DEEP SEA ELECTRONICS PLC
DSE7450 Configuration PC Suite Software Manual

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Author: Paul Gibbons

DEEP SEA ELECTRONICS PLC

Highfield House
Hunmanby
North Yorkshire
YO14 0PH
ENGLAND

Sales Tel: +44 (0) 1723 890099
Sales Fax: +44 (0) 1723 893303

E-mail : sales@Deepseaplc.com
Website : www.deepseaplc.com

DSE7450 Configuration Suite PC Software Manual.

Amendments List

Issue	Comments
1	Initial release
2	Adding AVR
3	Charging efficiency & plant battery charge percentage settings added

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

TABLE OF CONTENTS

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:

DSE PART	DESCRIPTION
057-004	Electronic Engines and DSE wiring
057-170	DSE7450 Operators Manual
057-082	DSE2130 Input Expansion Manual
057-139	DSE2131 Input Expansion Manual
057-140	DSE2133 Input Expansion Manual
057-141	DSE2152 Input Expansion Manual
057-083	DSE2157 Input Expansion Manual
057-084	DSE2548 Input Expansion Manual

The following third party documents are also referred to:

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

2 DESCRIPTION

This manual covers the operation of the **DSE Configuration Suite** for the DSE7450 module. Separate manuals cover the remaining DSE modules supported by the software.

The **DSE Configuration Suite** allows the DSE7450 module to be connected to a PC via USB 'A – USB B' cable. Once connected the various operating parameters within the module is viewed or edited as required by the engineer. This software allows easy controlled access to these values and also has diagnostic monitoring facilities.

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

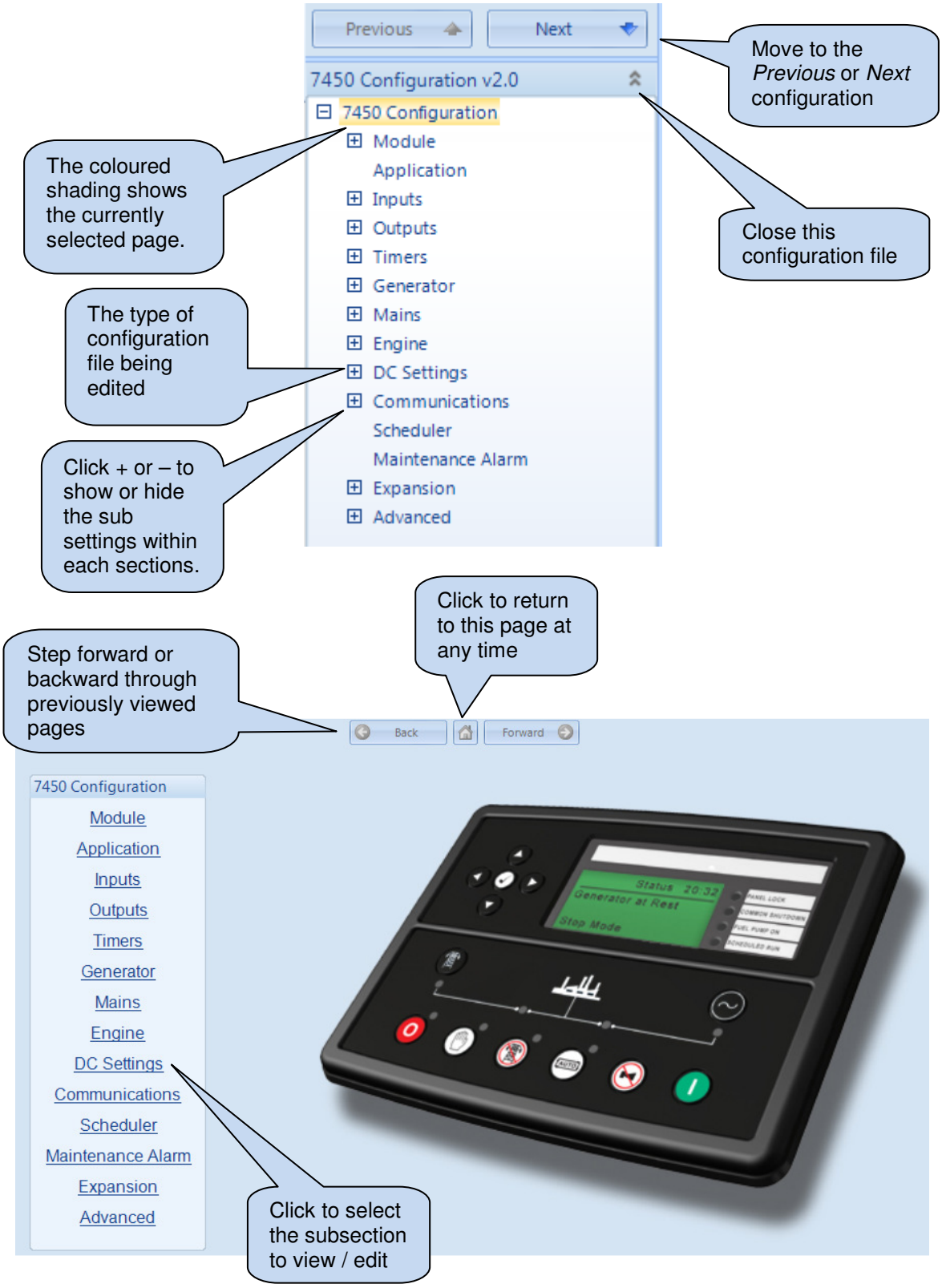
3 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

For information in regards to 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***

