command, the output becomes active. This configurable amount of time is the *Fail to Stop Timer*.	
Fan Control	Energises when the engine becomes available (up to speed and volts). This output is designed to control an external cooling fan. When the engine stops, the cooling fan remains running for the duration of the Fan Overrun Delay.	
Flexible Sensor A, B, C or D High Alarm	Active when the analogue input value rises above the *Flexible Sensor High Alarm* set point.	
Flexible Sensor A, B, C or D High Pre-Alarm	Active when the analogue input value rises above the *Flexible Sensor High Pre-Alarm* set point.	
Flexible Sensor A, B, C or D Low Alarm	Active when the analogue input value falls below the *Flexible Sensor Low Alarm* set point.	
Flexible Sensor A, B, C or D Low Pre-Alarm	Active when the analogue input value falls below the *Flexible Sensor Low Pre-Alarm* set point.	
Flexible Sensor A, B, C or D Open Circuit	Active when the *Flexible Sensor Open Circuit* alarm becomes active.	
Fuel Pump Control IEEE 37.2 – 71 Level Switch	Becomes active when the *Fuel level* falls below the *Fuel Pump Control ON* setting and is normally used to transfer fuel from the bulk tank to the day tank.	If the output is already active it becomes inactive when the *Fuel level* is above the *Fuel Pump Control OFF* settings.

Output Source	Activates…	Is Not Active….
Fuel Relay	Becomes active when the controller requires the governor/fuel system to be active.	Becomes inactive whenever the set is to be stopped, including between crank attempts, upon controlled stops and upon fault shutdowns.
Fuel Sensor Open Circuit	Active when the *Fuel Sensor Open Circuit* alarm becomes active	
Fuel Usage Alarm IEEE 37.2 – 80 Flow Switch	Active when the *Fuel Usage* alarm becomes active	
Gas Choke On	Becomes active during starting for the duration of the Gas Choke timer. Normally used to choke a gas engine.	Inactive at all other times
Gas Ignition	Becomes active during starting.	Becomes inactive a configurable amount of time after the *Fuel Relay* becomes inactive. This is the *Gas Ignition Off* timer.
Gen Loading Frequency Not Reached	Indicates that the generator frequency has not reached the configured *Loading Frequency* during the starting process.	
Gen Loading Voltage Not Reached	Indicates that the generator voltage has not reached the configured *Loading Voltage* during the starting process.	
Gen Over Frequency Overshoot Alarm IEEE 37.2 – 81 Frequency Relay	Becomes active when the *Over Frequency Overshoot* alarm is active	
Gen Over Frequency Overshoot Warning IEEE 37.2 – 81 Frequency Relay	Becomes active when the *Over Frequency Overshoot Warning* alarm is active	
Generator 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 High Voltage Alarm IEEE 37.2 – 59 AC Overvoltage Relay	Active when the *High Voltage Electrical Trip* alarm is active	
Generator High Voltage Warning IEEE 37.2 – 59 AC Overvoltage Relay	Active when the *High Voltage Warning* alarm is active	
Generator High Volts Shutdown IEEE 37.2 – 59 AC Overvoltage Relay	Active when the *High Voltage Shutdown* alarm is active	
Generator Load Inhibit	Active when the *Generator Load Inhibit* input is active	
Generator Low Voltage Shutdown/Electrical Trip IEEE 37.2 – 27 AC Undervoltage Relay	Active when the generator voltage falls below the *Low Voltage Alarm Trip* level	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
Generator Low Voltage Warning IEEE 37.2 – 27 AC Undervoltage Relay	Active when the generator voltage falls below the *Low Voltage Pre-Alarm Trip* level	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
Generator Over Frequency Alarm IEEE 37.2 – 81 Frequency Relay	Active when the generator frequency exceeds the *Over Frequency Shutdown Trip* level.	

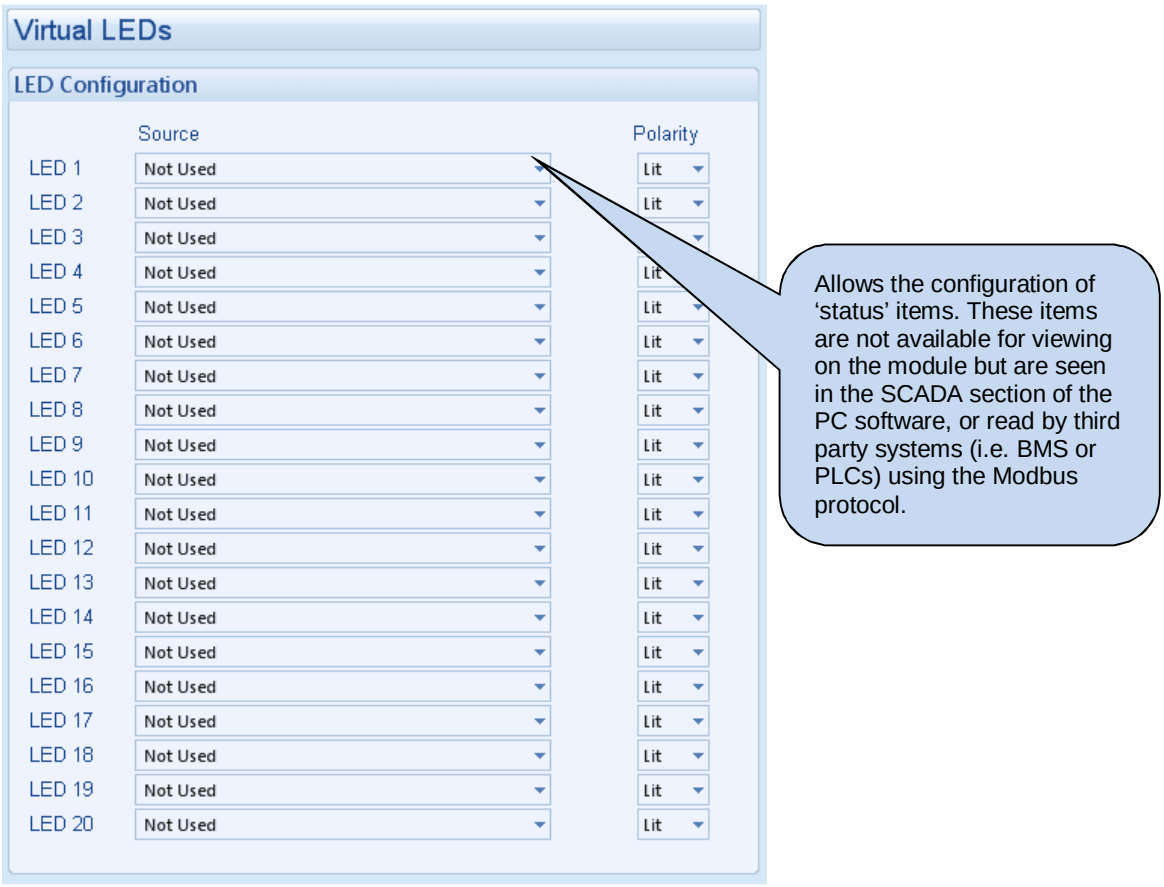
Output Source	Activates…	Is Not Active….
Generator Over Frequency Delayed Alarm IEEE 37.2 – 81 Frequency Relay	Active when the generator frequency exceeds the configured *Over Frequency Shutdown Trip* level for a duration longer than the set *Overshoot Delay* timer.	
Generator Over Frequency Delayed Warning IEEE 37.2 – 81 Frequency Relay	Active when the generator frequency exceeds the configured *Over Frequency Warning Trip* level for a duration longer than the set *Overshoot Delay* timer.	
Generator Phase Rotation Alarm IEEE 37.2 – 47 Phase Sequence Relay	Active when the detected generator phase sequence is different than the configured *Generator Phase Rotation*	
Generator Reverse Power IEEE 37.2 – 32 Directional Power Relay	Active when the *Generator Reverse Power* alarm is active	
HEST Active	Active when the High Exhaust System Temperature CAN alarm is active	
High Coolant Temperature Electrical Trip IEEE 37.2 – 26 Apparatus Thermal Device	Active when the *Coolant Temperature* exceeds the configured *High Coolant Temperature Electrical Trip* level	
High Coolant Temperature Shutdown IEEE 37.2 – 26 Apparatus Thermal Device	Active when the *Coolant Temperature* exceeds the configured *High Coolant Temperature Shutdown* level	
High Coolant Temperature Warning IEEE 37.2 – 26 Apparatus Thermal Device	Active when the *Coolant Temperature* exceeds the configured *High Coolant Temperature Warning* level	
Inhibit Scheduled run	Active when the Inhibit Scheduled run input is active	
Inhibit SMS Start	Active when the input Inhibit SMS Start input is active	
kW Overload Alarm	Active when the measured kW are above the setting of the *kW overload alarm*. Used to give alarms on overload, control a dummy load switch or for load shedding functionality.	
Lamp Test	Active when the lamp test is activated by a digital input or by pressing the *Mute/Lamp Test* control button	
Load Shedding Control (1-5)	Becomes active when the engine kW exceeds Load Shedding Control Trip Setting.	Inactive when the engine kW returns to below the Load Shedding Control Return setting.
Loading Frequency Not Reached	Active when the generator frequency has not reached the configured *Loading Frequency* during the starting process.	
Loading Voltage Not Reached	Active when the generator voltage has not reached the configured *Loading Voltage* during the starting process.	
Loss of Magnetic Pickup Signal	Active when the controller senses the loss of signal from the magnetic pickup probe	
Louvre Control	Active when the fuel relay becomes active. Normally used to drive ventilation louvres for the generator set	
Low Coolant Temperature IEEE 37.2 – 26 Apparatus Thermal Device	Active when the *Coolant Temperature* falls below the *Low Coolant Temperature alarm* setting	
Low Fuel Level IEEE 37.2 – 71 Level Switch	Active when the *Low Fuel Level* alarm becomes active	
Low Oil Pressure Shutdown IEEE 37.2 - 63 Pressure Switch	Active when the *Oil Pressure* falls below the *Low Oil Pressure Shutdown* setting	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
Low Oil Pressure Warning IEEE 37.2 - 63 Pressure Switch	Active when the *Oil Pressure* falls below the *Low Oil Pressure Warning* setting	Inactive when • The set is stopped • During starting sequence before the safety delay time has expired.
Main Config Selected	Active when the main configuration is active	
Mains Closed Aux	Active when the *Mains Closed Auxiliary* input is active	

Output Source	Activates…	Is Not Active….
Mains Failure IEEE 37.2 - 81 Frequency Relay IEEE 37.2 – 27 AC Undervoltage Relay IEEE 37.2 – 59 AC Overvoltage Relay	The output indicates that one or more of the module's sources of determining mains failure is active.	
Mains High Frequency IEEE 37.2 -81 Frequency Relay	Active when the mains frequency exceeds the *High Frequency* setting	
Mains High Voltage IEEE 37.2 – 59 AC Overvoltage Relay	Active when the mains voltage exceeds the *High Voltage* setting	
Mains Load Inhibit	Active when the *Mains Load Inhibit* input is active	
Mains Low Frequency IEEE 37.2 -81 Frequency Relay	Active when the mains frequency falls below the *Low Frequency* setting	
Mains Low Voltage IEEE 37.2 – 27 AC Undervoltage Relay	Active when the mains voltage falls below the *Low Voltage* setting	
Mains Phase Rotation Alarm	Active when the detected mains phase sequence is different than the configured *Mains Phase Rotation*	
Maintenance Alarm 1, 2 or 3 Due	Active when the relevant maintenance alarm is due.	
Manual Restore Contact	Active when the manual restore contact input is active	
MPU Open circuit	This output indicates that the module has detected an open circuit failure in the Magnetic Pickup transducer circuit.	
MSC Compatibility	Active when the *MSC Compatibility* alarm is active	
MSC Failure	Active when the *MSC Failure* alarm is active	
MSC ID Error	Active when the *MSC ID Error* alarm is active	
MSC Priority Error	Active when the *MSC Priority Error* alarm is active	
Negative Phase Sequence Alarm	Active when the *Negative Phase Sequence* alarm is active	
Negative VAr Alarm IEEE 37.2 – 40 Field Under Excitation Relay	Active when the negative VAr falls below the configured Generator *Negative VAr Alarm* level for a duration longer than the set *Delay* timer	
Negative VAr Warning IEEE 37.2 – 40 Field Under Excitation Relay	Active when the negative VAr falls below the configured Generator *Negative VAr Pre-Alarm* level for a duration longer than the set *Delay* timer	
Oil Pressure Sensor Open Circuit	Active when the *Oil Pressure Sensor* is detected as being open circuit.	
Oil Pressure Switch	Active when the oil pressure switch input is active	
Open Gen Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the generator to be off load this control source is activated.	Inactive whenever the generator is required to be on load
Open Gen Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the generator to be off load this control source is activated for the duration of the Breaker Open Pulse timer, after which it becomes inactive again.	
Open Mains Output IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the mains to be off load this control source is activated.	The output is inactive whenever the mains is required to be on load
Open Mains Output Pulse IEEE 37.2 – 52 AC Circuit Breaker	Used to control the load switching device. Whenever the module selects the mains to be off load this control source is activated for the duration of the Breaker Open Pulse timer, after which it becomes inactive again.	
Over Current IDMT Alarm	Active when the *Over Current IDMT* alarm is active	
Over Current Immediate Warning	Active when the *Over Current Immediate Warning* alarm is active	
Over Frequency Runaway IEEE 37.2 -81 Frequency Relay	Active when the *Over Frequency Runaway* alarm is active	
Over Frequency Warning IEEE 37.2 -81 Frequency Relay	Active when the *Over Frequency Warning* alarm is active	

Output Source	Activates…	Is Not Active….
Over Speed Runaway IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Runaway* alarm is active	
Over Speed Shutdown IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Shutdown* alarm is active	
Over Speed Warning IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Warning* alarm is active	
Overspeed Delayed Alarm IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Delayed* alarm is active	
Overspeed Delayed Warning IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Delayed Warning* alarm is active	
Over Speed Overshoot Alarm IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Overshoot* alarm is active	
Overspeed Overshoot Warning IEEE 37.2 – 12 Over Speed Device	Active when the *Over Speed Overshoot Warning* alarm is active	
PLC Output Flag 1-20	Active when the *PLC Flag* is active	
Positive VAr Alarm	Active when the positive VAr exceeds the configured Generator *Positive VAr Alarm* level for a duration longer than the set *Delay* timer	
Positive VAr Warning	Active when the positive VAr exceeds the configured Generator *Positive VAr Pre-Alarm* level for a duration longer than the set *Delay* timer	
Preheat During Preheat Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The preheat timer has expired
Preheat Until End Of Cranking	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached *crank disconnect* conditions
Preheat Until End Of Safety Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached the end of the *safety delay* timer
Preheat Until End of Warming Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached the end of the *warming* timer
Protections Disabled	Active when protections are turned off (Unticked) in the configuration.	
Remote Control 1-10	A series of output sources that are controlled by remote control in the SCADA section of the software, used to control external circuits.	
Remote start Off Load	Active when the *Remote Start Off Load* input is active	
Remote Start On Load	Active when the *Remote Start On Load* input is active	
Reset Maintenance 1, 2 or 3	Active when the relevant *Maintenance Alarm Reset* is active	
Scheduled Auto Start Inhibit	Active when the *Inhibit Scheduled Run* input is active	
SCR Inducement	Active when *SCR Inducement CAN Alarm* is active	
Shutdown Blocked	Becomes active when protections are disabled and one of the parameters goes out of limits	

Output Source	Activates…	Is Not Active….
Simulate Auto Button	Active when the *Simulate Auto Button* digital input is active	
Simulate Close Gen Breaker	Active when the *Simulate Close Gen Breaker* digital input is active	
Simulate Lamp Test	Active when the *Simulate Lamp Test* input digital is active	
Simulate Mains Available	Active when the *Simulate Mains Available* digital input is active	
Simulate Manual Button	Active when the *Simulate Manual* digital input is active	
Simulate Open Gen Breaker	Active when the *Simulate Open Gen Breaker* 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	
Smoke Limiting	Becomes active when the controller requests that the engine runs at idle speed. As an output, this is used to give a signal to the *Idle Speed Input* on the engine speed governor (if available)	Becomes inactive when the controller requests that the engine runs at rated speed.
SMS Remote Start Off Load	Active when the set receives an SMS message to start and run off load	
SMS Remote Start On Load	Active when the set receives an SMS message to start and run load	
Start Relay IEEE 37.2 – 54 Turning Gear Engaging Device	Active when the controller requires the cranking of the engine.	
Stop and Panel lock	Active when the *Stop And Panel Lock* digital input is active	
System in Auto Mode	Active when Auto mode is selected	
System in Manual Mode	Active when Manual mode is selected	
System in Stop Mode	Active when Stop mode is selected	
System in Test Mode	Active when Test On Load mode is selected	
Telemetry Active	Active when the communication port is live and for a short time after transmission stops. Used as a relay or LED source.	
Telemetry Data Active	Active when data is being transmitted. This output changes continuously state (flash) upon data transfer. Normally used as an LED source rather than a relay source as the signal flashes repeatedly. For a similar source more suited to drive a relay, see *Telemetry Active*.	
Temperature Sensor Open Circuit	Active when the *Temperature Sensor Open Circuit* alarm is active	
Under Frequency Shutdown \ Electrical Trip	Active when any of the *Generator Under Frequency Shutdown* or *Electrical Trip* alarm are active	
Under Frequency Warning	Active when the *Generator Under Frequency Warning* alarm is active	
Under Speed Shutdown \ Electrical trip	Active when any of the *Underspeed Shutdown* or *Electrical Trip* alarms are active	
Under Speed Warning	Active when the *Underspeed Warning* alarm is active.	
Waiting For Manual Restore 	Becomes active when the generator is on load and the mains supply is healthy but an input configured to Manual Restore is active. This is used to signal to an operator that action is required before the set transfers back to the mains supply.	

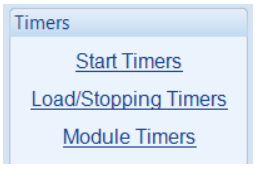
2.5.2 VIRTUAL LEDS



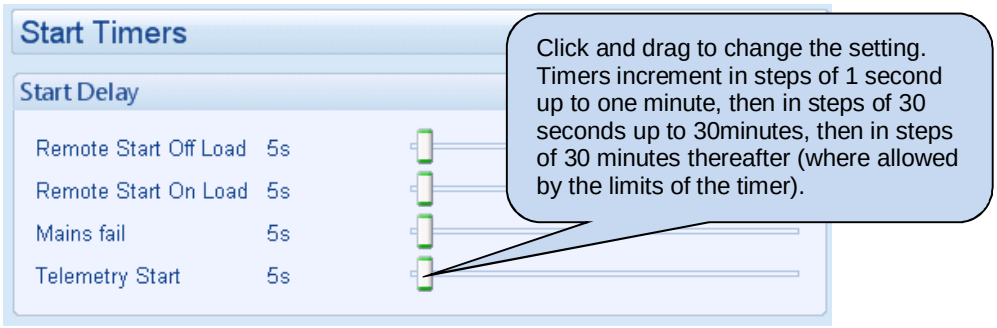
The list of output sources available for configuration of the module Virtual LEDs is listed in the section entitled *Output Sources.*

2.6 TIMERS

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

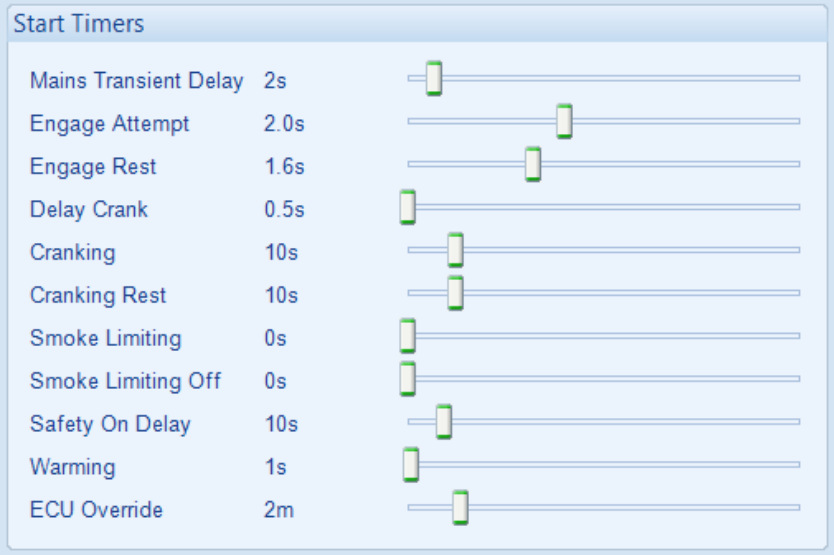


2.6.1 START TIMERS



= Only available on DSE7320 MKII AMF Modules

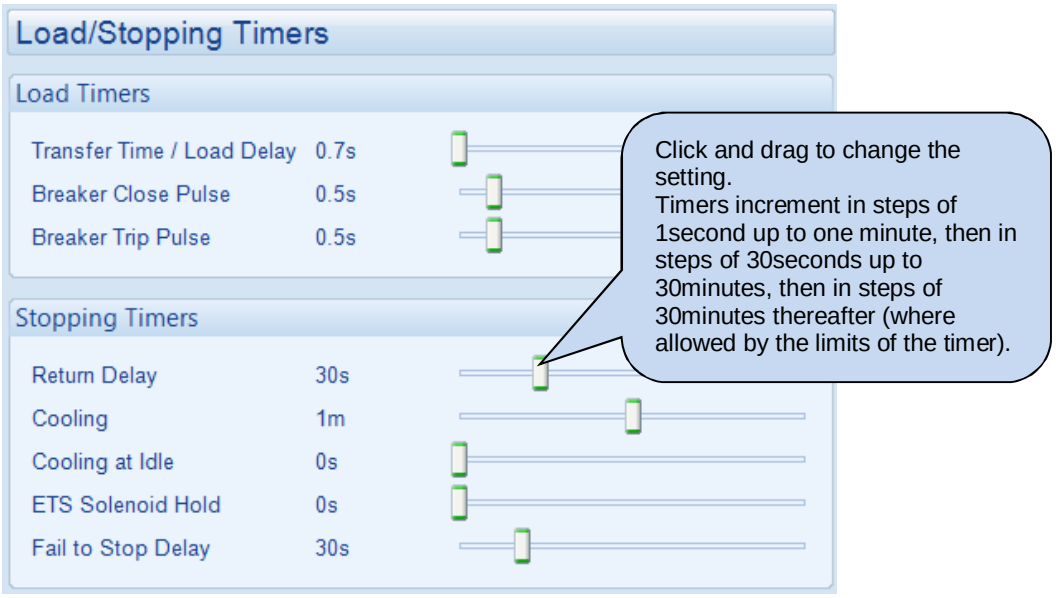
Timer	Description
Remote Start Off Load	The amount of time delay before starting in AUTO mode. This timer is activated upon the *Remote Start Off Load* command being issued. Typically this timer is applied to prevent starting upon fleeting start signals.
Remote Start On Load	The amount of time delay before starting in AUTO mode. This timer is activated upon the *Remote Start On Load* command being issued. Typically this timer is applied to prevent starting upon fleeting start signals.
Mains Fail	The amount of time delay before starting in AUTO mode. This timer is activated upon a mains failure detection.
Telemetry Start	The amount of time delay before starting in AUTO mode. This timer is activated upon a *Remote Start* command being received from a MODBUS master. Typically this timer is applied to prevent starting upon fleeting start signals.



= Only available on DSE7320 MKII AMF Modules

Timer	Description
Mains Transient Delay	Used to give a delay between sensing mains failure and acting upon it. This is used to prevent dropouts of the mains load switch and operation of the system due to mains supply transient conditions.
Engage Attempt	**NOTE: Only available if using magnetic pick-up and multiple engage attempts** The amount of time the module attempts to engage the starter motor during each engage attempt. If the Magnetic Pick-up is not detecting movement of the flywheel when this timer expires, the engage attempt terminates. When the engage fails consecutively for the configured number of *Engage Attempts*, the *Fail to Engage* alarm is activated.
Engage Rest	**NOTE: Only available if using magnetic pick-up and multiple engage attempts** The amount of time the module waits between attempts to engage the starter.
Delay Crank	The amount of time delay between the fuel relay and the crank relay energising. This is typically used to allow fuel systems to prime.
Cranking	The amount of time for each crank attempt
Crank Rest	The amount of time between multiple crank attempts.
Smoke Limit	The amount of time that the engine is requested to run at idle speed upon starting. This is typically used to limit emissions at startup.
Smoke Limit Off	The amout of time that the engine takes to run up to rated speed after removal of the command to run at idle speed. If this time is too short, the engine is stopped due to an *Underspeed* alarm. If the time is too long, *Underspeed* protection is disabled until the *Smoke Limit Time Off* time has expired.
Safety On Delay	The amount of time at startup that the controller ignores oil pressure and engine speed and other delayed alarms. This is used to allow the engine to run up to speed before protections are activated.
Warming	The amount of time the engine runs before being allowed to take load. This is used to warm the engine to prevent excessive wear.
ECU (ECM) Override	The amount of time the CAN ECU Power stays energised when the Start button is pressed in Stop mode.

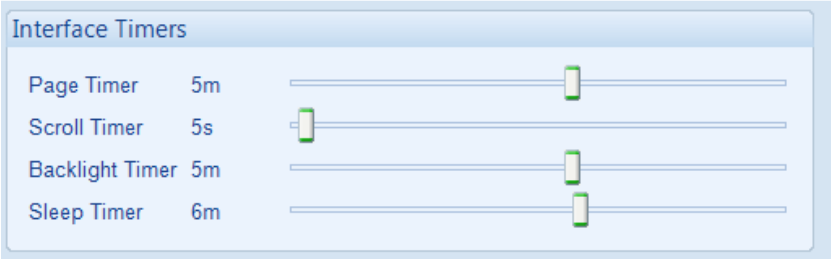
2.6.2 LOAD / STOPPING TIMERS



= Only available on DSE7320 MKII AMF Modules

Timer	Description
Transfer Time	The time between one load switch opening and the other closing. Used during transfer to and from the generator.
Breaker Close Pulse	The amount of time that *Breaker Close Pulse* signal is present when the request to close the load switch is given.
Breaker Trip Pulse	The amount of time that *Breaker Open Pulse* signal is present when the request to open the load switch is given.
Return Delay	A delay, used in auto mode only, that allows for short term removal of the request to stop the set before action is taken. This is usually used to ensure the set remains on load before accepting that the start request has been removed.
Cooling	The amount of time that the set is made to run OFF LOAD before being stopped. This is to allow the set to cool down and is particularly important for engines with turbo chargers.
Cooling At Idle	The amount of time that the set is made to run OFF LOAD and at Idle Speed before being stopped.
ETS Solenoid Hold	The amount of time the *Energise to stop* solenoid is kept energised after the engine has come to rest. This is used to ensure the set has fully stopped before removal of the stop solenoid control signal.
Fail To Stop Delay	If the set is called to stop and is still running after the *fail to stop* delay, a *Fail to Stop* alarm is generated.

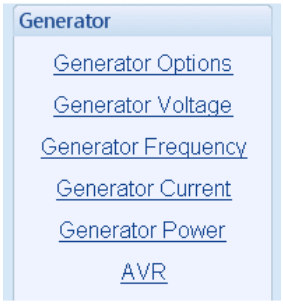
2.6.3 MODULE TIMERS



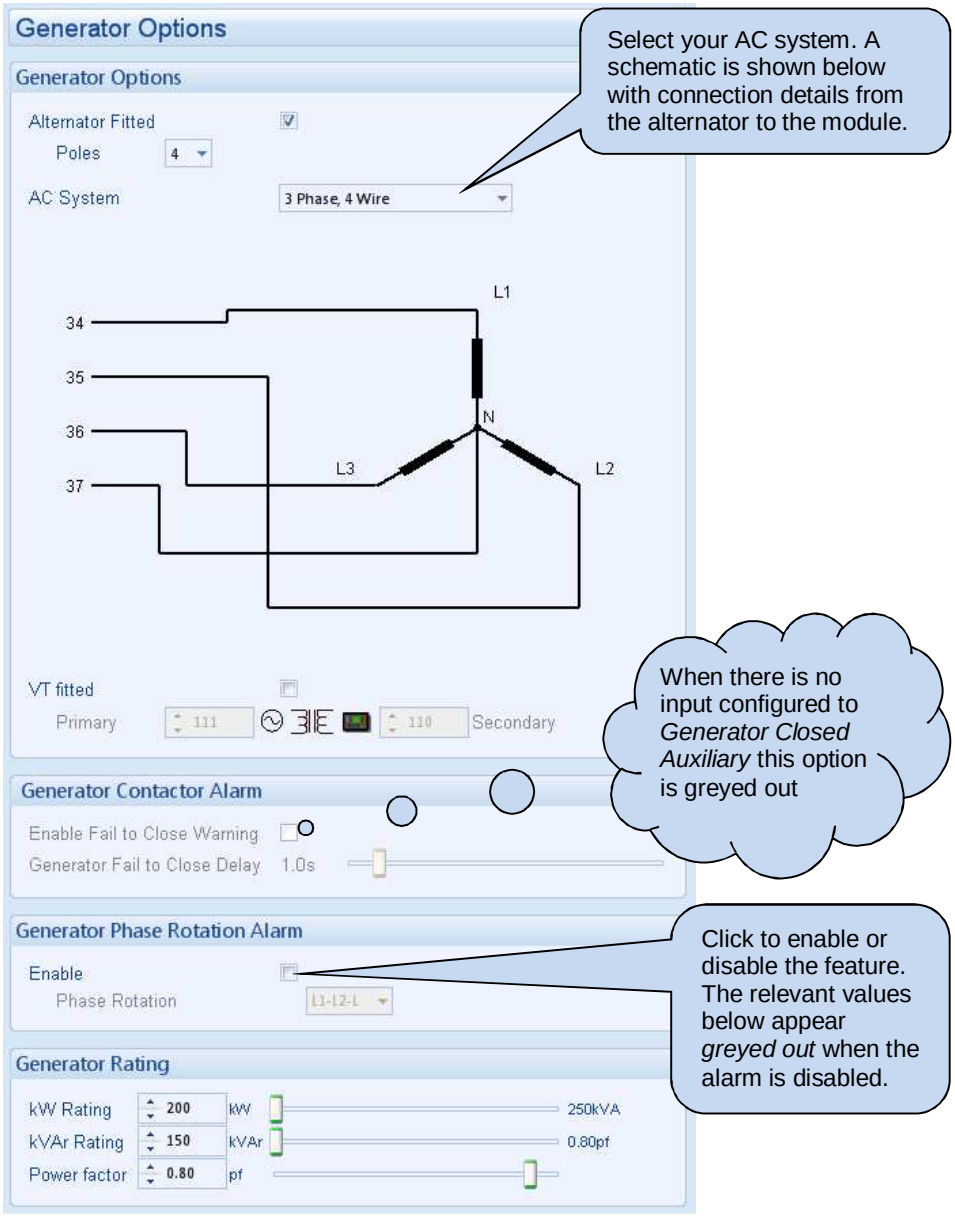
Timer	Description
LCD Page timer	If the module is left unattended for the duration of the *LCD Page Timer* it reverts to show the *Status* page.
LCD Scroll Timer	The scroll time between parameters on a selected page
Backlight Timer	If the module is left unattended for the duration of the *Backlight Timer*,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

2.7 GENERATOR

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



2.7.1 GENERATOR OPTIONS



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 controller voltage specifications. By entering the *Primary* and *Secondary* voltages of the transformer, the controller displays the *Primary* voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (ie 11kV) but also used on systems such as 600V ph-ph.

2.7.1.1 GENERATOR CONTACTOR ALARM

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

2.7.1.2 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 when the measured phase rotation is not as configured.

2.7.1.3 GENERATOR KW RATING

The Generator kW rating must be set in order for the *Generator Power* functions to be correctly utilised.
The Generator kW and kVAr rating must be correctly set.
The values you set here are the kW, kVAr, and Pf, NOT the kVA !

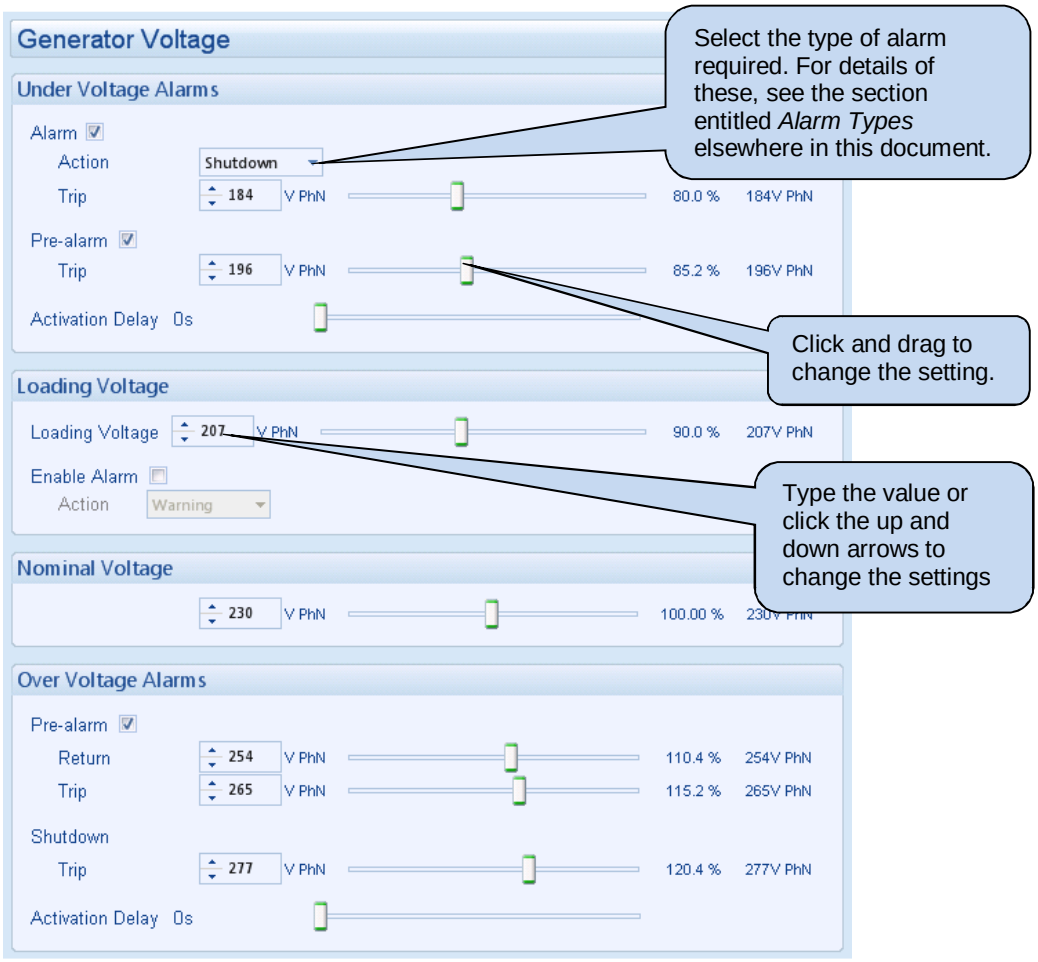
Calculating the VAr rating of a genset

- Most generators are rated for a power factor (W / VA) of 0.8
- From Pythagoras :

  $\cos \Phi = W / VA$
  $\cos \Phi = 0.8$
  $\Phi = \cos^{-1} 0.8 = 36.87°$
- From this we calculate the VAr rating of the typical 0.8 pf rated generator as :

  $\tan \Phi = VAr / W$
  $VAr = \tan 36.87 \times W$
  $VAr = 0.75 \times W$
- Or to simplify this, the VAr rating of a 0.8 pf rated generator is ¾ of the W rating (kVAr rating = 75% of kW rating)

2.7.2 GENERATOR VOLTAGE



2.7.2.1 UNDER VOLTAGE ALARMS

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

2.7.2.2 LOADING VOLTAGE

Parameter	Description
Loading Voltage	This is the minimum voltage the generator must be operating at before the module considers it available to take the load. It is also the voltage above the under voltage trip that the generator output must return to before the module considers that the supply is back within limits. (i.e. With an undervolts trip of 184.0V and a loading voltage of 207.0V, the output voltage must return to 207.0V following an under voltage event to be considered within limits.)
Enable Alarm	☐ = Alarm is disabled. ☑ = Upon starting and after the *Safety On Delay Timer* expires, if the generator output voltage fails to reach the *Loading Voltage* setpoint, the *Loading Voltage Not Reached* alarm is activated.

