



DEEP SEA ELECTRONICS

DSE72/7300 Series PC Configuration Suite

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DSE72/7300 Series configuration suite

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Amendments List

Amd. No.	Comments	Minimum Module version required	Minimum Configuration Suite Version required
1-4	Added Negative Phase Sequence, kW Overload, Earth Fault trip, Alternative Configurations	2.0.3	
5-10	Added Dual Mutual Standby and Coolant Cooler/Heater Control, AC System images, EJP input and output for EDF Energy Tariff changes (France), Maintenance Alarm 1, Configurable Status Screens	2.2.8	2.0.3.53
11-16	Added Modbus port selection, Virtual LEDs, Control Logic, Maintenance alarms 2 and 3, Load Shed and Dummy load controls, Manual Speed trim	3.0.18	2.0.4.68
17	Added 2510/2520 display expansion. Added changes to Dual Mutual Standby, Fuel usage, dummy load control, load shedding, and protections disabled. More details in many areas. Addition of 4 th level to the contents page to ease searching for details of 'sub pages'.	4.x.x.	2.0.6.x
18	Changes to the Communications page (7300)	4.5.2	2.0.6.123
19	Additions for V5 modules: Bidirectional language strings for module inputs, Updated control logic to allow one to feed into another, additional start delay timers, addition of electrical trip coolant temp alarm, sensor curve manager, language editor, additional electrical trip on selected alarms, remote control output sources.	5.x.x	2.0.8.19
20	Additions for V6 modules. 7320 breaker control in manual mode changed – now push to open, push to close. Mains current protection enabled when CT is in Load leg. Short circuit protection added to 7310 controller.	6.x.x	V2010 1 4.0.4.0
21	Added information on to changing strings for the SCADA alarms/event log through the language editor tool. Also added information on the Address Book.	-	4.14.26.0
22	Added new PLC editor, new Can alarms, fuel level monitoring	7.x.x	4.37.8.0

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Amendments List Continued

Amd. No.	Comments	Minimum Module version required	Minimum Configuration Suite Version required
23	Control by SMS messages Remote start off/on load / cancel Put into stop mode, put into Auto mode. Added extended SMS message to include oil pressure, coolant temp and engine hours run Option to send SMS message as an alarm/flash message Fuel level SMS Messages MPU alarm change to shutdown or warning File compression Speed up file transfers. PLC added more Nodes 50-to- 100 and increased number of flags Gen rev power added Gencomm –added 4 configurable Gencomm pages. Output sources- every alarm and input now has equivalent outputs. Logging. Starts / stops in the event log. Multiple phone number dial out scheme	8.x.x	2012.1v1.11.11
24	Added Start in manual mode input, cool down in stop mode and maintenance alarm reset through module facia	9.x.x	2012.19 V1.36.4.0
25	Added Generator kW , KVA & Pf Rating VAr alarms Additional PLC functions: new outputs configurable as flags. Additional configurable; Gencomm registers. Scada Additions ; Positive VAr & Negative VAr	10.x.x	2012.23 V1.40 8.0
26	Added Tier 4 changes to 7300 series DPTC Filter CAN Alarm HEST Active CAN Alarm DPF Digital Inputs DPF Digital Outputs	11.0	2012.42 V1.59.2
27	Added Tier 4 changes to 7200 series	11.0	2012.47 V1.66.4
28	Added DTC display options Backlight Power Saving Mode Engine DTC Logging Auto Load Sensing Inter Frame Delay in Advanced Communications Options Added Scheduler Bank1 and Bank 2	12.0	2013.21 V1.93.3.0
29	Updated for 7300 module's firmware version 14 Added additional Tier IV features Updated input functions list Updated output functions list	14.0	2015.22 V1.249.4

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1 BIBLIOGRAPHY

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

DSE PART	DESCRIPTION
057-004	Electronic Engines and DSE wiring
057-074	DSE72/7300 operator manual
057-082	DSE2130 input expansion manual
057-083	DSE2157 input expansion manual
057-084	DSE2548 input expansion manual
057-105	DSE2500 display expansion manual

The following third party documents are also referred to:

ISBN	DESCRIPTION
1-55937-879-4	IEEE Std C37.2-1996 IEEE Standard Electrical Power System Device Function Numbers and Contact Designations. Published by Institute of Electrical and Electronics Engineers Inc

2 DESCRIPTION

This manual covers the operation of the **configuration suite** for 7200 and 7300 series modules. Separate manuals cover other DSE modules.

The **DSE72/7300 Series configuration suite** allows the 7200/7300 family of modules to be connected to a PC via USB 'A –USB B' cable. Once connected the various operating parameters within the module can be viewed or edited as required by the engineer. This software allows easy controlled access to these values and also has diagnostic monitoring facilities.

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

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

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

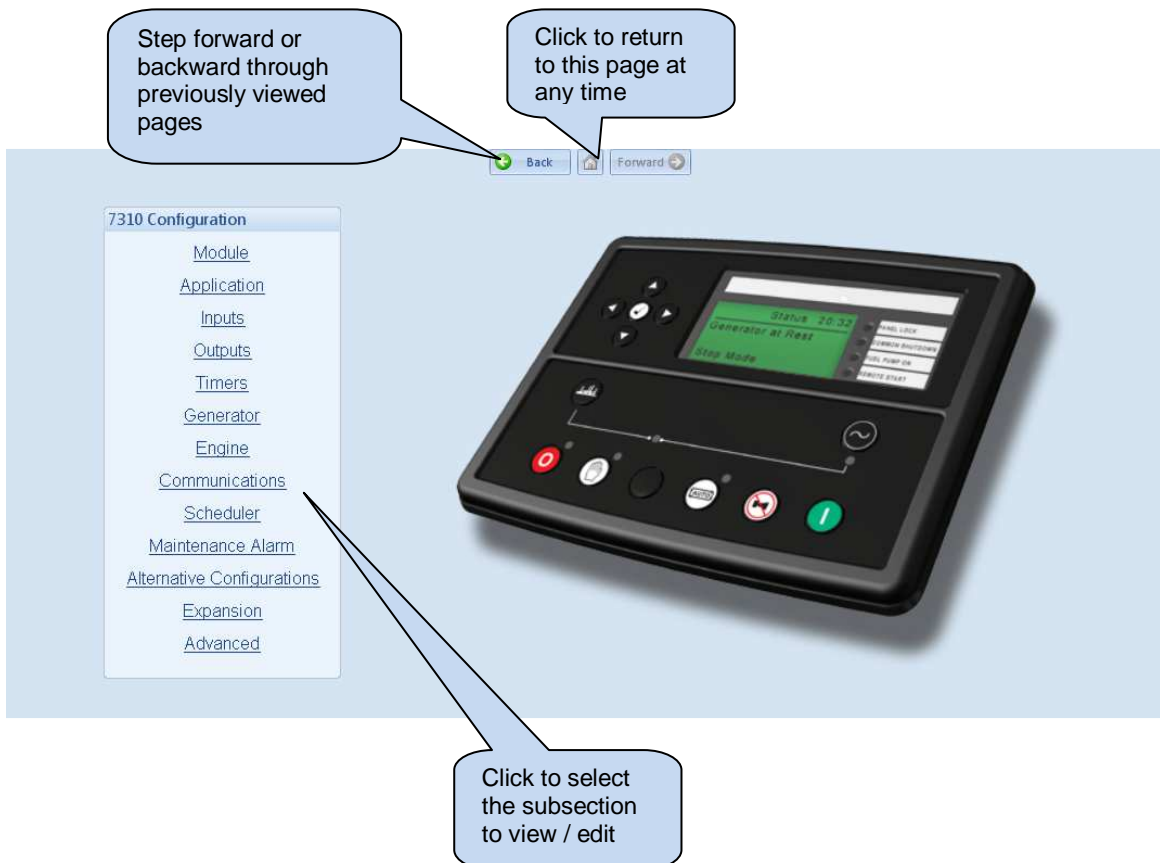
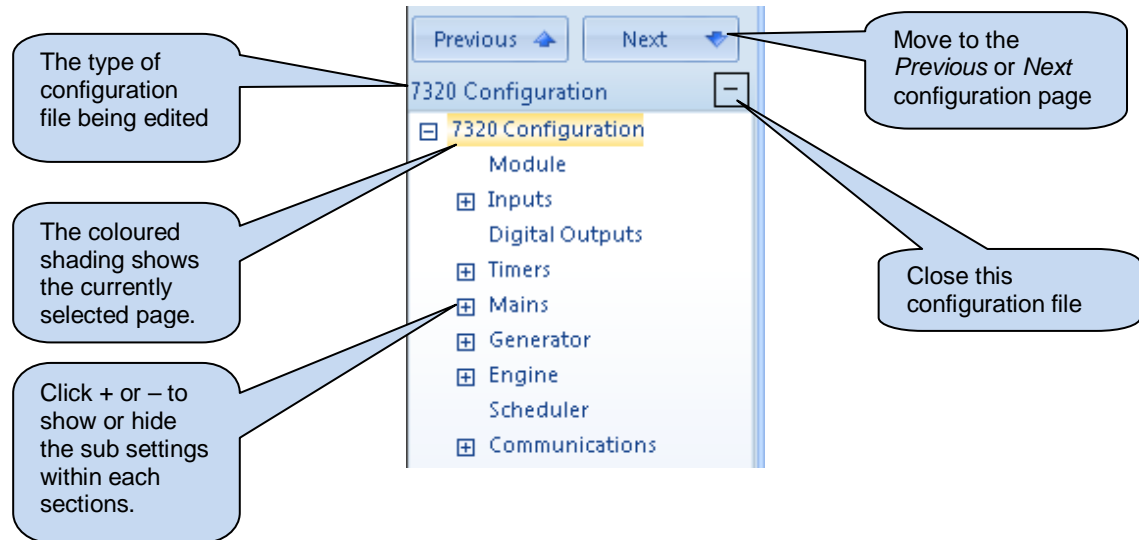
3 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

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

4 EDIT CONFIG

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

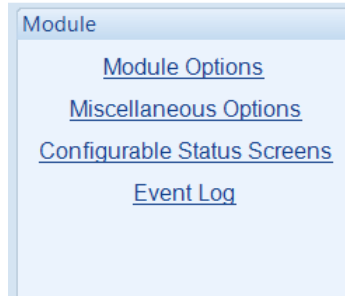
4.1 SCREEN LAYOUT



4.2 MODULE

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

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



4.2.1 MODULE OPTIONS

The screenshot shows the "Module Options" configuration page. It has a "Description" section with two text input boxes. Below that is the "LED Indicators" section, which contains a table with four rows. Each row has a number, a dropdown menu for the indicator type, a "Lit" status dropdown, and a text input box for the "Insert Card Text". At the bottom of the LED Indicators section are "Text Insert" and "Logo Insert" buttons.

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

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

Allows the user to create logo and text insert cards

4.2.2 MISCELLANEOUS OPTIONS

Miscellaneous Options

Miscellaneous Options

Enable fast loading feature

☐

Audible alarm prior to starting

☐

All warnings are latched

☐

Enable sleep mode

☐

Enable manual fuel pump control

☐

Enable manual frequency trim control

☐

Support right-to-left languages in module strings

☐

Enable alternative breaker button control

☐

Enable Cool Down In Stop Mode

☐

Enable maintenance reset on module front panel

☐

Enable Backlight Power Saving Mode


☐

Show Active DTC

☒

Show Inactive DTC

☐

Option	Description
Enable fast loading feature	<p><input type="checkbox"/> = Normal Operation, the safety on timer will be observed in full. This feature is useful if the module is to be used with some small engines where premature termination of the delay timer can lead to overspeed alarms on start up.</p> <p><input checked="" type="checkbox"/> = The module will terminate the safety on timer once all monitored parameters have reached their normal settings. This feature is useful if the module is to be used as a standby controller as it allows the generator to start and go on load in the shortest possible time.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> NOTE: Enabling Fast Loading is only recommended where steps have been taken to ensure rapid start up of the engine is possible. (For example when fitted with engine heaters, electronic governors etc.)</p> </div>
Audible alarm prior to starting	<p><input type="checkbox"/> = The module will start with no audible indication</p> <p><input checked="" type="checkbox"/> = The module will give an audible warning during the pre-start sequence as an indicator that the set is about to run. This is often a site's specification requirement of AUTO mode operation.</p>
All warnings are latched	<p><input type="checkbox"/> = Normal Operation, the warnings and pre-alarms will automatically reset once the triggering condition has cleared.</p> <p><input checked="" type="checkbox"/> = Warnings and pre-alarms latch when triggered. Resetting the alarm is performed by either an external reset applied to one of the inputs or, the 'Stop/Reset' pushbutton must be operated (once the triggering condition has been cleared).</p>
Enable sleep mode	<p><input type="checkbox"/> = Normal operation</p> <p><input checked="" type="checkbox"/> = A configuration option which will allow the module to go into "sleep mode"</p>
Enable manual fuel pump control	<p><input type="checkbox"/> = Normal operation</p> <p><input checked="" type="checkbox"/> = Allows manual fuel pump control when the "fuel level" instrument page is being viewed.</p>
Enable manual frequency trim control	<p><input type="checkbox"/> = Normal operation</p> <p><input checked="" type="checkbox"/> = Allows manual speed trim control when the engine speed is being viewed.</p>
Support right-left languages in module strings Version 5.x.x or later	<p>Determines the direction of text input where supported (i.e. configurable input text)</p> <p><input type="checkbox"/> = left to right language support</p> <p><input checked="" type="checkbox"/> = right to left language support</p>
Enable Alternative Breaker Control Button Version 6.x.x or later	<p>Controls the operation of the fascia mounted breaker control buttons (manual mode only)</p> <p><input type="checkbox"/> = Normal operation. Only a transfer is possible.</p> <p><input checked="" type="checkbox"/> = Alternative operation. If a supply is on load and that supply's breaker button is pressed, the breaker 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).</p>
Enable Cooldown in Stop Mode Version 9.x.x or later	<p><input type="checkbox"/> = Normal operation. Pressing the stop button will instantly open the breaker and stop the generator.</p> <p><input checked="" type="checkbox"/> = Alternative operation. Pressing the stop button will instantly open the breaker and put the generator into a cooling run. Pressing the stop button again will instantly stop the generator.</p>

Option	Description
Enable Maintenance Alarm Reset on Module Front Panel Version 9.x.x or later	<input type="checkbox"/> =Normal operation. The maintenance alarms can only be reset by PC Software or digital input if configured. <input checked="" type="checkbox"/> =Alternative operation. The maintenance alarms can be reset by scrolling to the maintenance page on the module and by pressing and holding the stop button on each alarm, the operator can reset each individual alarm.
Enable Backlight Power Saving Mode	Enables DC power saving by turning off the LCD Backlight if the module was not operated for the duration of the <i>Backlight Timer</i> .
Show Active DTC	Enable this option to show the active ECU DTC (fault codes) on the module display. (Active DTC are also called DM1 in pure J1939 ECU)
Show Inactive DTC	Enable this option to show the in-active ECU 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 pure J1939 ECU).

4.2.3 CONFIGURABLE STATUS SCREENS

NOTE: This feature is available only on DSE7200/7300 Series modules, V2.2 and above. On previous version modules, the status screen is fixed.

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

Configurable Status Screens

Home Page

Home Page Instrumentation

Displayed Pages

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

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

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

4.2.4 EVENT LOG

NOTE: This feature is available only on DSE72/7300 Series modules, V3.0 and above

4.2.4.1 DISPLAY OPTIONS

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

4.2.4.2 LOGGING OPTIONS

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

Event Log

Display Options

Module display ☒ Date and time ☐ Engine hours run

Logging Options

Log the following events to the event log

Power up <input checked="" type="checkbox"/>	Fuel level when at rest <input type="checkbox"/>
Log ECU Lamps <input checked="" type="checkbox"/>	Fuel Level <input checked="" type="checkbox"/>
Mains return <input checked="" type="checkbox"/>	Engine starts <input checked="" type="checkbox"/>
Mains fail <input checked="" type="checkbox"/>	Engine stops <input checked="" type="checkbox"/>
Engine DTC Logging <input type="text" value="Never"/>	

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

Shutdown alarms ☒

Repeat SMS ☐

Repeat delay 12h

Repeats 2

Electrical trip alarms ☒

Repeat SMS ☐

Repeat delay 12h

Repeats 2

Latched warnings ☒

Unlatched warnings ☒

Repeat SMS ☐

Repeat delay 12h

Repeats 2

Maintenance alarms ☒

Repeat SMS ☐

Repeat delay 12h

Repeats 2

Callouts:

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

Engine DTC Logging

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


4.3 APPLICATION

The screenshot shows the 'Application' configuration window with several sections and settings:

- ECU (ECM) Options**
 - Engine Type: Conventional Engine (Callout: Allows selection of the Engine type being used (ie Conventional Diesel Engine, Gas Engine or Electronic Engine))
 - Enhanced J1939: ☐
 - Alternative Engine Speed: ☐
 - Modbus Engine Comms Port: RS485 Port
- Dual Mutual Standby**
 - Dual Mutual Standby: Inactive (Callout: Dual Mutual feature for a two set system, one set as standby should the 'master' set fail.)
 - Load Balancing Enable: ☐
 - Load Balancing Time: 1h
- Auto Voltage Sensing**
 - Enable Auto Voltage Sensing: ☐ (Callout: Auto Voltage Sensing to facilitate easy module reconfiguration automatically.)
 - Over Voltage During Auto Sensing Trip: 277 V PhN
- Auto Load Sensing**
 - Enable Auto Load Sensing: ☐
- Protections**
 - Disable: ☐ (Callout: Allows all protections to be disabled and give "run to destruction" functionality.)
 - Protections Are Disabled: Never
 - Protections Disabled Alarm Action: Indication
 - Coolant Level Protection Override: ☐ (Callout: Disables "Coolant Level Protection", useful for some engine types.)

See overleaf for description of the parameters....

4.3.1 ECU (ECM) OPTIONS

Parameter	Description
Engine type	<p>Select the engine type appropriate to your system</p> <p><i>Conventional Engine</i> : Select this if you have a traditional (non ECU) engine, either Energise to Run or Energise to Stop.</p> <p><i>Conventional Gas Engine</i> : Select this if you have a traditional (non ECU) engine and require GAS engine functionality. This enables control of configurable outputs for <i>Gas Choke and Gas Ignition</i> and instructs the module to follow the gas engine timers.</p> <p><i>Other Engines</i> : The list of supported CAN (or Modbus) engines is constantly updated, check the DSE website at www.deepseapl.com for the latest version of Configuration Suite software.</p>
Enhanced J1939	<p><input type="checkbox"/> = The module will read 'Basic' instrumentation from the engine ECU and display (where supported by the engine) :</p> <ul style="list-style-type: none"> • Engine Speed • Oil Pressure • Engine Coolant Temperature • Hours Run <p><input checked="" type="checkbox"/> = The module will read and display an 'Enhanced' instrumentation list (where supported by the engine) :</p> <ul style="list-style-type: none"> • Engine Speed • Oil Pressure • Engine Coolant Temperature • Hours Run • Engine Oil Temperature • Exhaust Temperature • Fuel Pressure • Total Fuel used • Fuel Consumption • Inlet Manifold Temperature • Coolant Pressure • Turbo Pressure <p>Where an instrument is not supported by the engine ECU, the instrument is not displayed.</p>
Alternative Engine Speed	<p><input type="checkbox"/> = The engine is instructed to run at its <i>Nominal Speed</i> as configured by the Engine Manufacturer.</p> <p><input checked="" type="checkbox"/> = The engine is instructed to run at its <i>Alternative Speed</i> as configured by the Engine Manufacturer.</p>
Modbus Engine Comms Port	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p> NOTE: This feature is available only on DSE7300 Series modules, V3.0 and above.</p> </div> <p><i>RS485 Port</i> : The modules RS485 port is used to communicate to the engine (when a Modbus engine type is selected).</p> <p><i>DSENet Port</i> : The modules DSENet port is used to communicate to the engine (when a Modbus engine type is selected. This 'frees' the RS485 port in case connection to BMS or other RS485 compatible equipment is required.</p>

4.3.2 DUAL MUTUAL STANDBY



NOTE: This feature is available only on DSE7210/7310 modules, V2.0 and above.

Application Options

Dual Mutual Standby	<p><i>Inactive</i> – The module operates as a standalone module</p> <p><i>Master</i> – The module operates as the Master in a Dual Mutual or Dual Mutual Standby system.</p> <p><i>Slave</i> – The module operates as the Slave in a Dual Mutual or Dual Mutual Standby system.</p>
Load Balancing Enable	<p><input type="checkbox"/> = No Load Balancing takes place. The master controller will always be 'master'.</p> <p><input checked="" type="checkbox"/> = Load Balancing is enabled. Based upon the configuration of the <i>load balancing time</i> of the 'master' controller, the engines will 'change over' at regular intervals.</p>
Load Balancing time	The 'master' controller will run for the period of the <i>Load Balancing Time</i> . After this time, the 'master' will call for the 'slave' to run for the same duration. If the slave is not available, the master will continue to run.

4.3.2.1 OPERATION

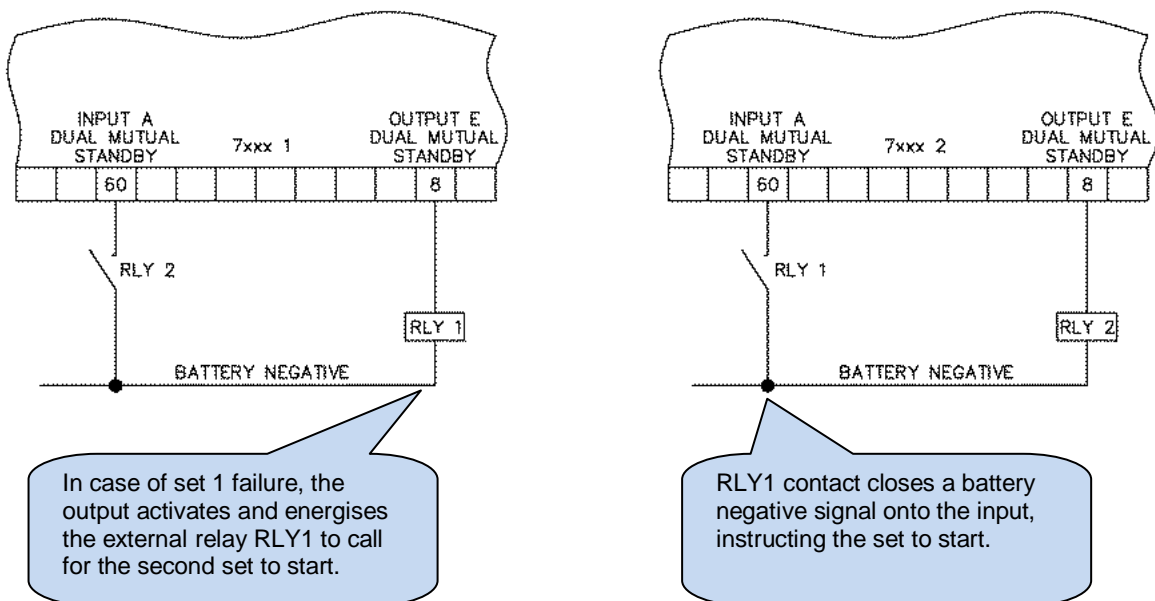
If no mains supply is available (DSE7x10) or the mains supply has failed then the module configured as *Master* will start the generator set to power the load.

If the *Master* module fails to start, or is unavailable due to maintenance, engine shutdown etc, the *Slave* module will start and take over from the *Master* to power the load.

This operation depends upon the correct interconnection of the modules as follows.

- Configure a digital output of each module to *Dual Mutual Standby*.
- Use this output to drive an external slave relay.
- This relay should be normally open and close a battery negative signal to a digital input on the *other* DSE module.
- This DSE module should be configured to *Dual Mutual Standby*.

4.3.2.2 TYPICAL WIRING DIAGRAM



4.3.3 AUTO VOLTAGE SENSING



NOTE: This feature is available only on DSE7300 Series modules, V2.0 and above.

Auto voltage sensing instructs the controller to monitor the generators output during the safety delay timer. During this time, the controller identifies the nominal voltage, frequency and topology of the alternator output and selects the most appropriate 'alternative configuration' to use.

This is particularly useful where a generator is switched from 50Hz/60Hz or 120V/240V for example.



NOTE: During the safety delay timer, the module factory set status page will display the L-N voltage, based upon the generator being 3 phase, 4 wire. This can lead to incorrect status display during the safety timer if Auto Voltage Sensing is enabled and the generator is not 3ph 4w. To prevent this, the status page can be customised to display other parameters if required (V2.2 modules or higher only). At the end of the safety timer, the correct voltages will be displayed.

Option	Description
Enable Auto Voltage Sensing	<input type="checkbox"/> = The module will operate as normal. <input checked="" type="checkbox"/> = <i>Auto voltage sensing</i> is enabled. During the safety delay timer, the module attempts to measure the system's nominal voltage and frequency and determine the topology of the alternator wiring. At the end of the safety timer, the main and alternative configurations are analysed to see which one is most appropriate to suit the connected system and the module continues to operate, using the most appropriate configuration to provide protection.

4.3.4 AUTO LOAD SENSING

Option	Description
Enable Auto Load Sensing	<input type="checkbox"/> = The module will operate as normal. <input checked="" type="checkbox"/> = <i>Auto load sensing</i> is enabled. When called to run off load, if a load was detected, the module will force the breaker close (if connected) and will enable 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(ir. In a manual breaker system).

4.3.5 DISABLE PROTECTIONS



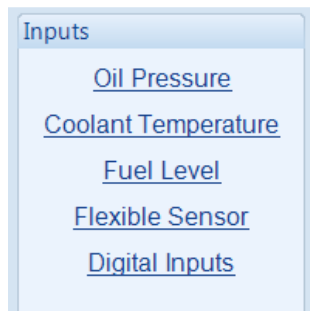
NOTE: This feature is available in module versions 4 and above.

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

Options	Description
Enable	<input type="checkbox"/> = The module will operate as normal and provide engine shutdown if required. <input checked="" type="checkbox"/> = <i>Protections disabled</i> function is activated. Operation depends upon the following configuration. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> 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. </div>
Disable All Protections	<i>Never</i> : The protections are not disabled <i>Always</i> : Protections are always overridden by the DSE controller. <i>On Input</i> : Protections are disabled whenever a configurable input set to <i>Protections Disabled</i> is activated
Protections Disabled Alarm Action	If <i>Disable All Protections</i> is set to <i>On Input</i> , this selection allows configuration of an alarm to highlight that the protections have been disabled on the engine. <i>Indication</i> : Any output or LCD display indicator configured to <i>Protections Disabled</i> will be made active; however the internal alarm sound will not operate. <i>Warning</i> : Any output or LCD display indicator configured to <i>Protections Disabled</i> will be made active, and the internal alarm sound will operate. When protections are disabled, <i>Protections Disabled</i> will appear on the module display to inform the operator of this status.

4.4 INPUTS

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



4.4.1 OIL PRESSURE

The 'Oil Pressure' configuration page is shown with several sections and callouts:

- Pressure Sensor**
 - Use Module to Measure Oil Pressure**: A checkbox that is currently unchecked.
 - Input Type**: A dropdown menu showing 'Not used'.
 - Edit...**: A button next to the 'Input Type' dropdown.
 - Oil pressure is read from the ECU (ECM)**: Text displayed when the 'Use Module' checkbox is checked.
- Sensor Open Circuit Alarm**
 - Enable Open Circuit Alarm**: A checkbox that is currently checked.
- Low Oil Pressure Alarms**
 - Shutdown**: A section with a checked checkbox and a 'Trip' value of 1.03 Bar (14.94 PSI, 103 kPa).
 - Pre-alarm**: A section with a checked checkbox and two 'Trip' values: 1.24 Bar (17.98 PSI, 124 kPa) and 1.38 Bar (20.01 PSI, 138 kPa).

Callouts provide additional instructions:

- Select the sensor type**: Points to the 'Input Type' dropdown.
- Click to edit the 'sensor curve'. See section entitled *Editing the sensor curve*.**: Points to the 'Edit...' button.
- Enable or disable the Open Circuit Alarm**: Points to the 'Enable Open Circuit Alarm' checkbox.
- Enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.**: Points to the checkboxes for the 'Shutdown' and 'Pre-alarm' sections.
- Type the value or click the up and down arrows to change the settings**: Points to the numerical input fields for the trip values.
- Click and drag to change the settings**: Points to the slider controls for the trip values.

