



DEEP SEA ELECTRONICS

DSE4610 & DSE4620

Configuration Suite PC Software Manual

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DSE4610 & DSE4620 Configuration Suite PC Software Manual

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Amendments Since Last Publication

| Amd. No. | Comments |
|----------|--|
| 1 | Initial release |
| 2 | Updated for V1.3 |
| 3 | Updated for V1.4 |
| 4 | Updated to add crank disconnect on oil pressure delay. |

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

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1 INTRODUCTION

This document details the use of the *DSE Configuration Suite PC Software* with the DSE4610 and DSE4620 modules, which are part of the DSE Genset® range of products.

The manual forms part of the product and should be kept for the entire life of the product. If the product is passed or supplied to another party, ensure that this document is passed to them for reference purposes.

This is not a *controlled document*. DSE do not automatically inform on updates. Any future updates of this document are included on the DSE website at www.deepseaelectronics.com




The *DSE Configuration Suite PC Software* allows the DSE4610 and DSE4620 modules to be connected to a PC via USB A to USB B cable (USB printer cable). Once connected, the software allows easy, controlled access to various operating parameters within the module which can then be viewed and edited as required.

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

The information contained in this manual must be read in conjunction with the information contained in the appropriate module documentation. This manual only details which settings are available and how they may be used. Separate manuals deal with the operation of the individual module and its ancillaries, refer to section entitled *Bibliography* elsewhere in this document for further information.

1.1 CLARIFICATION OF NOTATION

Clarification of notation used within this publication.

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

1.2 GLOSSARY OF TERMS

| Term | Description |
|---------------------|---|
| DSE4000, DSE4xxx | All modules in the DSE4xxx range. |
| DSE4600, DSE46xx | All modules in the DSE46xx range. |
| DSE4610 | DSE4610 module/controller |
| DSE4620 | DSE4620 module/controller |
| CT | Current Transformer An electrical device that takes a large AC current and scales it down by a fixed ratio to a smaller current. |
| HMI | Human Machine Interface A device that provides a control and visualisation interface between a human and a process or machine. |
| IDMT | Inverse Definite Minimum Time |
| IEEE | Institute of Electrical and Electronics Engineers |
| LED | Light Emitting Diode |
| PLC | Programmable Logic Controller A programmable digital device used to create logic for a specific purpose. |
| SCADA | Supervisory Control And Data Acquisition A system that operates with coded signals over communication channels to provide control and monitoring of remote equipment |

1.3 BIBLIOGRAPHY

This document refers to, and is referred by the following DSE publications which are obtained from the DSE website: www.deepseaelectronics.com or by contacting DSE technical support: support@deepseaelectronics.com.

1.3.1 INSTALLATION INSTRUCTIONS

Installation instructions are supplied with the product in the box and are intended as a 'quick start' guide only.

| DSE Part | Description |
|----------|---|
| 053-156 | DSE4610 & DSE4620 Installation Instructions |

1.3.2 MANUALS

Product manuals are obtained from the DSE website: www.deepseaelectronics.com or by contacting DSE technical support: support@deepseaelectronics.com.

| DSE Part | Description |
|----------|---|
| 057-151 | DSE Configuration Suite PC Software Installation & Operation Manual |
| 057-200 | DSE4610 & DSE4620 Operator Manual |

1.3.3 TRAINING GUIDES

Training guides are provided as 'hand-out' sheets on specific subjects during training sessions and contain specific information regarding to that subject.

| DSE Part | Description |
|----------|--|
| 056-005 | Using CTs With DSE Products |
| 056-010 | Over Current Protection |
| 056-022 | Switchgear Control |
| 056-026 | kVA, kW, kvar and Power Factor |
| 056-029 | Smoke Limiting |
| 056-055 | Alternate Configurations |
| 056-069 | Firmware Update |
| 056-091 | Equipotential Earth Bonding |
| 056-092 | Best Practices for Wiring Restive Sensors |
| 056-095 | Remote Start Input Functions |
| 056-097 | USB Earth Loops and Isolation |
| 056-099 | Digital Output to Digital Input Connection |

1.3.4 THIRD PARTY DOCUMENTS

The following third party documents are also referred to:

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

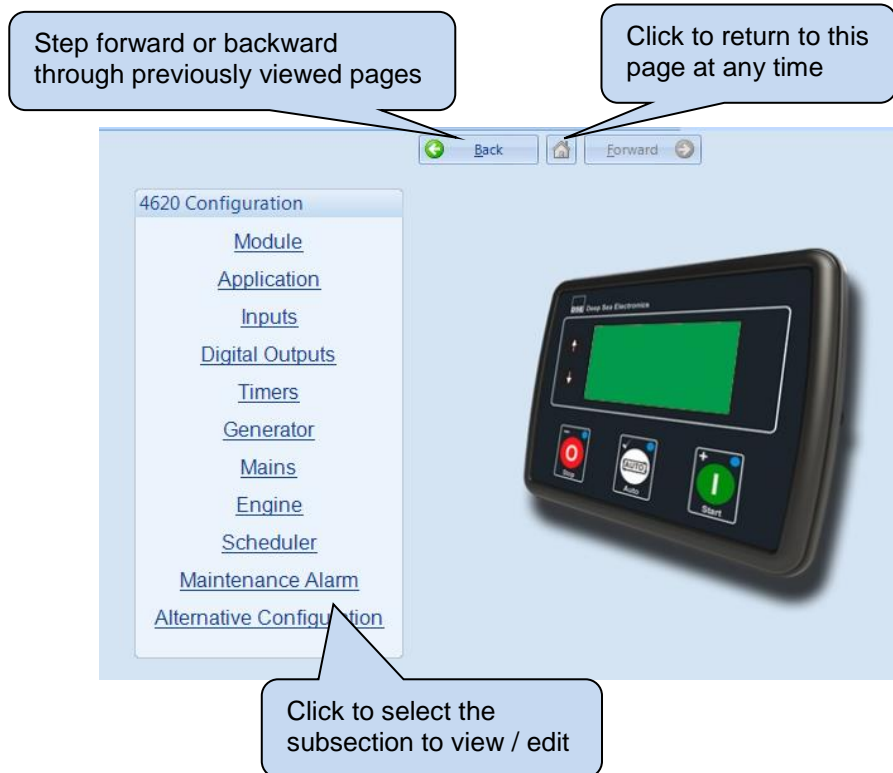
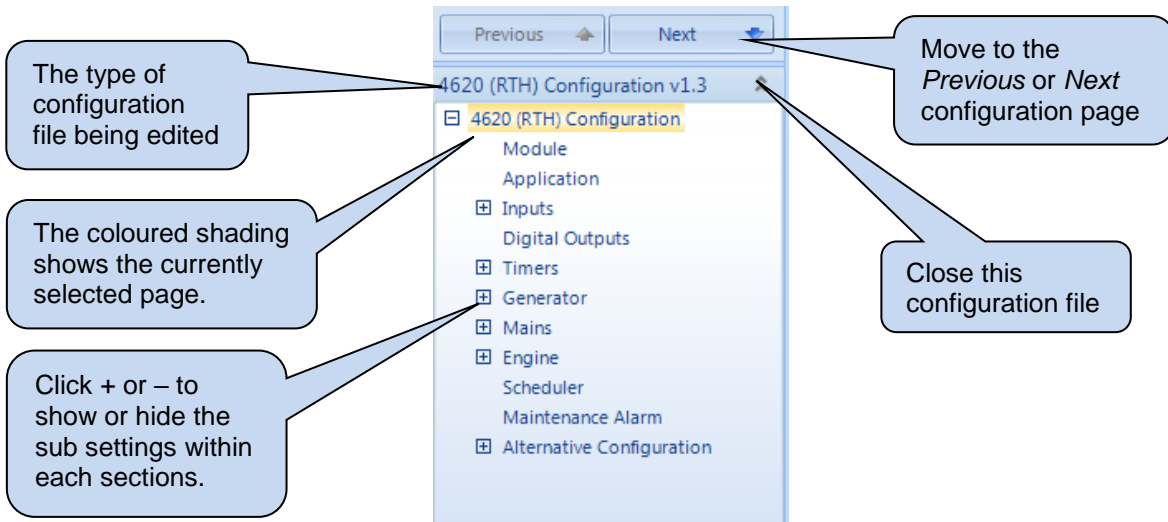
1.4 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

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

2 EDITING THE CONFIGURATION

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

2.1 SCREEN LAYOUT



2.2 MODULE



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

The screenshot shows a configuration window titled 'Module'. It is divided into two main sections: 'Module Options' and 'Instrumentation Suppression'. The 'Module Options' section contains ten items, each with a checkbox or a dropdown menu. The 'Instrumentation Suppression' section contains a list of parameters with checkboxes next to them. A callout box points to the 'Power Factor' checkbox with the text: 'Tick to hide the parameter on the module display.'

| Module Options | |
|----------------------------------|--------------------------|
| Lamp test at power up | <input type="checkbox"/> |
| Protected Start Mode | <input type="checkbox"/> |
| Power Save Mode Enable | <input type="checkbox"/> |
| Deep Sleep Mode Enable | <input type="checkbox"/> |
| Event Log In Hours Run | <input type="checkbox"/> |
| Enable Fast Loading | <input type="checkbox"/> |
| Maintenance Pin Protected Enable | <input type="checkbox"/> |
| Enable Cool Down In Stop Mode | <input type="checkbox"/> |
| Power Up In Mode | Stop ▾ |
| All warnings are latched | <input type="checkbox"/> |

| Instrumentation Suppression | |
|---|--------------------------|
| Suppress the following instrumentation on the module screen | |
| Generator Frequency | <input type="checkbox"/> |
| Mains Voltage | <input type="checkbox"/> |
| Current | <input type="checkbox"/> |
| kW | <input type="checkbox"/> |
| kVAr | <input type="checkbox"/> |
| kVA | <input type="checkbox"/> |
| Generator Voltage | <input type="checkbox"/> |
| Mains Frequency | <input type="checkbox"/> |
| Power Factor | <input type="checkbox"/> |
| kWh | <input type="checkbox"/> |
| kVArh | <input type="checkbox"/> |
| kVAh | <input type="checkbox"/> |

Parameters detailed overleaf...

| Miscellaneous Options | |
|---|--|
| Lamp Test At Power Up | <input type="checkbox"/> = Feature disabled <input checked="" type="checkbox"/> = The LEDs on the module's fascia all illuminate when the DC power is applied as a 'lamp test' feature. |
| Protected Start Mode | If enabled, the start button must be pressed twice to confirm manual start request |
| Power Save Mode Enable | <input type="checkbox"/> = Normal operation <input checked="" type="checkbox"/> = Module goes into power save (low current) mode after 1m of inactivity in STOP mode. Press any button to 'wake' the module. |
| Deep Sleep Mode Enable | (Available only if Power Save Mode is Enabled) When enabled, the module goes into a deeper sleep state with maximum power saving |
| Event log in Hours Run | <input checked="" type="checkbox"/> = The engine run hours is added to the recorded event in the event log |
| Enable Fast Loading | <input type="checkbox"/> = Normal Operation, the safety on timer is observed in full. This feature is useful if the module is to be used with some small engines where pre-mature termination of the delay timer can lead to overspeed alarms on start up. <input checked="" type="checkbox"/> = The module terminates the safety on timer once all monitored parameters have reached their normal settings. This feature is useful if the module is to be used as a standby controller as it allows the generator to start and go on load in the shortest possible time. |
|  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.) | |
| Maintenance PIN Protected Enable | Maintenance alarm reset through the front panel editor is PIN protected |
| Enable Cool Down in Stop Mode | Changes the way the module reacts to the Stop button. <input type="checkbox"/> =if the engine is running on load and the stop button is pressed, the module opens the breaker and directly shutdown the engine. <input checked="" type="checkbox"/> = if the engine is running and the breaker is closed, the module opens the breaker, wait for the cool down timer to expire, then shutdown the engine. |
|  NOTE: - If the engine is running with the breaker open, the module always shutdown the engine directly even if this option is enabled. | |
| Power Up in Mode | Select the mode that the module enters when DC power is applied. Available modes to select from: Auto, Manual, Stop mode |
| All Warnings Are Latched | <input type="checkbox"/> = Normal Operation, the warnings and pre-alarms automatically reset once the triggering condition has cleared. <input checked="" type="checkbox"/> = Warnings and pre-alarms latch when triggered. Resetting the alarm is performed by either an external reset applied to one of the inputs or, the 'Stop/Reset' pushbutton must be operated (once the triggering condition has been cleared). |

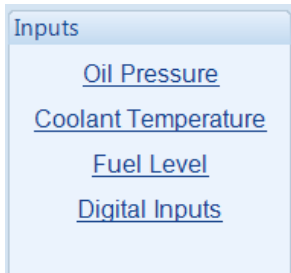
2.3 APPLICATION

The screenshot shows a configuration window titled 'Application'. Under the 'Engine Options' section, there is a dropdown menu for 'Engine Type' which is currently set to 'Conventional Engine'.

| Parameter | Description |
|-------------|---|
| Engine Type | <p>Select the appropriate engine type</p> <p>Conventional Engine: Select this for a traditional (non-electronic) engine, either Energise to Run or Energise to Stop.</p> <p>Conventional Gas Engine: Select this for a traditional (non-electronic) engine and require Gas engine functionality. This enables control of configurable outputs for <i>Gas Choke and Gas Ignition</i> and instructs the module to follow the gas engine timers.</p> |