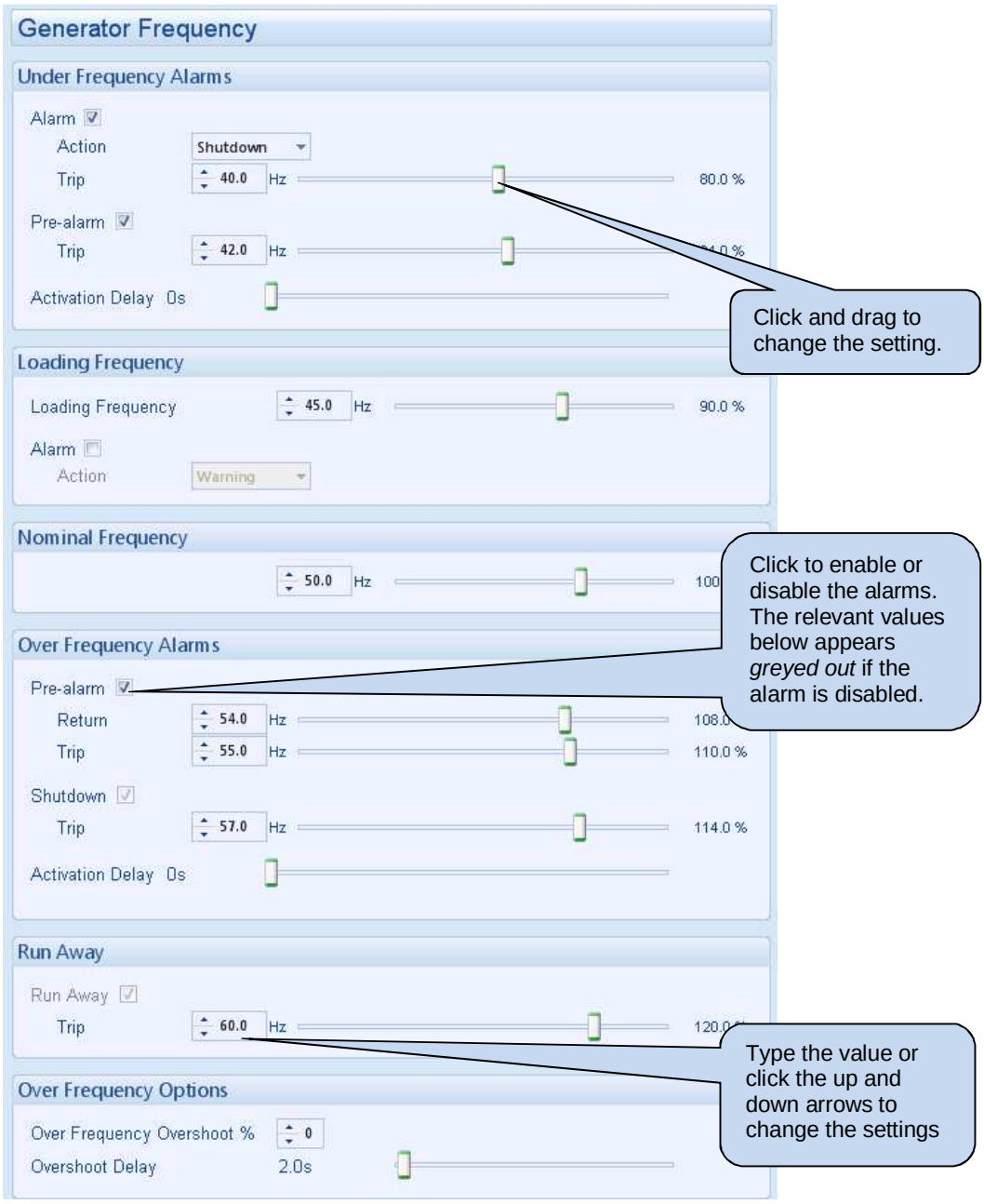
2.7.2.3 NOMINAL VOLTAGE

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

2.7.2.4 OVER VOLTAGE ALARMS

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

2.7.3 GENERATOR FREQUENCY



Parameters are detailed overleaf…

2.7.3.1 UNDER FREQUENCY ALARMS

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

2.7.3.2 LOADING FREQUENCY

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

2.7.3.3 NOMINAL FREQUENCY

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

2.7.3.4 OVER FREQUENCY ALARMS

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

2.7.3.5 RUN AWAY

Parameter	Description
Run Away IEEE 37.2 -81 Frequency Relay	**NOTE: Only available if using magnetic pick-up or an electronic engine is connected.** ☐ = Alarm is disabled ☑ = In the event of the generator output frequency rising above the configured *Trip* value, the *Run Away Shutdown* alarm is immediately triggered. This is used to protect against engine damage due to uncontrolled speed increase, where the engine speed runs away.
Trip	Set the frequency level for the *Run Away* alarm.

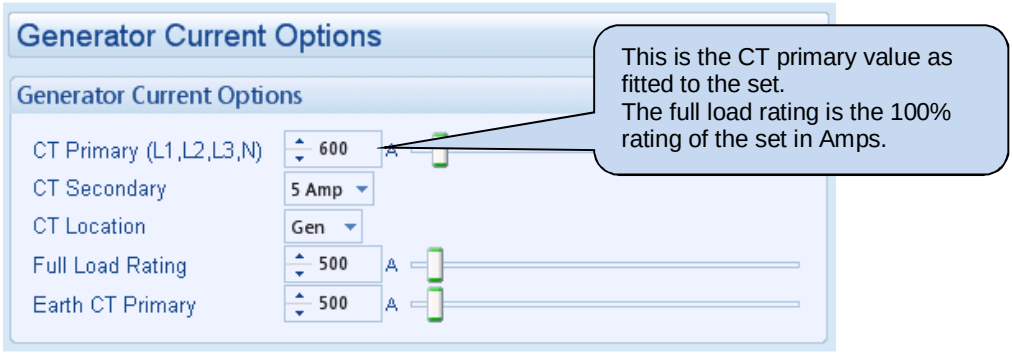
2.7.3.6 OVER FREQUENCY OPTIONS

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

2.7.4 GENERATOR CURRENT

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

2.7.4.1 GENERATOR CURRENT OPTIONS



Parameter	Description
CT Primary	Primary rating of the three phase Current Transformers
CT Secondary	Secondary rating of the Current Transformers
CT Location	***Gen:*** The CTs are in the feed from the generator, the module shows only generator load ***Load:*** The CTs are in the feed to the load, the module then displays load current, provided by the mains supply or the generator.
Full Load Rating	This is the full load current rating of the alternator
Earth CT Primary	Primary rating of the earth fault Current Transformers

2.7.4.2 GENERATOR CURRENT ALARMS

2.7.4.3 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 *Immediate Warning* is enabled, the controller generates a *warning alarm* as soon as the *Trip* level is reached. The alarm automatically resets once the generator loading current falls below the *Trip* level (unless *All Warnings are latched* is enabled). For further advice, consult the generator supplier.

IDMT ALARM

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

If the *Over Current IDMT Alarm* is enabled, the controller begins following the IDMT 'curve' when the current on any phase passes the *Trip* setting.

If the *Trip* is surpassed for an excess amount of time, the *IDMT Alarm* triggers (*Shutdown* or *Electrical Trip* as selected in *Action*).

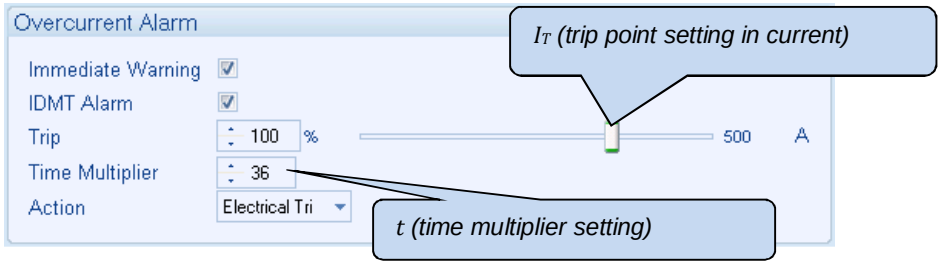
The larger the over circuit fault, the faster the trip. The speed of the trip is dependent upon the fixed formula:

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

Where:

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

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



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

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

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

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

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

CREATING A SPREADSHEET FOR THE OVER CURRENT IDMT CURVE

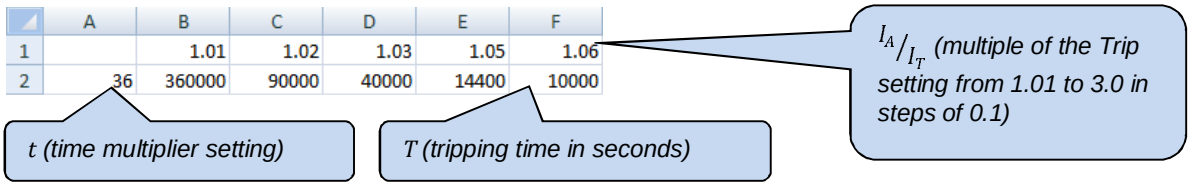
The formula used:

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

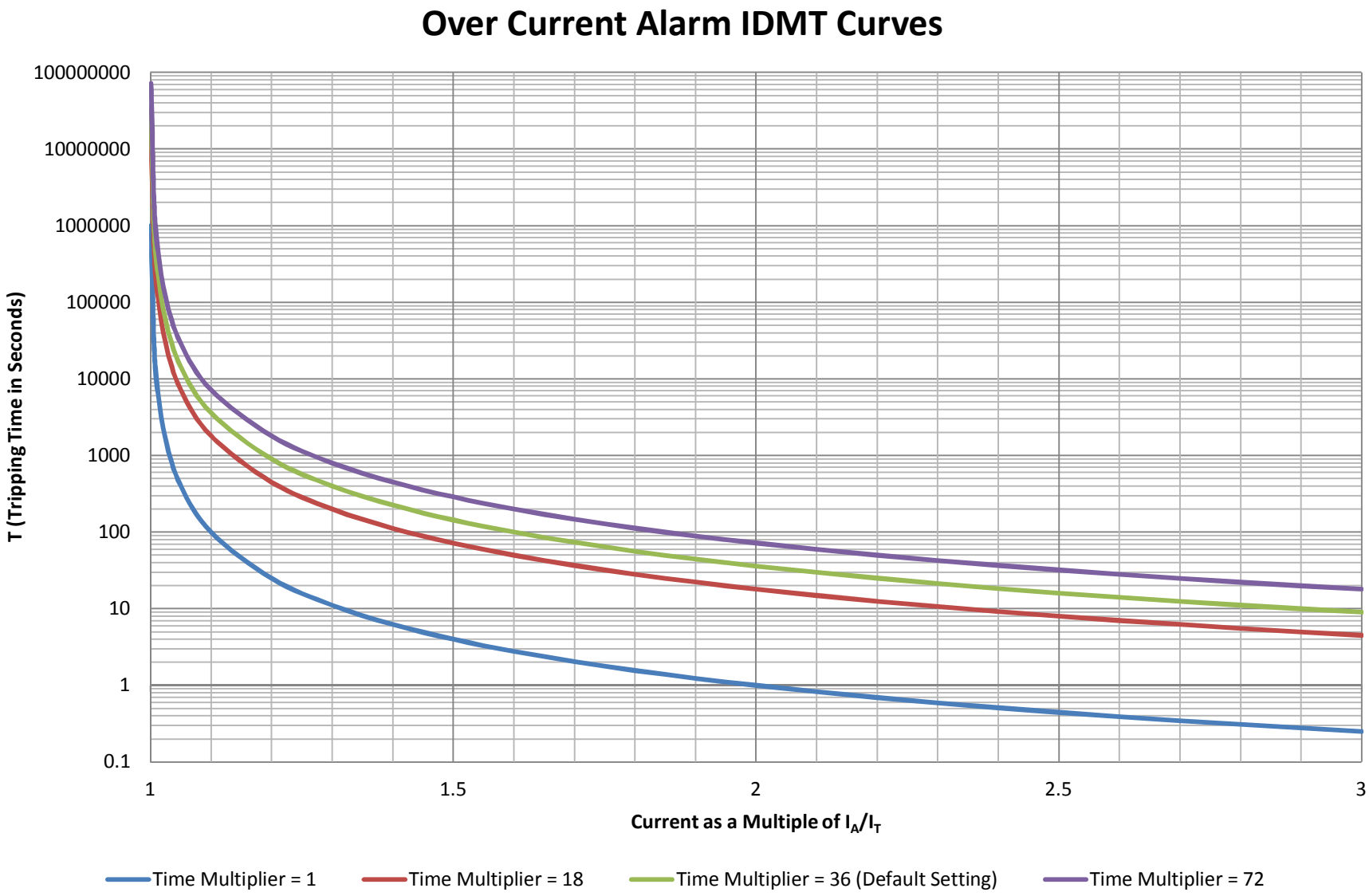
Where:

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

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



The formula for the *Tripping Time* cells is:


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

2.7.4.4 SHORT CIRCUIT ALARM

IEEE C37.2 – 51 IDMT Short Circuit Relay

If the *Short Circuit Alarm* is enabled, the controller begins following the IDMT 'curve' when the current on any phase passes the *Trip* setting.

If the *Trip* is surpassed for an excess amount of time, the *IDMT Alarm* triggers (*Shutdown* or *Electrical trip* as selected in *Action*).

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

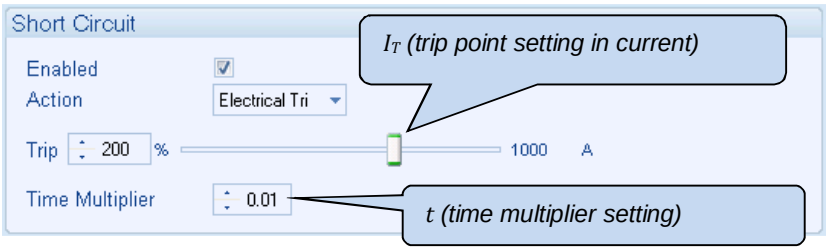
$$T = \frac{t \times 0.14}{\left(\left(\frac{I_A}{I_T}\right)^{0.02} - 1\right)}$$

Where:

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

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

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



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

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

CREATING A SPREADSHEET FOR THE SHORT CIRCUIT IDMT CURVE

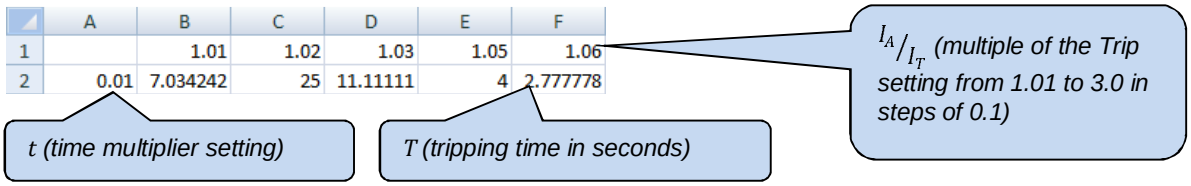
The formula used:

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

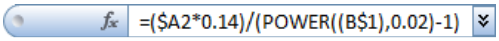
Where:

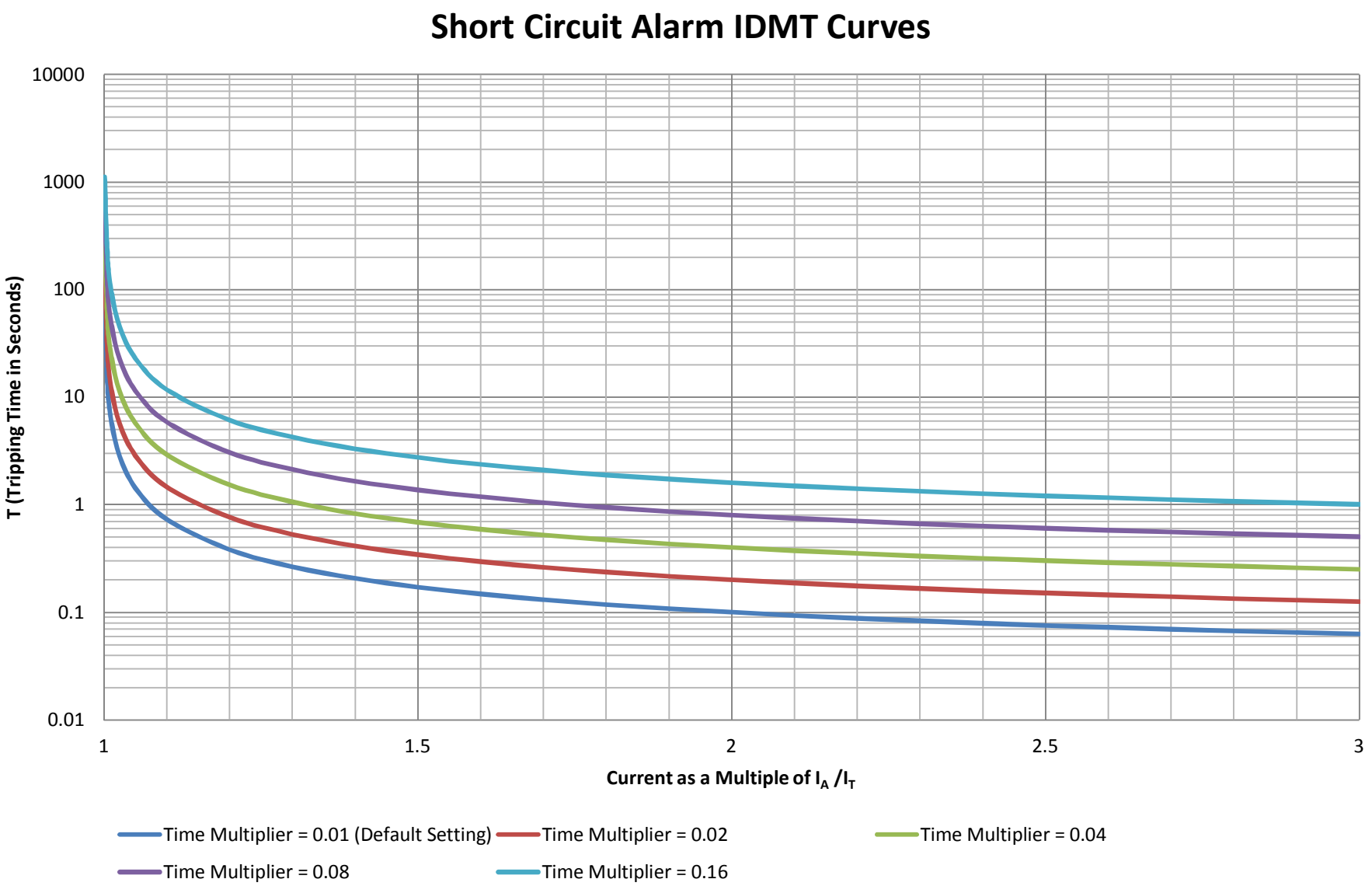
T is the tripping time in seconds (accurate to +/- 5% or +/- 50 ms (whichever is the greater))
I_A is the actual measured current
I_T is the trip point setting in current
t is the time multiplier setting

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



The formula for the *Tripping Time* cells is:




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

2.7.4.5 NEGATIVE PHASE SEQUENCE

IEEE C37.2 - 46 Phase-Balance Current Relay

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

For recommended settings contact your alternator manufacturer.

2.7.4.6 EARTH FAULT ALARM

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

If the *Earth Fault Alarm* is enabled, the controller begins following the IDMT 'curve' when the earth fault current passes the *Trip* setting.

If the *Trip* is surpassed for an excess amount of time, the *IDMT Alarm* triggers (*Shutdown* or *Electrical Trip* as selected in *Action*).

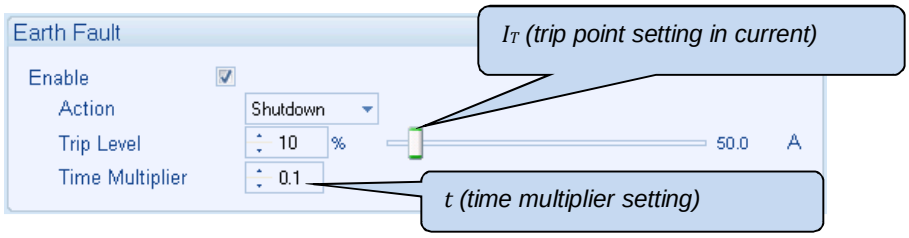
The larger the earth fault, the faster the trip. The speed of the trip is dependent upon the fixed formula:

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

Where:

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

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



CREATING A SPREADSHEET FOR THE EARTH FAULT IDMT CURVE

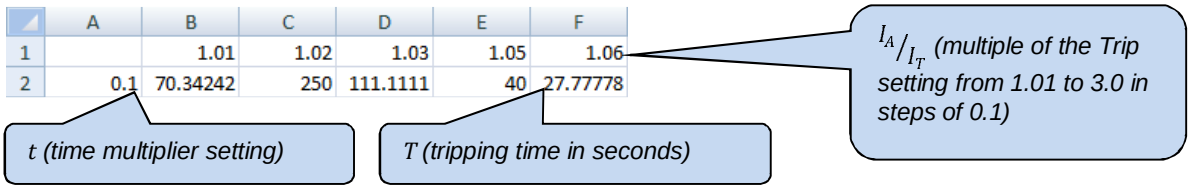
The formula used:

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

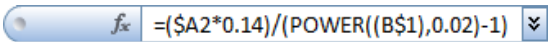
Where:

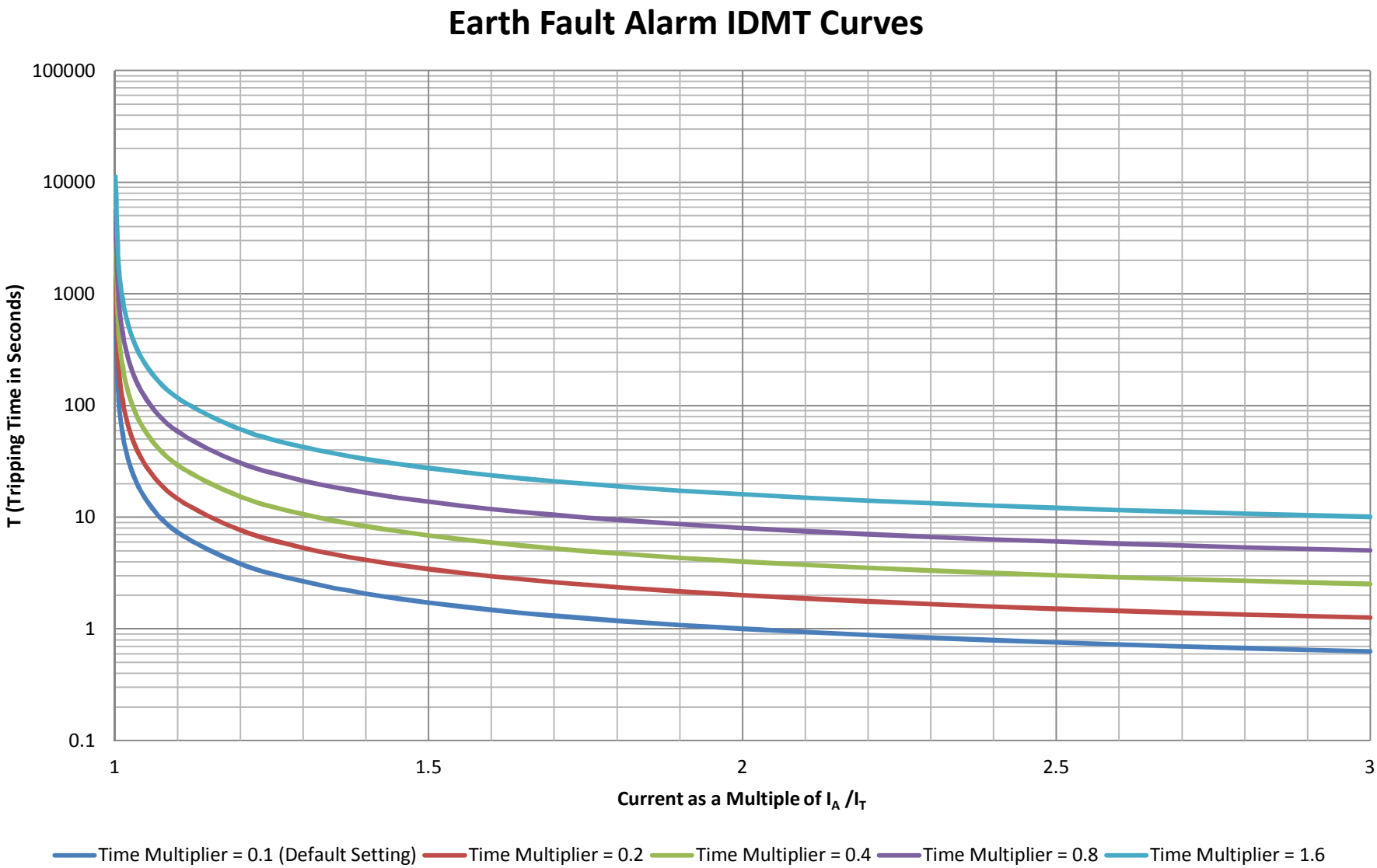
T is the tripping time in seconds (accurate to +/- 5% or +/- 50 ms (whichever is the greater))
I_A is the actual measured current
I_T is the trip point setting in current
t is the time multiplier setting

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



The formula for the *Tripping Time* cells is:




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

2.7.4.7 DEFAULT CURRENT PROTECTION TRIPPING CHARACTERISTICS

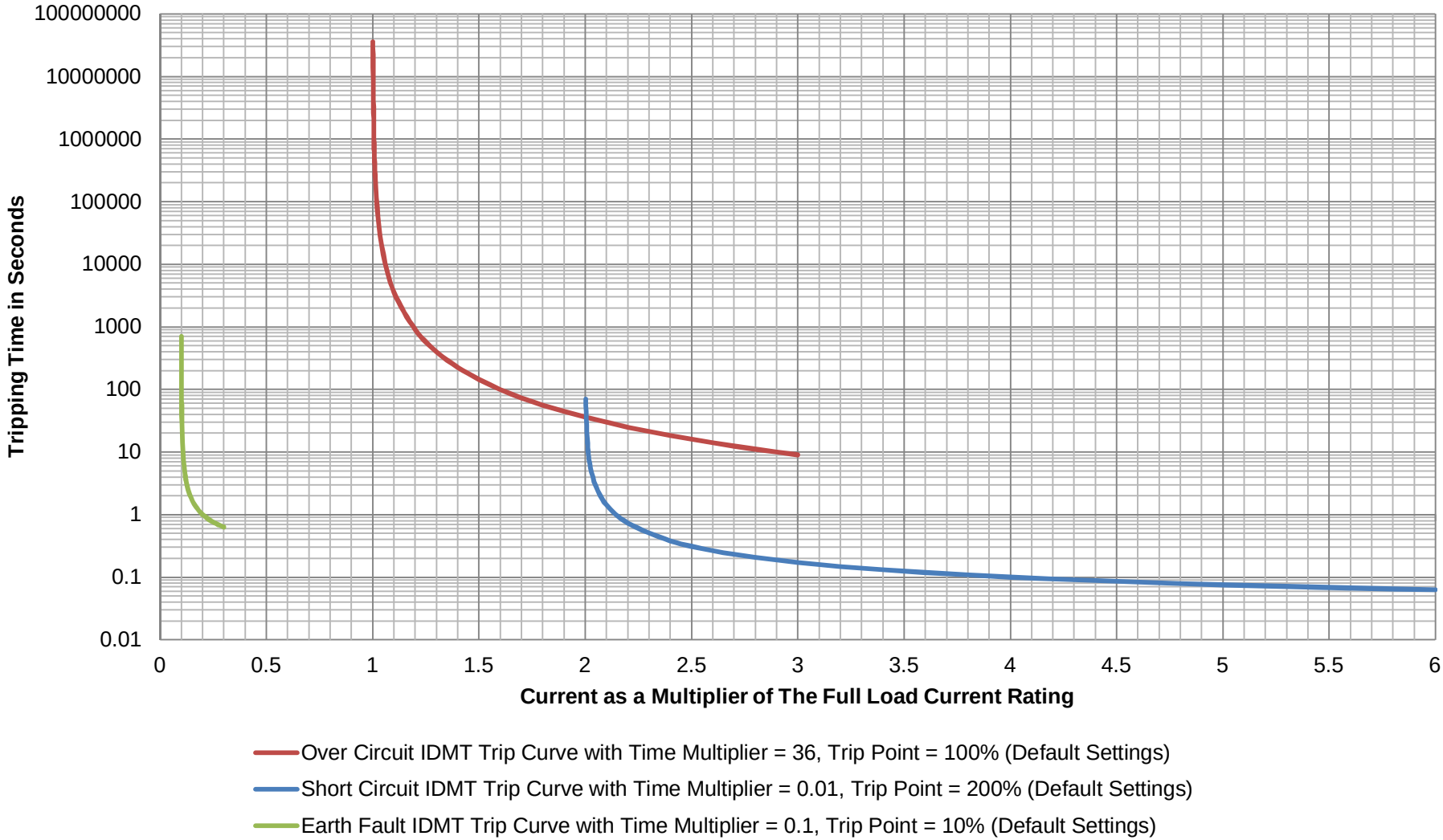
The graph on the following page shows the default settings for the IDMT tripping curves for the *Over Current, Short Circuit* and *Earth Fault* protections.

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

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

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

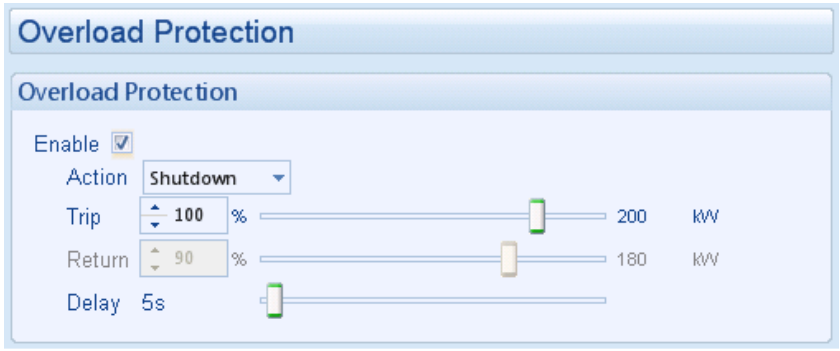
DSE Default Configratuion of Over Current, Short Circuit & Earth Fault IDMT Alarm Curves



2.7.5 GENERATOR POWER

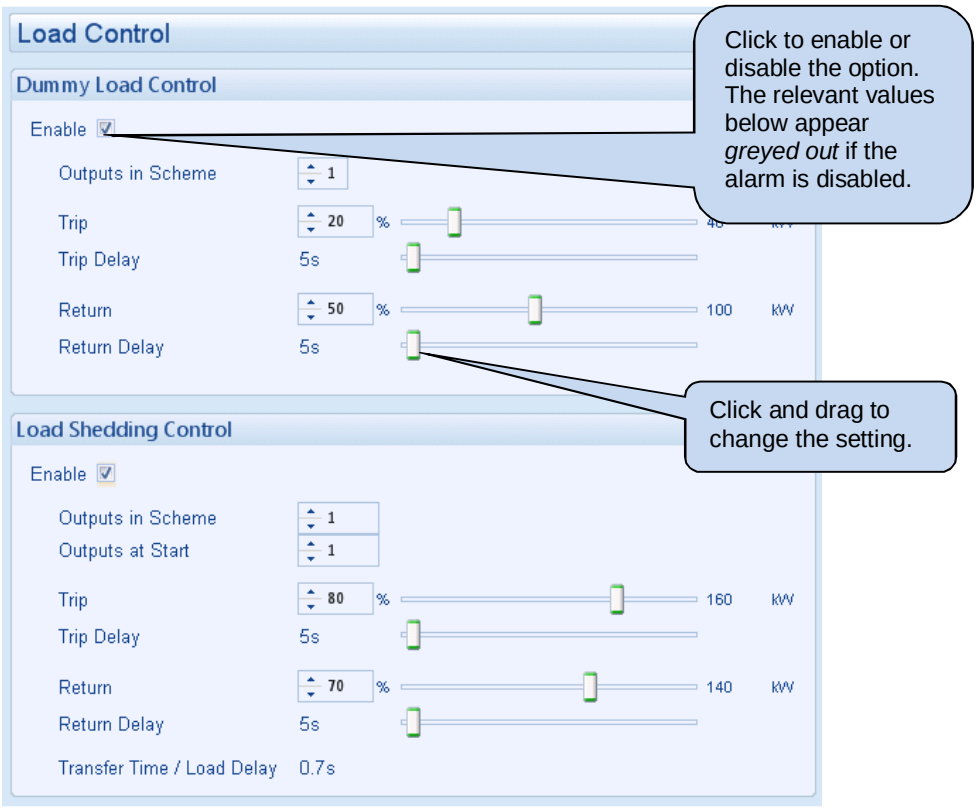
The *Generator Power* section is subdivided into smaller sections.
Select the required section with the mouse.

2.7.5.1 OVERLOAD PROTECTION



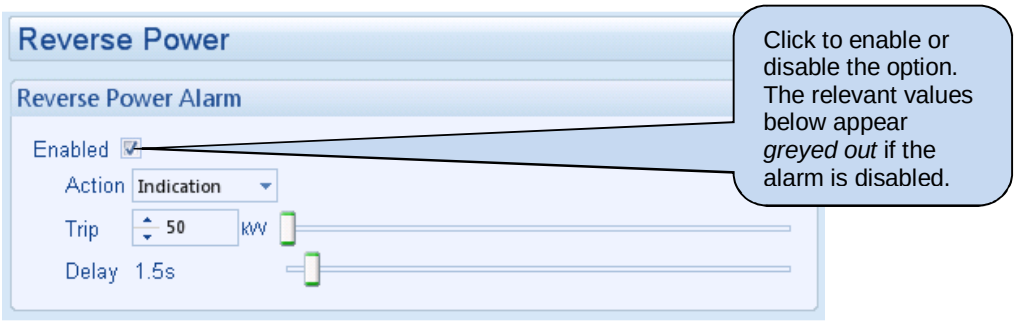
Parameter	Description
Overload Protection	☐ = Overload Protection alarm is disabled. ☑ = The *kW Overload Alarm* activates when the kW level exceeds the *Trip* setting for longer than the configured *Delay* time.
Action	Select the action for the *kW Overload Alarm:* ***Electrical Trip*** ***Indication***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

2.7.5.2 LOAD CONTROL



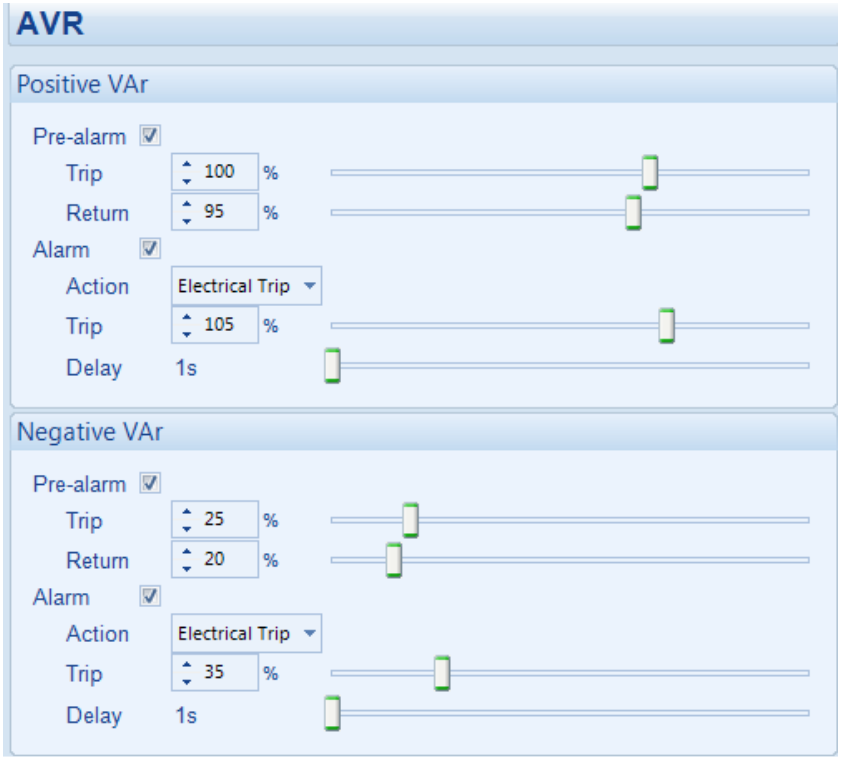
Parameter	Description
Dummy Load Control	Provides control of configurable outputs set to *Dummy Load Control*. ☐ = Dummy Load Control is disabled. ☑ = The module monitors the load and controls outputs configured to *Dummy Load Control (1-5)*
Outputs in Scheme	The amount of Dummy Load Control outputs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

2.7.5.3 REVERSE POWER



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

2.7.6 AVR

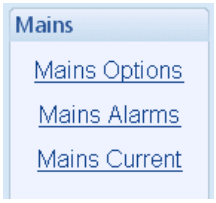


Parameter	Description
AVR	☐ = Alarms are disabled ☑ = The module monitors the Positive & Negative VAr levels and provides an alarm when the level exceeds the *Trip* setting longer than the configured *Delay* setting.
Action	Select the action for the *Reverse Power Alarm:* ***Electrical Trip*** ***Shutdown***