4.4.2 COOLANT TEMPERATURE

Coolant Temperature

[Coolant Temperature Alarms](#)

[Coolant Temperature Control](#)

4.4.2.1 COOLANT TEMPERATURE ALARMS

The screenshot shows the 'Coolant Temperature Alarms' configuration window. It includes sections for 'Temperature Sensor', 'High Coolant Temperature Alarms', and 'Low Coolant Temperature Alarms'. Callouts provide instructions: 'Select the sensor type' points to the 'Input Type' dropdown; 'Click to edit the sensor curve' points to the 'Edit...' button; 'Enable or disable the alarms' points to the checkboxes for 'Shutdown', 'Electrical Trip', and 'Pre-alarm'; 'Type the value or click the up and down arrows to change the settings' points to the temperature input fields; and 'Click and drag to change the settings' points to the sliders.

Coolant Temperature Alarms

Temperature Sensor

Use Module to Measure Coolant Temperature ☐

Input Type: Not used

High Coolant Temperature Alarms

Shutdown ☐ Trip: 96 °C 205 °F

Electrical Trip ☐ Trip: 95 °C

Pre-alarm ☒ Trip: 90 °C 194 °F
Return: 88 °C 190 °F

Low Coolant Temperature Alarms

Pre-alarm ☐ Return: 75 °C 167 °F
Trip: 70 °C 158 °F

Callouts:

- Select the sensor type
- Click to edit the 'sensor curve'. See section entitled *Editing the sensor curve*.
- Enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.
- Type the value or click the up and down arrows to change the settings
- Click and drag to change the settings

Options	Description
Pre alarm	<input type="checkbox"/> = Pre-alarm is disabled <input checked="" type="checkbox"/> = If the temperature exceeds the <i>trip</i> setting, an alarm is generated. The temperature must fall below the <i>return</i> setting to cease the alarm.
Electrical Trip Version 5.x.x or later	<input type="checkbox"/> = Electrical trip is disabled <input checked="" type="checkbox"/> = If the temperature exceeds the <i>trip</i> setting, an alarm is generated, the load switch is opened and the module enters the cooling timer after which the set is stopped.
Shutdown	If the temperature exceeds the <i>trip</i> setting, an alarm is generated, the load switch is opened and the set is immediately stopped.

4.4.2.2 COOLANT TEMPERATURE CONTROL



NOTE: This feature is available only on DSE72/7300 Series modules, V2.0.0 and above.

The Coolant temperature control settings provide for control of coolant heaters / coolers using the Coolant Temperature Sensor as the control input.

Outputs should be configured to *Coolant Cooler Control* and/or *Coolant Heater Control* to achieve this.

The screenshot shows the 'Coolant Temperature Control' configuration window. It contains three main sections: 'Coolant Heater Control', 'Coolant Cooler Control', and 'Fan Control'. Callouts provide the following information:

- Coolant Heater Control:**
 - Enable:** A checkbox to enable or disable the heater control.
 - On:** A temperature setting (50 °C) with up/down arrows. A callout says: 'Type the value or click the up and down arrows to change the settings'.
 - Off:** A temperature setting (55 °C) with up/down arrows. A callout says: 'Enable or disable the alarms. The relevant values below will appear greyed out if the alarm is disabled.'
- Coolant Cooler Control:**
 - Enable:** A checkbox to enable or disable the cooler control.
 - On:** A temperature setting (75 °C) with up/down arrows.
 - Off:** A temperature setting (70 °C) with up/down arrows.
 - Disable when set not available:** A checkbox.
 - A callout points to the temperature sliders: 'Click and drag to change the settings'.
- Fan Control:**
 - Fan Overrun Delay:** A time setting (0s) with a slider. A callout says: 'Click and drag to change the settings'.

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

4.4.3 FUEL LEVEL

Select the sensor type

Click to edit the 'sensor curve'. See section entitled *Editing the sensor curve*.

Click and drag to alter the time delay

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

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

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

Click and drag to change the settings

Hint : Set an output to "Fuel pump control". This can be used to transfer fuel from a bulk tank to the daytank, for example.

SMS logging of Fuel monitoring.

Input Type

Not used [Edit...](#)

Low Fuel Level Alarm

Enable ☐

Action Warning

Warning 10 %

Delay 0s

Fuel Pump Control

Enable ☐

On 25 %

Off 75 %

Fuel Monitoring

Fuel Tank Size 1000 Litres

Logging Interval 1m

Dial Out On Logging ☐

SMS enabled ☒

SMS interval every 1 logs

Stable Timer 0.5s

Change Indicating Filling 1 %

Change Indicating Stable 1 %

Fuel Usage Alarm

Enable ☐

Action Warning Always Latched

Running Rate 10 % / Hr

Stopped Rate 10 % / Hr

Fuel level options	
Fuel Pump Control	If enabled, allows the module to control an external fuel pump to transfer fuel from a bulk tank to the generator set's day tank.
Fuel Usage Alarm	Provides an alarm to monitor the usage of the generator set's fuel. There are two settings, one to monitor fuel usage when the set is running and another to monitor the fuel usage when the set is stopped. These alarms are provided to check for fuel leakage problems or potential fuel theft.

4.4.4 FLEXIBLE SENSOR

The screenshot shows the 'Flexible Sensor' configuration window. It is divided into several sections: 'Sensor Description', 'Input Type', and 'Sensor Alarms'. The 'Sensor Description' section has a 'Sensor Type' dropdown set to 'Temperature Sensor' and a 'Sensor Name' text box containing 'Flexible Sensor'. The 'Input Type' section has a dropdown set to 'Doosan sensor' and an 'Edit...' button. The 'Sensor Alarms' section is divided into 'Low Alarm', 'Low Pre-alarm', 'High Pre-alarm', and 'High Alarm' sections. Each section has checkboxes for enabling/disabling, dropdowns for actions (e.g., 'Shutdown'), and numerical trip values with up/down arrows and sliders. The 'Low Alarms String' is set to 'Flexible Sensor Low' and the 'High Alarms String' is set to 'Flexible Sensor High'. Callouts provide instructions on how to interact with these elements.

Select the sensor type

Click to edit the 'sensor curve'. See section entitled *Editing the sensor curve*.

Version 5.x.x or later
Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.

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

Click and drag to change the settings

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

Type the text you want to appear on the screen when the alarm is triggered.

4.4.5 EDITING THE SENSOR CURVES

While the *configuration suite* holds sensor specification for the most commonly used resistive sensors, occasionally it is required that the 72/7300 Series module be connected to a sensor not listed by the *configuration suite*. To aid this process, a sensor editor has been provided. Deleting custom sensor curves that have been added is performed in the main menu, select *Tools / Curve Manager*.

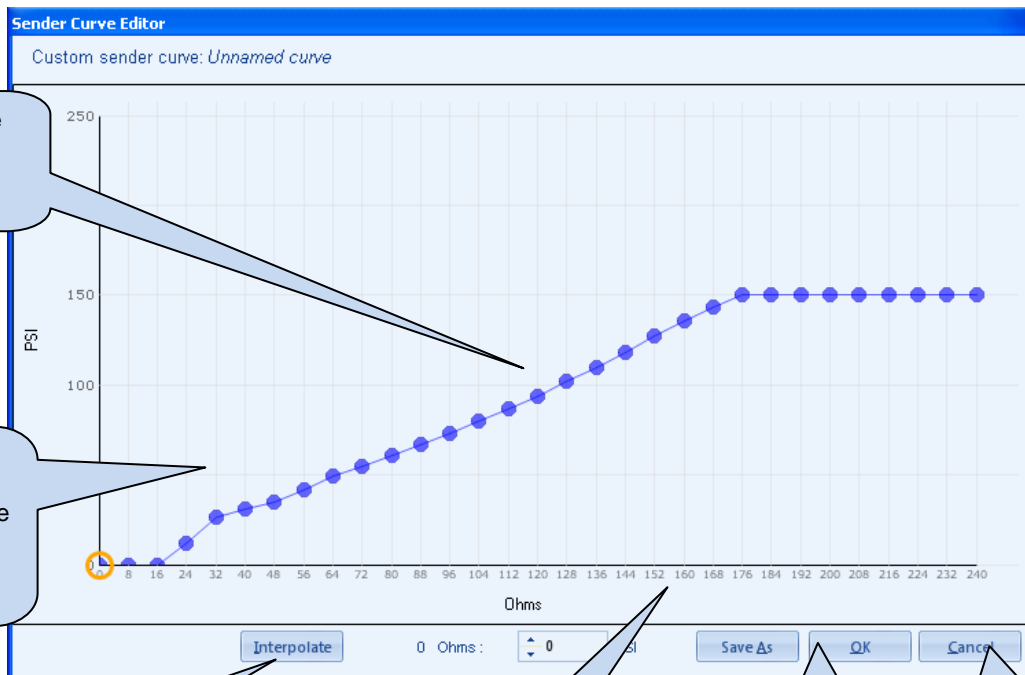
In this example, the closest match to the sensor in use is the VDO 10-180Ω fuel level sensor.

Input Type

VDO Ohm range (10-180)

Edit...

Click to edit the 'sensor curve'.



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

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

Click to draw a straight line (interpolate) between two points on the curve.

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

Click CANCEL to ignore and lose any changes you have made

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

New Curve Name

Specify name for custom curve

OK Cancel

Click OK to save the curve.

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

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

4.4.6 DIGITAL INPUTS

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

Digital Inputs

[Digital Inputs A - C](#)

[Digital Inputs D - F](#)

[Digital Inputs G - H](#)

Digital Input A

Function: Remote Start on Load

Polarity: Close to Activate

Action: [Greyed Out]

Arming: [Greyed Out]

LCD Display: [Greyed Out]

Activation Delay: 0s

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

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

Digital Input B

Function: User Configured

Polarity: Close to Activate

Action: Shutdown

Arming: Always

LCD Display: Sample Text

Activation Delay: 2s

Example of a user configured input

Close or open to activate

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

Click and drag to change the setting. This is used to give a delay on acceptance of the input. Useful for liquid level switches or to mask short term operations of the external switch device.

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

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


4.4.7 DIGITAL INPUT FUNCTIONS



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





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




= Only applicable to DSE7220 / DSE7320 AMF Modules

Function	Description
Not Used	The input is not used and no action is taken
Alarm Mute	This input is used to silence the audible alarm from an external source, such as a remote mute switch.
Alarm Reset	This input is used to reset any latched alarms from a remote location. It is also used to clear any latched warnings which may have occurred (if configured) without having to stop the generator.
Alt Config 1-3 Select DSE7300 Series V2.0.0 or above only	These inputs are used to instruct the DSE7300 Series module to follow one of the <i>alternative</i> configuration settings instead of the <i>main</i> configuration settings.
Auto Restore Inhibit IEEE 37.2 - 3 checking or interlocking relay	In the event of a remote start/mains failure, the generator will be instructed to start and take load. On removal of the remote start signal/mains return the module will continue to run the generator on load until the <i>Auto Restore Inhibit</i> input is removed. This input allows the controller to be fitted as part of a system where the restoration to mains is controlled remotely or by an automated system.
Auto start Inhibit IEEE 37.2 - 3 checking or interlocking relay	This input is used to provide an over-ride function to prevent the controller from starting the generator in the event of a remote start/mains out of limits condition occurring. If this input is active and a remote start signal/mains failure occurs the module will not give a start command to the generator. If this input signal is then removed, the controller will operate as if a remote start/mains failure has occurred, starting and loading the generator. This function can be used to give an ‘AND’ function so that a generator will only be called to start if the mains fails and another condition exists which requires the generator to run. If the ‘Auto start Inhibit’ signal becomes active once more it will be ignored until the module has returned the mains supply on load and shutdown. This input does not prevent starting of the engine in MANUAL or TEST modes.
Auxiliary Mains Fail 	The module will monitor the incoming single or three phase supply for Over voltage, Under Voltage, Over Frequency or Under frequency. It may be required to monitor a different mains supply or some aspect of the incoming mains not monitored by the controller. If the devices providing this additional monitoring are connected to operate this input, the controller will operate as if the incoming mains supply has fallen outside of limits, the generator will be instructed to start and take the load. Removal of the input signal will cause the module to act if the mains has returned to within limits providing that the mains sensing also indicates that the mains is within limits.
Coolant Temperature switch	This input is used to give a <i>Coolant Temperature High</i> shutdown from a digital normally open or closed switch. It allows coolant temperature protection using the switch and the analogue input can be used in parallel to give protection or configured to be used for indication only.
Disable Protections	The system designer provides this switch (not DSE) so its location will vary depending upon manufacturer, however it normally takes the form of a key operated switch to prevent inadvertent activation. Depending upon configuration, a warning alarm may be generated when the switch is operated. When active, and the module is suitably configured (see section entitled ‘Application’) this prevents the engine being stopped upon critical alarm (Sometimes called War Mode or Run to Destruction)

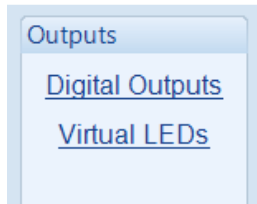
Function	Description
DPF Auto Regen Inhibit	This input is used to override the ECU function and prevent the automatic regeneration of the diesel particulate filter
DPF Force Regeneration	This input is used to override the ECU function and activate the regeneration of the diesel particulate filter
DPF Regeneration Interlock	This input is used to stop a manual regeneration from occurring
Droop enable	This input is used to switch the engine into droop mode on CAN engines that support this function.
Dual Mutual Standby DSE7210/7310 Series V2.0.0 or above only	This input provides interface to another DSE7210/7310 Series module to achieve Dual Mutual or Dual Mutual Standby functionality. This is described fully in the section entitled <i>Module</i> elsewhere in this manual.
EJP1 DSE72/7300 Series V2.0.0 or above only	For the French EJP (Effacement Jours de Pointe) tariff system. This input is functionally identical to <i>Remote Start Off Load</i> . If this input is active, operation will be similar to the 'Remote Start on load' function except that the generator will not be instructed to take the load. This function can be used where an engine only run is required e.g. for exercise.
EJP2 DSE72/7300 Series V2.0.0 or above only	For the French EJP (Effacement Jours de Pointe) tariff system. This input is functionally identical to <i>Remote Start On Load</i> . When in auto mode, the module will perform the start sequence and transfer load to the generator. If in Manual mode, the load will be transferred to the generator if the engine is already running, however in manual mode, this input will not generate start/stop requests of the engine.
External Panel Lock	This input is used to provide security to the installation. If the External Panel lock input is active, the module will not respond to operation of the Mode select or start buttons. This allows the module to be placed into a specific mode (such as Auto) and then secured. The operation of the module is not affected and the operator will still be able to view the various instrumentation pages etc. (<i>Front panel configuration access is still possible while the system lock is active</i>). <div style="border: 1px solid black; padding: 5px;"> NOTE: External control sources (i.e. Simulate Start Button) are not affected by the external panel lock input and will continue to operate normally.</div>
Fuel Usage Alarm	Becomes active when the amount of fuel used over a set time period exceeds the set value.
Generator Closed Auxiliary IEEE 37.2 - 3 Checking or interlocking relay	This input is used to provide feedback to allow the 7xxx to give true indication of the contactor or circuit breaker switching status. It should be connected to the generator load switching device auxiliary contact. Action: Warning (<i>Alarm only, No shutdown</i>)
Generator Load Inhibit IEEE 37.2 - 52 AC circuit breaker	This input is used to prevent the 7xxx from loading the generator. If the generator is already on load, activating this input will cause the 7xxx to unload the generator. Removing the input will allow the generator to be loaded again. <div style="border: 1px solid black; padding: 5px;"> NOTE: This input only operates to control the generator-switching device if the 7xxx load switching logic is attempting to load the generator. It will not control the generator-switching device when the mains supply is on load.</div>
Inhibit scheduled run IEEE 37.2 - 3 checking or interlocking relay	This input is used to provide a means of disabling a scheduled run.
Inhibit SMS remote start	This input is used to provide a means of disabling remote starts by SMS

Function	Description
Lamp Test	This input is used to provide a test facility for the front panel indicators fitted to the 7xxx module. When the input is activated all LED's should illuminate.
Low Fuel level switch	This input is used to allow feedback for low fuel level
Main Config Select DSE7300 Series V2.0.0 or above only	This input is used to select the <i>Main</i> configuration when <i>Alternative</i> configurations are enabled.
Mains closed Auxiliary IEEE 37.2 - 3 Checking or interlocking relay 	This input is used to provide feedback to allow the 7x20 to give true indication of the contactor or circuit breaker switching status. It should be connected to the mains load switching device auxiliary contact. Incorrect application of this signal does not trigger an alarm condition, it is used solely for indication of the breaker status.
Mains Load Inhibit IEEE 37.2 - 3 checking or interlocking relay 	<p>This input is used to prevent the 7x20 from loading the mains supply. If the mains supply is already on load activating this input will cause the 7x20 to unload the mains supply. Removing the input will allow the mains to be loaded again.</p> <div style="border: 1px solid black; padding: 5px;"> <p>⚠ NOTE: This input only operates to control the mains switching device if the 7x20 load switching logic is attempting to load the mains. It will <u>not</u> control the mains switching device when the generator is on load.</p> </div>
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 <i>Auto mode</i> while the input is present. Typically, a key switch provides this input with <i>spring return to closed</i> functionality.
Oil Pressure Switch	A digital normally open or closed oil pressure switch gives this input. It allows oil pressure protection using the switch and the analogue input to be used in parallel to give protection or to be used for oil pressure indication only.
Remote Start off load	If this input is active, operation will be similar to the 'Remote Start on load' function except that the generator will not be instructed to take the load. This function can be used where an engine only run is required e.g. for exercise.
Remote Start on load	When in auto mode, the module will perform the start sequence and transfer load to the generator. In Manual mode, the load will be transferred to the generator if the engine is already running, however in manual mode, this input will not generate start/stop requests of the engine.
Reset Maintenance Alarm 1,2,3	On activation of this input the maintenance alarm will be reset.
Simulate Auto Button	<div style="border: 1px solid black; padding: 5px;"> <p>⚠ NOTE: If a call to start is present when AUTO MODE is entered, the starting sequence will begin. Call to Start can come from a number of sources depending upon module type and configuration and includes (but is not limited to) : Remote start input present, Mains failure, Scheduled run, Auxiliary mains failure input present, Telemetry start signal from remote locations.</p> </div> <p>This input mimics the operation of the 'Auto' button and is used to provide a remotely located Auto mode push button.</p>
Simulate Lamp Test Button	This input is used to provide a test facility for the front panel indicators fitted to the module. When the input is activated all LED's should illuminate. The input also serves a second function, in that it also provides a mute signal to silence the audible alarm. The input is recognised by the module as though it was the Push button on the module itself being operated.
Simulate Mains Available 	This function is provided to override the module's internal monitoring function. If this input is active, the module will not respond to the state of the incoming AC mains supply.

Function	Description
Simulate Manual Button	This input mimic's the operation of the 'Manual' button and is used to provide a remotely located Manual mode push button.
Simulate Start Button	This input mimic's the operation of the 'Start' button and is used to provide a remotely located start push button.
Simulate Stop Button	This input mimic's the operation of the 'Stop' button and is used to provide a remotely located stop/reset push button.
Simulate Test On Load Button 	This input mimics the operation of the 'Test' button and is used to provide a remotely located Test on load mode push button.
Smoke Limiting IEEE 37.2 – 18 accelerating or decelerating device	This input instructs the module to give a <i>run at idle speed</i> command to the engine either via an output configured to <i>smoke limit</i> or by data commands when used with supported electronic engines.
Start in Manual Mode DSE7300 Series V9.0.0 or above only	Combined function input that instructs the module to enter MANUAL MODE and also perform the <i>START</i> function. Once the input is active, the module will be placed into manual mode and the generator will start.
Stop and Panel Lock DSE7300 Series V2.0.0 or above only	Combined function input that instructs the module to enter STOP MODE and also perform the <i>Panel Lock</i> function. Once the input is active, the module will not respond to operation of the Mode select or start buttons. The operator will still be able to view the various instrumentation pages etc. (<i>Front panel configuration access is still possible while the system lock is active</i>).
Transfer to Mains/ Open Generator IEEE 37.2 - 52 AC circuit breaker	This input is used to transfer the load to the mains supply (AMF module) when running in MANUAL MODE or provide the 'Open Generator' signal in a non AMF Module.)
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

4.5 OUTPUTS

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



4.5.1 DIGITAL OUTPUTS

The screenshot displays the 'Digital Outputs' configuration page, which is divided into three main sections: 'Outputs (Supplied from Emergency Stop Input)', 'Relay Outputs (DC Supply Free)', and 'Relay Outputs (DC Supply Out)'. Each section contains a table with 'Source' and 'Polarity' columns. Callouts provide additional context:

- Top Callout:** "These are greyed out as they are fixed, not adjustable unless a CAN engine has been selected" (pointing to greyed-out options in the first section).
- Left Callout 1:** "Select what the output is to be used to control" (pointing to the 'Source' dropdown in the first section).
- Left Callout 2:** "These labels match the typical wiring diagram" (pointing to the output labels 'Output B', 'Output C (N/C)', and 'Output D' on the left).
- Right Callout 1:** "Select if the relay is to energise or de-energise upon activation of the source" (pointing to the 'Polarity' dropdown in the second section).
- Right Callout 2:** "Output sources are sorted into groups." (pointing to a search dropdown menu on the right that lists various system components like 'Air Filter', 'Cooler Control', etc., grouped under categories like 'ECU', 'Genset', 'Load switching', and 'Misc').
- Bottom Callout:** "For faster function selection, type and search for specific words, i.e. type 'speed' all items including these letters are listed (underspeed, overspeed etc)" (pointing to the search input field at the bottom).

4.5.2 VIRTUAL LEDS

Virtual LEDs

LED Configuration

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

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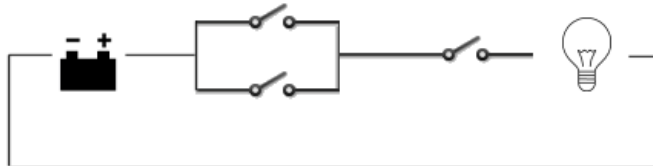
Allows configuration of 'status' items. These items are not available for viewing on the module itself but can be seen in the SCADA section of the PC software, or read by third party systems (ie BMS or PLCs) using the Modbus protocol.

4.5.3 CONTROL LOGIC

NOTE: This feature is NOT available only on DSE72/7300 Series modules V7 or later. It has been superseded (replaced) by PLC Logic detailed elsewhere in this document.

Allows additional flexibility of output configuration by combining sources to create a new one. Three User Defined Controls are available that can be selected in the output source list for LEDs, Relay outputs or virtual LEDs.

Imagine the schematic like a simple circuit with a battery and a bulb.



There are two switches (*Output sources*) in parallel to provide an **OR** function and one switch (*Output source*) in series to provide an **AND** function.

When the conditions are satisfied, the bulb will illuminate (The *User Defined Control* will activate).

Control blocks are processed in order (block 1, block 2 then block 3). This sequence repeats every 100mS. Careless setting of a control logic block can cause toggling of an output at a rate of 100mS on/off. This may shorten the life and/or cause damage to externally connected slave relays or other connected equipment.

4.5.3.1 EXAMPLE USING BOTH OR & AND FUNCTIONS

User Defined Control 1

Description:

Battery High Voltage

Active

Auto Mode

Active

Battery Low Voltage

Active

An output configured to *User Defined Control 1* will activate when the module is in *Auto Mode* **AND** when either *Battery High Voltage* **OR** *Battery Low Voltage* alarms are active

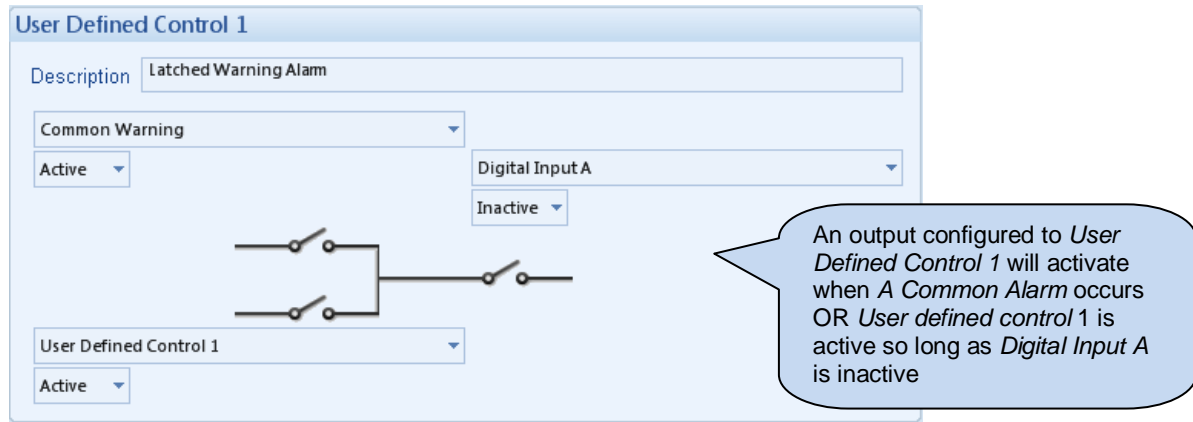
Detailed description

IF (*Battery High Voltage* alarm is active **OR** the *Battery Low Voltage* alarm is active) **AND** the module is in *Auto Mode* **THEN** the *User Defined Control 1* is activated. Any output or LCD indicator configured to *User Defined Control 1* will operate.

4.5.3.2 EXAMPLE OF A LATCHED OUTPUT

This example can only be achieved with module versions 5.x.x or higher. Module's before V5.x.x will not allow the selection of *User Defined Control* as an input into the logic.

This uses a 'loop around' to create a latched output, reset when Digital Input A is activated.

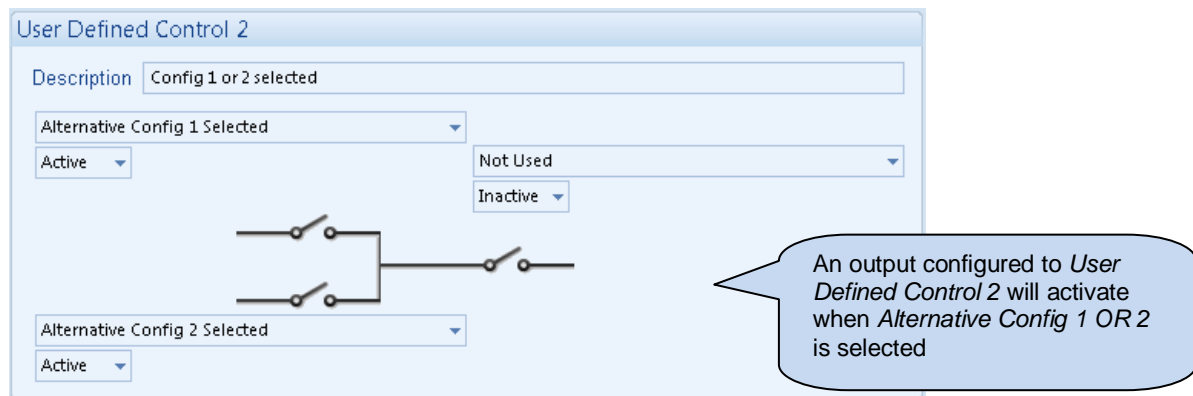


Detailed description

A warning alarm will cause User Defined Control 1 to become active if Digital Input A is not active. Subsequent resetting of the common warning (warning alarms are self resetting) will keep User Defined Control 1 active due to the 'loop around'. The latch is reset by activating Digital Input A momentarily.

4.5.3.3 EXAMPLE USING OR FUNCTIONS ONLY

The **AND** function must be permanently active to use only the **OR** function. This is achieved by setting the **AND** condition to *Not Used, Inactive*.



Detailed description

IF Alternative config 1 is selected **OR** Alternative config 2 is selected **THEN** the User Defined Control 2 is activated. Any output or LCD indicator configured to User Defined Control 2 will operate.

4.5.3.4 EXAMPLE USING AND FUNCTION ONLY

To use the **AND** function only, set either one of the **OR** functions to *Not used*, *Active* so that it will be permanently open.

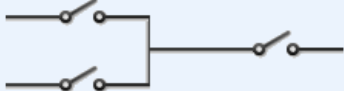
User Defined Control 3

Description: Panel doors closed

Digital Input A: Active

Digital Input B: Active

Not Used: Active



An output configured to User Defined Control 3 will activate when Digital Input A AND B is selected

Detailed description

IF Digital Input A is active **AND** Digital Input B is active, **THEN** the User Defined Control 2 is activated. Any output or LCD indicator configured to User Defined Control 2 will operate.

4.5.4 OUTPUT SOURCES

The list of output sources available for configuration of the module relay outputs also applies to the LED configuration and expansion relay outputs (7300 series only).




