DEEP SEA ELECTRONICS

DSEL401 MKII
Configuration Suite PC Software Manual

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DSEL401 MKII Configuration Suite PC Software Manual

Amendments List

Issue	Comments	Minimum Module version required	Minimum Configuration Suite Version required
1	Initial release	V1.0.0	2014.66 v1.185.6
1.1	Checked text and corrected minor typos	V1.0.0	2014.66 v1.185.6
2	Ammended to include new module feautres: - Limit Audible Alarm Duration - Mains Supply - Light Output Override - Power Save Mode digital input - Auto Retry on Loss of Crank Disconnect	V1.2.0	2016.53 v2.9.6

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

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1 INTRODUCTION

The **DSE Configuration Suite PC Software** allows the DSEL401 MKII modules to be connected to a PC via USB 'A –USB B' cable. Once connected the various operating parameters within the module are viewed or edited as required by the engineer. This software allows easy controlled access to these values.

This manual details the configuration of the DSEL401 MKII controllers
The DSE Configuration Suite PC Software must only be used by competent, qualified personnel, as changes to the operation of the module may have safety implications on the panel / generating set to which it is fitted. Access to critical operational sequences and settings for use by qualified engineers, may be barred by a security code set by the generator provider.
The information contained in this manual must be read in conjunction with the information contained in the appropriate module documentation. This manual only details which settings are available and how they may be used. A separate manual deals with the operation of the individual module (See section entitled *Bibliography* elsewhere in this document).

1.1 BIBLIOGRAPHY

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

1.1.1 INSTALLATION INSTRUCTIONS

DSE PART	DESCRIPTION
053-172	DSEL401 MKII Installation Instructions Sheet

1.1.2 MANUALS

DSE PART	DESCRIPTION
057-151	DSE Configuration Suite PC Software Installation & Operation Manual
057-004	Electronic Engines and DSE wiring
057-221	DSEL401 MKII Operator Manual

1.1.3 OTHER

The following third party documents are also referred to:

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

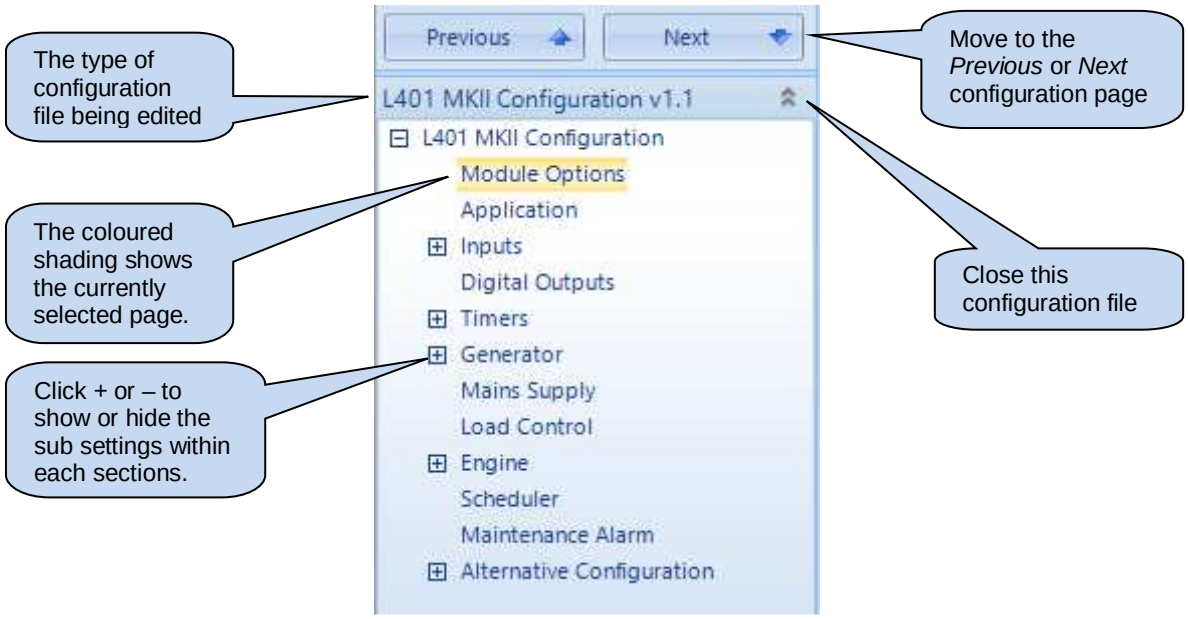
1.2 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

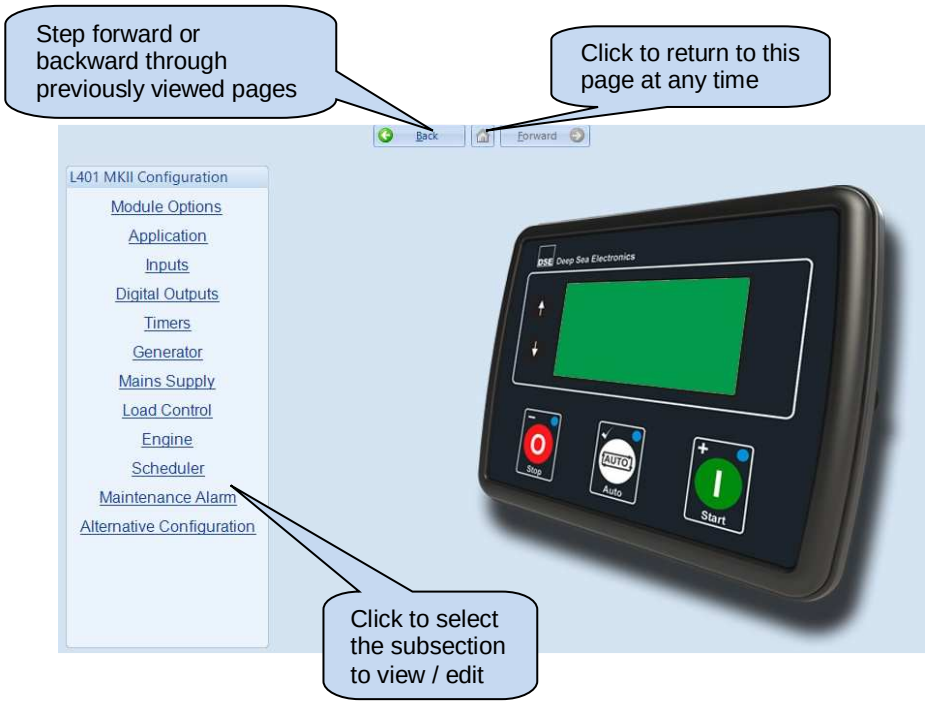
For information in regards to instating and using the DSE Configuration Suite Software please refer to DSE publication: ***057-151 DSE Configuration Suite PC Software Installation & Operation Manual*** which is found on our website: **www.deepseaplc.com**

2 EDITING THE CONFIGURATION

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

2.1 SCREEN LAYOUT





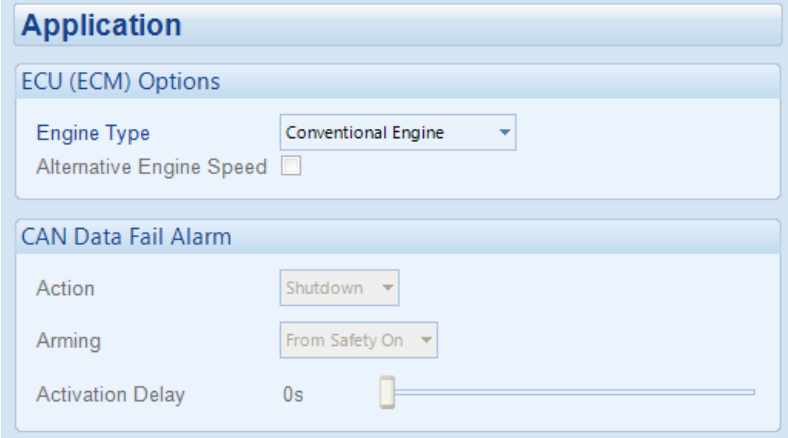
2.2 MODULE OPTIONS

Setting	Description
Lamp Test At Power Up	☐ = Feature disabled ☑ = 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	☐ = Normal operation ☑ = 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
Display SPN Strings	☐ =The module displays CAN messages in manufacturer numerical code. ☑ = The module displays CAN messages in ENGLISH text alongside the manufacturer numerical code.
Event log in Hours Run	☑ = The engine run hours is added to the recorded event in the event log

Setting	Description
Enable Fast Loading	☐ = Normal Operation, the safety on timer is observed in full. This feature is useful if the module is used with some small engines where pre-mature termination of the delay timer leads to overspeed alarms on start up. ☑ = The module terminates the safety on timer once all monitored parameters have reached their normal settings. This feature is useful if the module is 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. ☐ = Pressing the stop button instantly opens the breaker and stops the engine. ☑ = Pressing the stop button instantly opens the breaker and puts the engine into a cooling run. Pressing the stop button again instantly stops the engine. **NOTE: When the set is running off load, this option has no effect and pressing the Stop button immediately causes the engine to stop.**
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
Auto Light Control Enable	☐ = Feature is disabled. ☑ = An additional control screen is shown under the module's Manual Control display section. When the set is started in Manual mode, the light outputs are controlled via the module's *Manual* Control display section. The light outputs follow the *Start Up Timers* and *Shutdown Timers* automatically.
All Light Control Enable	☐ = Feature is disabled. ☑ = An additional control screen is shown under the module's *Manual Control* display section for controlling all light outputs together in Manual mode.
Individual Light Control Enable	☐ = Feature is disabled. ☑ = Additional control screens are shown under the module's *Manual Control* display section for controlling light outputs individually in Manual mode.
Auto Light Initiation When Started in Manual Mode	☐ = When the set is started in Manual mode, the light outputs are controlled via digital inputs or via the light control screens on the module display. ☑ = When the set is started in Manual mode, the light outputs follow the *Start Up Timers* and *Shutdown Timers* automatically.
All Warnings Are Latched	☐ = Normal Operation, the warnings and pre-alarms automatically reset once the triggering condition has cleared. ☑ = Warnings and pre-alarms latch when triggered. Resetting the alarm is performed by either an external reset applied to one of the inputs or, the 'Stop/Reset' pushbutton must be operated (once the triggering condition has been cleared).
Manual Mast Control	☐ = The mast control in Manual mode is disabled. ☑ = Normal operation, the mast control is enabled in both Manual and Auto modes.
Limit Audible Alarm Duration	☐ = Normal operation, the configured *Audible Alarm* digital output is active when any alarm is active on the controller. The *Audible Alarm* digital output is inactive when the alarm is muted or reset. ☑ = The configured *Audible Alarm* digital output is active when any alarm is active on the controller for the duration of the *Audible Alarm Duration* timer. The *Audible Alarm* digital output is inactive when the alarm is muted or reset or when the *Audible Alarm Duration* timer expires.

2.3 APPLICATION

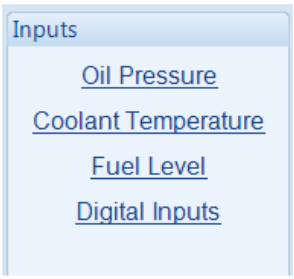
NOTE: For further details and instructions on ECU options and connections, refer to DSE Publication: *057-004 Electronic Engines and DSE Controllers* which are found on our website: *www.deepseaplc.com*



Parameter	Description
Engine Type	Select the appropriate engine type ***Conventional Engine:*** Select this for a traditional (non ECU) engine, either Energise to Run or Energise to Stop. ***Conventional Gas Engine:*** Select this for a traditional (non ECU) engine and require Gas engine functionality. This enables control of configurable outputs for *Gas Choke and Gas Ignition* and instructs the module to follow the gas engine timers. ***Other Engines:*** The list of supported CAN (or Modbus) engines is constantly updated, check the DSE website at www.deepseaplc.com for the latest version of Configuration Suite software.
Alternative Engine Speed	☐ = The engine is instructed to run at its *Nominal Speed* as configured by the Engine Manufacturer. ☑ = The engine is instructed to run at its *Alternative Speed* as configured by the Engine Manufacturer.
CAN Data Fail	Provides protection against failure of the ECU CAN data link. The alarm action list is as follows: ***None*** ***Shutdown*** ***Warning***
Arming	Select when the *CAN ECU Data Fail* alarm is active. Options are as follows: ***From Safety On:*** Active only after the *Safety On* delay timer ***From Starting:*** Active only after the *Crank Relay* is energised
Activation Delay	The amount of time before the module activates the *CAN ECU Data Fail* after a failure.

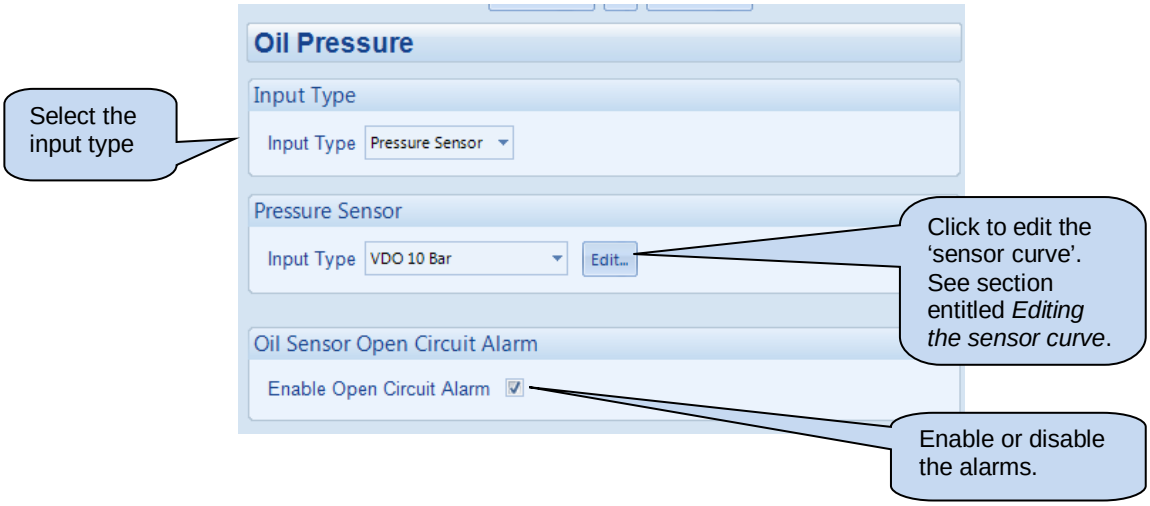
2.4 INPUTS

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



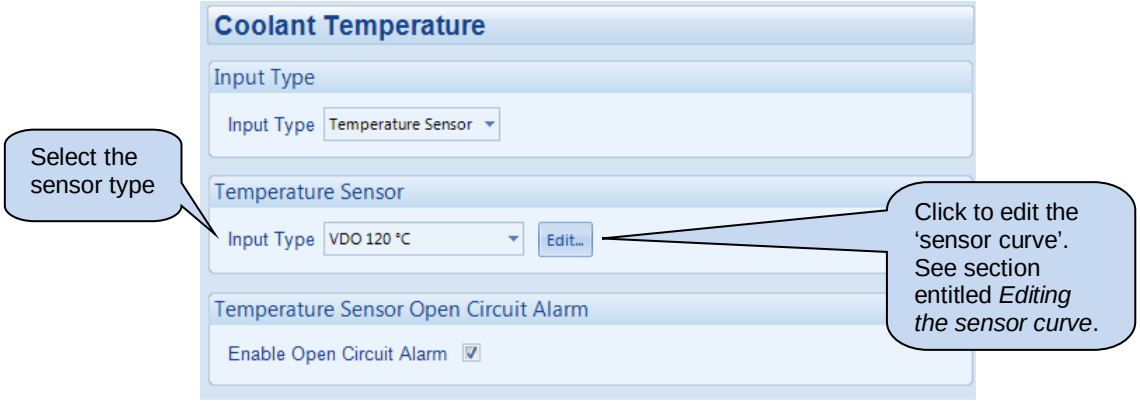
2.4.1 OIL PRESSURE

When a CAN Engine file is selected in *Engine Type* on the Application settings page – Most engines give oil pressure from CAN link. In these cases, Input A is fixed as Digital Input. Configuration is the same as for Digital Inputs, detailed elsewhere in this document.
Where the CAN engine does not support oil pressure over CAN link, Analogue input A is selectable as either digital input, or as analogue oil pressure sensor.