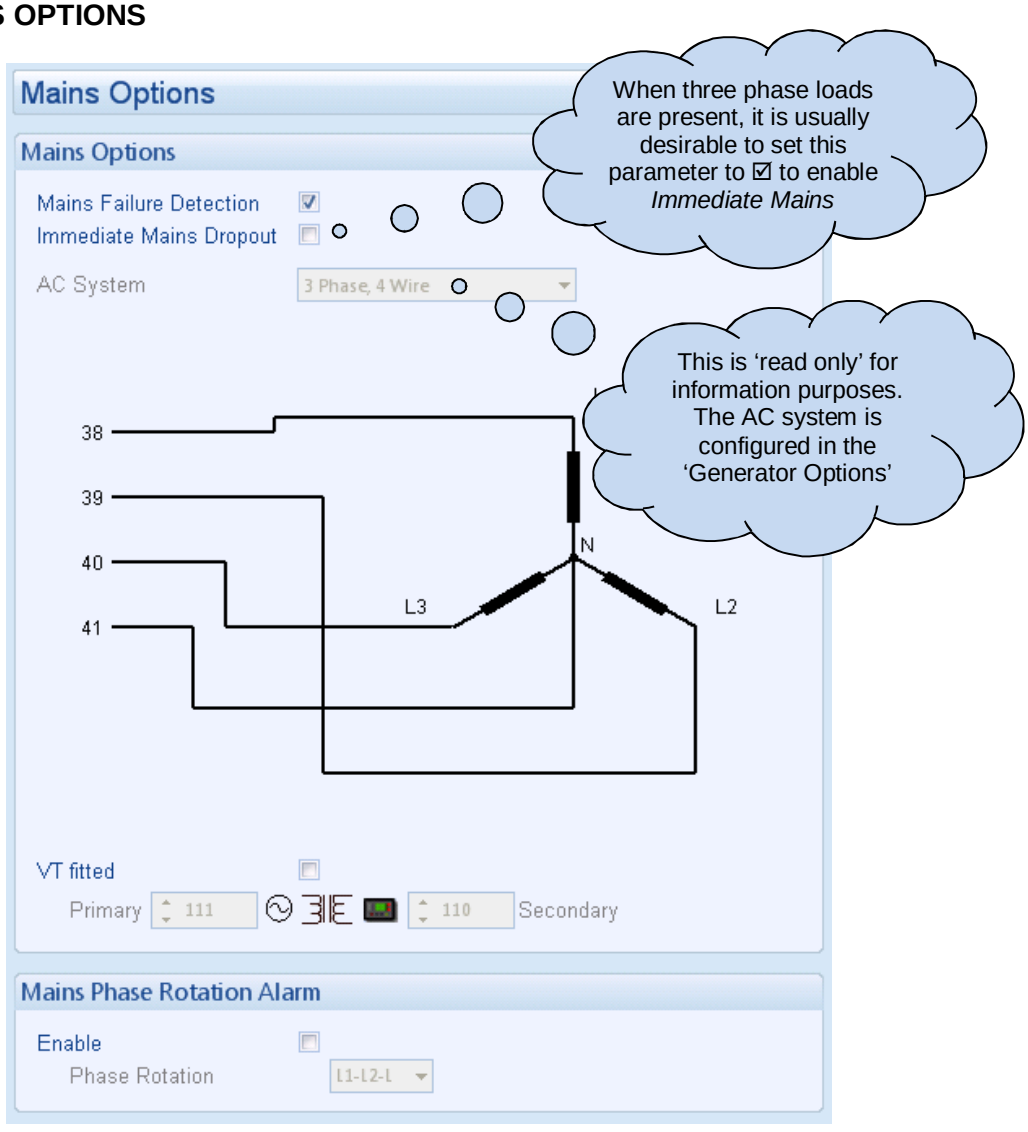
2.8 MAINS

= Only available on DSE7320 MKII AMF Modules

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



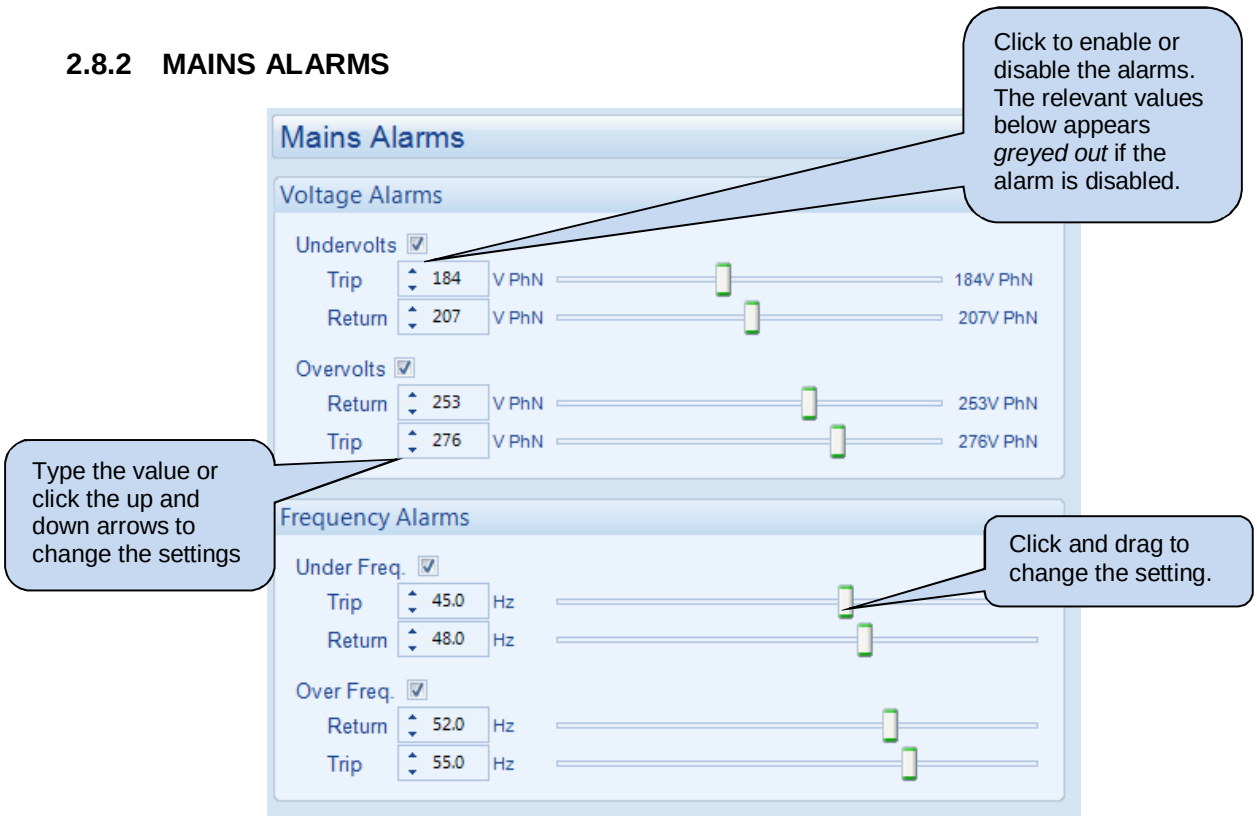
2.8.1 MAINS OPTIONS



Parameters are detailed overleaf…

Parameter	Description
Mains Failure Detection	☐ = The module ignores the status of the mains supply. ☑ = The module monitors the mains supply and use this status for automatically starting and stopping the set in auto mode.
Immediate Mains Dropout	☐ = Upon mains failure, the mains load switch is kept closed until the generator is up to speed and volts. ☑ = Upon mains failure, the mains load switch is opened immediately, subject to the setting of the *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
Mains Phase Rotation IEEE 37.2 – 47 Phase Sequence Relay	☐ = Mains phase rotation is not checked. ☑ = A mains failure is detected when the measured phase rotation is not as configured.

2.8.2 MAINS ALARMS

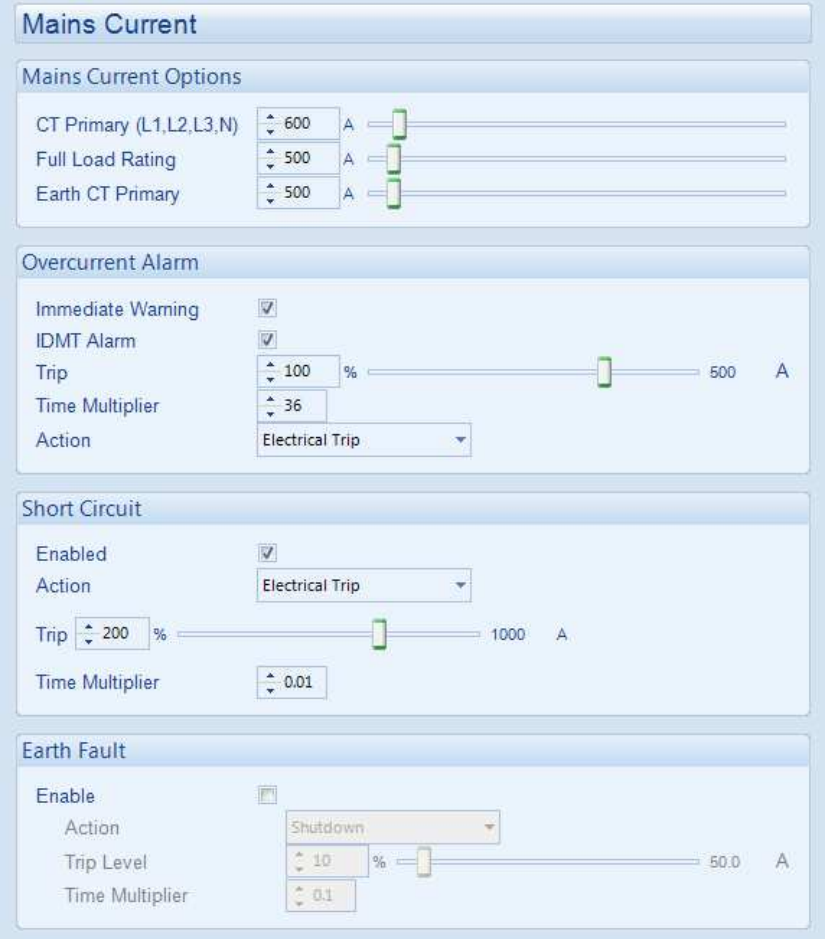


Alarm	IEEE designation
Mains Under Voltage IEEE 37.2 – 27 AC Undervoltage Relay	☐ = Mains Under Voltage detection is disabled ☑ = Mains Under Voltage gives an alarm in the event of the mains voltage falling below the configured *Under Voltage Trip* value. The *Under Voltage Trip* value is adjustable to suit the application. The alarm is reset and the mains is considered within limits when the mains voltage rises above the configured *Under Voltage Return* level.
Mains Over Voltage IEEE 37.2 – 59 AC Overvoltage Relay	☐ = Mains Over Voltage detection is disabled ☑ = Mains Over Voltage gives an alarm in the event of the mains voltage rising above the configured *Over Voltage Trip* value. The *Over Voltage Trip* value is adjustable to suit the application. The alarm is reset and the mains is considered within limits when the mains voltage falls below the configured *Over Voltage Return* level.
Mains Under Frequency IEEE 37.2 – 81 Frequency Relay	☐ = Mains Under Frequency detection is disabled ☑ = Mains Under Frequency gives an alarm in the event of the mains frequency falling below the configured *Under Frequency Trip* value. The *Under Frequency Trip* value is adjustable to suit the application. The alarm is reset and the mains is considered within limits when the mains frequency rises above the configured *Under Frequency Return* level.
Mains Over Frequency IEEE 37.2 – 81 Frequency Relay	☐ = Mains Over Frequency detection is disabled ☑ = Mains Over Frequency gives an alarm in the event of the mains frequency rising above the configured *Over Frequency Trip* value. The *Over Frequency Trip* value is adjustable to suit the application. The alarm is reset and the mains is considered within limits when the mains frequency falls below the configured *Over Frequency Return* level.

2.8.3 MAINS CURRENT

NOTE: Mains Current Alarms are provided on DSE7320 MKII modules only when the Current Transformers are fitted into the 'load leg'.

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

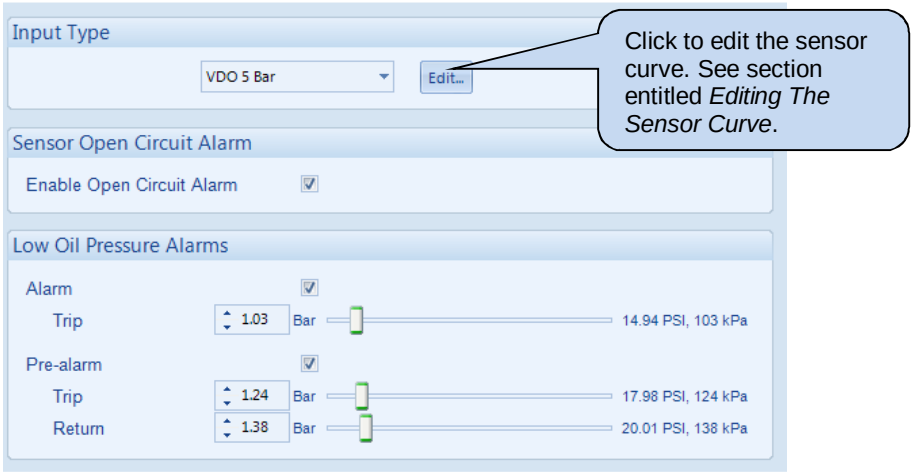


2.9 ENGINE

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

2.9.1 OIL PRESSURE

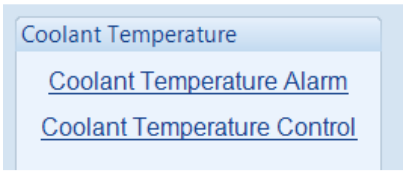
If a CAN Engine File is selected – Most engines give oil pressure over CAN link. In these cases, Analogue Input A is configured as Flexible Analogue or Digital Input. Configuration of Flexible Analogue Inputs and Digital Inputs is detailed elsewhere in this document.
Where the CAN engine does not support oil pressure over CAN link, Analogue input A is selectable as either digital input, analogue flexible input, or as analogue oil pressure sensor.



Parameter	Description
Input Type	Select the sensor curve from a pre-defined list or create a user-defined curve.
Enable Open Circuit Alarm	☐ = Alarm is disabled. ☑ = The *Low Oil Pressure Open Circuit Alarm* is active when the module detects an open circuit when the sensor is disconnected
Low Oil Pressure Alarm	☐ = Alarm is disabled. ☑ = The *Low Oil Pressure Shutdown Alarm* is active when the measured oil pressure drops below the configured *Trip* level.
Low Oil Pressure Pre-Alarm	☐ = Alarm is disabled. ☑ = The *Low Oil Pressure Warning Alarm* is active when the measured oil pressure drops below the configured *Trip* level. The warning is automatically reset when the oil pressure increases above the configured *Return* level.

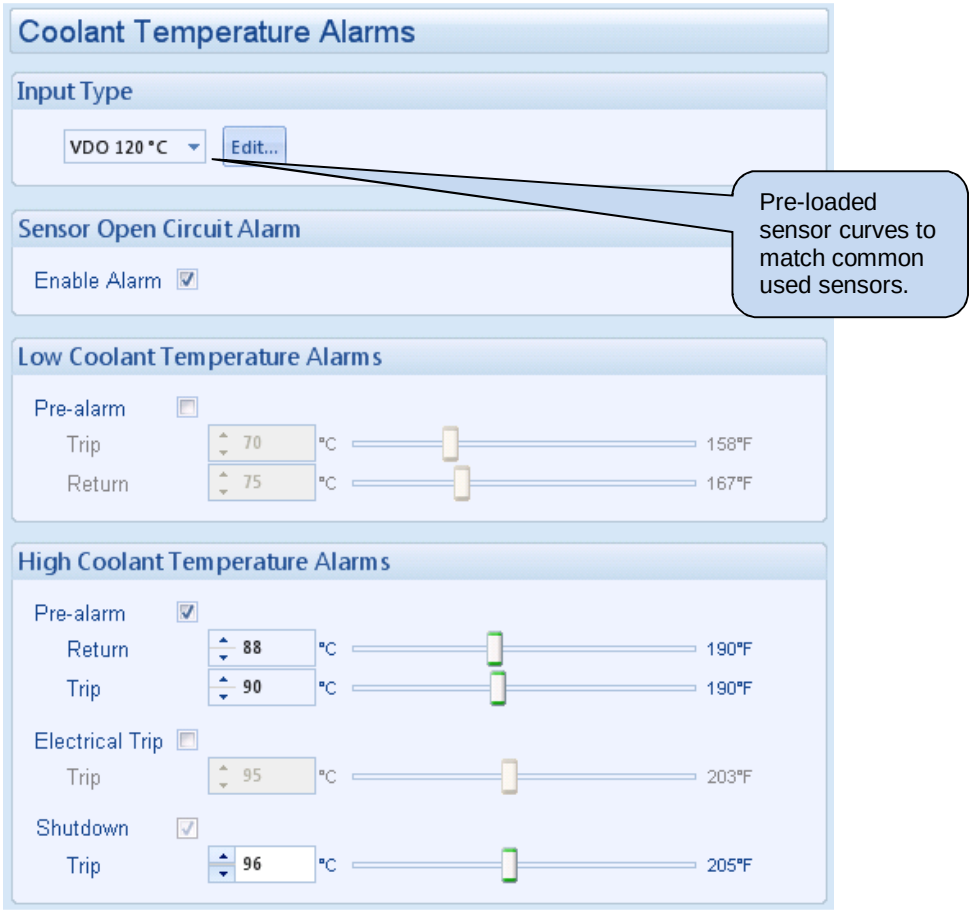
2.9.2 COOLANT TEMPERATURE

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



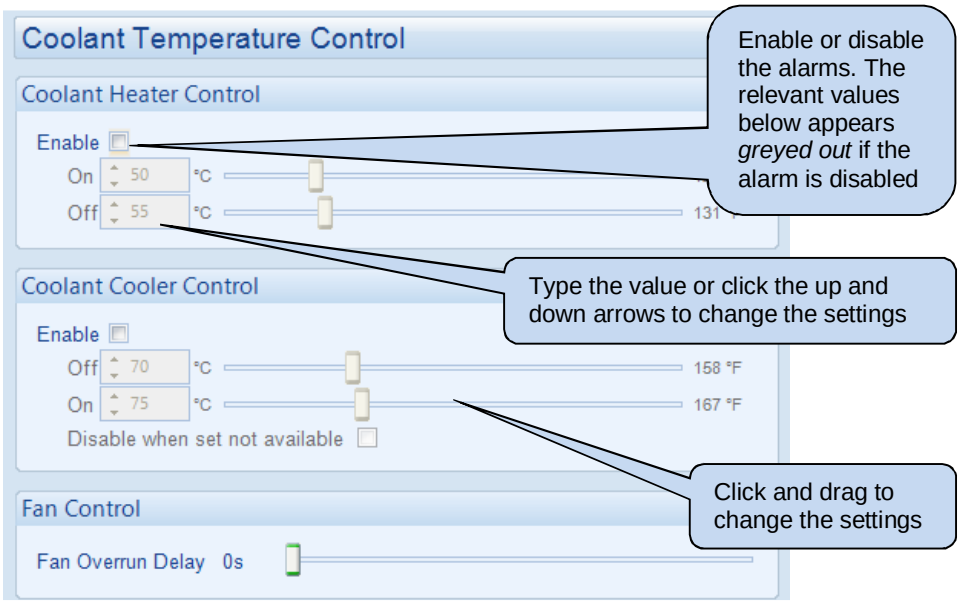
2.9.3 COOLANT TEMPERATURE ALARM

If a CAN Engine File is selected – Engines give temperature measurements from CAN link. Analogue Input B is configured as Digital Input. Configuration is the same as for Digital Inputs, detailed elsewhere in this document.



Parameter	Description
Input Type	Select the sensor curve from a pre-defined list or create a user-defined curve.
Enable Open Circuit Alarm	☐ = Alarm is disabled. ☑ = The *Coolant Temperature Open Circuit* Alarm is active when the module detects an open circuit when the sensor is disconnected
Low Coolant Temperature Pre-Alarm	☐ = Alarm is disabled. ☑ = The *Low Coolant Temperature Warning Alarm* is active when the measured coolant temperature falls below the configured *Trip* level. The *Warning* is automatically reset when the coolant temperature rises above the configured *Return* level.
High Coolant Temperature Pre-Alarm	☐ = Alarm is disabled. ☑ = The *High Coolant Temperature Warning Alarm* is active when the measured coolant temperature rises above the configured *Trip* level. The *Warning* is automatically reset when the coolant temperature falls below the configured *Return* level.
Electrical Trip	☐ = Alarm is disabled. ☑ = The *High Coolant Temperature Controlled Shutdown Alarm* is active when the measured coolant temperature rises above the configured *Trip* level.
High Coolant Temperature Alarm	The *High Coolant Temperature Shutdown Alarm* is active when the measured coolant temperature rises above the configured *Trip* level.

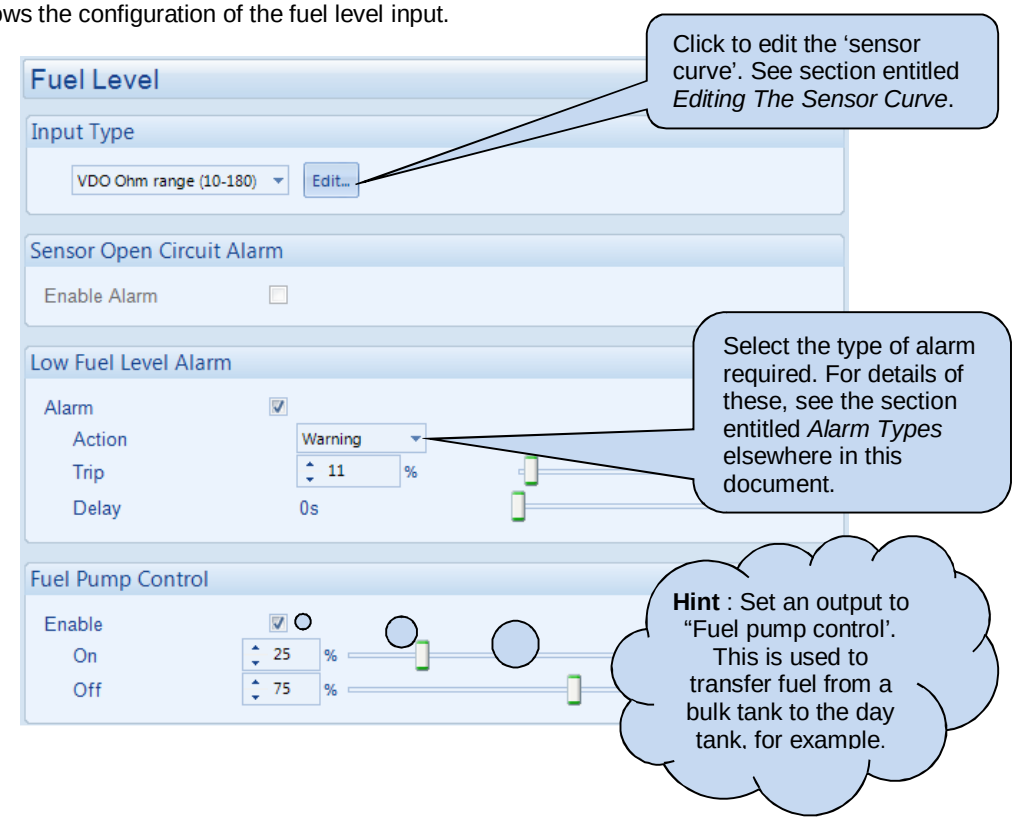
2.9.4 COOLANT TEMPERATURE CONTROL



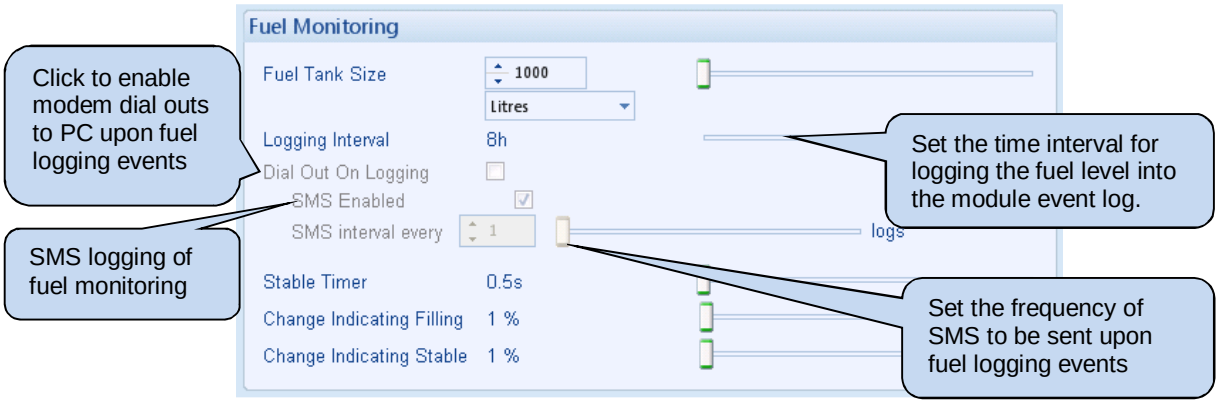
Parameter	Description
Coolant Heater Control	☐ = Coolant Heater Control function is disabled ☑ = The digital output configured to *Coolant Heater Control* is energised when the engine coolant temperature falls below the configured *On* level. This is designed to control an external engine heater. When the coolant temperature rises above the configured *Off* level, the digital output is de-energised.
Coolant Cooler Control	☐ = Coolant Cooler Control function is disabled ☑ = The digital output configured to *Coolant Cooler Control* is energised when the engine coolant temperature exceeds the configured *On* level. This is designed to control an external engine cooling system, for instance an additional cooling fan. When the coolant temperature falls below the configured *Off* level, the digital output is then de-energised.
Fan Control	An output configured to *Fan Control* energises when the engine becomes available (up to speed). This output is designed to control an external cooling fan. When the engine stops, the cooling fan remains running for the duration of the *Fan Overrun Delay.*

2.9.5 FUEL LEVEL

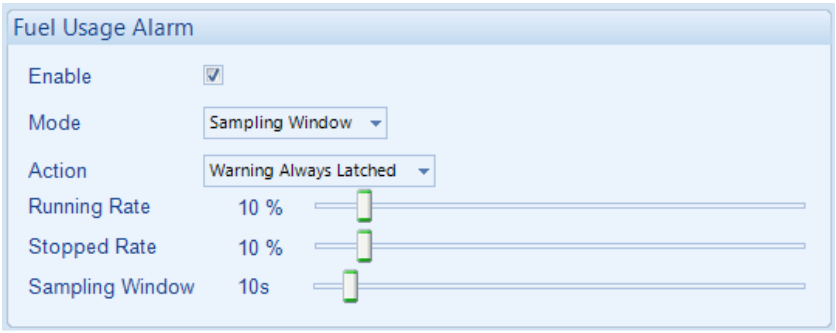
This section allows the configuration of the fuel level input.



Parameter	Description
Input Type	Select the sensor curve from a pre-defined list or create a user-defined curve.
Sensor Open Circuit Alarm	☐ = Alarm is disabled. ☑ = The *Fuel Level Open Circuit Alarm* is active when the module detects an open circuit when the sensor is disconnected
Low Fuel Level Alarm	☐ = Alarm is disabled. ☑ = The *Low Fuel Level Alarm* is active when the measured fuel level drops below the *Trip* setting for the configured *Delay* time.
Fuel Pump Control	☐ = Fuel Pump Control is disabled. ☑ = Allows the module to control an external fuel pump to transfer fuel from a bulk tank to the day tank. A digital output configured for *Fuel Pump Control* energises when the fuel level falls below the configured *On* setting and de-energises when the fuel level exceeds the configured *Off* setting.

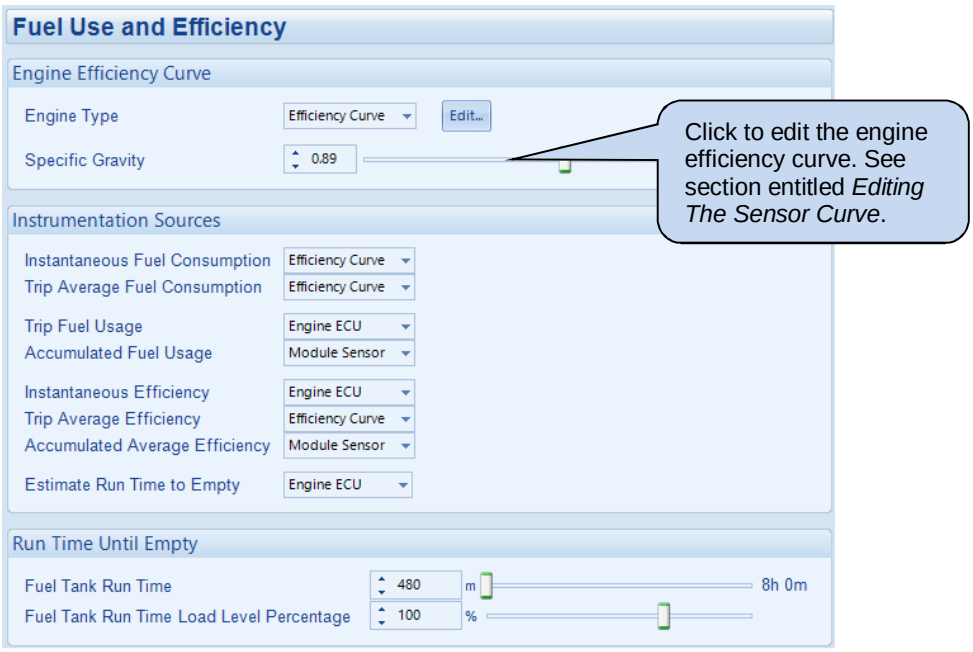


Parameter	Description
Stable Timer	The controller maintains a rolling record of the fuel level percentage for the duration of the *Stable Timer*. When the rolling record of the fuel level percentage indicates that the fuel level has increased more than the *Change Indicating Filling* during the *Stable Timer*, the controller records a *Fuel Filling Start* event in its event log. When the rolling record of the fuel level indicates that the fuel level has not changed more than the *Change Indicating Stable* during the *Stable Timer*, the controller records a *Fuel Filling Stop* event in its event log.
Change Indicating Filling	When the fuel level increases at a rate higher than $\frac{\textit{Change Indicating Filling}}{\textit{Stable Timer}}$ then a fuel fill start event is recorded into the event log. Depending on configuration this generates a dial out or SMS message. **Example:** *Stable Timer* = 1 minute *Change Indicating Filling* = 3 % When the fuel level increases by more than 3% in 1 minute, a fuel fill event is recorded.
Change Indicating Stable	During filling, if the fuel level increases at a rate less than $\frac{\textit{Change Indicating Stable}}{\textit{Stable Timer}}$ then a fuel fill end event is recorded into the event log. Depending on configuration this generates a dial out or SMS message. **Example:** *Stable Timer* = 1 minute *Change Indicating Stable* = 2 % When the fuel level increases by less than 2% in 1 minute, a fuel fill end event is recorded.
Fuel Usage Alarm	Provides an alarm to monitor the usage of the fuel. The alarm activates when the fuel level drops at a higher rate than the configured *Running Rate* while the engine is running. Or if the fuel level drops at a higher rate than the configured *Stopped Rate* while the engine is stopped. This alarm is provided to check for fuel leakage problems or potential fuel theft.



Parameter	Description
Mode	**Standard Mode:** The fuel usage alarm activates when the fuel level decreases at a higher rate per hour than the configured *Running Rate* while the engine is running, or *Stopped Rate* while the engine is stopped. **Sampling Window:** The fuel usage alarm activates when the fuel level decreases at a higher rate per *Sampling Window* than the configured *Running Rate* while the engine is running, or *Stopped Rate* while the engine is stopped.

2.9.6 FUEL USE AND EFFICIENCY



2.9.6.1 ENGINE EFFICIENCY CURVE

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

2.9.6.2 INSTRUMENTATION SOURCES

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

2.9.6.3 RUN TIME UNTIL EMPTY

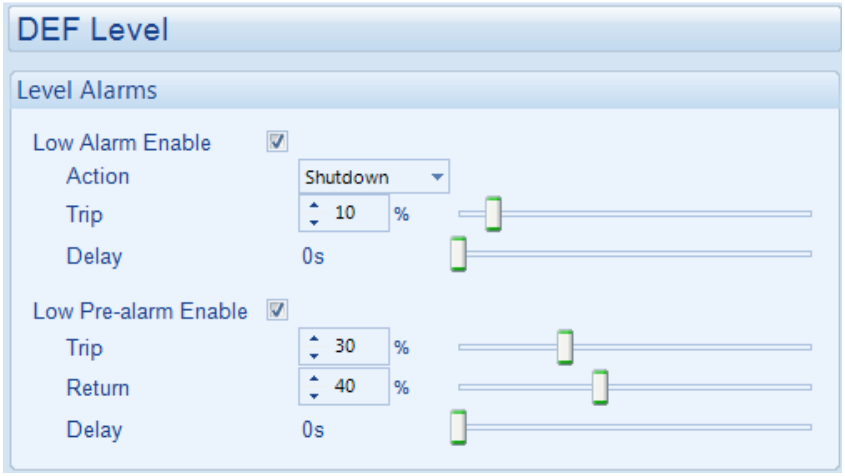
Parameter	Description
Fuel Tank Run Time	The time in minutes how long the generator's fuel tank last when running at the *Fuel Tank Run Time Load Level Percentage*
Fuel Tank Run Time Load Level Percentage	The percentage of full load kW the generator which is used to calculate how long the fuel in the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

2.9.7 DEF LEVEL

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

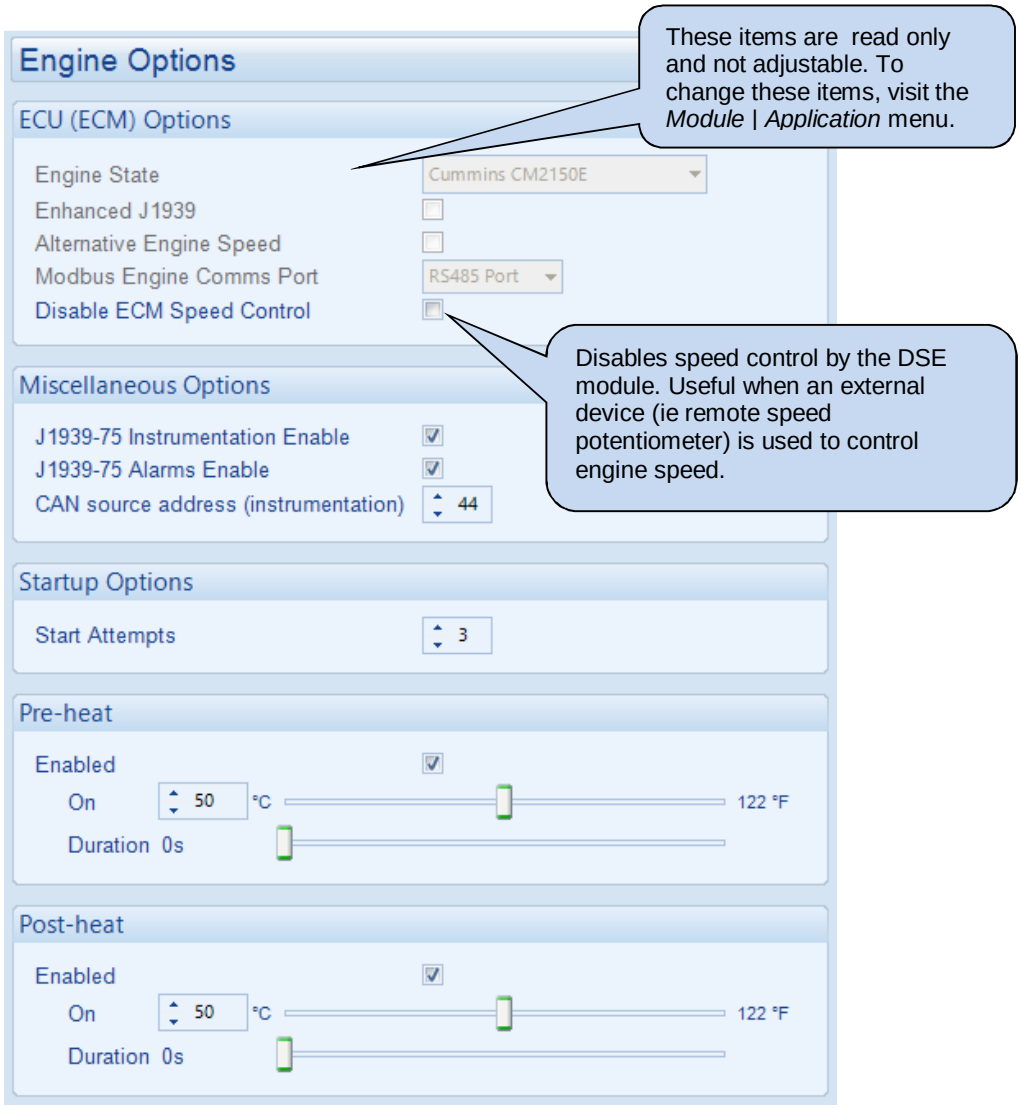
NOTE: Configuration of the *Alarm Action* in this section defines the DSE module response to the CANbus message; however, the ECU (ECM) still shuts down the engine depending on the alarm severity.

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



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

2.9.8 ENGINE OPTIONS



2.9.8.1 MISCELLANEOUS OPTIONS

NOTE: For a full list of the J1939-75 alarms and instrumentation, refer to DSE Publication: *057-253 DSE7300MKII Operator Manual* which is found on our website: *www.deepseaplc.com*

Parameter	Description
J1939-75 Instrumentation Enable	Allows the DSE module to be interrogated by another CAN device and transfer the generator set instrumentation over J1939 link.
J1939-75 Alarms Enable	Allows the DSE module to be interrogated by another CAN device and transfer the alarms over J1939 link.
CAN Source Address (Instrumentation)	**NOTE: For a full list of the J1939-75 engine message and instrumentation, refer to DSE Publication: *057-253 DSE7300MKII Operator Manual* which is found on our website: *www.deepseaplc.com*** Set the *CAN Source Address* for the DSE module over which other CANbus devices read the generator set instrumentation.