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

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



= Only available on DSE7220 / DSE7320 AMF Modules


Output source	Activates...	Is not active....
Not Used	The output will 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 73xx V8 or above only	Active when the Alarm mute input is active	
Alarm reset 73xx V8 or above only	Active when the Alarm reset input is active	
Alternative Config 1 (2 or 3) selected 73xx V8 or above only	Active when Alternative configuration is used 3 separate outputs for 3 inputs	
Arm Safety On Alarms	Becomes active at the end of the <i>safety delay</i> timer whereupon all alarms configured to 'From Safety On' become active	Inactive when : <ul style="list-style-type: none"> When the set is at rest In the starting sequence before the Safety Delay timer has expired
Audible Alarm IEEE 37.2 – 74 alarm relay	This output indicates that the internal sounder is operating to allow it to feed an external sounder. Operation of the Mute pushbutton will reset this output once activated.	Inactive if the internal sounder is not operating.
Auto restore inhibit 73xx V8 or above only	Active when the Auto start inhibit input is active	
Auto start inhibit 73xx V8 or above only	Active when the Auxiliary mains fail input is active	
Auxiliary mains fail 73xx V8 or above only	Active when the Coolant temperature switch input is active	
Battery High Voltage IEEE 37.2 – 59DC overvoltage relay	This output indicates that a Battery High voltage alarm has occurred.	Inactive when battery voltage is not High
Battery Low Voltage IEEE 37.2 – 27DC undervoltage relay	This output indicates that a Battery Low Voltage alarm has occurred.	Inactive when battery voltage is not Low
Calling For Scheduled Run	Active during a <i>Scheduled Run</i> request from the inbuilt <i>Scheduler</i> .	



Output source	Activates...	Is not active...
CAN ECU Data Fail	Becomes active when no CAN data is received from the ECU after the safety delay timer has expired	Inactive when: <ul style="list-style-type: none"> CAN data is being received The set is at rest During the starting sequence before the safety delay timer has expired
CAN ECU Power	Used to switch an external relay to power the CAN ECU. Exact timing of this output is dependent upon the type of the engine ECU	
CAN ECU Shutdown	The engine ECU has indicated that a Shutdown alarm is present.	Inactive when no Shutdown alarm from the ECU is present
CAN ECU Stop	Active when the DSE controller is requesting that the CAN ECU stops the engine.	
CAN ECU Warning	The engine ECU has indicated that a Warning alarm is present.	Inactive when no Warning alarm from the ECU is present
Charge Alternator Failure (Shutdown or warning)	Indicates that there is a charging fault with the auxiliary charging alternator	<ul style="list-style-type: none"> When the set is at rest During the starting sequence before the safety delay timer has expired
Close Generator Output IEEE 37.2 – 52 ac circuit breaker	Used to control the load switching device. Whenever the 7xxx module selects the generator to be on load this control source will be active.	Inactive whenever the generator is not required to be on load
Close Generator Output Pulse IEEE 37.2 – 52 ac circuit breaker	Used to control the load switching device. Whenever the 7xxx module selects the generator to be on load this control source will be active for the duration of the Breaker Close Pulse timer, after which it will become inactive again.	
Close Mains Output IEEE 37.2 – 52 ac circuit breaker 	Used to control the load switching device. Whenever the 7xxx module selects the mains to be on load this control source will be active.	The output is inactive whenever the mains is not required to be on load
Close Mains Output Pulse IEEE 37.2 – 52 ac circuit breaker 	Used to control the load switching device. Whenever the 7xxx module selects the mains to be on load this control source will be active for the duration of the Breaker Close Pulse timer, after which it will become inactive again.	
Combined Mains Failure 	Active when the mains supply is out of limits OR the input for Auxiliary Mains Failure is active	
Combined Maintenance Alarm	Indicates that one of the maintenance alarms is active	
Combined Under and Over Frequency Alarm	Active when the generator is shutdown due to either under OR overfrequency	
Combined Under and Over Frequency Warning	Active when the generator alarm for either under OR overfrequency is active	
Combined Under and Over Voltage Alarm	Active when the generator is shutdown due to either under OR overvoltage	
Combined Under and Over Voltage Warning	Active when the generator alarm for either under OR overvoltage is active	
Common Alarm	Active when one or more alarms (of any type) are active	The output is inactive when no alarms are present
Common Electrical Trip	Active when one or more <i>Electrical trip</i> alarms are active	The output is inactive when no electrical alarms are present
Common Shutdown	Active when one or more <i>Shutdown</i> alarms are active	The output is inactive when no shutdown alarms are present
Common Warning	Active when one or more <i>Warning</i> alarms are active	The output is inactive when no warning alarms are present
Coolant Cooler Control DSE72/7300 V2.0.0 or above only	Activated by the Coolant Cooler Control in conjunction with the Coolant Temperature Sensor.	
Coolant Heater Control DSE72/7300 V2.0.0 or above only	Activated by the Coolant Heater Control in conjunction with the Coolant Temperature Sensor.	
Coolant Temperature High Shutdown	Active when the <i>Coolant Temperature</i> exceeds the <i>High Coolant Temperature Shutdown</i> setting	
Coolant Temperature High Warning	Active when the <i>Coolant Temperature</i> exceeds the <i>High Coolant Temperature Warning</i> setting	

Output source	Activates...	Is not active....
Coolant Temperature Low	Active when the <i>Coolant Temperature</i> falls below the <i>Low Coolant Temperature alarm</i> setting	
Coolant Temperature Switch 73xx V8 or above only	Active when the Coolant input is active	
Cooling Down	Active when the Cooling timer is in progress	The output is inactive at all other times
DEF Level Low 73xx V14 or above only	Active when <i>DEF Level Low</i> CAN alarm is active	
Digital Input A - H	Active when the digital input is active	Inactive when : <ul style="list-style-type: none"> If the input is not active If the input is active but conditioned by <i>activation delay</i>, <i>safety timer</i> or <i>Arming</i> requirements.
Display Heater Fitted and ON	Active when the internal LCD heater is switched on	
DPF Forced Regeneration Requested	Active when the DPF Regeneration function is overridden by the digital input "DPF Force Regeneration"	
DPF Non Mission State	Active when the DPF Non Mission Regeneration is active	
DPF Regeneration in Progress	Active when the DPF Regeneration is active	
DPF Regeneration Interlock Active	Active when the DPF Regeneration Interlock is active	
DPTC Filter	Active when the Diesel Particulate Filter CAN alarm is active	
Droop Enable	Becomes active when an input configured to <i>Droop enable</i> is active or if <i>Droop Enable</i> has been activated in the module configuration (CAN engine only)	
Dummy Load Control (1-5)	Becomes active when the engine kW falls below the Dummy Load Control Trip Setting.	Inactive when the engine kW returns to above the Dummy Load Control Return setting.
Dual Mutual Input	Active when the digital input configured to <i>Dual Mutual Standby</i> is active	
Dual Mutual Standby DSE7210/7310 V2.0.0 or above only	This output provides interface to another DSE7210/7310 modules to achieve Dual Mutual or Dual Mutual Standby functionality. This is described fully in the section entitled Module elsewhere in this manual.	
Earth Fault Trip Alarm DSE7300 V2.0.0 or above only	Indicates that an earth fault alarm is active.	
EJP1 / EJP2	Indicates that an input configured to EJP1 or EJP2 is active	
Emergency Stop	Active when the Emergency Stop input has been activated	
Energise to Stop	Normally used to control an <i>Energise to Stop</i> solenoid, this output becomes active when the controller wants the set to stop running.	Becomes inactive a configurable amount of time after the set has stopped. This is the <i>ETS hold time</i> .
Engine Over Speed Shutdown <i>IEEE 37.2 – 12 overspeed device</i>	Active if the engine speed exceeds the <i>Over Speed Shutdown</i> setting	
Engine Over Speed Warning <i>IEEE 37.2 – 12 overspeed device</i>	Active if the engine speed exceeds the <i>Over Speed Warning</i> setting	
Engine Under Speed Shutdown <i>IEEE 37.2 - 14 underspeed relay</i>	Active when the engine speed falls below the <i>Underspeed Shutdown</i> setting	
Engine Under Speed Warning <i>IEEE 37.2 - 14 underspeed relay</i>	Active when the engine speed falls below the <i>Underspeed Warning</i> setting	
External Panel Lock 73xx V8 or above only	Active when the external panel lock input is active	External Panel Lock 73xx ver 8.0+
Fail To Close Generator	Active when the digital input <i>Gen Closed Auxiliary</i> does not activate after the <i>Close Gen Output</i> becomes active within the configured <i>Generator Fail to Close Delay</i>	
Fail to Start	Becomes active if the set is not seen to be running after the configurable number of start attempts.	
Fail to Stop (come to rest)	If the set is still running a configurable amount of time after it has been given the stop command, the output will become active. This is the <i>Fail to stop</i> timer.	



Output source	Activates...	Is not active...
Fan Control	Energises when the engine becomes available (up to speed and volts). This output is designed to control an external cooling fan. When the engine stops, the cooling fan will remain running for the duration of the Fan Overrun Delay.	
Flexible Sensor Active 73xx V8 or above only	Active when the <i>Flexible Sensor</i> , configured as digital input, becomes active	
Flexible Sensor High Shutdown	Active when the <i>Flexible Sensor High Shutdown</i> alarm is active	
Flexible Sensor High Warning	Active when the <i>Flexible Sensor High Warning</i> alarm is active	
Flexible Sensor Low Shutdown	Active when the <i>Flexible Sensor Low Shutdown</i> alarm is active	
Flexible Sensor Low Warning	Active when the <i>Flexible Sensor Low Warning</i> alarm is active	
Fuel Level Low IEEE 37.2 – 71 level switch	Active when the Fuel Level falls below the <i>Fuel Level Low</i> setting	
Fuel Pump Control IEEE 37.2 – 71 level switch	Becomes active when the <i>Fuel level</i> falls below the <i>Fuel Pump Control ON</i> setting and is normally used to transfer fuel from the bulk tank to the day tank.	If the output is already active it will become inactive when the <i>Fuel level</i> is above the <i>Fuel Pump Control OFF</i> settings.
Fuel Relay	Becomes active when the controller requires the governor/fuel system to be active.	Becomes inactive whenever the set should be stopped, including between crank attempts, upon controlled stops and upon fault shutdowns.
Fuel Usage Alarm	Active when the <i>Fuel Usage Alarm</i> 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 <i>fuel relay</i> becomes inactive. This is the <i>Gas ignition off</i> timer.
Gen Loading Frequency Not Reached	Active when the generator frequency has not reached the configured <i>Loading Frequency</i> during the starting process.	
Gen Loading Voltage Not Reached	Active when the generator voltage has not reached the configured <i>Loading Voltage</i> during the starting process.	
Gen Over Frequency Overshoot Alarm	Active when the <i>Frequency Overshoot Alarm</i> is active	
Gen Over Frequency Overshoot Warning	Active when the <i>Frequency Overshoot Warning</i> is active	
Gen Combined Under and Over Frequency Shutdown IEEE 37.2 - 81 frequency relay	Active when either an under frequency or over frequency shutdown has been activated.	The output is inactive when the generator supply is healthy
Gen Combined Under and Over Frequency Warning IEEE 37.2 - 81 frequency relay	Active when either a generator under frequency or over frequency warning has been activated.	The output is inactive when the generator supply is healthy
Gen Combined Under and Over Voltage Shutdown IEEE 37.2 – 27AC undervoltage relay IEEE 37.2 – 59AC overvoltage relay	Active when either a generator under voltage or over voltage shutdown has been activated.	The output is inactive when the generator supply is healthy
Gen Combined Under and Over Voltage Warning IEEE 37.2 – 27AC undervoltage relay IEEE 37.2 – 59AC overvoltage relay	Active when either a generator under voltage or over voltage warning has been activated.	The output is inactive when the generator supply is healthy
Gen Over Current IDMTAlarm IEEE 37.2 – 51 ac time overcurrent relay	Active when an overcurrent condition has caused the <i>Overcurrent IDMT</i> alarm to trigger	
Gen Over Current Immediate Warning IEEE 37.2 – 50 instantaneous overcurrent relay	Active when an overcurrent condition exceeds the <i>Overcurrent alarm Trip</i> setting. At the same time, the controller begins following the <i>IDMT curve</i> . If the overload condition exists for an excess time, the <i>Overcurrent IDMT</i> alarm will activate.	

Output source	Activates...	Is not active....
Generator Available	Becomes active when the generator is available to take load.	Inactive when <ul style="list-style-type: none"> Loading voltage and loading frequency have not been reached After <i>electrical trip</i> alarm During the starting sequence before the end of the warming timer.
Generator Closed Aux	Active when the <i>Generator closed auxiliary</i> input is active	
Generator Earth Fault	Active when the <i>Generator earth fault</i> alarm has been triggered by excess earth current.	
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 Volts Shutdown	Active when the generator voltage exceeds the <i>High Voltage Shutdown</i> setting	
Generator Load Inhibit 73xx V8 or above only	Active when the <i>Generator Load Inhibit</i> input is active	
Generator Low Voltage Shutdown/Electrical Trip	Active when the generator voltage falls below the <i>Low Voltage Alarm Trip</i> level	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Generator Low Voltage Warning	Active when the generator voltage falls below the <i>Low Voltage Pre-Alarm Trip</i> level	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Generator Over Frequency Alarm	Active when the generator frequency exceeds the <i>Over Frequency Shutdown Trip</i> level.	
Generator Over Frequency Delayed Alarm	Active when the generator frequency exceeds the configured <i>Over Frequency Shutdown Trip</i> level for a duration longer than the set <i>Overshoot Delay</i> timer.	
Generator Over Frequency Delayed Warning	Active when the generator frequency exceeds the configured <i>Over Frequency Warning Trip</i> level for a duration longer than the set <i>Overshoot Delay</i> timer.	
Generator Over Frequency Warning IEEE 37.2 - 81 frequency relay	Active when the generator frequency exceeds the <i>High Frequency Warning</i> setting	
Generator Over Frequency Shutdown IEEE 37.2 - 81 frequency relay	Active when the generator frequency exceeds the <i>High Frequency Shutdown</i> setting	
Generator Over Voltage Shutdown IEEE 37.2 – 59AC overvoltage relay	Active when the generator voltage exceeds the <i>High Voltage Shutdown</i> setting	
Generator Over Voltage Warning IEEE 37.2 – 59AC overvoltage relay	Active when the generator voltage exceeds the <i>High Voltage Warning</i> setting	
Generator Phase Rotation Alarm	Active when the detected generator phase sequence is different than the configured <i>Generator Phase Rotation</i>	
Generator Reverse Power	Active when the <i>Generator Reverse Power</i> alarm is active	
Generator Under Frequency Warning IEEE 37.2 - 81 frequency relay	Active when the generator frequency falls below the <i>Low Frequency Warning</i>	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Generator Under Frequency Shutdown IEEE 37.2 - 81 frequency relay	Active when the generator frequency falls below the <i>Low Frequency Shutdown</i>	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Generator Under Voltage Shutdown IEEE 37.2 – 27AC undervoltage relay	Active when the generator voltage falls below the <i>Low Voltage Shutdown</i>	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Generator Under Voltage Warning IEEE 37.2 – 27AC undervoltage relay	Active when the generator voltage falls below the <i>Low Voltage Warning</i> setting	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.

Output source	Activates...	Is not active....
HEST Active	Active when the High Exhaust System Temperature CAN alarm is active	
High Coolant Temperature Electrical Trip	Active when the <i>Coolant Temperature</i> exceeds the configured <i>High Coolant Temperature Electrical Trip</i> level	
High Coolant Temperature Shutdown	Active when the <i>Coolant Temperature</i> exceeds the configured <i>High Coolant Temperature Shutdown</i> level	
High Coolant Temperature Warning	Active when the <i>Coolant Temperature</i> exceeds the configured <i>High Coolant Temperature Warning</i> level	
Inhibit Scheduled run 73xx V8 or above only	Active when the Inhibit Scheduled run input is active	
Inhibit SMS Start 73xx V8 or above only	Active when the input Inhibit SMS Start input is active	
kW Overload Alarm DSE72/7300 V2.0.0 or above only	Active when the measured kW are above the setting of the <i>kW overload alarm</i> . Can be used to give alarms on overload, control a dummy load breaker or for load shedding functionality.	
Lamp Test 73xx version 8.0+	Active when the Lamp Test input is active	
Load Shedding Control (1-5)	Becomes active when the engine kW exceeds Load Shedding Control Trip Setting.	Inactive when the engine kW returns to below the Load Shedding Control Return setting.
Loading Frequency Not Reached	Active when the generator frequency has not reached the configured <i>Loading Frequency</i> during the starting process.	
Loading Voltage Not Reached	Active when the generator voltage has not reached the configured <i>Loading Voltage</i> during the starting process.	
Loss of Magnetic Pickup Signal	Active when the controller senses the loss of signal from the magnetic pickup probe	
Louvre Control	Normally used to drive ventilation louvres for the generator set, this output becomes active when the fuel relay becomes active	Inactive when the fuel relay becomes inactive.
Low Coolant Temperature	Active when the <i>Coolant Temperature</i> falls below the <i>Low Coolant Temperature alarm</i> setting	
Low Fuel Level	Active when the Fuel Level falls below the <i>Fuel Level Low</i> setting	
Low Oil Pressure Shutdown IEEE 37.2 - 63 pressure switch	Active when the <i>Oil Pressure</i> falls below the <i>Low Oil Pressure Shutdown</i> setting	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Low Oil Pressure Warning IEEE 37.2 - 63 pressure switch	Active when the <i>Oil Pressure</i> falls below the <i>Low Oil Pressure Warning</i> setting	Inactive when <ul style="list-style-type: none"> The set is stopped During starting sequence before the safety delay time has expired.
Main Config Selected	Indicates that the main configuration has been selected	
Mains Closed Aux	Active when the <i>Mains closed auxiliary</i> input is active	
Mains Failure  IEEE 37.2 - 81 frequency relay IEEE 37.2 - 27AC undervoltage relay IEEE 37.2 - 59AC overvoltage relay	The output indicates that one or more of the module's sources of determining mains failure is active.	The output is inactive when the mains supply is healthy
Mains Load Inhibit 73xx V8 or above only	Active when the Mains Load Inhibit input is active	
Mains Over Frequency IEEE 37.2 - 81 frequency relay	Active when the mains frequency exceeds the <i>High Frequency</i> setting	
Mains Over Voltage IEEE 37.2 - 59AC overvoltage relay	Active when the mains voltage exceeds the <i>High Voltage</i> setting	
Mains Under Frequency IEEE 37.2 - 81 frequency relay	Active when the mains frequency falls below the <i>Low Frequency</i> setting	
Mains Under Voltage IEEE 37.2 - 27AC undervoltage relay	Active when the mains voltage falls below the <i>Low Voltage</i> setting	

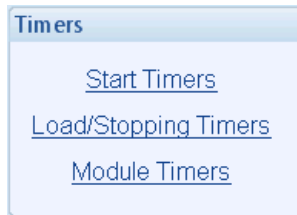
Output source	Activates...	Is not active...
Maintenance alarm 1,2,3 Due	Indicates that the specified maintenance alarm is due	
Manual Restore Contact 73xx V8 or above only	Active when the manual restore contact input is active	
MPU Open Circuit	Active when circuit to magnetic pickup is seen as open circuit	
Negative Phase Sequence Alarm IEEE 37.2 - 46 phase balance current relay DSE72/7300 V2.0.0 or above only	Active when the <i>Negative Phase Sequence Alarm</i> is active	
Negative VAr Alarm	Active when the negative VAr falls below the configured Generator <i>Negative VAr Alarm</i> level for a duration longer than the set <i>Delay</i> timer	
Negative VAr Warning	Active when the negative VAr falls below the configured Generator <i>Negative VAr Pre-Alarm</i> level for a duration longer than the set <i>Delay</i> timer	
Oil Pressure Sender Open Circuit	Active when the <i>Oil Pressure Sensor</i> is detected as being open circuit.	
Oil Pressure Switch 73xx V8 or above only	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 7xxx module selects the generator to be off load this control source will be active.	Inactive whenever the generator is required to be on load
Open Gen Output Pulse IEEE 37.2 – 52 ac circuit breaker	Used to control the load switching device. Whenever the 7xxx module selects the generator to be off load this control source will be active for the duration of the Breaker Open Pulse timer, after which it will become inactive again.	
Open Mains IEEE 37.2 – 52 ac circuit breaker 	Used to control the load switching device. Whenever the 7xxx module selects the mains to be off load this control source will be active.	The output is inactive whenever the mains is required to be on load
Open Mains Pulse IEEE 37.2 – 52 ac circuit breaker 	Used to control the load switching device. Whenever the 7xxx module selects the mains to be off load this control source will be active for the duration of the Breaker Open Pulse timer, after which it will become inactive again.	
Over Frequency Warning	Active when the Generator Over Frequency Warning is active	
Overspeed Shutdown / Warning / Delayed Alarm / Delayed warning / Overshoot alarm / overshoot warning. 73xx V8 or above only	Active when a Overspeed Shutdown / Warning / Delayed warning / Overshoot alarm / overshoot warning is active.	
PLC Output Flag 1-20 73xx V8 or above only	Active when the PLC flag is active	
Positive VAr Alarm	Active when the positive VAr exceeds the configured Generator <i>Positive VAr Alarm</i> level for a duration longer than the set <i>Delay</i> timer	
Positive VAr Warning	Active when the positive VAr exceeds the configured Generator <i>Positive VAr Pre-Alarm</i> level for a duration longer than the set <i>Delay</i> timer	
Preheat during preheat timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : <ul style="list-style-type: none"> The set is stopped The preheat timer has expired
Preheat until end of crank	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : <ul style="list-style-type: none"> The set is stopped The set has reached <i>crank disconnect</i> conditions
Preheat until end of safety timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : <ul style="list-style-type: none"> The set is stopped The set has reached the end of the <i>safety delay</i> timer
Preheat until end of warming timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : <ul style="list-style-type: none"> The set is stopped The set has reached the end of the <i>warming</i> timer

Output source	Activates...	Is not active...
Protections Disabled 73xx V8 or above only	Active when protections are turned off (Unticked) in the configuration.	
Remote Control 1-10 V5 or above only	A series of output sources that can be controlled by remote control in the SCADA section of the software. They can be used to control external circuits or can be used in the <i>control logic</i> section of the configuration suite.	
Remote start off load 73xx V8 or above only	Active when the remote start off load input is active	
Remote start on load 73xx V8 or above only	Active when the remote start on load input is active	
Reset maintenance 1 / 2 / 3 73xx V8 or above only	Active when the reset maintenance 1 / 2 / 3 input is active	
Scheduled Auto Start Inhibit	Active when the configured <i>Inhibit Scheduled Run</i> digital input is active	
Scheduled Run	Active during a <i>scheduled run</i> .	
SCR Inducement 73xx V14 or above	Active when <i>SCR Inducement CAN Alarm</i> is active	
Shutdown Blocked 73xx V8 or above only	Becomes active when protections are disabled and one of the parameters goes out of limits	
Simulate Auto button 73xx V8 or above only	Active when the simulate auto button input is active	
Simulate close Gen breaker 73xx V8 or above only	Active when the simulate close gen breaker input is active	
Simulate lamp test 73xx V8 or above only	Active when the simulate lamp test input is active	
Simulate Mains available 73xx V8 or above only	Active when the simulate mains available input is active	
Simulate Manual Button 73xx V8 or above only	Active when the simulate manual input is active	
Simulate Open Gen Breaker 73xx V8 or above only	Active when the simulate open gen breaker input is active	
Simulate Start Button	Active when the simulate start button input is active	
Simulate Stop Button 73xx V8 or above only	Active when the simulate stop button input is active	
Simulate test on load button 73xx V8 or above only	Active when the simulate test on load button input is active	
Smoke Limiting	Becomes active when the controller requests that the engine runs at idle speed. As an output, this can be used to give a signal to the <i>Idle input</i> of an engine speed governor (if available)	Becomes inactive when the controller requests that the engine runs at rated speed.
SMS Remote Start Off Load 73xx V8 or above only	Active when set "receives an SMS message to start and run off load"	
SMS Remote Start on Load 73xx V8 or above only	Active when 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 73xx V8 or above only	Active when the stop and panel lock input is active	

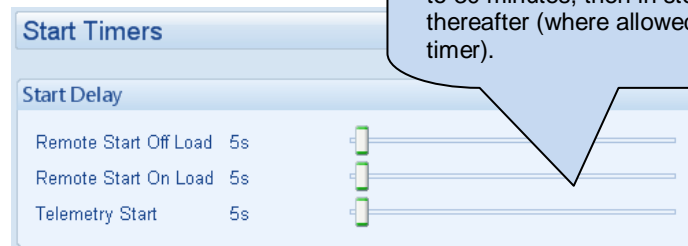
Output source	Activates...	Is not active....
System in Auto Mode	Active when the controller is in AUTO mode	Inactive in any other mode.
System in Manual Mode	Active when the controller is in MANUAL mode	Inactive in any other mode.
System in Stop Mode	Active when the controller is in STOP mode	Inactive in any other mode.
System in Test Mode 	Active when the controller is in TEST mode	Inactive in any other mode.
Telemetry Active (Relay)	Active when the communication port is live and for a short time after transmission stops. Can be used as a relay or LED source.	
Telemetry Data Active (LED)	Active when data is being transmitted. This output will change continuously state (flash) upon data transfer. Normally used as an LED source rather than a relay source as this source will flash repeatedly. For a similar source more suited to drive a relay, see <i>Telemetry Active</i> .	
Under Frequency Shutdown \ Electrical Trip	Active when the Generator Under Frequency Shutdown or Electrical Trip Alarm is active	
Under Frequency Warning	Active when the Generator Under Frequency Warning is active	
User Defined Control 1-3 active	Indicates that the specified User Defined Control (Control Logic) is active	
Under Speed Shutdown \ Electrical trip	Active when underspeed shutdown or electrical trip is active	
Under Speed Warning	Active when underspeed warning 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 can be used to signal to an operator that action is required before the set can transfer back to the mains supply.	

4.6 TIMERS

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




4.6.1 START TIMERS

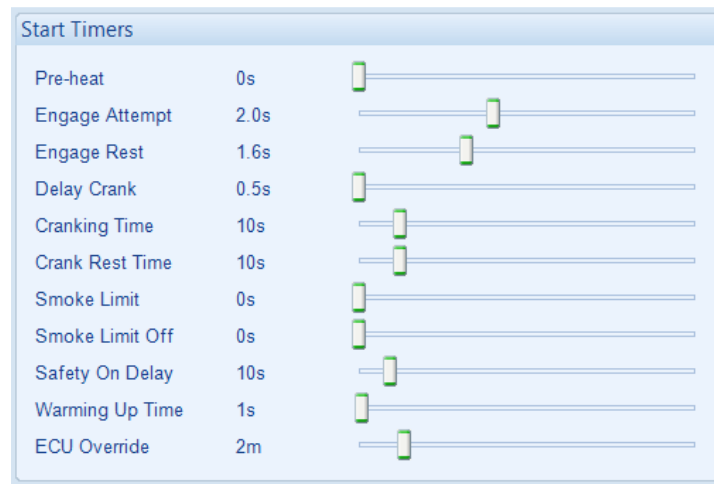



Click and drag to change the setting. Timers increment in steps of 1 second up to one minute, then in steps of 30 seconds up to 30 minutes, then in steps of 30 minutes thereafter (where allowed by the limits of the timer).



= Only available on DSE7220 / DSE7320 AMF Modules

Timer	Description
Remote Start Off Load	Used to give a delay before starting in AUTO mode. This timer is activated upon the respective start command being issued. Typically this timer is applied to prevent starting upon fleeting remote start signals or short term mains failures.
Remote Start On Load	
 Mains Fail	
Telemetry Start	Note Modules versions before 5.x.x have only one Start Delay timer that applies to start commands from Remote start on/off load, mains failures and telemetry start requests.