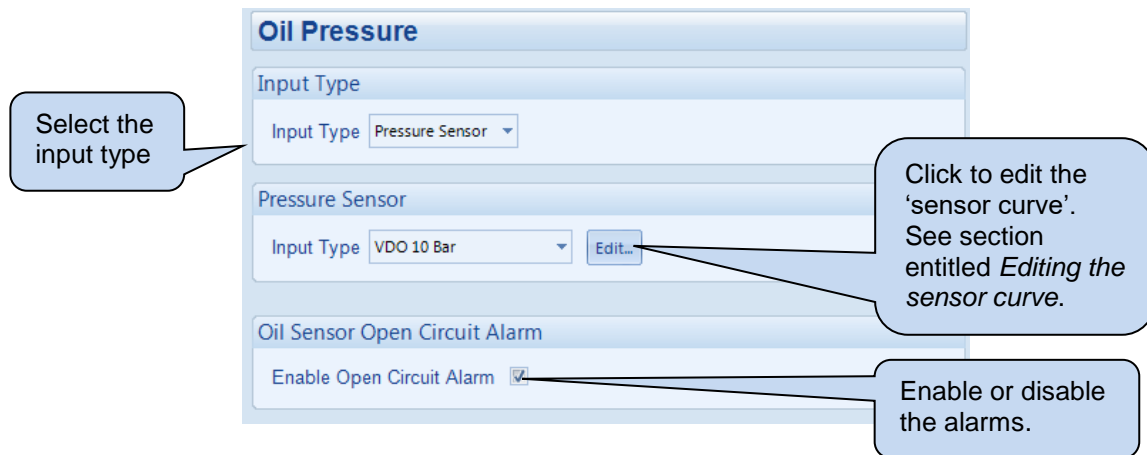
2.4 INPUTS

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



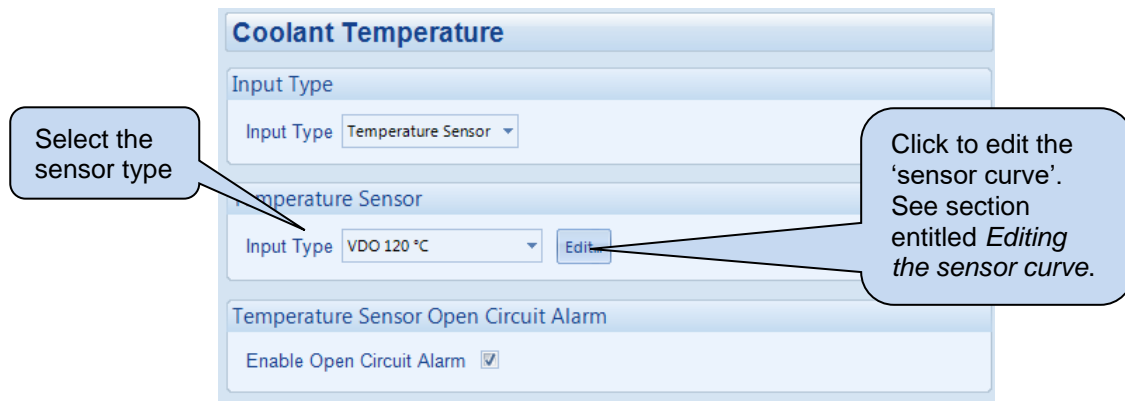
2.4.1 OIL PRESSURE

This section allows the configuration of the oil pressure input.



2.4.2 COOLANT TEMPERATURE

This section allows the configuration of the coolant temperature input.



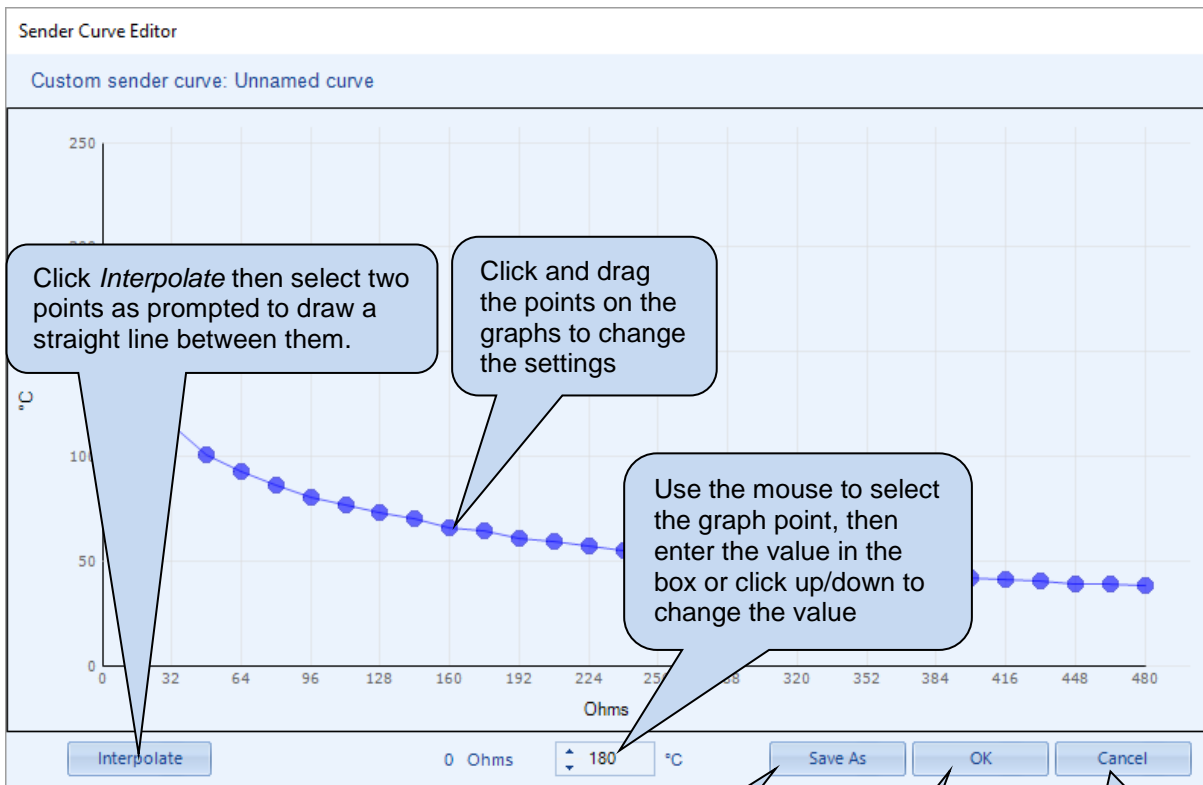
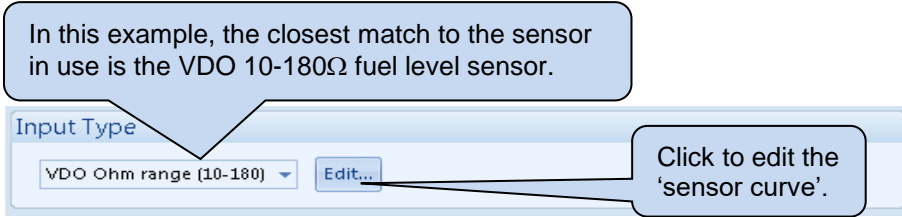
2.4.3 FUEL LEVEL

This section allows the configuration of the fuel level input.

The screenshot shows the 'Fuel Level' configuration window, divided into three main sections: 'Sender Usage', 'Input Type', and 'Sensor Alarms'. The 'Sender Usage' section includes a dropdown for 'Use sender as' set to 'Fuel level sensor'. The 'Input Type' section shows 'VDO Ohm range (10-180)' with an 'Edit...' button. The 'Sensor Alarms' section is divided into 'Low Alarm', 'Pre-alarm', and 'High Alarm' categories, each with 'Enable' checkboxes, 'Action' dropdowns (all set to 'Shutdown'), and percentage-based trip points. Time delay settings are shown as '0s' for each alarm type. To the right of the settings are three horizontal sliders with green handles, corresponding to the low, pre-alarm, and high alarm levels. Five callout boxes provide instructions: 1. 'Select the sensor type' points to the 'Use sender as' dropdown. 2. 'Click to edit the 'sensor curve'. See section entitled *Editing the sensor curve*.' points to the 'Edit...' button. 3. 'Select the type of alarm required. For details of these, see the section entitled *Alarm Types* elsewhere in this document.' points to the 'Action' dropdown for the Low Alarm. 4. 'Click to enable or disable the alarms. The relevant values below appears *greyed out* if the alarm is disabled.' points to the 'Low Alarm Enable' checkbox. 5. 'Type the value or click the up and down arrows to change the settings' points to the percentage input field for the High Alarm. 6. 'Click and drag to alter the time delay' points to the '0s' delay field for the High Alarm.

2.4.4 EDITING THE SENSOR CURVE

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



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

Click **OK** to save the curve.

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

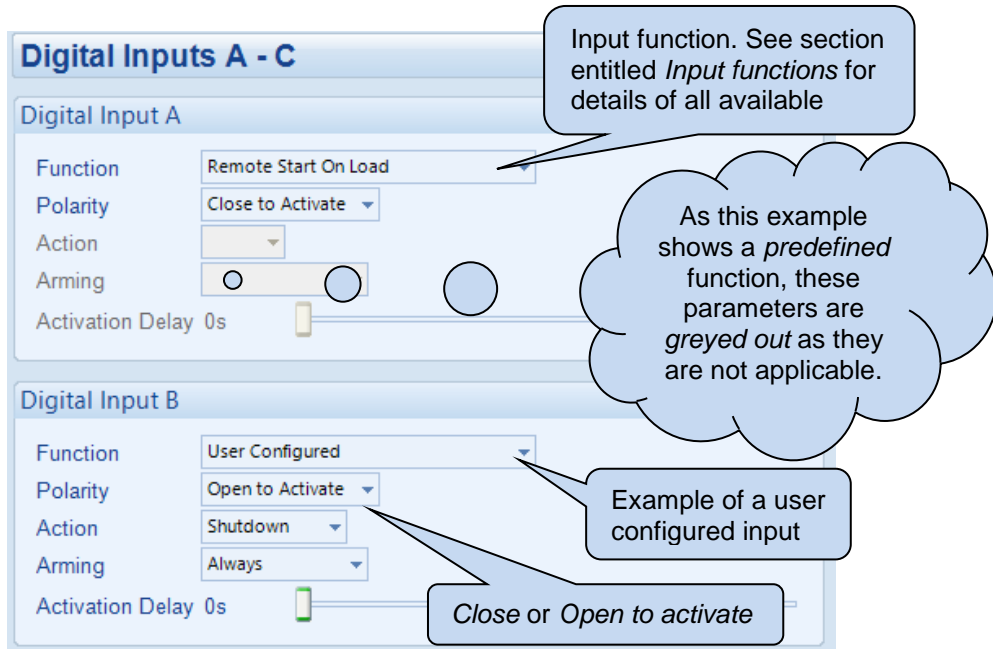
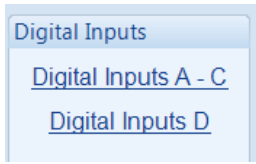
Click **OK** to accept the changes and return to the configuration editor

Click **CANCEL** to ignore and lose any changes you have made

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

2.4.5 DIGITAL INPUTS

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





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


2.4.5.1 INPUT FUNCTIONS





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

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

 = Only applicable for the AMF module type

| Function | Description |
|---|--|
| Alarm Mute | This input is used to silence the audible alarm from an external source, such as a remote mute switch. |
| Alarm Reset | This input is used to reset any latched alarms from a remote location. It is also used to clear any latched warnings which may have occurred (if configured) without having to stop the generator. |
| Alt Configuration | This input is used to instruct the module to follow the relevant <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 is instructed to start and take load. On removal of the remote start signal/mains return the module continues to run the generator on load until the <i>Auto Restore Inhibit</i> input is removed. This input allows the controller to be fitted as part of a system where the restoration to mains is controlled remotely or by an automated system. |
| Auto Start Inhibit IEEE 37.2 - 3 Checking Or Interlocking Relay | This input is used to provide an over-ride function to prevent the controller from starting the generator in the event of a remote start/mains out of limits condition occurring. If this input is active and a remote start signal/mains failure occurs the module does not give a start command to the generator. If this input signal is then removed, the controller operates as if a remote start/mains failure has occurred, starting and loading the generator. This function is used to give an ‘AND’ function so that a generator is only called to start if the mains fails and another condition exists which requires the generator to run. If the ‘Auto start Inhibit’ signal becomes active once more it is ignored until the module has returned the mains supply on load and shutdown. This input does not prevent starting of the engine in MANUAL mode. |
| Auxiliary Mains Fail  | The module monitors the incoming single or three phase supply for Over voltage, Under Voltage, Over Frequency or Under frequency. It may be required to monitor a different mains supply or some aspect of the incoming mains not monitored by the controller. If the devices providing this additional monitoring are connected to operate this input, the controller operates as if the incoming mains supply has fallen outside of limits, the generator is instructed to start and take the load. Removal of the input signal causes the module to act if the mains has returned to within limits providing that the mains sensing also indicates that the mains is within limits. |
| Coolant Temperature Switch IEEE 37.2 – 26 Apparatus Thermal Device | This input is used to give a <i>Coolant Temperature High</i> shutdown from a digital normally open or closed switch. It allows coolant temperature protection. |
| Emergency Stop | Provides an immediate engine hot shutdown, used in emergency situations |