4 EDIT CONFIG

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

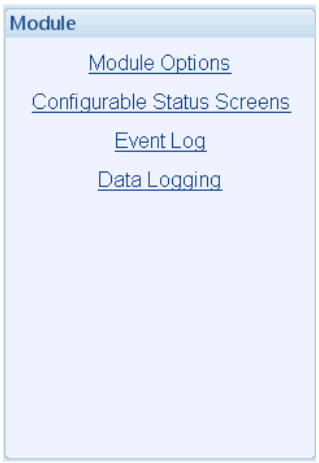
4.1 SCREEN LAYOUT



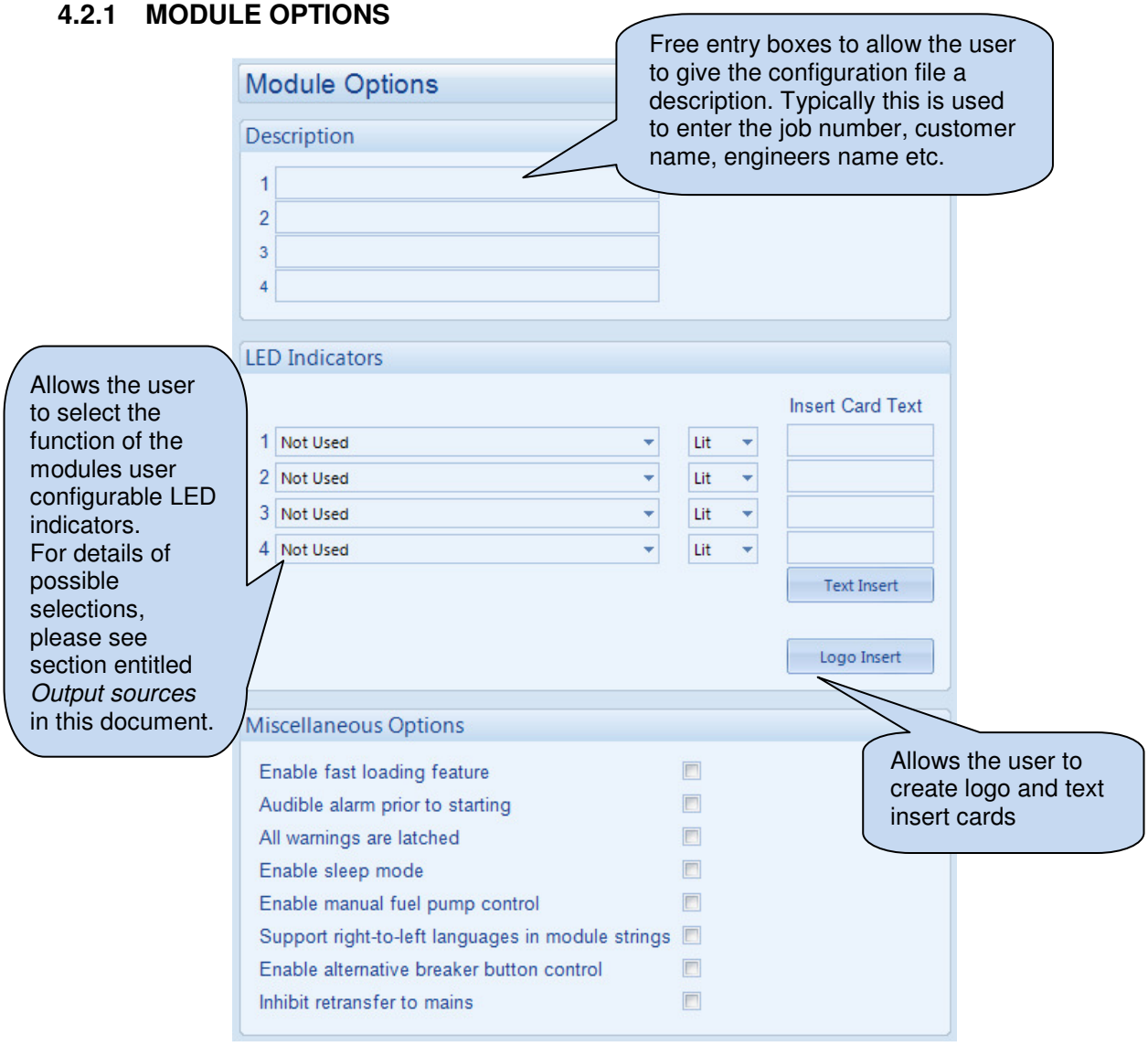
4.2 MODULE

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

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



4.2.1 MODULE OPTIONS

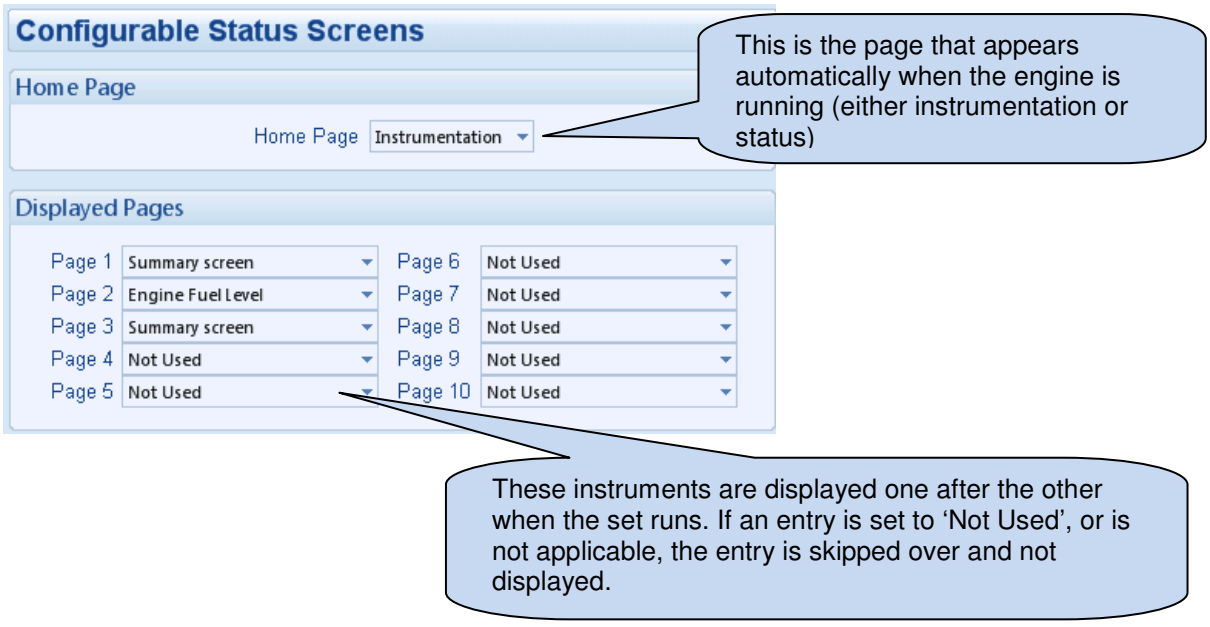


Parameter	Description
Enable fast loading feature	☐ = Normal Operation, the safety on timer is observed in full. This feature is useful if the module is to be used with some small engines where pre-mature termination of the delay timer leads to overspeed alarms on start up. ☑ = The module terminates the safety on timer once all monitored parameters have reached their normal settings. This feature is useful if the module is to be used as a standby controller as it allows the generator to start and go on load in the shortest possible time. **NOTE: Enabling Fast Loading is only recommended where steps have been taken to ensure rapid start up of the engine is possible. (For example when fitted with engine heaters, electronic governors etc.)**
Audible alarm prior to starting	☐ = The module starts with no audible indication ☑ = The module gives an audible warning during the pre-heat timer as an indicator that the set is about to run. This is often a site's specification requirement of AUTO mode operation.