Timer	Description
 Mains Transient Delay	Used to delay the detection of mains failure. This is normally used to prevent short term transients or <i>brownout</i> conditions from being classified as a Mains Failure.
Pre-heat	Give a 'pre start' time during which the <i>Preheat</i> output will become active (if configured)
Engage Attempt	(Only available if using Magnetic pick-up and multiple engage attempts) This timer dictates the duration that the module will attempt to engage the starter motor during each engage attempt. If the Magnetic Pick-up is not detecting movement of the flywheel when this timer expires, the engage attempt will terminate. Once all engage attempts have been made, the next start attempt begins
Engage Rest	(Only available if using Magnetic pick-up and multiple engage attempts) This timer dictates the duration that the module will wait between attempts to engage to starter.
Cranking time	The length of each crank attempt
Crank rest time	The time between multiple crank attempts.
Smoke limit	The amount of time that the engine will be requested to run at <i>idle</i> speed upon starting. This is typically used to limit emissions at startup.
Smoke limit off	This should be set to a little longer than the amount of time that the set takes to run up to rated speed after removal of the command to run at <i>idle</i> speed. If this time is too short, the set could be stopped due to <i>underspeed</i> failure. If the time is too long, <i>underspeed</i> protection is disabled until the <i>Smoke limit time off</i> time has expired.
Safety on delay	The amount of time at startup that the controller will ignore oil pressure, engine speed, alternator voltage and other <i>delayed</i> alarms. This is used to allow the engine to run up to speed before protections are activated.
Overspeed overshoot	Allows for a temporary raising of the overspeed trip point at startup to prevent overspeed shutdown caused by slow acting speed governing systems.
Warming up time	The amount of time that the set will run BEFORE being allowed to take load. This is used to warm the engine to prevent excessive wear.
ECU Override	The amount of time the CAN ECU Power stays energised when the Start button is pressed in Stop mode.

4.6.2 LOAD / STOPPING TIMERS

Load/Stopping Timers

Load Timers

Transfer Time / Load Delay 0.7s

Breaker Close Pulse 0.5s

Breaker Trip Pulse 0.5s

Stopping Timers

Return Delay 30s

Cooling Time 1m

Cooling Time At Idle 0s

ETS Solenoid Hold 0s


Fail to Stop Delay 30s

Generator Transient Delay 0.0s

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



= Only available on DSE7220 / DSE7320 AMF Modules

Timer	Description
Transfer time/ Load Delay	This timer has two functions  1: The time between the mains load switch being opened and the generator load switch being closed (and vice versa). 2. The time between the Load Shed Control outputs (if configured) being energised and the generator being placed on load (at startup).
Breaker close pulse	The amount of time that <i>Breaker Close Pulse</i> signals will be present when the request to close a breaker is given.
Breaker Trip pulse	The amount of time that <i>Breaker Open Pulse</i> signals will be present when the request to open a breaker is given.
Return delay	A delay, used in auto mode only, that allows for short term removal of the request to stop the set before action is taken. This is usually used to ensure the set remains on load before accepting that the start request has been removed.
Cooling time	The amount of time that the set will be made to run OFF LOAD before being stopped. This is to allow the set to cool down and is particularly important for engines with turbo chargers.
Cooling Time At Idle	After the Cooling Time, the module will instruct the set to run at idle speed for this amount of time before stopping. (Set to zero if function not required)
ETS Solenoid hold	The amount of time the <i>Energise to stop</i> solenoid will be kept energised after the engine has come to rest. This is used to ensure the set has fully stopped before removal of the stop solenoid control signal.
Fail to stop delay	If the set is called to stop and is still running after the <i>fail to stop</i> delay, a <i>Fail to Stop</i> alarm is generated.
Generator transient delay	Used to delay the generator under/over volts/frequency alarms. Typically this is used to prevent spurious shutdown alarms caused by large changes in load levels.

4.6.3 MODULE TIMERS

Interface Timers

Page Timer
5m

Scroll Timer
5s

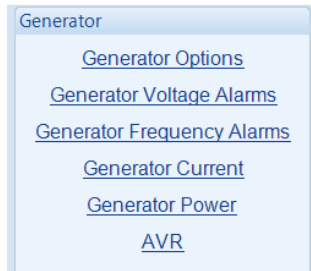
Backlight Timer
5m

Sleep Timer
6m

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

4.7 GENERATOR

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



4.7.1 GENERATOR OPTIONS

These parameters are described overleaf...

Generator Options

Alternator Fitted ☒

Poles 4

AC System 3 Phase, 4 Wire

VT fitted ☐

Primary 111 Secondary 110

Generator Contactor Alarm

Enable Fail to Close Warning ☐

Generator Fail to Close Delay 1.0s

Generator Phase Rotation Alarm

Enable ☐

Phase Rotation L1-L2-L3

Generator Rating

kW Rating 200 kW 250kVA

kVAr Rating 150 kVAr 0.80pf

Power factor 0.80 pf

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

Select your AC system. A schematic is shown below with connection details from the alternator to the DSE72/7300 Series module.

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

If there is no input configured to *Generator Closed Auxiliary* this option will be greyed out

Parameter	Description
Alternator fitted	<input type="checkbox"/> = There is no alternator in the system, it is an <i>engine only</i> application <input checked="" type="checkbox"/> = An alternator is fitted to the engine, it is a generator application.
Poles	The number of poles on the alternator
VT Fitted	<input type="checkbox"/> = The voltage sensing to the controller is direct from the alternator <input checked="" type="checkbox"/> = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the generated voltage to be within the 72/7300 Series controller voltage specification. By entering the <i>Primary</i> and <i>Secondary</i> voltages of the transformer, the controller will display the <i>Primary</i> voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (ie 11kV) but can also be used on systems such as 600V ph-ph.

4.7.1.1 GENERATOR CONTACTOR ALARM

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

4.7.1.2 GENERATOR PHASE ROTATION

 **NOTE: Generator Phase rotation is fitted to DSE72/7300 Series modules V2.0.0 and higher only.**

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

4.7.1.3 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 :

$$\cos \phi = W / VA$$

$$\cos \phi = 0.8$$

$$\phi = \cos^{-1} 0.8 = 36.87^\circ$$
- From this we can calculate the VAr rating of the typical 0.8 pf rated generator as :

$$\tan \phi = VAr / W$$

$$VAr = \tan 36.87^\circ \times W$$

$$VAr = 0.75 \times W$$
- Or to simplify this, the VAr rating of a 0.8 pf rated generator is $\frac{3}{4}$ of the W rating (kVAr rating = 75% of kW rating)

4.7.2 GENERATOR VOLTAGE ALARMS

Generator Voltage Alarms

Under Voltage Alarms

Alarm ☒

Action Shutdown

Trip 319 V PhPh 80.0 % 319V PhPh

Pre-alarm ☒

Trip 339 V PhPh 85.2 % 339V PhPh

Loading Voltage

Loading Voltage 359 V PhPh 90.0 % 359V PhPh

Enable Alarm ☐

Action Warning

Nominal Voltage

398 V PhPh 100.00 % 398V PhPh

Over Voltage Alarms

Pre-alarm ☒

Return 440 V PhPh 110.4 % 440V PhPh

Trip 459 V PhPh 115.2 % 459V PhPh

Shutdown

Trip 480 V PhPh 120.4 % 480V PhPh

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

V5 or later
Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.

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

Click to enable alarm upon failure to reach loading voltage.

Click and drag to change the setting.

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

4.7.3 GENERATOR FREQUENCY ALARMS

The screenshot displays the 'Generator Frequency Alarms' configuration window, which is divided into four main sections: Under Frequency Alarms, Loading Frequency, Nominal Frequency, and Over Frequency Alarms. Each section contains various settings, including checkboxes for enabling/disabling alarms, dropdown menus for actions, and sliders for trip and return frequencies. Callouts provide additional context: 'Click to enable or disable the alarms. The relevant values below will appear *greyed out* if the alarm is disabled.' points to the 'Alarm' checkbox in the Under Frequency Alarms section. 'Type the value or click the up and down arrows to change the settings' points to the 'Trip' input field for the Under Frequency Pre-alarm. 'Click and drag to change the setting.' points to the slider for the Under Frequency Pre-alarm trip. 'Click to enable alarm upon failure to reach loading frequency' points to the 'Alarm' checkbox in the Loading Frequency section. 'Overfrequency Shutdown can only be disabled if another method of speed protection is available (ie CAN or Magnetic Pickup). Hence the checkbox is *greyed out*' points to the 'Shutdown' checkbox in the Over Frequency Alarms section.

Generator Frequency Alarms

Under Frequency Alarms

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

Action Shutdown

Trip 40.0 Hz 80.0 %

Pre-alarm ☒

Trip 42.0 Hz 84.0 % Click and drag to change the setting.

Loading Frequency

Loading Frequency 45.0 Hz 90.0 %

Alarm ☐ Click to enable alarm upon failure to reach loading frequency

Action Warning

Nominal Frequency

50.0 Hz 100 %

Over Frequency Alarms

Pre-alarm ☒

Return 54.0 Hz

Trip 55.0 Hz

Shutdown ☐ Overfrequency Shutdown can only be disabled if another method of speed protection is available (ie CAN or Magnetic Pickup). Hence the checkbox is *greyed out*

Trip 57.0 Hz 114.0 %

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

4.7.4 GENERATOR CURRENT OPTIONS

Generator Current

Generator Current Options

CT Primary (L1,L2,L3,N) A ☐

CT Secondary ☐

Full Load Rating A ☐

Earth CT Primary A ☐

Overcurrent Alarm

Immediate Warning ☒

IDMT Alarm ☒

Trip %

Time Multiplier

Action

Short circuit

Enabled ☒

Action

Trip %

Time Multiplier

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

Click and drag to change the setting.

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

Timer	Description
CT Primary	Primary rating of the Current Transformers
CT Secondary	Secondary rating of the Current Transformers
CT Location	Gen : The CTs are in the feed from the generator so will show only generator load Load : The CTs are in the feed to the load. The module will now display load current, provided by the mains supply or the generator.

4.7.5 GENERATOR CURRENT ALARMS

Generator Current Options

CT Primary (L1,L2,L3,N) A ☐

CT Secondary

CT Location

Full Load Rating A ☐

Earth CT Primary A ☐

Overcurrent Alarm

Immediate Warning ☒

IDMT Alarm ☒

Trip % ☐ 500 A

Time Multiplier

Action

Short circuit

Enabled ☒

Action

Trip % ☐ 1000 A

Time Multiplier

Negative Phase Sequence

Enable ☐

Action

Trip Level % ☐

Delay

Earth Fault

Enable ☐

Action

Trip Level % ☐ 50.0 A

Time Multiplier

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

DSE7310 V6+ only
The Short Circuit tripping curve is based upon EN 60255-3:1989 Type A.
This is often referred to as a "Normally Inverse" tripping curve.

Often called Negative Sequence Current, this check that the alternator is not loaded 'out of balance' with one phase loaded excessively more than another.

The Earth fault tripping curve is based upon EN 60255-3:1989 Type A.
This is often referred to as a "Normally Inverse" tripping curve.

See following pages for descriptions of these parameters.

4.7.5.1 OVERCURRENT ALARM

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

Immediate warning

IEEE 37.2 -50 instantaneous overcurrent relay

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

IDMT Alarm

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

If the *IDMT Alarm* is enabled, the 72/7300 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the *IDMT Alarm* triggers (*Shutdown* or *Electric trip* as selected in *Action*).

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

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

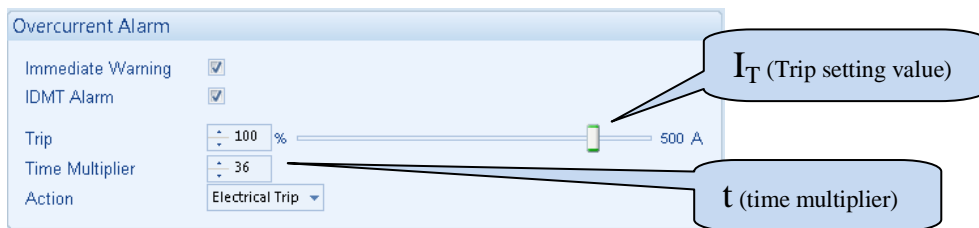
Where: T is the tripping time in seconds

I_A is the actual current of the most highly loaded line (L1 or L2 or L3)

I_T is the delayed over-current trip point

t is the time multiplier setting and also represents the tripping time in seconds at twice full load (when $I_A / I_T = 2$).

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



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

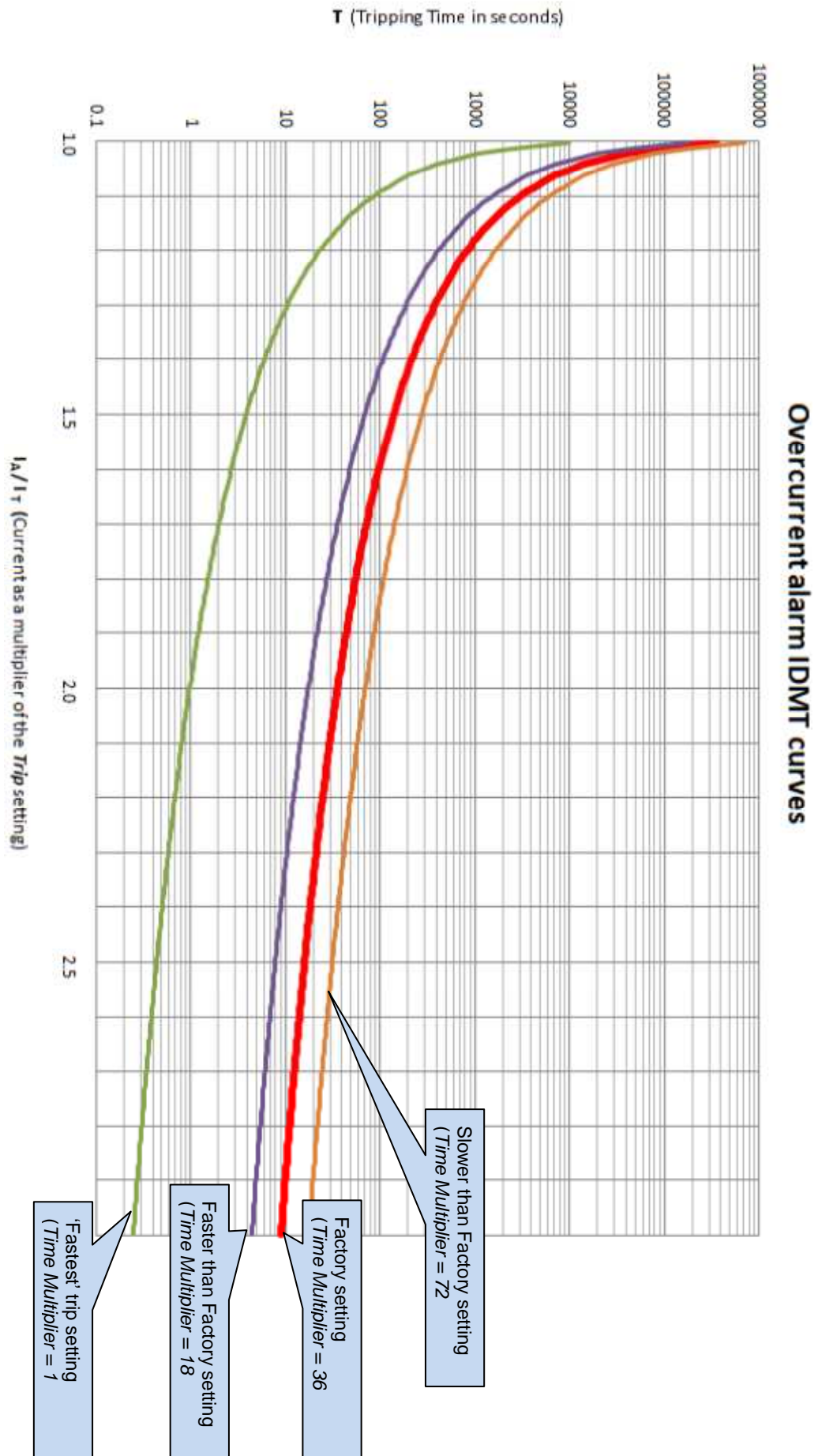
The effect of an overload on the generator is that the alternator windings begin to overheat, the aim of the *IDMT alarm* is to prevent the windings being overload (heated) too much. The amount of time that the set can be safely overloaded is governed by how high the overload condition is.

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

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

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

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



Creating an Excel spreadsheet of the IDMT curve.

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

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

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

t – Time Multiplier
Factory setting is 36

T – Tripping time (seconds)

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

The formula for the *Tripping Time* cells is : $=\$A2/POWER((B\$1-1),2)$

4.7.5.2 SHORT CIRCUIT

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

NOTE: Short Circuit alarm is fitted to DSE7300 Series modules V6.0.0 and higher only.

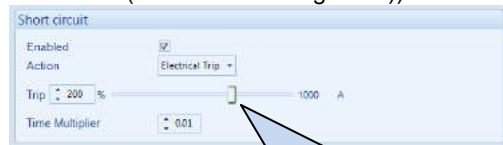
If the *Short Circuit alarm* is enabled, the DSE7300 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the Alarm triggers (*Shutdown* or *Electric trip* as selected in *Action*).

The higher the *Short Circuit*, the faster the trip. The speed of the trip is dependent upon the fixed formula :

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

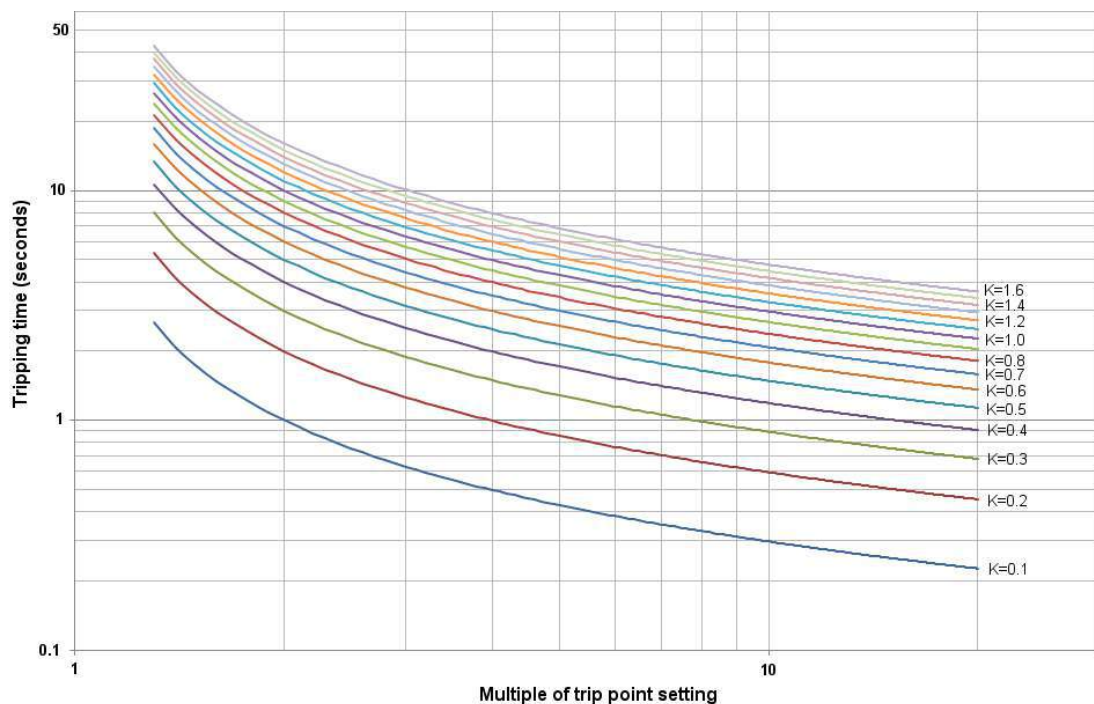
Where: T is the tripping time in seconds (accurate to +/- 5% or +/- 50ms (whichever is the greater))

K is the time multiplier setting
I is the actual current measured
I_s is the trip setting value



K (time multiplier setting)

I_s (Trip setting value)



4.7.5.3 NEGATIVE PHASE SEQUENCE

(Negative Sequence Current / Unbalanced Load)

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

For recommended settings you should contact your alternator manufacturer.

4.7.5.4 EARTH FAULT

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



NOTE: Short Circuit alarm is fitted to DSE7300 Series modules V6.0.0 and higher only.



NOTE: Earth fault alarm is fitted to DSE7300 Series modules V2.0.0 and higher only. DSE7300 Series Version 1 has Earth Fault current display only. DSE7200 Series have no Earth Fault functionality.

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

If the *Earth Fault alarm* is enabled, the DSE7300 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the Alarm triggers (*Shutdown* or *Electric trip* as selected in *Action*).

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

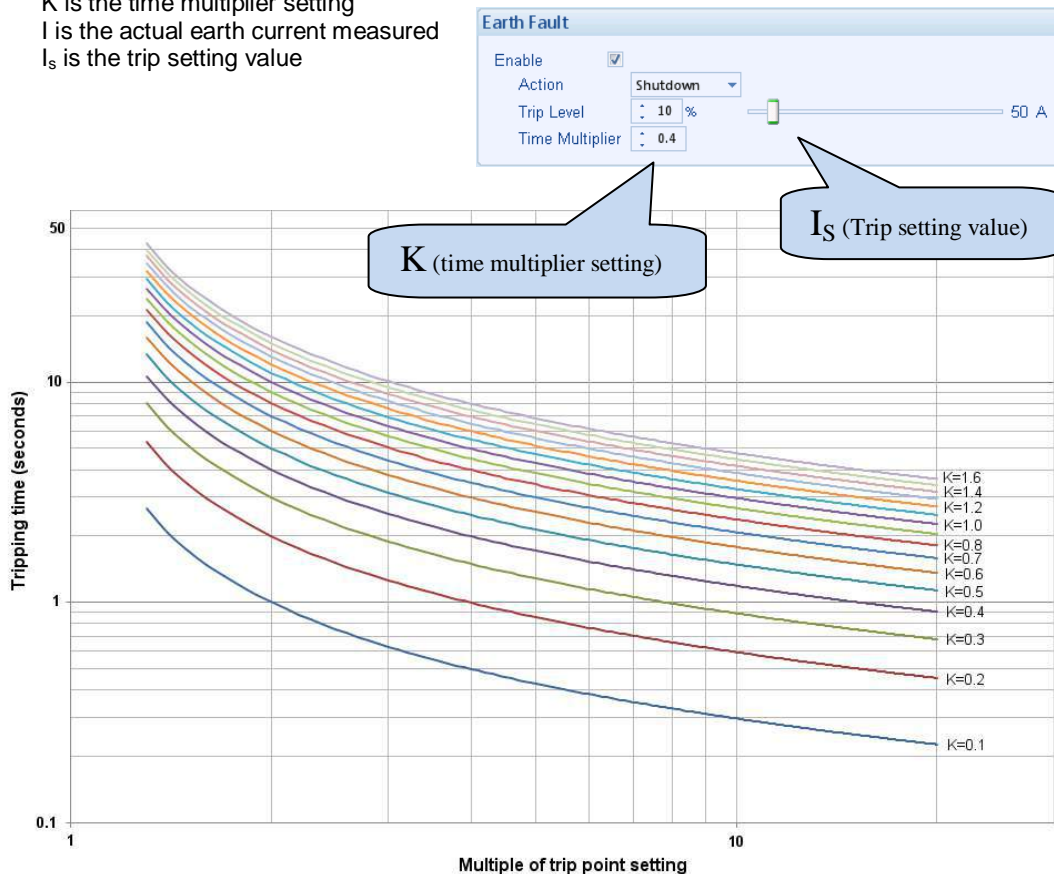
$$T = K \times 0.14 / ((I / I_s)^{0.02} - 1)$$

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

K is the time multiplier setting

I is the actual earth current measured

I_s is the trip setting value



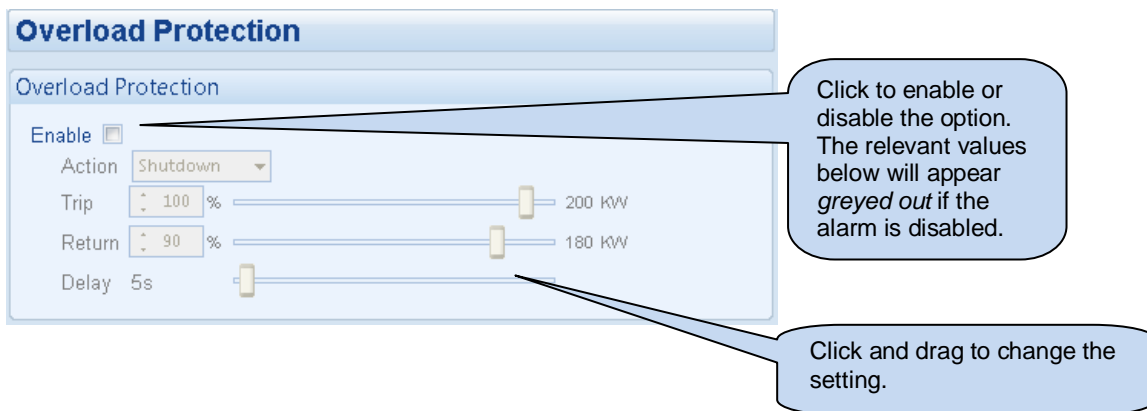
4.7.6 GENERATOR POWER

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



4.7.6.1 OVERLOAD PROTECTION

Overload protection is a subpage of the Generator Power page.



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

4.7.6.2 LOAD CONTROL

Load Control

Dummy Load Control

Enable ☐

Outputs in Scheme

Trip %

Trip Delay

Return %

Return Delay

Transfer Time / Load Delay

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

Click and drag to change the setting.

Load Shedding Control

Enable ☐

Outputs in Scheme

Outputs at Start

Trip %

Trip Delay

Return %

Return Delay

Transfer Time / Load Delay

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

Continued overleaf...

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

Reverse Power

Reverse Power Alarm

Enabled ☐

Action Indication

Trip 20000 kW

Delay 30.0s

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

Setting	Description
Reverse Power IEEE 37.2 – 32 Directional power relay (Not Applicable to DSE72xx series)	<p>This setting is used to configure the generator reverse power alarm: -</p> <p><input type="checkbox"/> = Generator reverse power will NOT give an electrical trip alarm. <input checked="" type="checkbox"/> = Generator reverse power WILL give an electrical trip alarm in the event of the reverse power exceeding the displayed 'reverse power trip' values for the configured time.</p> <p>Actions Warning (<i>Alarm only, No shutdown</i>) Shutdown (<i>Alarm and shutdown</i>) Electrical Trip (<i>Alarm/off-load generator followed by shutdown after cooling</i>)</p>

4.7.6.3 AVR

The screenshot displays the AVR configuration interface, divided into two sections: Positive VAr and Negative VAr. Each section has a Pre-alarm and an Alarm section. The Pre-alarm section includes Trip and Return settings with up/down arrows and a percentage value. The Alarm section includes an Action dropdown (set to Electrical Trip), a Trip setting with up/down arrows and a percentage value, and a Delay setting (set to 1s). Callouts provide instructions: 'Click to enable or disable the option. The relevant values below will appear greyed out if the alarm is disabled.' points to the Pre-alarm checkbox; 'Type the value or click the up and down arrows to change the settings' points to the Trip and Return input fields; and 'Click and drag to change the setting.' points to the sliders for the Trip and Delay settings.

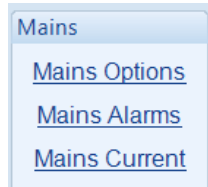
Setting	Description
AVR	<p><input type="checkbox"/> = Alarms are disabled <input checked="" type="checkbox"/> = The module will monitor the Positive & Negative VAr levels and provide an alarm function if the level exceeds the <i>Trip</i> setting for the configured amount of time in the <i>Delay</i> setting.</p> <p>Action <i>Electrical Trip</i>: The generator is taken off load and the set stopped after the <i>Cooling timer</i>. Any output or LCD display set to <i>Positive</i> or <i>Negative</i> is energised. <i>Indication</i>: No alarm is generated; however any output or LCD display set to <i>kW</i> <i>Shutdown</i>: The generator is taken off load and the set stopped immediately.</p>

4.8 MAINS

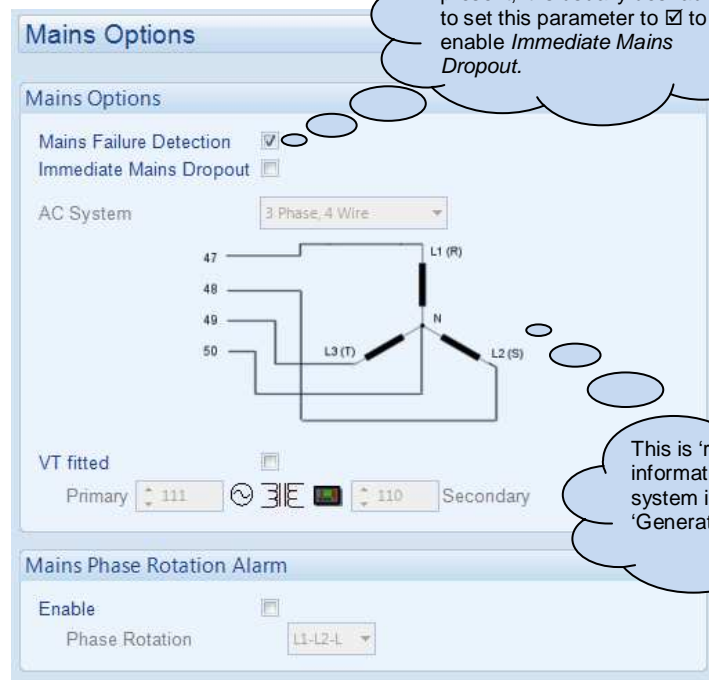


= Only available on DSE7220 / DSE7320 AMF Modules

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



4.8.1 MAINS OPTIONS



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

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


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

Parameter	Description
VT Fitted 	<input type="checkbox"/> = The voltage sensing to the controller is direct from the mains <input checked="" type="checkbox"/> = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the supplied voltage to be within the 72/7300 Series controller voltage specification. By entering the <i>Primary</i> and <i>Secondary</i> voltages of the transformer, the controller will display the <i>Primary</i> voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (ie 11kV) but can also be used on systems such as 600V ph-ph.