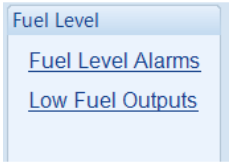
2.4.2 COOLANT TEMPERATURE

When a CAN Engine file is selected in *Engine Type* on the Application settings page – Engines give temperature measurements from CAN link. Input A is fixed as Digital Input. Configuration is the same as for Digital Inputs, detailed elsewhere in this document.

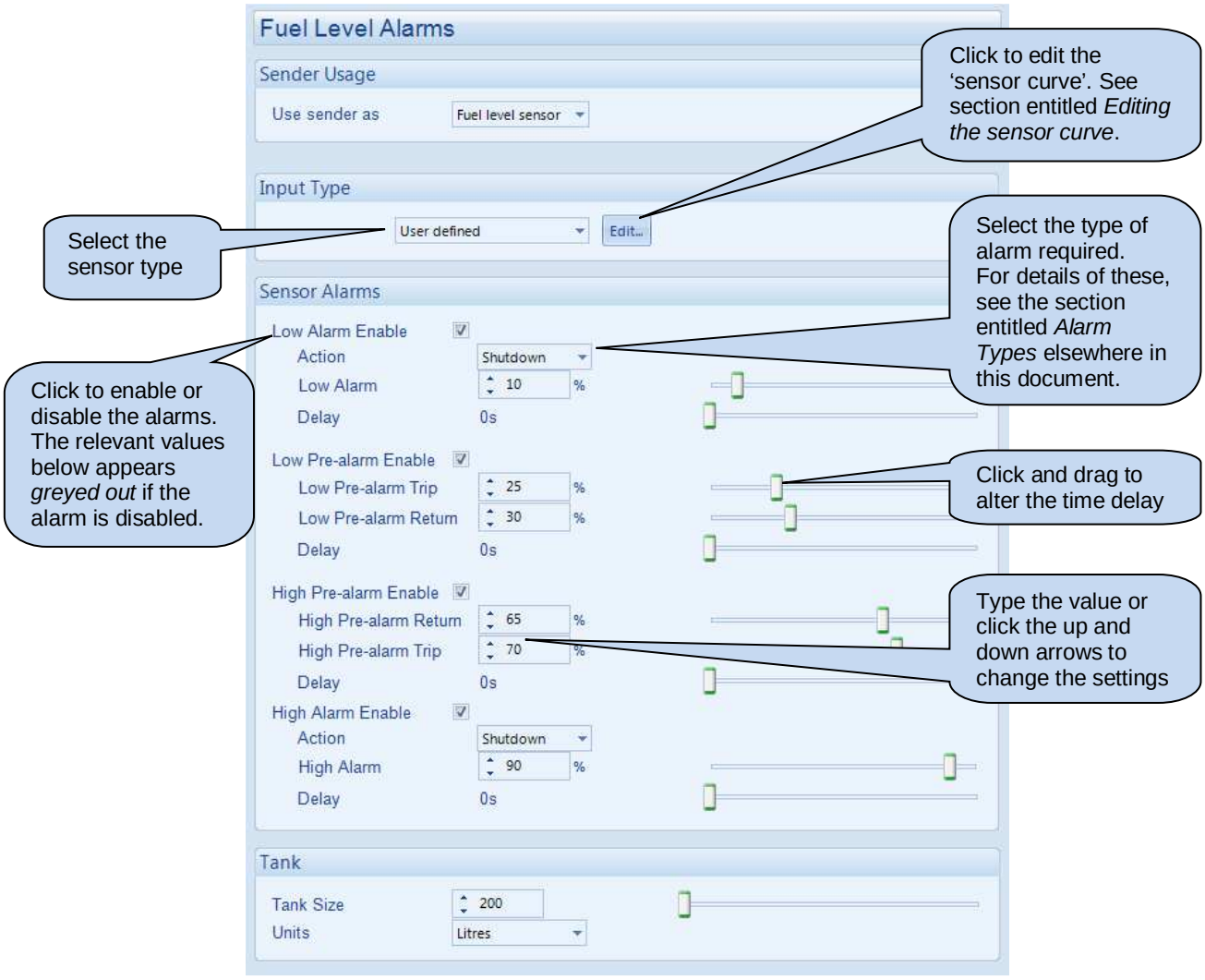


2.4.3 FUEL LEVEL

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



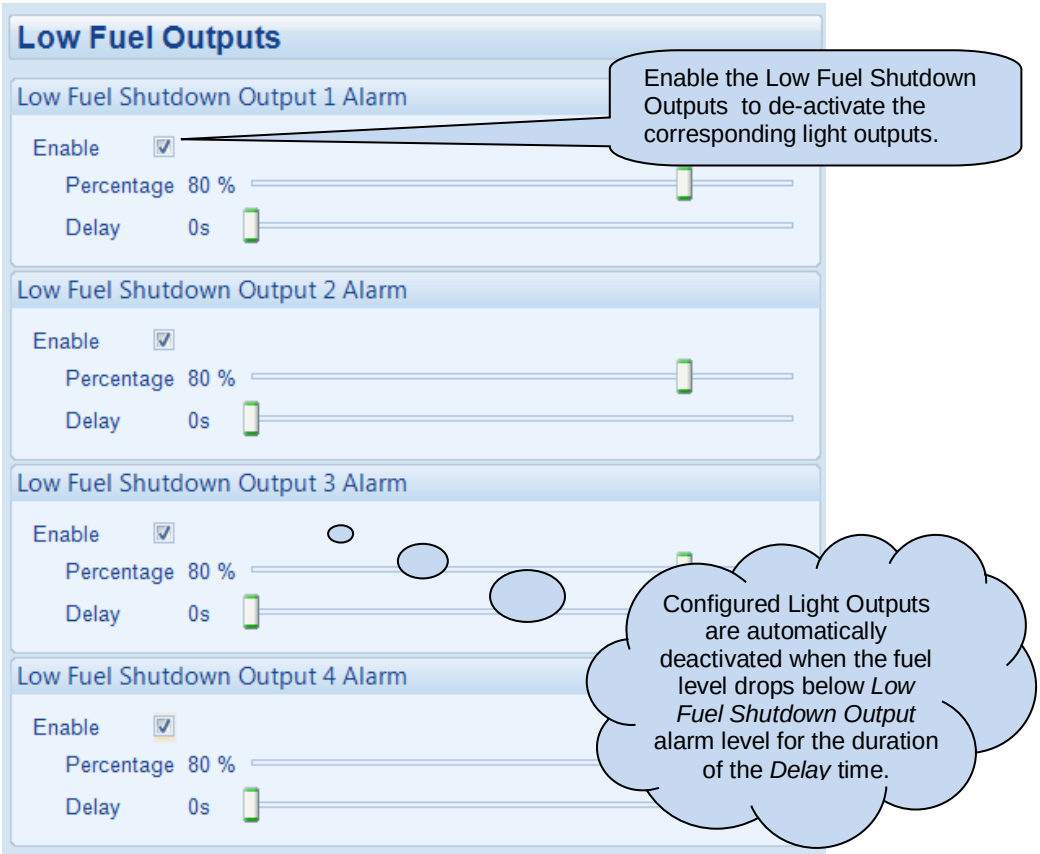
2.4.3.1 FUEL LEVEL ALARMS



Parameters are detailed overleaf…

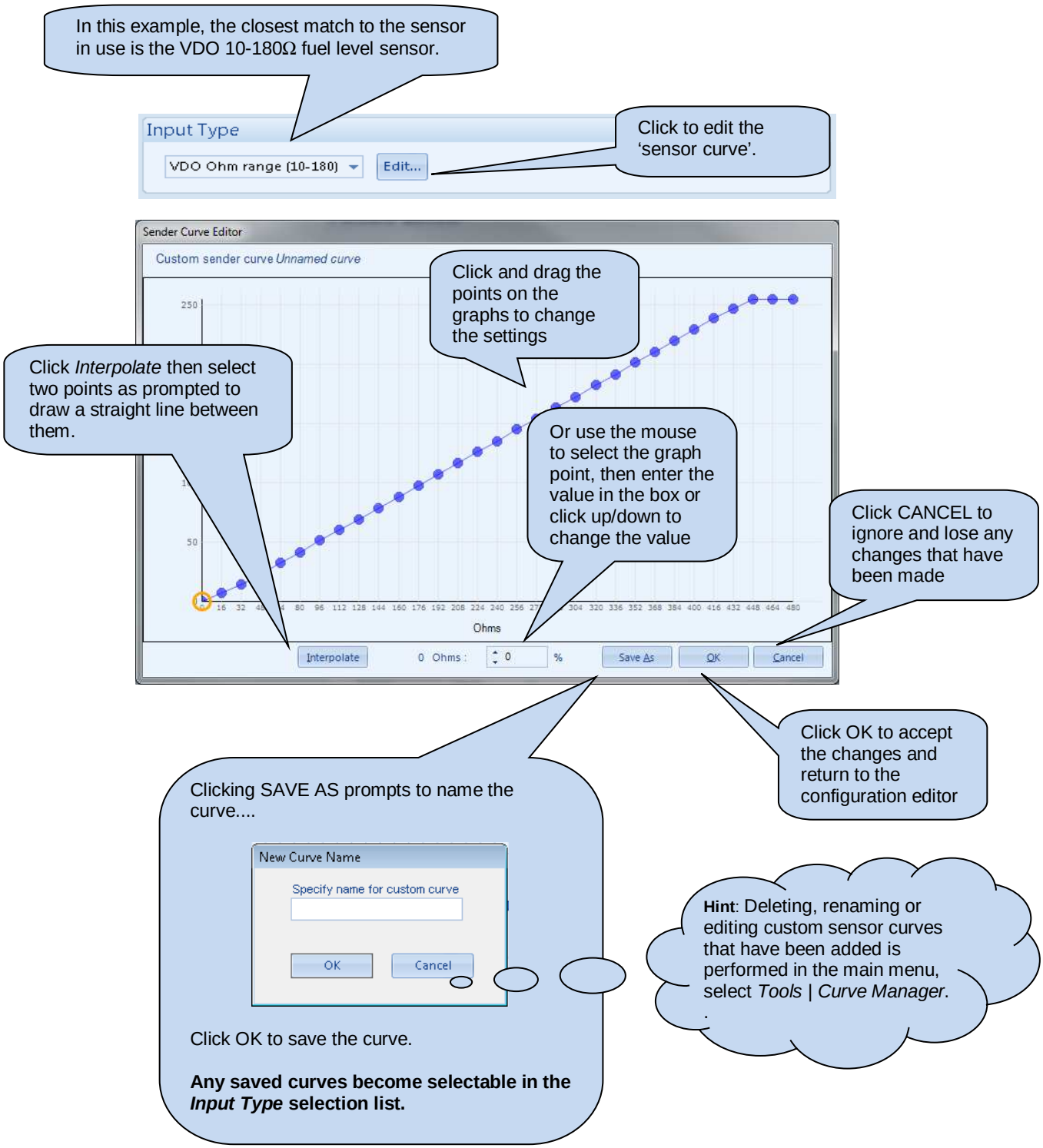
Parameter	Description
Use Sender As	Allows the configuration of the sender usage. *Fuel Level Sensor:* The input is to be connected to a Fuel Level sensor *Flexible Sensor:* The input is used as a *Flexible Sensor*
Input Type	Select the sender curve from a pre-defined list or create a user-defined curve.
Low Alarm Enable	☐ = Alarm is disabled. ☑ = The *Low Fuel Level Alarm* is active when the measured fuel level drops below the *Low Alarm* setting for the configured *Delay* time.
Low Pre-Alarm Enable	☐ = Alarm is disabled. ☑ = The *Low Fuel Level Pre-Alarm* is active when the measured fuel level drops below the *Low Pre-Alarm Trip* setting for the configured *Delay* time. The pre-alarm is automatically reset when the fuel level exceeds the configured *Low Pre-Alarm Return* setting.
High Pre-Alarm Enable	☐ = Alarm is disabled. ☑ = The *High Fuel Level Pre-Alarm* is active when the measured fuel level rises above the *High Pre-Alarm Trip* setting for the configured *Delay* time. The pre-alarm is automatically reset when the fuel level drops below the configured *High Pre-Alarm Return* setting.
High Alarm Enable	☐ = Alarm is disabled. ☑ = The *High Fuel Level Alarm* is active when the measured fuel level rises above the *High Alarm* setting for the configured *Delay* time.
Tank Size	Enter the size of the fuel tank where the fuel level sensor is fitted.
Units	Select the type of units to be used for the fuel level: ***Imperial Gallons*** ***Litres*** ***US Gallons***

2.4.3.2 LOW FUEL OUTPUTS



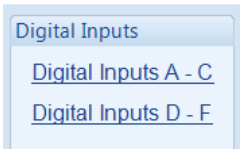
2.4.4 EDITING THE SENSOR CURVE

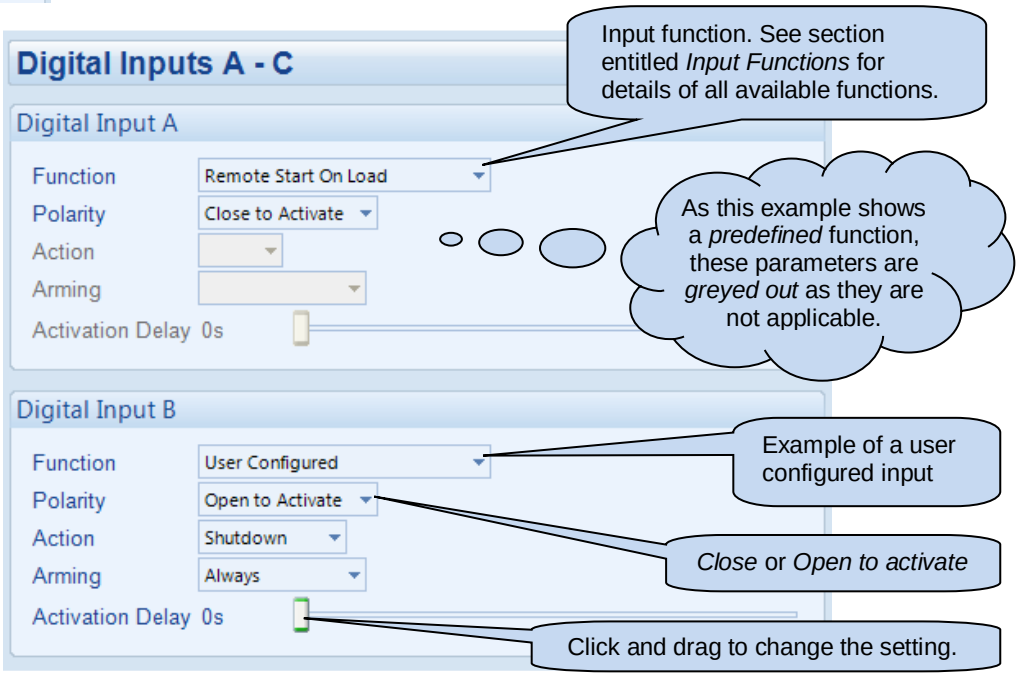
While the DSE Configuration Suite PC Software holds sensor specification for the most commonly used resistive sensors, occasionally it is required that the module be connected to a sensor not listed by the *configuration suite*. To aid this process, a sensor editor has been provided.