Parameter	Description
All Warnings Are Latched	☐ = Normal Operation, the warnings and pre-alarms automatically reset once the triggering condition is 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).
Enable Alternative Breaker Button Control	Default breaker button control is transfer to Generator/ Transfer to mains: Alternative breaker button control is:- Open Mains breaker / Close mains breaker Open Generator breaker / Close breaker.
Enable sleep mode	☐ =Normal operation ☑ =The module goes into "sleep mode" if left in manual mode for a prolonged time with no button presses.
Enable manual fuel pump control	☐ =Normal operation ☑ =Allows manual fuel pump control when the "fuel level" instrument page is being viewed.
Support right-left languages in module strings	Determines the direction of text input where supported (i.e. configurable input text) ☐ =left to right language support ☑ =right to left language support
Inhibit Retransfer to Mains	☐ =Normal operation ☑ =The module inhibits a transfer back to the mains.

4.2.2 CONFIGURABLE STATUS SCREENS

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



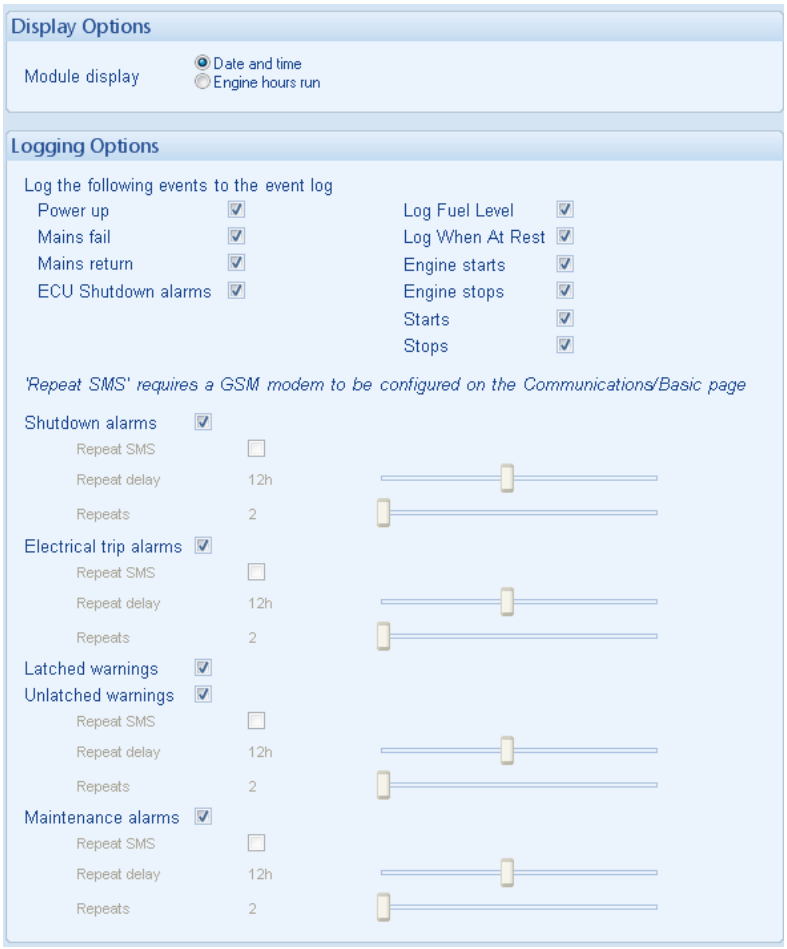
4.2.3 EVENT LOG

4.2.3.1 DISPLAY OPTIONS

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

4.2.3.2 LOGGING OPTIONS

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



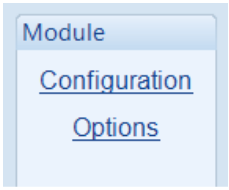
4.2.3.3 SMS MESSAGING

When using the controller, logged events also cause modem ‘dial outs’ and SMS messages to be sent if the module is configured to do so and connected to a suitable external GSM modem with functioning SIM card.

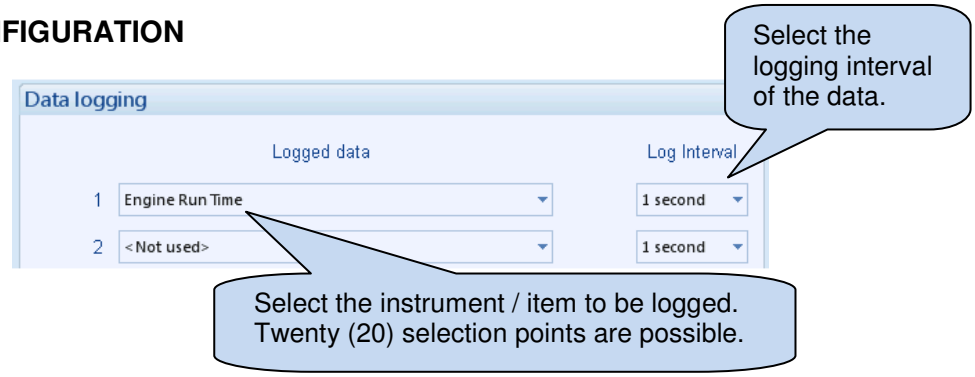
4.2.4 DATA LOGGING

NOTE: Data logging to internal and external memory is available.

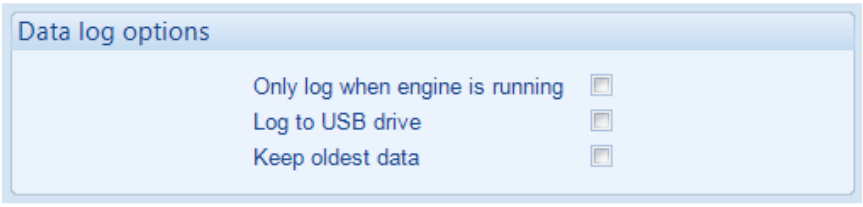
The Data Logging page is subdivided into smaller sections.
Select the required section with the mouse.