| Function | Description |
|---|--|
| External Panel Lock | <p>⚠️ NOTE: External control sources (i.e. Simulate Start Button) are not affected by the external panel lock input and continue to operate normally.</p> <p>This input is used to provide security to the installation. When the External Panel lock input is active, the module does not respond to operation of the Mode select or Start buttons. This allows the module to be placed into a specific mode (such as Auto) and then secured. The operation of the module is not affected and the operator is still able to view the various instrumentation pages etc. (<i>Front panel configuration access is still possible while the system lock is active</i>).</p> |
| Fuel Tank Bund Level High | A digital normally open or closed fuel tank bund level switch gives this input. It is used to indicate that the fuel tank leaks. |
| Generator Load Inhibit IEEE 37.2 - 52 AC Circuit Breaker | <p>⚠️ NOTE: This input only operates to control the generator-switching device if the module load switching logic is attempting to load the generator. It does not control the generator switching device when the mains supply is on load.</p> <p>This input is used to prevent the module from loading the generator. If the generator is already on load, activating this input causes the module to unload the generator. Removing the input allows the generator to be loaded again.</p> |
| Lamp Test | This input is used to provide a test facility for the front panel indicators fitted to the module. When the input is activated all LEDs illuminate. |
| Low Fuel Level Switch IEEE 37.2 - 71 Liquid Level Switch | This input is used to allow feedback for low fuel level. |
| Mains Load Inhibit IEEE 37.2 - 3 Checking or Interlocking Relay  | <p>⚠️ NOTE: This input only operates to control the mains switching device if the module load switching logic is attempting to load the mains. It does not control the mains switching device when the generator is on load.</p> <p>This input is used to prevent the module from loading the mains supply. If the mains supply is already on load activating this input causes the module to unload the mains supply. Removing the input allows the mains to be loaded again.</p> |
| Maintenance Reset Alarm Air | Provides an external digital input to reset the maintenance alarm |
| Maintenance Reset Alarm Fuel | Provides an external digital input to reset the maintenance alarm |
| Maintenance Reset Alarm Oil | Provides an external digital input to reset the maintenance alarm |
| Oil Pressure Switch IEEE 37.2 – 63 Pressure Switch | A digital normally open or closed oil pressure switch gives this input. It allows low oil pressure protection. |
| Remote Start Off Load | If this input is active, operation is similar to the 'Remote Start on load' function except that the generator is not instructed to take the load. This function is used where an engine only run is required e.g. for exercise. |
| Remote Start On Load | When in auto mode, the module performs the start sequence and transfer load to the generator. In Manual mode, the load is transferred to the generator if the engine is already running, however in manual mode, this input does not generate start/stop requests of the engine. |

| Function | Description |
|---|---|
| Simulate Auto Button | <p> NOTE: If a call to start is present when AUTO MODE is entered, the starting sequence begins. Call to Start comes from a number of sources depending upon module type and configuration and includes (but is not limited to) : Remote start input present, Mains failure, Scheduled run, Auxiliary mains failure input present, Telemetry start signal from remote locations.</p> <p>This input mimics the operation of the 'Auto' button and is used to provide a remotely located Auto mode push button.</p> |
| Simulate Mains Available  | This function is provided to override the module's internal monitoring function. If this input is active, the module does not respond to the state of the incoming AC mains supply. |
| Simulate Start Button | This input mimics the operation of the 'Start' button and is used to provide a remotely located start push button. |
| Simulate Stop Button | This input mimics the operation of the 'Stop' button and is used to provide a remotely located stop/reset push button. |
| 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. |
| Transfer To Generator/Open Mains IEEE 37.2 - 52 AC Circuit Breaker  | This input is used to transfer the load to the generator when running in MANUAL MODE |
| Transfer To Mains/ Open Generator IEEE 37.2-52 AC Circuit Breaker  | This input is used to transfer the load to the mains supply when running in MANUAL MODE |

2.5 OUTPUTS

The screenshot shows a configuration window titled "Digital Outputs". It contains a table with columns for "Source" and "Polar". The "Source" column lists: Fuel Relay, Start Relay, Close Gen Output, Close Mains Output, Common Warning, and Common Electrical Trip. The "Polar" column lists: Energise, Energise, De-Energise, Energise, and Energise. The "Fuel Relay" and "Start Relay" rows are highlighted in yellow. Callouts provide the following information:

- A thought bubble pointing to the yellow-highlighted rows: "These are greyed out as they are fixed and not adjustable."
- A callout box pointing to the "Polar" column: "Select what the output is to control"
- A callout box pointing to the "Source" column: "Select if the relay is to *energise* or *de-energise* upon activation of the source"
- A thought bubble pointing to the output labels (Output A-F): "These labels match the typical wiring diagram"

| Output | Source | Polar |
|----------|------------------------|-------------|
| Output A | Fuel Relay | Energise |
| Output B | Start Relay | Energise |
| Output C | Close Gen Output | De-Energise |
| Output D | Close Mains Output | Energise |
| Output E | Common Warning | Energise |
| Output F | Common Electrical Trip | Energise |



2.5.1 OUTPUT SOURCES


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


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



The outputs are in alphabetical order with the *parameter* first. For instance for over frequency output, it's listed as *Generator*

 = Only applicable for the AMF module type

| Output Source | Activates... | Is Not Active... |
|--|---|--|
| Not Used | The output does not change state (Unused) | |
| Air Filter Maintenance | Active when the <i>Air Filter Maintenance Alarm</i> is due. | |
| 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 |
| Analogue Input A, B & C (Digital) | Active when the relevant analogue input is configured as digital and is active | |
| Audible Alarm IEEE 37.2 – 74 Alarm Relay | Use this output to activate an external sounder or external alarm indicator. Activation of the <i>Alarm Mute</i> input resets this output once activated | Inactive if no alarm condition is active or <i>Alarm Mute</i> input was active |
| Battery High Voltage IEEE 37.2 – 59 DC Overvoltage Relay | This output indicates that a Battery Over voltage alarm has occurred | Inactive when battery voltage is not High |
| Battery Low Voltage IEEE 37.2 – 27 DC Undervoltage Relay | This output indicates that a Battery Under Voltage alarm has occurred. | Inactive when battery voltage is not Low |
| Charge Alternator Failure Shutdown | Active when the charge alternator shutdown alarm is active | |
| Charge Alternator Failure Warning | Active when the charge alternator warning alarm is active | |
| Close Gen Output IEEE 37.2 – 52 AC Circuit Breaker | Used to control the load switching device. Whenever the module selects the generator to be on load this control source is activated. | Inactive whenever the generator is not required to be on load |
| Close Gen Output Pulse IEEE 37.2 – 52 AC Circuit Breaker | Used to control the load switching device. Whenever the module selects the generator to be on load this control source is activated for the duration of the Breaker Close Pulse timer, after which it becomes inactive again. | |
| Close Mains Output IEEE 37.2 – 52 AC Circuit Breaker  | Used to control the load switching device. Whenever the module selects the mains to be on load this control source is activated. | The output is inactive whenever the mains is not required to be on load |
| Close Mains Output Pulse IEEE 37.2 – 52 AC Circuit Breaker  | Used to control the load switching device. Whenever the module selects the mains to be on load this control source is activated for the duration of the Breaker Close Pulse timer, after which it becomes inactive again. | |

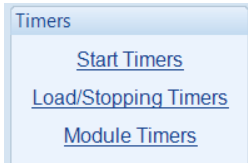
| Output Source | Activates... | Is Not Active... |
|---|--|--|
| Combined Mains Failure  | Active when the mains supply is out of limits OR the input for Auxiliary Mains Failure is active | |
| Common Alarm | Active when one or more alarms (of any type) are active | The output is inactive when no alarms are present |
| Common Electrical Trip | Active when one or more <i>Electrical Trip</i> alarms are active | The output is inactive when no shutdown alarms are present |
| Common Shutdown | Active when one or more <i>Shutdown</i> alarms are active | The output is inactive when no shutdown alarms are present |
| Common Warning | Active when one or more <i>Warning</i> alarms are active | The output is inactive when no warning alarms are present |
| Cooling Down | Active when the Cooling timer is in progress | |
| Delayed Load Output 1, 2, 3 & 4 | Provide delayed outputs for controlling load switching devices | |
| Digital Input A, B, C & D | Active when the relevant digital input is active | |
| Display Heater Fitted and On | Active when the display heater is on | |
| Emergency Stop IEEE 37.2 – 5 Stopping Device | Active when the <i>Emergency Stop</i> input has been activated | |
| Energise To Stop | Normally used to control an <i>Energise to Stop</i> solenoid, this output becomes active when the controller wants the set to stop running. | Becomes inactive a configurable amount of time after the set has stopped. This is the <i>ETS hold time</i> . |
| Fail To Start IEEE 37.2 - 48 Incomplete Sequence Relay | Becomes active if the set is not seen to be running after the configurable number of start attempts | |
| Fail To Stop IEEE 37.2 - 48 Incomplete Sequence Relay | If the set is still running a configurable amount of time after it has been given the stop command, the output becomes active. This configurable amount of time is the <i>Fail to Stop Timer</i> . | |
| Flexible Sensor C Low/High – Alarm/Pre- Alarm | Active when the relevant flexible sensor alarm is active | |
| Fuel Filter Maintenance | Indicates that the fuel filter maintenance alarm is due | |
| Fuel Level High Alarm/Pre-Alarm | Active when the relevant High Fuel Level alarm is active | |
| Fuel Level Low Alarm/Pre-Alarm | Active when the relevant Low Fuel Level alarm is active | |
| Fuel Relay | Becomes active when the controller requires the governor/fuel system to be active. | Becomes inactive whenever the set is to be stopped, including between crank attempts, upon controlled stops and upon fault shutdowns. |
| Gen Over Frequency Overshoot Alarm IEEE 37.2 – 81 Frequency Relay | Becomes active when the <i>Over Frequency Overshoot</i> alarm is active | |
| Generator Available | Becomes active when the generator is available to take load. | Inactive when <ul style="list-style-type: none"> • <i>Loading voltage</i> and <i>loading frequency</i> have not been reached • After <i>electrical trip</i> alarm • During the starting sequence before the end of the warming timer. |
| Generator High Voltage Alarm IEEE 37.2 – 59 AC Overvoltage Relay | Active when the <i>High Voltage Shutdown / High Voltage Warning</i> alarm is active | |

| Output Source | Activates... | Is Not Active.... |
|---|---|--|
| Generator Low Voltage Alarm IEEE 37.2 – 27 AC Undervoltage Relay | Active when the generator voltage falls below the <i>Under 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 Over Frequency Shutdown IEEE 37.2 – 81 Frequency Relay | Active when the generator frequency exceeds the <i>Over Frequency Shutdown Trip</i> level. | |
| Generator Under Frequency Shutdown IEEE 37.2 – 81 Frequency Relay | Active when the generator frequency drops below the <i>Under Frequency Shutdown Trip</i> level. | |
| High Coolant Temperature Shutdown IEEE 37.2 – 26 Apparatus Thermal Device | Active when the <i>Coolant Temperature</i> exceeds the configured <i>High Coolant Temperature Shutdown</i> level | |
| kW Overload Alarm | Active when the measured kW are above the setting of the <i>kW overload alarm</i> . Used to give alarms on overload, control a dummy load switch or for load shedding functionality. | |
| Loss of Mag Pickup Signal | Active when the controller senses the loss of signal from the magnetic pickup probe | |
| 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. |
| Mains High Frequency IEEE 37.2 -81 Frequency Relay | Active when the mains frequency exceeds the <i>High Frequency</i> setting | |
| Mains High Voltage IEEE 37.2 – 59 AC Overvoltage Relay | Active when the mains voltage exceeds the <i>High Voltage</i> setting | |
| Mains Low Frequency IEEE 37.2 -81 Frequency Relay | Active when the mains frequency falls below the <i>Low Frequency</i> setting | |
| Mains Low Voltage IEEE 37.2 – 27 AC Undervoltage Relay | Active when the mains voltage falls below the <i>Low Voltage</i> setting | |
| Oil Pressure Sender Open Circuit | Active when the Oil Pressure Sensor is detected as being open circuit. | |
| Oil Filtler Maintenance | Active when the relevant maintenance alarm is due. | |
| Oil Pressure Sender Open Circuit | Active when the <i>Oil Pressure Sensor</i> is detected as being open circuit. | |
| Open Gen Output IEEE 37.2 – 52 AC Circuit Breaker | Used to control the load switching device. Whenever the module selects the generator to be off load this control source is activated. | Inactive whenever the generator is required to be on load |
| Open Gen Output Pulse IEEE 37.2 – 52 AC Circuit Breaker | Used to control the load switching device. Whenever the module selects the generator to be off load this control source is activated for the duration of the Breaker Open Pulse timer, after which it becomes inactive again. | |
| Open Mains Output IEEE 37.2 – 52 AC Circuit Breaker  | Used to control the load switching device. Whenever the module selects the mains to be off load this control source is activated. | The output is inactive whenever the mains is required to be on load |

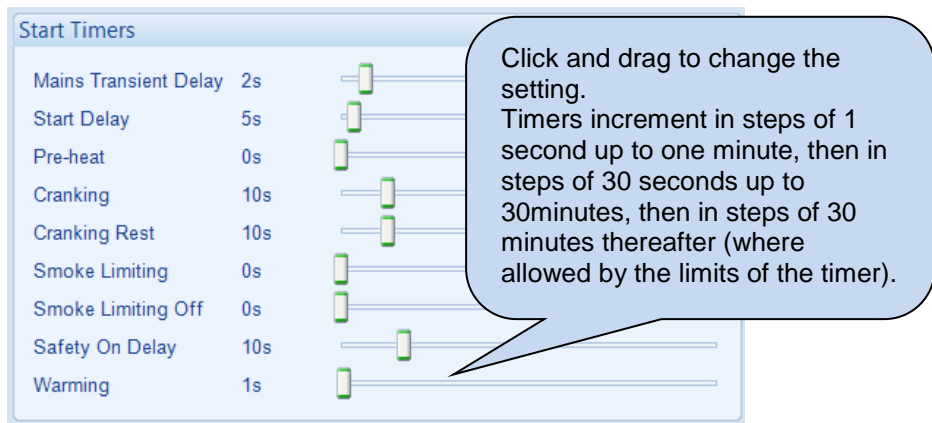
| Output Source | Activates... | Is Not Active.... |
|---|---|--|
| Open Mains Output Pulse IEEE 37.2 – 52 AC Circuit Breaker  | Used to control the load switching device. Whenever the module selects the mains to be off load this control source is activated for the duration of the Breaker Open Pulse timer, after which it becomes inactive again. | |
| Over Current Delayed Alarm | Active when the <i>Over Current Delayed</i> alarm is active | |
| Over Current Immediate Warning | Active when the <i>Over Current Immediate Warning</i> alarm is active | |
| Over Speed Shutdown IEEE 37.2 – 12 Over Speed Device | Active when the <i>Over Speed Shutdown</i> alarm is active | |
| Over Speed Overshoot Alarm IEEE 37.2 – 12 Over Speed Device | Active when the <i>Over Speed Overshoot</i> alarm is active | |
| Preheat During Preheat Timer | Becomes active when the preheat/postheat timer begins. Normally used to control the engine preheat glow-plugs. | Inactive when : <ul style="list-style-type: none"> The set is stopped The preheat timer has expired |
| Preheat Until End Of Cranking | Becomes active when the preheat/postheat 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 |
| Smoke Limiting | Becomes active when the controller requests that the engine runs at idle speed. As an output, this is used to give a signal to the <i>Idle Speed Input</i> on the engine speed governor (if available) | Becomes inactive when the controller requests that the engine runs at rated speed. |
| Start Relay IEEE 37.2 – 54 Turning Gear Engaging Device | Active when the controller requires the cranking of the engine. | |
| System in Auto Mode | Active when Auto mode is selected | |
| System in Manual Mode | Active when Manual mode is selected | |
| System in Stop Mode | Active when Stop mode is selected | |
| Temperature Sensor Open Circuit | Active when the <i>Temperature Sensor Open Circuit</i> alarm is active | |
| Under Speed Shutdown | Active when any of the <i>Underspeed Shutdown</i> or <i>Electrical Trip</i> alarms are active | |
| Waiting For Manual Restore  | Becomes active when the generator is on load and the mains supply is healthy but an input configured to Manual Restore is active. This is used to signal to an operator that action is required before the set transfers back to the mains supply. | |