4.8.1.1 MAINS PHASE ROTATION



NOTE: Mains Phase rotation is fitted to DSE7300 Series modules V2.0.0 and higher only.

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

4.8.2 MAINS ALARMS

Mains Alarms

Voltage Alarms

Undervolts ☒

Trip V PhPh

Return V PhPh

Overvolts ☒

Return V PhPh

Trip V PhPh

Frequency Alarms

Under Freq. ☒

Trip Hz

Return Hz

Over Freq. ☒





Return Hz

Trip Hz

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

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

Click and drag to change the setting.

Alarm	IEEE designation
Mains Under voltage 	IEEE 37.2 - 27AC Undervoltage relay
Mains Over voltage 	IEEE 37.2 - 59AC Overvoltage relay
Mains Under Frequency 	IEEE 37.2 -81 Frequency relay
Mains Over Frequency 	IEEE 37.2 -81 Frequency relay

4.9 MAINS CURRENT

NOTE: Mains Current Alarms are provided on DSE7320 modules V6.0.0 and higher only, and only when the Current Transformers are fitted into the 'load leg'.

Mains Current

Mains Current Options

CT Primary (L1,L2,L3,N)

600 A

Full Load Rating

500 A

Earth CT Primary

500 A

Overcurrent Alarm

Immediate Warning

☒

IDMT Alarm

☒

Trip

100 %

500 A

Time Multiplier

36

Action

Electrical Trip

Short Circuit

Enabled

☒

Action

Electrical Trip

Trip

200 %

1000 A

Time Multiplier

0.01

Earth Fault

Enable

☐

Action

Shutdown

Trip Level

10 %

50.0 A

Time Multiplier

0.1

4.9.1.1 OVERCURRENT ALARM

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

Immediate warning

IEEE 37.2 -50 instantaneous overcurrent relay

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

IDMT Alarm

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

If the *IDMT Alarm* is enabled, the 72/7300 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the *IDMT Alarm* triggers (*Shutdown* or *Electric trip* as selected in *Action*).

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

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

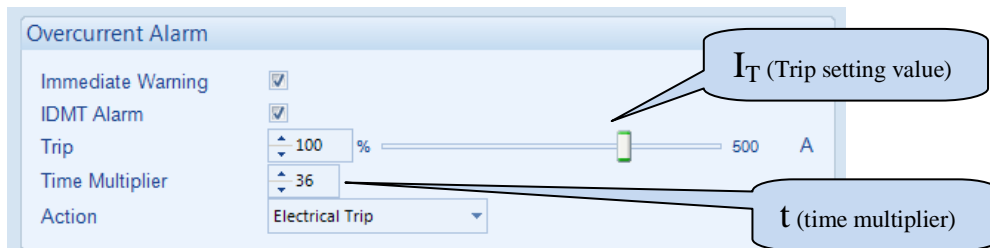
Where: T is the tripping time in seconds

I_A is the actual current of the most highly loaded line (L1 or L2 or L3)

I_T is the delayed over-current trip point

t is the time multiplier setting and also represents the tripping time in seconds at twice full load (when $I_A/I_T = 2$).

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



These settings provide for normal use of the mains up to 100% full load. If full load is surpassed, the *Immediate Warning* alarm is triggered, the mains continues to power the load.

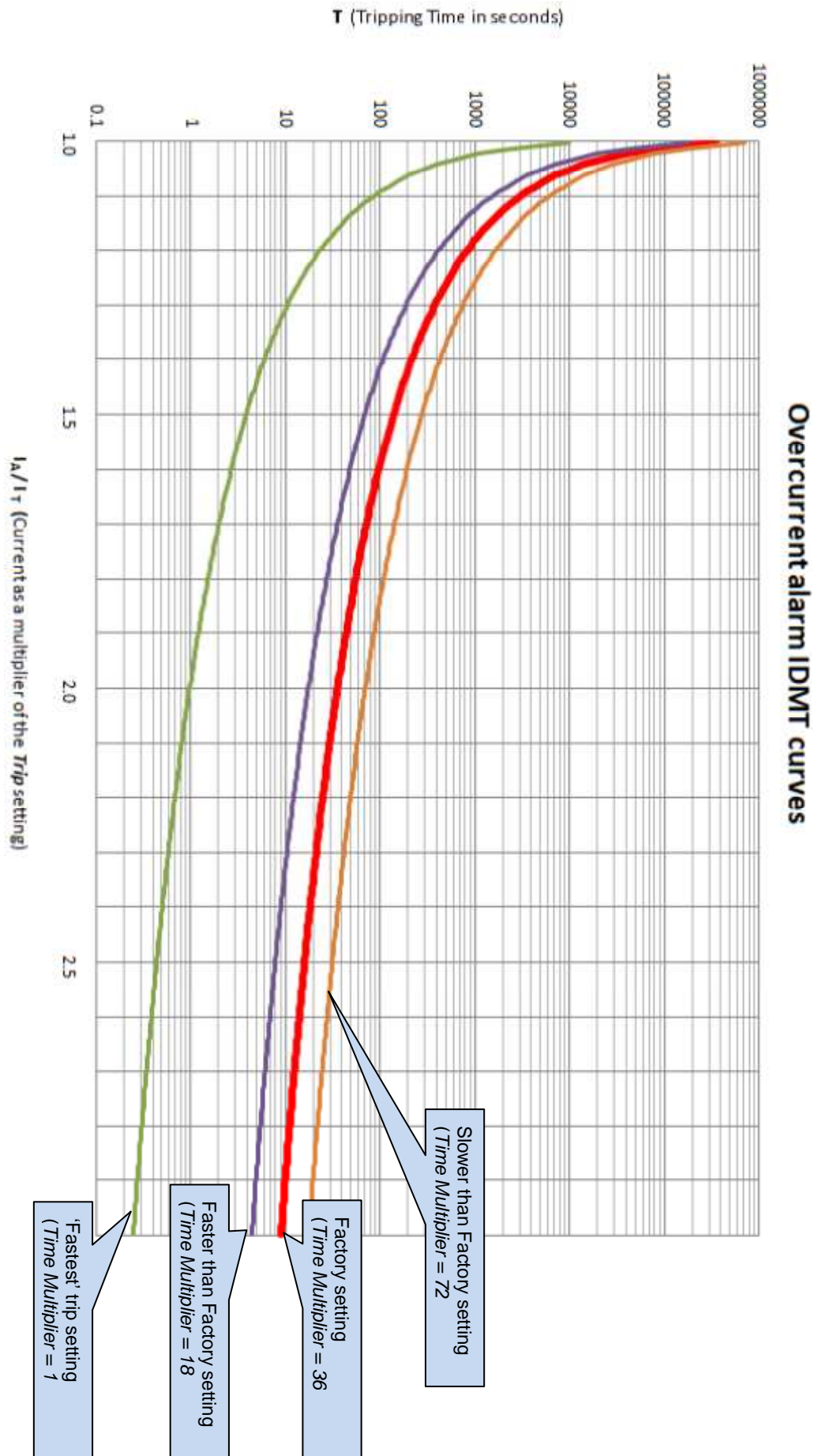
The effect of an overload on the mains is that the supply cables and transformer windings begin to overheat, the aim of the *IDMT alarm* is to prevent them being overloaded (heated) too much. The amount of time that the cables can be safely overloaded is governed by how high the overload condition is.

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

The IDMT alarm factory settings, allows for overload of the mains supply to the limits of typical supply cables whereby 110% overload is permitted for 1 hour.

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

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



Creating an Excel spreadsheet of the IDMT curve.

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

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

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

t – Time Multiplier
Factory setting is 36

T – Tripping time (seconds)

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

The formula for the *Tripping Time* cells is : $=\$A2/POWER((B\$1-1),2)$

4.9.1.2 SHORT CIRCUIT

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

NOTE: Short Circuit alarm is fitted to DSE7300 Series modules V6.0.0 and higher only.

If the *Short Circuit alarm* is enabled, the DSE7300 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the Alarm triggers (*Shutdown* or *Electric trip* as selected in *Action*).

The higher the *Short Circuit*, the faster the trip. The speed of the trip is dependent upon the fixed formula :

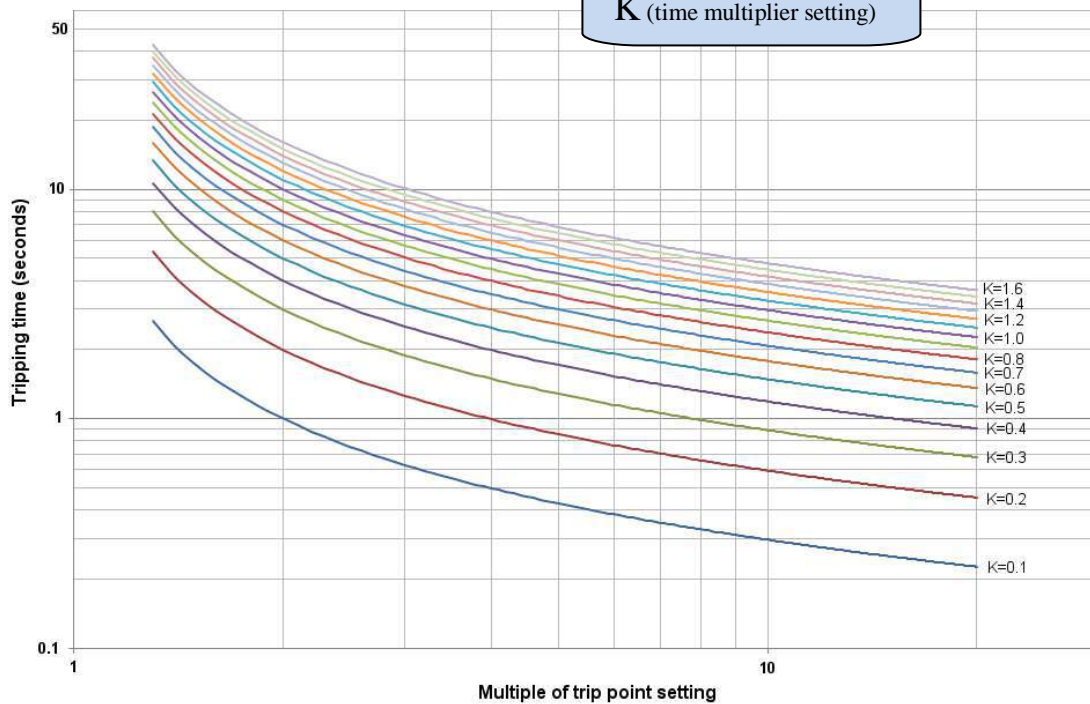
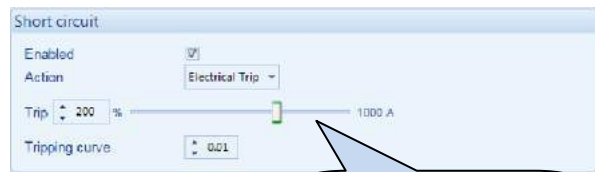
$$T = K \times 0.14 / ((I / I_s)^{0.02} - 1)$$

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

K is the time multiplier setting

I is the actual current measured

I_s is the trip setting value



4.9.1.3 EARTH FAULT

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



NOTE: Short Circuit alarm is fitted to DSE7300 Series modules V6.0.0 and higher only.



NOTE: Earth fault alarm is fitted to DSE7300 Series modules V2.0.0 and higher only. DSE7300 Series Version 1 has Earth Fault current display only. DSE7200 Series have no Earth Fault functionality.

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

If the *Earth Fault alarm* is enabled, the DSE7300 Series controller begins following the IDMT 'curve'. If the *Trip* is surpassed for an excess amount of time the Alarm triggers (*Shutdown* or *Electric trip* as selected in *Action*).

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

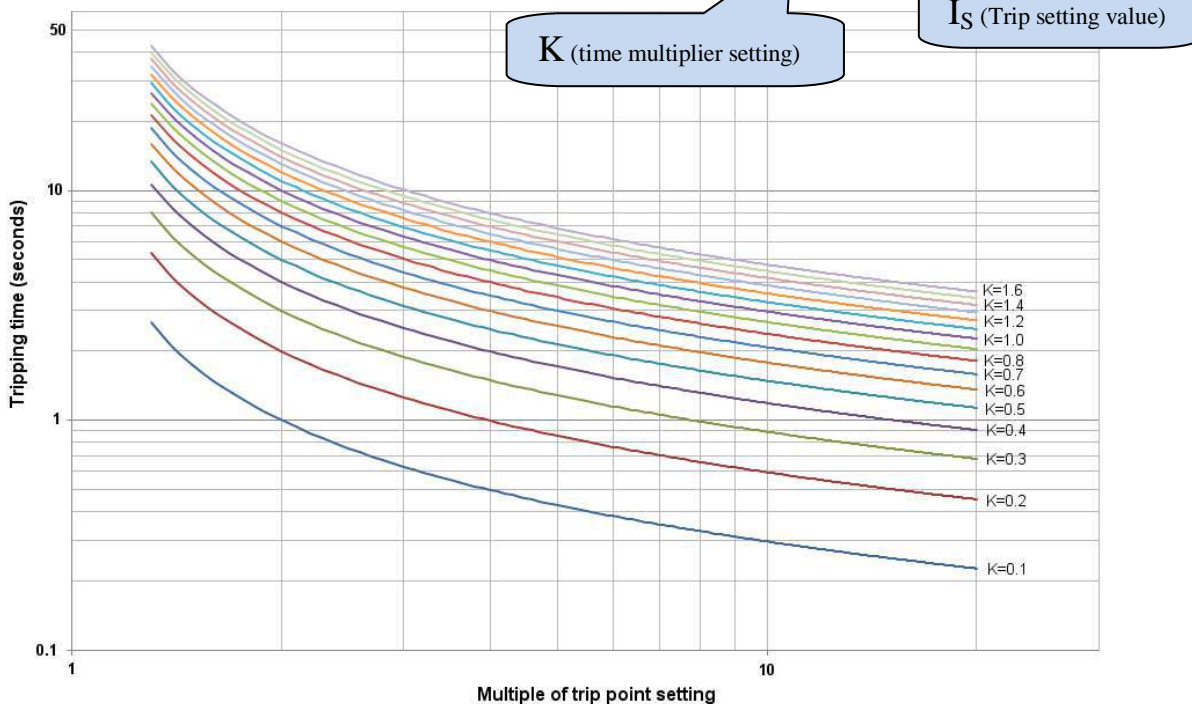
$$T = K \times 0.14 / ((I / I_s)^{0.02} - 1)$$

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

K is the time multiplier setting

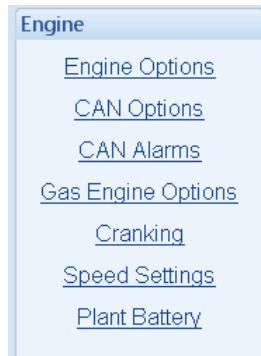
I is the actual earth current measured

I_s is the trip setting value



4.10 ENGINE

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



4.10.1 ENGINE OPTIONS

Engine Options

ECU (ECM) Options

Engine Type: Conventional Engine

Enhanced J1939: ☐

Alternative Engine Speed: ☐

Modbus Engine Comms Port: RS485 Port

Disable ECM Speed Control: ☐

Sensing Options

Disable ECM Speed Sensing: ☐

Magnetic Pickup Fitted: ☒

Flywheel Teeth: 190

Startup Options

Enable Multiple Engage Attempts: ☐

Engage Attempts: 2

Start Attempts: 3

Loss of Sensing Signal: Shutdown

Disable under speed alarms if sensor fails: ☐

Magnetic pickup open circuit: Shutdown

Overspeed Options

Overspeed Overshoot %: 0

Overshoot Delay: 2s

Droop

Enable: ☐

4.0 %

Callouts:

- This item is not adjustable here, it's read only. To change this item, visit the *Module / Application* menu.
- Disables speed control by the DSE module. Useful if an external device (ie remote speed potentiometer) is used to control engine speed.
- Click to enable or disable the option. The relevant values below will appear *greyed out* if the alarm is disabled.
- Overspeed setting is temporarily raised by this the *Overspeed Overshoot* amount during the *Overshoot timer*
- Magnetic pickup open circuit Alarm options Shutdown or Warnings always latched

4.10.1.1 SENSING OPTIONS

Parameter	Description
Magnetic pickup fitted	<input type="checkbox"/> = Magnetic pickup device is not fitted to the DSE module. <input checked="" type="checkbox"/> = A low impedance magnetic pickup device is fitted to the DSE module to measure engine speed. Specifications of the DSE module Magnetic Pickup Input are contained within DSE publication 057-074 72/7300 Series Operator Manual.
Flywheel teeth	The number of teeth on the engine flywheel. This is read by the magnetic pickup device.


4.10.1.2 STARTUP OPTIONS

Parameter	Description
Start Attempts	<p>The number of starting attempts the module will make.</p> <p>If the module does not detect that the engine has fired before the end of the <i>Cranking time</i>, then the current start attempt is cancelled and the <i>Crank Rest</i> time takes place before the next crank attempt begins.</p> <p>If, after all configured <i>start attempts</i>, the engine is not detected as running, the <i>Fail to Start</i> shutdown alarm is generated.</p> <p>The engine is detected as running by checking all methods of <i>Crank Disconnect</i>. For further details, see the section entitled <i>Crank Disconnect</i> elsewhere in this document.</p>
Loss of sensing signal	<p>If the speed sensing signal is lost during engine running, an alarm is generated :</p> <p><i>Shutdown</i>: The generator is removed from load and the set is immediately stopped.</p> <p><i>Warning</i>: The generator continues to run, however a warning alarm is raised.</p>

4.10.1.3 OVERSPEED OPTIONS

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

4.10.1.4 DROOP

 NOTE: Droop options are available only where supported by the Engine ECU over the CAN or Modbus datalink. Contact engine manufacturer for further details.	
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Parameter	Description
Enable	<input type="checkbox"/> = Engine droop is not enabled.
Droop %	<input checked="" type="checkbox"/> = Where supported by the electronic engine ECU, the DSE 72/7300 series modules enables droop in the engine ECU governor at the %age configured.

4.10.2 CAN OPTIONS

CAN Options

Engine Hours

Module to Record Engine Hours ☐

DPF Regeneration Control

Allow Non-Mission Regeneration ☒

Speed Switch

Enable ☐ Default Dataset ECU

ECU Wakeup

Enable ☐

Periodic Wakeup Time 1h

Coolant Measurement Persistence ☐

Available for ECUs which require the engine speed to drop during a manual regeneration cycle. During this period, the generator will not be available to supply power and the under speed and under frequency alarms will not be active.

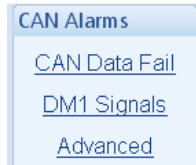
When enabled, DSE module counts Engine Run Hours. When disabled, Engine ECU provides Run Hours.

Method for speed control over CAN if supported by the ECU.

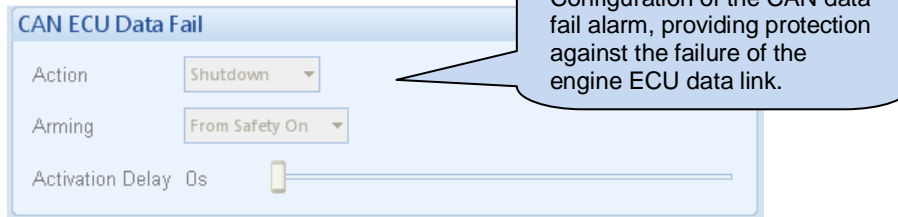
When enabled, DSE module periodically 'powers up' the engine ECU when the engine is stopped. This can be utilised to provide coolant temperature measurement when the engine is stopped.

4.10.3 CAN ALARMS

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



4.10.3.1 CAN DATA FAIL



Parameter	Description
CAN data fail alarm	<p>Action:</p> <p><i>None</i> : Should communications from the engine ECU not be present, no action is taken. The DSE72/7300 series module ignores shutdown messages from the engine ECU leaving these to be handled by the engine ECU. The DSE module continues to provide protection on any parameters measured directly</p> <p><i>Shutdown</i> : The engine is immediately shutdown upon loss of communications from the engine ECU.</p> <p><i>Warning</i> : Should communications from the engine ECU not be present, a warning alarm is generated. The DSE72/7300 series module ignores shutdown messages from the engine ECU leaving these to be handled by the engine ECU. The DSE module continues to provide protection on any parameters measured directly</p> <p>Arming :</p> <p><i>From safety On</i> : The communications link monitoring is activated after the termination of the <i>Safety Delay Timer</i>.</p> <p><i>From Starting</i> : The communications link monitoring is activated once the engine cranking begins.</p>

4.10.3.2 DM1 SIGNALS

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

DM1 Signals	
Amber Warning	
Action	Warning
Arming	Always
Activation Delay	0s
Red Shutdown	
Action	Shutdown
Arming	Always
Activation Delay	0s
Malfunction	
Action	Warning
Arming	Always
Activation Delay	0s
Protect	
Action	Warning
Arming	From Safety On
Activation Delay	0s

4.10.3.3 ADVANCED

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

Other Specific Signals

Water In Fuel

Action Warning

Arming Always

Activation Delay 0s

DPTC Filter

Enabled ☒

Action Warning

Arming From Safety On

This alarm is active when the soot level reaches the point where a manual regeneration is required.

HEST Active

Enabled ☒

Action Warning

Arming From Safety On

High Exhaust Stack Temperature alarm generated by the ECU.

DEF Level

Enabled ☒

Action Warning

Arming From Safety On

Activation Delay 0s

Diesel Exhaust Fluid Level Low alarm generated by the ECU

SCR Inducement

Enabled ☒

Action Warning

Arming From Safety On

Activation Delay 0s

Selective Catalytic Reduction Inducement alarm generated by the ECU

4.10.4 GAS ENGINE OPTIONS

Gas Engine Options

Gas Engine Timers

Choke Timer	2s	<input type="text"/>
Gas On Delay	2s	<input type="text"/>
Ignition Off Delay	2s	<input type="text"/>

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

Controls the amount of time between energising the Gas Ignition and energising the Fuel output. Used in the starting sequence to purge old gas from the engine.

Controls the amount of time between de-energising the Fuel output and de-energising the Gas Ignition output. Used in the stopping sequence to purge unburnt gas from the engine before it is stopped.

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

4.10.5 CRANKING

Cranking

Options

Crank disconnect on oil pressure ☐

Check oil pressure prior to starting ☒

Crank Disconnect

Generator Frequency	21.0	Hz	<input type="text"/>
Engine Speed	600	RPM	<input type="text"/>
Oil Pressure	2.00	Bar	<input type="text"/>

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

If check oil pressure prior to starting is enabled, the cranking will not be allowed if the oil pressure is not seen as being low. This used as a *double check* that the engine is stopped before the starter is engaged

Click and drag to change the setting.

Manual Crank

Hold Start Button To Crank ☐

Manual Crank Limit 30s

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

4.10.5.1 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 its *crank disconnect* setting will result in the cessation of the cranking signal.

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

4.10.5.2 MANUAL CRANK

It is sometimes specified or preferred that the start button is held during cranking and released to cease cranking, *Hold Start Button Crank* is enabled to provide this function. When enabled, the start button must be held (pressed) to allow cranking. Should the button be released, cranking will cease regardless of engine speed. To give protection against overcranking, the maximum crank time is governed by the *Manual Crank Limit*. Additionally, automatic crank disconnect is still provided.

4.10.6 SPEED SETTINGS

Speed Settings

Under Speed

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

Action Shutdown Version 5.x.x or later
Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.

Trip 1200 RPM Type the value or click the up and down arrows to change the settings

Pre-alarm ☐

Trip 1260 RPM

Return 1350 RPM

Over Speed

Pre-alarm ☐

Return 1620 RPM Click and drag to change the setting.

Trip 1650 RPM

Shutdown

Trip 1710 RPM

Overspeed shutdown cannot be disabled.

4.10.7 PLANT BATTERY

The screenshot shows the 'Plant Battery' configuration window. It is divided into two main sections: 'Voltage Alarms' and 'Charge Alternator Alarm'.

Voltage Alarms:

- Undervolts:** Enabled (checked). Settings include Warning at 10.0 V DC, Return at 10.5 V DC, and Delay at 1m.
- Overvolts:** Enabled (checked). Settings include Return at 29.5 V DC, Warning at 30.0 V DC, and Delay at 1m.

Charge Alternator Alarm:

- Use Module for Charge Alternator:** A checkbox that is currently unchecked.
- Shutdown:** Enabled (checked). Settings include Trip at 4.0 V DC and Delay at 5s.
- Warning:** Enabled (checked). Settings include Trip at 6.0 V DC and Delay at 5s.

Callouts:

- Left Callout:** 'Type the value or click the up and down arrows to change the settings' points to the numerical input fields for the voltage thresholds.
- Top Right Callout:** 'Click and drag to change the setting.' points to the slider controls for the voltage thresholds.
- Bottom Right Callout:** 'When a CAN ECU is connected, the DSE module reads the value from the ECU. Enabling this option overrides the CAN reading with the measured Charge Alternator Voltage.' points to the 'Use Module for Charge Alternator' checkbox.
- Bottom Right Callout (continued):** 'Click to enable or disable the option. The relevant values below will appear *greyed out* if the alarm is disabled.' points to the 'Warning' checkbox.

Alarm	IEEE designation
Plant Battery Undervolts	IEEE 37.2 -27 DC Undervoltage relay
Plant Battery Overvolts	IEEE 37.2 -59 DC Overvoltage relay

4.11 COMMUNICATIONS



NOTE: Communications options are not available on DSE7200 series controllers

The 7300 series module includes RS232 and RS485 ports for connection to a modem or other device. The protocol used is Modbus RTU.

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

Communications

- Basic
- Advanced
- SMS Control

4.11.1 BASIC

Module Identification

Site identity

Genset identity

Serial Port Configuration

Slave ID

Baud Rate

Port Usage

Modem Settings

Alarm numbers

GSM Modem ☐

SMS Message centre number

SMS Recipient numbers

Send extended instrumentation ☐

Send as flash message ☐

Baud rate adjustable from 1200-115200

Selects no modem to incoming / outgoing or both

These items are *greyed out* until a relevant option in *Port Usage* is selected.

Select for GSM modem type

Sends extended instrumentation with the Alarm code (Oil pressure / Coolant temp / HRS run)

Sends Alarm messages as a flash instant message.

4.11.1.1 SERIAL PORT CONFIGURATION

Timer	Description
Port usage	<p>Only one of the two serial ports can be used at any one time (RS232 or RS485) The options are :</p> <p>No Modem – RS232 ports is used for direct RS232 connection to PLC, BMS etc</p> <p>Incoming modem calls – RS232 port connected to modem, used to accept incoming calls only.</p> <p>Incoming and outgoing modem (Sequence) – RS232 port connected to modem used to accept incoming calls and also make calls upon shutdown alarms.</p> <p>Outgoing modem alarms (Sequence) - RS232 port connected to modem, used to make calls upon shutdown alarms.</p> <p>Incoming and outgoing modem (Cyclic) – RS232 port connected to modem used to accept incoming calls and also make calls upon shutdown alarms.</p> <p>Outgoing modem alarms (Cyclic) - RS232 port connected to modem, used to make calls upon shutdown alarms.</p> <p>RS485 – The RS485 port is active. This is often used to connect to PLC's, building management systems and other third party equipment.</p>

4.11.1.2 MODEM SETTINGS

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

4.11.1.3 RECOMMENDED MODEMS

DSE stock and supply the following recommended modems:

PSTN (fixed line) modem

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

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

GSM modem

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

Description	DSE Part Number
Wavecom Fastrak Supreme GSM Modem supplied with power supply cable, RS232 connection cable and GSM antenna. Suitable for GSM operating on 900/1800 MHz bands.	0830-001-01
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 DSE7300 series module.	