2.9.8.2 STARTUP OPTIONS

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

2.9.8.3 PRE-HEAT

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

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

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

2.9.8.4 POST-HEAT

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

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

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

2.9.9 ECU (ECM) OPTIONS

Parameter	Description
Module to Record Engine Hours	When enabled, DSE module counts Engine Run Hours. When disabled, Engine ECU (ECM) provides Run Hours.
DPF Regeneration Control	Available for ECUs (ECM) which require the engine speed to drop during a manual regeneration cycle. During this time, the generator is not available to supply power and the under speed and under frequency alarms are not active.
Speed Switch	Defines the method of speed control over CANbus when supported by the ECU (ECM). Selection needs to match the ECU (ECM) calibration for the speed control method. Available speed control methods to choose from: ***CAN Open Increase Decrease*** ***CAN Open Speed Demand*** ***Default Dataset ECU*** ***ECU Analogue Absolute*** ***ECU Analogue Relative*** ***ECU CAN Open Analogue*** ***ECU Frequency Input*** ***ECU Increase Decrease Input***
ECU Wakeup	☐ = Option is disabled. ☑ = When the engine is stopped, the DSE module sends a wakeup signal to the ECU (ECM) and keeps it powered up for 2 minutes to read the ECU (ECM) parameters. This is periodically repeated depending on the configured *Periodic Wakeup Time.*

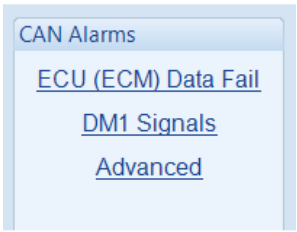
Paramters continued overleaf…

Parameter	Description
Coolant Measurement Persistance	**NOTE: Available only when *ECU Wakeup* is enabled.** ☐ = Option is disabled. ☑ = The *Coolant Temperature* measurement is used for the *Coolant Temperature Control.*
Droop	**NOTE: Droop options are only available where supported by the Engine ECU (ECM) over the CAN or MODBUS datalink. Contact the engine manufacturer for further details.** ☐ = Engine droop is not enabled. ☑ = Where supported by the electronic engine ECU (ECM), the DSE 72/7300 series modules enables droop in the engine ECU (ECM) governor at the %age configured.
SPN Ignore List	Choose the specific SPN for the module to ignore. The module allows the engine to keep running when the ignored SPN occurs; however, depending on the severity, the engine shuts down based on the ECU (ECM) calibration. This is used to mask certain indications or warnings on the ECU (ECM) and not display them on the DSE module.
CAN Source Address (Engine Messages)	**NOTE: For a full list of the J1939-75 engine message and instrumentation, refer to DSE Publication: *057-253 DSE7300MKII Operator Manual* which is found on our website: *www.deepseaplc.com*** Set the *CAN Source Address* for the DSE module over which other CANbus devices read the alarms.

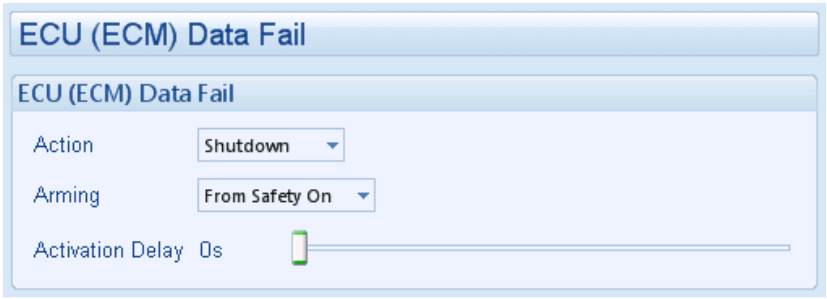
2.9.10 ECU (ECM) ALARMS

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

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



2.9.10.1 ECU (ECM) DATA FAIL



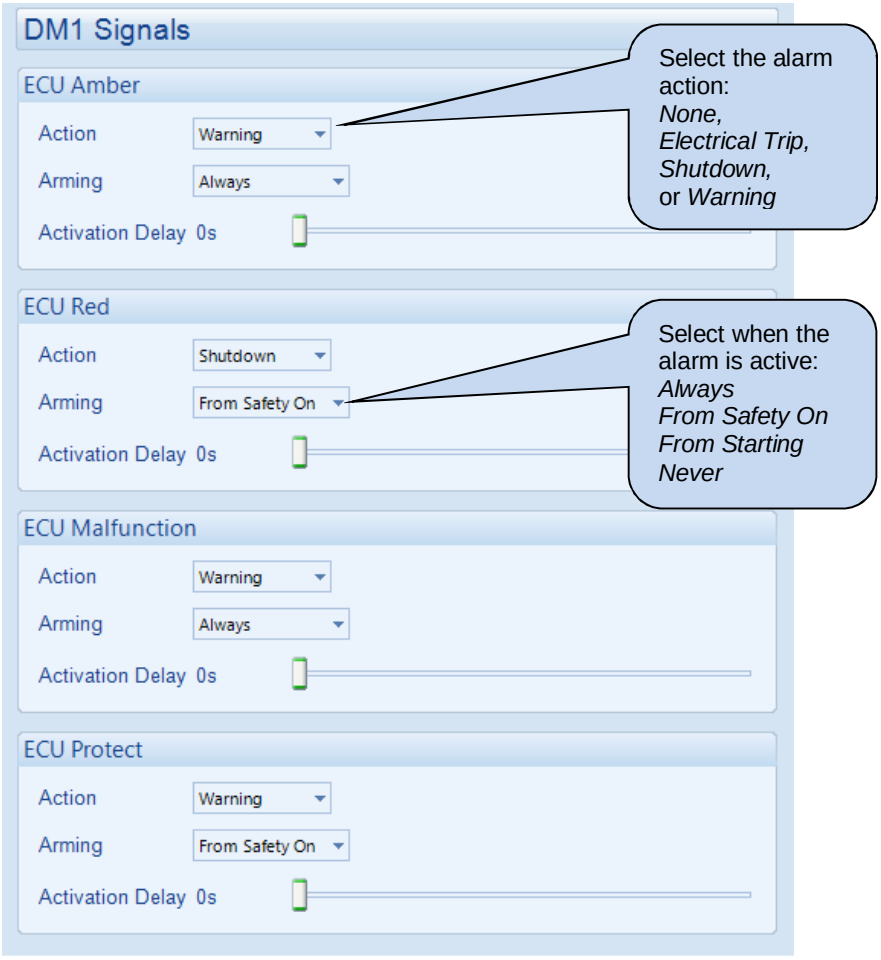
Parameter	Description
CAN Data Fail	Provides protection against failure of the ECU (ECM) CAN data link. The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***None*** ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the *CAN ECU (ECM) Data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

2.9.10.2 DM1 SIGNALS

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

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

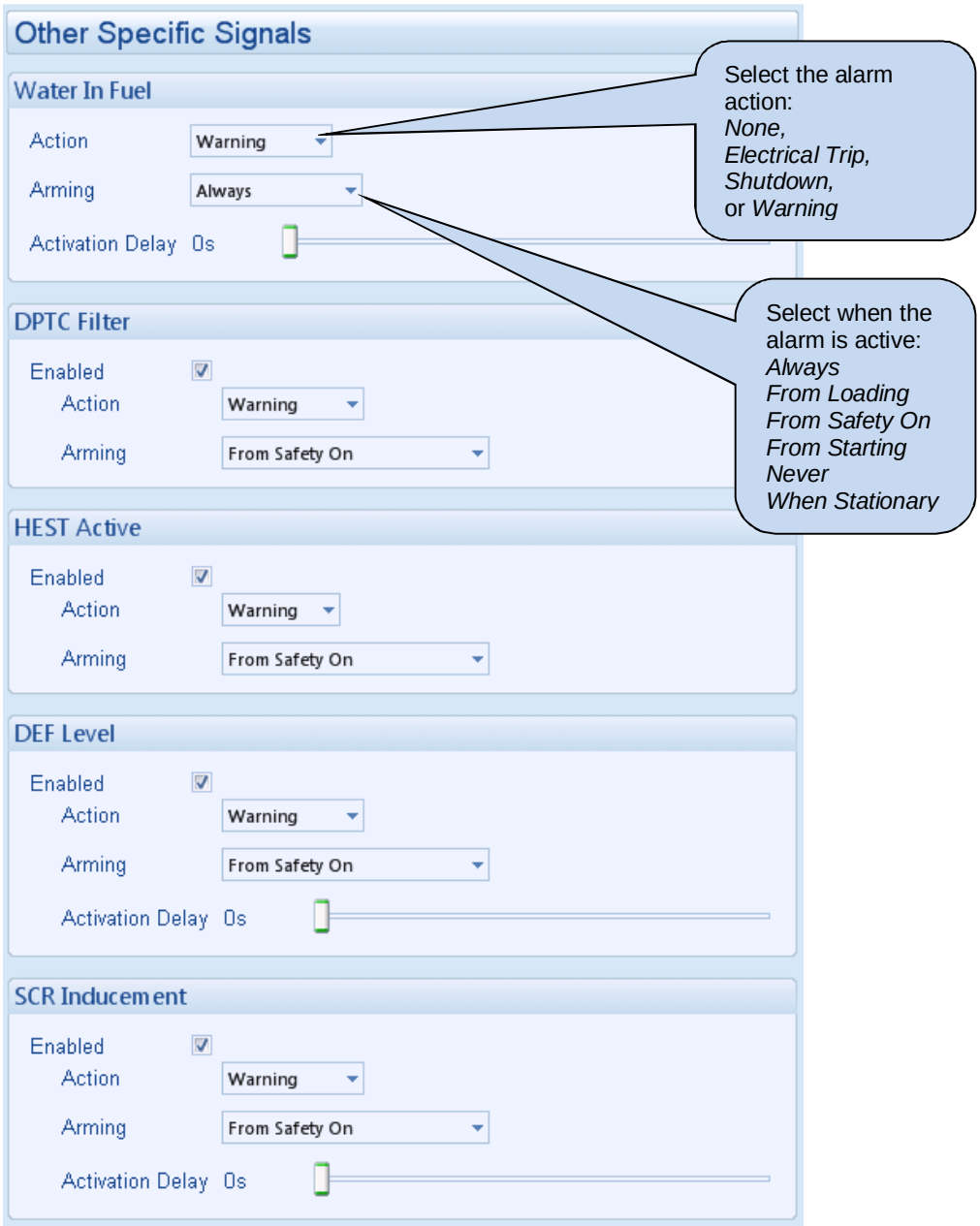
DM1 signals are messages from the CAN (ECM) ECU. The following parameters allows configuration of how the DSE module responds to these messages.



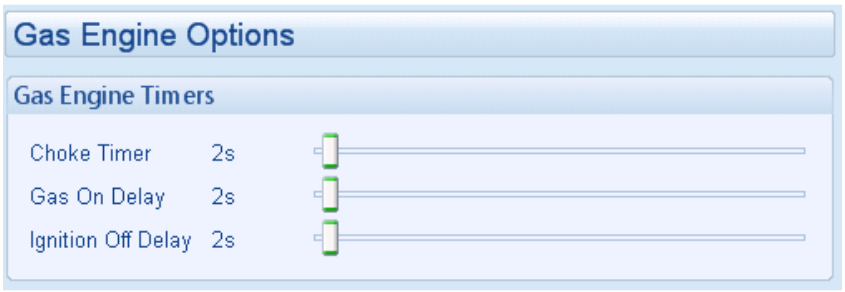
2.9.10.3 ADVANCED

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

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



2.9.11 GAS ENGINE OPTIONS

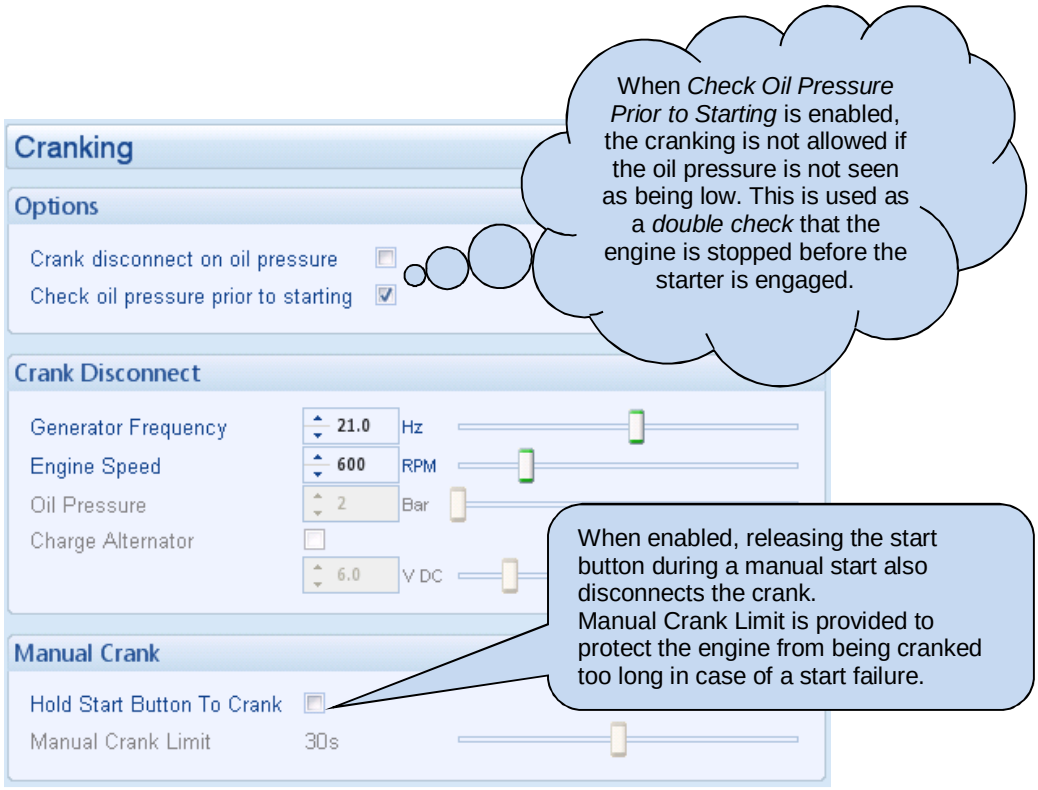


Parameter	Description
Choke Timer	Controls the amount of time that the Gas Choke output is active during the starting sequence.
Gas On Delay	Controls the amount of time between energising the Gas Ignition and energising the Fuel output. Used in the starting sequence to purge old gas from the engine.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

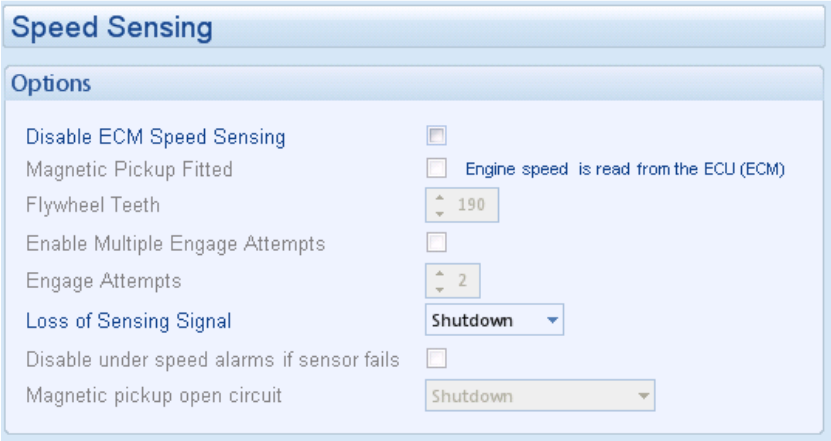
2.9.12 CRANK DISCONNECT

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

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

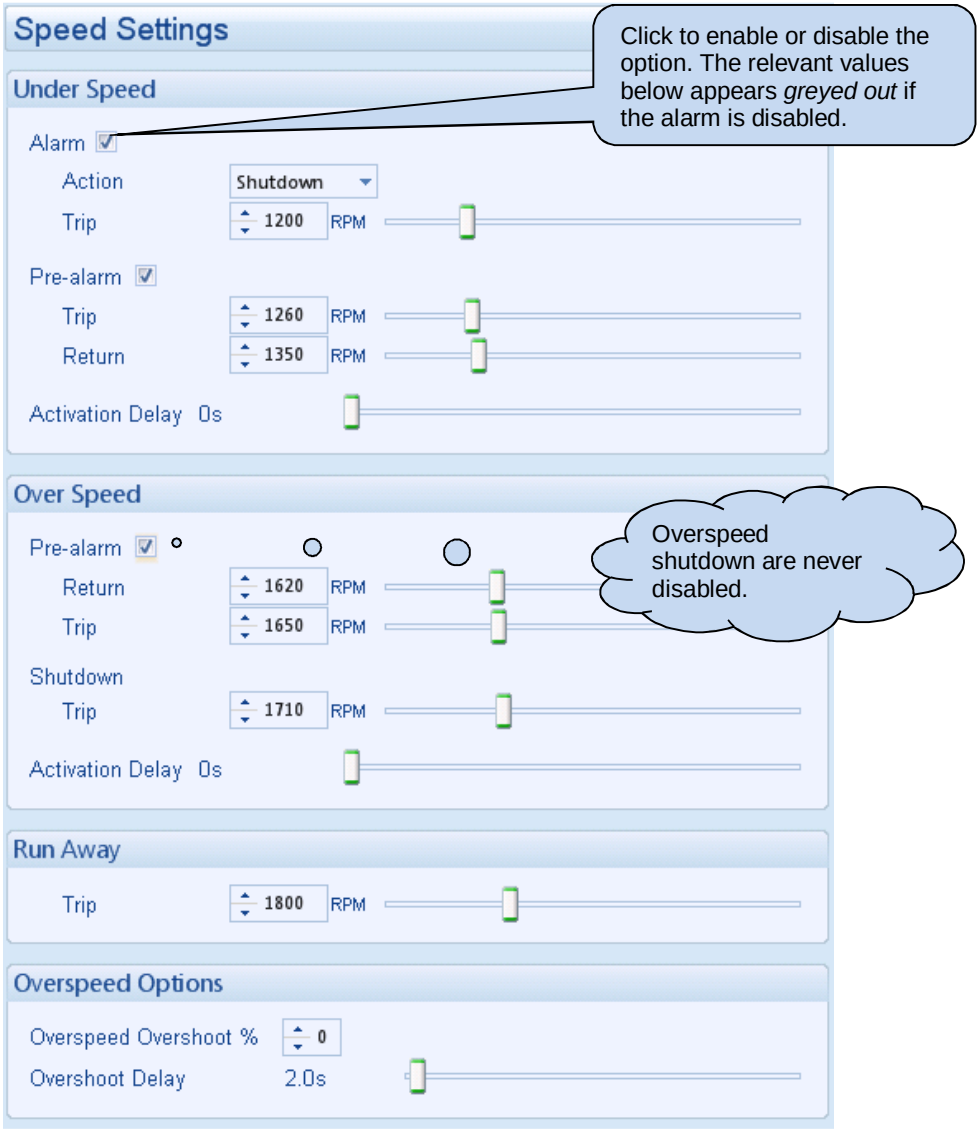


2.9.13 SPEED SENSING



Parameter	Description
Disable ECM Speed Sensing	☐ = An ECM is connected to the DSE module and being used for speed sensing. ☑ = An ECM is connected to the DSE module but another form of speed sensing fitted to the DSE module is being used.
Magnetic Pickup Fitted	**NOTE: For specifications of the magnetic pickup input, refer to DSE Publication: *057-253 DSE7300MKII Operator Manual* which is found on our website: *www.deepseaplc.com*** ☐ = Magnetic pickup device is not connected to the DSE module. ☑ = A low impedance magnetic pickup device is connected to the DSE module to measure engine speed.
Flywheel Teeth	Define the number of pulses which are counted by the speed sensing device in each engine revolution.
Enable Multiple Engage Attempts	☐ = No engage attempt is given. If no speed sensing is detected during cranking, the *Fail To Start* alarm is active. ☑ = If no magnetic pickup pulses are detected during cranking, it is assumed that the starter has not engaged to turn the engine. The starter is withdrawn and re-energised for the configured number of *Engage Attempts.*
Loss of Sensing Signal	If the speed sensing signal is lost during engine running (or not present during cranking when *Multiple Engage Attempts* is enabled), an alarm is generated: *Shutdown:* The engine is removed from load and is immediately stopped. *Warning:* The engine continues to run, however a warning alarm is raised.
Disable Under Speed Alarms If Sensor Fails	☐ = Under speed alarms activate even if speed sensor has failed. ☑ = Under speed alarms are disabled when the speed sensor fails.
Magnetic Pickup Open Circuit	If the magnetic pickup device is not detected, an alarm is generated: *Shutdown:* The engine is removed from load and is immediately stopped. *Warning Always Latched:* The engine continues to run, however a latched warning alarm is raised even if the magnetic pickup signal returns to normal.

2.9.14 SPEED SETTINGS



2.9.14.1 UNDER SPEED

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

2.9.14.2 OVER SPEED

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

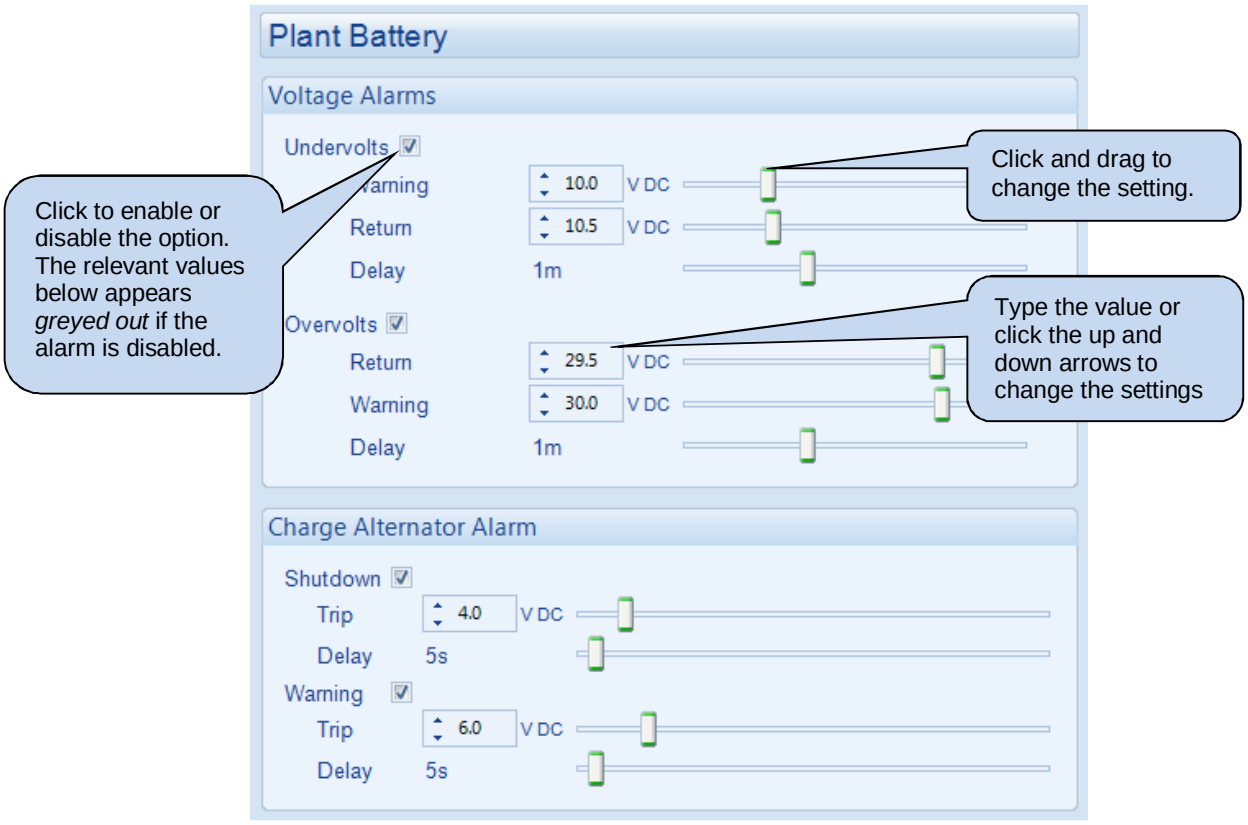
2.9.14.3 RUN AWAY

Parameter	Description
Run Away	☐ = Alarm is disabled ☑ = In the event of the engine speed rising above the configured *Trip* value the *Run Away Shutdown* alarm is immediately triggered. This is used to protect against engine damage due to uncontrolled speed increase, where the engine speed runs away.
Trip	Set the speed level for the *Run Away* alarm.

2.9.14.4 OVERSPEED OPTIONS

Parameter	Description
Overspeed Overshoot % 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 setting during the starting process for a short time. Rather than 'inhibiting' the Overspeed alarms, the levels are temporarily raised by the *Overspeed Overshoot %* for the duration of the *Overspeed Overshoot* delay from starting.

2.9.15 PLANT BATTERY



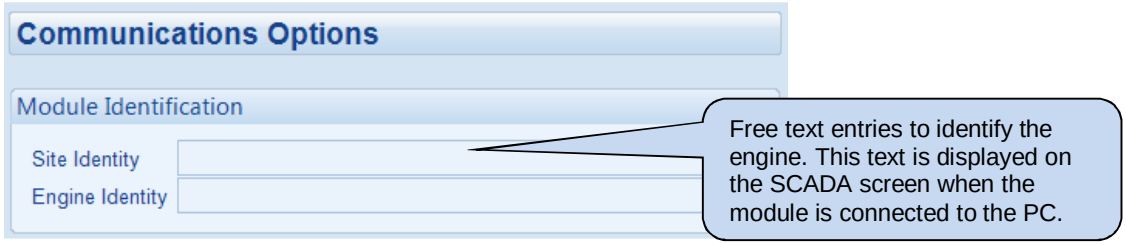
Parameter	Description
Plant Battery Undervolts IEEE 37.2 -27 DC Undervoltage Relay	The alarm activates when the battery voltage drops below the configured *Pre-Alarm* level for the configured *Delay* time. When the battery voltage rises above the configured *Return* level, the alarm is de-activated.
Plant Battery Overvolts IEEE 37.2 -59 DC Overvoltage Relay	The alarm activates when the battery voltage rises above the configured *Pre-Alarm* level for the configured *Delay* time. When the battery voltage drops below the configured *Return* level, the alarm is de-activated.
Charge Alternator Alarm	The alarm activates when the charge alternator voltage falls below the configured *Trip* level for the configured *Delay* time.
Charge Alternator Pre-Alarm	The alarm activates when the charge alternator voltage falls below the configured *Trip* level for the configured *Delay* time.

2.10 COMMUNICATIONS

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

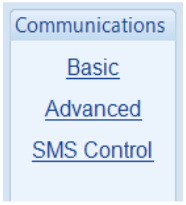
2.10.1 COMMUNICATION OPTIONS

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

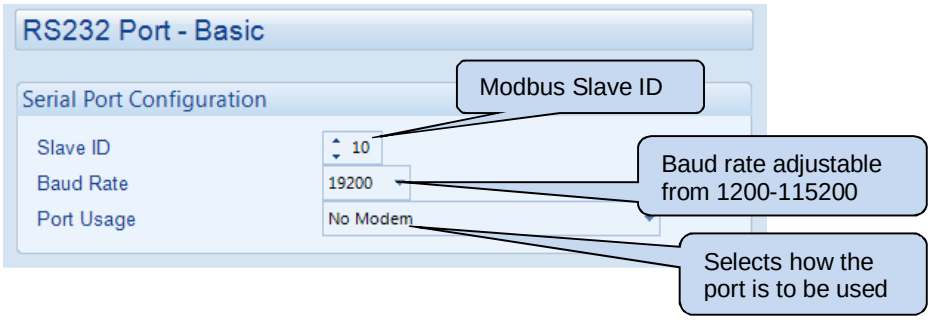


2.10.2 RS232 PORT

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



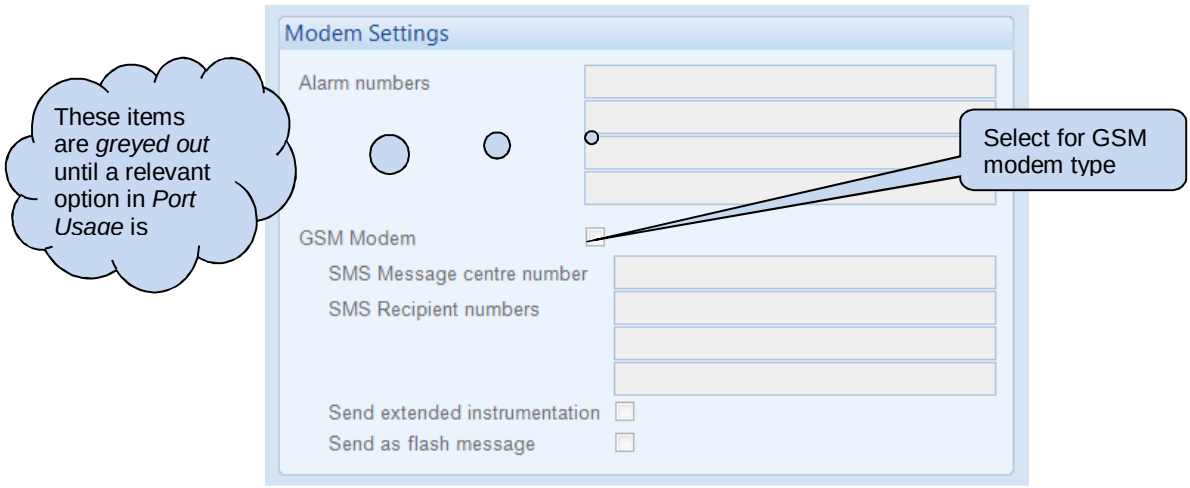
2.10.2.1 BASIC



SERIAL PORT CONFIGURATION

Parameter	Description
Port usage	The options are : ***No Modem:*** RS232 ports is used for direct RS232 connection to PLC, BMS etc ***Incoming Modem Calls:*** RS232 port connected to modem, used to accept incoming calls from a PC only. ***Incoming And Outgoing Modem:*** RS232 port connected to modem used to accept incoming calls from a PC and also make calls upon events. ***Outgoing Modem Alarms:*** RS232 port connected to modem, used to make calls upon events.
Cyclic	When multiple *Alarm Numbers* are configured, the module attempts to dial each number. When the dial out call fails to one of the configured numbers, the module completes the cycle and re-attempts to call those numbers for the configured number of *Retries*.
Sequence	When multiple *Alarm Numbers* are configured, the module attempts to dial each number. When the dial out call fails to one of the configured numbers, the module attempts to call that number for the configured number of *Retries*, before it carries on to the next number.

MODEM SETTINGS



Parameter	Description
Alarm Number	The phone number that the module dials upon an event. This number must be connected to a PC modem on a PC running the DSE Configuration Suite Software. Leave this field empty when dial-out to a PC is not required.
GSM Modem	☐ = The connected modem is a fixed line telephone modem ☑ = The connected modem is a GSM (cellular) modem. The GSM signal strength meter and GSM operator are shown on the module display.
SMS Message Centre Number	The Message centre used to send SMS messages. This number is obtained from the GSM operator.
SMS Recipient Numbers	Numbers of the cell phones to send SMS messages to. Leave blank if SMS function is not required.

RECOMMENDED MODEMS

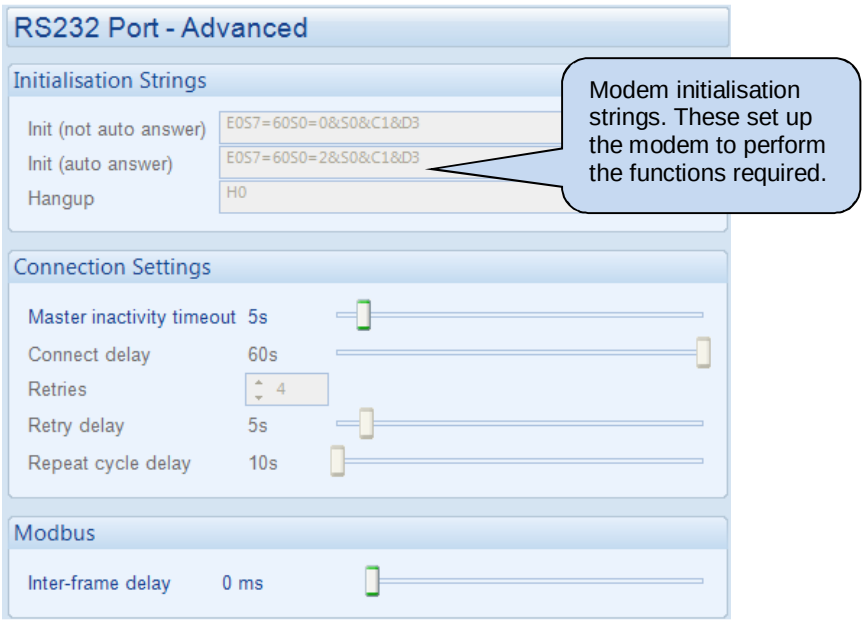
DSE stock and supply the following recommended modems:

GSM modem

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

Description	DSE Part Number
The GSM Modem is supplied with power supply cable, RS232 connection cable and GSM antenna. Suitable for GSM operating on 900/1800 MHz bands.	0830-001-01
NOTE : This modem is supplied ready configured to operate with the DSE module. When purchasing from a third party, the modem is not configured to communicate with the DSE module.	

2.10.2.2 ADVANCED



INITIALISATION STRINGS

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

Factory set initialisation strings

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

Silent operation

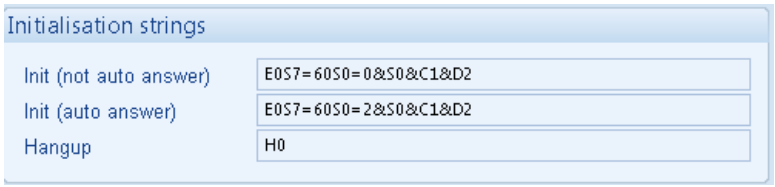
The modem connected to the DSE controller usually makes dialling noises and ‘squeal’ in the initial stages of making a data call. To control this noise, add the following command to the end of the initialisation string:

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

Sierra/Wavecom Fastrak Supreme GSM Modem initialisation strings

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

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



OTHER MODEMS

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

2.10.2.3 CONNECTION SETTINGS

Parameter	Description
Master Inactivity Timeout	The module monitors by default the USB port for communications. When activity is detected on the RS232 port, the module monitors the port for further data. If no data activity is detected on the port for the duration of the *Master Inactivity Timer*, it reverts to looking at the USB port. This needs to be set longer than the time between MODBUS polls from the master.
Connect Delay	The amount of time that is allowed to elapse between the alarm being registered and the controller dialling out with the fault.
Retries	The number of times the module attempts to contact the remote PC by modem.
Retry Delay	The amount of time between retries
Repeat Cycle Delay	The amount of time between the cycle repeats when dialing out calls to multiple *Alarm Numbers* fails.

2.10.2.4 MODBUS

Parameter	Description
Inter-frame delay	Provides a delay between the DSE module receiving a MODBUS query and replying to it. It is useful when the DSE module is too fast for the Master device.

2.10.3 TROUBLESHOOTING MODEM COMMUNICATIONS

2.10.3.1 MODEM COMMUNICATION SPEED SETTING

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

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

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

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

When connected, enter the following command:

AT+IPR=9600 and press <ENTER>
This sets the modem to 9600 baud.

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

Enter the following command:

AT&W and press <ENTER>

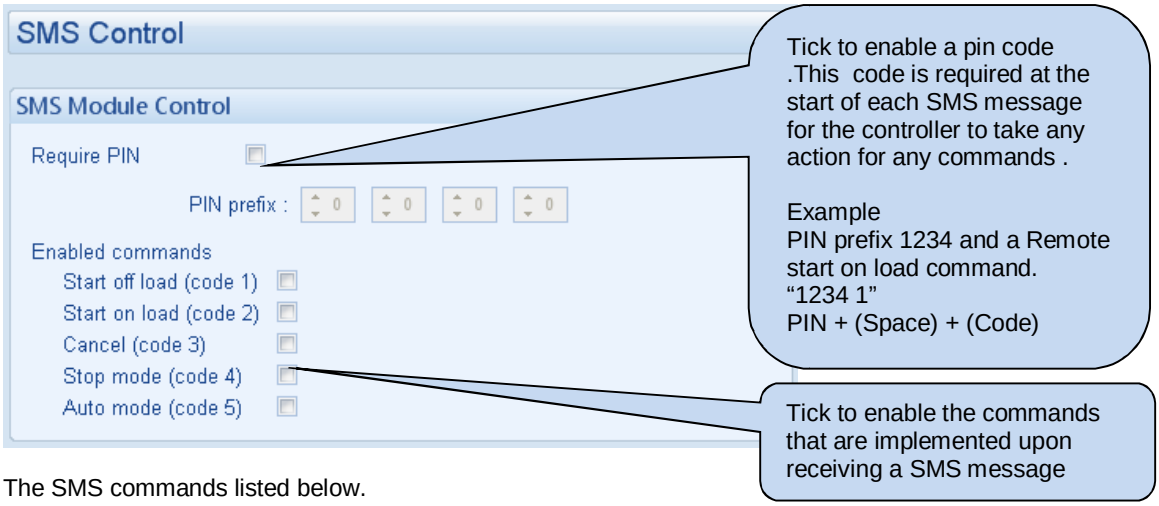
This saves the new setting in the modem. Power is now removed. The next time power is applied, the modem starts with the new settings (Baud rate = 9600), suitable to communicate with the DSE module.

2.10.3.2 GSM MODEM CONNECTION

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

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

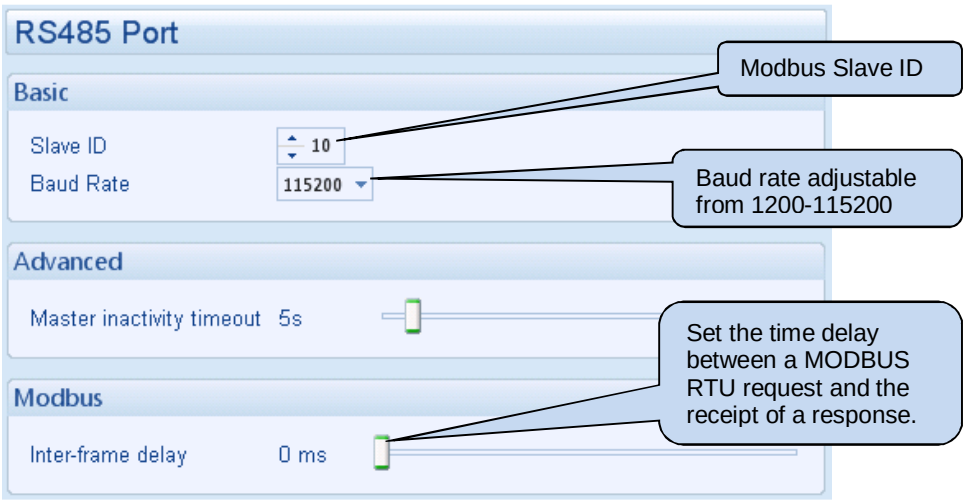
2.10.4 SMS MODULE CONTROL



The SMS commands listed below.