2.6 TIMERS


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



2.6.1 START TIMERS



 = Only applicable for the AMF module type

| Timer | Description |
|---|---|
|  Mains Transient Delay | Used to give a delay between sensing mains failure and acting upon it. This is used to prevent dropouts of the mains breaker and operation of the system due to mains supply transient conditions. |
| Start Delay | Used to give a delay before starting in AUTO mode. This timer is activated upon a remote start signal being applied, or upon a start due to mains failure, scheduled run or any other <i>automatic_start</i> . Typically this timer is applied to prevent starting upon fleeting remote start signals or short term mains failures. |
| Pre-heat | Give a 'pre start' time during which the <i>Preheat</i> output becomes active (if configured) |
| Cranking | The length of each crank attempt |
| Cranking Rest | The time between multiple crank attempts. |
| Smoke Limiting | The amount of time that the engine is requested to run at <i>idle</i> speed upon starting. This is typically used to limit emissions at startup. |
| Smoke Limiting 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 ignores oil pressure, engine speed, alternator voltage and other <i>delayed</i> alarms. This is used to allow the engine to run up to speed before protections are activated. |
| Warming | The amount of time that the set runs BEFORE being allowed to take load. This is used to warm the engine to prevent excessive wear. |

2.6.2 LOAD / STOPPING TIMERS

Load Control Timers

- Transfer Delay: 0.7s
- Breaker Trip Pulse: 0.5s
- Breaker Close Pulse: 0.5s

Load Delay Timers

- Delay Load Output 1: 0s
- Delay Load Output 2: 0s
- Delay Load Output 3: 0s
- Delay Load Output 4: 0s


Stopping Timers

- Return Delay: 30s
- Cooling: 1m
- Cooling at Idle: 0s
- ETS Solenoid Hold: 0s
- Fail to Stop Delay: 30s
- Generator Transient Delay: 0.0s

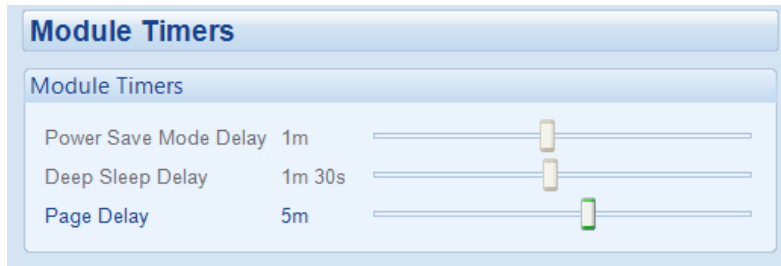
Click and drag to change the setting. Timers increment in steps of 1second up to one minute, then in steps of 30seconds up to 30minutes, then in steps of 30minutes thereafter (where allowed by the limits of the timer).

Respective digital outputs, when configured, become energised after the respective load delay timer expires.

 = Only applicable for the AMF module type

| Timer | Description |
|--|--|
|  Transfer Delay | The time between one load switch opening and the other closing. Used during transfer to and from the generator. |
| Breaker Close Pulse | The amount of time that <i>Breaker Close Pulse</i> signal is present when the request to close the load switch is given. |
| Breaker Trip Pulse | The amount of time that <i>Breaker Open Pulse</i> signal is present when the request to open the load switch is given. |
| Delay Load Output 1, 2, 3 & 4 | The time delay before energising the configured “Delayed Load” outputs. These outputs are used to control additional load breakers to provide five stage loading. After the generator load switch is closed, the remaining four outputs are closed after the configurable time delay. This allows for additional loads to be energised in sequence, minimising the size of step loading of the generator |
| Return Delay | A delay, used in auto mode only, that allows for short term removal of the request to stop the set before action is taken. This is usually used to ensure the set remains on load before accepting that the start request has been removed. |
| Cooling | The amount of time that the set is made to run OFF LOAD before being stopped. This is to allow the set to cool down and is particularly important for engines with turbo chargers. |
| Cooling at Idle | The amount of time the generator runs at an idle speed after the <i>Cooling Time</i> has expired |
| ETS Solenoid Hold | The amount of time the <i>Energise to stop</i> solenoid is kept energised after the engine has come to rest. This is used to ensure the set has fully stopped before removal of the stop solenoid control signal. |
| Fail To Stop Delay | If the set is called to stop and is still running after the <i>fail to stop</i> delay, a <i>Fail to Stop</i> alarm is generated. |
| 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. |

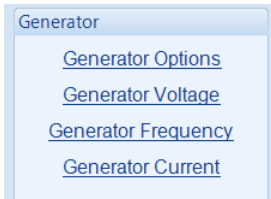
2.6.3 MODULE TIMERS



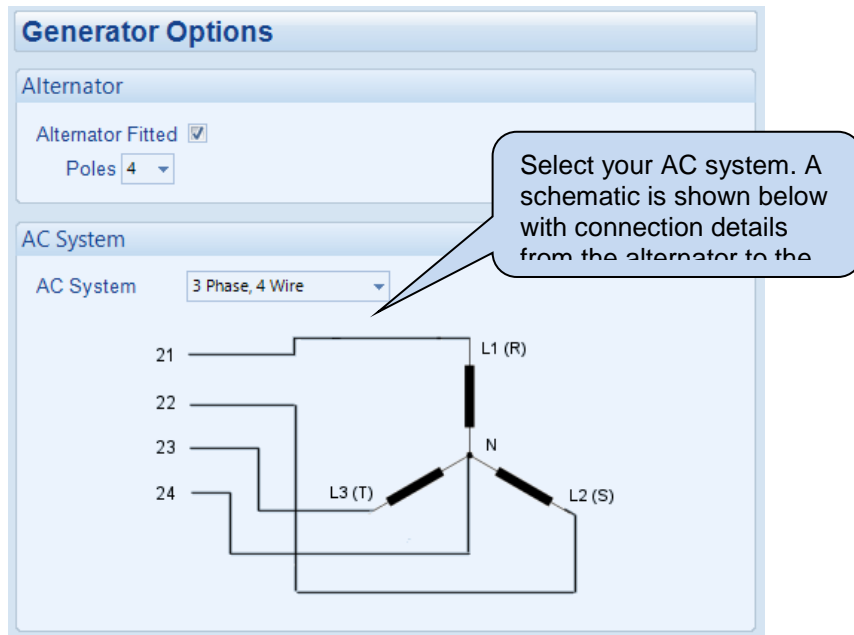
| Timer | Description |
|-----------------------|--|
| Power Save Mode Delay | If the module is left unattended in Stop mode for the duration of the <i>Power Save Mode Delay</i> , it enters low power consumption mode (Power Save Mode). |
| Deep Sleep Delay | When the module is in Power Save Mode, if left unattended for the duration of the <i>Deep Sleep Mode Delay</i> timer, it enters a lower power consumption mode (Deep Sleep Mode) |
| Page Delay | If the module is left unattended for the duration of the <i>Page Delay Timer</i> , it reverts to show the Status page. |

2.7 GENERATOR

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

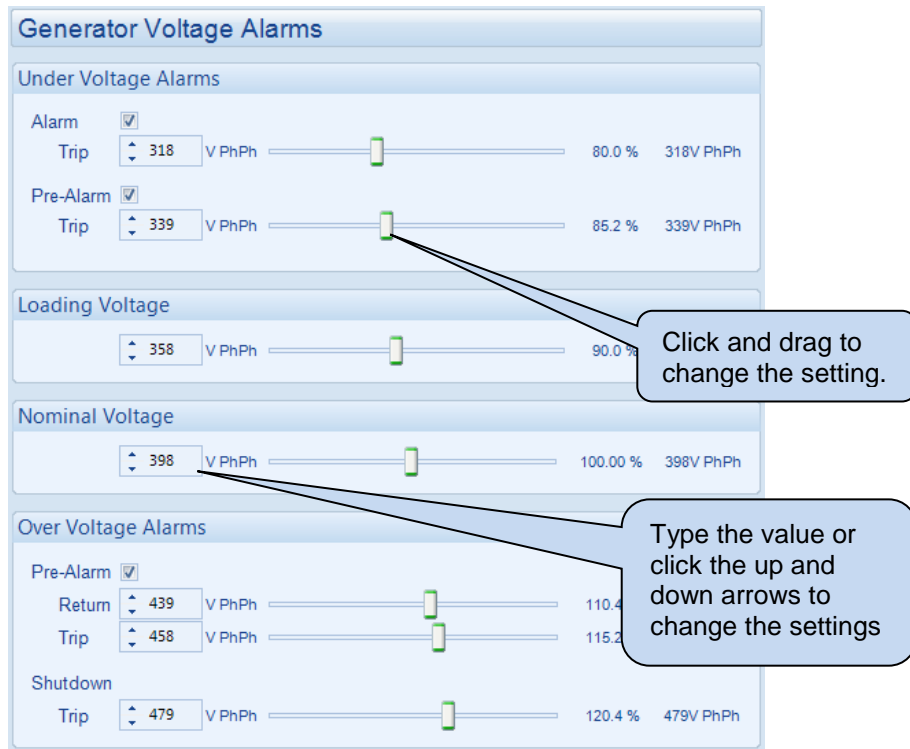


2.7.1 GENERATOR OPTIONS



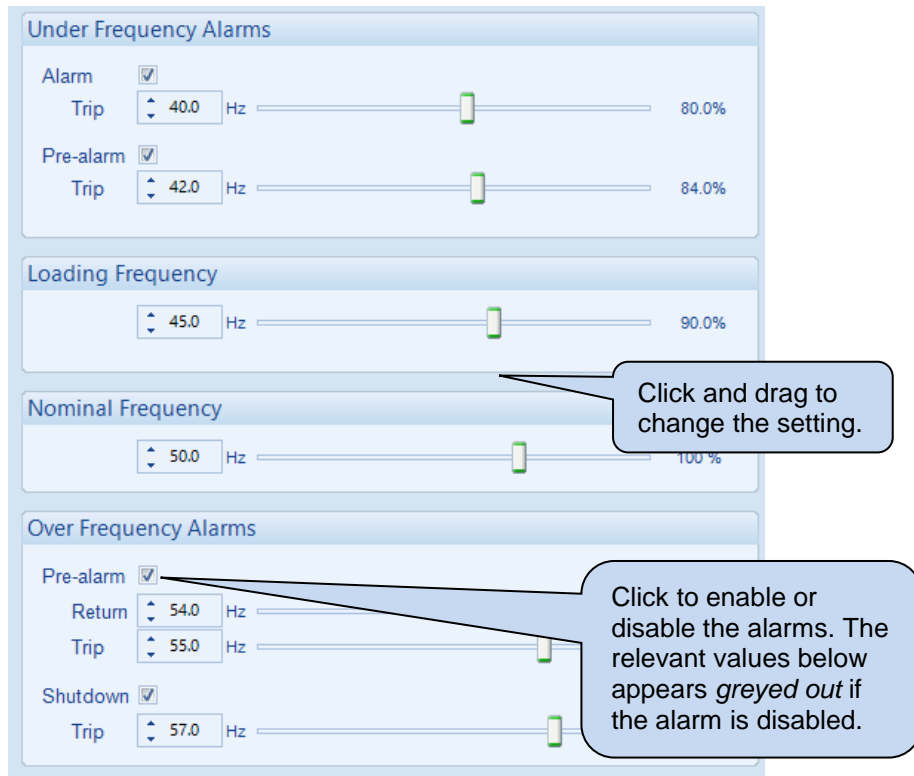
| Parameter | Description |
|-------------------|---|
| Alternator Fitted | <input type="checkbox"/> = There is no alternator in the system, it is an <i>engine only</i> application <input checked="" type="checkbox"/> = An alternator is fitted to the engine, it is a generator application. |
| Poles | The number of poles on the alternator |
| AC System | <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>NOTE: For further information on the wiring for the different topologies, please refer to the DSE module operator manual.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>NOTE: This list is not exhaustive. DSE reserve the right to add to this list as part of our policy of continual development.</p> </div> <p>Select the AC system topology from the list:</p> <ul style="list-style-type: none"> 2 Phase, 3 Wire L1 - L2 2 Phase, 3 Wire L1 - L3 2 Wire Unearthed DC (DSE4610 Only) 3 Phase, 3 Wire 3 Phase, 4 Wire 3 Phase, 4 Wire Delta Single Phase, 2 Wire |