2.4.5 DIGITAL INPUTS

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





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

2.4.6 INPUT FUNCTIONS

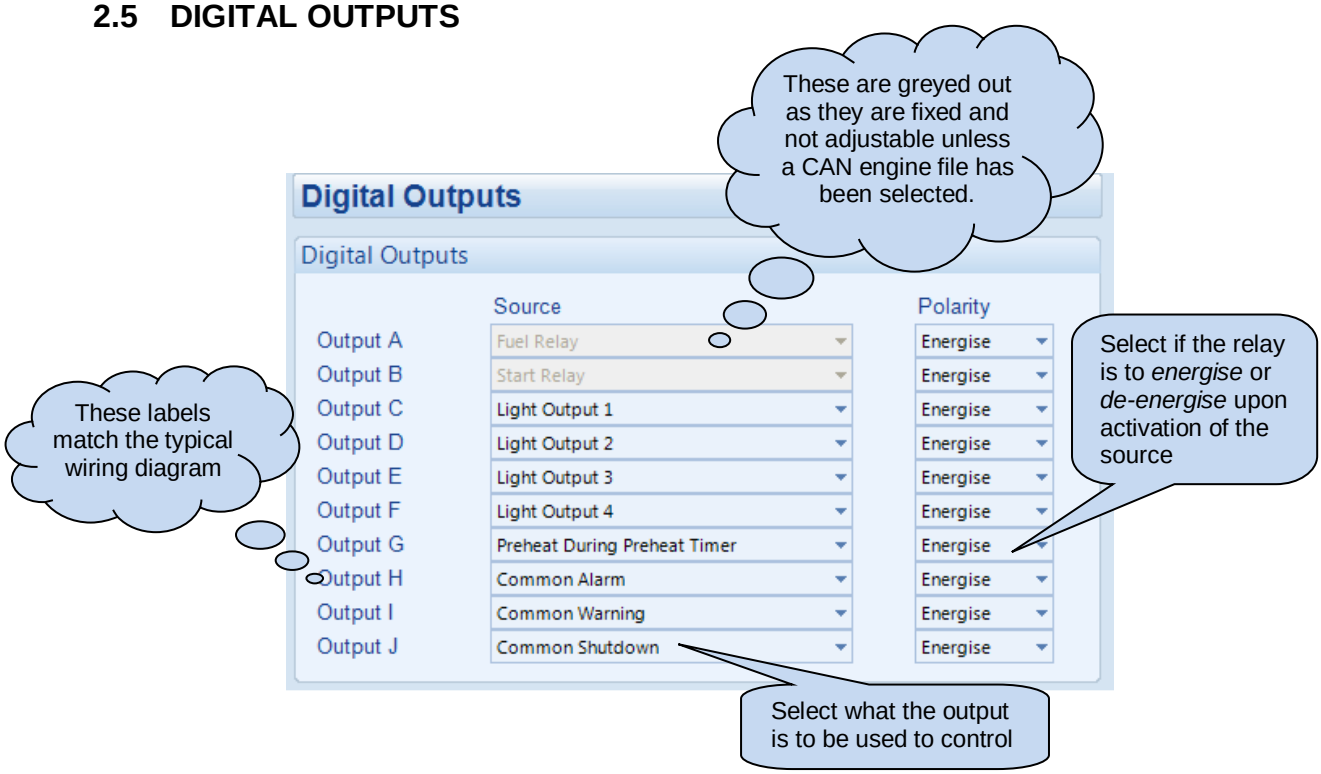
Where a digital input is NOT configured as “user configured”, a selection is made from a list of predefined functions. The selections are as follows:

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

Function	Description
Alarm Mute	This input is used to silence the audible alarm from an external source, such as a remote mute switch.
Alarm Reset	This input is used to reset any latched alarms from a remote location. It is also used to clear any latched warnings which may have occurred (if configured) without having to stop the generator.
Alternative Configuration	These inputs are used to instruct the module to follow the *alternative* configuration settings instead of the *main* configuration settings.
Auto Start Inhibit IEEE 37.2 - 3 checking or interlocking relay	This input is used to provide an override function to prevent the controller from starting the generator in the event of a remote start condition occurring. If this input is active and a remote start signal occurs the module does not give a start command to the generator. When this input signal is removed, the controller operates as if a remote start 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 a remote start occurs 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 next remote start request. This input does not prevent starting of the engine in MANUAL mode.
Controlled Shutdown	This input allows an external source to tell the controller to lower the mast, i.e. a wind gauge at the top of the mast closes a relay switch. The light outputs deactivates and the normal stopping sequence is initiated.
Coolant Temperature Switch	This input is used to give a *Coolant Temperature High* 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
External Panel Lock	Locks the mode buttons on the module front fascia.
Holding Supports Open	This input is used to provide a feedback to the module that the supports are open and is safe to activate the *Light Mast Up* digital output.
Inhibit Light Output 1, 2 ,3 & 4 IEEE 37.2 - 52 AC Circuit Breaker	This input is used to prevent the module from activating the corresponding light output. If the light outut was already activated, activating this input causes the light output de-activation. Removing the input allows the light output to become active again.
Inhibit Scheduled Run IEEE 37.2 - 3 Checking Or Interlocking Relay	This input is used to provide a mean of disabling a scheduled run.
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.
Light Mast Fully Closed	This input is used to provide a feedback to the module that the light mast is fully closed. This input overrides the module’s control for closing the mast both in Automatic and Manual modes.
Light Mast Fully Open	This input is used to provide a feedback to the module that the light mast is fully open. This input overrides the module’s control for opening the mast both in Automatic and Manual modes.
Light Output Acitvate 1, 2, 3, & 4	If the module is running the genset off load, this input activates the corresponding light output.

Function	Description
Light Output Override	This is used to activate the digital outputs *Light Output 1, 2, 3 & 4*; irrespective of the status of the generator supply and the *Mains Supply Acitve* digital input. This is useful for powering up the light outputs from an external supply. The light mast control is not affected by this input function.
Low Fuel Level Switch IEEE 37.2 - 71 Liquid Level Switch	Used to give a digital input function to provide a low fuel level alarm
Mains Supply Active	When this input is active the module's display changes the generator icon to mains. AC parameters such as Voltage, Frequency and Current are shown as Mains parameters. the generator starting is inhibited when this input is active. For further details, see the section entitled *Mains Supply* elsewhere in this document.
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	A digital normally open or closed oil pressure switch gives this input. It allows low oil pressure protection.
Override Fuel Shutdown	This input provides a mean to prevent all Low Fuel Shutdown Otuput Alarms
Photocell Start	When in auto mode, the module performs the start sequence and activate all configured Light Outputs.
Power Save Mode	This is used to force the module into *Power Save Mode.*
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 are 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 activate all configured Light Outputs.
Simulate Auto Button	**NOTE: If a call to start is present when AUTO MODE is entered, the starting sequence begins. Call to Start comes from a number of sources depending upon module type and configuration and includes (but is not limited to) : Remote start input present, Scheduled run.** This input mimic's the operation of the 'Auto' button and is used to provide a remotely located Auto 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.
Smoke Limiting IEEE 37.2 – 18 accelerating or decelerating device	This input instructs the module to give a *run at idle speed* command to the engine either via an output configured to *smoke limit* or by data commands when used with supported electronic engines.

2.5 DIGITAL OUTPUTS



2.5.1 OUTPUT SOURCES

The list of output sources available for configuration of the module relay.

Under the scope of IEEE 37.2, *function numbers are also used to represent functions in microprocessor devices and software programs*. Where the DSE output functions are 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*.

Output Source	Active…	Inactive….
Not Used	The output does not change state (Unused)	
Air Filter Maintenance	Indicates that the air filter maintenance alarm is due	
Air Flap Relay	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, configured as digital input, is active	
Audible Alarm IEEE 37.2 – 74 alarm relay	Use this output to activate an external sounder or external alarm indicator. Operation of the Mute pushbutton resets this output once activated.	Inactive if no alarm condition is active or if the Mute pushbutton was pressed.
Battery High Voltage IEEE 37.2 – 59DC 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 – 27DC undervoltage relay	This output indicates that a Battery Under Voltage alarm has occurred.	Inactive when battery voltage is not Low

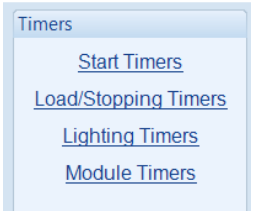
Output source	Activates…	Is not active….
CAN ECU Data Fail	Becomes active when no CAN data is received from the ECU after the safety delay timer has expired	Inactive when: • CAN data is being received • The set is at rest • During the starting sequence before the safety delay timer has expired
CAN ECU Error	Becomes active when a 'Yellow lamp' – Warning alarm is signalled by the CAN ECU	
CAN ECU Fail	Becomes active when a 'Red lamp' – Shutdown alarm is signalled by the CAN ECU	
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 Stop	Active when the DSE controller is requesting that the CAN ECU stops the engine.	
Charge Alternator Warning/Shutdown	Active when the charge alternator alarm is active	
Combined Gen/Mains Failure	Active when either the Generator or Mains supplies has failed	
Combined Mains Supply Failure	Active when a *Mains Failure* is detected	
Common Alarm	Active when one or more alarms (of any type) are active	The output is inactive when no alarms are present
Common Electrical Trip	Active when one or more *Electrical Trip* alarms are active	The output is inactive when no shutdown alarms are present
Common Shutdown	Active when one or more *Shutdown* alarms are active	The output is inactive when no shutdown alarms are present
Common Warning	Active when one or more *Warning* alarms are active	The output is inactive when no warning alarms are present
Cooling Down	Active when the Cooling timer is in progress	The output is inactive at all other times
Digital Input A to F	Active when the relevant digital input is active	
Display Heater Fitted and ON	Active when the LCD screen heater is active **NOTE: For further information on the display heater, refer to DSE Publication: *056-081 Screen Heaters* which are found on our website: *www.deepseaplc.com***	
Emergency Stop	Active when the Emergency Stop alarm is active.	
Energise To Stop	Normally used to control an *Energise to Stop* solenoid, this output becomes active when the controller wants the set to stop running.	Becomes inactive a configurable amount of time after the set has stopped. This is the *ETS hold time*.
Fail To Start IEEE 37.2 - 48 Incomplete Sequence Relay	Becomes active if the set is not seen to be running after the configurable number of start attempts	
Fail To Stop IEEE 37.2 - 48 Incomplete Sequence Relay	If the set is still running a configurable amount of time after it has been given the stop command, the output becomes active. This configurable amount of time is the *Fail to Stop Timer*.	
Flexible Sensor C High Alarm	Active when the flexible sensor high alarm is active	
Flexible Sensor C High Pre-Alarm	Active when the flexible sensor high pre-alarm is active	
Flexible Sensor C Low Alarm	Active when the flexible sensor low alarm is active	
Flexible Sensor C Low Pre-Alarm	Active when the flexible sensor low pre-alarm is active	
Fuel Filter Maintenance	Indicates that the fuel filter maintenance alarm is due	
Fuel Level High Alarm	Active when the level detected by the fuel level sensor has risen above the high fuel level alarm setting.	
Fuel Level High Pre-Alarm	Active when the level detected by the fuel level sensor has risen above the high fuel level pre-alarm setting.	
Fuel Level Low Alarm	Active when the level detected by the fuel level sensor has fallen below the low fuel level alarm setting.	
Fuel Level Low Pre-Alarm	Active when the level detected by the fuel level sensor has fallen below the low fuel level pre-alarm setting.	

Output source	Activates…	Is not active….
Fuel Relay	Becomes active when the controller requires the governor/fuel system to be active.	Becomes inactive whenever the set must be stopped, including between crank attempts, upon controlled stops and upon fault shutdowns.
Fuel Sender Trip 1, 2, 3 & 4	Active when the corresponding Low Fuel Shutdown Output Alarm is active	
Gen Over Frequency Overshoot Alarm	Active when the over frequency overshoot alarm is active	
Gen/Mains High Frequency	Active when a *High Frequency* alarm is detected on either the Gen or Mains	
Gen/Mains High Voltage	Active when a *High Votlage* alarm is detected on either the Gen or Mains	
Gen/Mains Low Frequency	Active when a *Low Frequency* alarm is detected on either the Gen or Mains	
Gen/Mains Low Voltage	Active when a *Low Votlage* alarm is detected on either the Gen or Mains	
Generator Available	Becomes active when the generator is available to take load.	Inactive when • *Loading voltage* and *loading frequency* have not been reached • After *electrical trip* alarm • During the starting sequence before the end of the warming timer.
Generator High Voltage Alarm	Active when the generator voltage exceeds the shutdown level.	
Generator Low Voltage Alarm	Active when the generator voltage falls below the shutdown level during normal running.	
Generator Over Frequency Shutdown	Becomes active when the over frequency shutdown alarm is active	
Generator Under Frequency Shutdown	Becomes active when the under frequency shutdown alarm is active	
High Coolant Temperature Shutdown	Active when the high coolant temperature shutdown alarm is active	
Light Mast Down	**NOTE: Activating the *Emergency Stop* immediately de-activates this output.** Active when the light mast is needed to be lowered. In Auto mode, the module activates this output after the *Return Delay* timer expires. The output remains active until the *Light Mast Fully Closed* digital input is activated or the *Mast Down Time* delay expires. In Manual mode, holding the down button on the mast control screen activates this output. The output remains active until the down button is released or if the *Light Mast Fully Closed* digital input is active.	
Light Mast Up	**NOTE: Activating the *Emergency Stop* immediately de-activates this output.** Active when the light mast is needed to be raised. In Auto mode, the module activates this output after the *Warming Up* timer expires. The output remains active until the *Light Mast Fully Open* digital input is activated or the *Mast Up Time* delay expires. In Manual mode, holding the up button on the mast control screen activates this output. The output remains active until the up button is released or if the *Light Mast Fully Open* digital input is active.	
Light Output 1, 2, 3 & 4	Provide delayed outputs for controlling the lights	
Low Current Alarm	Becomes active when the low current alarm is active	
Low Oil Pressure Shutdown	Active when the Low Oil Pressure Shutdown alarm is activated	

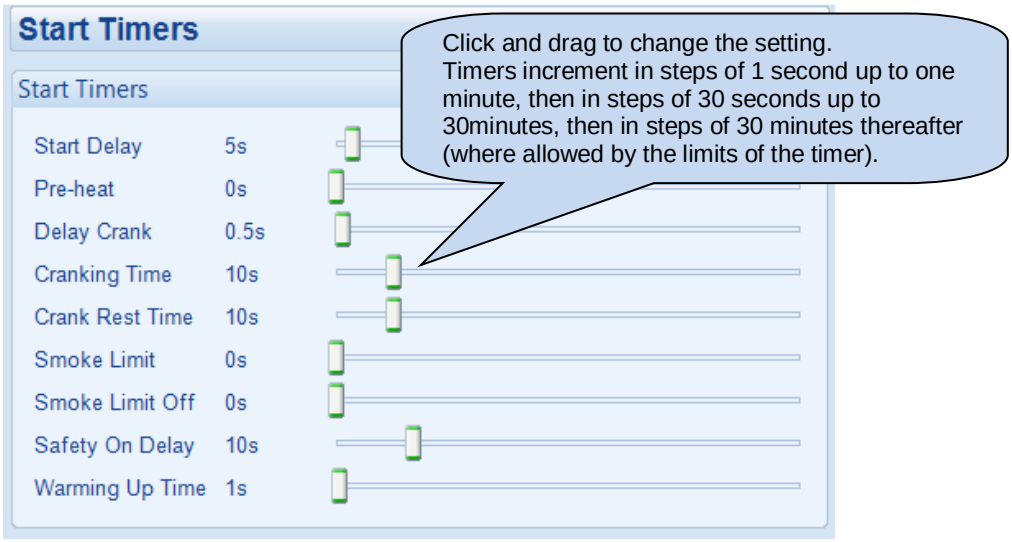
Output source	Activates…	Is not active….
Mains Supply Active	Active when the *Mains Supply Active* digital input is activated. For further details, see the section entitled *Crank Disconnect* elsewhere in this document.	
Mains Supply High Frequency	Active when the *Mains High Frequency Alarm* is active. For further details, see the section entitled *Crank Disconnect* elsewhere in this document.	
Mains Supply High Voltage	Active when the *Mains High Voltage Alarm* is active. For further details, see the section entitled *Crank Disconnect* elsewhere in this document.	
Mains Supply Low Frequency	Active when the *Mains Low Frequency Alarm* is active. For further details, see the section entitled *Crank Disconnect* elsewhere in this document.	
Mains Supply Low Voltage	Active when the *Mains Low Voltage Alarm* is active. For further details, see the section entitled *Crank Disconnect* elsewhere in this document.	
Oil Filter Maintenance	Indicates that the oil filter maintenance alarm is due	
Oil Pressure Sender Open Circuit	Active when the Oil Pressure Sensor is detected as being open circuit.	
Over Current Delayed Alarm	Active when an overcurrent condition has caused the Overcurrent Delayed alarm to trigger	
Over Current Immediate Warning IEEE 37.2 – 50 instantaneous overcurrent relay	Active when an overcurrent condition exceeds the Overcurrent alarm Trip setting. At the same time, the controller begins following the IDMT curve. If the overload condition exists for an excess time, the Overcurrent IDMT alarm activates.	
Over Speed Shutdown IEEE 37.2 – 12 over speed device	Active if the engine speed exceeds the Over Speed Shutdown setting	
Over Speed Overshoot Alarm	Active if the engine speed exceeds the Over Speed Overshoot alarm setting	
Preheat During Preheat Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The preheat timer has expired
Preheat Until End Of Cranking	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached *crank disconnect* conditions
Preheat Until End Of Safety Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached the end of the *safety delay* timer
Preheat Until End of Warming Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : • The set is stopped • The set has reached the end of the *warming* timer
Smoke Limiting	Becomes active when the controller requests that the engine runs at idle speed. As an output, this is used to give a signal to the *Idle input* of an 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 Temperature Sensor is detected as being open circuit.	
Under Speed Shutdown	Active when the engine speed falls below the under speed Shutdown setting	

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.