4.11.2 ADVANCED

Advanced

Initialisation Strings

Init (not auto answer) `E0S7=60S0=0&S0&C1&D3`

Init (auto answer) `E0S7=60S0=2&S0&C1&D3`

Hangup `H0`

Connection Settings

Master inactivity timeout 5s

Connect delay 60s

Retries 4

Retry delay 5s

Repeat cycle delay 10s

Inter Frame Delay

Inter Frame Delay 0.000s

Modem initialisation strings. These set up the modem to perform the functions required.

Set the time delay between a Modbus RTU request and the receipt of a response.

4.11.2.1 INITIALISATION STRINGS

The initialisation strings are commands that are sent to the modem upon powering up the DSE module and additionally at regular intervals subsequently, whenever the DSE7300 series module *initialises* (resets) the modem.

Factory set initialisation strings

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

Silent operation

The modem connected to the DSE7300 series will usually make dialling noises and 'squeal' in the initial stages of making a data call. To control this noise, add the following command to the end of the initialisation string :

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

Multitech ZBA Global Modem initialisation strings

The DSE7300 series factory settings for the initialisation strings are suited to the Multitech ZBA Global Modem :

Initialisation strings	
Init (not auto answer)	E0S7=60S0=0&S0&C1&D3
Init (auto answer)	E0S7=60S0=2&S0&C1&D3
Hangup	H0

Wavecom Fastrak Supreme GSM Modem initialisation strings

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

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

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

OTHER MODEMS

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

4.11.2.2 CONNECTION SETTINGS

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

4.11.2.3 INTER-FRAME DELAY

Timer	Description
Inter-frame delay	Adds a delay before the DSE module responds to a request from the Modbus Master device.

4.11.3 TROUBLESHOOTING MODEM COMMUNICATIONS

4.11.3.1 MODEM COMMUNICATION SPEED SETTING

First ensure the modem is set to communication with the DSE module at 9600 baud – Modems supplied by DSE are factory adjusted to operate with the DSE7300 series module. Only modems purchased from a third party may require adjustment.

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

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

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

When connected. enter the following command:

AT+IPR=9600 and press <ENTER>

This sets the modem to 9600 baud.

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

Enter the following command:

AT&W and press <ENTER>

This saves the new setting in the modem. Power can now be removed. The next time power is applied, the modem starts with the new settings (Baud rate = 9600), suitable to communicate with the DSE7300 series module.

4.11.3.2 GSM MODEM CONNECTION

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

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

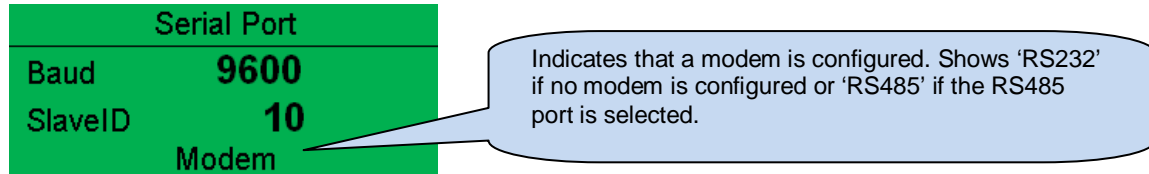
4.11.3.3 DSE7300 SERIAL PORT INSTRUMENT DISPLAY

Version 4.x.x modules and later.

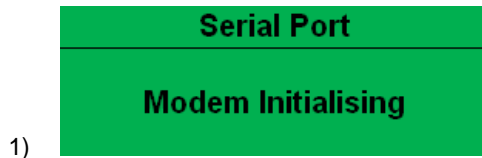
The following section is an excerpt from the DSE72/7300 series operator manual (DSE Publication 057-074) and details the *Serial Port* instrument, used for monitoring operation of the DSE7300 series module serial port.

NOTE:- Factory Default settings are for the RS232 port to be enabled (no modem connected), operating at 19200 baud, modbus slave address 10.

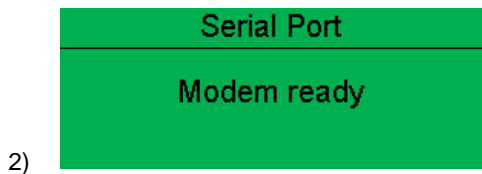
Example 1 – Module connected to a RS232 telephone modem.



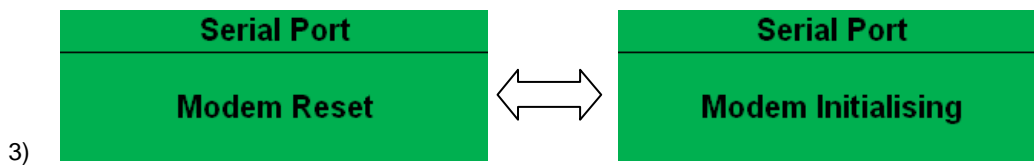
Modem Setup Sequence



If the Modem and DSE72/7300 series communicate successfully :



In case of communication failure between the modem and DSE72/7300 series module, the modem is automatically reset and initialisation is attempted once more :



In the case of a module that is unable to communicate with the modem, the display will continuously cycle between 'Modem Reset' and 'Modem Initialising' as the module resets the modem and attempts to communicate with it again. This will continue until correct communication is established with the modem. In this instance, you should check connections and verify the modem operation.

Example 2 – Module connected to a modem.

Serial Port	
Baud	9600
SlaveID	10
Modem	

Example 3 – Modem status of a GSM modem

Currently connected GSM operator and signal strength.

Serial Port	
Carrier	Orange
Modem Ready	

Example 4 - Module RS485 port configured for connection to a modbus master.

Serial Port	
Baud	19200
SlaveID	1
RS485	

4.11.4 SMS MODULE CONTROL

SMS Control

SMS Module Control

Require PIN ☐

PIN prefix :

Enabled commands

- Start off load (code 1) ☐
- Start on load (code 2) ☐
- Cancel (code 3) ☐
- Stop mode (code 4) ☐
- Auto mode (code 5) ☐

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

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

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

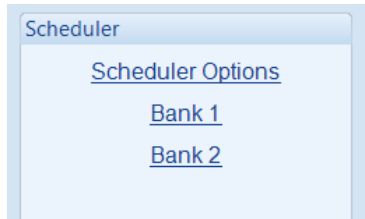
The SMS commands listed below.

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

4.12 SCHEDULER

The section is subdivided into smaller sections.

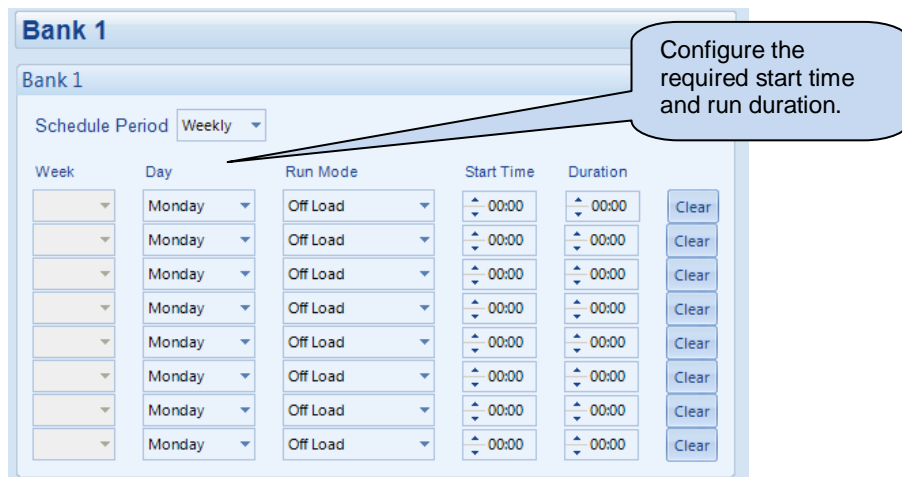
Each Bank of the Exercise Scheduler is used to give up to 16 scheduled runs. This run schedule is configurable to repeat every 7 days (weekly) or every 28 days (monthly). The run can be *on load* or *off load*. Each scheduler bank can be configured differently either to weekly or monthly based exercises.



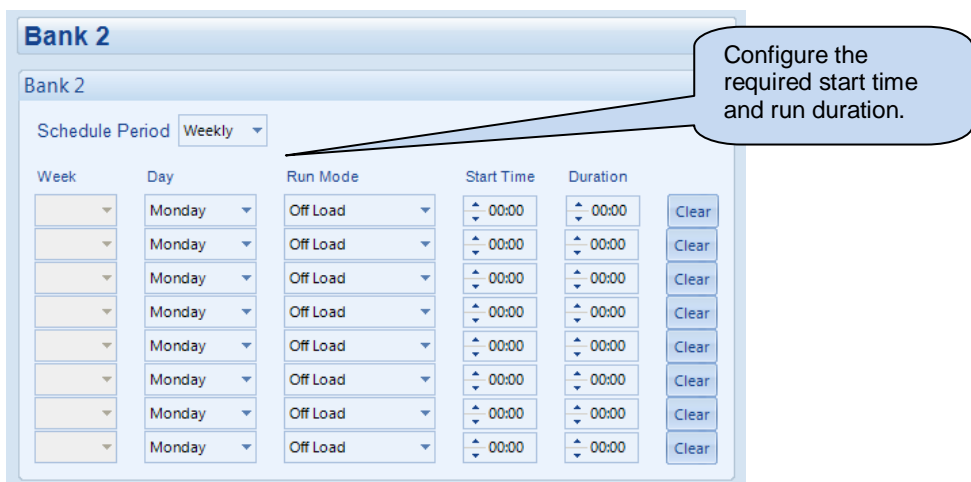
4.12.1 SCHEDULER OPTIONS



4.12.2 BANK 1



4.12.3 BANK 2



4.13 MAINTENANCE ALARM

NOTE: Maintenance Alarm is supported in V2.1 and later modules only.
Maintenance alarms 2 and 3 supported in V3.0 and later modules only.

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

The screenshot shows the 'Maintenance alarm 1' configuration window. It includes an 'Enable' checkbox, a 'Description' field with the text 'Maintenance alarm 1', an 'Action' dropdown menu set to 'Warning', an 'Engine run hours' field with a value of 10 and a unit of 'hrs', an 'Enable alarm on due date' checkbox, and a 'Maintenance interval' field with a value of 1 and a unit of 'months'. Two callout boxes provide additional information: one points to the 'Enable' checkbox stating 'Click to enable or disable the option. The relevant values below will appear *greyed out* if the alarm is disabled.', and another points to the 'Engine run hours' and 'Maintenance interval' fields stating 'Maintenance Alarm will occur when the engine has run for the specified number of hours OR the specified date interval has passed (whichever occurs soonest)'.

There are two ways to reset the maintenance alarm :

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

4.14 ALTERNATIVE CONFIGURATIONS



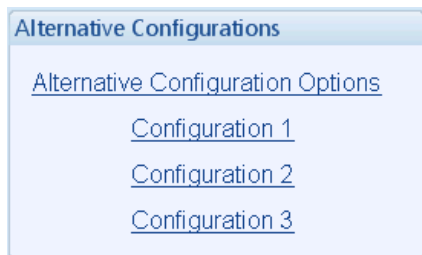
NOTE: Alternative Configurations are supported in V2.0 and later modules only.

Alternative Configurations are provided to allow the system designer to cater for different AC requirements utilising the same generator system. Typically this feature is used by Rental Set Manufacturers where the set is capable of being operated at (for instance) 120V 50Hz and 240V 50Hz using a selector switch, or by taking advantage of the “auto voltage sensing” option of the DSE72/7300 Series.

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

Alternative Configurations can be selected using either:

- Configuration Suite Software (Selection for ‘Default Configuration’)
- DSE72/7300 Series Fascia Editor
- Via external signal to DSE72/7300 Series module input configured to “Alt Config x” select.



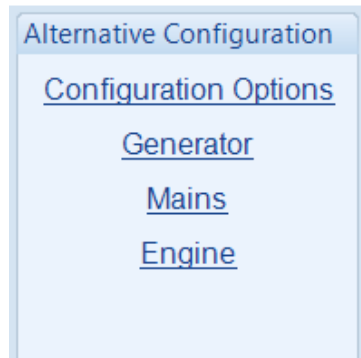
4.14.1 ALTERNATIVE CONFIGURATION OPTIONS



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

4.14.2 ALTERNATIVE CONFIGURATIONS EDITOR


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



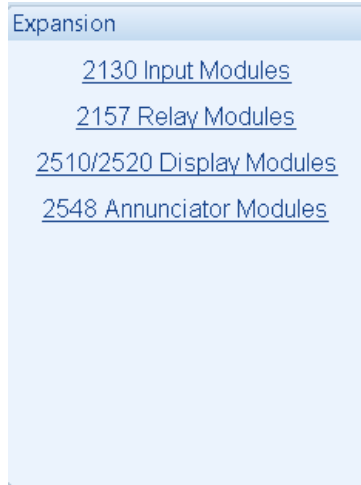
Alternative configuration options contain a subset of the main configuration. The adjustable parameters are not discussed here as they are identical to the main configuration options.

4.15 EXPANSION

 **NOTE : Expansion options are not available on DSE7200 series controllers**

 **NOTE : DSE2510 / DSE2520 display modules are available only on DSE7300 series controllers version 4 and above.**

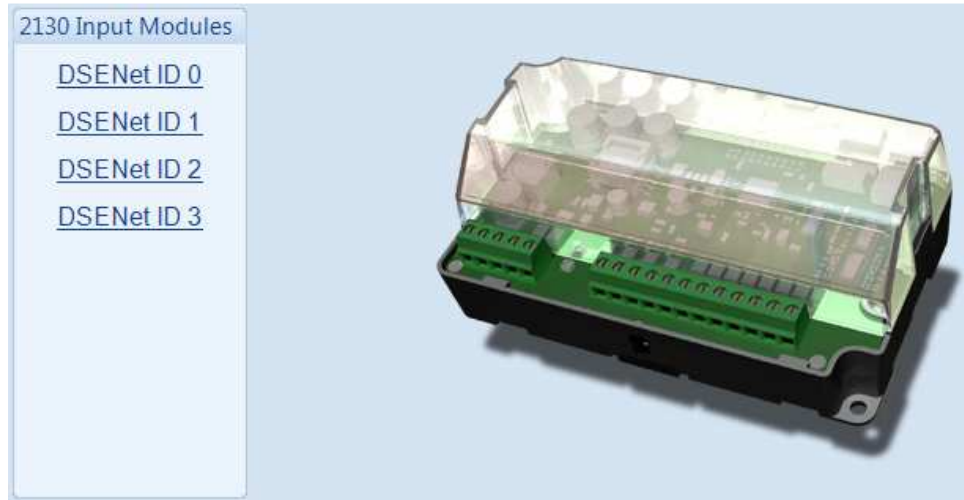
The *Expansion* page is subdivided into smaller sections.
Select the required section with the mouse.



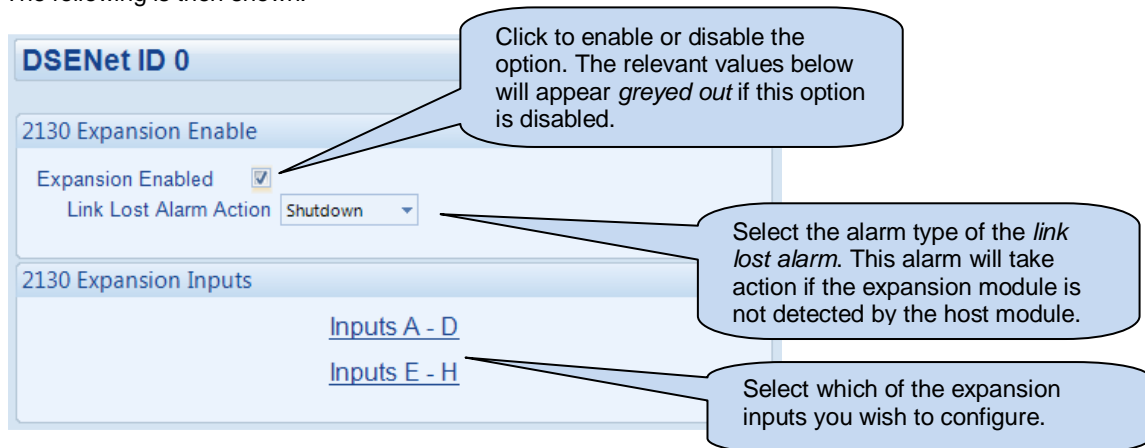
See overleaf for description of the different expansion modules.

4.15.1 2130 INPUT MODULES

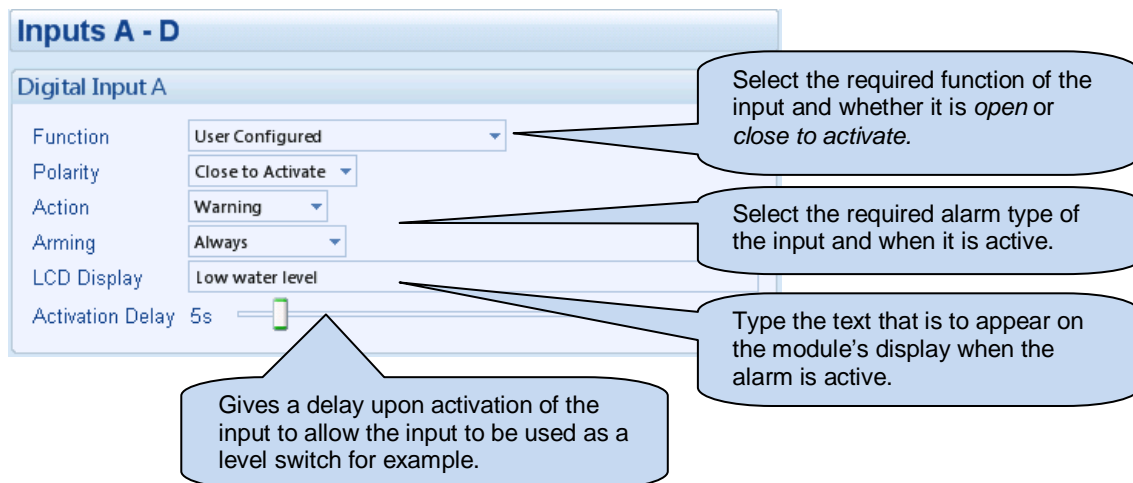
Select the DSENet ID of the input expansion you wish to configure.



The following is then shown:



4.15.1.1 DIGITAL INPUTS (A-D)



4.15.1.2 ANALOGUE INPUTS (E-H)

NOTE: - DSE7300 series modules prior to V4 support only 'User Configured' (alarm type) digital input functions on expansion inputs A-H. DSE7300 series modules V4 and later support both 'User configured' and 'pre-defined' digital input functions on expansion inputs A-H.

Analogue Input E

Sensor Description

Sensor Type None

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

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

Used as an Analogue Input

Analogue Input E

Sensor Description

Sensor Type Pressure SensorSensor Name 2130 ID0 Flexible Sensor E

Input Type

VDO 10 BarEdit...

Edit the sensor curve if required.

Sensor Alarms

Alarm Arming AlwaysLow Alarm Enable ☒

Action

Shutdown

Low Alarm

1.03BarLow Pre-alarm Enable ☒

Low Pre-alarm Trip

1.17Bar

Low Pre-alarm Return

1.24Bar

Low Alarm String

Flexible Sensor LowHigh Pre-alarm Enable ☒

High Pre-alarm Return

1.40Bar

High Pre-alarm Trip

1.50BarHigh Alarm Enable ☒

Action

Shutdown

High Alarm

1.60Bar

High Alarm String

Flexible Sensor High

Click and drag to change the
setting.

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

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

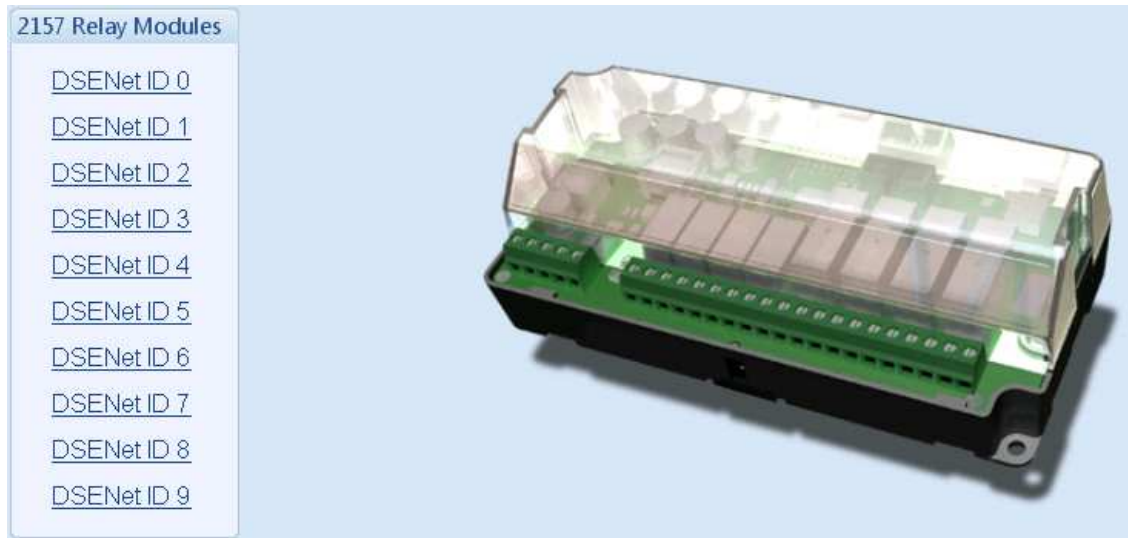
Used as a Digital Input

The screenshot shows a configuration window titled "Digital Input" with the following fields and callouts:

- Function:** A dropdown menu set to "User Configured". A callout points to it: "Select the required function of the input and whether it is *open* or *close to activate*."
- Polarity:** A dropdown menu set to "Close to Activat". A callout points to it: "Select the required alarm type of the input and when it is active."
- Action:** A dropdown menu set to "Warning".
- Arming:** A dropdown menu set to "Always".
- LCD Display:** An empty text input field. A callout points to it: "Type the text that is to appear on the module's display when the alarm is active."
- Activation Delay:** A text input field set to "0s". A callout points to it: "Gives a delay upon activation of the input to allow the input to be used as a liquid level switch for example."

2157 RELAY MODULES

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



The following is then shown:

DSENet ID 0

2157 Enable

Expansion Enabled ☒

Link Lost Alarm Action Shutdown

Relay Outputs (Normally Open)

	Source	Polarity
A	Not Used	Energise
B	Not Used	Energise
C	Not Used	Energise
D	Not Used	Energise

Relay Outputs (Changeover)

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

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

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

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

4.15.3 2510 / 2520 DISPLAY EXPANSION

Available on module version 4.x.x and later.

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



The following is then shown:

DSENet ID 0

2510/2520 Expansion Enable

Expansion Enabled ☒

Link Lost Alarm Action Shutdown

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

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

Control Buttons

Control Buttons Enable ☒

☒ - The display acts as a complete mimic/control of the host module.
☐ - The display is for instrumentation only – the mode change buttons are disabled.

Sounder Configuration

Sounder Enable ☒

Follow main unit ☐

Auto Mute Timer Enable ☒

Auto Mute Timer 1m

Enable or disable the expansion module's internal sounder.

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

☒ - The internal sounder will sound for the duration of the *Auto Mute Timer* after which it will automatically stop. Pressing the *MUTE* button during the timer will also silence the sounder.
☐ - *Auto Mute* is disabled.

4.15.4 2548 LED EXPANSION

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



The following is then shown:

DSENet ID 0

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

2548 Expansion Enable

Expansion Enabled ☒

Link Lost Alarm Action **Shutdown**

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

Sounder Configuration

Follow main unit ☐

Sounder enabled ☐

Enable or disable the expansion module's internal sounder.

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

LED Indicators

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

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

Annunciator Insert Card

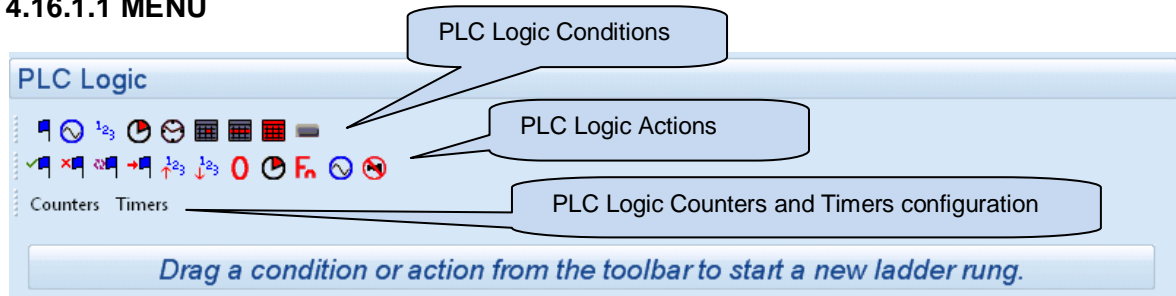
4.16 ADVANCED

4.16.1 PLC

NOTE: - This feature is **NOT** available on any DSE72xx or 73xx Series modules before V7. These modules included Control Logic, detailed elsewhere in this document.

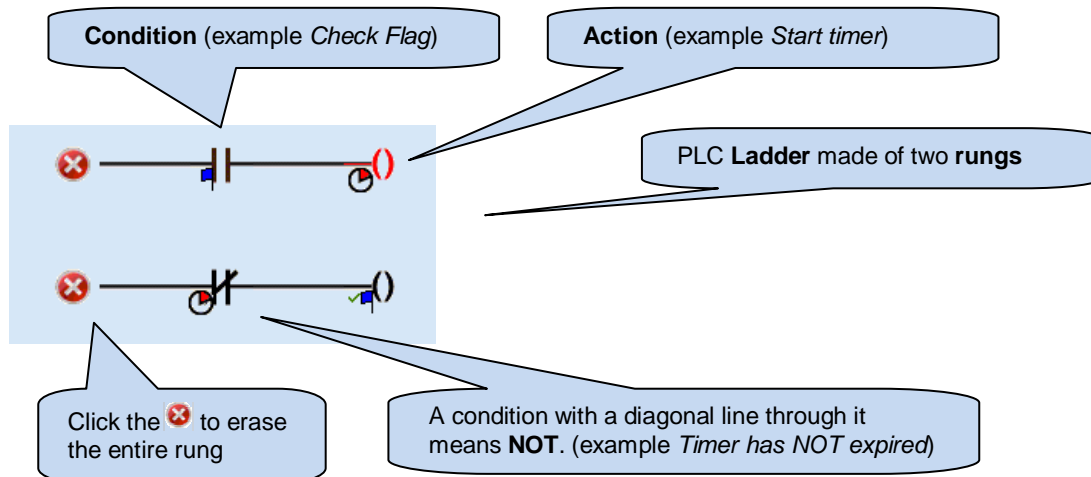
PLC Logic adds comprehensive PLC functionality to the DSE controller. This is an advanced section, used entirely at your own risk.

4.16.1.1 MENU



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

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



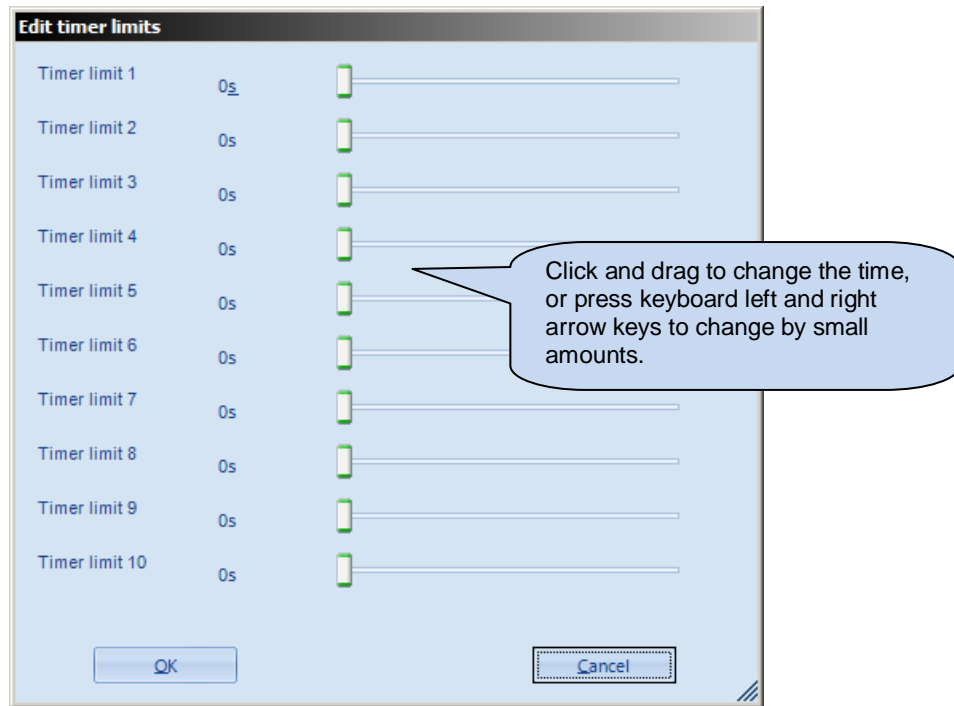
4.16.1.2 FLAGS

A *flag* is set when a condition within the DSE controller is met. For instance, if the module is in *Auto Mode* an internal flag is set. This flag is exposed as an *output source* when configuring module outputs and LEDs. In addition to internal flags, a further twenty (20) custom flags are available (named PLC Flag 1-20). These can be used to 'memorise' that a condition has been met, and/or used to drive module outputs and LEDs'. For example if a timer expires, a flag can be set to make a note of the timer expiring for later use in the ladder.