2.7.2 GENERATOR VOLTAGE



| Parameter | Description |
|---|---|
| Generator Under Voltage Alarm IEEE 37.2 - 27AC Undervoltage Relay | <input type="checkbox"/> = Generator Under Volts does NOT give an alarm <input checked="" type="checkbox"/> = Generator Under Volts gives an alarm in the event of the generator output falling below the configured <i>Under Volts Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Undervolts Alarm Trip</i> value is adjustable to suit user requirements. |
| Generator Under Voltage Pre-Alarm IEEE 37.2 - 27AC Undervoltage Relay | <input type="checkbox"/> = Generator Under Volts does NOT give a warning alarm <input checked="" type="checkbox"/> = Generator Under Volts gives a warning alarm in the event of the generator output falling below the configured <i>Under Volts Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Undervolts Pre-Alarm Trip</i> value is adjustable to suit user requirements. |
| Loading Voltage | This is the minimum voltage the generator must be operating at before the module considers it available to take the load. It is also the voltage above the under voltage trip that the generator output must return to before the module considers that the supply is back within limits. (i.e. With an undervolts trip of 184.0V and a loading voltage of 207.0V, the output voltage must return to 207.0V following an under voltage event to be considered within limits.) |
| Nominal Voltage | This is used to calculate the percentages of the alarm setpoints. |
| Generator Over Voltage Pre-Alarm IEEE 37.2 – 59 AC Overvoltage Relay | <input type="checkbox"/> = Alarm is disabled <input checked="" type="checkbox"/> = Generator Over Volts gives a warning alarm in the event of the generator output voltage rising above the configured <i>Over Volts Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Warning</i> is automatically reset when the generator output voltage falls below the configured <i>Return</i> level. The <i>Over Volts Pre-Alarm Trip</i> value is adjustable to suit user requirements. |
| Generator Over Voltage IEEE 37.2 – 59 AC Overvoltage Relay | <input type="checkbox"/> = Alarm is disabled <input checked="" type="checkbox"/> = Generator Over Volts gives a <i>Shutdown</i> alarm in the event of the generator output rising above the configured <i>Over Volts Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Overvolts Alarm Trip</i> value is adjustable to suit user requirements. |

2.7.3 GENERATOR FREQUENCY



| Parameter | Description |
|---|--|
| Generator Under Frequency Alarm IEEE 37.2 -81 Frequency Relay | <input type="checkbox"/> = Generator Under Frequency does NOT give an alarm <input checked="" type="checkbox"/> = Generator Under Frequency gives an alarm in the event of the generator output frequency falling below the configured <i>Under Frequency Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Underfrequency Alarm Trip</i> value is adjustable to suit user requirements. |
| Generator Under Frequency Pre-Alarm IEEE 37.2 -81 Frequency Relay | <input type="checkbox"/> = Generator Under Frequency does NOT give a warning alarm <input checked="" type="checkbox"/> = Generator Under Frequency gives a warning alarm in the event of the generator output frequency falling below the configured <i>Under Frequency Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Under Frequency Pre-Alarm Trip</i> value is adjustable to suit user requirements. |
| Loading Frequency | This is the minimum frequency the generator must be operating at, before the module considers it available to take the load. It is also the frequency above the under frequency trip that the generator output must return to before the module considers that the supply is back within limits. (i.e. With an underfrequency trip of 42.0 Hz and a loading frequency of 45.0 Hz, the output frequency must return to 45.0 Hz following an under frequency event to be considered within limits.) |
| Nominal Frequency | This is used to calculate the percentages of the alarm setpoints. |
| Generator Over Frequency Pre-Alarm IEEE 37.2 -81 Frequency Relay | <input type="checkbox"/> = Alarm is disabled <input checked="" type="checkbox"/> = Generator Over Frequency gives a warning alarm in the event of the generator output frequency rising above the configured <i>Over frequency Pre-Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Warning</i> is automatically reset when the generator output frequency falls below the configured <i>Return</i> level. The <i>Over Frequency Pre-Alarm Trip</i> value is adjustable to suit user requirements. |
| Generator Over Frequency Shutdown IEEE 37.2 -81 Frequency Relay | <input type="checkbox"/> = Alarm is disabled <input checked="" type="checkbox"/> = Generator Over Frequency gives a <i>Shutdown</i> alarm in the event of the generator output rising above the configured <i>Over Frequency Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Over Frequency Alarm Trip</i> value is adjustable to suit user requirements. |

2.7.4 GENERATOR CURRENT

The screenshot shows the 'Generator Current' configuration window, divided into several sections:

- Generator Current Options:** Contains 'CT Primary (L1,L2,L3,N)' set to 600, 'Full Load Rating' set to 500 A, and 'CT Location' set to 'Gen'.
- Overcurrent Alarm:** Includes checkboxes for 'Immediate Warning' and 'Delayed Alarm', a dropdown for 'Delayed Alarm Action' (set to 'Electrical Trip'), a 'Delay' of 1m, and a 'Trip' set to 100%.
- Generator Rating:** Shows 'kW Rating' set to 200 kW.
- Overload Protection:** Features an 'Enable' checkbox, an 'Action' dropdown (set to 'Shutdown'), a 'Trip' set to 100%, and a 'Delay' of 5s.

Callouts provide additional context:

- Callout 1: Points to the CT Primary value, stating: "This is the CT primary value as fitted to the set (CT secondary must be 5A). The full load rating is the 100% rating of the set in Amps."
- Callout 2: Points to the alarm checkboxes, stating: "Click to enable or disable the option. The relevant values below appears *greyed out* if the alarm is disabled."
- Callout 3: Points to the kW Rating input, stating: "Type the value or click the up and down arrows to change the settings."

2.7.4.1 GENERATOR CURRENT OPTIONS

| Parameter | Description |
|------------------|--|
| CT Primary | Primary rating of the three phase Current Transformers |
| Full Load Rating | This is the full load current rating of the alternator |
| CT Location | Gen: The CTs are in the feed from the generator, the module provides current instrumentation and protections when the generator is on load Load: The CTs are in the feed to the load, the module provides current instrumentation and protections when the generator is on load, and current instrumentation when the mains is on load. |

2.7.4.2 OVERCURRENT ALARM

The overcurrent alarm combines an immediate warning trip level and a delayed overcurrent protection.

2.7.4.2.1 IMMEDIATE WARNING

IEEE 37.2 -50 instantaneous overcurrent relay

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

2.7.4.2.2 DELAYED ALARM


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

| Parameter | Description |
|----------------------|---|
| Immediate Warning | <input type="checkbox"/> = Alarm is disabled <input checked="" type="checkbox"/> = Gives a warning alarm in the event of the generator current rising above the configured <i>Overcurrent Trip</i> value. The <i>Warning</i> is automatically reset when the generator current falls below the <i>Trip</i> level. The <i>Overcurrent Trip</i> value is adjustable to suit user requirements. |
| Delayed Alarm | <input type="checkbox"/> = Alarm is disabled <input checked="" type="checkbox"/> = An alarm activates in the event of the generator current rising above the configured <i>Overcurrent Trip</i> value for longer than the <i>Delay</i> time. The <i>Overcurrent Trip</i> value is adjustable to suit user requirements. |
| Delayed Alarm Action | Select the type of alarm required from the list: Electrical Trip Shutdown Warning |
| Delay | The amount of time before the module activates the <i>Overcurrent Alarm</i> . |
| Trip | Set the percentage of total load at which the <i>Overcurrent Alarm</i> is activated |

2.7.4.3 GENERATOR RATING

| Parameter | Description |
|---------------------|---|
| Generator kW rating | The generator kW rating must be set in order for the <i>Generator Power</i> functions to be correctly utilised. |

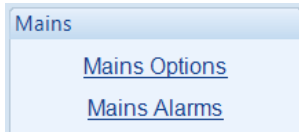
2.7.4.4 OVERLOAD PROTECTION

| Parameter | Description |
|---------------------|--|
| Overload Protection | <p> NOTE: The <i>Return</i> level is only used when <i>Warning</i> action is selected, to silence the <i>Warning</i> alarm when the <i>KW</i> level drops below the configured <i>Return</i> level.</p> <p><input type="checkbox"/> = Overload Protection function is disabled. <input checked="" type="checkbox"/> = <i>kW Overload Alarm</i> activated when the <i>kW</i> level exceeds the <i>Trip</i> level for the configured <i>Delay</i> time.</p> |
| Action | Select the type of alarm required from the list: <i>Electrical Trip</i> <i>Shutdown</i> |
| Trip | Set the percentage of total <i>kW</i> load at which the <i>Overload Alarm</i> is activated |
| Delay | The amount of time before the module activates the <i>Overload Alarm</i> . |

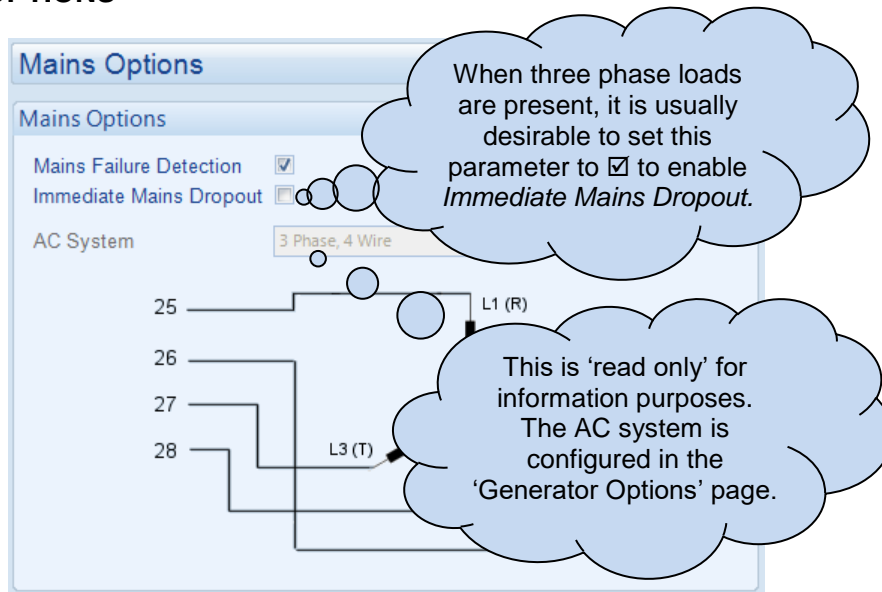
2.8 MAINS

 = Only applicable for the AMF module type

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



2.8.1 MAINS OPTIONS



Mains Options

Mains Failure Detection

Immediate Mains Dropout

AC System **3 Phase, 4 Wire**

25 — L1 (R)




26 —

27 —

28 — L3 (T)





When 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.

| Parameter | Description |
|--|---|
| Mains Failure Detection  | <input type="checkbox"/> = The module ignores the status of the mains supply. <input checked="" type="checkbox"/> = The module monitors 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 is kept closed until the generator is up to speed and volts. <input checked="" type="checkbox"/> = Upon mains failure, the mains load switch is opened immediately, subject to the setting of the <i>mains transient</i> timer. |
| AC System  | <div style="border: 1px solid black; padding: 5px;"> <p>NOTE: For further information on the wiring for the different topologies, please refer to the DSE module operator manual.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>NOTE: This list is not exhaustive. DSE reserve the right to add to this list as part of our policy of continual development.</p> </div> <p>These settings are used to detail the type of AC system to which the module is connected:</p> <ul style="list-style-type: none"> 2 Phase, 3 Wire L1 - L2 2 Phase, 3 Wire L1 – L3 3 Phase, 3 Wire 3 Phase, 4 Wire 3 Phase, 4 Wire Delta Single Phase, 2 Wire |

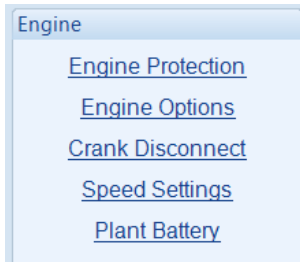
2.8.2 MAINS ALARMS

The screenshot shows the 'Mains Alarms' configuration window. It is divided into sections for Voltage Alarms and Frequency Alarms. Each section has a checkbox to enable or disable the alarm type. Below each checkbox are numerical input fields for 'Trip' and 'Return' values, accompanied by sliders for visual adjustment. Callouts provide instructions: 'Click to enable or disable the alarms. The relevant values below appears' points to the checkboxes; 'Type the value or click the up and down arrows to change the settings' points to the input fields; and 'Click and drag to change the' points to the sliders.