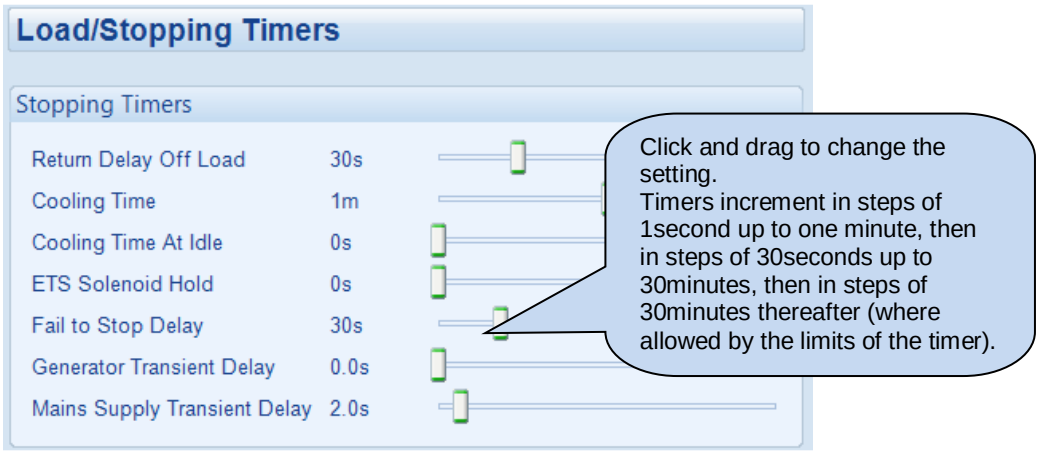


2.6.1 START TIMERS



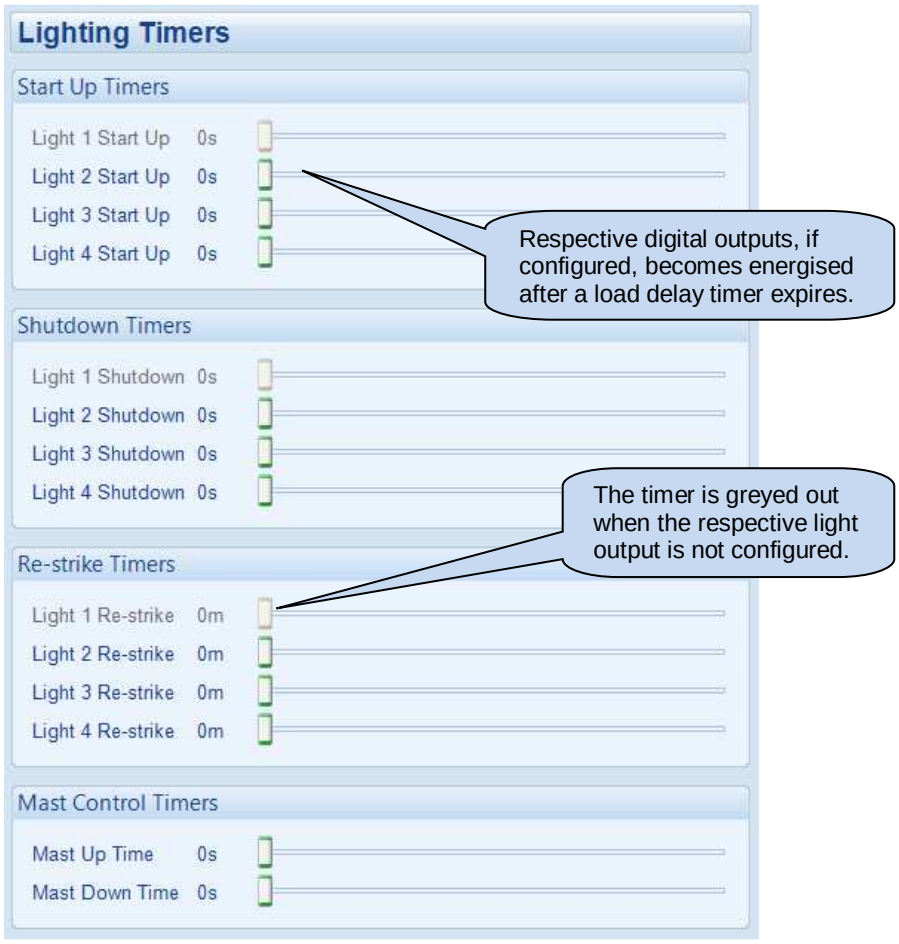
Timer	Description
Start Delay	The amount of time delay before starting in AUTO mode. This timer is activated upon the respective start command being issued. Typically this timer is applied to prevent starting upon fleeting start signals.
Pre-heat	The amount of 'pre start' time during which the *Preheat* output becomes active (if configured)
Delay Crank	The amount of time delay between the fuel relay and the crank relay energising. This is typically used to allow fuel systems to prime.
Cranking Time	The amount of time for each crank attempt
Crank Rest Time	The amount of time between multiple crank attempts.
Smoke Limit	The amount of time that the engine is requested to run at idle speed upon starting. This is typically used to limit emissions at startup.
Smoke Limit Off	The amout of time that the engine takes to run up to rated speed after removal of the command to run at idle speed. If this time is too short, an *Underspeed* alarm is detected. If the time is too long, *Underspeed* protection is disabled until the *Smoke Limit Time Off* time has expired.
Safety On Delay	The amount of time at startup that the controller ignores oil pressure and engine speed and other delayed alarms. This is used to allow the engine to run up to speed before protections are activated.
Warming Up Time	The amount of time the engine runs before being allowed to take load. This is used to warm the engine to prevent excessive wear.

2.6.2 LOAD / STOPPING TIMERS



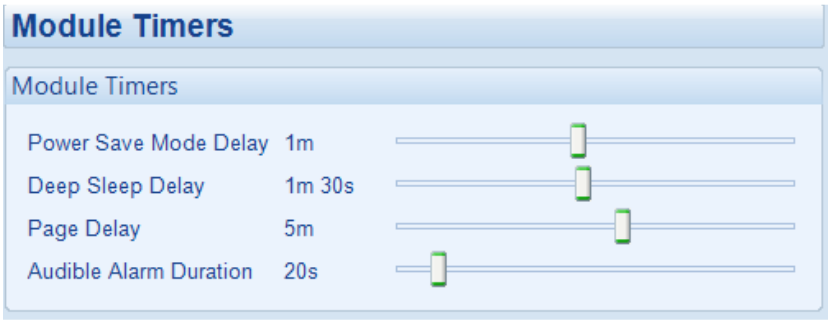
Timer	Description
Return Delay Off Load	The amount of time, in Auto mode only, that allows for short term removal of the request to stop the set before action is taken. This is used to ensure the set remains on load before accepting that the start request has been removed.
Cooling Time	The amount of time that the set is made to run off load before stopping. This allows the set to cooldown and is particularly important for engines with turbo chargers.
Cooling Time At Idle	The amount of time the module instructs the engine to run at idle speed after the *Cooling Time*.
ETS Solenoid Hold	The amount of time the *Energise to Stop* output 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	The amount of time when the set is called to stop and is still running after the *Fail To Stop* delay, a *Fail to Stop* alarm is generated.
Generator Transient Delay	Used to delay the generator under/over volts/frequency alarms. Typically this is used to prevent spurious shutdown alarms caused by large changes in load levels.
Mains Supply Transient Delay	Used to delay the mains under/over volts/frequency alarms. Typically this is used to prevent spurious alarms caused by mains brownouts.

2.6.3 LIGHTING TIMERS



Timer	Description
Light Start Up	When the generator becomes available and after the activation of the *Light Mast Fully Open* digital input or the expiry of the *Mast Up Time* delay, the corresponding light output is delayed for this amount of time before activating
Light Shutdown	**NOTE: The Light Mast Down digital output activates after the longest Light Shutdown timer has expired.** After the Return Delay time expires, the corresponding light output remains active for this amount of time.
Light Re-Strike	When a light output has been de-energised, this is the amount of time for the light to cool down before the light output is energised again.
Mast Up Time	The amount of time required for the light mast to fully open. If this timer expires before the *Light Mast Fully Open* digital input is activated, the *Light Mast Up* digital output becomes inactive.
Mast Down Time	The amount of time required for the light mast to fully close. If this timer expires before the *Light Mast Fully Closed* digital input is activated, the *Light Mast down* digital output becomes inactive.

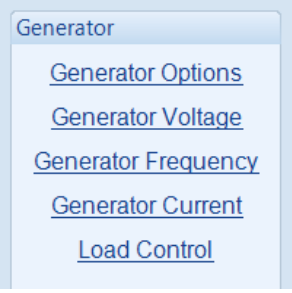
2.6.4 MODULE TIMERS



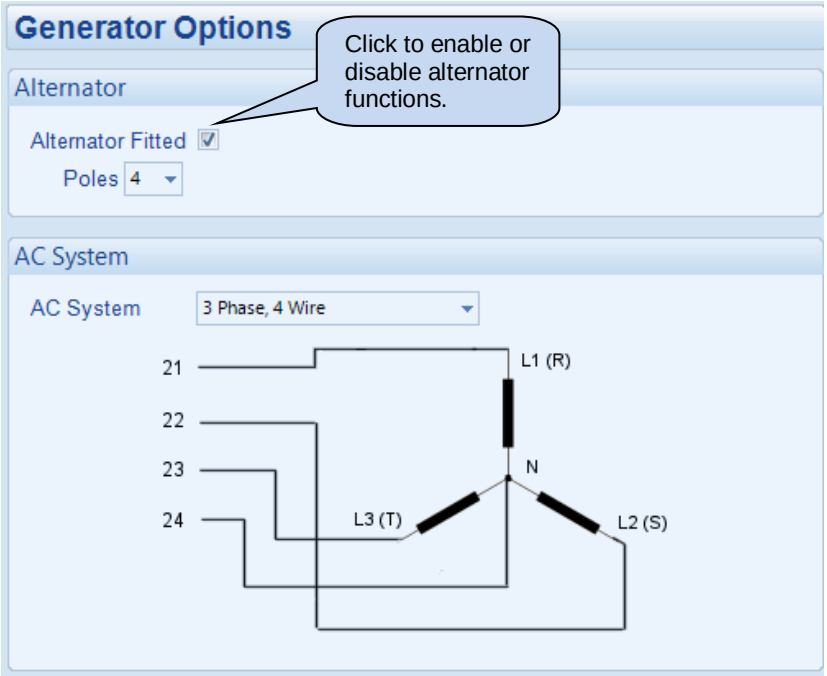
Timer	Description
Power Save Mode Delay	If the module is left unattended in Stop mode for the duration of the *Power Save Mode Delay,* it enters low power consumption mode (Power Save Mode).
Deep Sleep Delay	When the module is in Power Save Mode, if left unattended for the duration of the *Deep Sleep Mode Delay* timer, it enters a lower power consumption mode (Deep Sleep Mode)
Page Delay	If the module is left unattended for the duration of the *Page Delay Timer,* it reverts to show the Status page.
Audible Alarm Duration	When an alarm is active on the module, this is the time duration during which the *Audible Alarm* digital output is active. This is configurable when the *Limit Audible Alarm Duration* option is enabled under *Module Options.*

2.7 GENERATOR

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

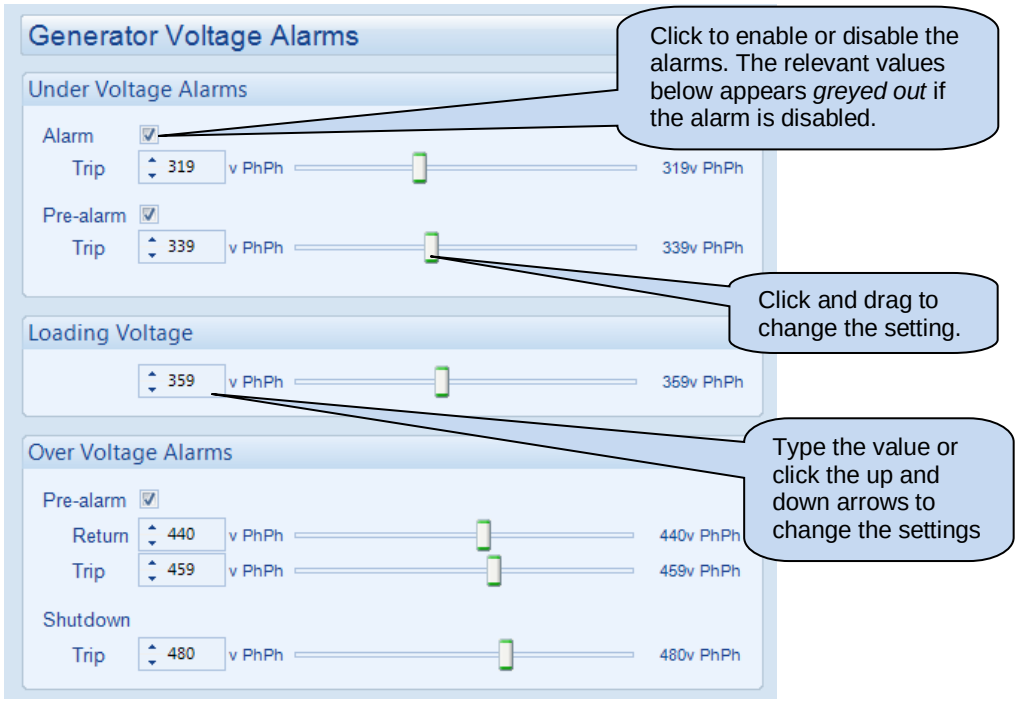


2.7.1 GENERATOR OPTIONS



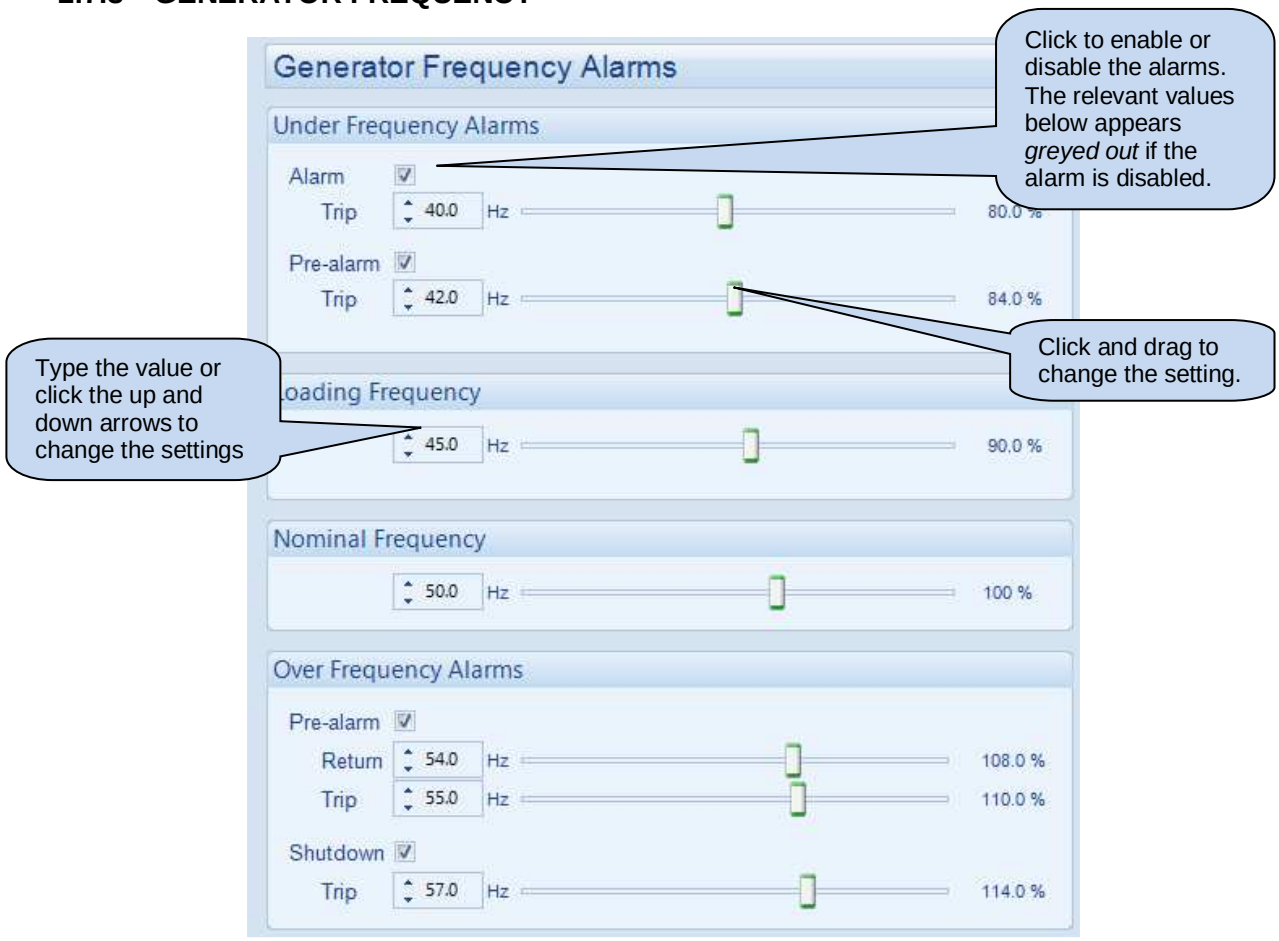
Parameter	Description
Alternator Fitted	☐ = There is no alternator in the system, it is an *engine only* application ☑ = An alternator is fitted to the engine, it is a generator application.
AC System	Allows a number of AC systems to be catered for. Selecting the AC system shows the connections required for that particular system, along with the relevant connection numbers on the controller.