4.2.4.1 CONFIGURATION



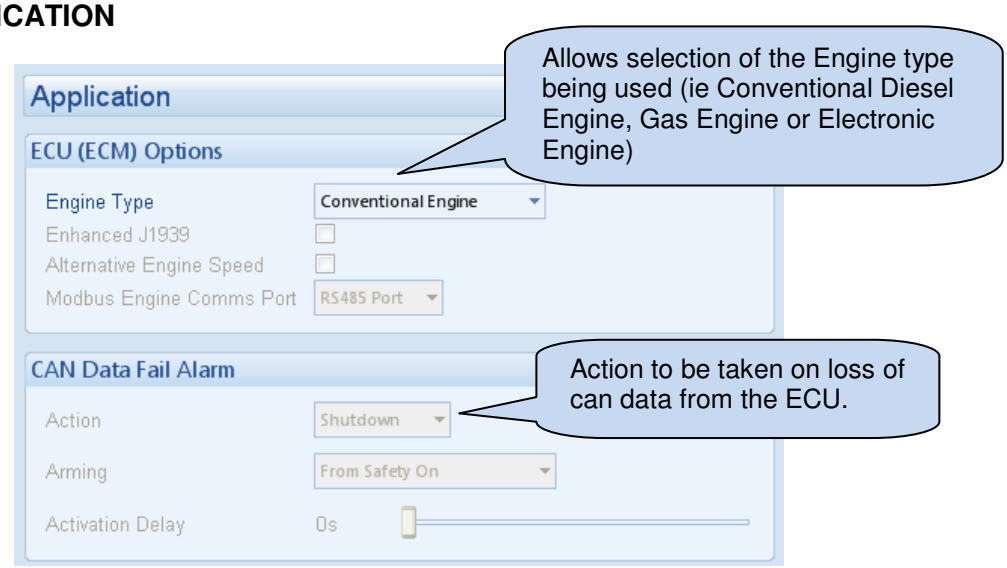
4.2.4.2 OPTIONS



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

4.3 APPLICATION

4.3.1 APPLICATION



See overleaf for description of the parameters....

4.3.2 ECU (ECM) OPTIONS

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

4.3.3 DISABLE PROTECTIONS

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

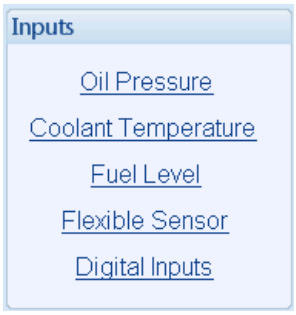
Options	Description
Enable	☐ = The module operates as normal and provides engine shutdown if required. ☑ = *Protections disabled* function is activated. Operation depends upon the following configuration. **NOTE: Writing a configuration to the controller that has “Protections Disabled” configured, results in a warning message appearing on the PC screen for the user to acknowledge before the controller’s configuration is changed. This prevents inadvertent activation of the feature.**
Disable All Protections	*Never* : The protections are not disabled *Always* : Protections are always overridden by the DSE controller. *On Input* : Protections are disabled whenever a configurable input set to *Protections Disabled* is activated
Protections Disabled Alarm Action	If *Disable All Protections* is set to *On Input*, this selection allows configuration of an alarm to highlight that the protections have been disabled on the engine. *Indication :* Any output or LCD display indicator configured to *Protections Disabled* is made active, however the internal alarm sound don't operate. Warning *:* Any output or LCD display indicator configured to *Protections Disabled* is made active, and the internal alarm sound operates. When protections are disabled, *Protections Disabled* appear on the module display to inform the operator of this status.

4.3.4 CAN DATA FAIL ALARM

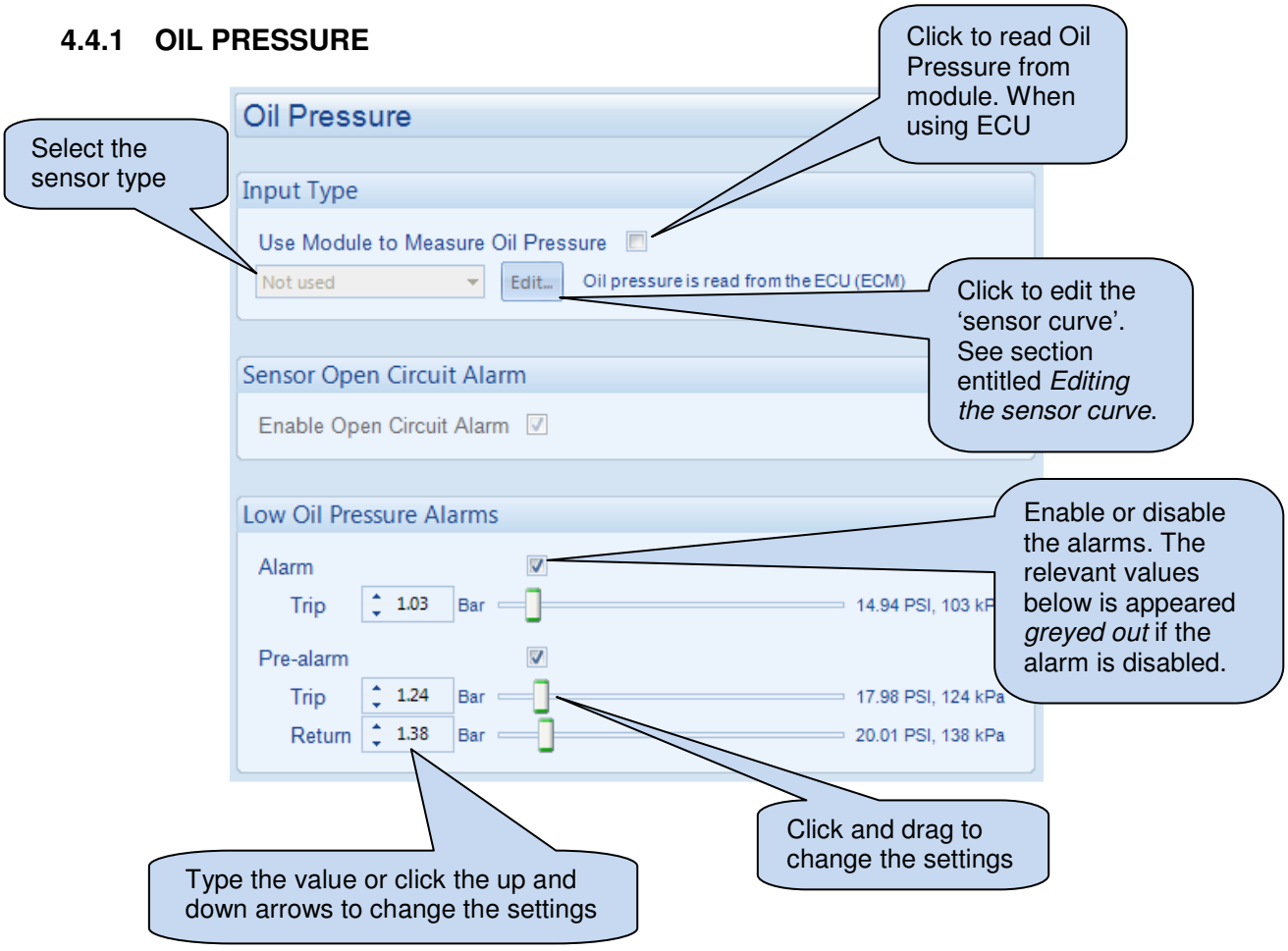
Parameter	Description
CAN Data Fail	Provides protection against failure of the ECU (ECM) CANbus data link. The alarm action list is as follows, see section entitled *Alarm Types* for more information: ***None*** ***Electrical Trip*** ***Shutdown*** ***Warning***
Arming	Select when the *CAN ECU (ECM)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

4.4 INPUTS

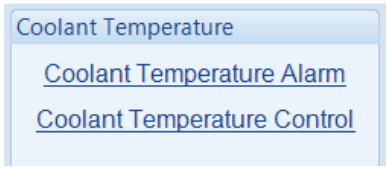
The *Inputs* page is subdivided into smaller sections.
Select the required section with the mouse.