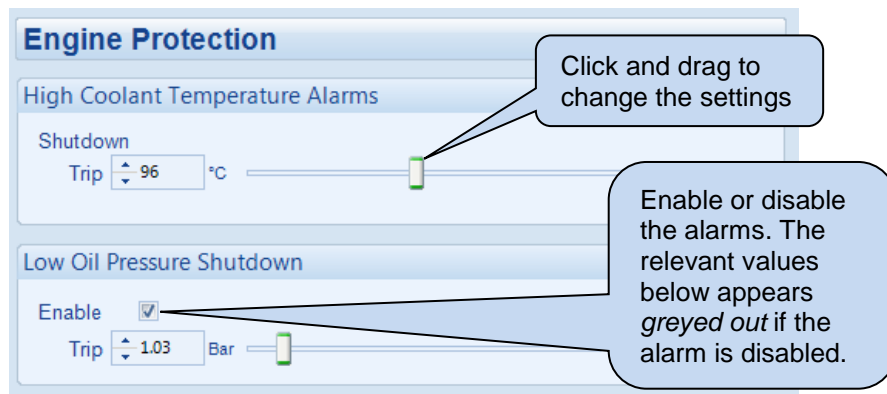
| Alarm | IEEE designation |
|---|---|
| Mains Under Voltage IEEE 37.2 – 27 AC Undervoltage Relay  | <input type="checkbox"/> = Mains Under Voltage detection is disabled <input checked="" type="checkbox"/> = Mains Under Voltage gives an alarm in the event of the mains voltage falling below the configured <i>Under Voltage Trip</i> value. The <i>Under Voltage Trip</i> value is adjustable to suit the application. The alarm is reset and the mains is considered within limits when the mains voltage rises above the configured <i>Under Voltage Return</i> level. |
| Mains Over Voltage IEEE 37.2 – 59 AC Overvoltage Relay  | <input type="checkbox"/> = Mains Over Voltage detection is disabled <input checked="" type="checkbox"/> = Mains Over Voltage gives an alarm in the event of the mains voltage rising above the configured <i>Over Voltage Trip</i> value. The <i>Over Voltage Trip</i> value is adjustable to suit the application. The alarm is reset and the mains is considered within limits when the mains voltage falls below the configured <i>Over Voltage Return</i> level. |
| Mains Under Frequency IEEE 37.2 – 81 Frequency Relay  | <input type="checkbox"/> = Mains Under Frequency detection is disabled <input checked="" type="checkbox"/> = Mains Under Frequency gives an alarm in the event of the mains frequency falling below the configured <i>Under Frequency Trip</i> value. The <i>Under Frequency Trip</i> value is adjustable to suit the application. The alarm is reset and the mains is considered within limits when the mains frequency rises above the configured <i>Under Frequency Return</i> level. |
| Mains Over Frequency IEEE 37.2 – 81 Frequency Relay  | <input type="checkbox"/> = Mains Over Frequency detection is disabled <input checked="" type="checkbox"/> = Mains Over Frequency gives an alarm in the event of the mains frequency rising above the configured <i>Over Frequency Trip</i> value. The <i>Over Frequency Trip</i> value is adjustable to suit the application. The alarm is reset and the mains is considered within limits when the mains frequency falls below the configured <i>Over Frequency Return</i> level. |

2.9 ENGINE

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



2.9.1 ENGINE PROTECTION



| Parameter | Description |
|--------------------------------|--|
| High Coolant Temperature Alarm | The <i>High Coolant Temperature Shutdown Alarm</i> is active when the measured coolant temperature rises above the configured <i>Trip</i> level. |
| Low Oil Pressure Alarms | <input type="checkbox"/> = Alarm is disabled. <input checked="" type="checkbox"/> = The <i>Low Oil Pressure Shutdown Alarm</i> is active when the measured oil pressure drops below the configured <i>Trip</i> level. |

2.9.2 ENGINE OPTIONS

2.9.2.1 STARTUP OPTIONS

| Parameter | Description |
|------------------------------|---|
| Start Attempts | <p>The number of starting attempts the module makes.</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 (or not present during cranking when <i>Multiple Engage Attempts</i> is enabled), 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> |
| Magnetic Pickup Open Circuit | <p>If the magnetic pickup device is not detected, 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> |

2.9.2.2 GAS ENGINE TIMERS

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

2.9.2.3 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 057-200 4600 Series Operator Manual. |
| Flywheel teeth | The number of teeth on the engine flywheel. This is read by the magnetic pickup device. |

2.9.2.4 OVERSPEED OPTIONS

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

2.9.3 CRANK DISCONNECT

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

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

Crank Disconnect

Options

Crank Disconnect on Oil Pressure

Check Oil Pressure Prior to Starting

Crank Disconnect

Generator Frequency Hz

Engine Speed RPM

Oil Pressure Bar

Delay

When *Check Oil Pressure Prior to Starting* is enabled, the cranking is not allowed if the oil pressure is not seen as being low. This is used as a *double check* that the engine is stopped before the starter is engaged.

Click and drag to change the setting.

2.9.4 SPEED SETTINGS

Speed Settings

Under Speed Shutdown

Enable

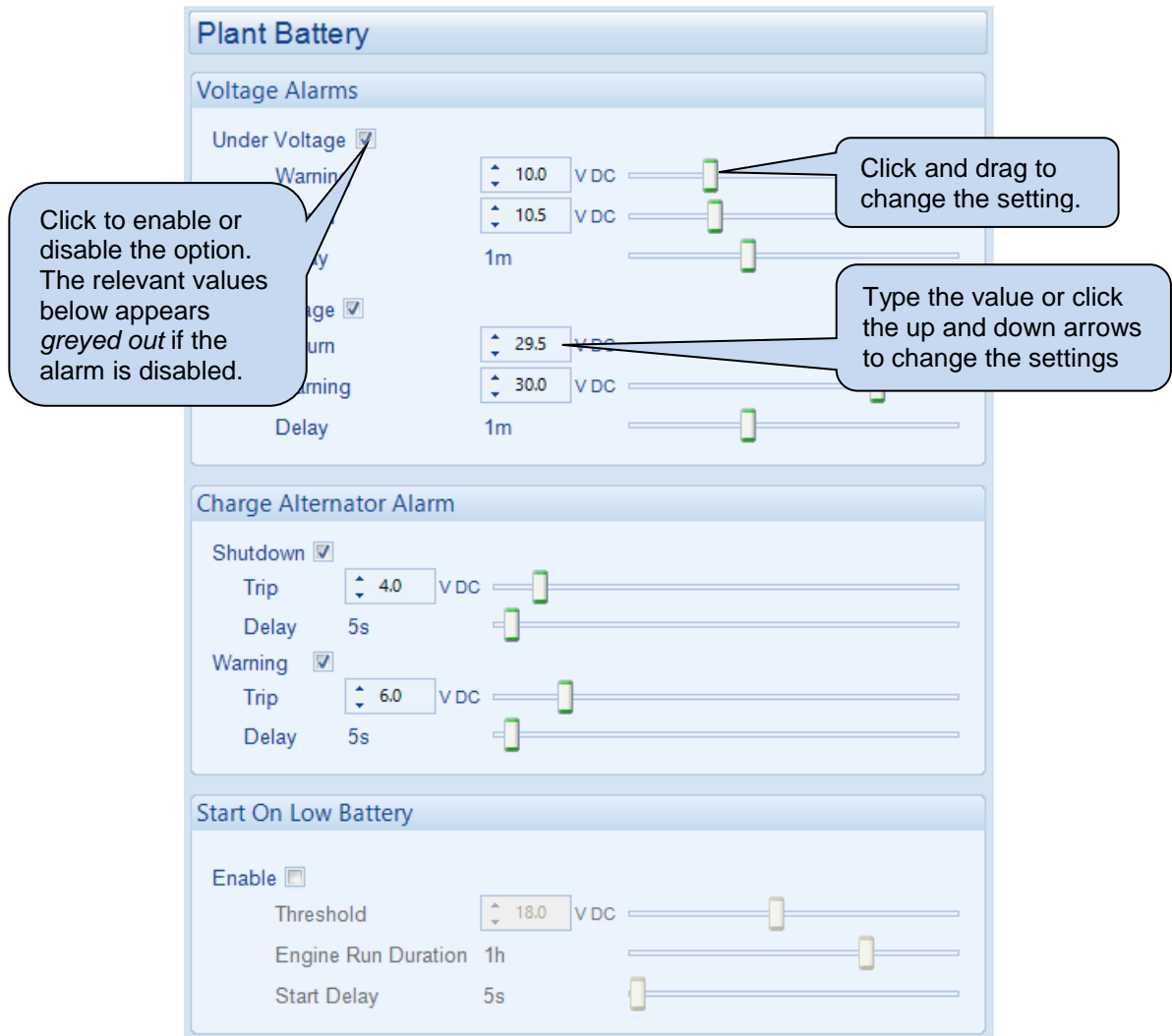
RPM

Over Speed Shutdown

Trip RPM

| Parameter | Description |
|-------------------|--|
| Under Speed Alarm | <input type="checkbox"/> = <i>Under Speed</i> alarm is disabled <input checked="" type="checkbox"/> = <i>Under Speed</i> gives an alarm in the event of the engine speed falling below the configured <i>Under Speed Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Underspeed Alarm Trip</i> value is adjustable to suit user requirements. |
| Over Speed Alarm | Over Speed gives a <i>Shutdown</i> alarm in the event of the engine speed rising above the configured <i>Over Speed Alarm Trip</i> value for longer than the <i>Activation Delay</i> . The <i>Over Speed Alarm Trip</i> value is adjustable to suit user requirements. |

2.9.5 PLANT BATTERY



| Parameter | Description |
|---|--|
| Plant Battery Under Voltage IEEE 37.2 -27 DC Undervoltage Relay | The alarm activates when the battery voltage drops below the configured <i>Pre-Alarm</i> level for the configured <i>Delay</i> time. When the battery voltage rises above the configured <i>Return</i> level, the alarm is de-activated. |
| Plant Battery Over Voltage IEEE 37.2 -59 DC Overvoltage Relay | The alarm activates when the battery voltage rises above the configured <i>Pre-Alarm</i> level for the configured <i>Delay</i> time. When the battery voltage drops below the configured <i>Return</i> level, the alarm is de-activated. |
| Charge Alternator Alarm | The alarm activates when the charge alternator voltage falls below the configured <i>Trip</i> level for the configured <i>Delay</i> time. |
| Charge Alternator Warning | The alarm activates when the charge alternator voltage falls below the configured <i>Trip</i> level for the configured <i>Delay</i> time. |
| Start on Low Battery | <input type="checkbox"/> = Start on Low Battery is disabled. <input checked="" type="checkbox"/> = Select to enable autostart upon the battery voltage falling to the <i>threshold</i> level. The engine starts and run for the specified <i>Engine Run Time</i> . This occurs only if the module is in AUTO mode |
| Start Delay | Start delay timer for the <i>Start on Low Battery</i> function. |

2.10 SCHEDULER

The scheduler is used to automatically start the set at a configured day and time and run it for the configured duration of hours.

The generator is made to run *on load* or *off load* depending upon the configuration :

| Function | Description |
|-----------------|---|
| Enabled | <input type="checkbox"/> = Scheduled runs are disabled <input checked="" type="checkbox"/> = Scheduled runs are enabled based on the below settings. |
| Scheduled Runs | Determines the loading state mode of the generator when running on schedule <input type="checkbox"/> = The module runs the generator on schedule with the load switch open <input checked="" type="checkbox"/> = The module runs the generator on schedule and closes the load switch |
| Schedule Period | Determines the repeat interval for the scheduled run. Options available are: Weekly, Monthly |
| Week | Specifies the week of the month, on which the scheduled run takes place |
| Day | Specifies the day of week, on which the scheduled run takes place |
| Start Time | Determines at what time of day the scheduled run starts |
| Duration | Determines the time duration in hours for the scheduled run |
| Clear | Resets the values for the Day, Start Time and Duration to defaults |

2.11 MAINTENANCE ALARM

The screenshot displays the 'Maintenance Alarm' configuration window, which is organized into three sections: 'Maintenance alarm Air', 'Maintenance Alarm Oil', and 'Maintenance Alarm Fuel'. Each section contains an 'Enable' checkbox, an 'Action' dropdown menu, and an 'Engine run hours' spinner control. Callout boxes provide additional information: the first points to the 'Enable' checkbox, stating that clicking it toggles the alarm and that values below become greyed out when disabled; the second points to the 'Action' dropdown in the Oil section, listing 'Warning' and 'Shutdown' as options; the third points to the 'Engine run hours' spinner in the Fuel section, explaining that the alarm triggers at the specified hour mark.

There are two ways to reset the maintenance alarm:

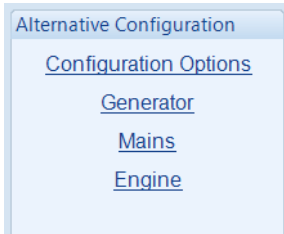
- 1) Activate a digital input configured to "Maintenance Reset Alarm".
- 2) Use the SCADA | Maintenance | Maintenance Alarm section of this PC Software.
- 3) Through the Front Panel Editor of the module

2.12 ALTERNATIVE CONFIGURATIONS

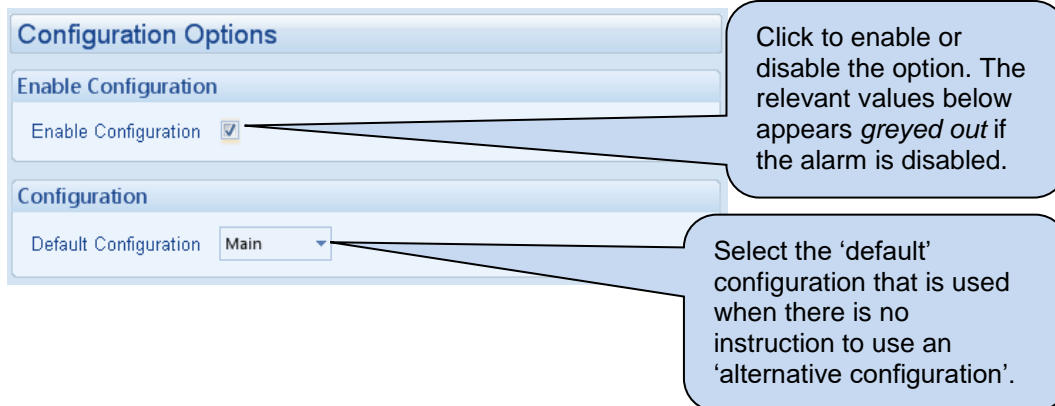
An Alternative Configuration is provided to allow the system designer to cater for different AC requirements utilising the same generator system. Typically this feature is used by Rental Set Manufacturers where the set is capable of being operated at (for instance) 120V 50Hz and 240V 50Hz using a selector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

The Alternative Configuration is selected using either:

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

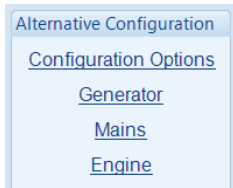


2.12.1 CONFIGURATION OPTIONS

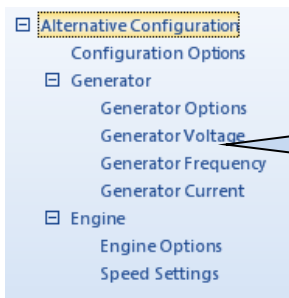
A screenshot of the "Configuration Options" interface. It shows a section titled "Configuration Options" with a sub-section "Enable Configuration" containing a checkbox labeled "Enable Configuration" which is checked. Below this is a section titled "Configuration" with a dropdown menu labeled "Default Configuration" currently set to "Main". Two callout boxes provide instructions: one points to the checkbox and says "Click to enable or disable the option. The relevant values below appears *greyed out* if the alarm is disabled." The other points to the dropdown menu and says "Select the 'default' configuration that is used when there is no instruction to use an 'alternative configuration'."