Parameter	Code	Description
Start Off Load	1	When in Auto mode, the module performs the start sequence but the engine is not instructed to take the load. This function is used where an engine only run is required e.g. for exercise.
Start On Load	2	When in auto mode, the module performs the start sequence and transfer load to the engine.
Cancel	3	This cancels the SMS Start Off load or SMS Start On Load.
Stop Mode	4	This mimics the operation of the ‘Stop’ button and is used to provide a remote SMS stop command.
Auto Mode	5	This input mimics the operation of the “AUTO” button

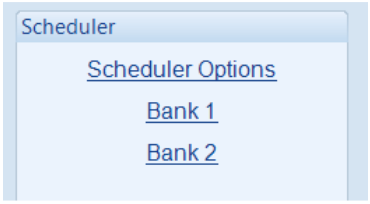
2.10.5 RS485 PORT



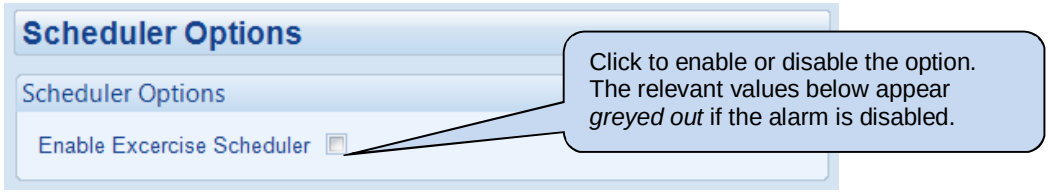
Timer	Description
Master Inactivity Timeout	The module monitors by default the USB port for communications. When activity is detected on the RS485 port, the module monitors the port for further data. If no data activity is detected on the port for the duration of the *Master Inactivity Timer*, it reverts to looking at the USB port. This needs to be set longer than the time between MODBUS polls from the master.

2.11 SCHEDULER

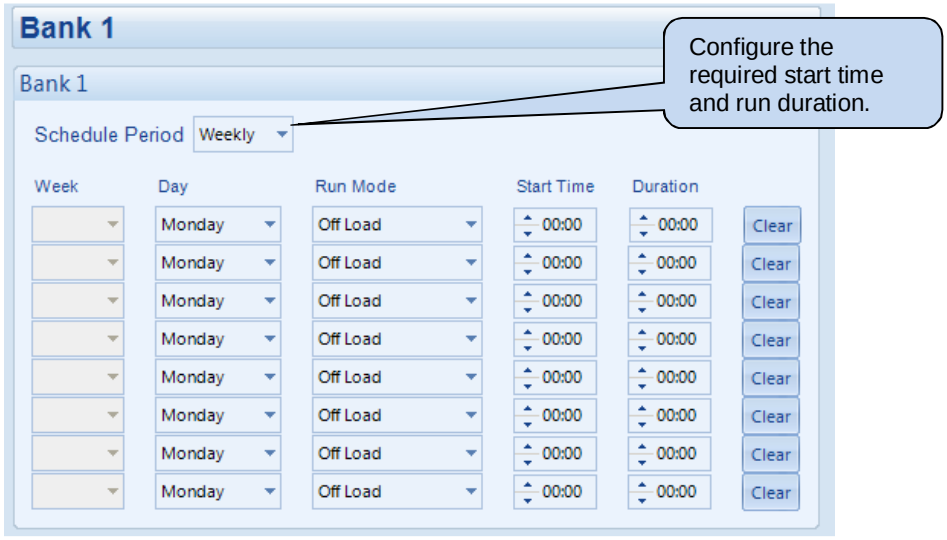
The section is subdivided into smaller sections.
Each Bank of the Exercise Scheduler is used to give up to 8 scheduled runs per bank, 16 in total. This run schedule is configurable to repeat every 7 days (weekly) or every 28 days (monthly). The run is *on load* or *off load.*
Each scheduler bank configured differently either to weekly or monthly based exercises.



2.11.1 SCHEDULER OPTIONS

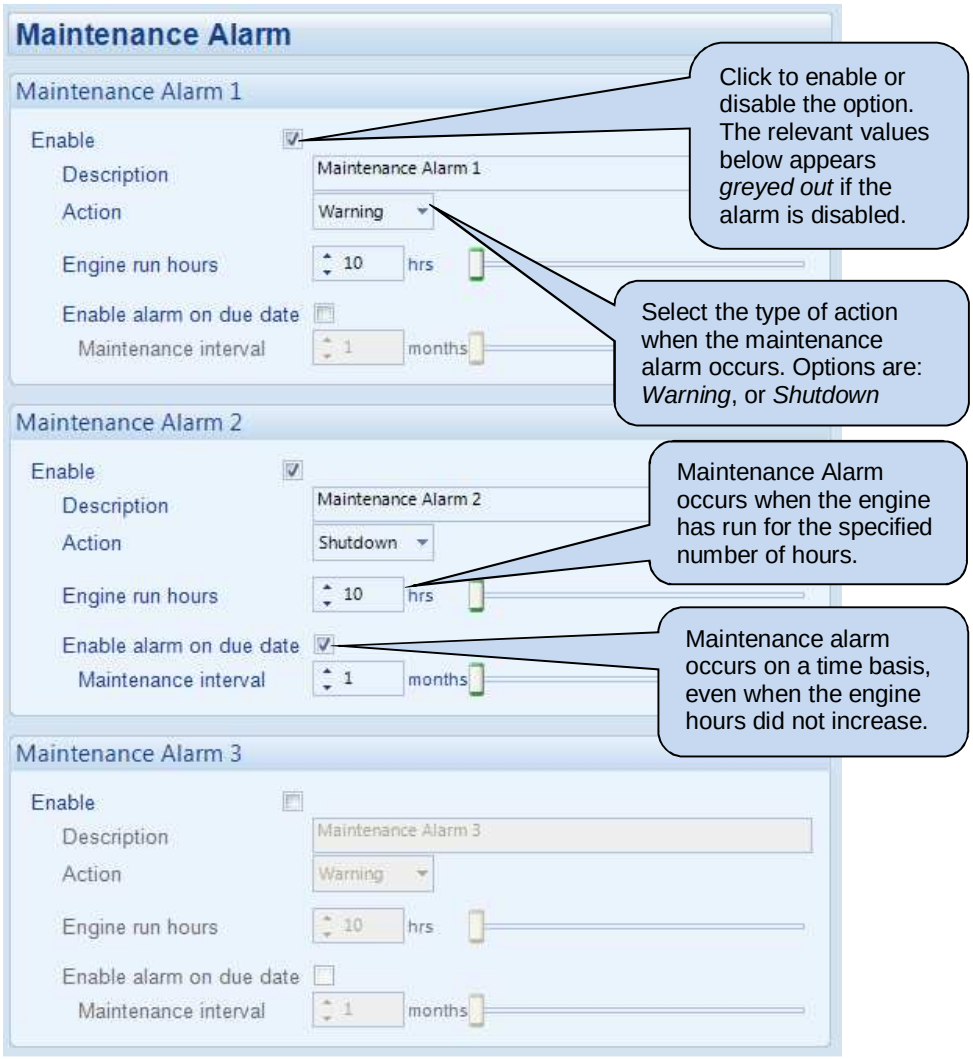


2.11.2 BANK 1 / BANK 2



Function	Description
Schedule Period	Determines the repeat interval for the scheduled run. Options available are: Weekly, Monthly
Week	Specifies the week of the month, on which the scheduled run takes place
Day	Specifies the day of week, on which the scheduled run takes place
Run Mode	Determines the loading state mode of the generator when running on schedule ***Auto Start Inhibit:*** the generator is prevented from running in *Auto* mode. ***Off Load:*** The module runs the generator on schedule with the load switch open ***On Load:*** The module runs the generator on schedule and closes the load switch
Start Time	Determines at what time of day the scheduled run starts
Duration	Determines the time duration in hours for the scheduled run
Clear	Resets the values for the Day, Start Time and Duration to defaults

2.12 MAINTENANCE ALARM

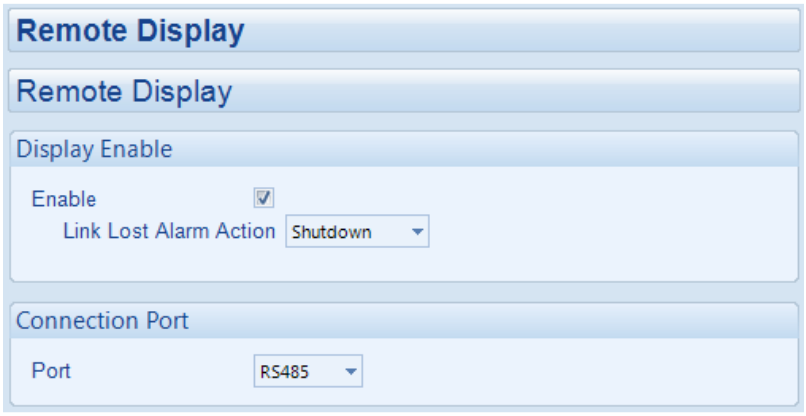


There are two ways to reset the maintenance alarm:

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

2.13 REMOTE DISPLAY

NOTE: This feature allows the DSE73xx MKII module to be connected to one DSE25xx MKII remote display module. For further details on the DSE2510MKII or DSE2520 MKII module operation and configuration, refer to DSE Publication: 057-278 DSE2510 MKII & DSE2520 MKII Operators Manual, and 057-279 DSE2510 MKII & DSE2520MKII Software Manual.



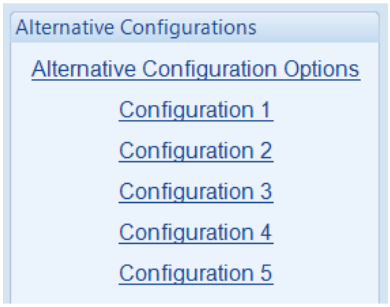
Function	Description
Display Enable	☐ = The Remote Display is disabled. ☑ = This feature allows the DSE73xx MKII module to be connected to one DSE25xx MKII remote display module.
Link Lost Alarm Action	Select the action for the L*ink Lost Alarm*. ***Electrical Trip*** ***Shutdown*** ***Warning*** This alarm takes action if the remote display DSE2500 MKII module is not detected by the host module.
Connection Port	Select the port to be used for the Remote Display. **NOTE: The selected port's Baud Rate is fixed to 115200, the relevant port's slave ID is configured in the Communications section.**

2.14 ALTERNATIVE CONFIGURATIONS

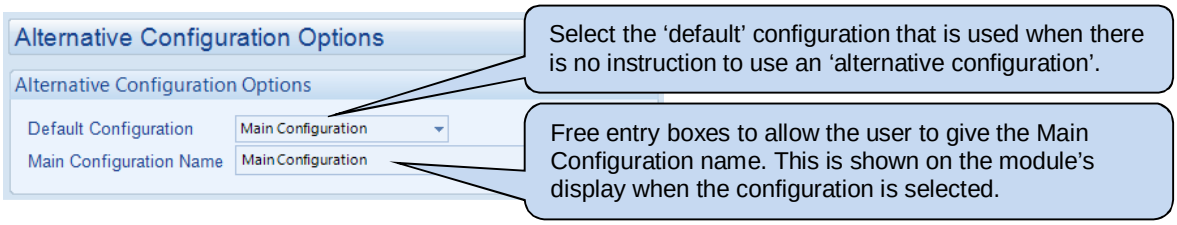
An Alternative Configuration is provided to allow the system designer to cater for different AC requirements utilising the same generator system. Typically this feature is used by Rental Set Manufacturers where the set is capable of being operated at (for instance) 120V 50Hz and 240V 50Hz using a selector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

The Alternative Configuration is selected using either:

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

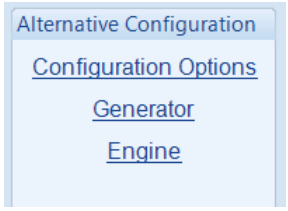


2.14.1 ALTERNATIVE CONFIGURATION OPTIONS

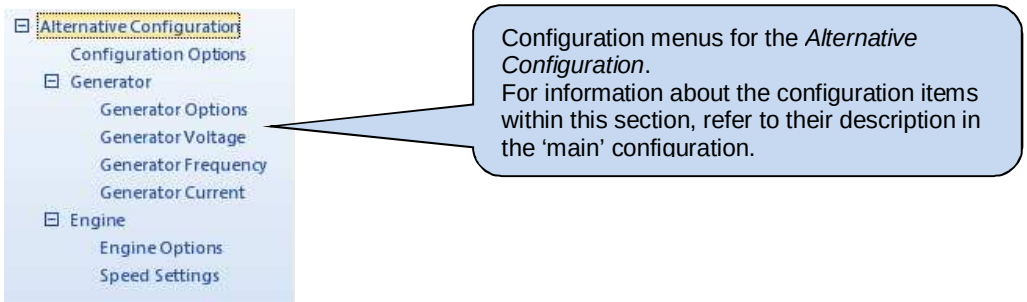


2.14.2 ALTERNATIVE CONFIGURATION

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

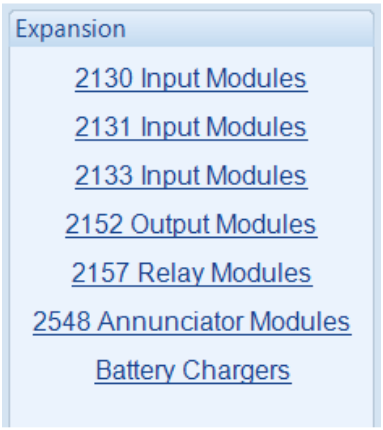


Alternative configuration options contain a subset of the main configuration. The adjustable parameters are not discussed here as they are identical to the main configuration options :



2.15 EXPANSION

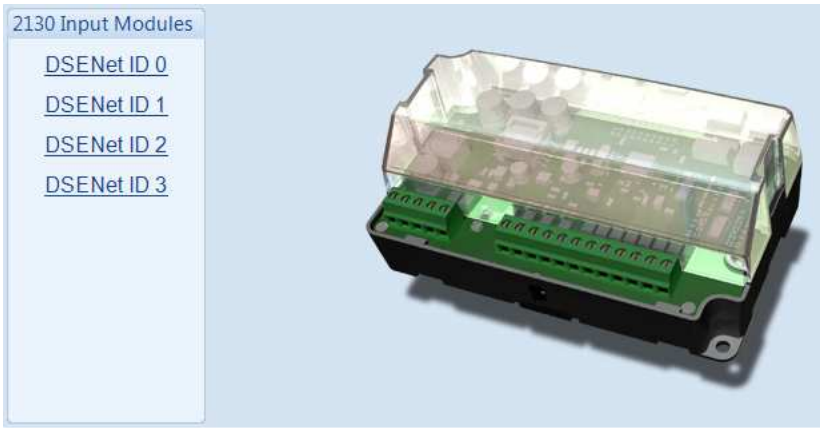
The *Expansion* page is subdivided into smaller sections.
Select the required section with the mouse.



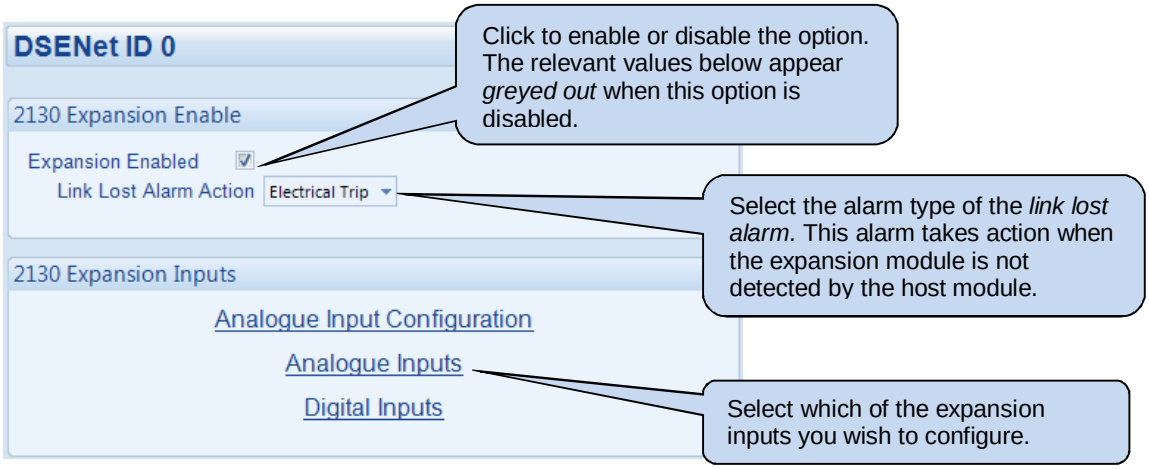
See overleaf for description of the different expansion modules.

2.15.1 2130 INPUT MODULES

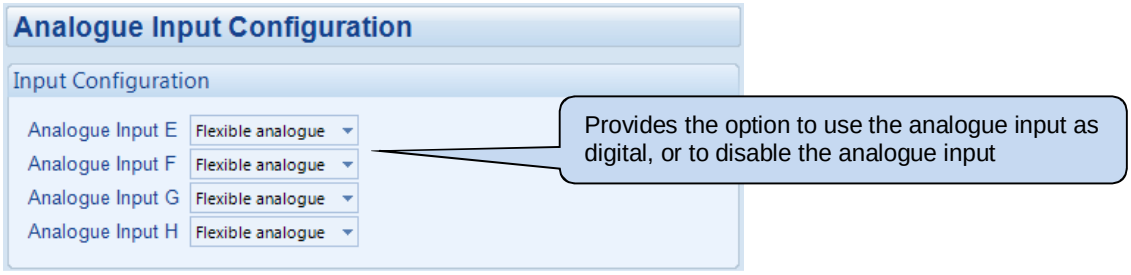
Select the DSENet ID of the input expansion you wish to configure.



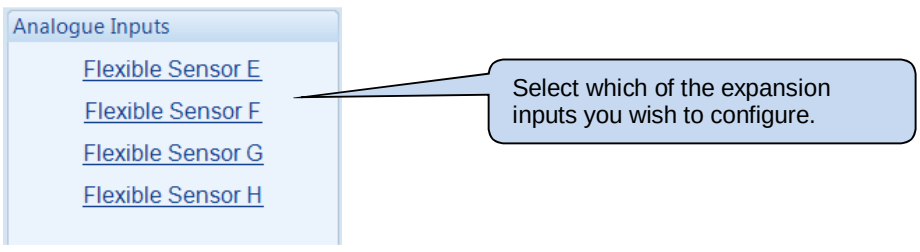
The following is then shown:



2.15.1.1 ANALOGUE INPUT CONFIGURATION (E-H)

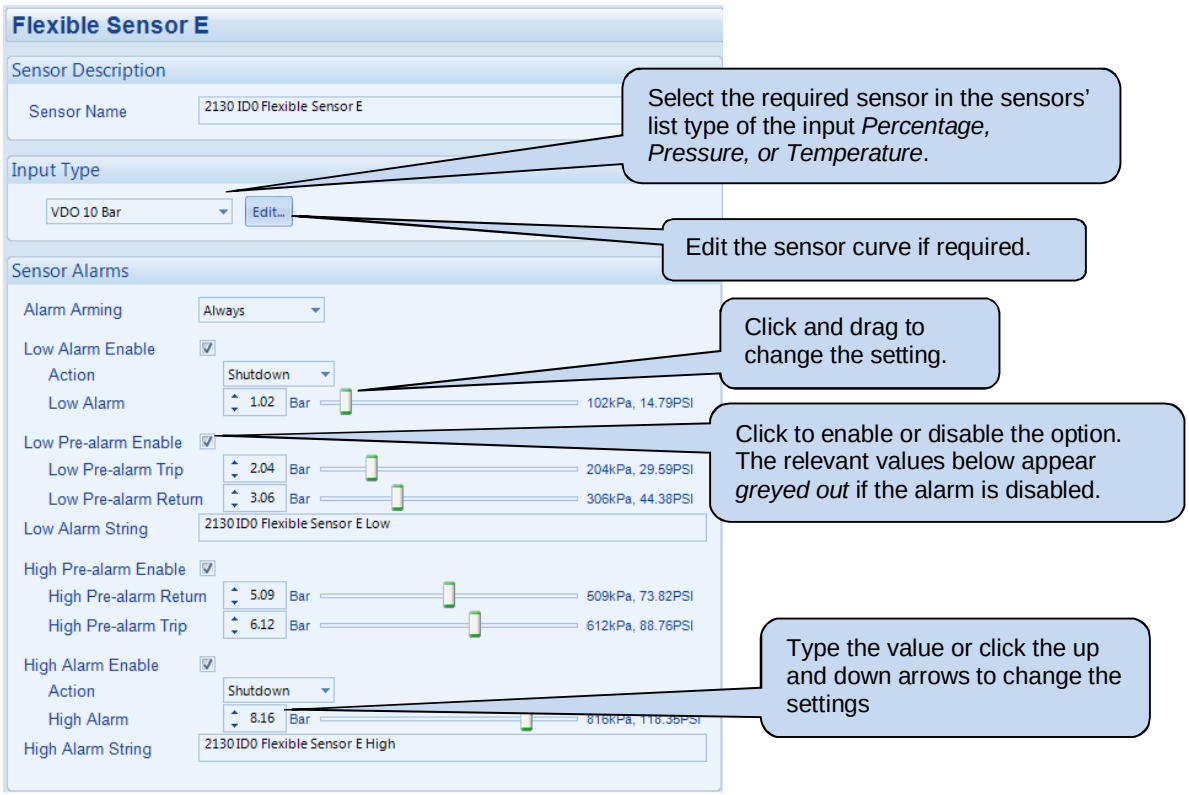


2.15.1.2 ANALOGUE INPUTS



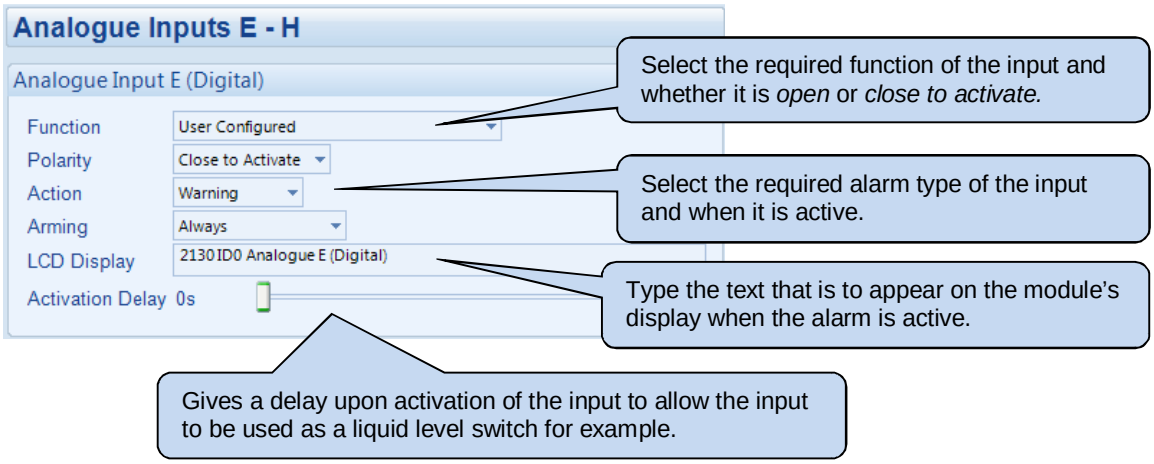
2.15.1.3 FLEXIBLE SENSOR (E-H)

Used as an Analogue Input

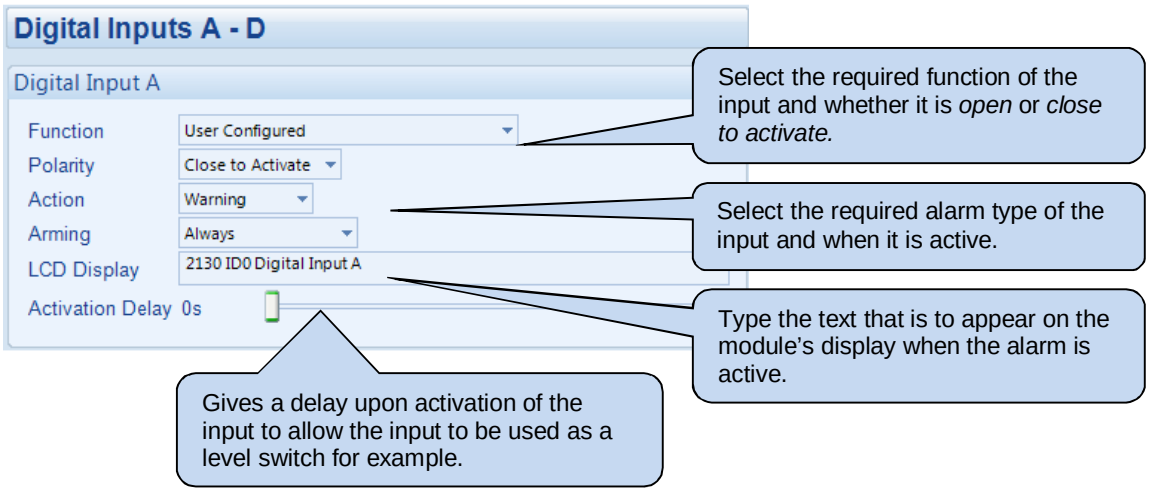


Used as a Digital Input

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

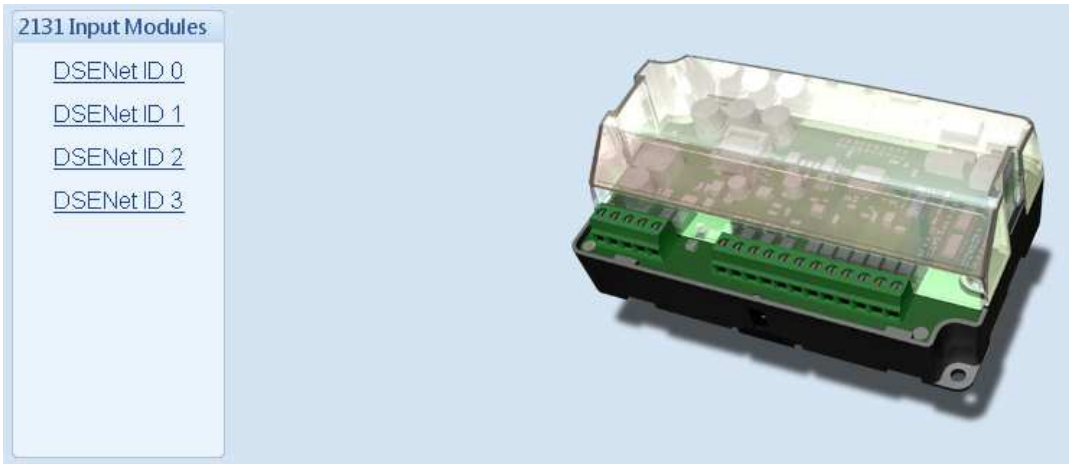


2.15.1.4 DIGITAL INPUTS (A-D)

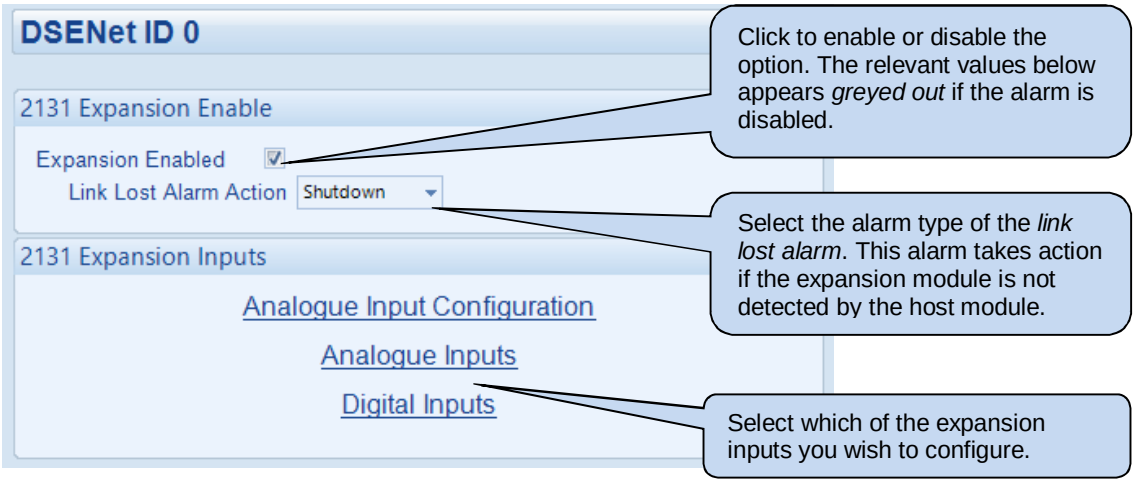


2.15.2 DSE2131 RATIOMETRIC EXPANSION INPUT MODULE

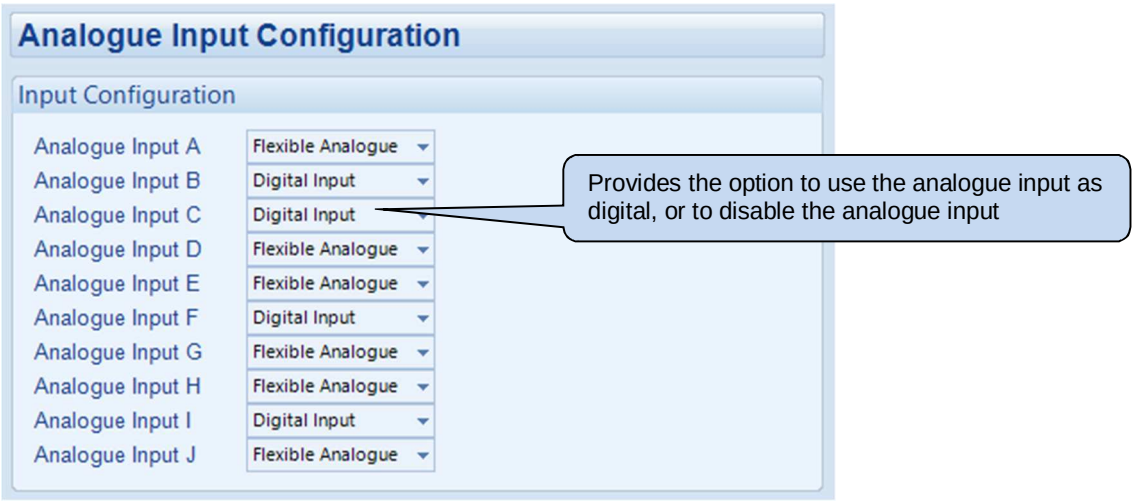
Select the DSENet ID of the input expansion you wish to configure. The ID of the expansion input module is set by rotary decimal switch accessible under the removable cover of the device.



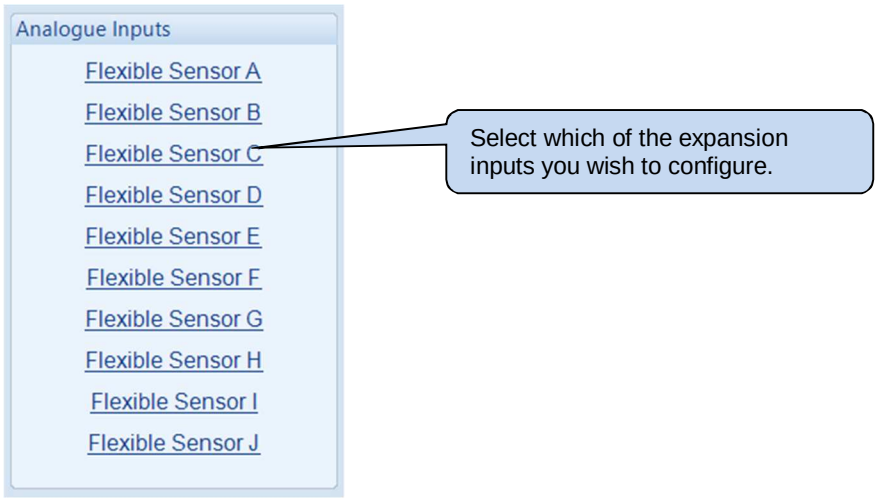
The following is then shown:



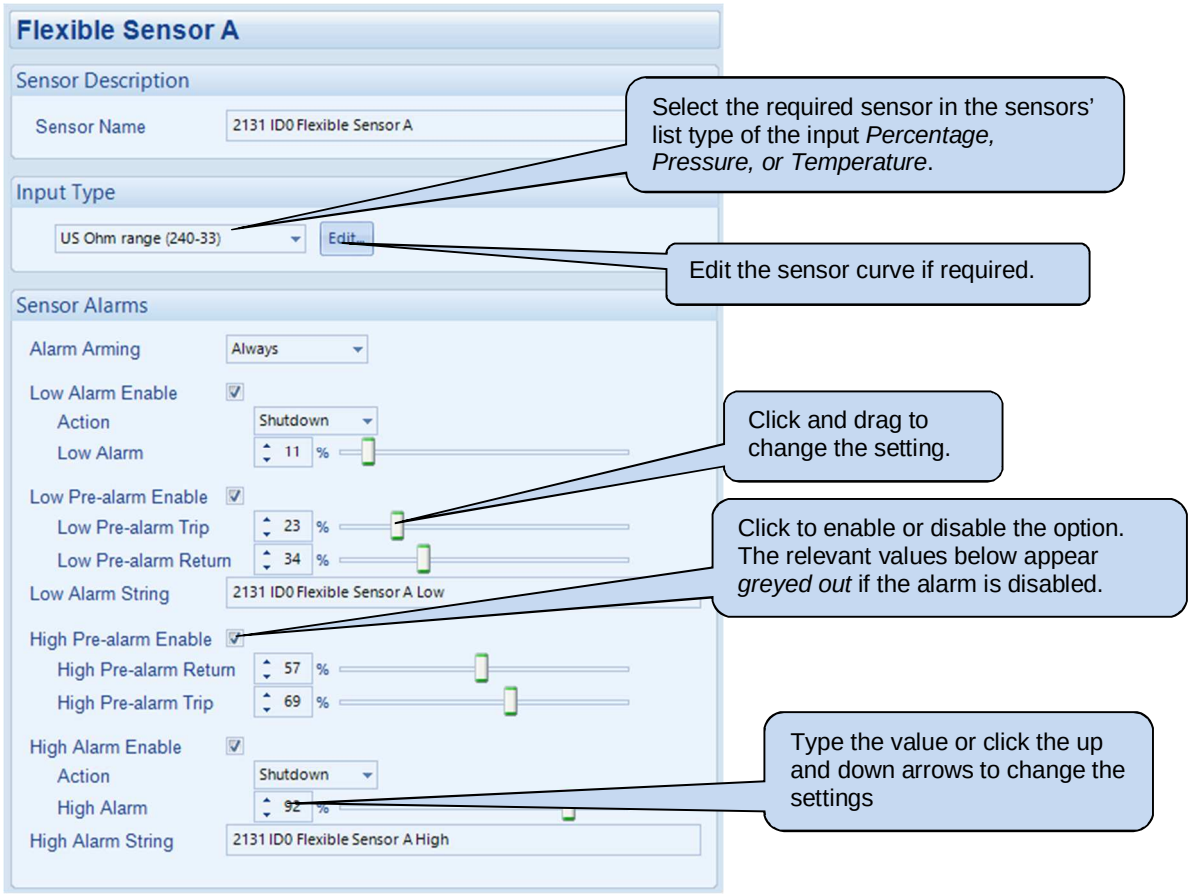
2.15.2.1 ANALOGUE INPUT CONFIGURATION



2.15.2.2 ANALOGUE INPUTS

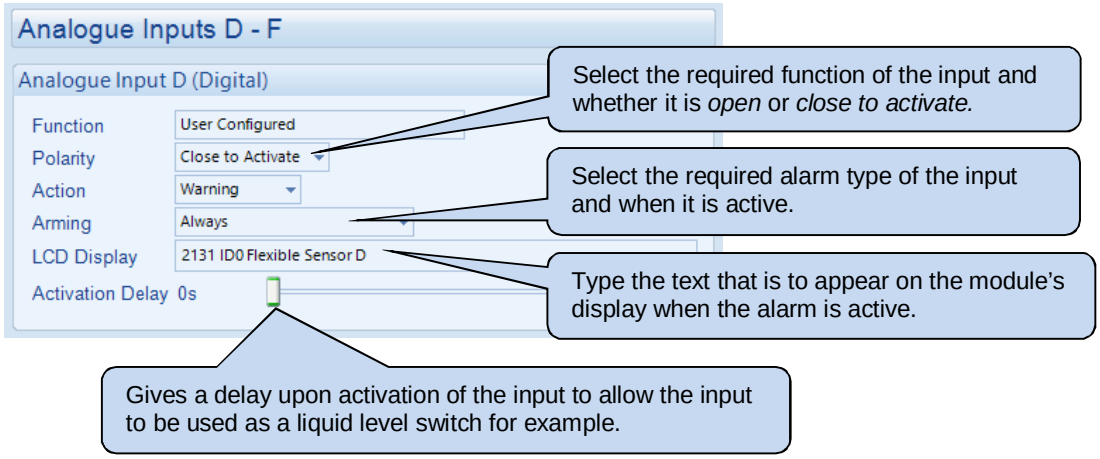


Used as an Analogue Input



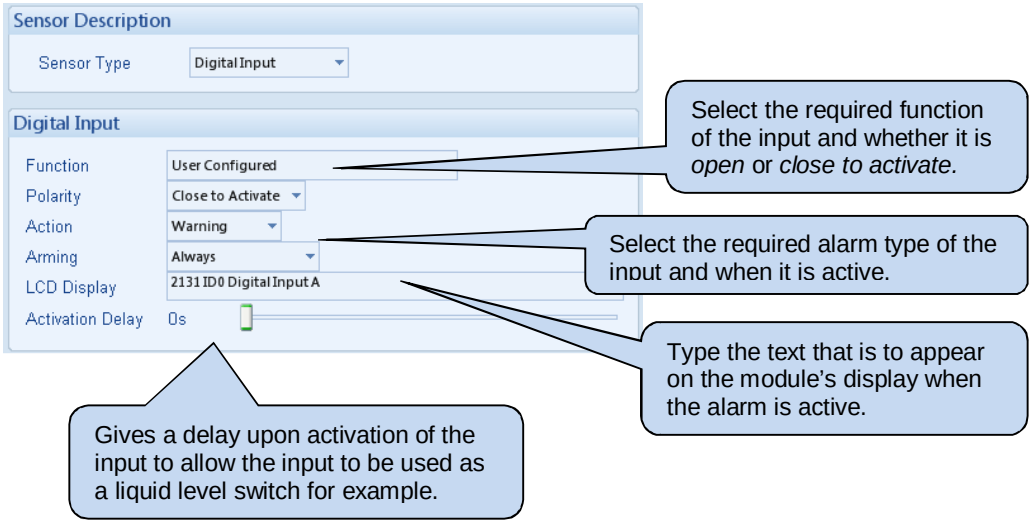
Used as a Digital Input

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

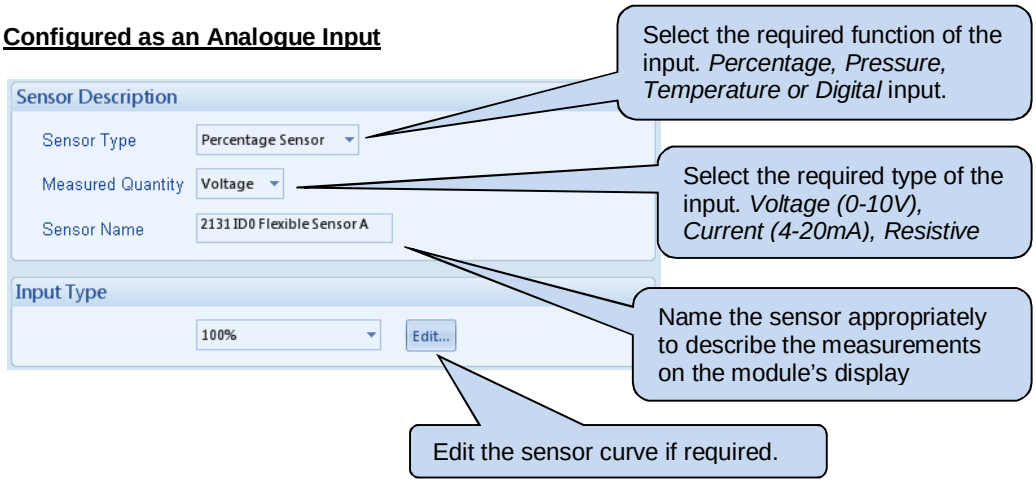


Depending upon your selection of *Sensor Type*, one of the following configuration screens are shown :