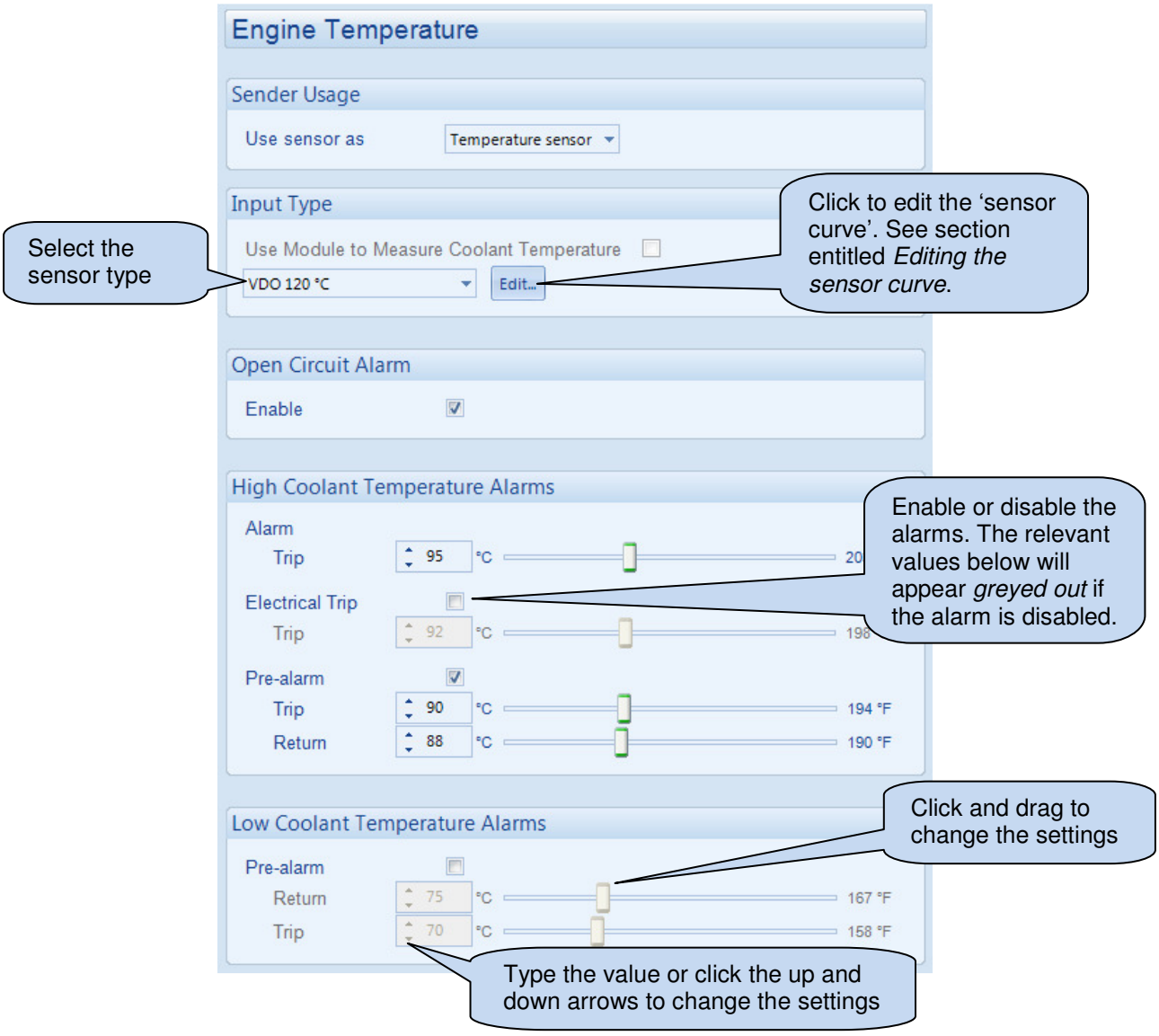
4.4.1 OIL PRESSURE



4.4.2 COOLANT TEMPERATURE



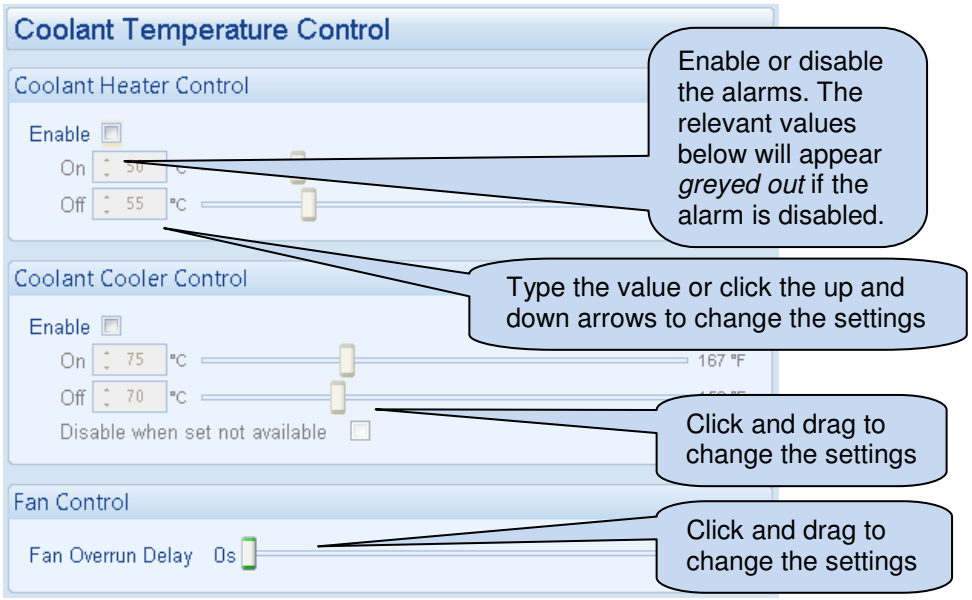
4.4.2.1 COOLANT TEMPERATURE ALARMS



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

4.4.2.2 COOLANT TEMPERATURE CONTROL

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

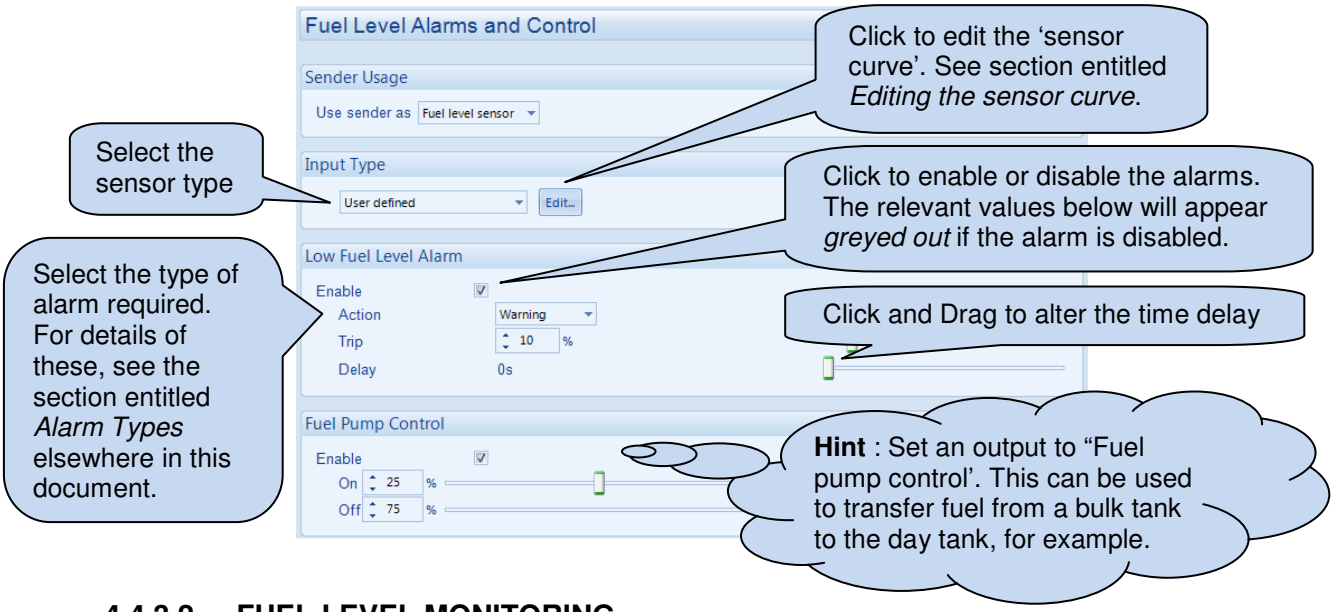


Option	Description
Coolant heater control	☐ = Coolant Heater Control function is disabled ☑ = Coolant Heater Control function is enabled. If the engine coolant temperature falls below the *On* setting, any output configured to *Coolant Heater Control* is energised. This is designed to control an external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