2.12.2 ALTERNATIVE CONFIGURATION

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



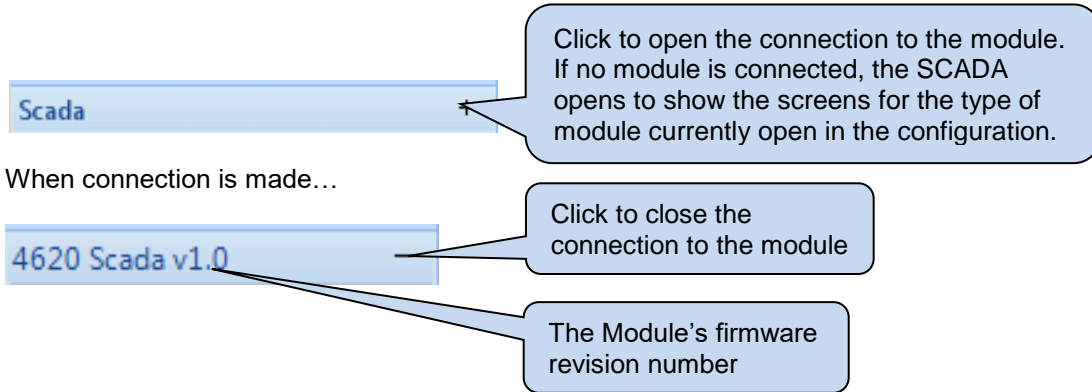
Alternative configuration options contain a subset of the main configuration. The adjustable parameters are not discussed here as they are identical to the main configuration options :



Configuration menus for the *Alternative Configuration*. For information about the configuration items within this section, refer to their description in the 'main' configuration.

3 SCADA

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



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



3.1 MIMIC

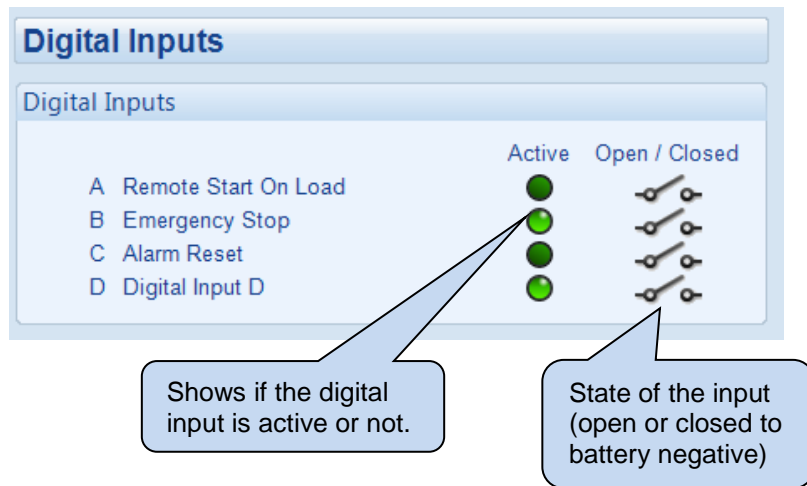
This screen provides a mimic of the control module and allows the operator to change the control mode of the module.



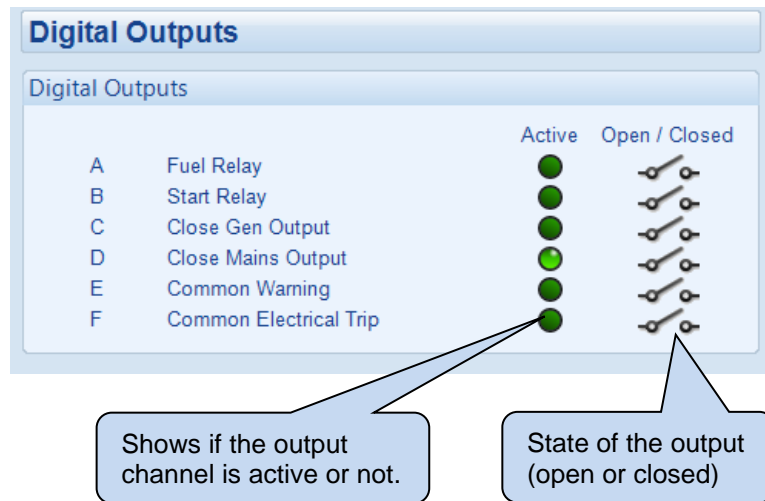
Hint : Buttons may not operate if this has been locked out by the *Access Permissions* security feature of the Configuration Suite Software. Refer to your system supplier for details.

Click the mimic buttons to control the module remotely

3.2 DIGITAL INPUTS



3.3 DIGITAL OUTPUTS



3.4 MAINS



AMF MODULE TYPE ONLY

Shows the modules measurements of the mains supply.

Mains

Frequency

50.3 Hz

Phase To Neutral Voltages

| | | |
|---------|---------|---------|
| L1 - N | L2 - N | L3 - N |
| 242.5 V | 241.5 V | 241.0 V |

Phase To Phase Voltages

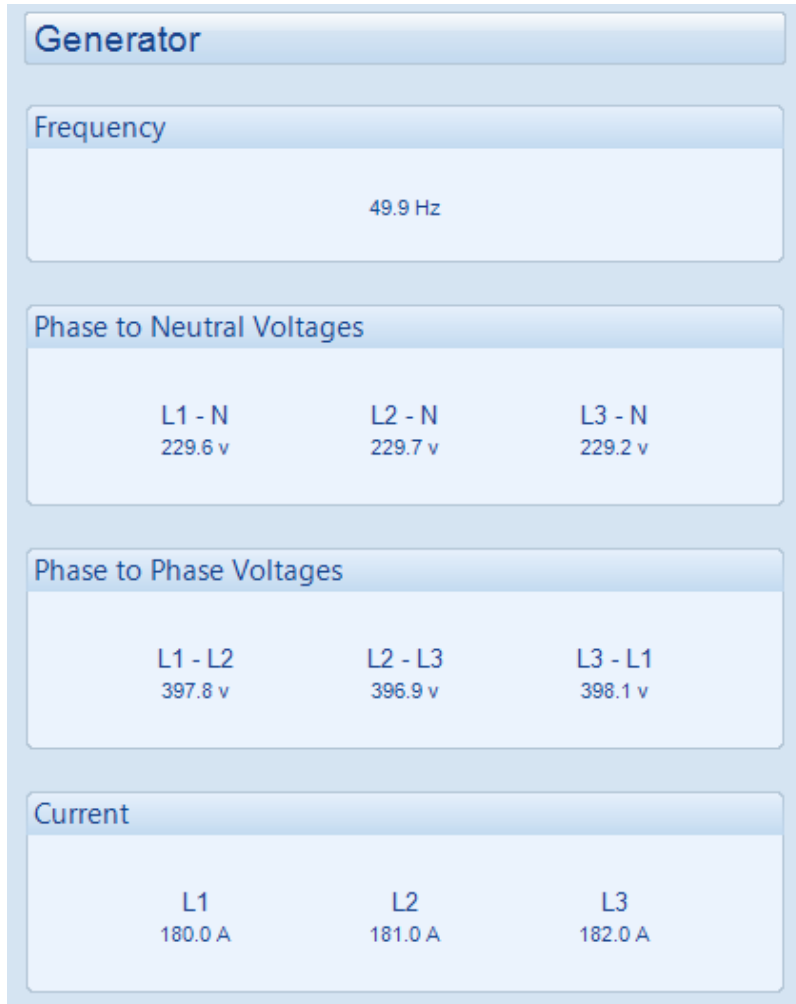
| | | |
|---------|---------|---------|
| L1 - L2 | L2 - L3 | L3 - L1 |
| 419.0 V | 418.6 V | 419.4 V |

Current

| | | |
|---------|---------|---------|
| L1 | L2 | L3 |
| 442.0 A | 443.0 A | 441.0 A |

3.5 GENERATOR

Shows the modules measurements of the generator parameters.



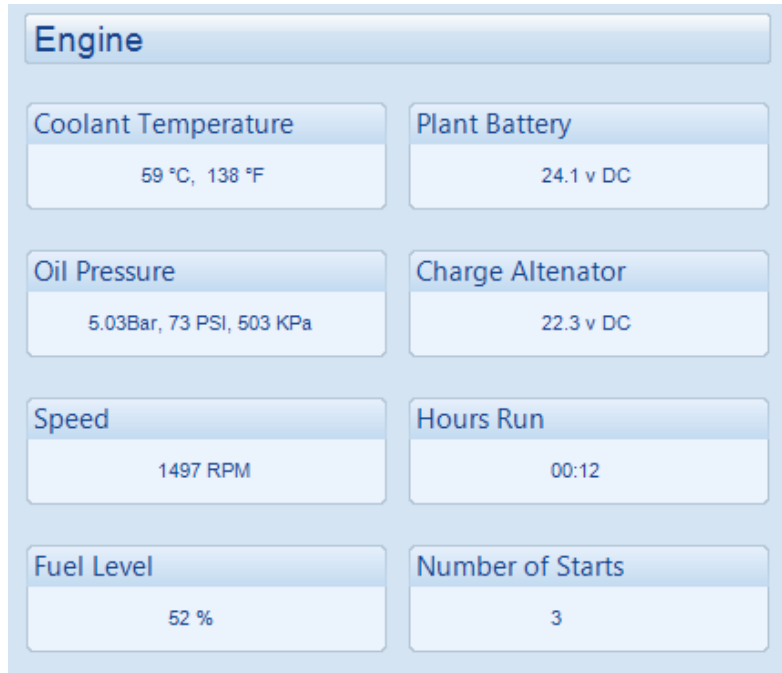
3.6 POWER

Shows the modules measurements of the generator power parameters.

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

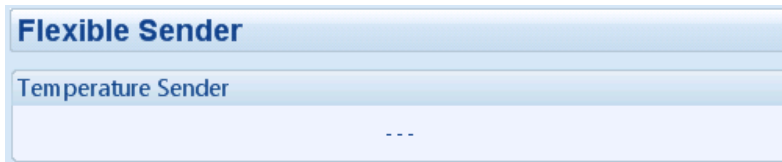
3.7 ENGINE

Shows the modules measurements of the engine parameters.



3.8 FLEXIBLE SENSOR

Shows the measurement of the Flexible Sensor (If configured)



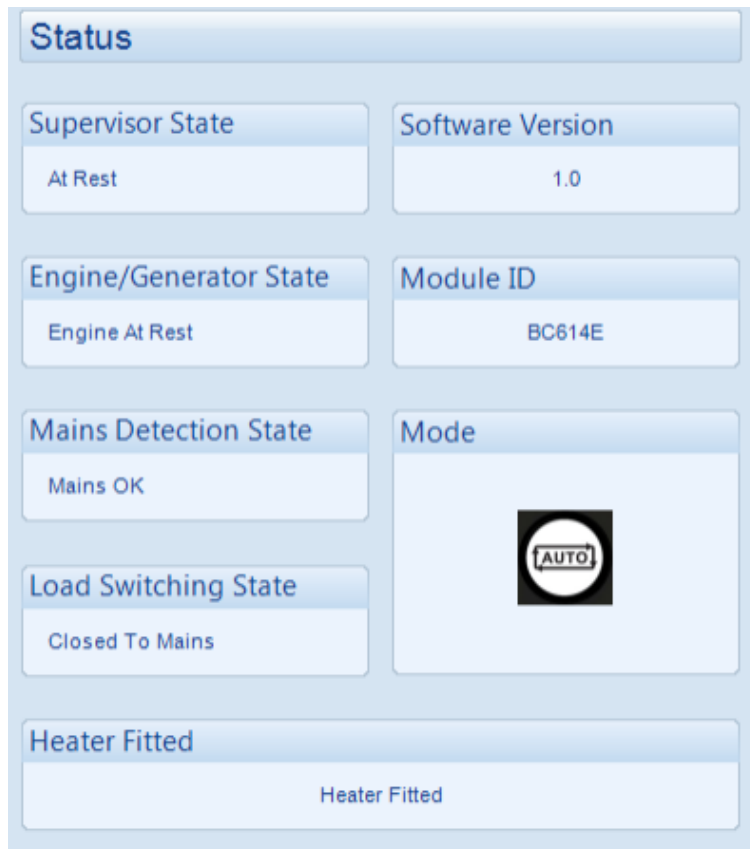
3.9 ALARMS

Shows any present alarm conditions.



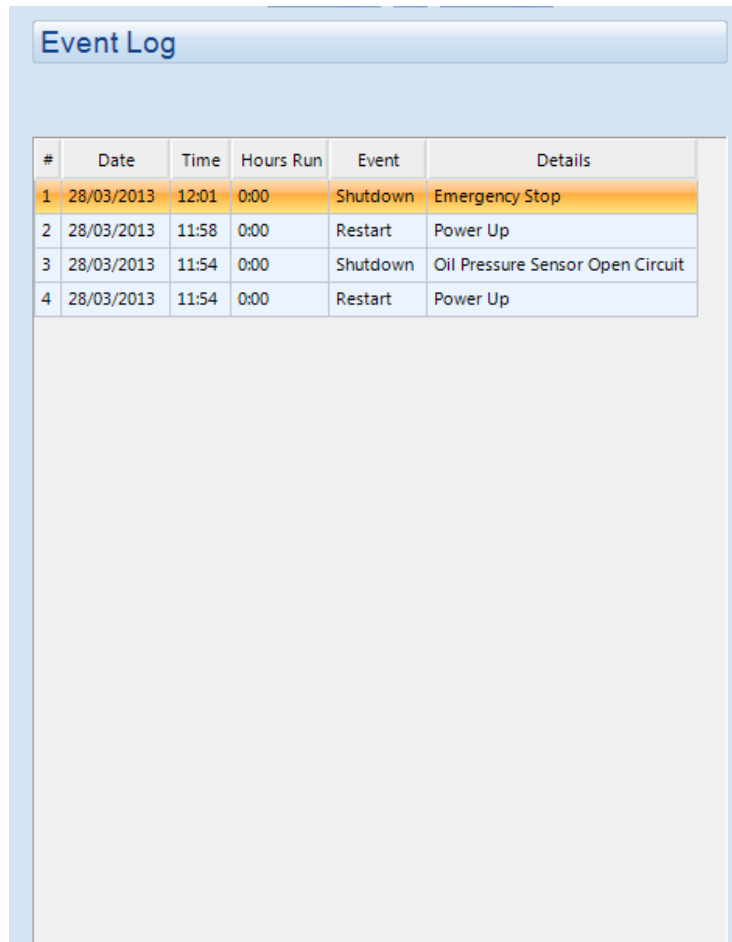
3.10 STATUS

Shows the module's current status.