2.7.2 GENERATOR VOLTAGE



Alarm	Description
Generator Under voltage IEEE 37.2 - 27AC Undervoltage Relay	These settings are used to configure the generator under voltage alarm: - **Alarm -** ☐ = Generator Under Volts does NOT give a Shutdown alarm ☑ = Generator Under Volts gives a shutdown alarm in the event of the generator output falling below the configured '*under volts trip*' value. The '*under volts trip*' value can be adjusted to suit user requirements. **Pre-alarm -** ☐ = Generator Under Volts does NOT give a pre-alarm warning ☑ = Generator Under Volts gives a pre-alarm warning in the event of the generator output falling below the displayed '*under volts pre-alarm*' value. The '*under volts pre-alarm'* value can be adjusted to suit user requirements.
Loading Voltage	This is the minimum voltage the generator must be operating at before the module will consider 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 with in limits. (i.e. With an undervolts trip of 184.0V and an undervolts return of 207.0V, the output voltage must return to 207.0V following an under voltage event to be considered within limits.)
Generator Over voltage IEEE 37.2 – 59 AC Overvoltage Relay	Used to configure the generator over voltage alarm. **Pre-alarm:** ☐ = Generator Over Volts does NOT give a pre-alarm warning ☑ = Generator Over Volts gives a pre-alarm warning in the event of the generator output rising above the displayed '*over volts pre-alarm*' value. The '*overvolts pre-alarm'* value can be adjusted to suit user requirements. The voltage must return to below the '*Over volts return*' setting before the module will consider that the supply is back with in limits. (i.e. With an overvolts trip of 276.0V and an overvolts return of 253.0V, the mains voltage must return to 253.0V following an over voltage event to be considered within limits.) **Shutdown:** This is the setting at which a Generator Over Volts will give a shutdown alarm in the event of the generator output rising above the displayed '*over volts trip*' value. The '*over volts trip*' value can be adjusted to suit user requirements. ☐ = The generator runs at its normal voltage ☑ = The generator runs at its alternative voltage

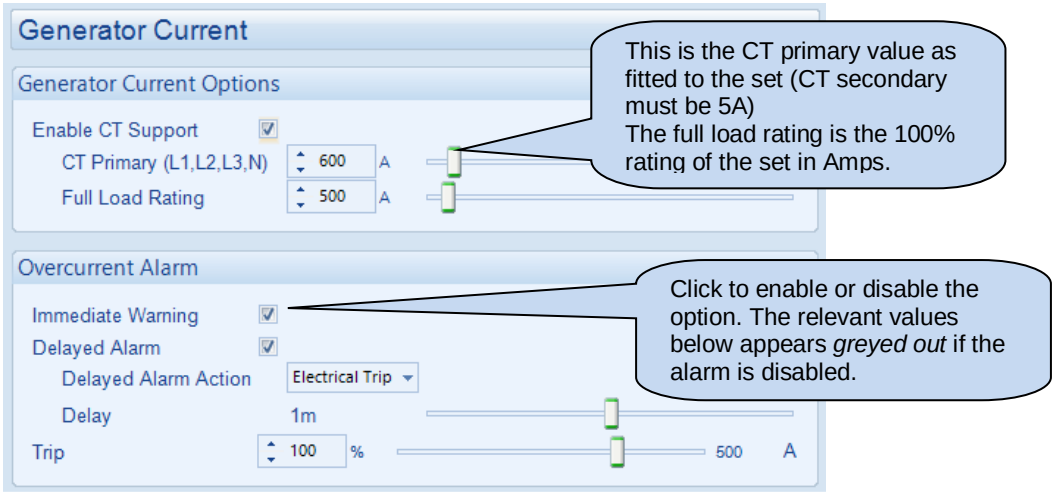
2.7.3 GENERATOR FREQUENCY



Alarm	Description
Generator Under Frequency IEEE 37.2 -81 Frequency Relay	These settings are used to configure the generator under frequency alarm: - **Shutdown -** ☐ = Generator Under Frequency does NOT give a Shutdown alarm ☑ = Generator Under Frequency gives a shutdown alarm in the event of the generator output falling below the displayed '*under frequency trip*' value. The '*under frequency trip*' value can be adjusted to suit user requirements. **Pre-alarm -** ☐ = Generator Under frequency does NOT give a pre-alarm warning ☑ = Generator Under frequency gives a pre-alarm warning in the event of the generator output falling below the displayed '*under frequency pre-alarm*' value. The '*under frequency pre-alarm*' value can be adjusted 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 with in limits. (i.e. With a under frequency trip of 45.0Hz and a under frequency return of 48.0Hz, the mains frequency must return to 48.0Hz following an under frequency event to be considered within limits.)

Alarm	Description
Nominal Frequency	This setting is used to configure the generator nominal frequency. This is also used if the 'Return to Nominal' function is selected when using automatic synchronising. The frequency of a common bus is maintained at this figure when load sharing.
Generator Over Frequency IEEE 37.2 -81 Frequency Relay	**NOTE: When the frequency is selected as the only source of speed sensing (i.e. no Mag-pickup fitted), then the generator over frequency alarm trip can not be disabled as it provides an overspeed protection function. If a Mag-pickup is fitted ad selected as the speed sensing source it is possible to disable the over frequency trip if required.** These settings are used to configure the generator over frequency alarm: **Pre-alarm -** ☐ = Generator Over frequency does NOT give a pre-alarm warning ☑ = Generator Over frequency gives a pre-alarm warning in the event of the generator output rising above the displayed '*over frequency pre-alarm*' value. The '*over frequency pre-alarm'* value can be adjusted to suit user requirements. The frequency must return to below the '*Over frequency return*' setting before the module considers that the supply is back with in limits. (i.e. With a OFF trip of 55.0Hz and a OFF return of 52.0Hz, the mains frequency must return to 52.0Hz following an over frequency event to be considered within limits.) **Shutdown -** ☐ = Generator Over Frequency does NOT give a Shutdown alarm ☑ = Generator Over Frequency gives a shutdown alarm in the event of the generator output rising above the displayed '*over frequency trip*' value. The '*over frequency trip*' value can be adjusted to suit user requirements.

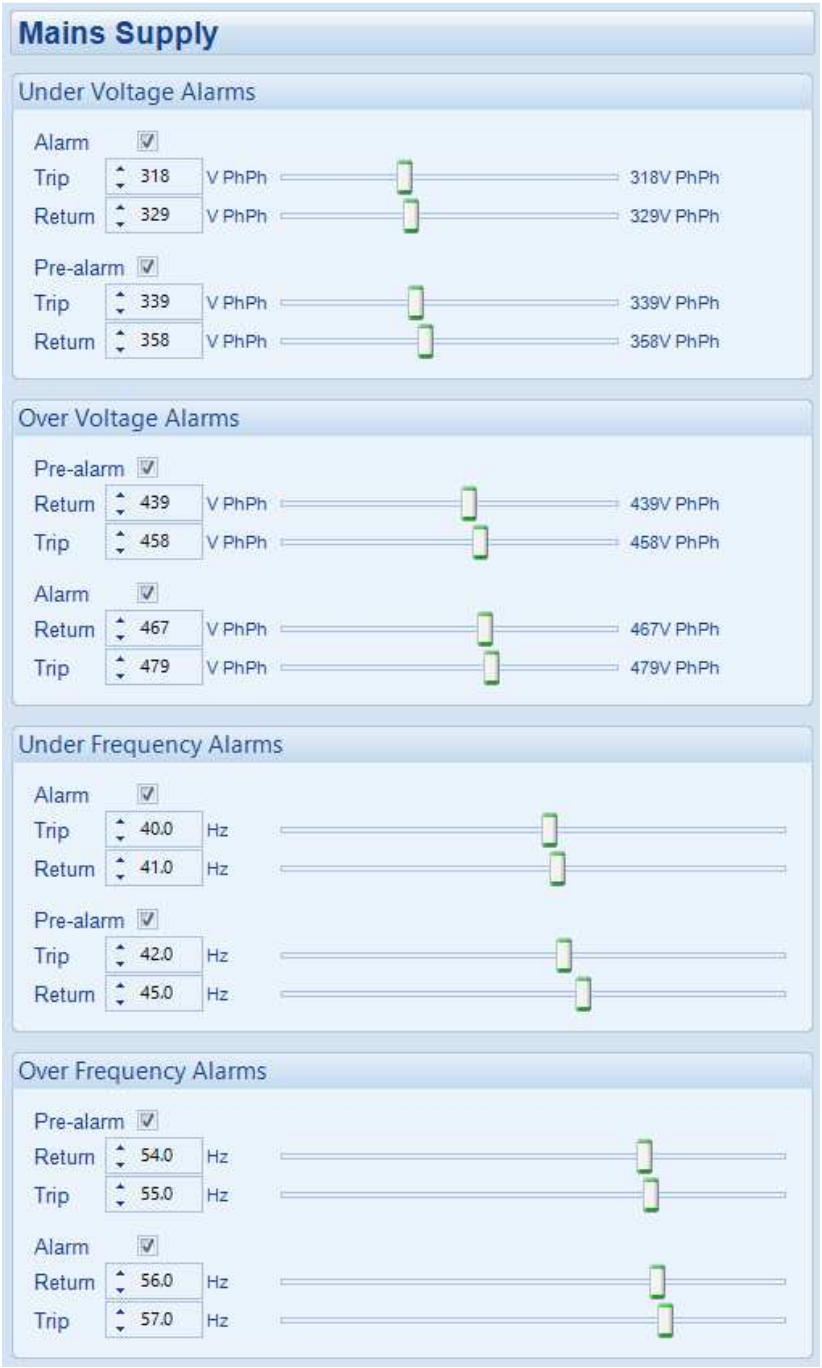
2.7.4 GENERATOR CURRENT



2.7.5 MAINS SUPPLY

NOTE: A digital input configured for *Mains Supply Active* is required for these parameters to have effect.

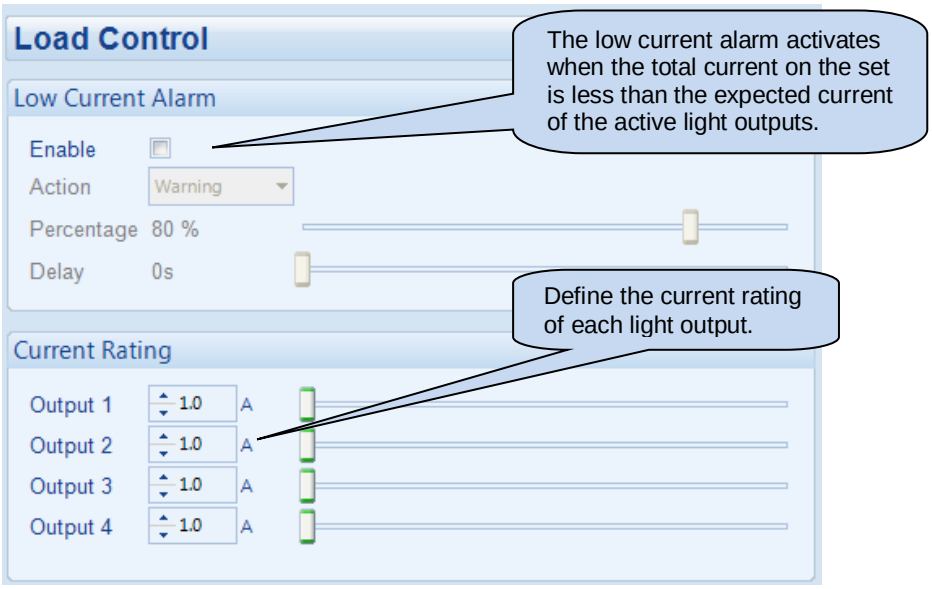
A configured *Mains Supply Active* digital input allows the controller to monitor the AC sensing terminals being fed from an external supply without the generator running. When this input is active, the module expects the supply on the AC sensing terminals to be within the *Mains Supply* voltage and frequency limits in order to operate the light outputs. This requires a manual changeover panel to transfer the supply between the mains and the generator.