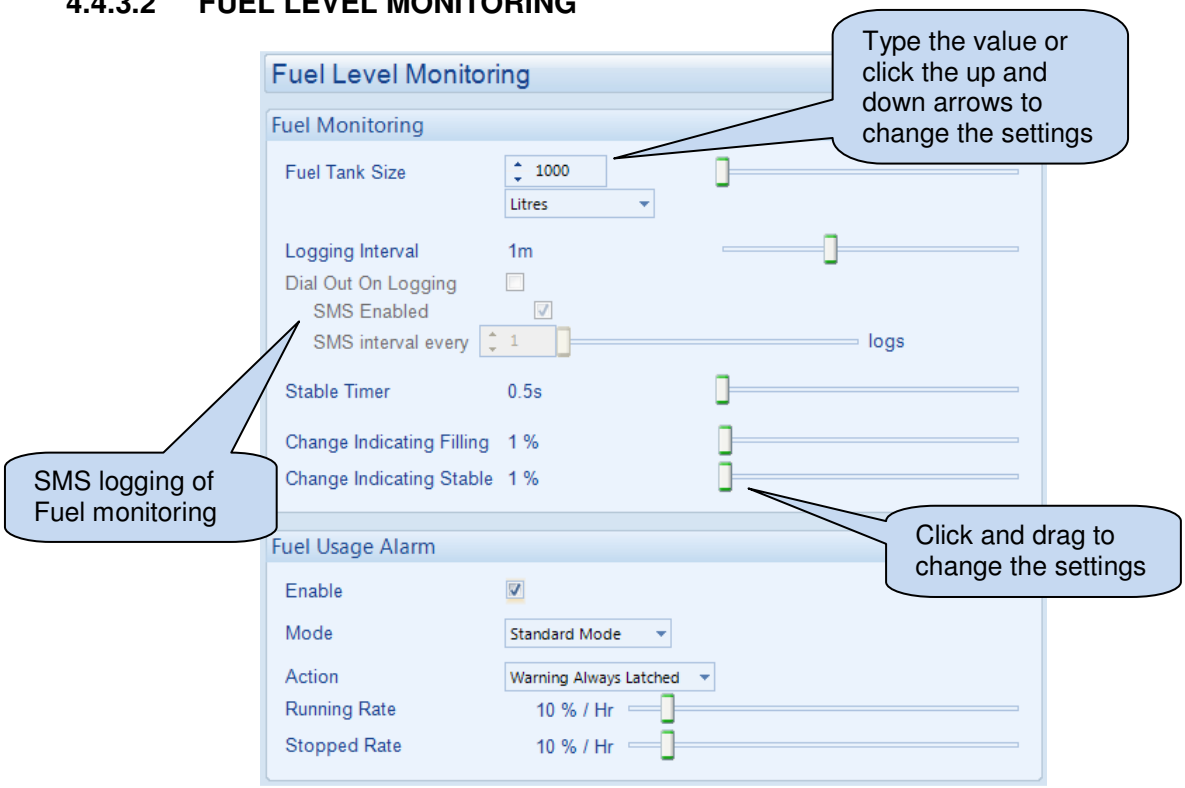
4.4.3 FUEL LEVEL

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

4.4.3.1 FUEL LEVEL ALARMS AND CONTROL



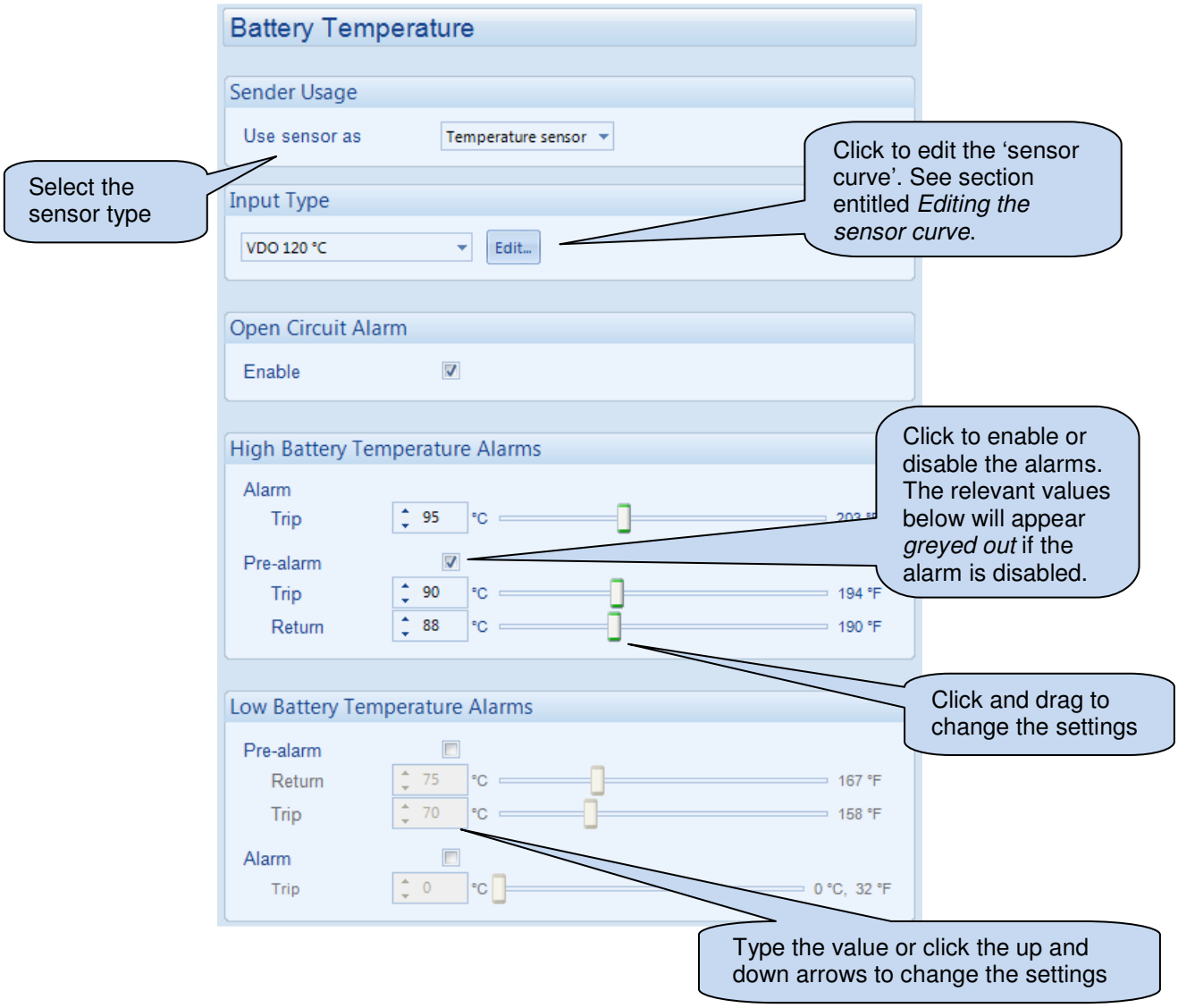
4.4.3.2 FUEL LEVEL MONITORING



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