Configured as a Digital Input

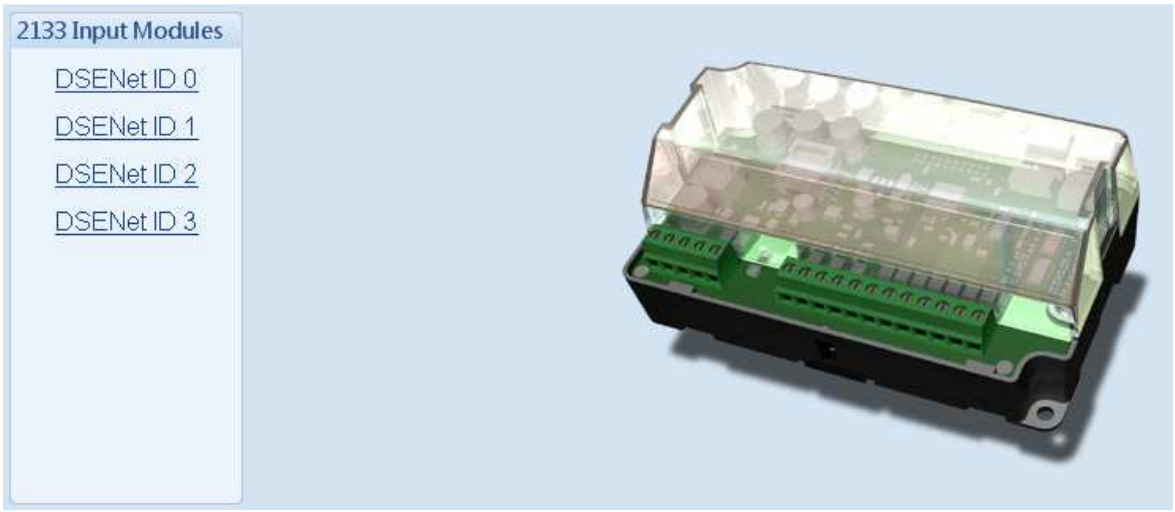


Configured as an Analogue Input

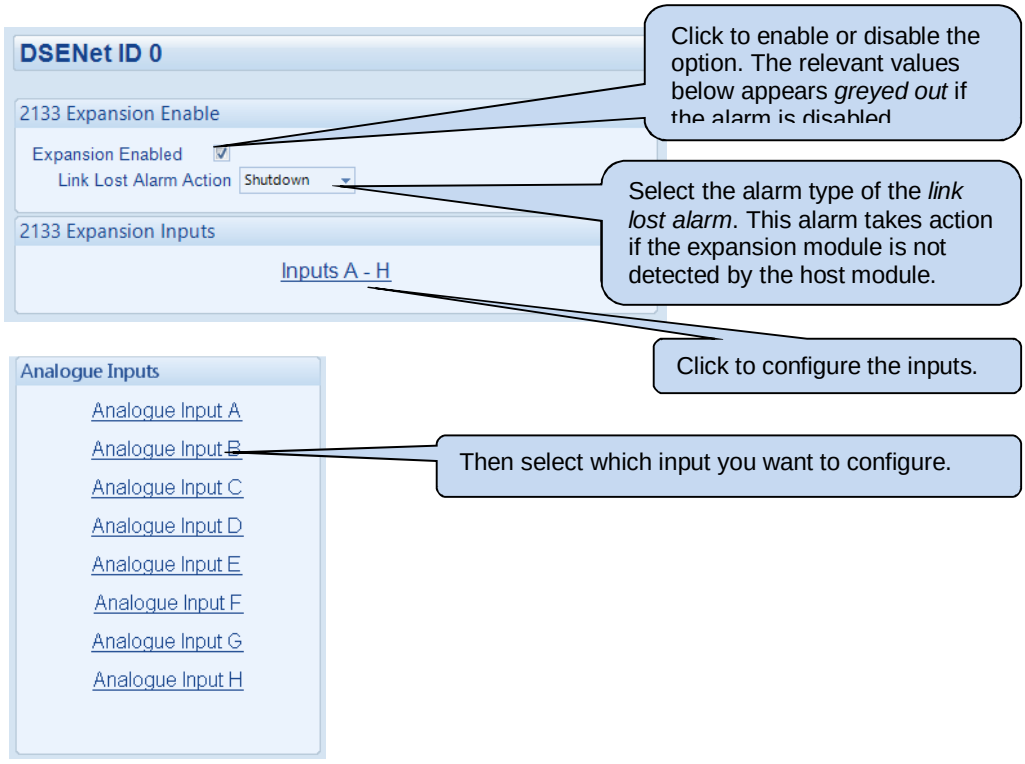


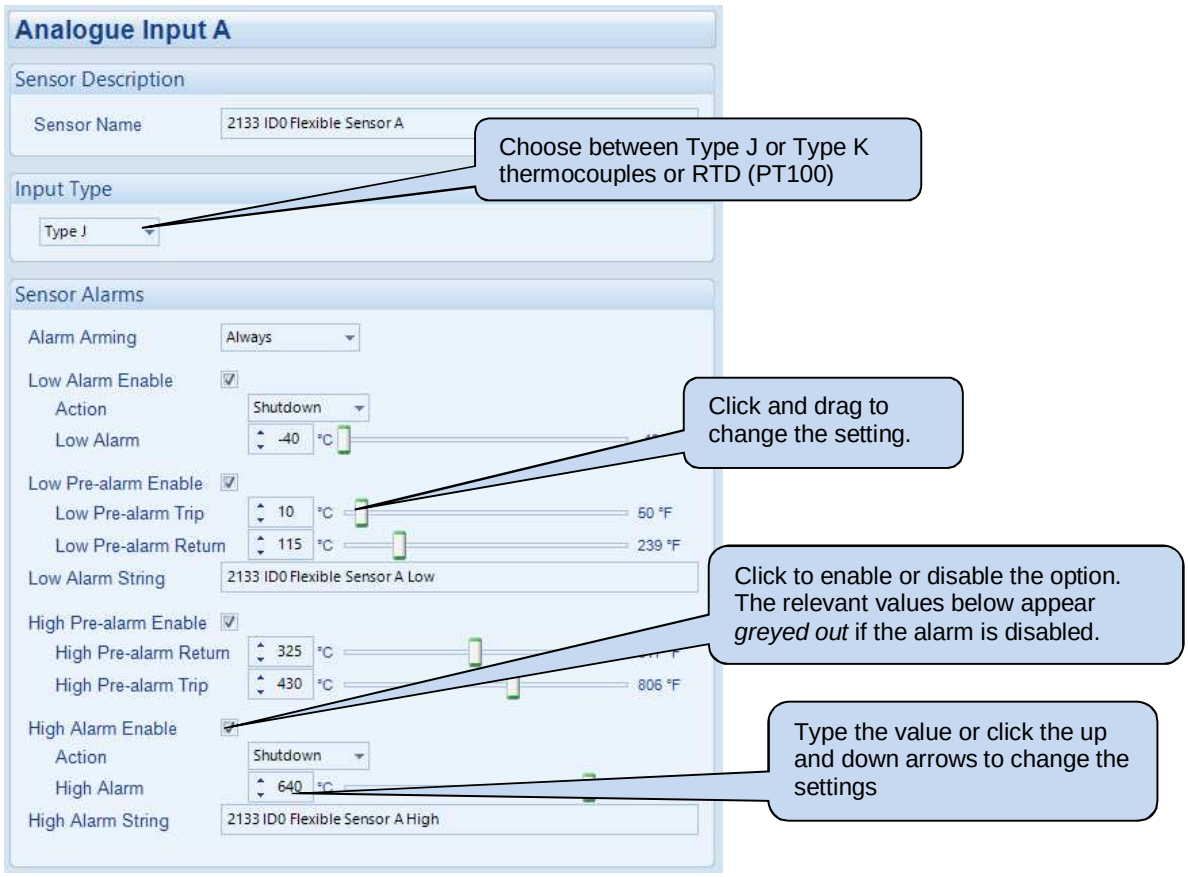
2.15.3 DSE2133 RTD / THERMOCOUPLE INPUT MODULE

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.



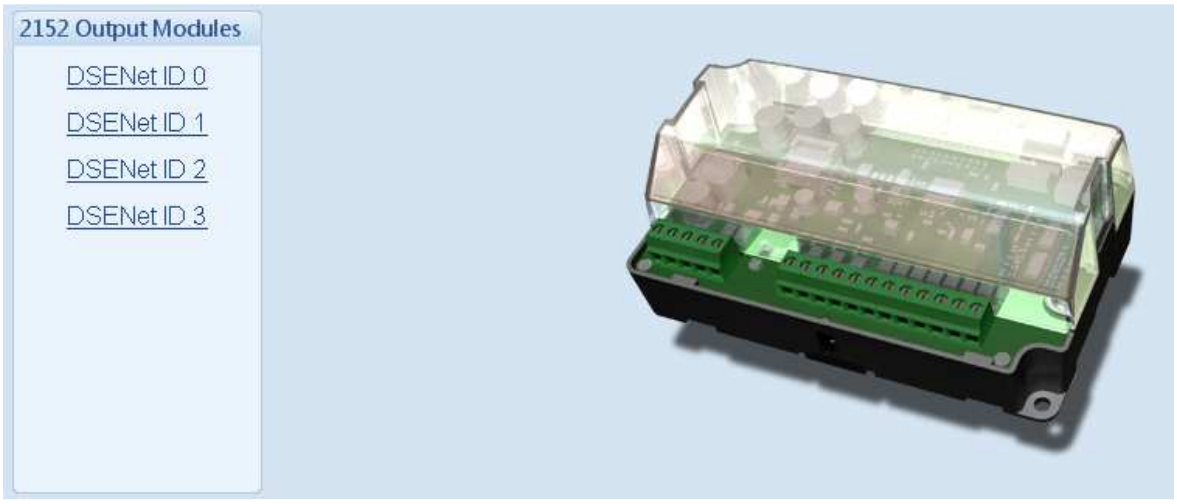
The following is then shown:



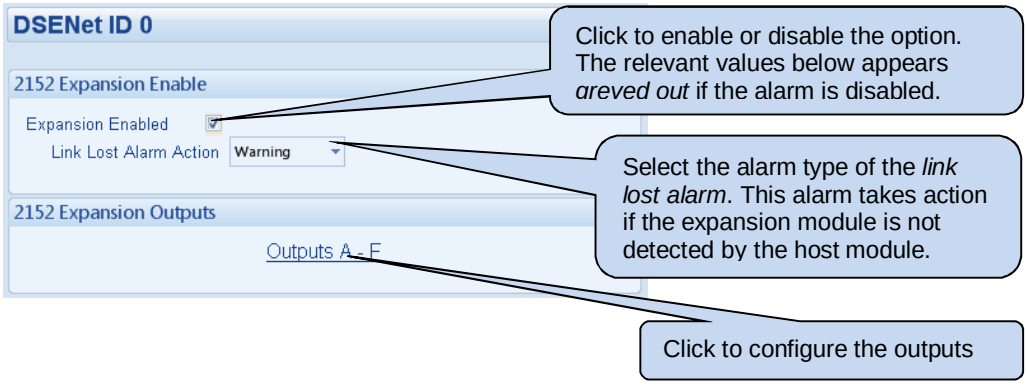

Analogue Input A
Sensor Description
Sensor Name
2133 ID0 Flexible Sensor A
Input Type
Type J
Sensor Alarms
Alarm Arming
Always
Low Alarm Enable
Action
Shutdown
Low Alarm
-40
°C
Low Pre-alarm Enable
Low Pre-alarm Trip
10
°C
50 °F
Low Pre-alarm Return
115
°C
239 °F
Low Alarm String
2133 ID0 Flexible Sensor A Low
High Pre-alarm Enable
High Pre-alarm Return
325
°C
High Pre-alarm Trip
430
°C
806 °F
High Alarm Enable
Action
Shutdown
High Alarm
640
°C
High Alarm String
2133 ID0 Flexible Sensor A High
Choose between Type J or Type K thermocouples or RTD (PT100)
Click and drag to change the setting.
Click to enable or disable the option. The relevant values below appear *greyed out* if the alarm is disabled.
Type the value or click the up and down arrows to change the settings

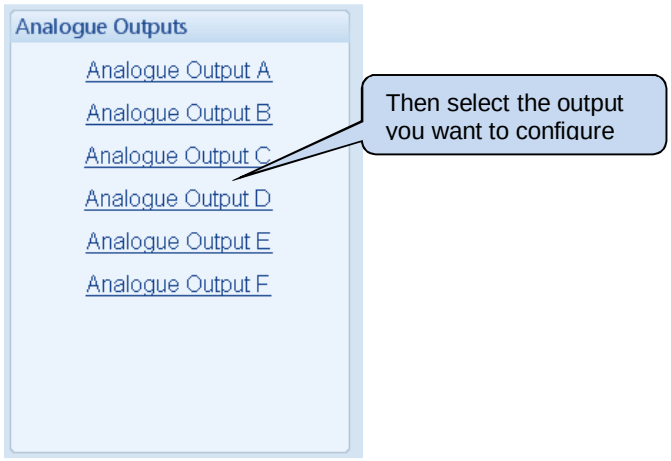
2.15.4 DSE2152 ANALOGUE OUTPUT MODULE

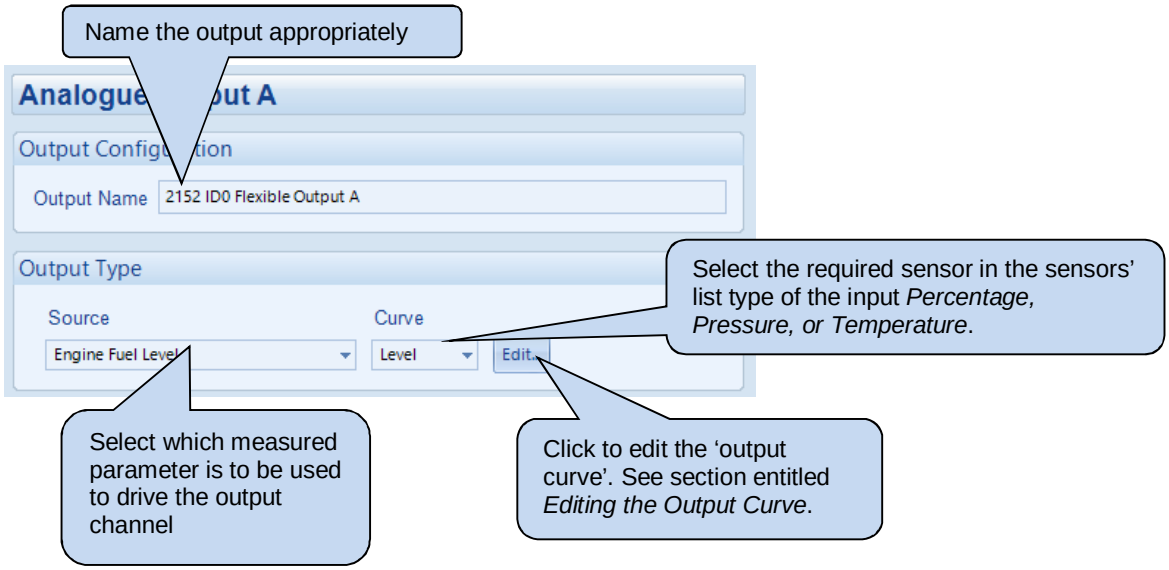
Select the DSENet ID of the output expansion you wish to configure. The ID of the expansion output module is set by rotary decimal switch accessible under the removable cover of the device.



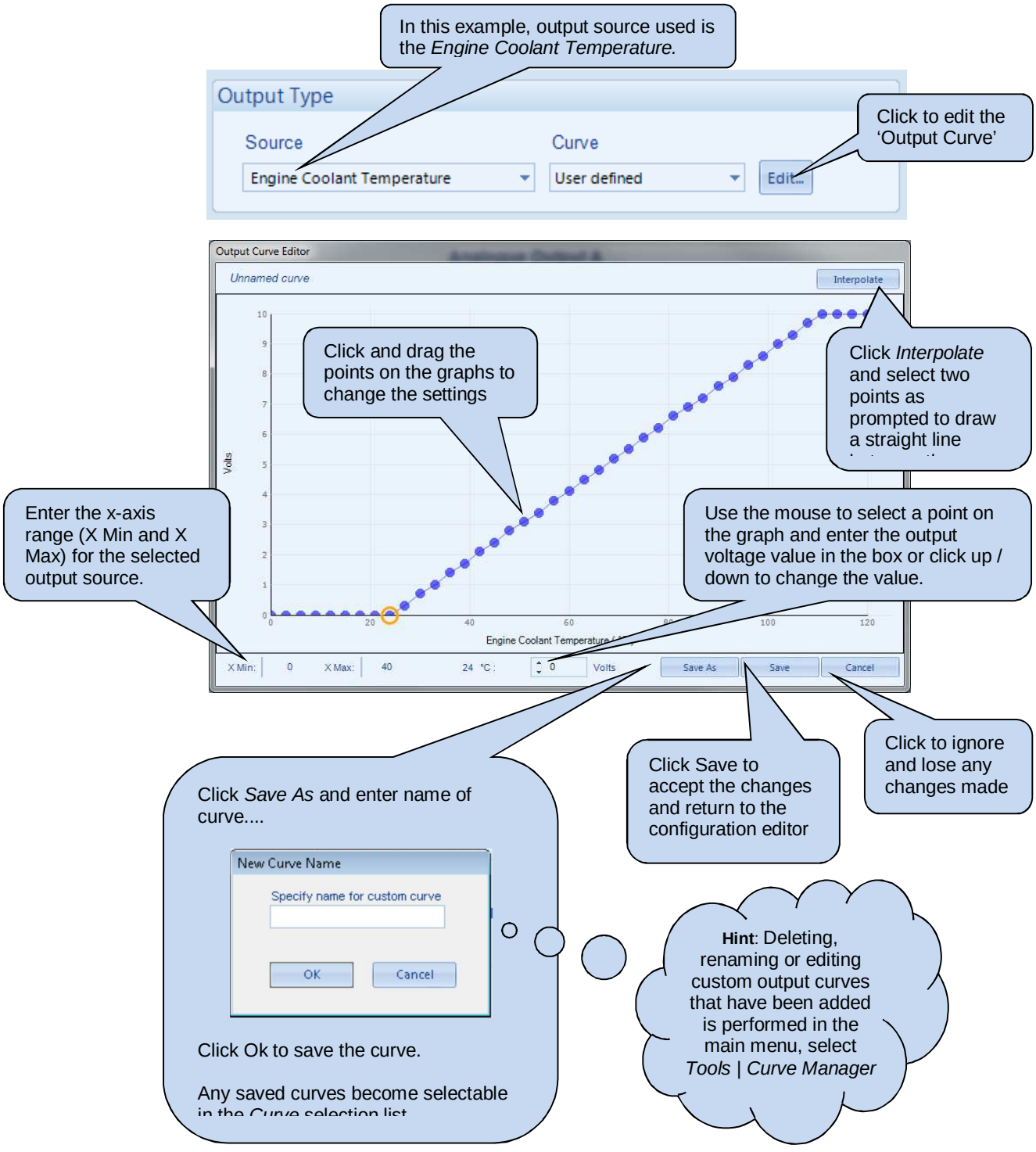
The following is then shown:




Analogue Outputs
Analogue Output A
Analogue Output B
Analogue Output C
Analogue Output D
Analogue Output E
Analogue Output F
Then select the output you want to configure

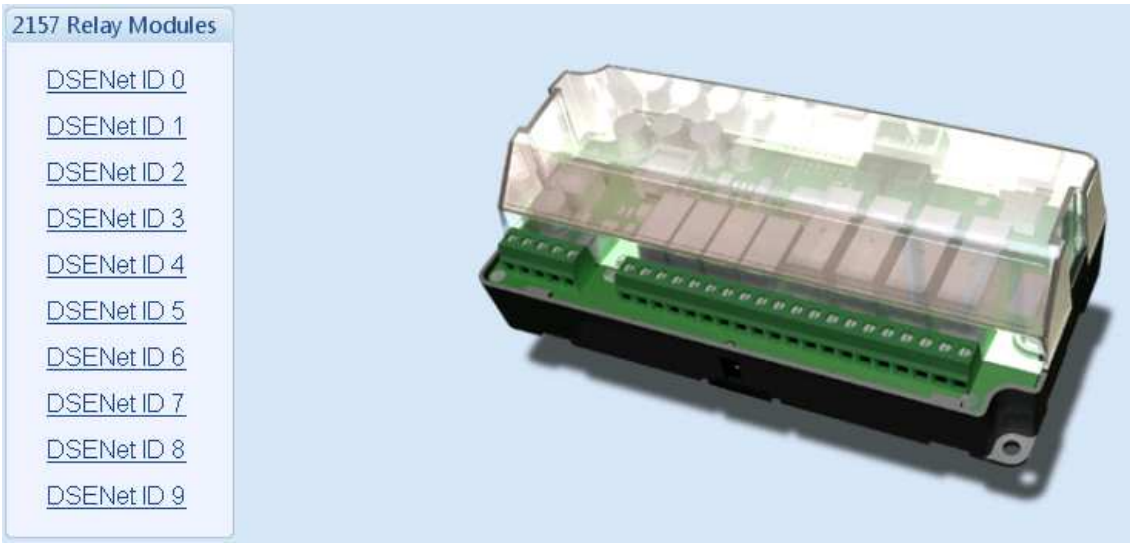

Name the output appropriately
Output Configuration
Output Name
2152 ID0 Flexible Output A
Output Type
Source
Curve
Engine Fuel Level
Level
Edit...
Select the required sensor in the sensors' list type of the input *Percentage, Pressure, or Temperature*.
Select which measured parameter is to be used to drive the output channel
Click to edit the 'output curve'. See section entitled *Editing the Output Curve*.

2.15.4.1 EDITING THE OUTPUT CURVE

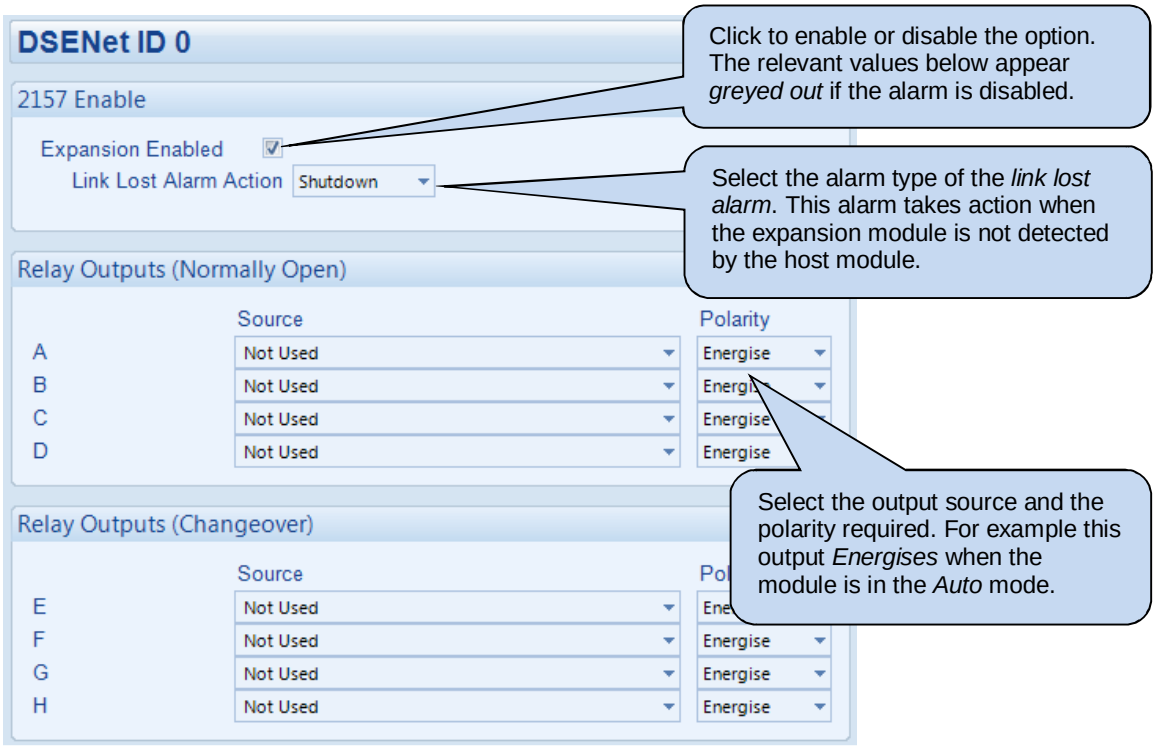


2.15.5 2157 RELAY MODULES

Select the DSENet ID of the relay expansion you wish to configure.



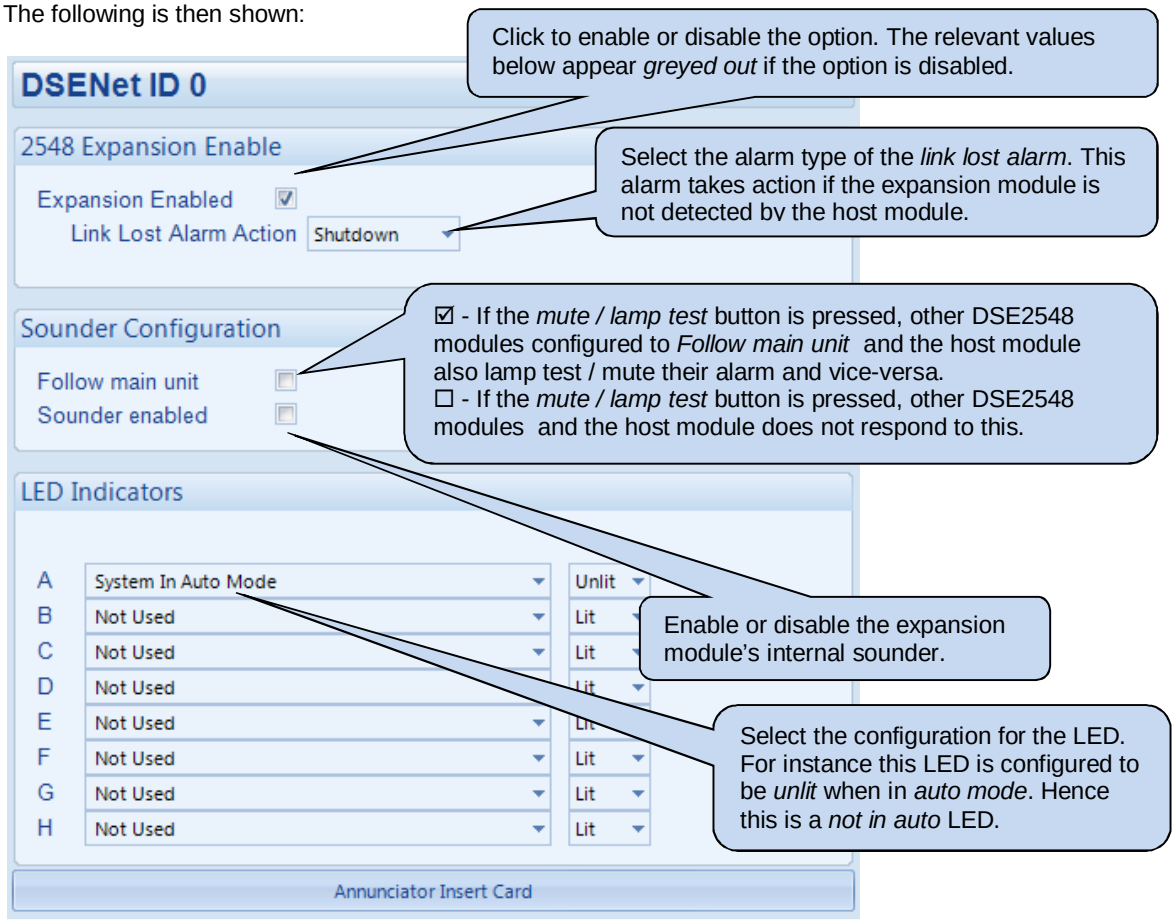
The following is then shown:



2.15.6 2548 LED EXPANSION

Select the DSENet ID of the LED expansion you wish to configure.

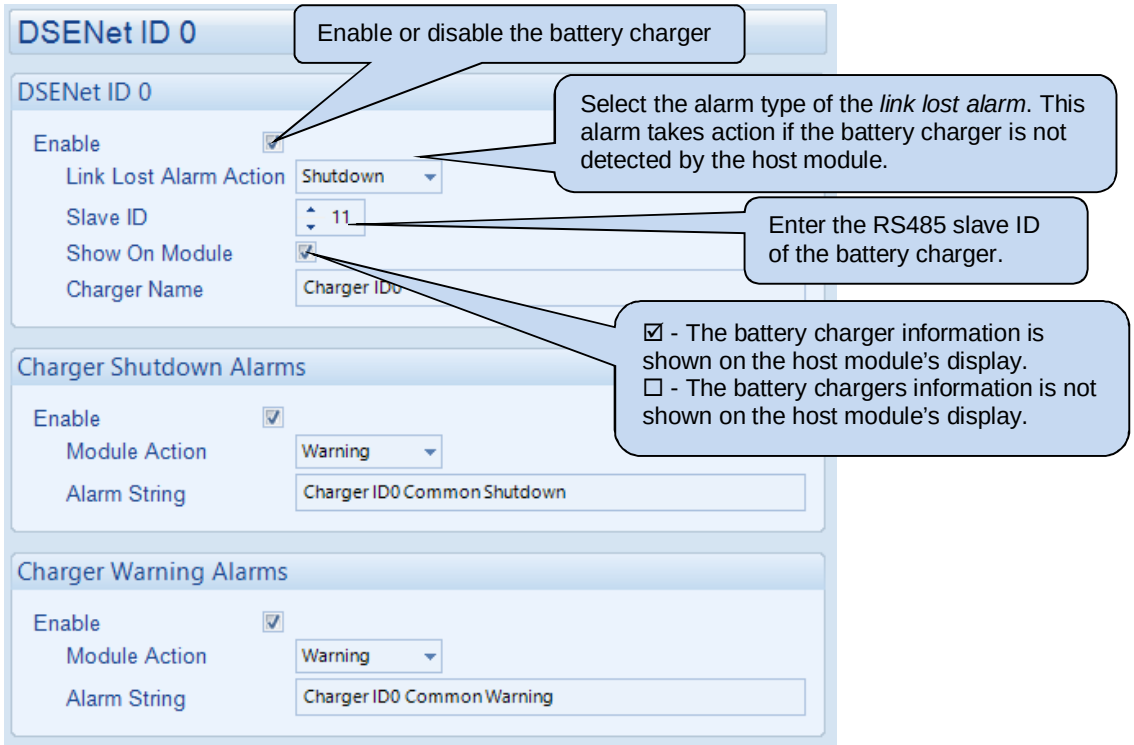
The following is then shown:



2.15.7 BATTERY CHARGERS

Select the DSENet ID of the Battery Charger you wish the DSE host controller to communicate too. This enables the DSE host controller to display battery charger parameters and alarms.

The following is then shown:

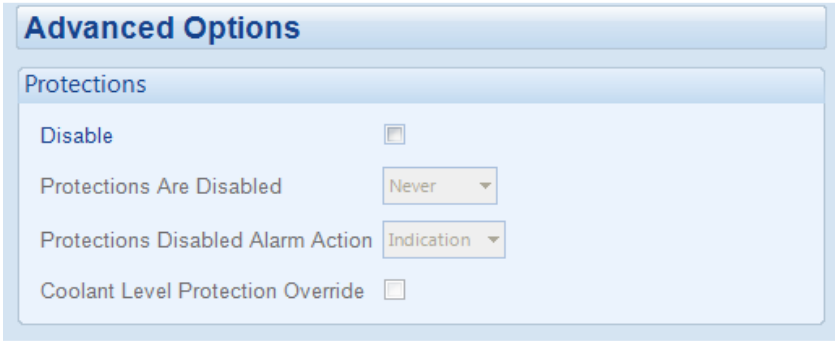


2.16 ADVANCED

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

2.16.1 ADVANCED OPTIONS

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

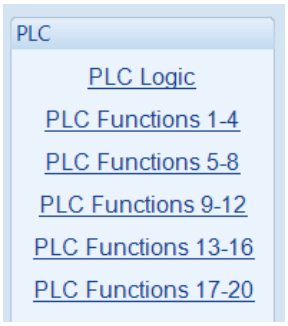


This feature is provided to assist the system designer in meeting specifications for "Warning only", "Protections Disabled", "Run to Destruction", "Battleshort Mode" or other similar wording.

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

2.16.2 PLC

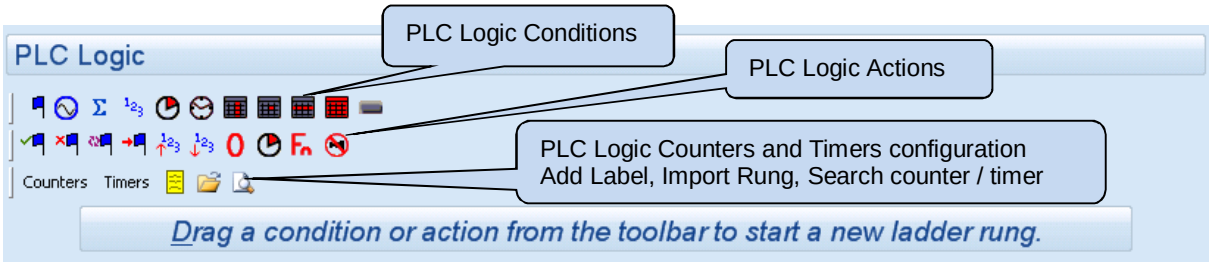
The *PLC* section is subdivided into smaller sub-sections.