Parameters are detailed overleaf…

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

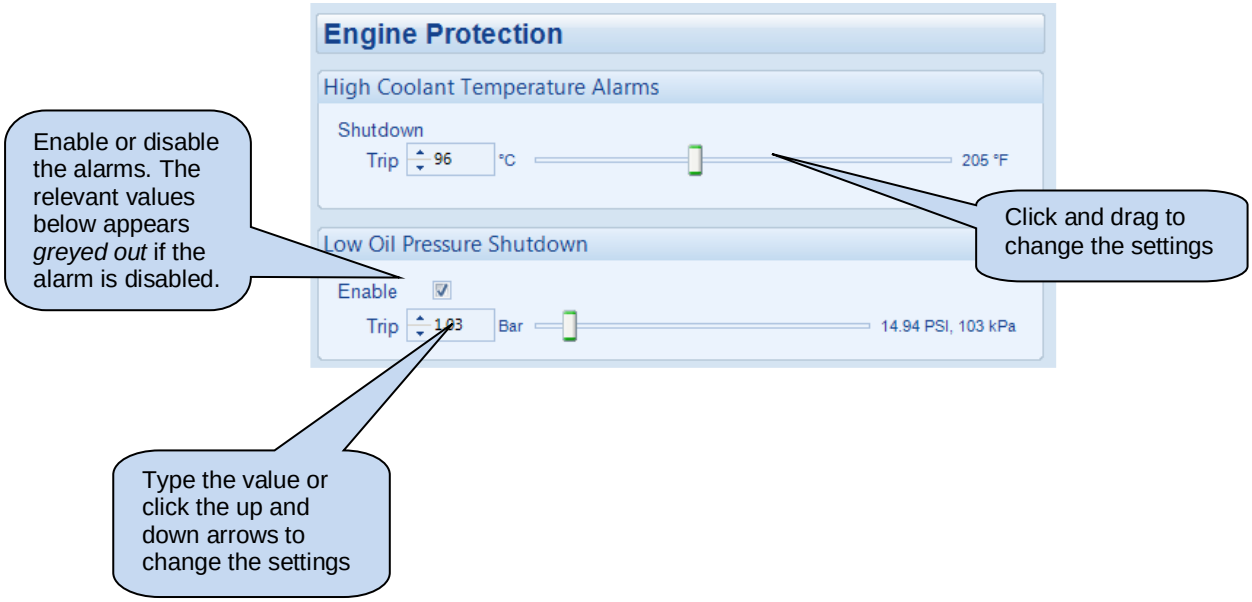
2.7.6 LOAD CONTROL



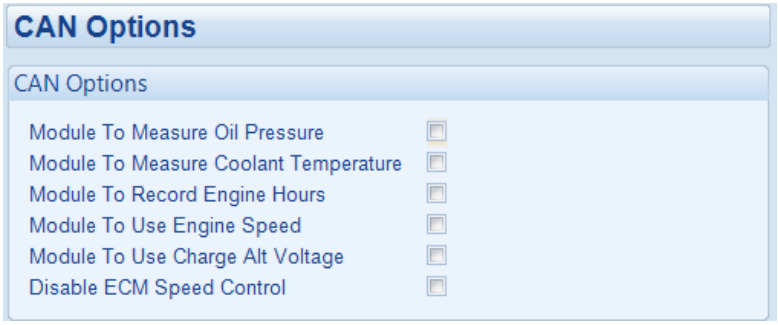
2.8 ENGINE

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

2.8.1 ENGINE PROTECTION

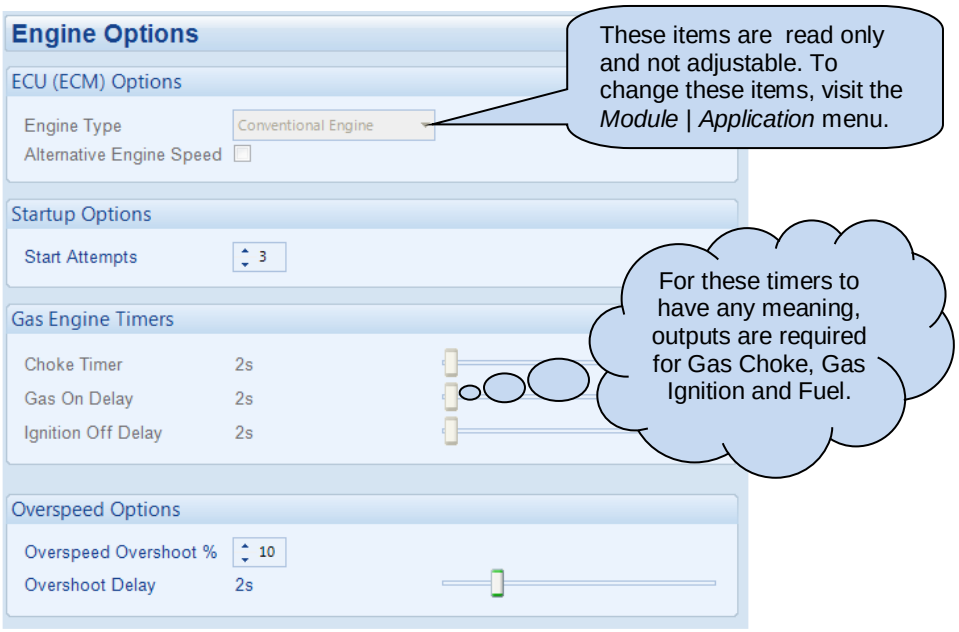


2.8.2 CAN OPTIONS



Option	Description
Module to Measure Oil Pressure	When enabled the oil pressure analogue input is used for the measurement instead of using the value measured by the ECU
Module to Measure Coolant Temperature	When enabled the coolant temperature analogue input is used for the measurement instead of using the value measured by the ECU
Module to Record Engine Hours	When enabled, DSE module counts Engine Run Hours. When disabled, Engine ECU provides Run Hours.
Module To Use Engine Speed	When enabled the module frequency measurement determines the engine speed instead of using the speed value measured by the ECU.
Module to Use Charge Alt Voltage	When enabled the charge alternator voltage measured by the module is used instead of the value measured by the ECU
Disable ECM Speed Control	Disables speed control by the DSE module. Useful if an external device (ie remote speed potentiometer) is used to control engine speed.

2.8.3 ENGINE OPTIONS



2.8.3.1 STARTUP OPTIONS

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

2.8.3.2 GAS ENGINE TIMERS

Parameter	Description
Choke Timer	Controls the amount of time that the Gas Choke output is activated 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.

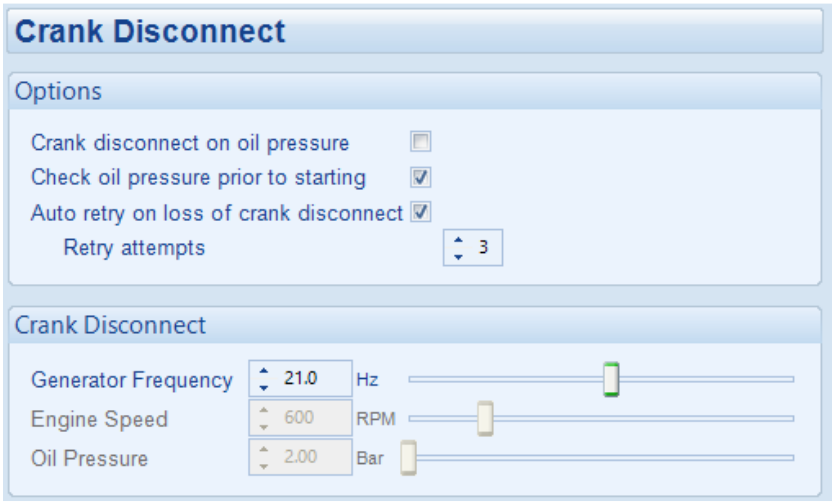
2.8.3.3 OVERSPEED OPTIONS

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

2.8.4 CRANK DISCONNECT

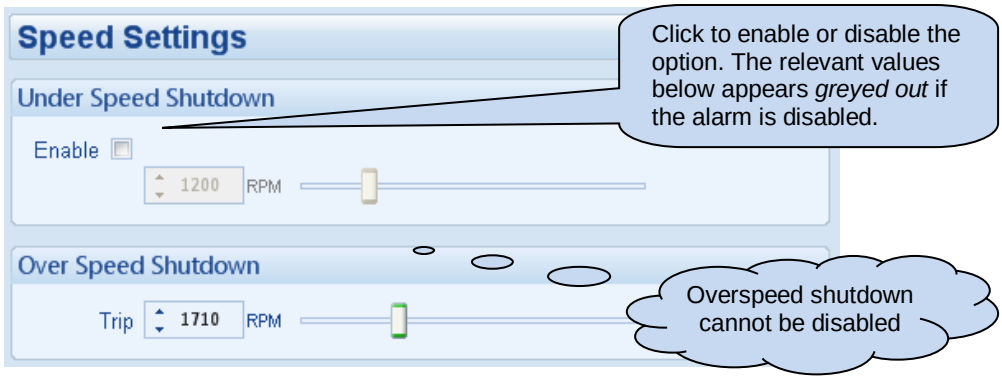
Crank disconnect settings are used to detect when the set fires during the starting sequence.
As the set is cranked, the first parameter that passes its *crank disconnect* setting results in the cessation of the cranking signal.

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.

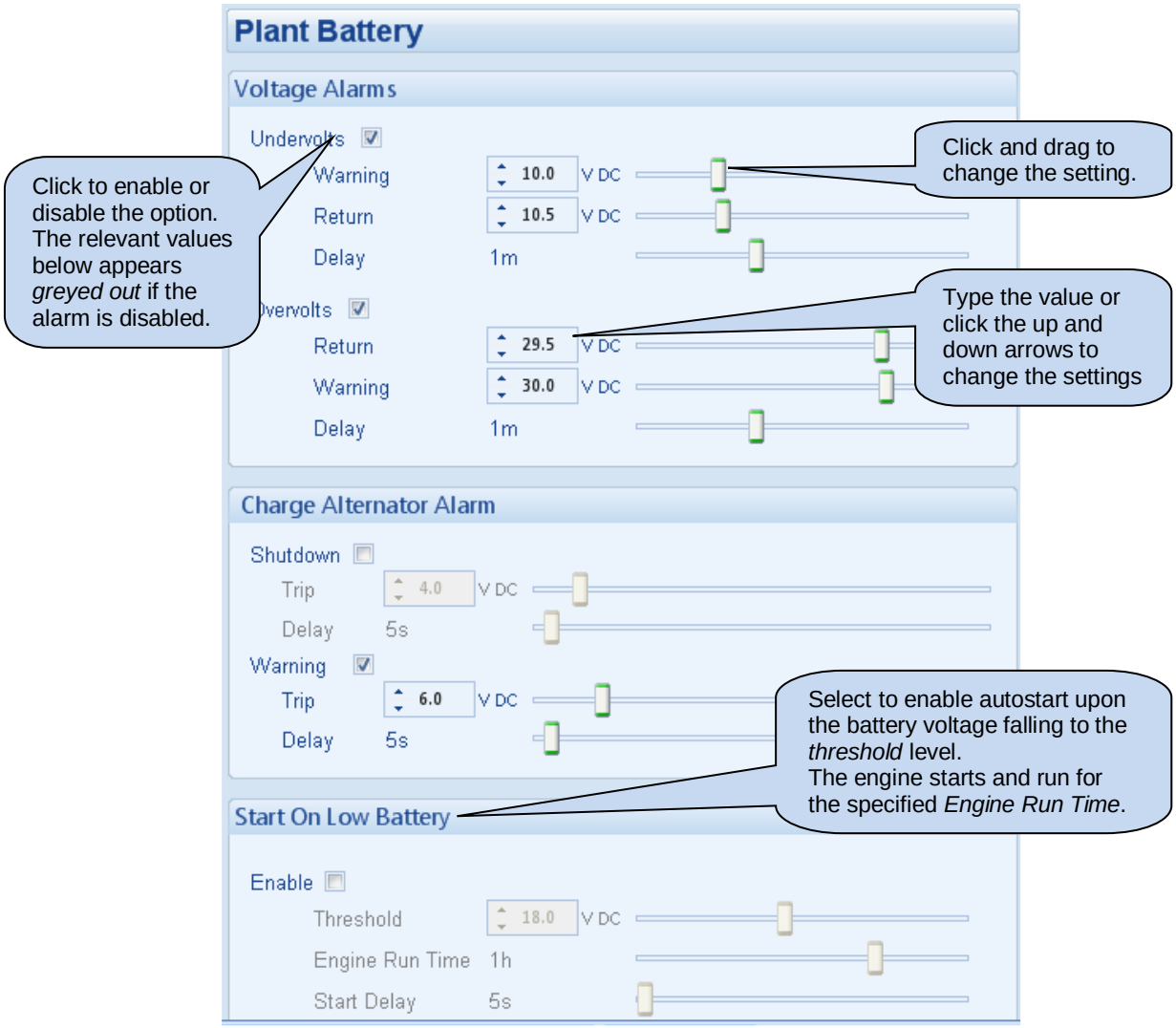


Parameter	Description
Crank Disconnect on Oil Pressure	☐ = Oil pressure is not used to disconnect the crank motor. ☑ = When starting, the crank is disconnected when the measured oil pressure value rises above the configured *Oil Pressure Crank Disconnect* level.
Check Oil Pressure Prior to Starting	☐ = Oil pressure is not checked prior to engaging the crank motor. ☑ = The cranking is not 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.
Auto Retry on Loss of Crank Disconnect	☐ = Normal operation. ☑ = After a crank disconnect, if the engine fails to start and the set is seen to be at rest, the module activates an unlatched shutdown alarm and repeats the starting sequence. The number of retries is defined by the *Retry Attempts.*

2.8.5 SPEED SETTINGS



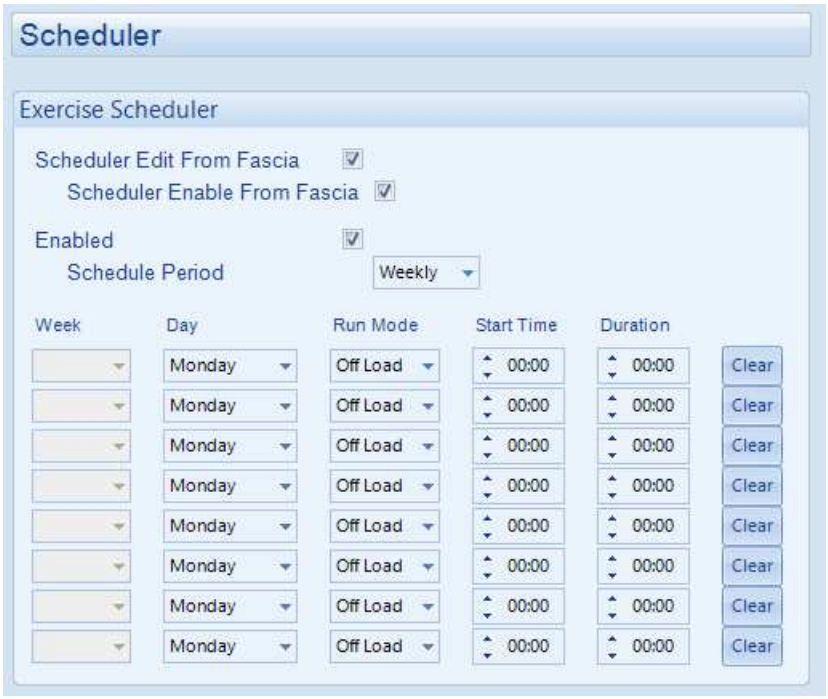
2.8.6 PLANT BATTERY



Alarm	Description
Plant Battery Undervolts IEEE 37.2 -27 DC Undervoltage relay	☐ = Battery Under Voltage Alarms are disabled. ☑ = Select to enable Battery Under Voltage Alarms . Set the Warning, Return and Delay settings as required.
Plant Battery Overvolts IEEE 37.2 -59 DC Overvoltage relay	☐ = Battery Over Voltage Alarms are disabled. ☑ = Select to enable Battery Over Voltage Alarms . Set the Warning, Return and Delay settings as required.
Start on Low Battery	☐ = Start on Low Battery is disabled. ☑ = Select to enable autostart upon the battery voltage falling to the *threshold* level. The engine starts and run for the specified *Engine Run Time*. This occurs only if the module is in AUTO mode
Charge Alternator Alarm	If the voltage measured at the charge alternator output drops below the configured value the respective alarm is triggered.
Start Delay	Start delay timer for the Start on Low Battery function.