3.11 EVENT LOG

Shows the contents of the module's event log.

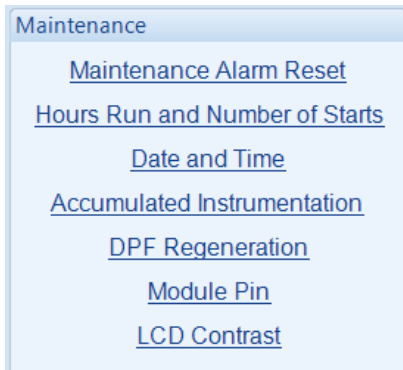


The screenshot shows a window titled "Event Log" with a table containing four rows of event data. The first row is highlighted in orange. The table has columns for #, Date, Time, Hours Run, Event, and Details.

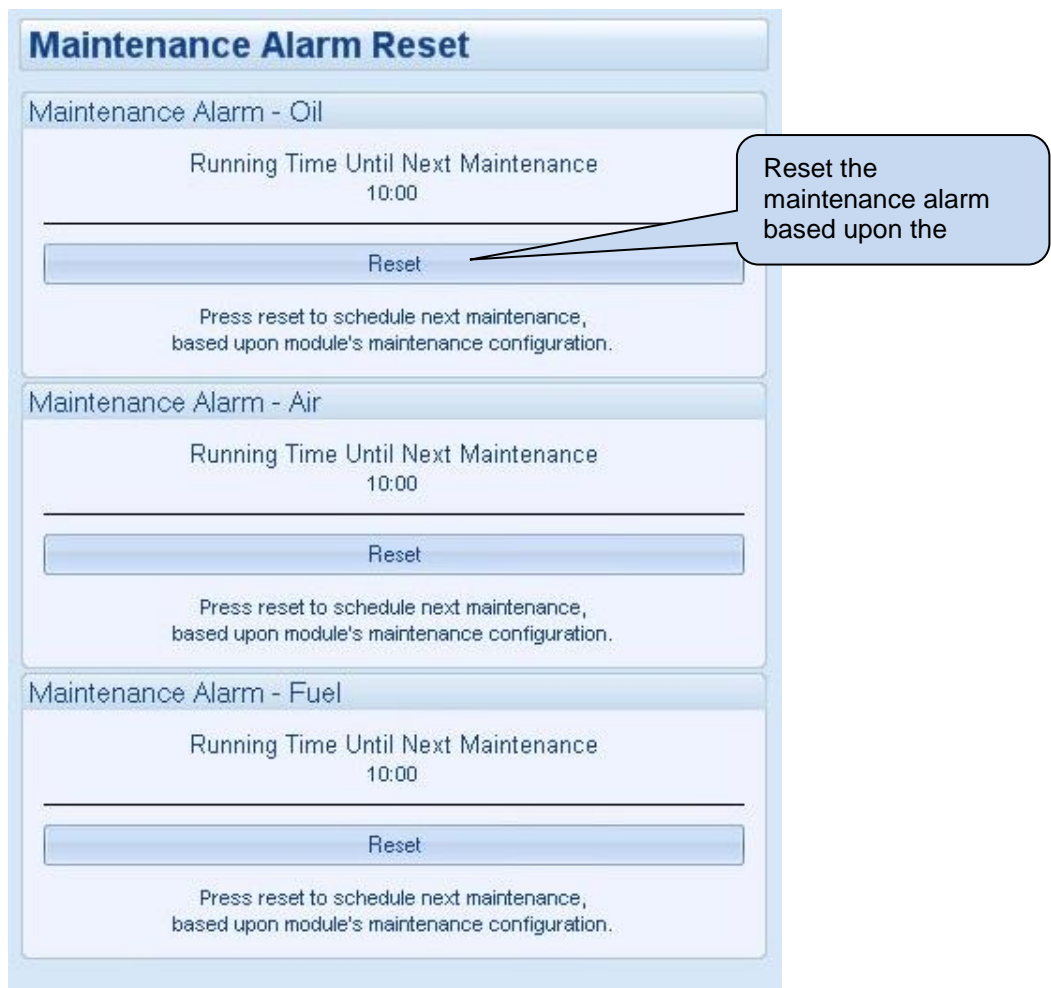
| # | Date | Time | Hours Run | Event | Details |
|---|------------|-------|-----------|----------|----------------------------------|
| 1 | 28/03/2013 | 12:01 | 0:00 | Shutdown | Emergency Stop |
| 2 | 28/03/2013 | 11:58 | 0:00 | Restart | Power Up |
| 3 | 28/03/2013 | 11:54 | 0:00 | Shutdown | Oil Pressure Sensor Open Circuit |
| 4 | 28/03/2013 | 11:54 | 0:00 | Restart | Power Up |

3.12 MAINTENANCE

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

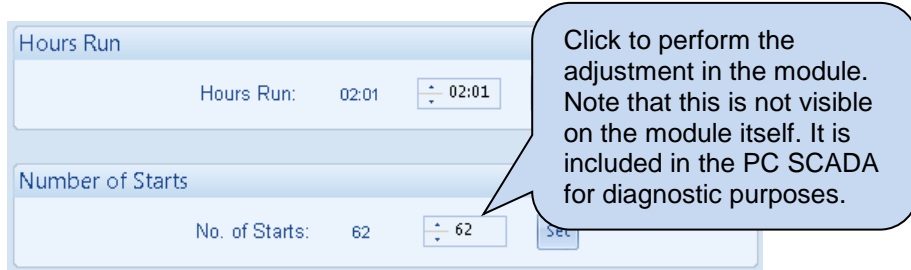


3.12.1 MAINTENANCE ALARM RESET



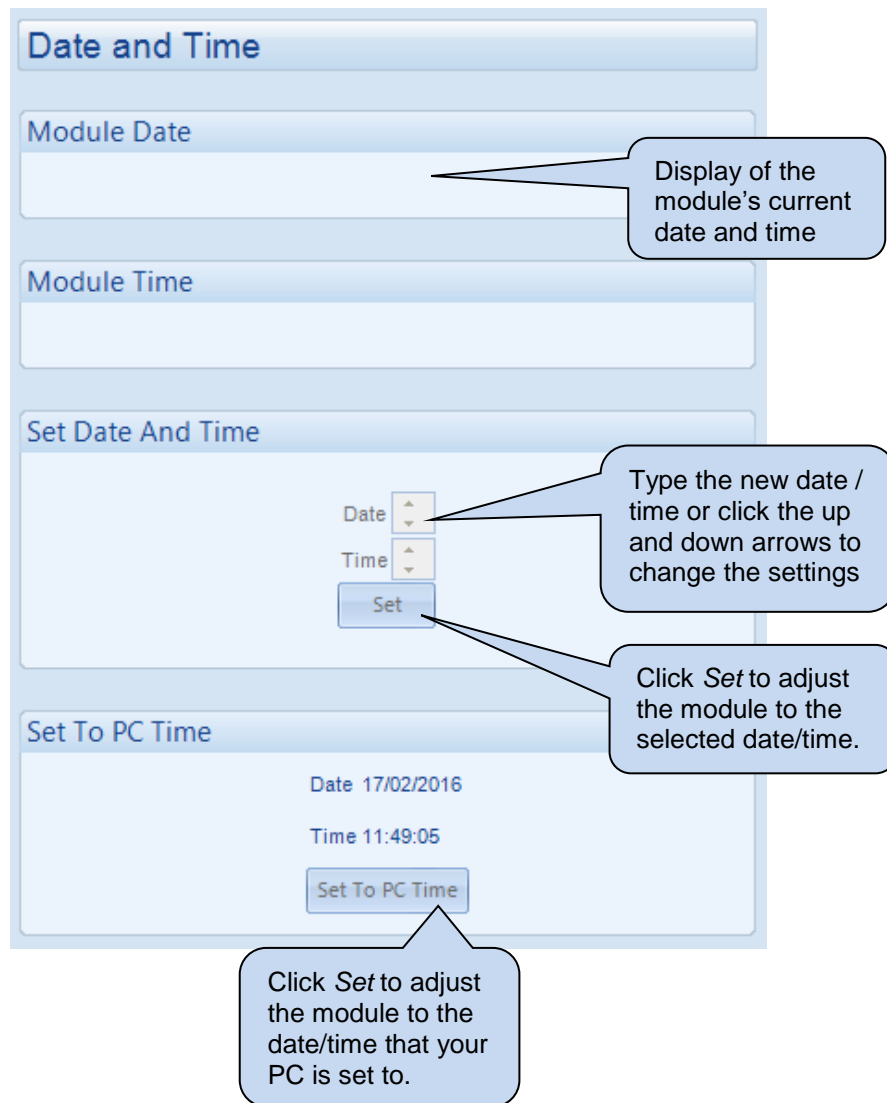
3.12.2 HOURS RUN AND NUMBER OF STARTS

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.



3.12.3 DATE AND TIME

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



3.12.4 ACCUMULATED INSTRUMENTATION

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

Accumulated Instrumentation

kWh

kWh: 75.0 kWh

kVAh

kVAh: 100.0 kVAh

kVArh

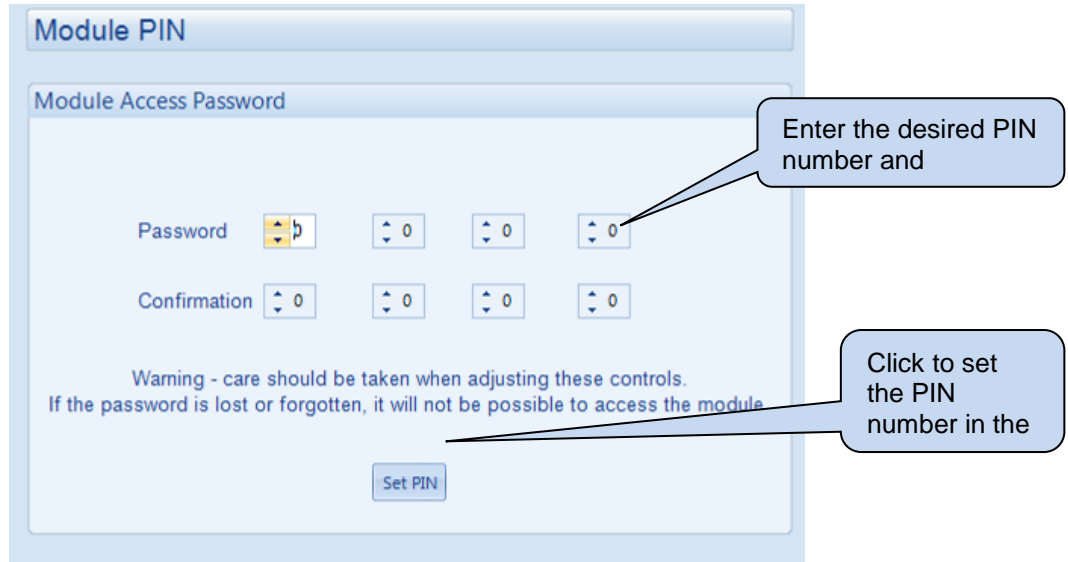
kVArh: 18.0 kVArh

Reset

3.12.5 MODULE PIN

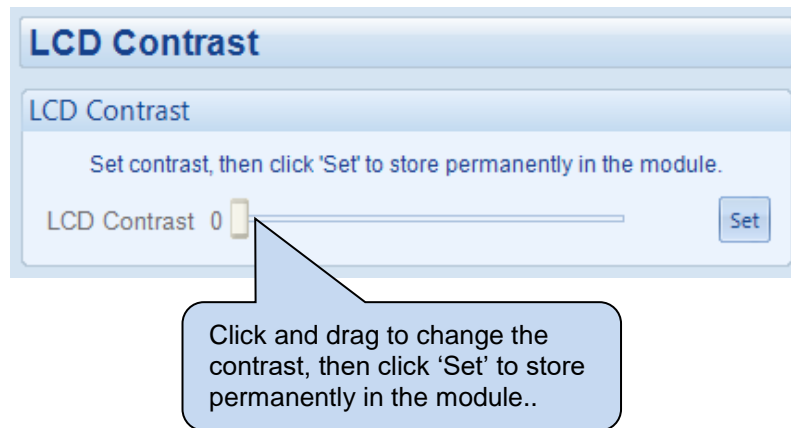
NOTE : If the PIN is lost or forgotten, it is no more possible to access the module!

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



3.12.6 LCD CONTRAST

Allows adjustment of the module's LCD contrast setting.



4 ALARM TYPES

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

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

5 ALARM ARMING

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

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

5.1 ALWAYS

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

5.2 FROM STARTING

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

5.3 FROM SAFETY ON

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

5.4 ENGINE PROTECTION

The protection is active when the engine is running and all engine protection (for example oil pressure and coolant temperature) are in a 'healthy' state.

Oil Pressure Warning

Oil Pressure Shutdown

High Coolant Temperature Warning

High Coolant Temperature Shutdown

High Coolant Temperature Electrical Trip

5.5 OVERSHOOT

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

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

Example

57 Hz *Over Frequency* setting, 10% *Overspeed Overshoot*

During *Safety Delay* a generator frequency above $(57 \text{ Hz} \times 1.1) = 62.7 \text{ Hz}$ results in an immediate shutdown without delay.

After *Safety delay*, a generator frequency above 57 Hz for the period of the *Generator Transient Delay* results in a shutdown.

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