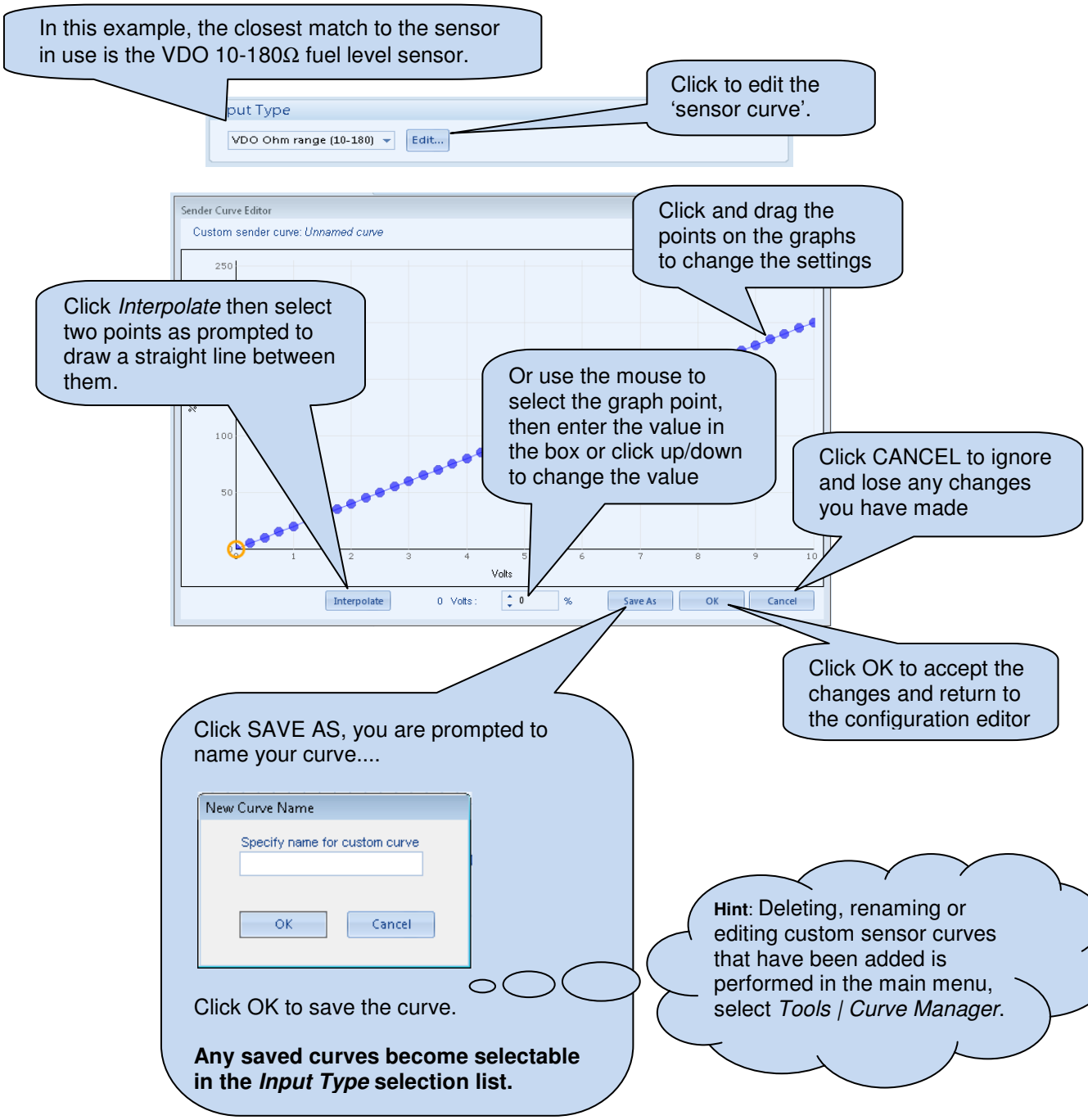
4.4.4 BATTERY TEMPERATURE

The following screen shot shows the configuration when set for *Temperature Sensor.* When set to other Sensor Type, consult the relevant manual section for details (Digital inputs, Oil Pressure input etc)