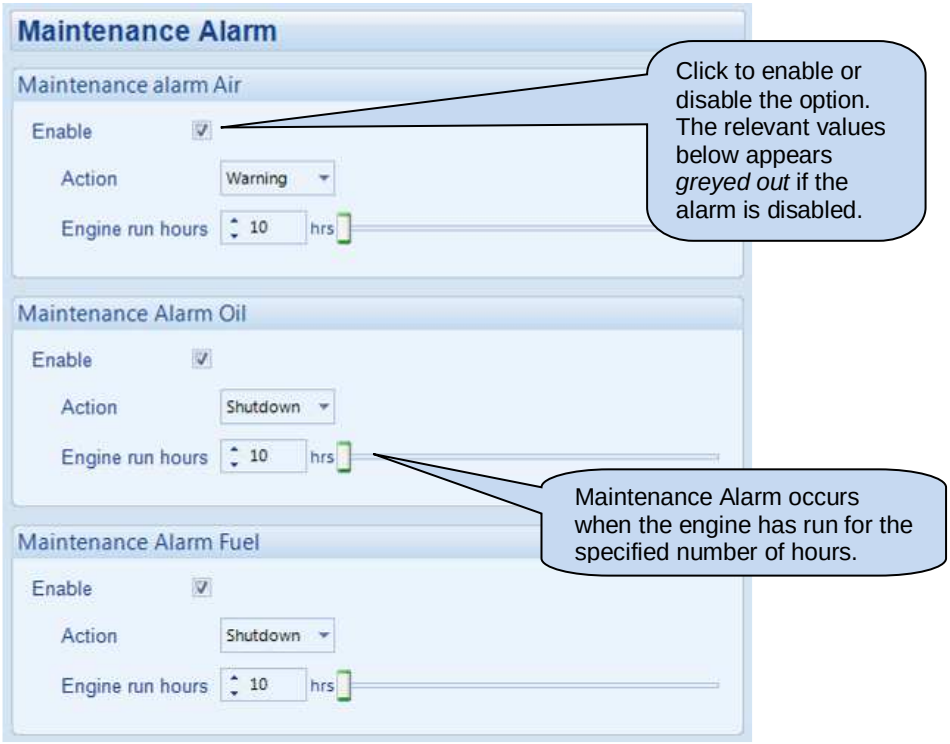
2.9 SCHEDULER

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
Scheduler Edit From Fascia	☐ = Scheduled is configurable only using the DSE Configuration Suite software ☑ = Scheduled is configurable through the module front panel
Scheduler Enable From Fascia	☐ = Scheduled is enabled or disabled only using the DSE Configuration Suite software ☑ = Scheduler is possible to enable and disable through the module front panel
Enabled	☐ = Scheduled runs are disabled ☑ = Enables the Scheduler
Schedule Period	Determines the repeat interval for the scheduled run. Options available are: Weekly, Monthly, Daily
Scheduled Runs are On Load	☐ = The module runs the generator on schedule with the breaker open ☑ = The module runs the generator on schedule and closes the breaker
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

2.10 MAINTENANCE ALARM



There are three 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

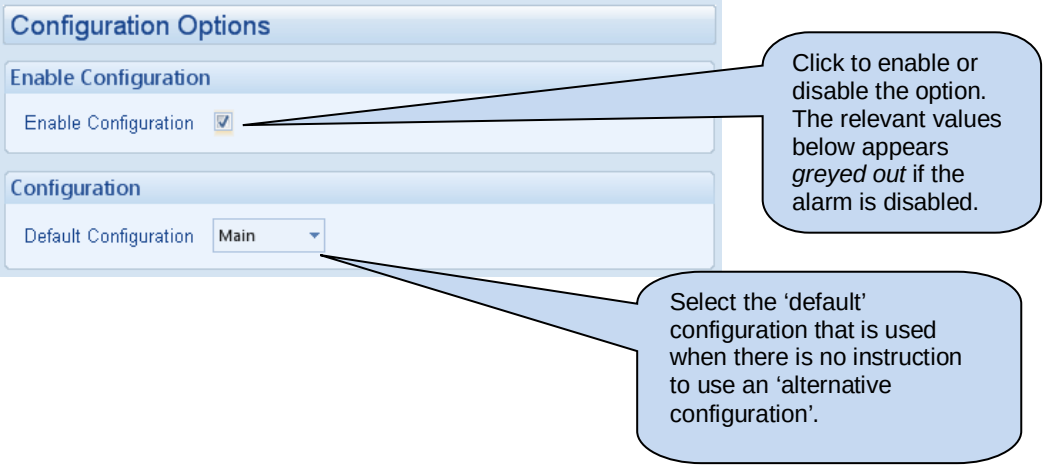
2.11 ALTERNATIVE CONFIGURATION

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')
- L401 MKII Front Panel Editor
- Via external signal to the L401 MKII module input configured to "Alternative Configuration" select.

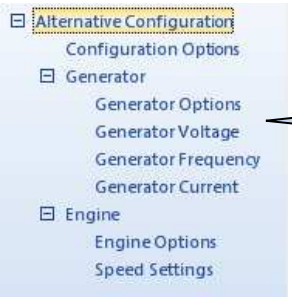
2.11.1 CONFIGURATION OPTIONS



2.11.2 ALTERNATIVE CONFIGURATIONS EDITOR

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

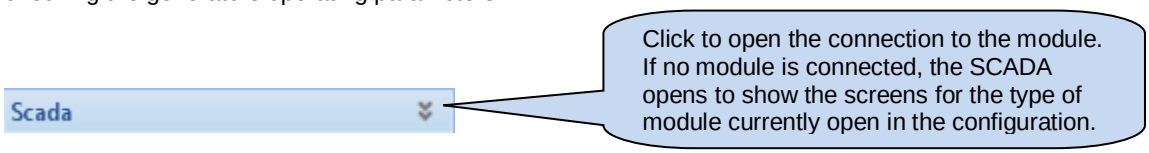
Alternative configuration options contain a subset of the main configuration. The adjustable parameters are not discussed here as they are identical to the main configuration options :



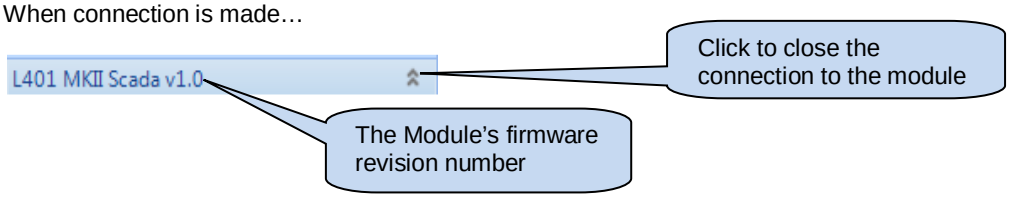
Configuration menus for the *Alternative Configuration*.
For information about the configuration items within this section, refer to their description in the 'main' configuration.

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.



When connection is made…



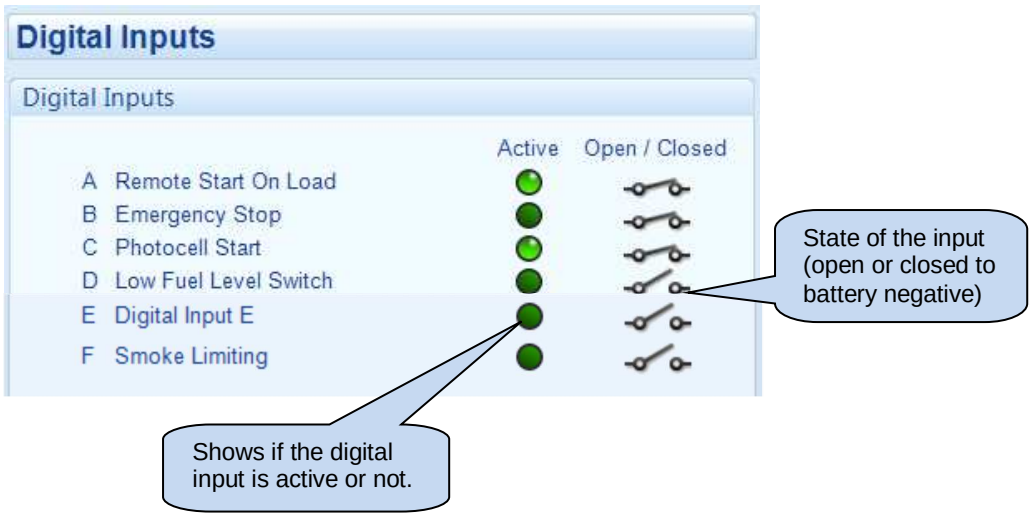
The *SCADA* page is subdivided into smaller sections.
Select the required section with the mouse.

3.1 MIMIC

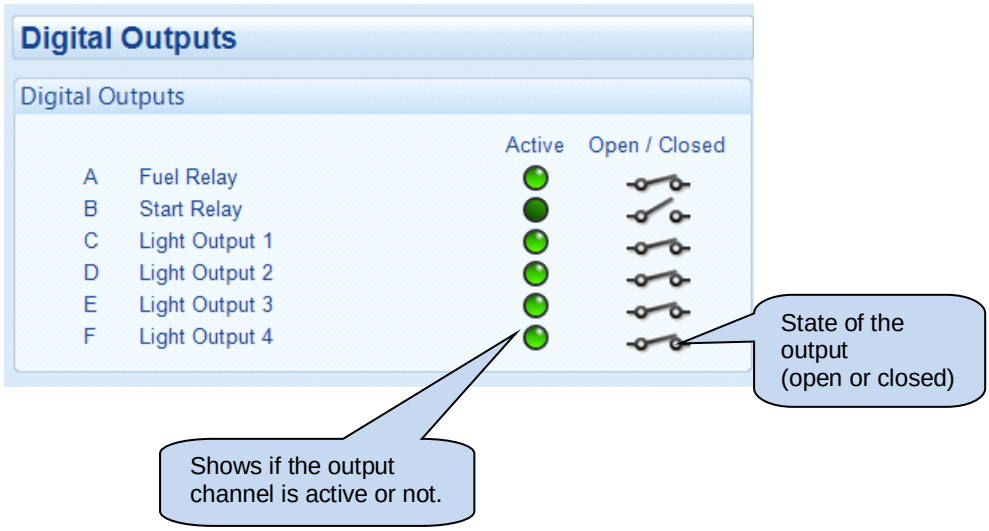
This screen provides a mimic of the control module and allows the operator to change the control mode of the module.

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

3.2 DIGITAL INPUTS

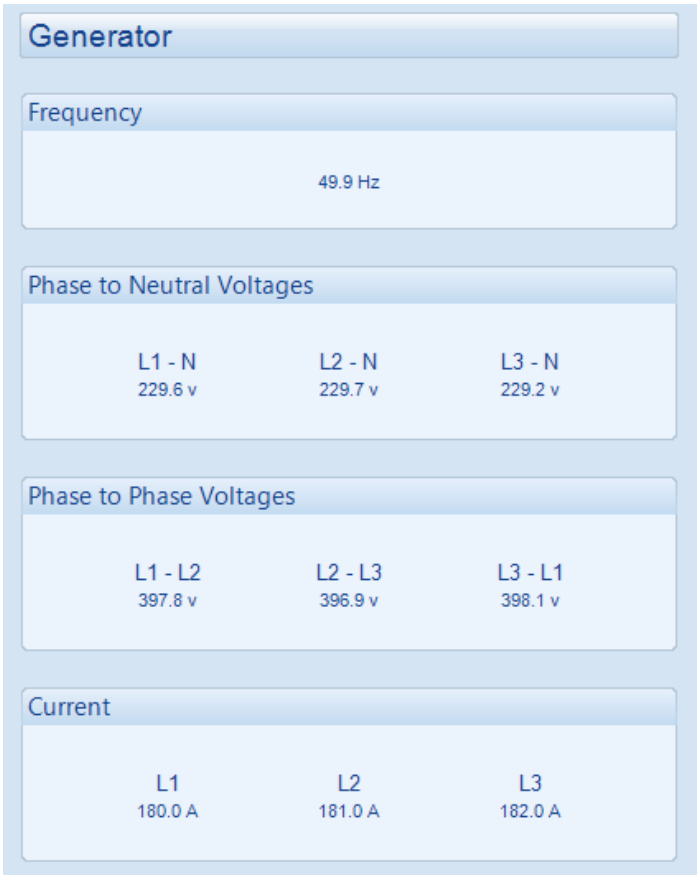


3.3 DIGITAL OUTPUTS



3.4 GENERATOR

Shows the modules measurements of the generator supply.

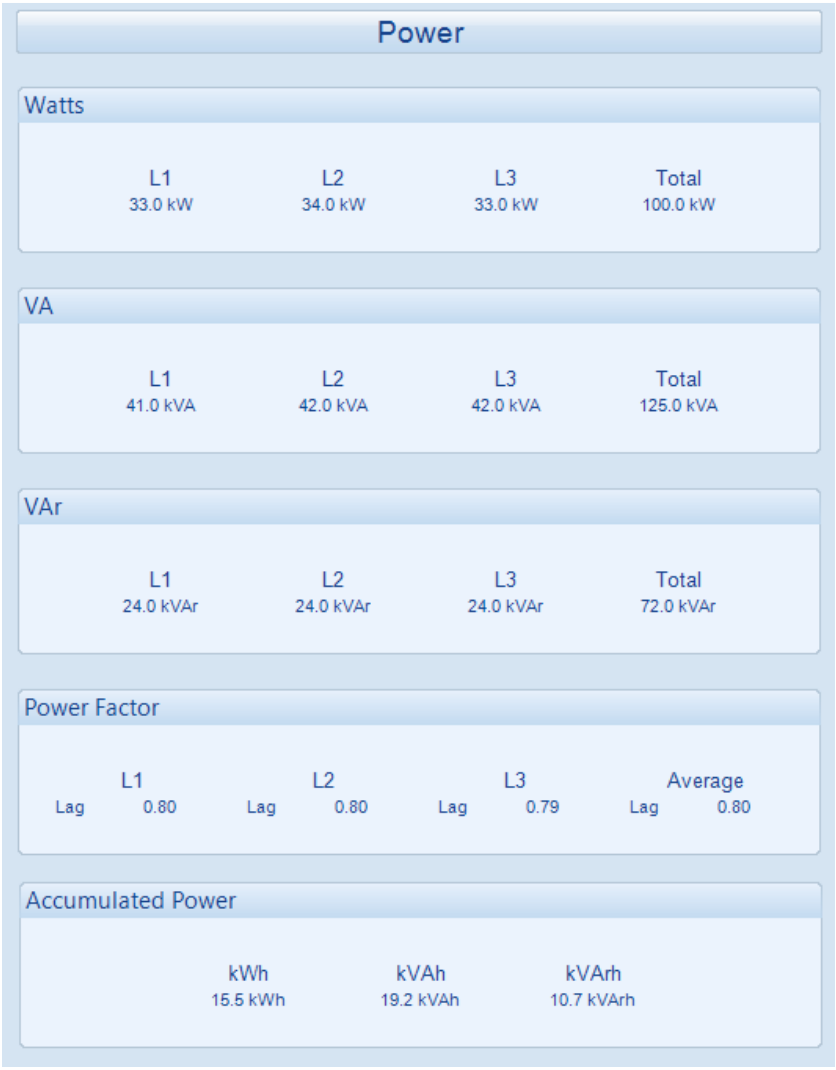


3.5 MAINS SUPPLY

Shows the modules measurements of the mains supply.

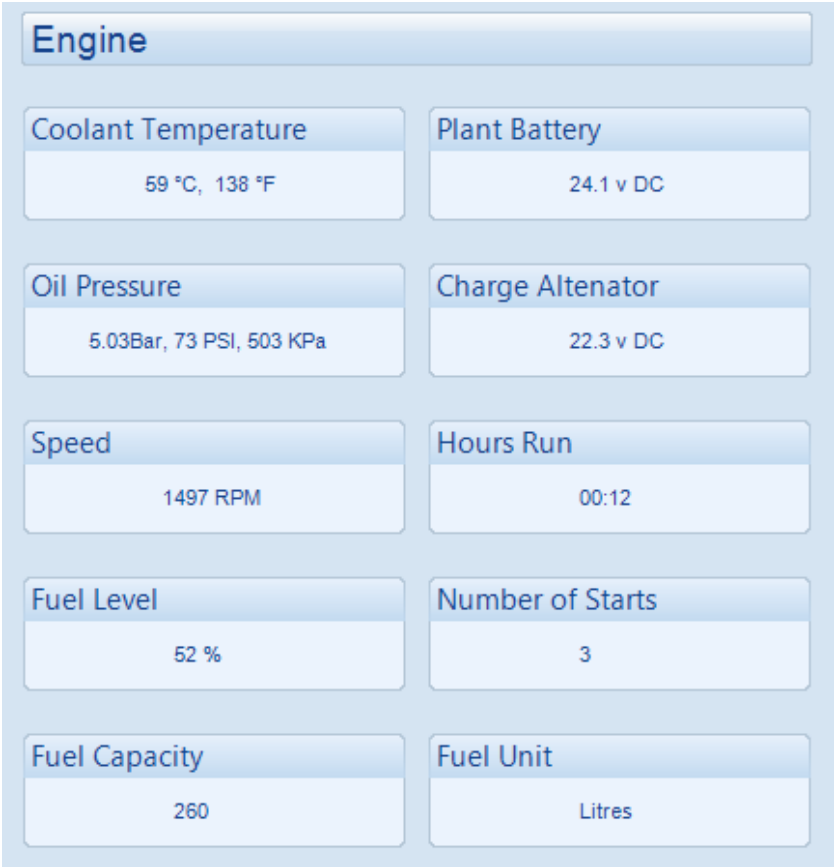
3.6 POWER

Shows the modules measurements of the power parameters.