2.16.2.1 PLC LOGIC

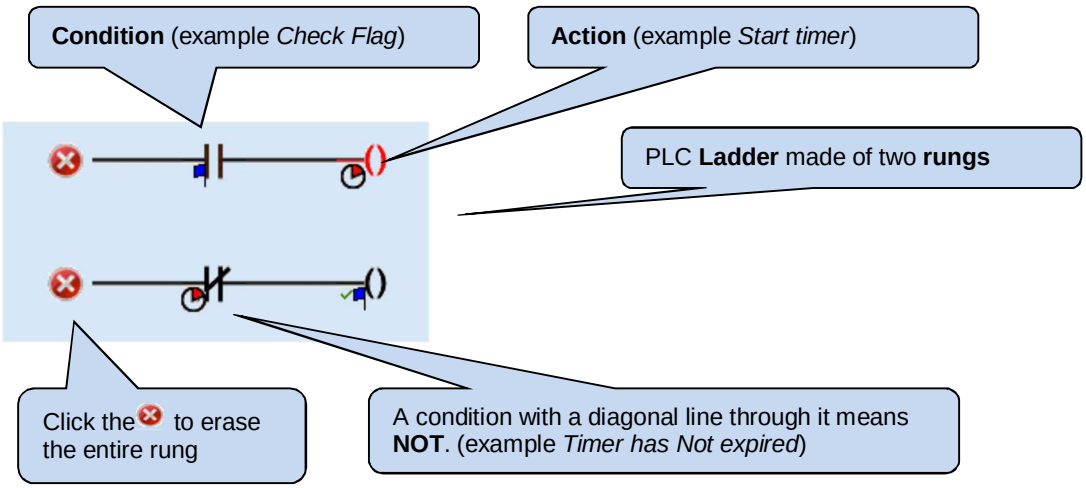
NOTE: For further details and instructions on PLC Logic and PLC Functions, refer to DSE Publication: *057-175 PLC Programming Guide* which is found on our website: *www.deepseaplc.com*

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



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

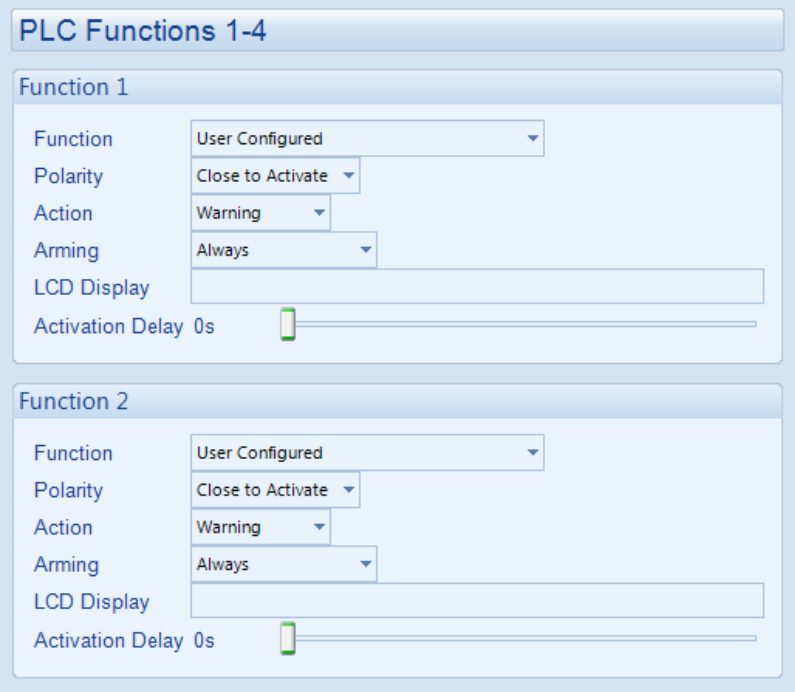
For instance if the conditions in the rung are met, the action takes place.



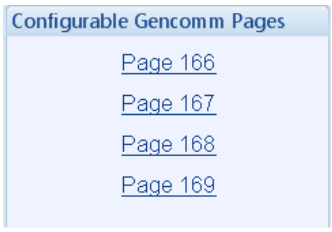
2.16.2.2 PLC FUNCTIONS

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

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

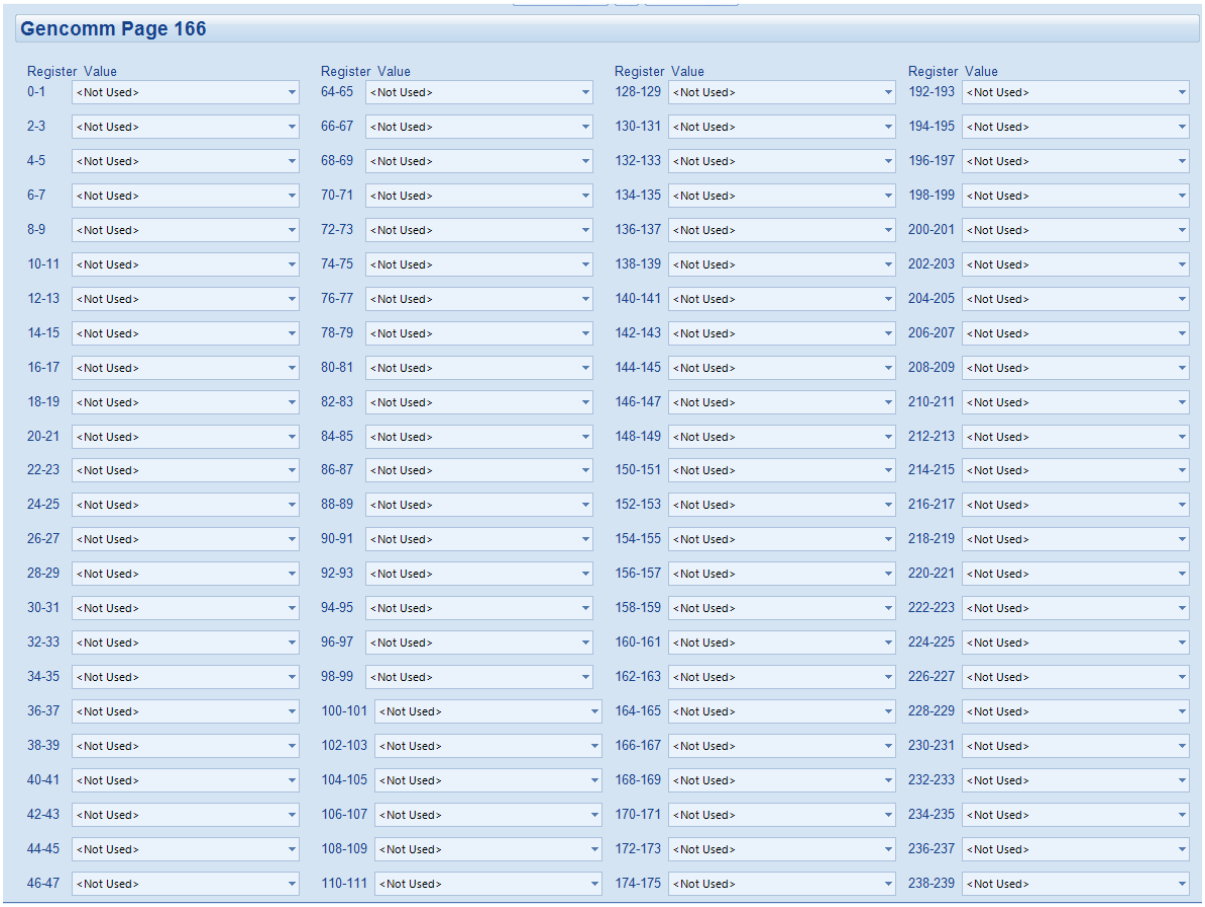


2.16.3 CONFIGURABLE GENCOMM PAGES



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

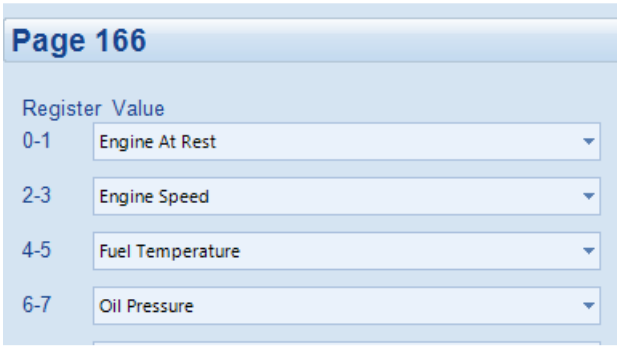
All configurable Gencomm registers are 32-bit unsigned format.



The configurable MODBUS pages are:

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

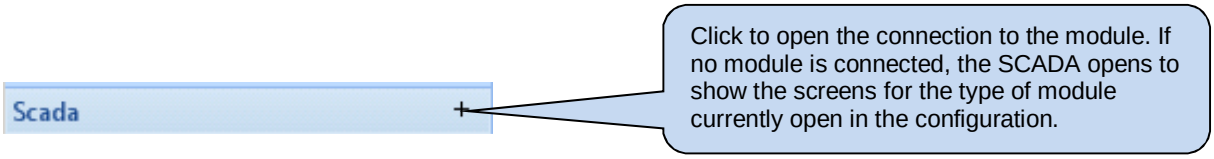
Example of Gencomm page configuration:



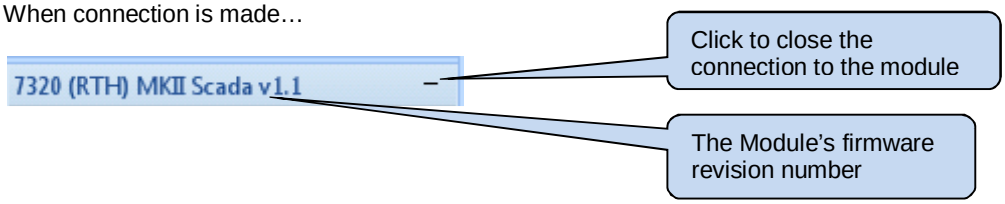
The register address is obtained from the formula: register_address=page_number*256+register_offset.
To read the *Engine Speed* from the above register, the MODBUS master device needs to read the data in two registers and then combine the data from the Most Signficant Bit and the Least Significant Bit.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

3 SCADA

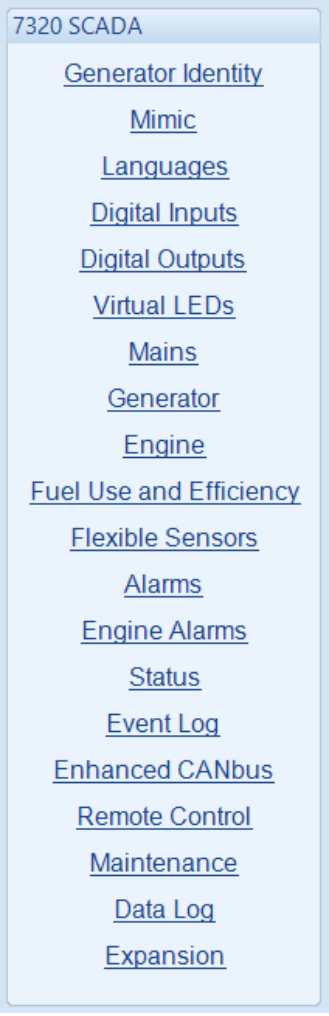
SCADA stands for **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition and is provided both as a service tool and also as a means of monitoring / controlling the generator set.
As a service tool, the SCADA pages are to check the operation of the controller's inputs and outputs as well as checking the generators operating parameters.



When connection is made…



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



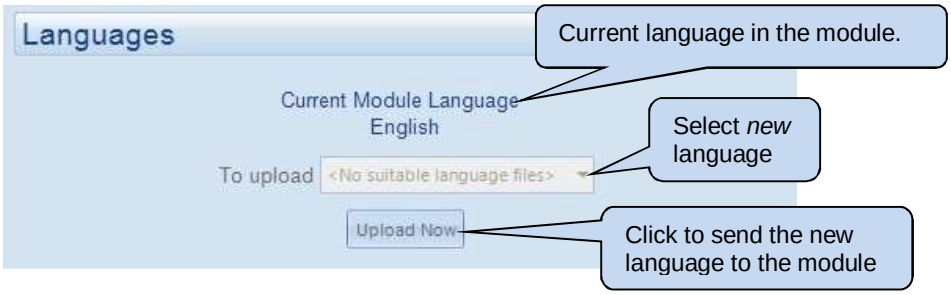
3.1 GENERATOR IDENTITY

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

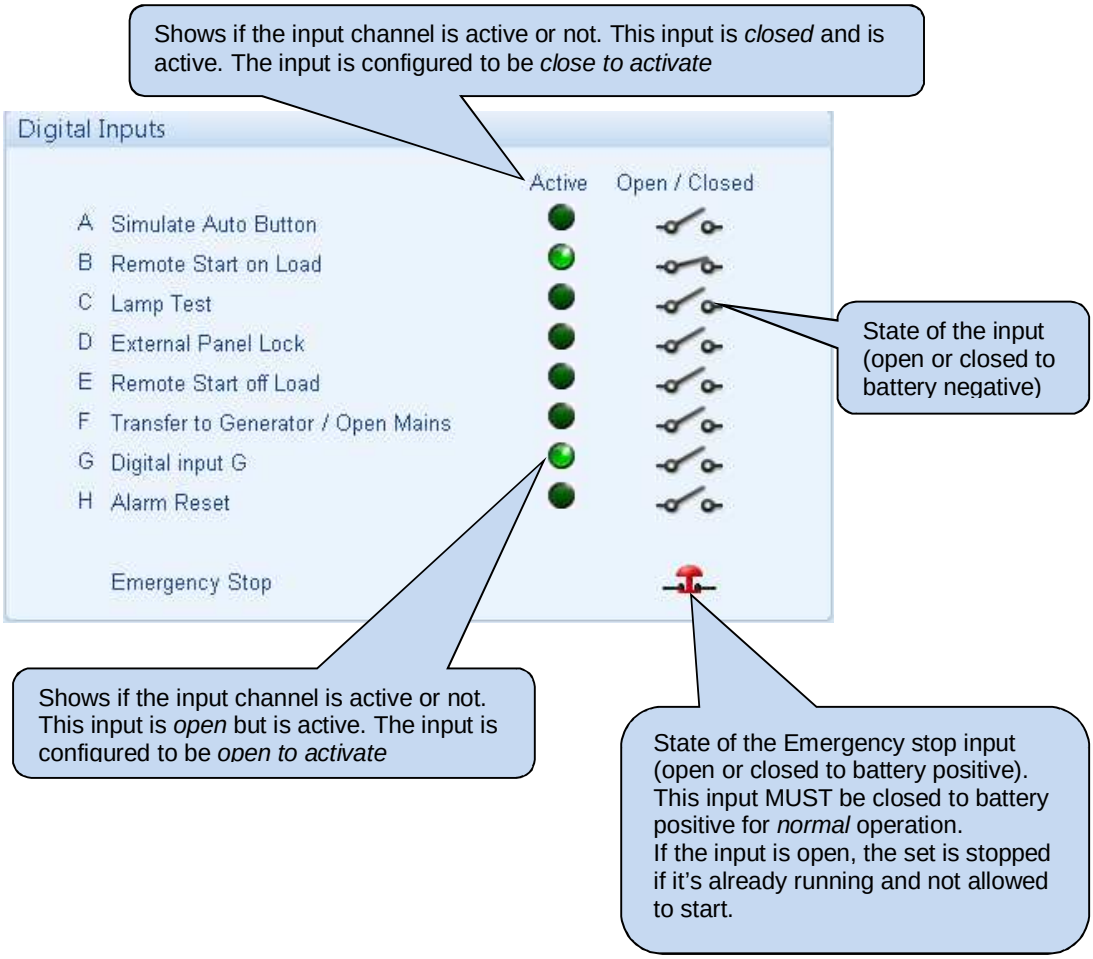
3.2 MIMIC

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

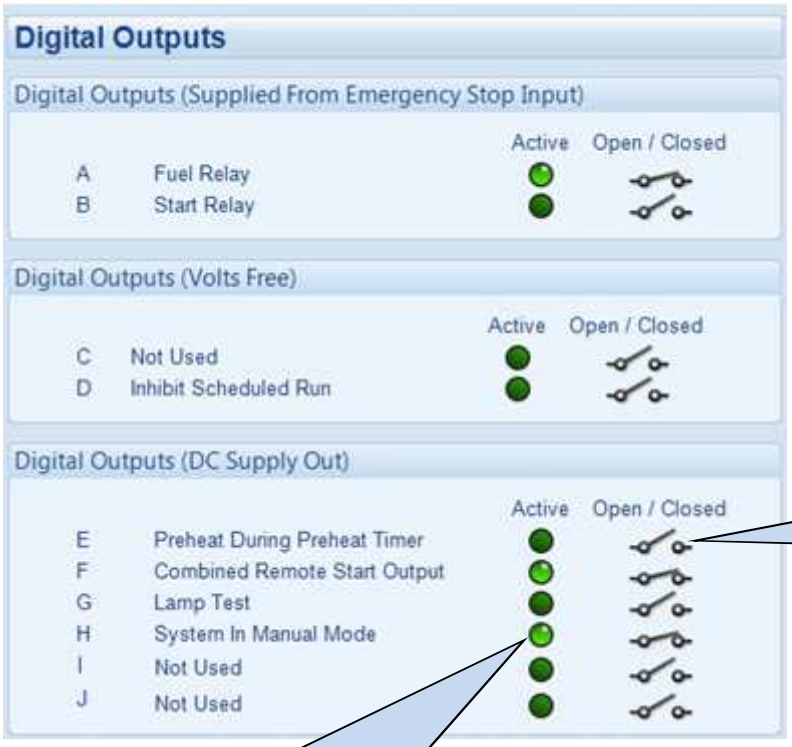
3.3 LANGUAGES



3.4 DIGITAL INPUTS



3.5 DIGITAL OUTPUTS

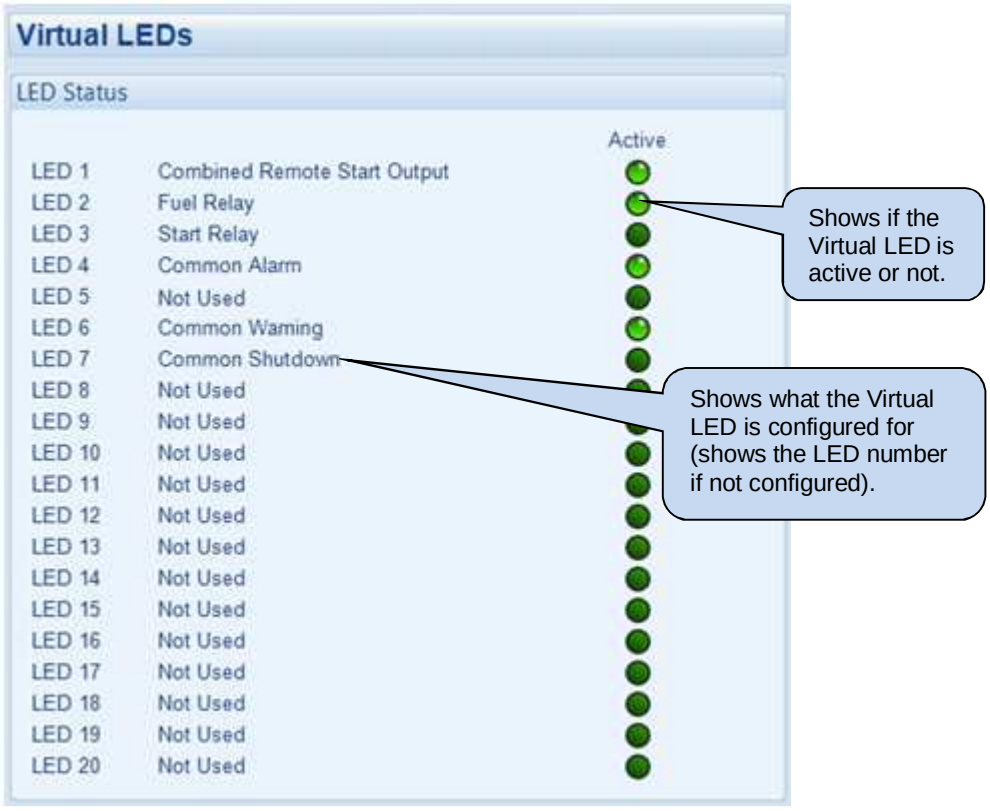


State of the output (open or closed)

Shows if the output channel is active or not. This output is *closed* and is active. The output is configured to be *System in Manual Mode Energise.* As the module is in Manual mode, the output is *energised*.

3.6 VIRTUAL LEDS

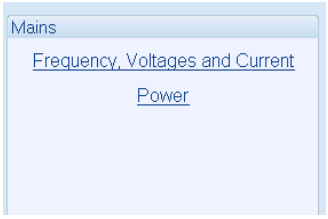
Shows the state of the *Virtual LEDs*. These LEDs are not fitted to the module or expansion modules, they are not physical LEDs. They are provided to show status and appear only in the SCADA section of the configuration suite, or read by third party PLC or Building Management Systems (for example) using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



3.7 MAINS

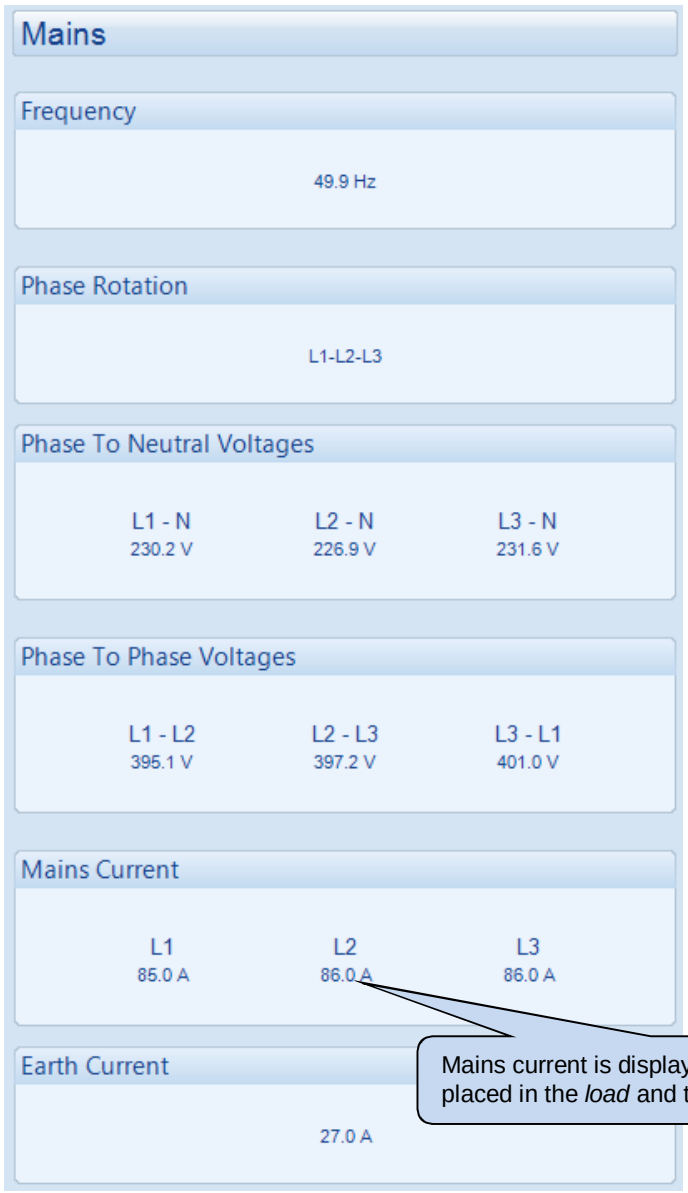
= Only available on DSE7320 MKII AMF Modules

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



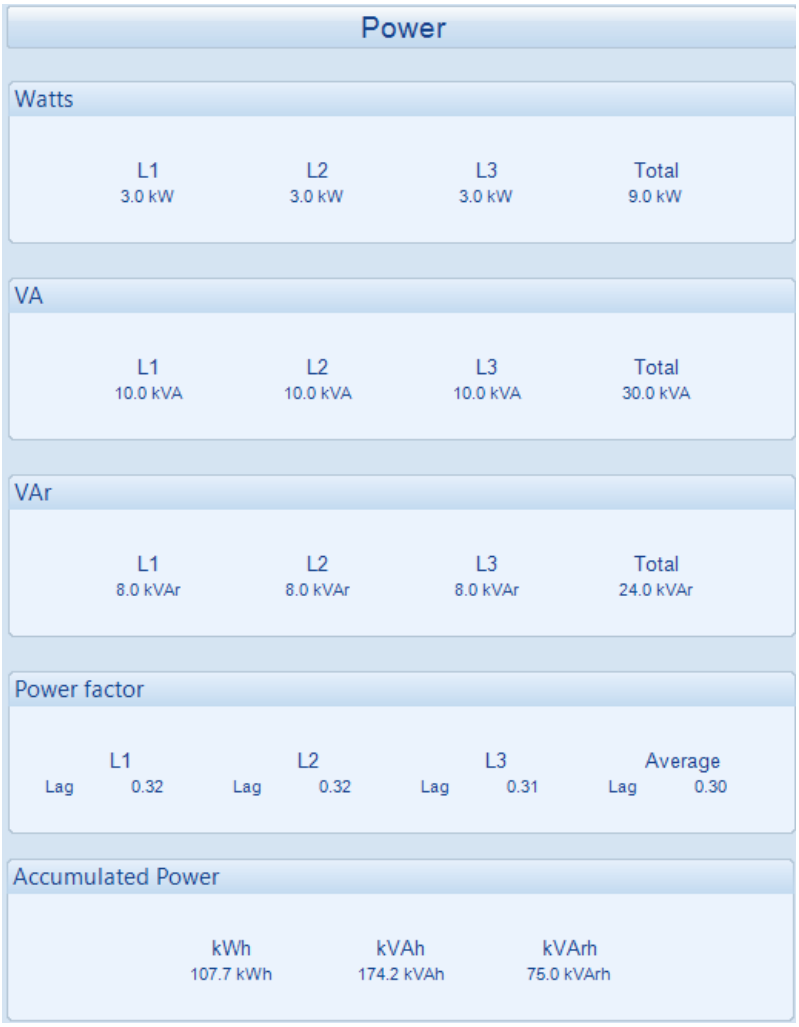
3.7.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the module's measurements of the mains supply (7320 MKII only).



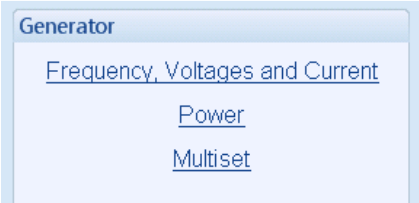
3.7.2 POWER

Shows the modules measurements of the mains supply power (7320 MKII only).



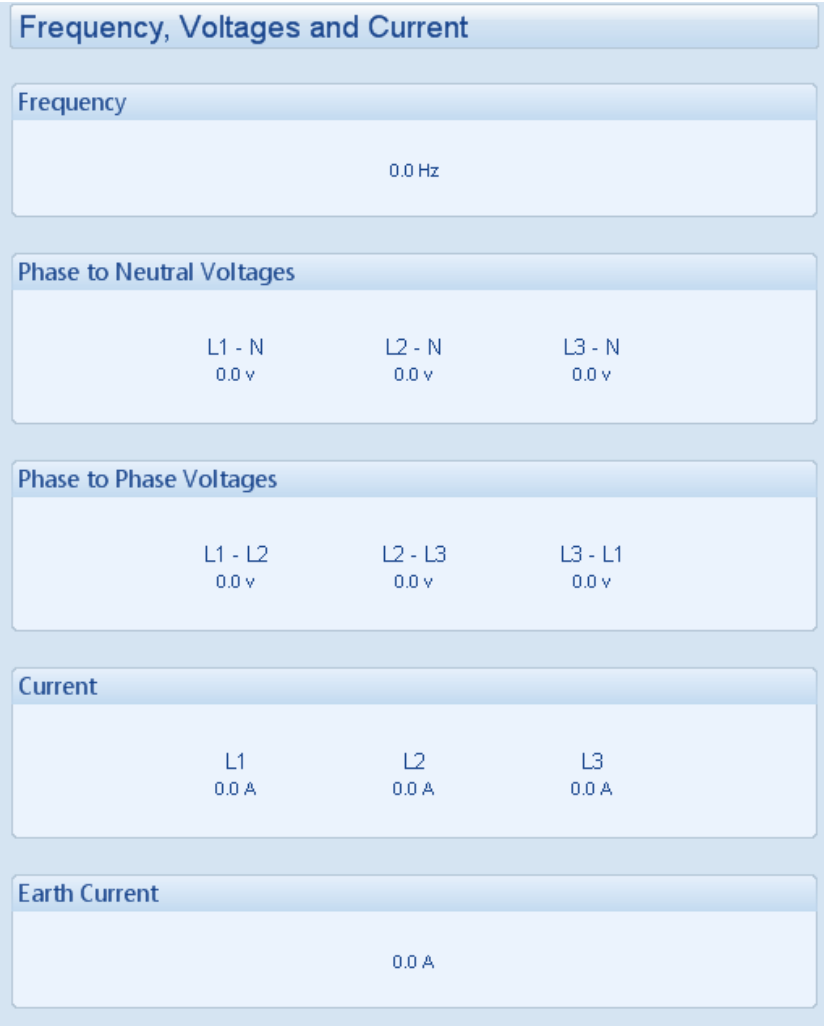
3.8 GENERATOR

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



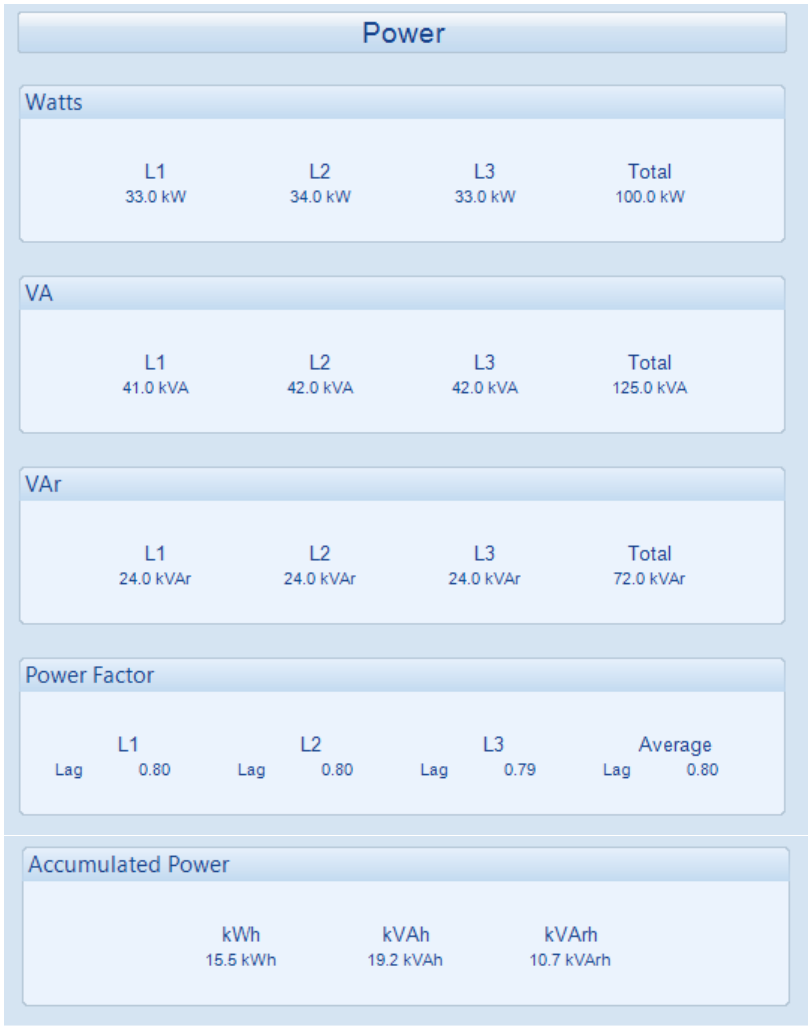
3.8.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the modules measurements of the generator supply.



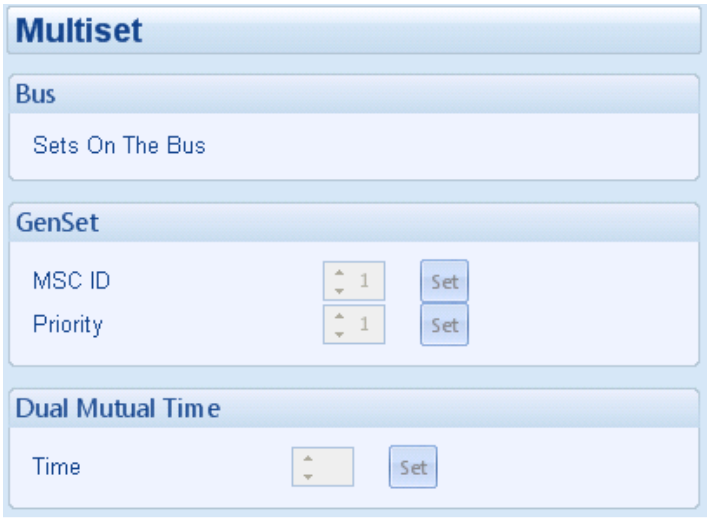
3.8.2 POWER

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



3.8.3 MULTISET

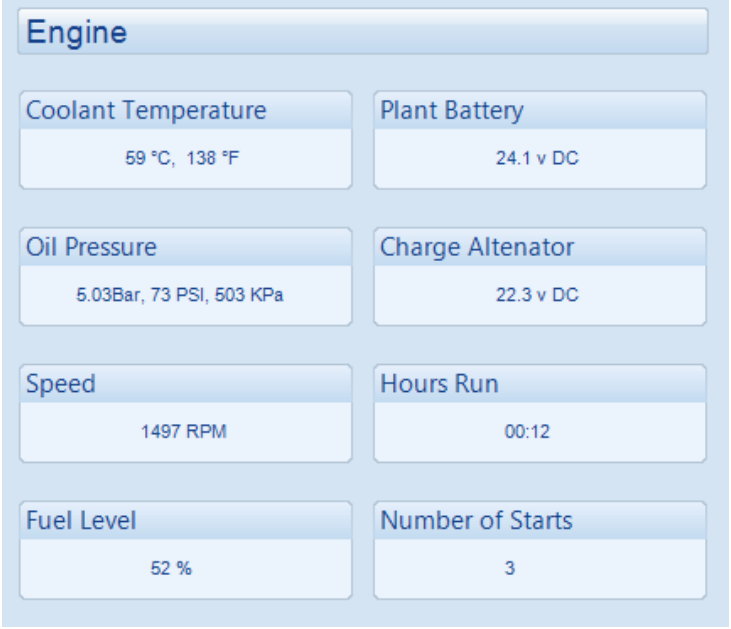
Allows setting the module's MSC link parameters.



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

3.9 ENGINE

Shows the modules measurements of the engine parameters.



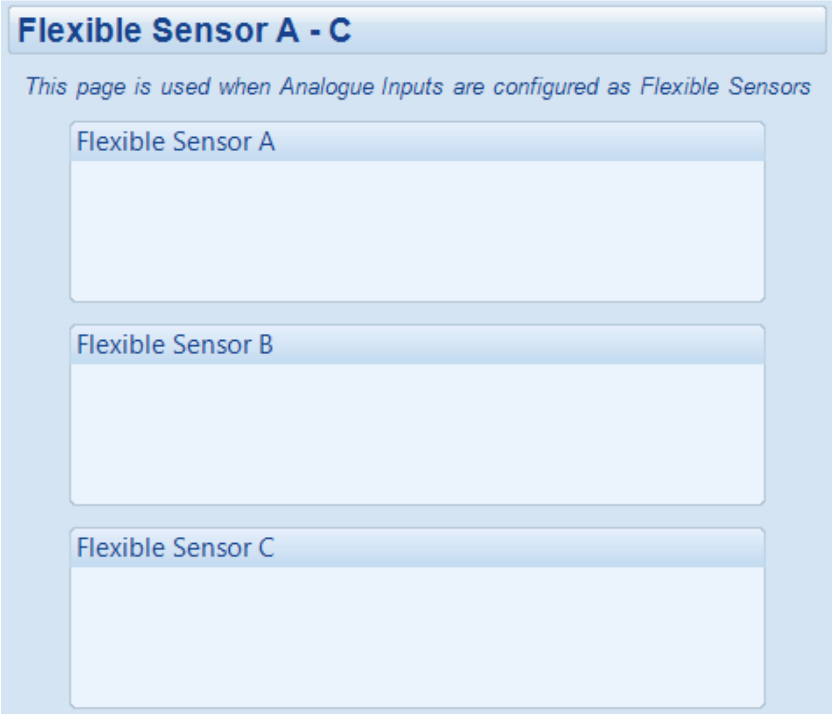
3.10 FUEL USE AND EFFICIENCY

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

3.11 FLEXIBLE SENSORS

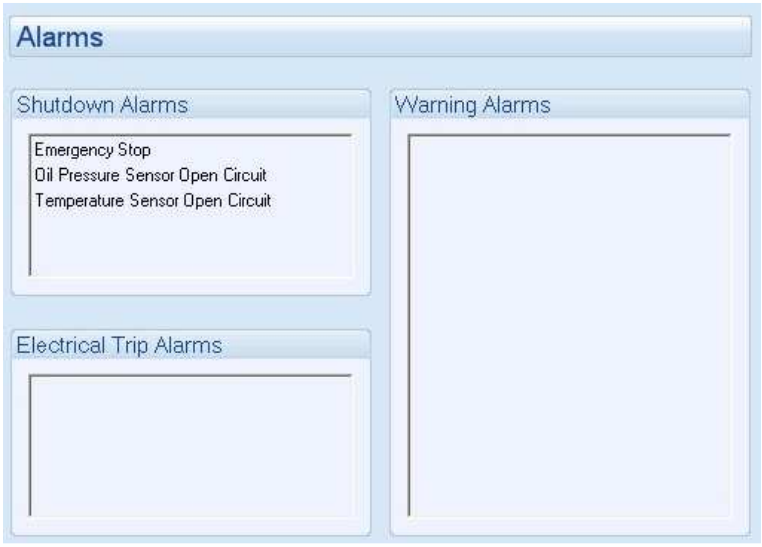
The *Flexible Sensors* section is subdivided into smaller sections.
Select the required section with the mouse.