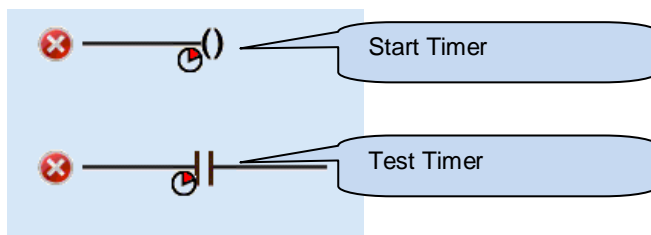
4.16.1.3 TIMERS

The PLC logic section contains ten (10) user timers for use in the ladder.

A timer is configured by clicking **Timers** in the menu bar. The 'Edit time limits' window appears.



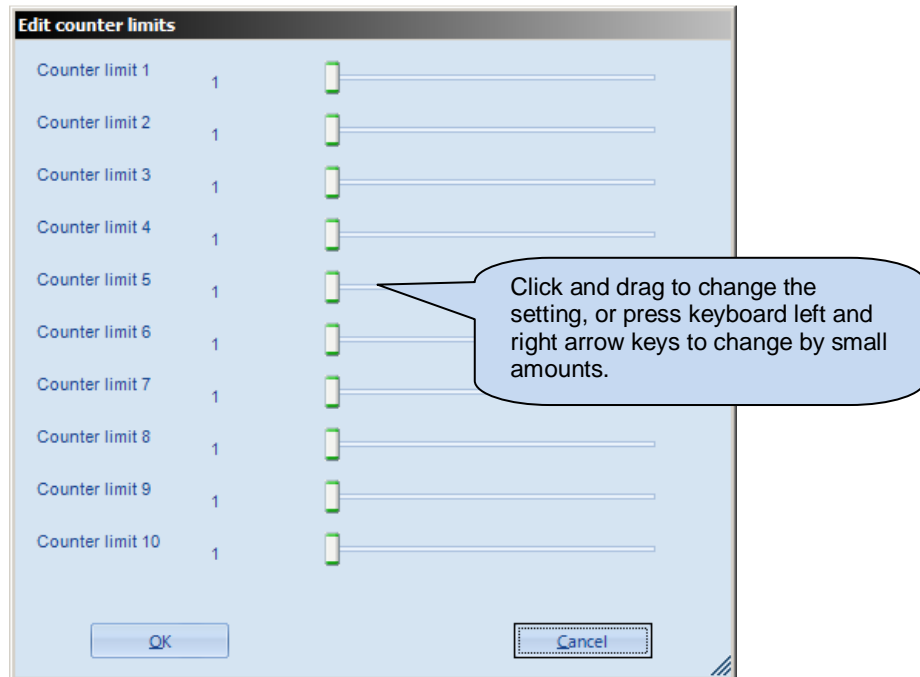
A timer is used by adding the timer action to the ladder. When this action takes place, the timer begins. Upon the timer reaching the configured 'Timer limit', a test for the timer will be successful:



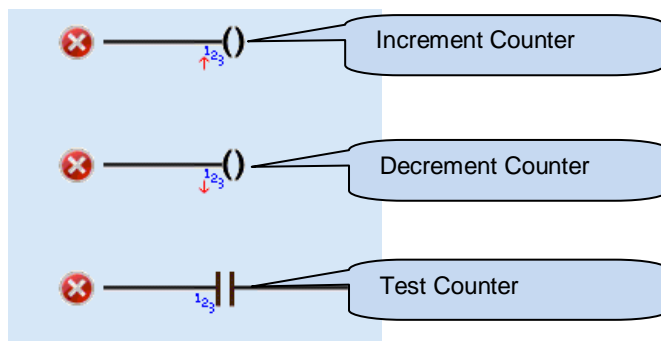
4.16.1.4 COUNTERS

The PLC logic section contains ten (10) user counters for use in the ladder.

A counter is configured by clicking **Counters** in the menu bar. The 'Edit counter limits' window appears.



A counter is used by incrementing (adding to) or decrementing (subtracting from) to the counter on the ladder. Upon the counter reaching the configured 'Counter limit', a test for the counter will be successful:



4.16.1.5 PLC FUNCTIONS

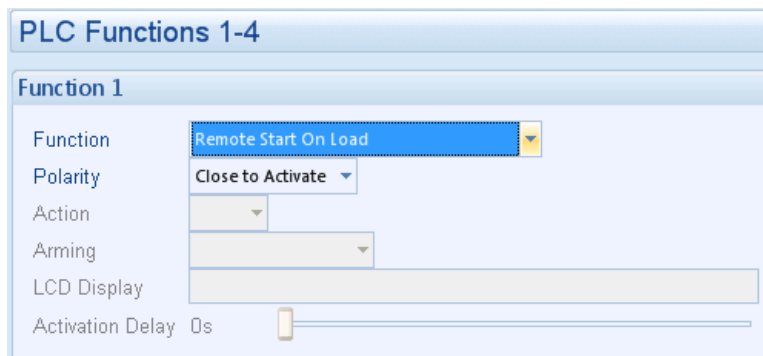
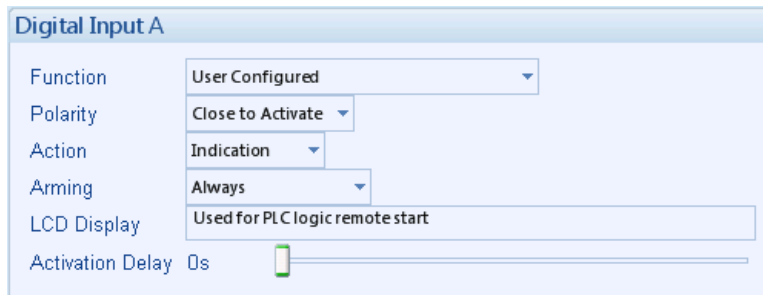
PLC Functions allow the PLC logic to create alarm conditions or drive 'virtual inputs' on the controller. A PLC function is configured in the same way as a module digital input:

Predefined Functions

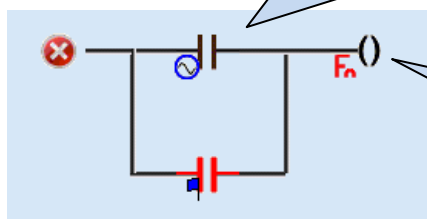


Predefined functions can only be used once in the DSE Configuration Suite. For example if digital input A is configured to 'remote start on load', another input cannot be configured to the same function. Similarly, a PLC function cannot be configured to this function either.

Where this is a required function, it is achieved by setting the digital input to "User Configured", "always active", "indication", and OR'ing this into the PLC condition as follows:



Condition: Battery Volts below 10V
OR Digital input A is active.



Action: Trigger PLC Function 1(Remote Start On Load)

User Defined alarms

Function 1

Function: User Configured

Polarity: Close to Activate

Action: Warning

Arming: Always

LCD Display

Activation Delay: 0s

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

Example of a user configured input



Close or open to activate

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

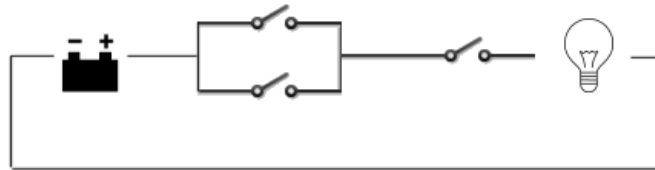
Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.

Click and drag to change the setting. This is used to give a delay on acceptance of the input. Useful for liquid level switches or to mask short term operations of the external switch device.

4.16.1.6 CREATING AND EDITING RUNGS

- Click a symbol in the tool bar and drag it to the bar () to create the first rung in your ladder.
- Click a symbol in the tool bar and drag it to a blank space below existing rungs to create a new rung.
- Click a symbol in the tool bar and drag it to the ladder diagram to place the symbol.
- To move a placed symbol, click and drag it to its new location.
- To copy a placed symbol, press the keyboard **CTRL** button, then click and drag the symbol to the location you want to copy it to.
- To delete a placed symbol, click on it, it changes colour to red, now press the keyboard **DELETE** button.
- Click  next to a rung to erase the entire rung.

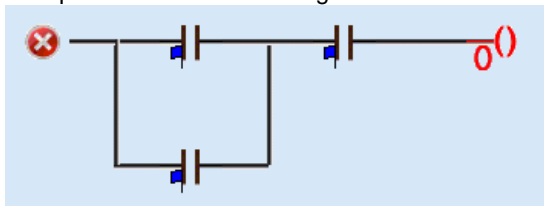
Imagine the schematic like a simple circuit with a battery and a bulb.



There are two switches (*Output sources*) in parallel to provide an **OR** function and one switch (*Output source*) in series to provide an **AND** function.

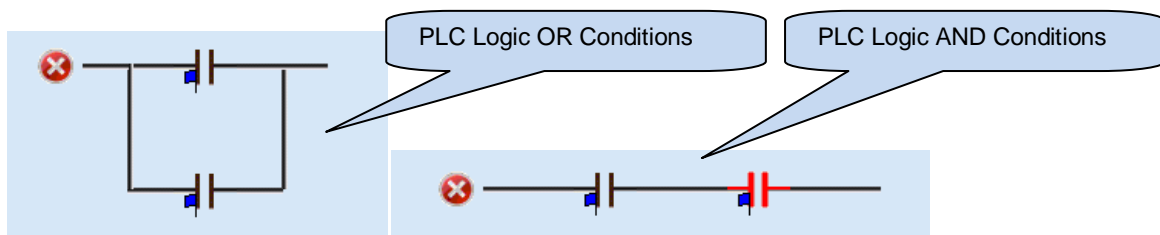
When the conditions are satisfied, the bulb will illuminate (The action will occur).

An equivalent PLC ladder rung looks like this :

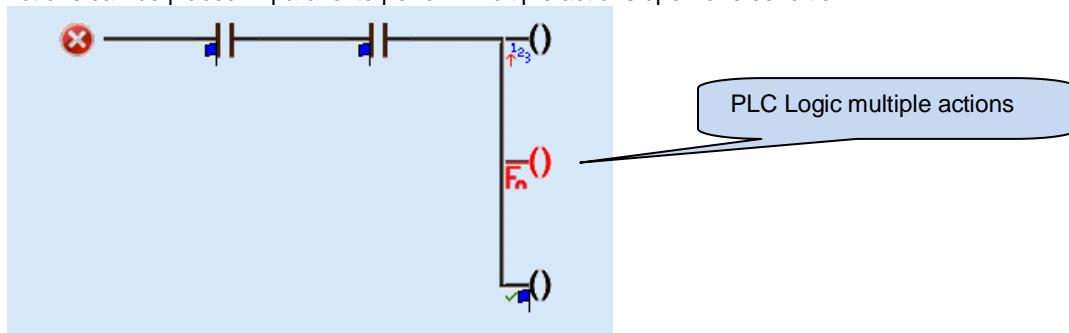


Rungs are processed in order (rung 1, rung 2, rung 3 etc). This sequence repeats every 100mS. Careless setting of the PLC logic can cause toggling of an output at a rate of 100mS on/off. This may shorten the life and/or cause damage to externally connected slave relays or other connected equipment.






Conditions can be placed in series to form an AND operation, or in parallel for form an OR operation:




Actions can be placed in parallel to perform multiple actions upon one condition:


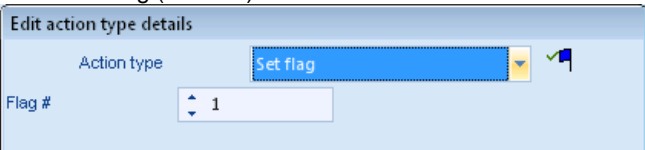



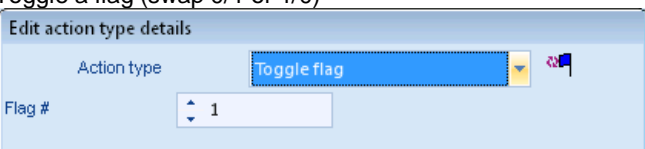

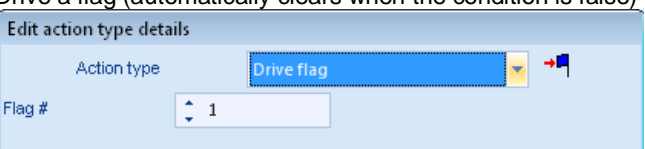

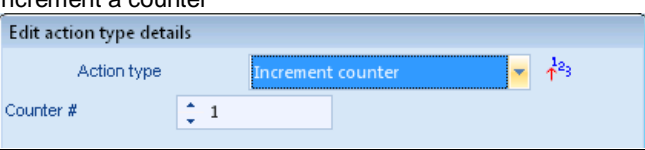

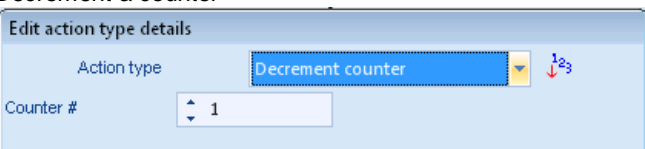

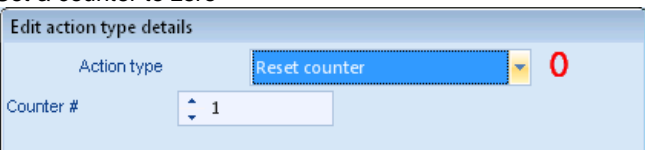

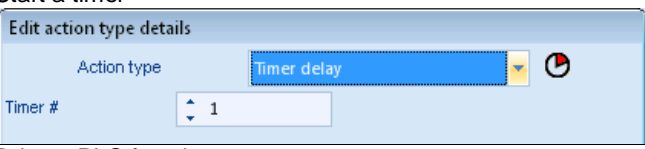

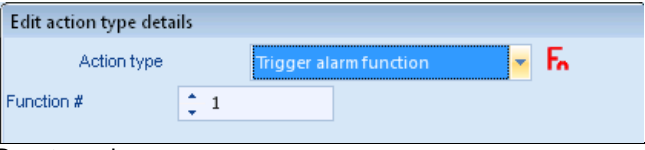

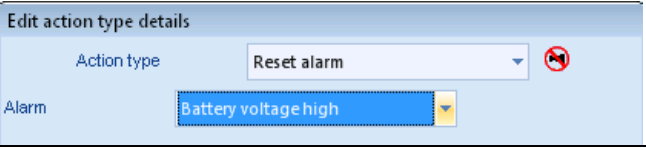


4.16.1.7 CONDITIONS

Conditions	
	<p>Test flag (for instance : test module inputs, test for certain condition)</p> <div data-bbox="357 293 1007 488"> <p>Edit condition type details</p> <p>Condition type Flag test</p> <p>Polarity Normally open</p> <p>Source Auto Mode</p> </div>
	<p>Test an instrumentation value</p> <div data-bbox="357 517 1023 786"> <p>Edit condition type details</p> <p>Condition type Instrumentation value</p> <p>Polarity Normally open</p> <p>Instrumentation Battery Voltage</p> <p>Test Less than</p> <p>Value 8.0V DC</p> </div>
	<p>Test a counter</p> <div data-bbox="357 815 1007 999"> <p>Edit condition type details</p> <p>Condition type Counter test</p> <p>Polarity Normally open</p> <p>Counter # 1</p> </div>
	<p>Test a timer</p> <div data-bbox="357 1028 1002 1223"> <p>Edit condition type details</p> <p>Condition type Timer test</p> <p>Polarity Normally open</p> <p>Timer # 1</p> </div>
	<p>Test for a specific time period in the day</p> <div data-bbox="357 1252 1007 1462"> <p>Edit condition type details</p> <p>Condition type Time of day</p> <p>Polarity Normally open</p> <p>Start 09:00 Duration 00:10</p> </div>

Conditions	
	<p>Test for a certain day</p> <div> <div> Edit condition type details </div> <div> <div>Condition type</div> <div>Day of week</div> </div> <div> <div>Polarity</div> <div>Normally open</div> </div> <div> <div>Day(s)</div> <div>Tuesday</div> <div> <input type="checkbox"/> Monday <input checked="" type="checkbox"/> Tuesday <input type="checkbox"/> Wednesday <input type="checkbox"/> Thursday <input type="checkbox"/> Friday <input type="checkbox"/> Saturday <input type="checkbox"/> Sunday </div> </div> <div> <div>OK</div> <div>Cancel</div> </div> </div>

4.16.1.8 ACTIONS

Actions	
	Set a PLC flag (Set to 1) 
	Reset a PLC flag (Set to 0) 
	Toggle a flag (swap 0/1 or 1/0) 
	Drive a flag (automatically clears when the condition is false) 
	Increment a counter 
	Decrement a counter 
	Set a counter to zero 
	Start a timer 
	Drive a PLC function 
	Reset an alarm 

4.16.1.9 EXAMPLES

AUTO MUTE after 30 seconds and provide a manual mute function using Digital Input C.

Function 1

Function: Alarm Mute

Polarity: Close to Activate

Action: []

Arming: []

LCD Display: []

Activation Delay: 0s

PLC Function 1 configured to Alarm Mute.

Digital Input C

Function: User Configured

Polarity: Close to Activate

Action: Indication

Arming: Always

LCD Display: Used by PLC for Alarm Mute

Activation Delay: 0s

Digital Input C configured to Indication. This input will be checked for by the PLC logic. Descriptive text placed in the "LCD Display" box for future reference. (LCD Display text does not appear on the screen for "indication" inputs).

PLC Logic

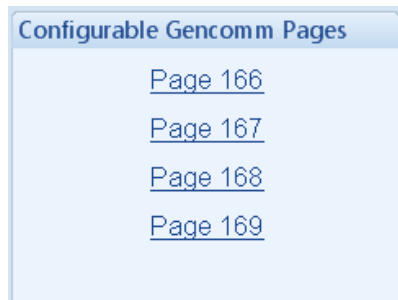
Counters Timers

Condition	Action
Flag Test (Audible Alarm)	Start Timer 1 (30 seconds)
If the audible alarm is active	Begin a 30 second delay

Condition	Action
Timer 1 expired OR Flag Test (Digital Input C)	Trigger Function (Alarm Mute)
When the timer expires OR Digital Input C is activated	Trigger the alarm mute function

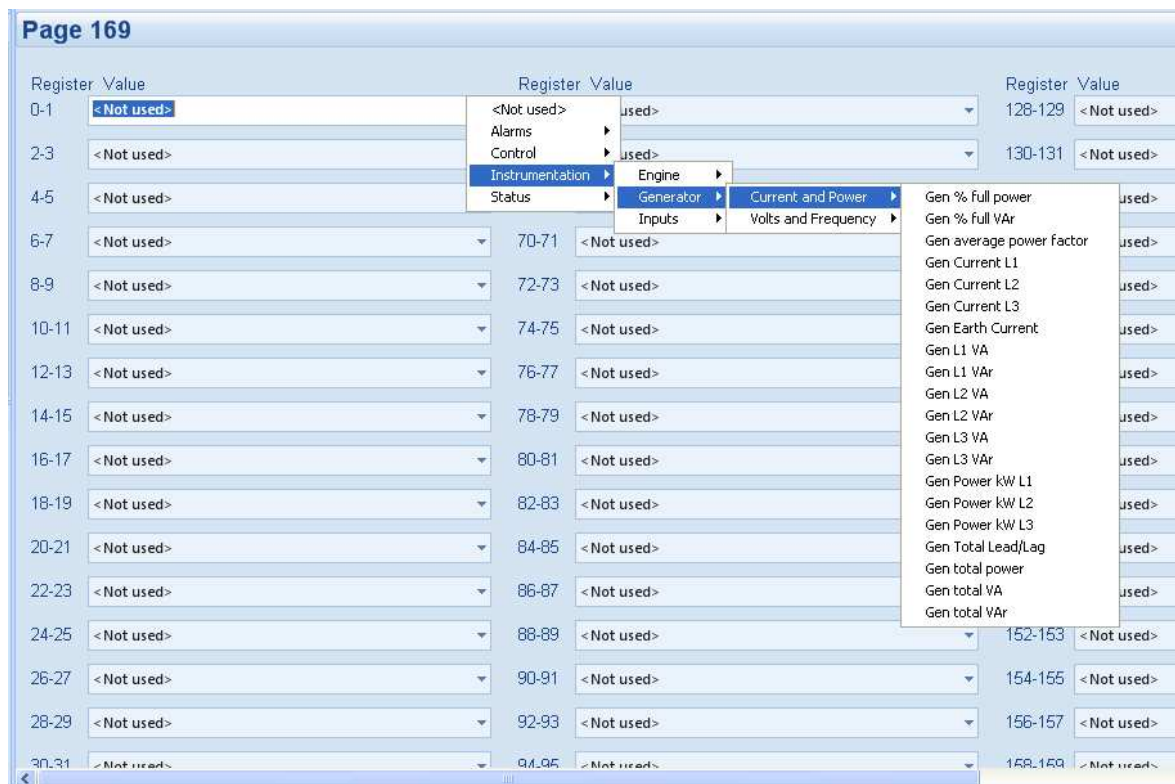
Drag a condition or action from the toolbar to start a new ladder rung.

4.16.2 CONFIGURABLE GENCOMM PAGES (DSE73XX MODEL ONLY)



There are 4 configurable Gencomm pages, the user can select which items go into these registers / pages that can be used for PLCs / Building Management systems. This speeds up the communication time as only a limited numbers of registers need to be read instead of polling all the registers within the module that are not necessary used.

4.16.2.1 PAGES 166~169

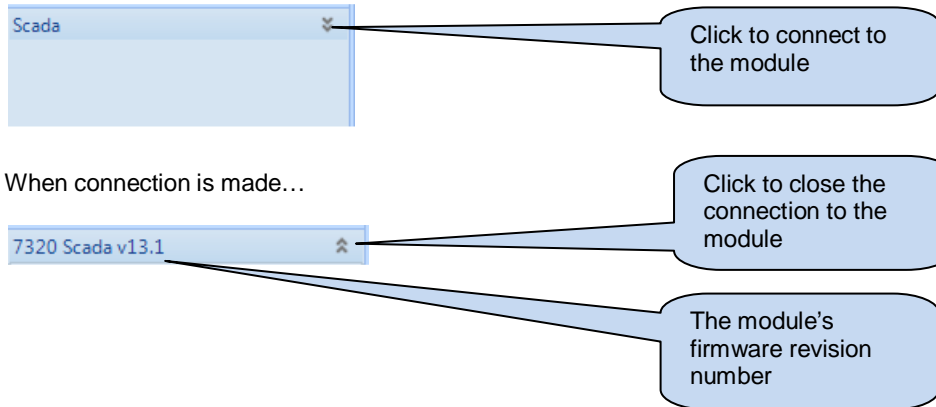


The registers (return a 32 bit value over 2 consecutive registers) can be configured from the grouped drop down boxes as shown above.

5 SCADA

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

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



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



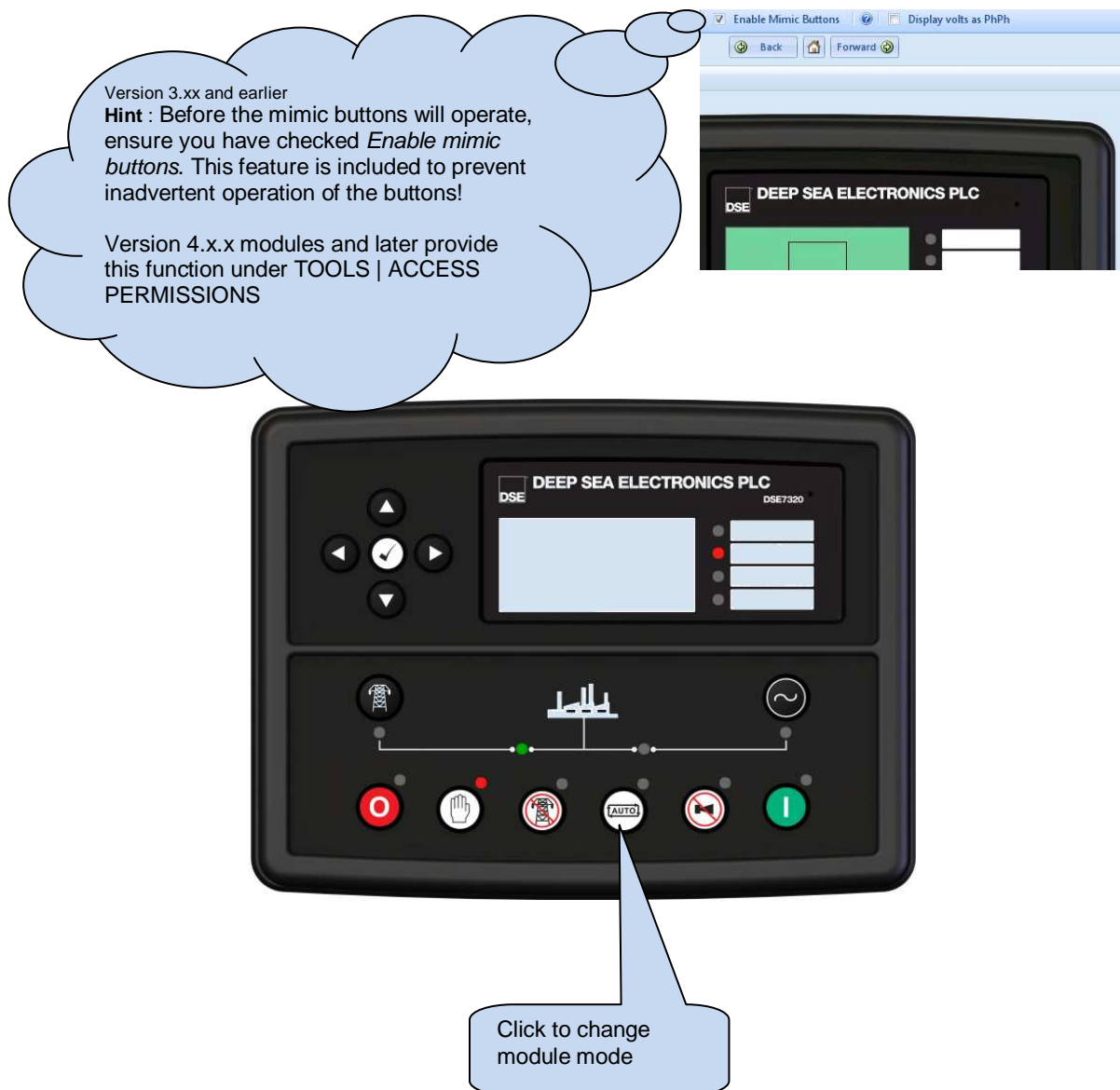
5.1 GENERATOR IDENTITY

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

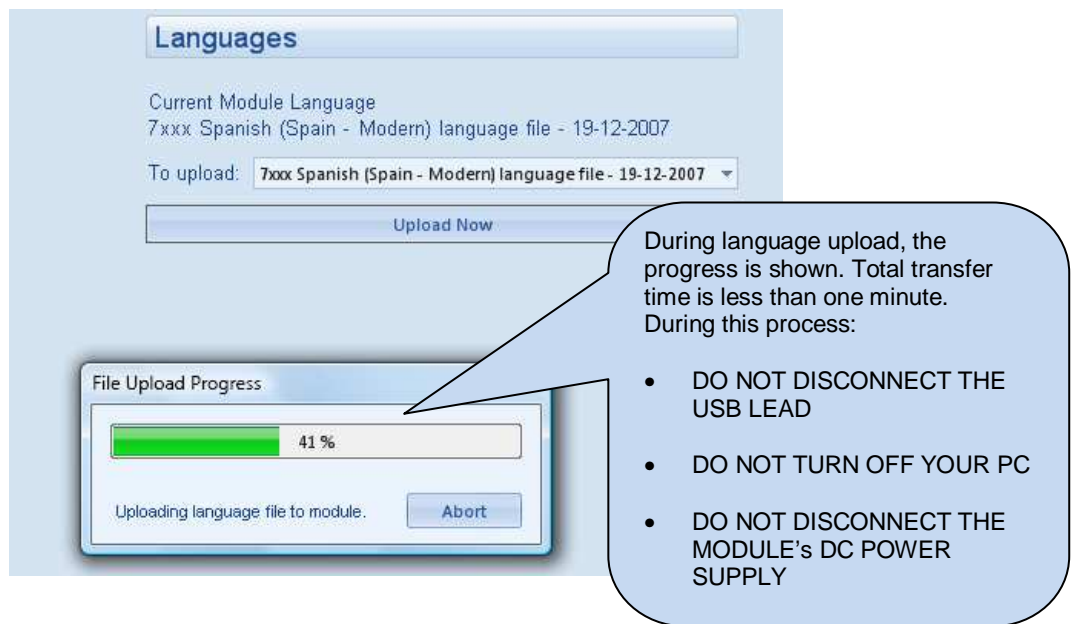
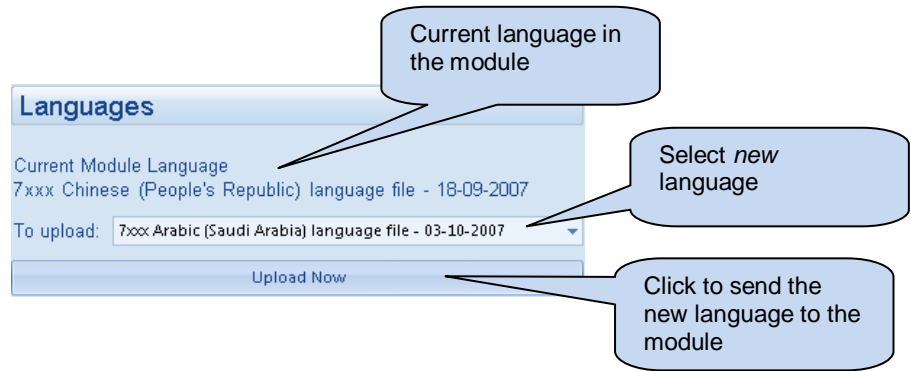
Generator Identity	
Site Identity	Deep Sea Electronics Head Office
Genset Identity	Volvo TAD941 GE