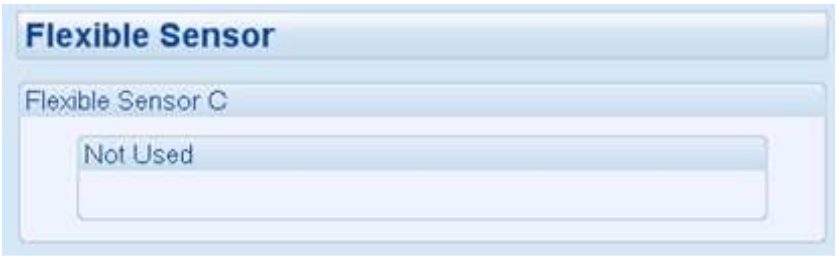
3.7 ENGINE

Shows the modules measurements of the engine parameters.



3.8 FLEXIBLE SENSOR

Shows the modules measurements of the flexible sensors parameters.



3.9 ALARMS

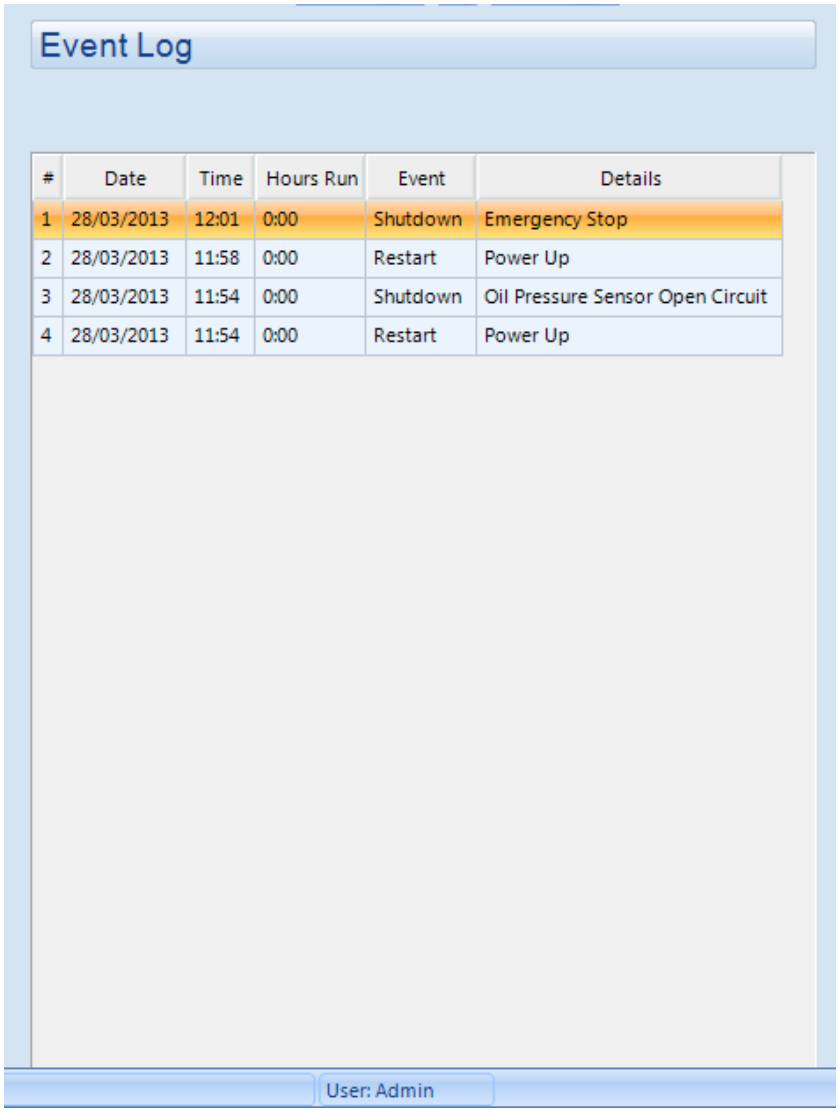
Shows any present alarm conditions.

3.10 STATUS

Shows the module's current status.

3.11 EVENT LOG

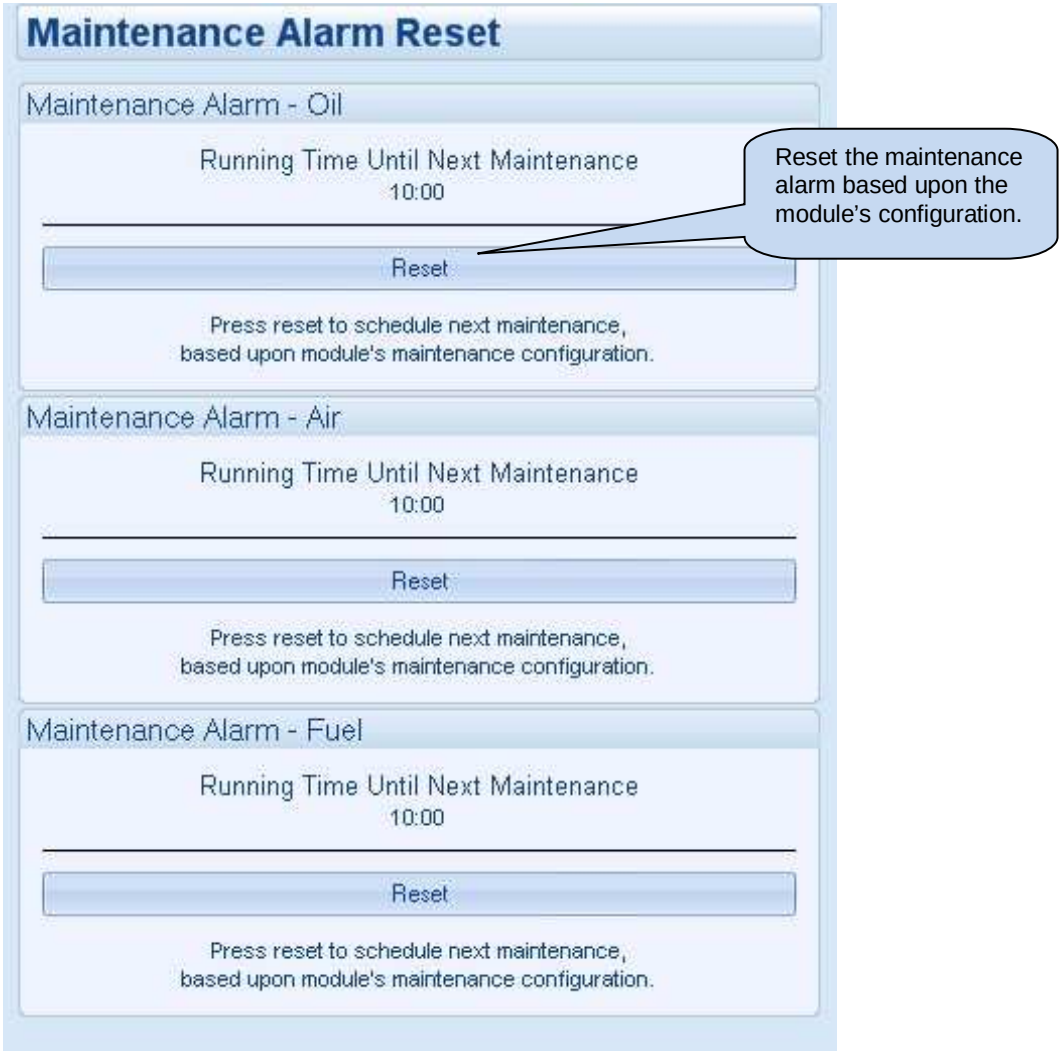
Shows the contents of the module's event log.



3.12 MAINTENANCE

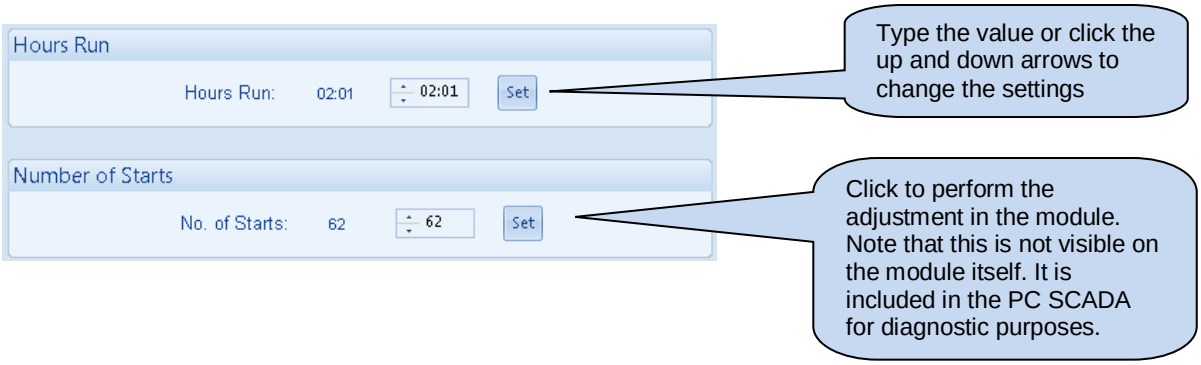
The *Maintenance* section is subdivided into smaller sections.
Select the required section with the mouse.

3.12.1 MAINTENANCE ALARM RESET



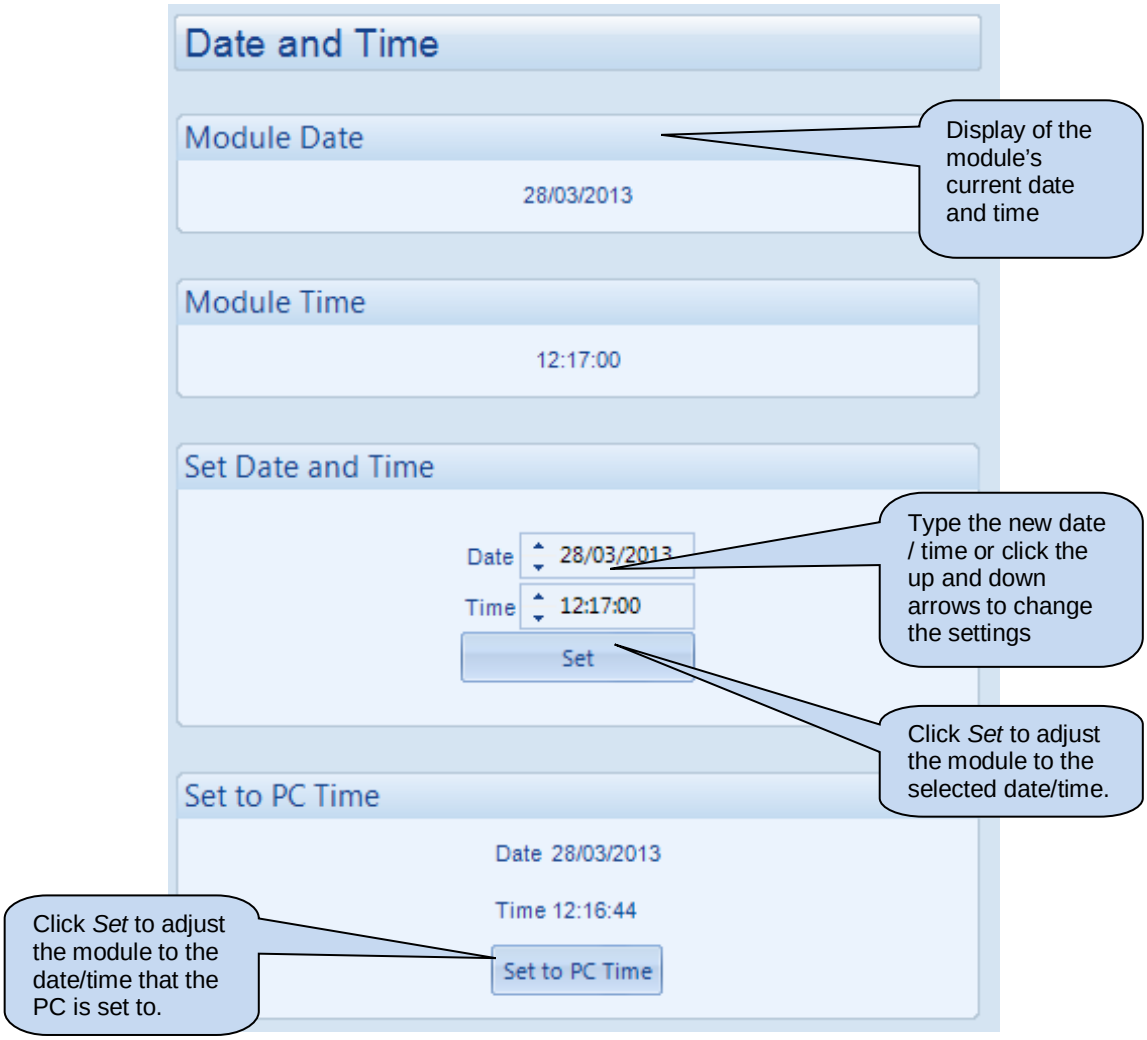
3.12.2 HOURS RUN AND NUMBER OF STARTS

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.

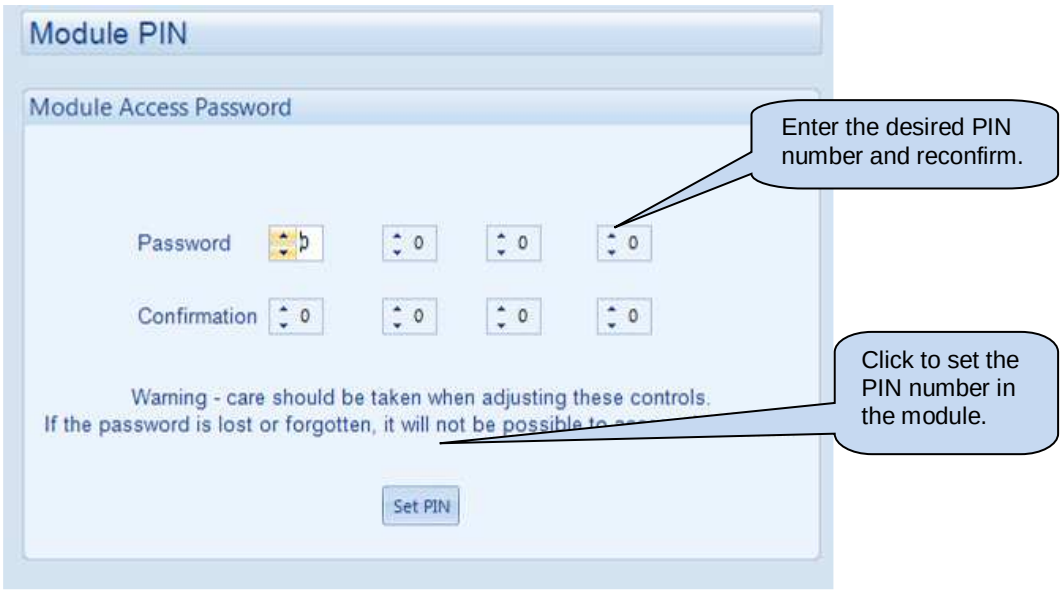


3.12.4 ACCUMULATED INSTRUMENTATION

3.12.5 MODULE PIN

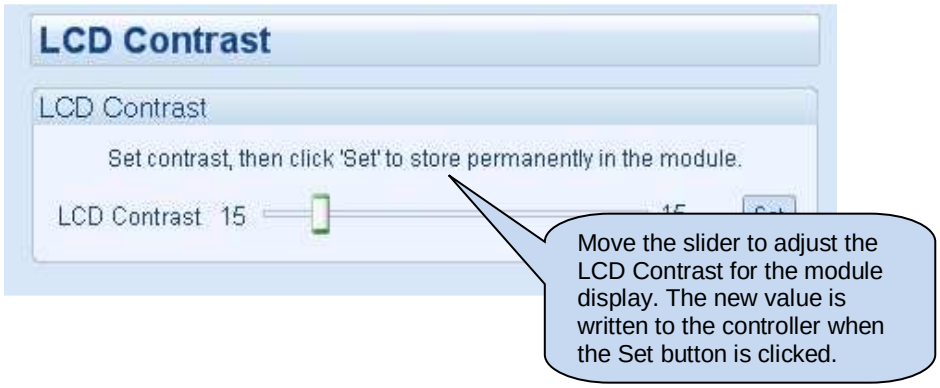
NOTE : If the PIN is lost or forgotten, it is no more possible to access the module!

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 is sent to the controller from the PC software.



3.12.6 LCD CONTRAST

The LCD Contrast section allows the adjustment of the module's display contrast level. This is useful when the contrast is configured through the Front Panel Editor and set to a level where the display is no longer visible.



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

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