Shows the modules measurements of the flexible sensors parameters.



3.12 ALARMS

Shows any present alarm conditions.

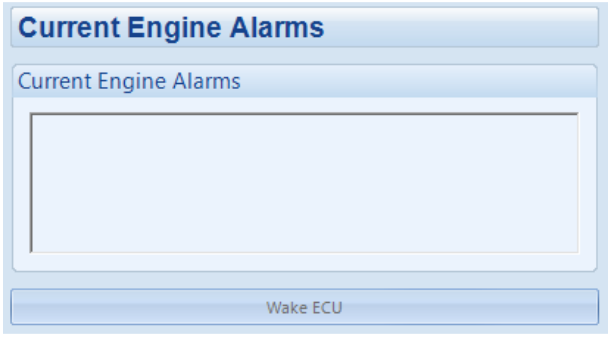


3.13 ENGINE ALARMS

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

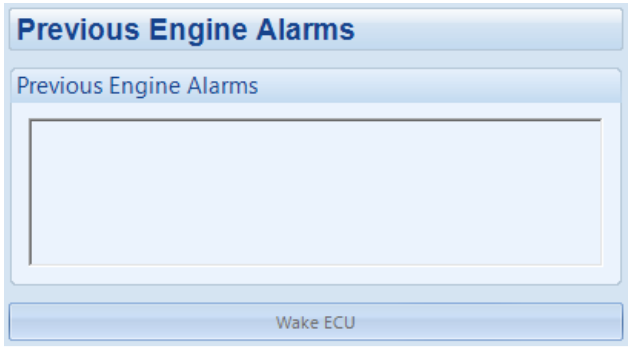
3.13.1 CURRENT ENGINE ALARMS

Shows the current engine alarms.



3.13.2 PREVIOUS ENGINE ALARMS

Shows the previous engine alarms.

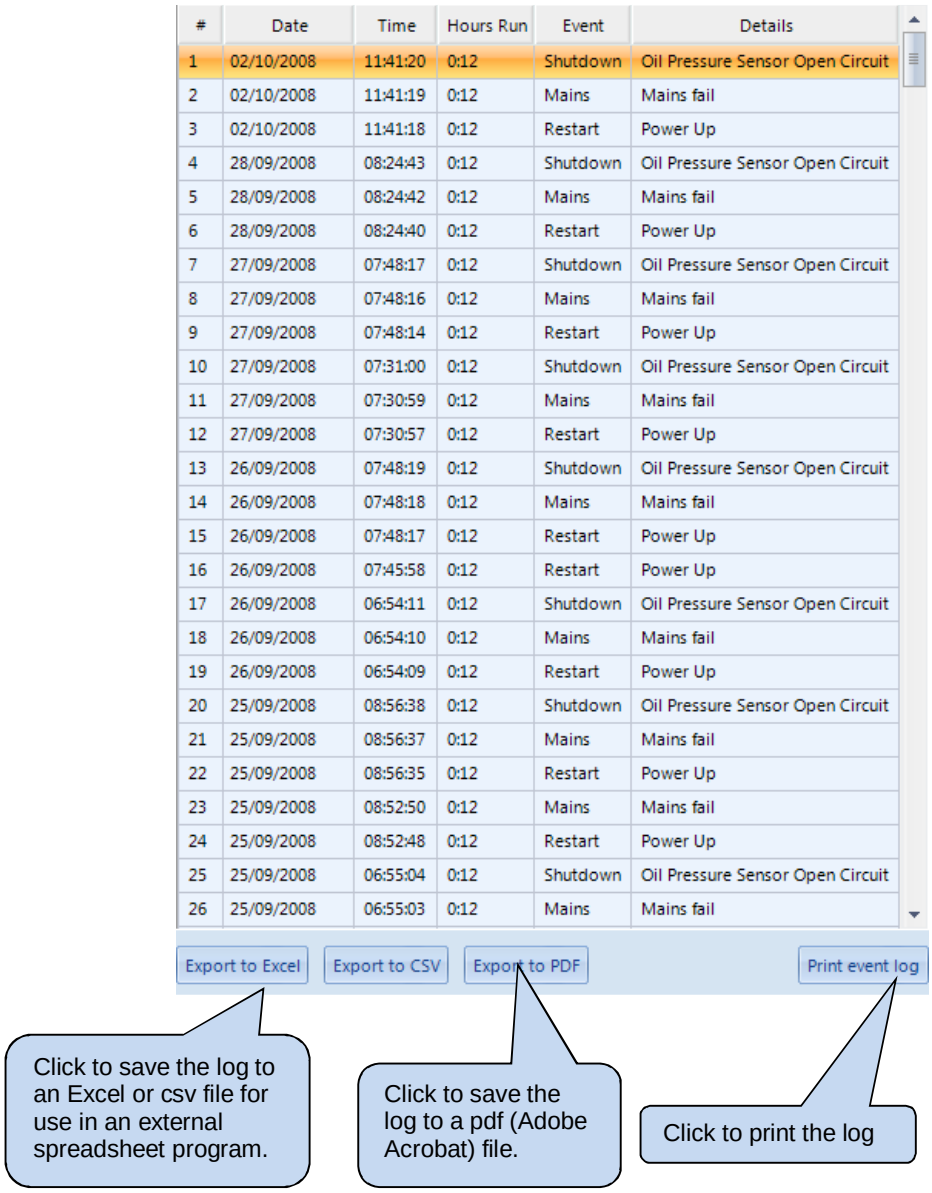


3.14 STATUS

Shows the module's current status.

3.15 EVENT LOG

Shows the contents of the module's event log.



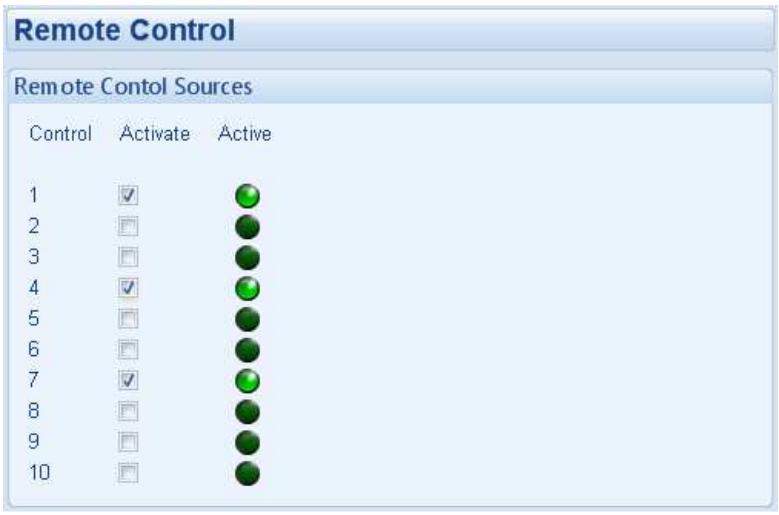
#	Date	Time	Hours Run	Event	Details
1	02/10/2008	11:41:20	0:12	Shutdown	Oil Pressure Sensor Open Circuit
2	02/10/2008	11:41:19	0:12	Mains	Mains fail
3	02/10/2008	11:41:18	0:12	Restart	Power Up
4	28/09/2008	08:24:43	0:12	Shutdown	Oil Pressure Sensor Open Circuit
5	28/09/2008	08:24:42	0:12	Mains	Mains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

3.16 ENHANCED CANBUS

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

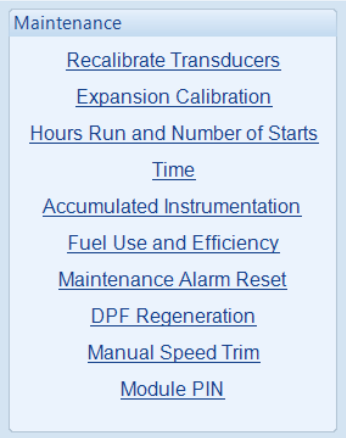
3.17 REMOTE CONTROL

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



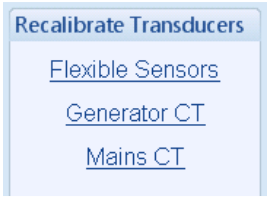
3.18 MAINTENANCE

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



3.18.1 RECALIBRATE TRANSDUCERS

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

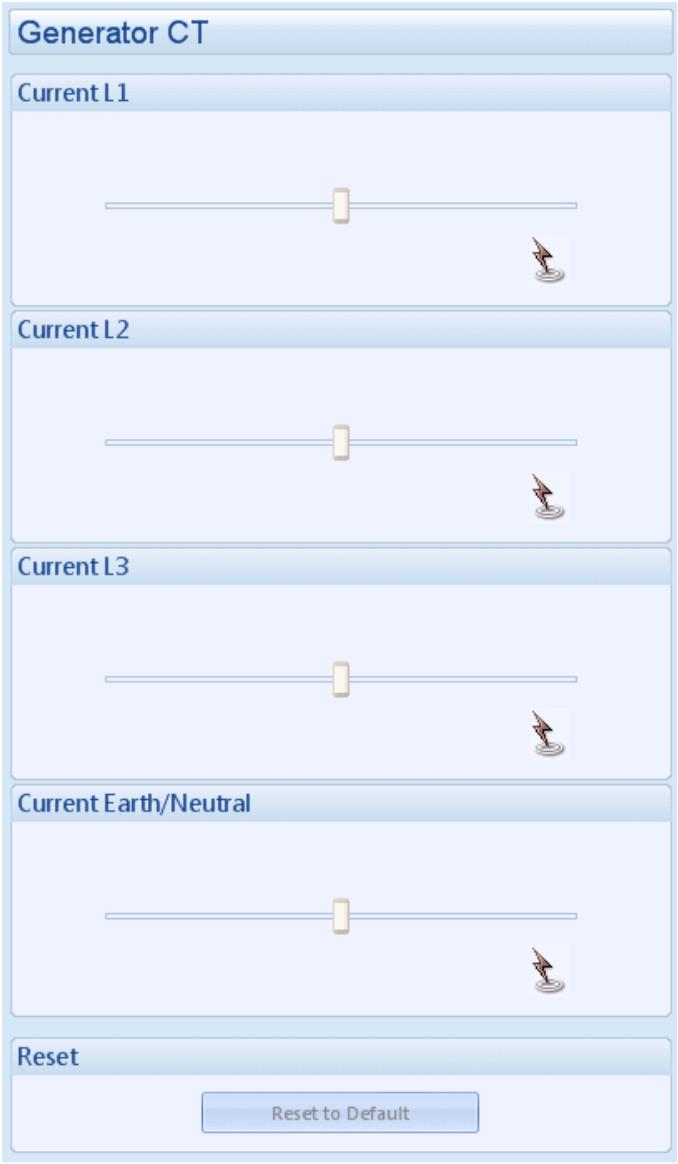


3.18.1.1 FLEXIBLE SENSORS

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

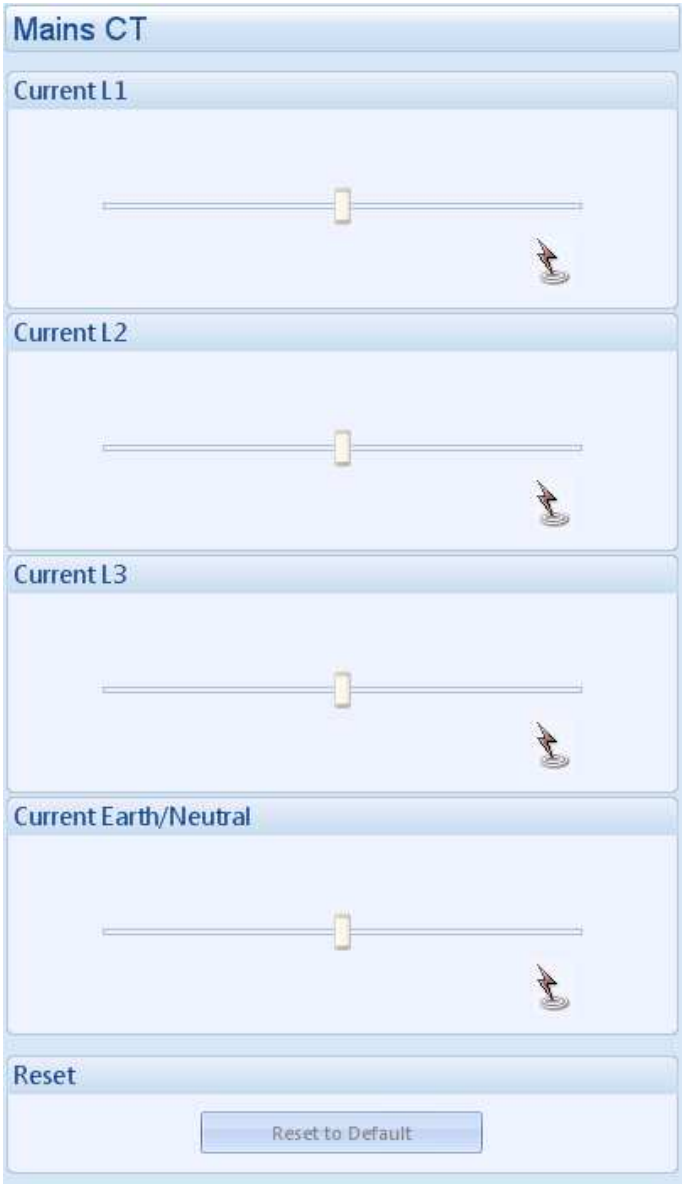
3.18.1.2 GENERATOR CT

Allows the recalibration of the generator CT readings.



3.18.1.3 MAINS CT

= Only available on DSE7320 MKII AMF Modules and when the *CT Location* is configured to *Load.*

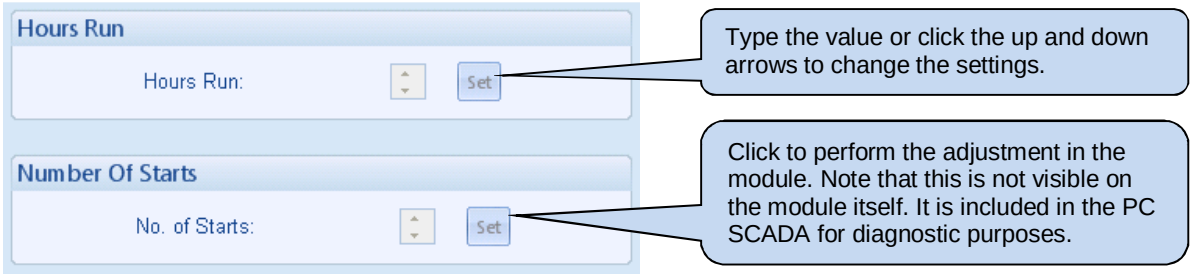


3.18.2 EXPANSION CALIBRATION

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

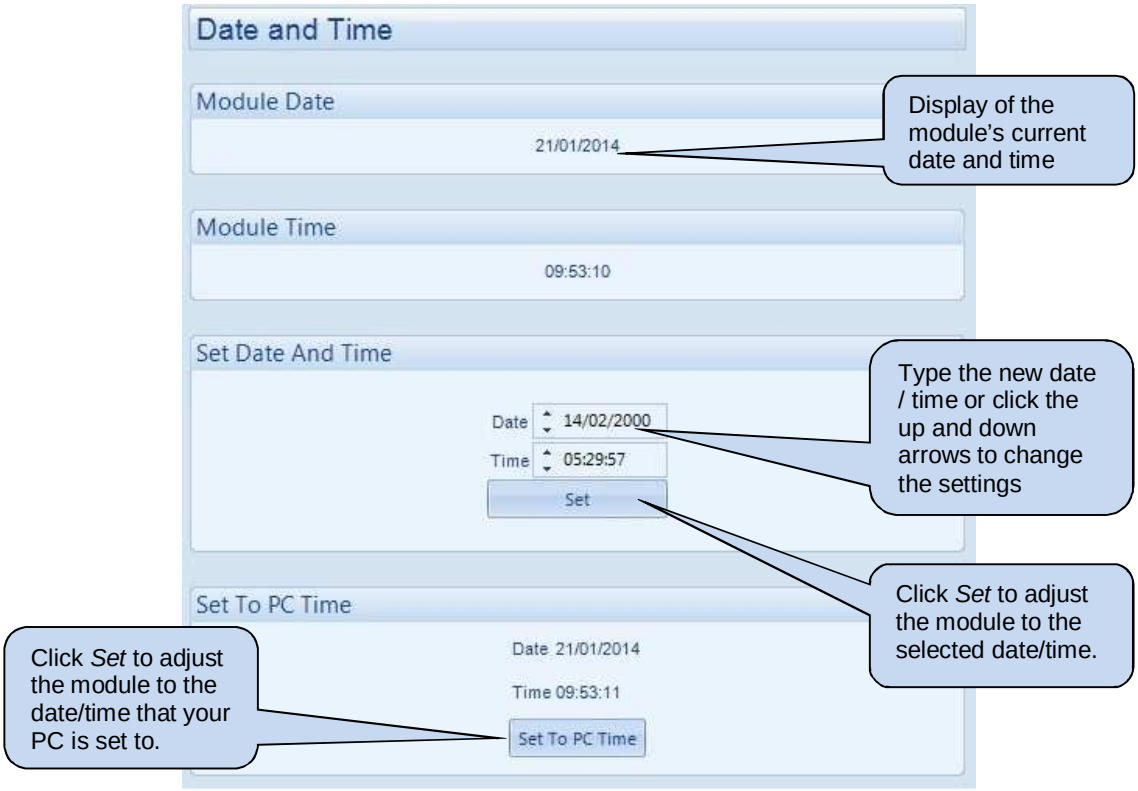
3.18.3 HOURS RUN AND NUMBER OF STARTS

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



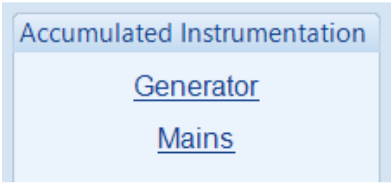
3.18.4 TIME

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



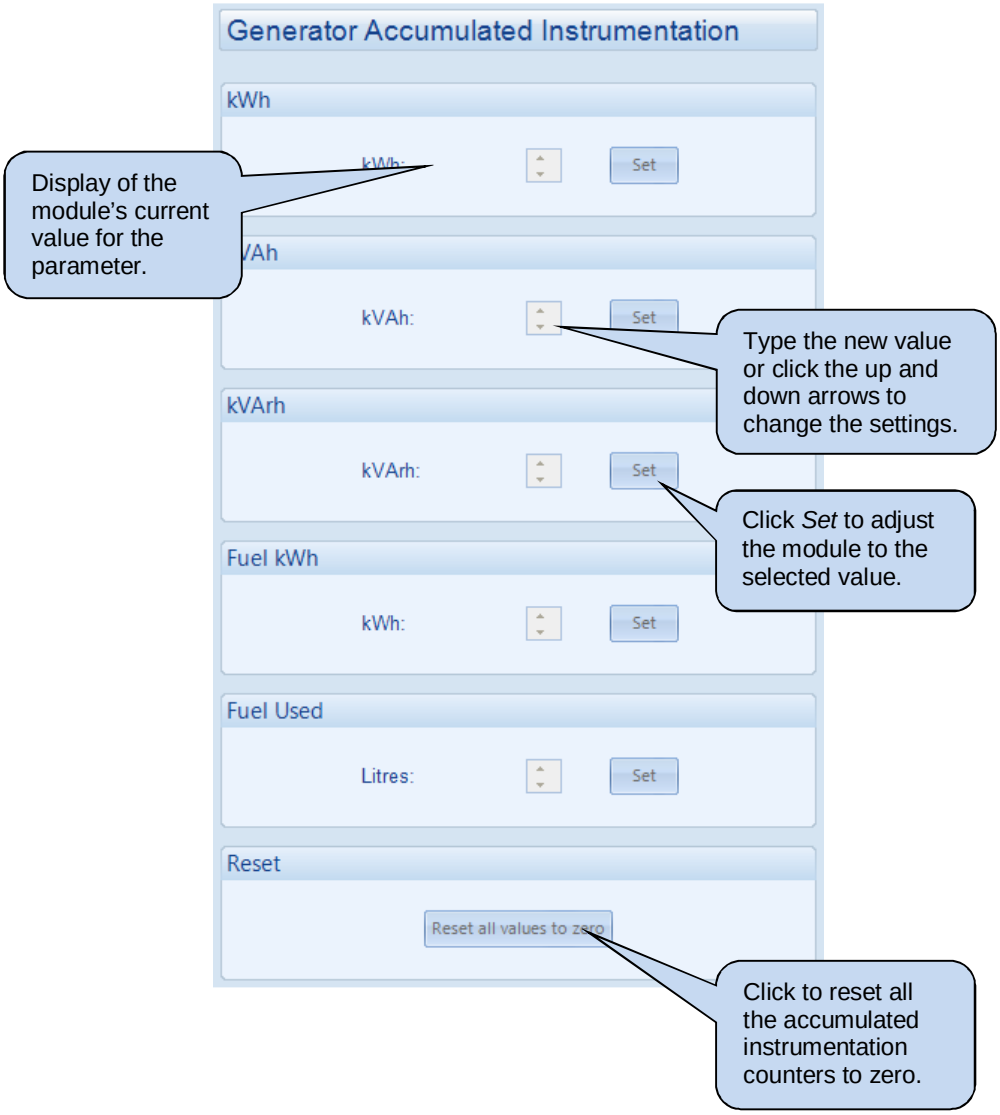
3.18.5 ACCUMULATED INSTRUMENTATION

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



3.18.5.1 GENERATOR

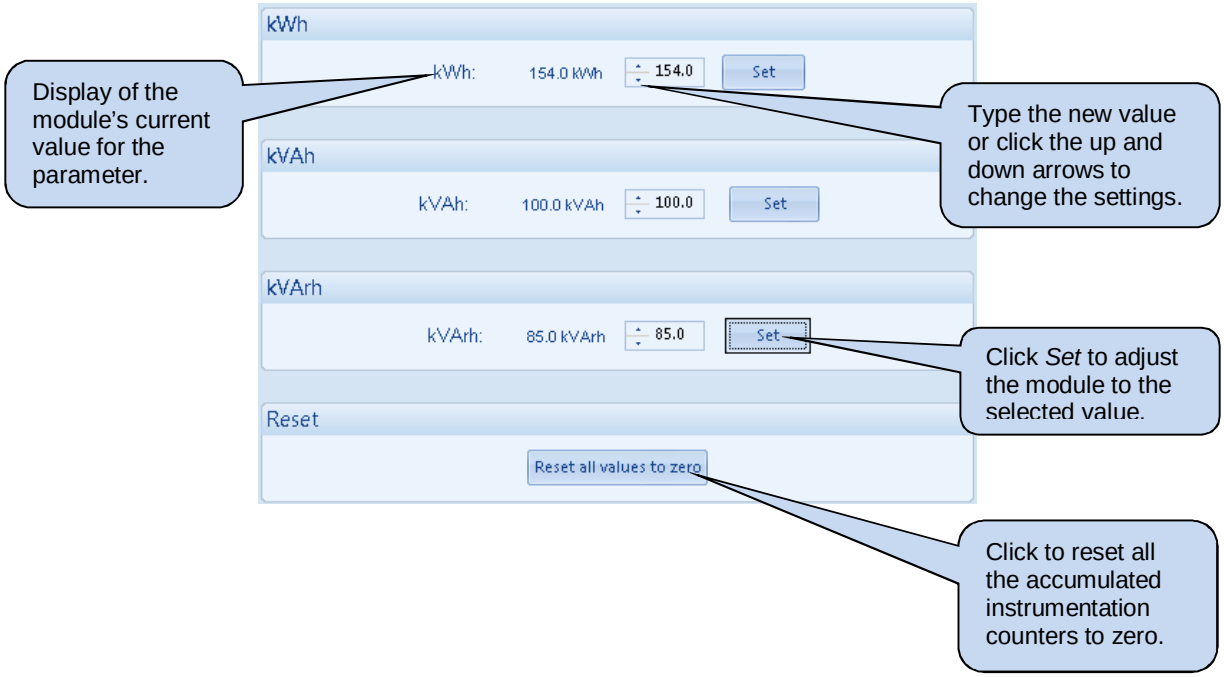
Allows the user to view or change the module's Generators accumulated instrumentation.



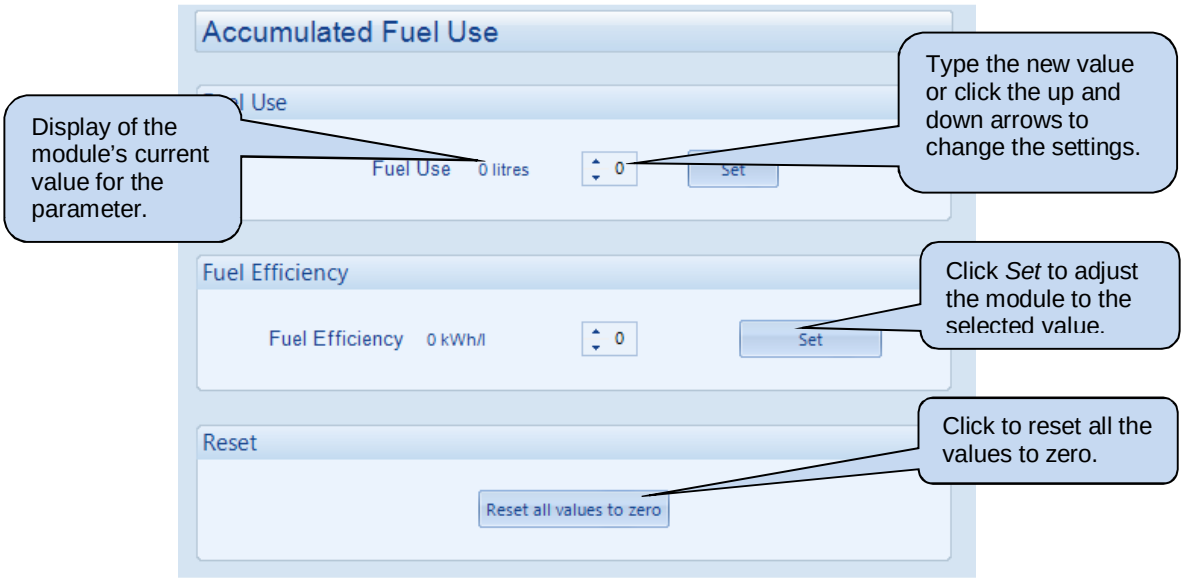
3.18.5.2 MAINS

= Only available on DSE7320 MKII AMF Modules and when the *CT Location* is configured to *Load.*

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



3.18.6 FUEL USE AND EFFICIENCY

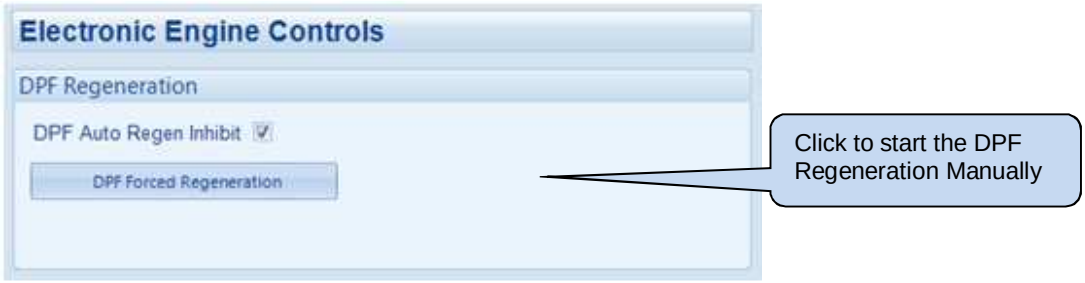


3.18.7 MAINTENANCE ALARM RESET

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

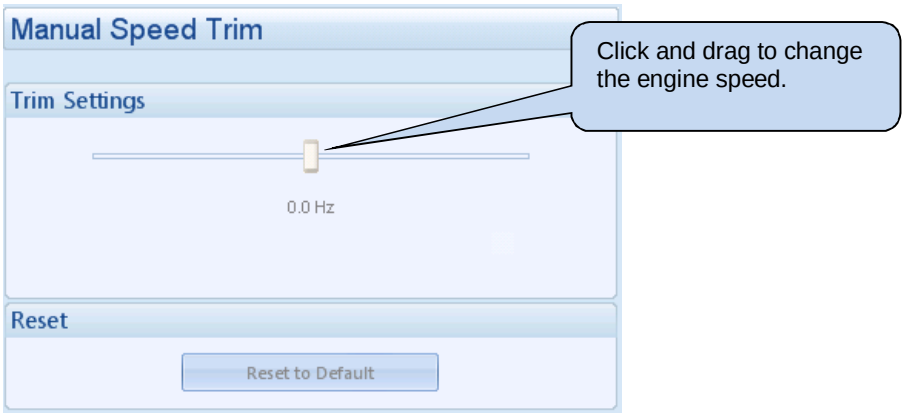
3.18.8 DPF REGENERATION

The DPF Forced Regeneration is controlled when the Electronic Engine supports the Non-mission DPF Regeneration.



3.18.9 MANUAL SPEED TRIM

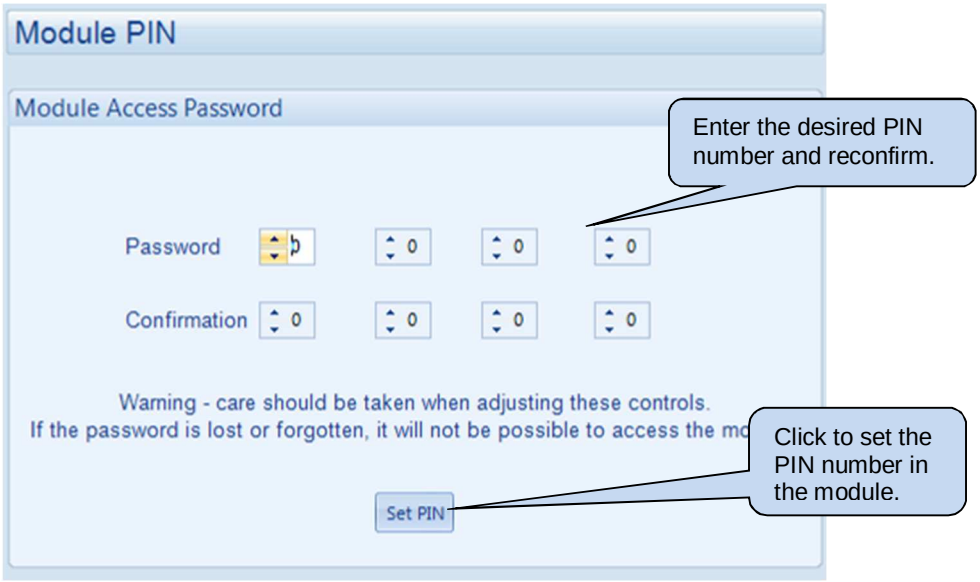
Allows manual speed trim of the engine (when enabled in the module configuration)



3.18.10 MODULE PIN

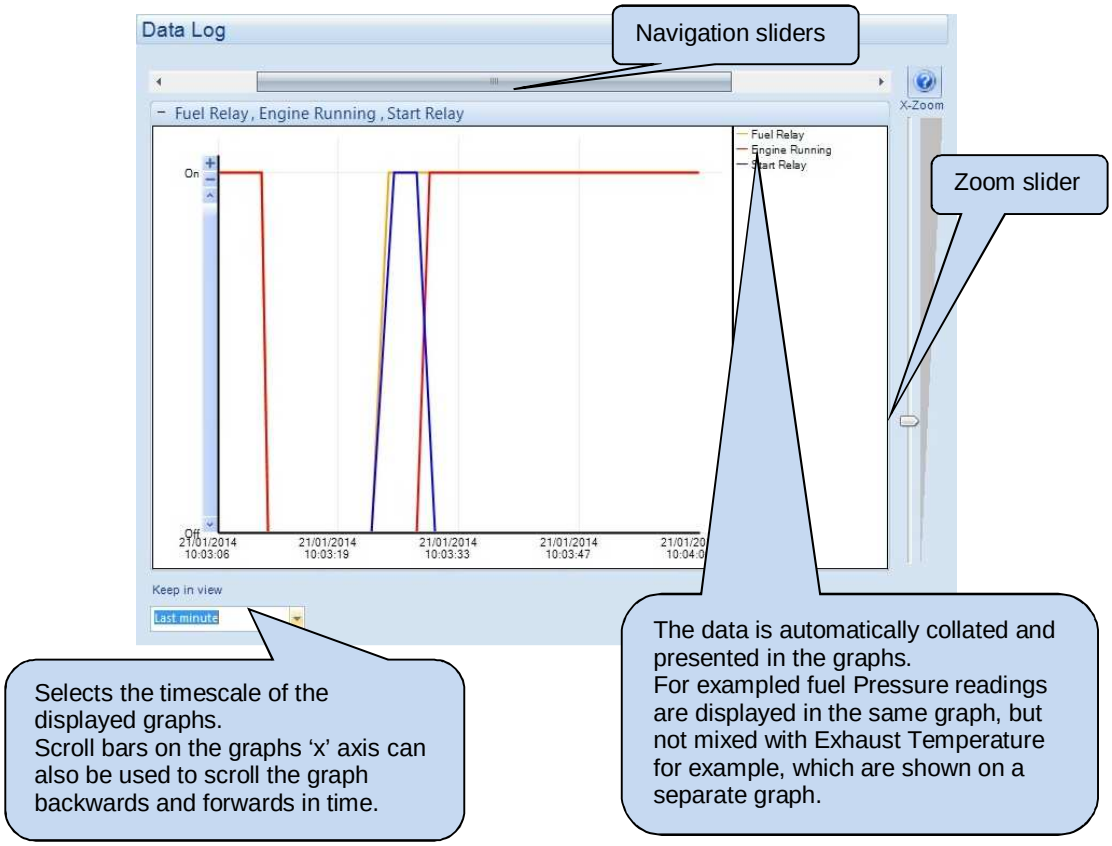
NOTE : If the PIN is lost or forgotten, it is no more possible to access the module!

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

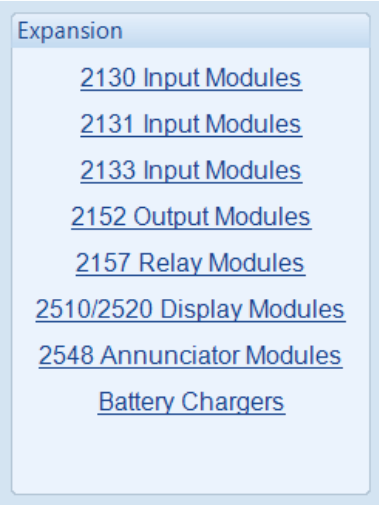


3.19 DATA LOG

Allows viewing of the module datalog (if configured).

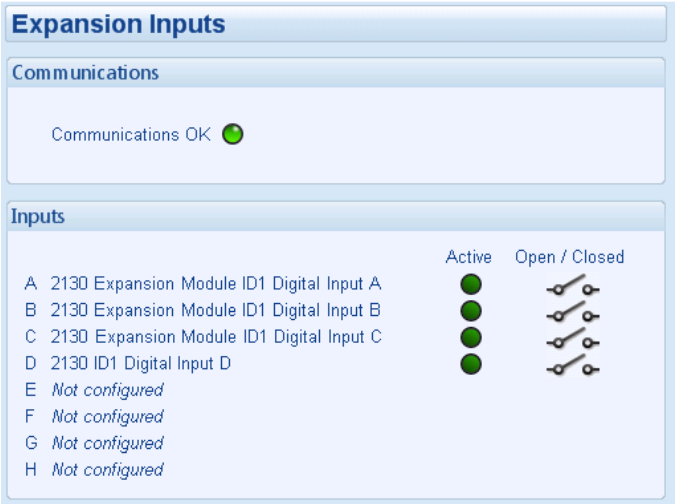


3.20 EXPANSION



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

For example:



4 ALARM TYPES

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

Alarm type	Description
Indication	No audible alarm or common warning signal occurs. *Indication* alarms are only used to illuminate indicators or to activate outputs.
Warning	Audible alarm and common alarm signal is generated. The set continues to run. *Warning alarms* are used to draw the operator's attention to a minor issue or to a problem that may escalate to an Electrical Trip or Shutdown Alarm if left untreated.
Electrical Trip	Audible alarm and common alarm signal is generated. The set is taken off load and the cooling timer begins, after which the set is stopped. *Electrical Trip alarms* are series issues that require the set to be taken off load. As the name implies, this is often electrical faults that occur 'after' the load switch. The set is allowed to cool before stopping.
Shutdown	Audible alarm and common alarm signal is generated. The set is taken off load and immediately stopped. *Shutdown alarms* are serious issues that demand immediate stopping of the generator. For instance Emergency Stop or Overspeed alarms require immediate shutdown.

5 ALARM ARMING

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

Timing Segment	Stopped	Start Delay	Preheat	Cranking	Safety Delay	Smoke Limiting	Smoke Limiting Off	Warming Up	Gen Available/ Gen On Load	Cooling	Cooling in Idle
Always											
From Starting											
From Safety On											
Engine Protection											
Overfrequency / Overspeed Overshoot											

5.1 ALWAYS

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

5.2 FROM STARTING

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

5.3 FROM SAFETY ON

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

5.4 ENGINE PROTECTION

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

5.5 OVERSHOOT

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

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

Example

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

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