5.2 MIMIC

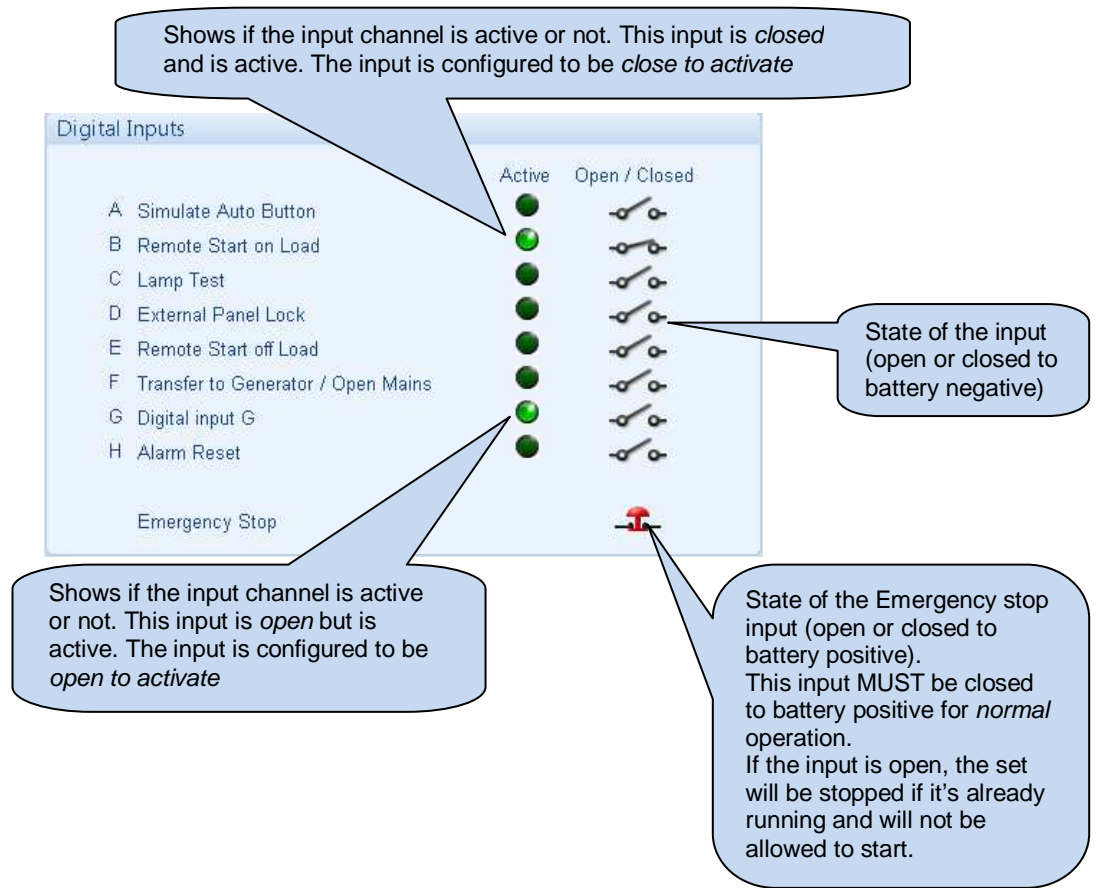
This screen provides a mimic of the control module and allows the operator to change the control mode of the module.



















5.3 LANGUAGES



5.4 DIGITAL INPUTS



5.5 DIGITAL OUTPUTS

Digital Outputs (Supplied from Emergency Stop Input)		
		Active Open / Closed
A	Fuel Relay	 
B	Start Relay	 
Digital Outputs (Volts Free)		
		Active Open / Closed
C (N/C)	Close Mains Output	 
D	Close Gen Output	 
Digital Outputs (DC Supply Out)		
		Active Open / Closed
E	Not Used	 
F	Not Used	 
G	Not Used	 
H	Not Used	 

Shows if the output channel is active or not. This output is *closed* but is active. The output is configured to be *Close Mains de-energise*. As the relay is normally closed (N/C) and the *Close Mains* source is not present, the relay is *activated* to *open* the N/C relay.

State of the output (open or closed)

5.6 VIRTUAL LEDS

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

Virtual LEDs

LED Status

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

Shows if the Virtual LED is active or not

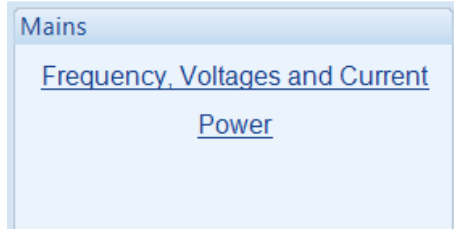
Shows what the Virtual LED is configured for (shows the LED number if not configured)

5.7 MAINS



DSE7220 / DSE7320 AMF MODULES ONLY.

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



5.7.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the module's measurements of the mains supply (7220/7320 only).

Mains			
Frequency			
49.9 Hz			
Phase Rotation			
L1-L2-L3			
Phase To Neutral Voltages			
L1 - N 230.2 V	L2 - N 226.9 V	L3 - N 231.6 V	
Phase To Phase Voltages			
L1 - L2 395.1 V	L2 - L3 397.2 V	L3 - L1 401.0 V	
Mains Current			
L1 85.0 A	L2 86.0 A	L3 86.0 A	
Earth Current			
27.0 A			

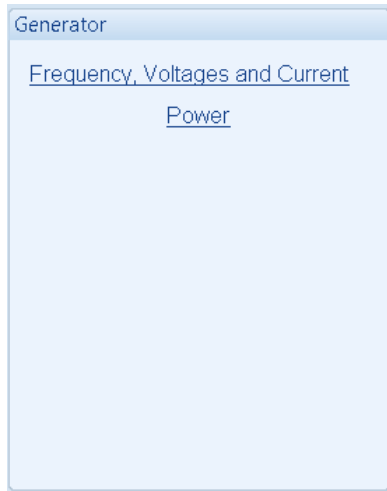
5.7.2 POWER

Shows the module's measurements of the mains supply power (7220/7320 only).

Power			
Watts			
L1 5.6 kW	L2 5.5 kW	L3 5.6 kW	Total 16.7 kW
VA			
L1 6.6 kVA	L2 6.5 kVA	L3 6.6 kVA	Total 19.7 kVA
VAr			
L1 3.9 kVAr	L2 3.9 kVAr	L3 3.9 kVAr	Total 19.7 kVAr
Power factor			
L1 0.85	L2 0.84	L3 0.85	Average 0.85
Accumulated Power			
kWh 1.6 kWh	kVAh 1.9 kVAh	kVArh 1.1 kVArh	

5.8 GENERATOR

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



5.8.1 FREQUENCY, VOLTAGES AND CURRENT

Shows the module's measurements of the generator supply.

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

5.8.2 POWER

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

Watts				
L1 0.0 kW 0.0 %	L2 0.0 kW 0.0 %	L3 0.0 kW 0.0 %	Total 0.0 kW 0.0 %	
VA				
L1 0.0 kVA	L2 0.0 kVA	L3 0.0 kVA	Total 0.0 kVA	
VAr				
L1 0.0 kVAr	L2 0.0 kVAr	L3 0.0 kVAr	Total 0.0 kVAr 0.0 %	
Power Factor				
L1 ---	L2 ---	L3 ---	Average ---	
Accumulated Power				
kWh 299.0 kWh	kVAh 330.3 kVAh	kVArh 112.8 kVArh		

5.9 ENGINE

Shows the module's measurements of the engine parameters.

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

5.10 FLEXIBLE SENSOR

Shows the measurement of the Flexible Sensor (If configured)

Flexible Sender
Temperature Sender

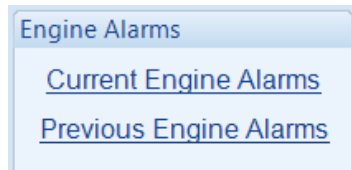
5.11 ALARMS

Shows any present alarm conditions.

Shutdown Alarms	Warning Alarms
EM Stop	Fail to stop
Electrical Trip Alarms	

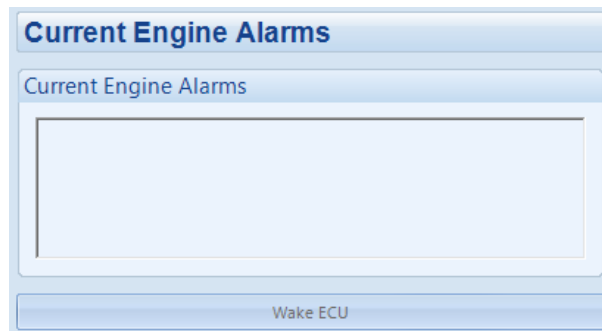
5.12 ENGINE ALARMS

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



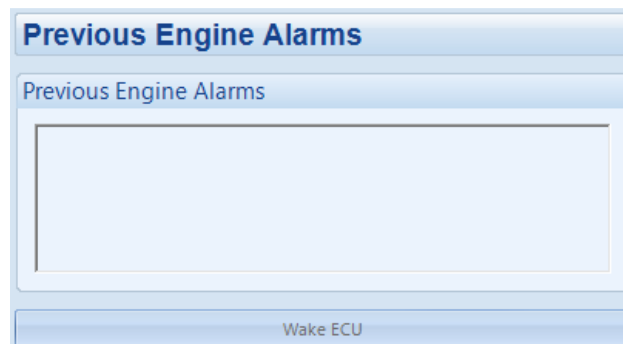
5.12.1 CURRENT ENGINE ALARMS

Shows the current engine alarms.



5.12.2 PREVIOUS ENGINE ALARMS

Shows the previous engine alarms.



5.13 STATUS

Shows the module's current status.

Status

Supervisor State

Software Version

255.255

Engine/Generator State

Module ID

Mains Detection State

Mode



Load Switching State

Protections

Enabled

Heater Fitted

5.14 EVENT LOG

Shows the contents of the module's event log.

The limit of the event log is 100 events on the 72xx series and 250 events on the 73xx series.

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

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

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

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

Click to print the log

5.15 ENHANCED CANBUS

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

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

5.16 REMOTE CONTROL

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

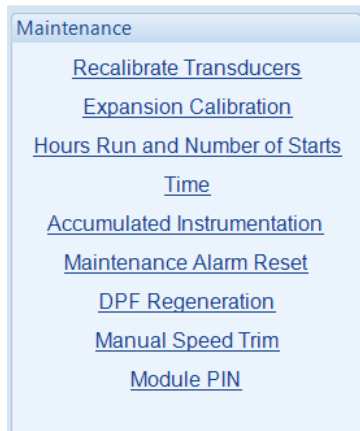
Any of the module outputs, expansion outputs, LED indicators, or remote Annunciator LEDs can be configured to *Remote Control 1-10*. This output source is energised/de-energised by click the respective check box as shown below in the *Activate* column below.

The interface is titled "Remote Control" and contains a sub-section "Remote Control Sources". It displays a table with three columns: "Control", "Activate", and "Active". The "Control" column lists numbers 1 through 10. The "Activate" column contains checkboxes, all of which are currently unchecked. The "Active" column contains status indicators, all of which are currently active (represented by solid black circles).

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

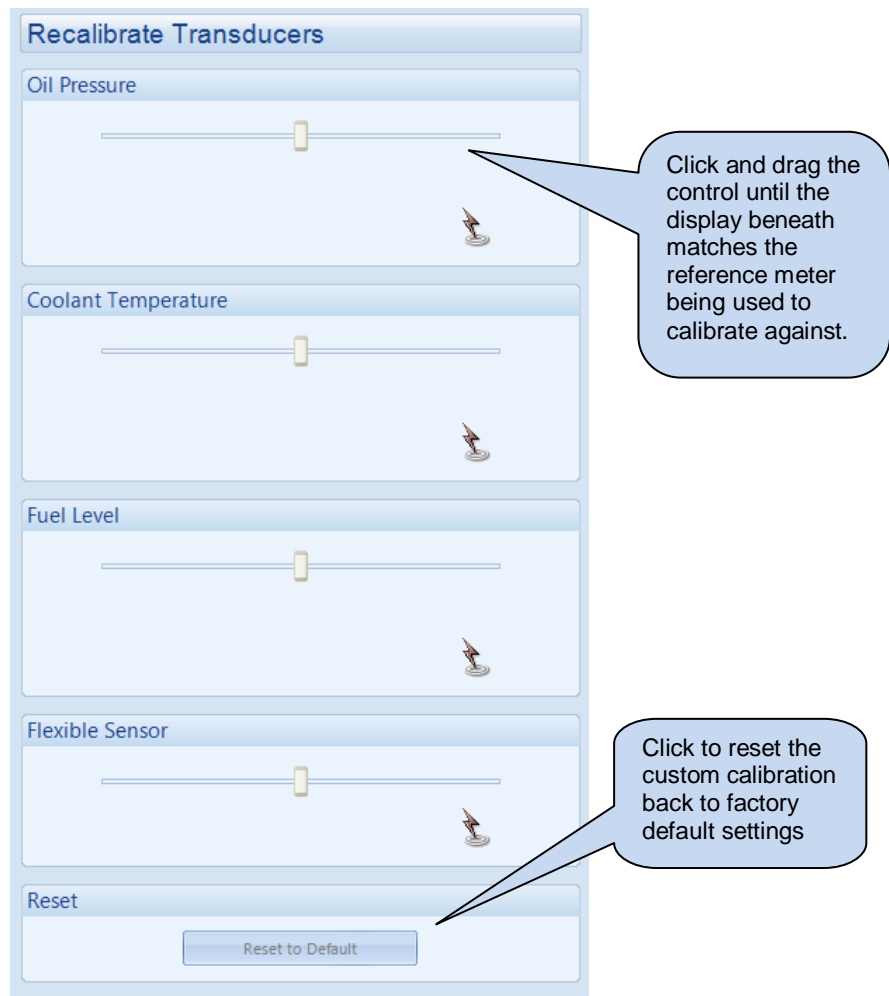
5.17 MAINTENANCE

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



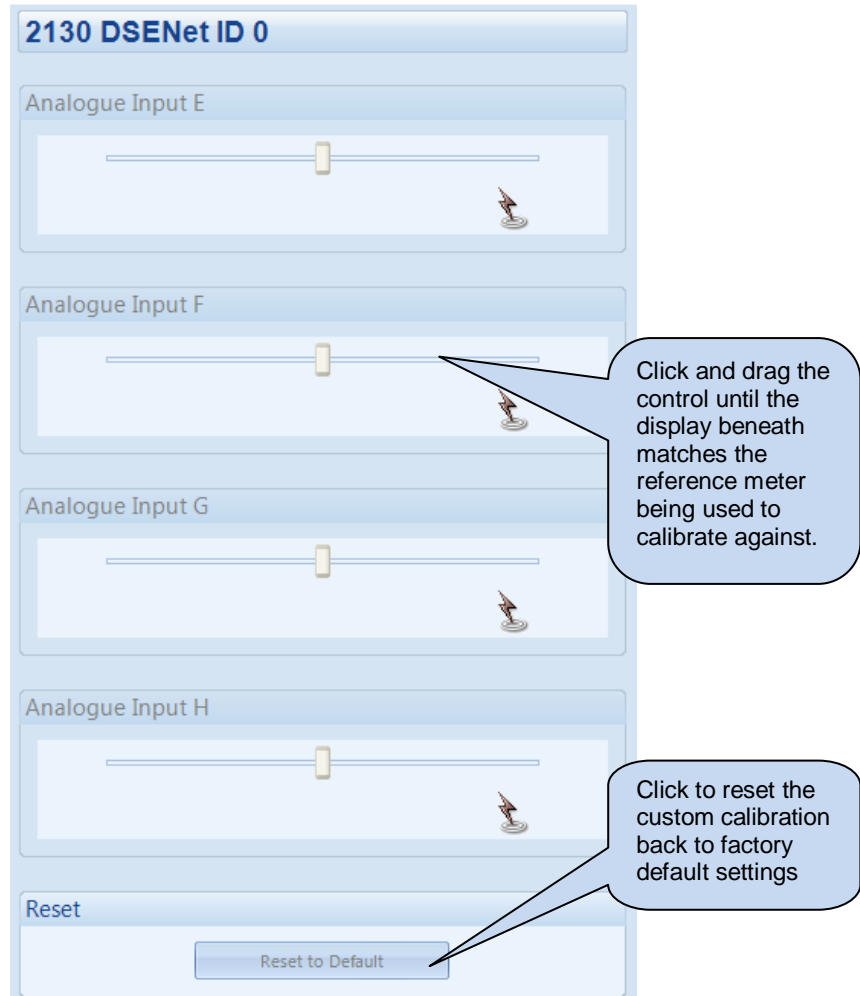
5.17.1 RECALIBRATE TRANSDUCERS

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



5.17.2 EXPANSION CALIBRATION

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



5.17.3 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 generator so that the controller display matches the amount of work previously done by the system.

The screenshot shows two sections: 'Hours Run' and 'Number of Starts'. Each section has a text field, a numeric input field with up/down arrows, and a 'Set' button. Callout boxes provide instructions: 'Type the value or click the up and down arrows to change the settings' points to the 'Set' button in the 'Hours Run' section, and 'Click to perform the adjustment on the module' points to the 'Set' button in the 'Number of Starts' section.

Hours Run

Hours Run: 02:01 [up/down arrows] 02:01 [Set]

Number of Starts

No. of Starts: 62 [up/down arrows] 62 [Set]

5.17.4 TIME

The screenshot shows three sections: 'Module Date', 'Module Time', and 'Set Date and Time'. The 'Module Date' and 'Module Time' sections display the current date and time. The 'Set Date and Time' section has input fields for Date and Time, each with up/down arrows, and a 'Set' button. Below these is a 'Set to PC Time' section with a 'Set to PC Time' button. Callout boxes provide instructions: 'Display of the module's current date and time' points to the 'Module Time' display; 'Type the new date / time or click the up and down arrows to change the settings' points to the 'Set Date and Time' input fields; 'Click Set to adjust the module to the selected date/time.' points to the 'Set' button; and 'Click Set to adjust the module to the date/time that your PC is set to.' points to the 'Set to PC Time' button.

Module Date

18/10/2007

Module Time

04:52:39

Set Date and Time

Date [up/down arrows] 18/10/2007

Time [up/down arrows] 04:52:35

[Set]

Set to PC Time

Date 18/10/2007

Time 10:52:41

[Set to PC Time]

5.17.5 ACCUMULATED INSTRUMENTATION

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

The screenshot displays a web-based interface for managing accumulated instrumentation. It features four main sections: kWh, kVAh, kVArh, and a Reset section. Each section shows a current value, a text input field for a new value, and a 'Set' button. The kWh section shows 154.0 kWh with a 'Set' button. The kVAh section shows 100.0 kVAh with a 'Set' button. The kVArh section shows 85.0 kVArh with a 'Set' button. The Reset section contains a 'Reset all values to zero' button. Callouts provide instructions: 'Display of the module's current value for the parameter' points to the kWh value; 'Type the new value or click the up and down arrows to change the settings' points to the kWh input field; 'Click Set to adjust the module to the selected value' points to the kWh 'Set' button; and 'Click to reset all the accumulated instrumentation counters to zero.' points to the 'Reset all values to zero' button.

Display of the module's current value for the parameter

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

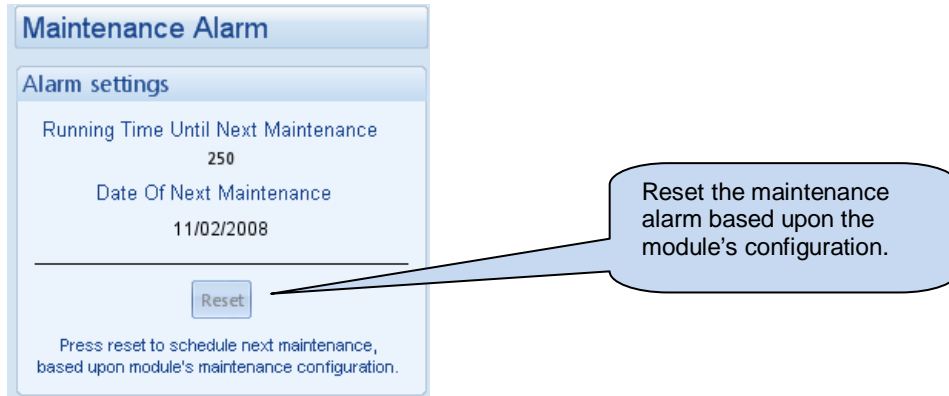
Click Set to adjust the module to the selected value

Click to reset all the accumulated instrumentation counters to zero.

5.17.6 MAINTENANCE ALARM RESET

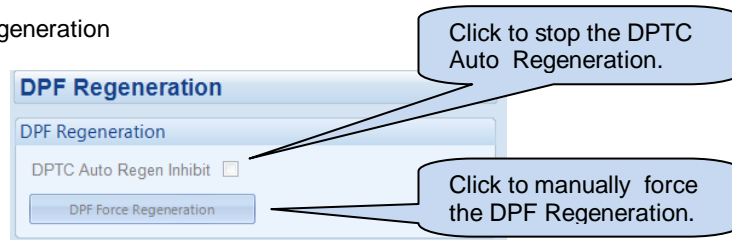
NOTE: Maintenance Alarm is supported in V2.1 and later modules only.
Maintenance alarms 2 and 3 supported in V3.0 and later modules only.

Depending upon module version, there may be up to three maintenance alarms active in the control module. Each is reset individually:



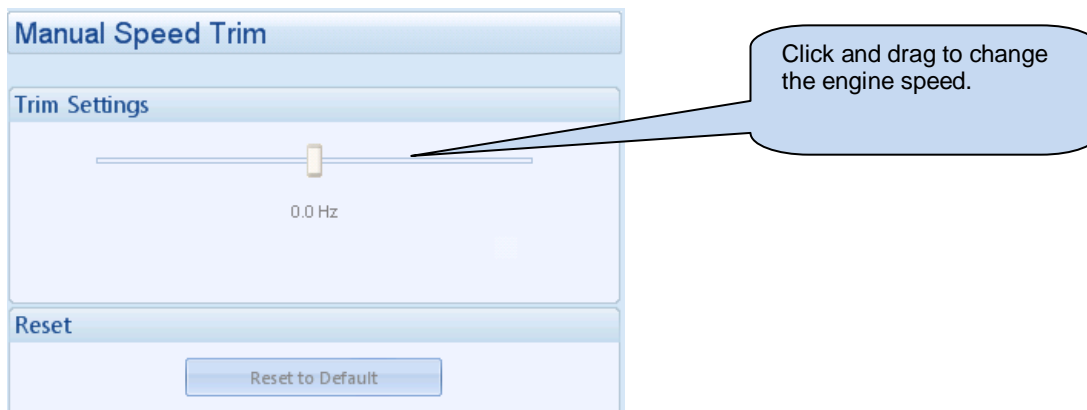
5.17.7 DPF REGENERATION

Allows control over the DPF regeneration



5.17.8 MANUAL SPEED TRIM

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



5.17.9 MODULE PIN



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

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

Module PIN

Module Access Password

Password

Confirmation

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

Set PIN

Enter the desired PIN number and reconfirm.

Click to set the PIN number in the module.

5.18 EXPANSION

This section is subdivided into smaller sections to allow the monitoring of the connected expansion inputs/outputs modules.

Expansion

[2130 Input Modules](#)

[2157 Relay Modules](#)

[2548 Annunciator Modules](#)

5.18.1 2130 INPUT MODULES

Click to select the connected expansion device to monitor the status.

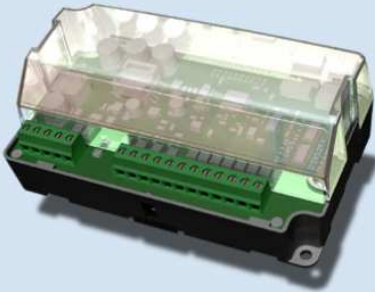
2130 Input Modules

[DSENet ID 0](#)

[DSENet ID 1](#)

[DSENet ID 2](#)

[DSENet ID 3](#)



Expansion Inputs

Communications

Communications OK 

Inputs

	Active	Open / Closed
A 2130 Expansion Module ID0 Digital Input A		
B 2130 Expansion Module ID0 Digital Input B		
C 2130 Expansion Module ID0 Digital Input C		
D 2130 Expansion Module ID0 Digital Input D		
E		
F		
G		
H		

Communications Link status LED.

State of the input (open or closed to battery negative)

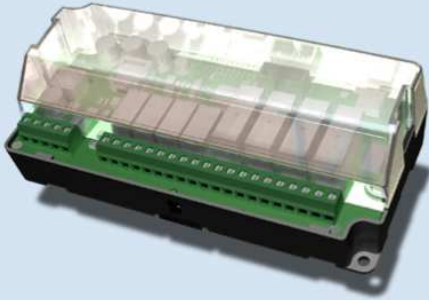
Shows if the input channel is active or not.

5.18.2 2157 RELAY MODULES

Click to select the connected expansion device to monitor the status.

2157 Relay Modules

[DSENet ID 0](#)
[DSENet ID 1](#)
[DSENet ID 2](#)
[DSENet ID 3](#)
[DSENet ID 4](#)
[DSENet ID 5](#)
[DSENet ID 6](#)
[DSENet ID 7](#)
[DSENet ID 8](#)
[DSENet ID 9](#)







Relay Outputs





Communications

Communications OK ●

Relay Outputs (Normally Open)

	Active	Open / Closed
A	●	
B	●	
C	●	
D	●	

Relay Outputs (Changeover)

	Active	Open / Closed
E	●	
F	●	
G	●	
H	●	


Communications Link status LED.

5.18.3 2548 ANNUNCIATOR MODULES

Click to select the connected expansion device to monitor the status.

2548 Annunciator Modules

- [DSENet ID 0](#)
- [DSENet ID 1](#)
- [DSENet ID 2](#)
- [DSENet ID 3](#)
- [DSENet ID 4](#)
- [DSENet ID 5](#)
- [DSENet ID 6](#)
- [DSENet ID 7](#)
- [DSENet ID 8](#)
- [DSENet ID 9](#)



LED Outputs

Communications

Communications OK

LED Indicators

	Active
A	
B	
C	
D	
E	
F	
G	
H	
Sounder	

Communications Link status LED.

6 ALARM TYPES

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

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