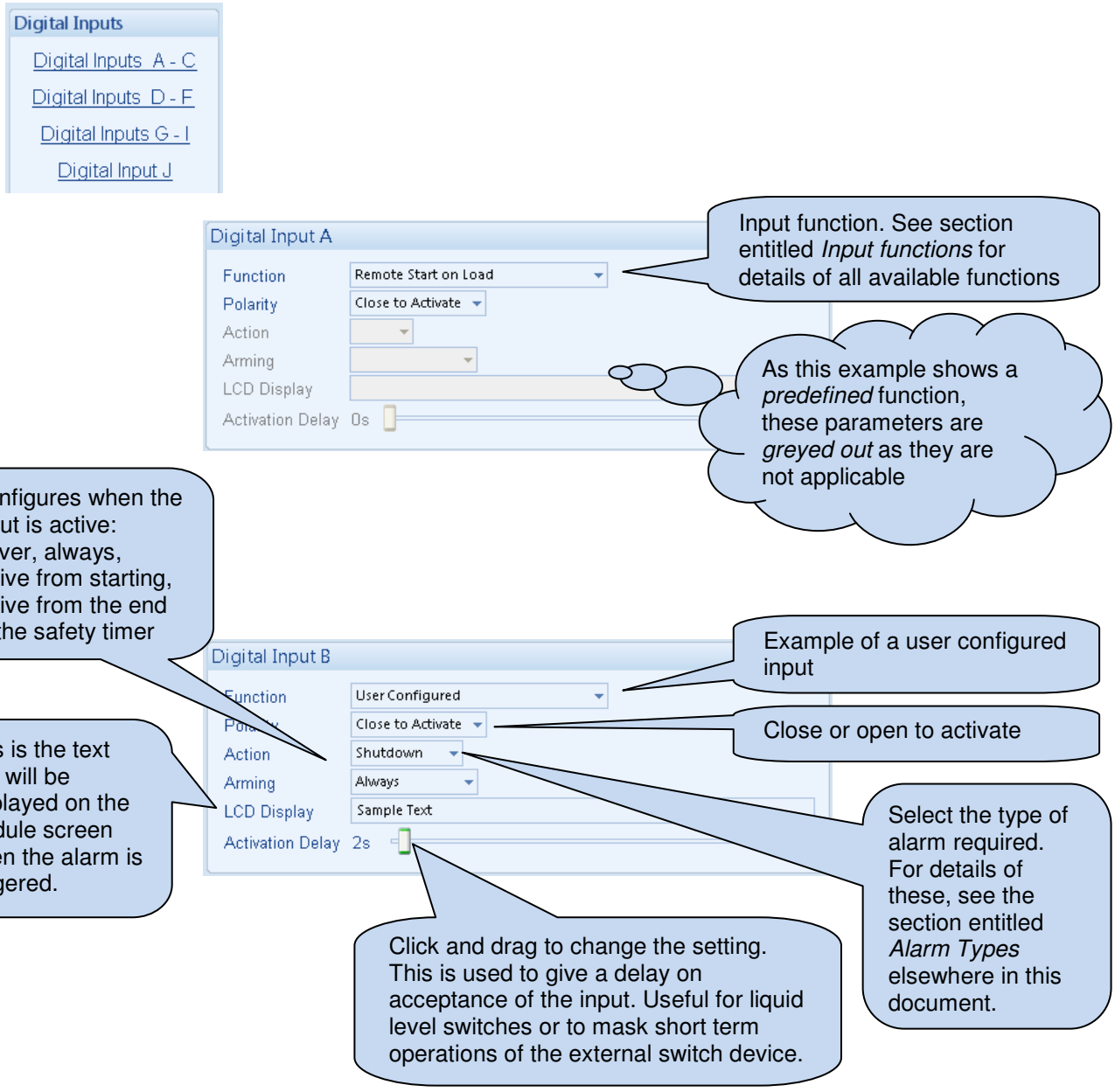
4.4.5 EDITING THE SENSOR CURVES

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



4.4.6 DIGITAL INPUTS

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



4.4.7 DIGITAL INPUT FUNCTIONS

Where a digital input is NOT configured as “user configured”, a selection 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.

NOTE: Input selection is dependant on controller.

Function	Description
Air flap closed auxiliary IEEE 37.2 - 3 Checking or interlocking relay	This input is used to connect to the Air flap switch contacts. This gives an immediate shutdown in the event of the air-flap being closed. It also prevents the generator from being restarted if the air flap has not been reset following an overspeed shutdown.
Alarm Mute	This input is used to silence the audible alarm from an external source, such as a remote mute switch.
Alarm Reset	This input is used to reset any latched alarms from a remote location. It is also used to clear any latched warnings which may have occurred (if configured) without having to stop the generator.
Alt Config 1-3 Select	These inputs are used to instruct the module to follow one of the *alternative* configuration settings instead of the *main* configuration settings.
Alternative Language Select	This input is used to select the alternative uploaded language file.
Auto Restore Inhibit IEEE 37.2 - 3 checking or interlocking relay	In the event of a remote start/mains failure, the generator is instructed to start and take load. On removal of the remote start signal/mains return the module continues to run the generator on load until the *Auto Restore Inhibit* input is removed. This input allows the controller to be fitted as part of a system where the restoration to mains is controlled remotely or by an automated system.
Auto start Inhibit IEEE 37.2 - 3 checking or interlocking relay	This input is used to provide an over-ride function to prevent the controller from starting the generator in the event of a remote start/mains out of limits condition occurring. If this input is active and a remote start signal/mains failure occurs the module doesn't 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 ignores until the module has returned the mains supply on load and shutdown. This input does not prevent starting of the engine in MANUAL or TEST modes.
Auxiliary Mains Fail	The module 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 is operated 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.

Function	Description
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 using the switch and the analogue input is used to give protection or configured to be used for indication only.
Crank Disconnect	This input is used to give an external crank disconnect input.
Disable Protections	The system designer provides this switch (not DSE) so its location varies depending upon manufacturer, however it normally takes the form of a key operated switch to prevent inadvertent activation. Depending upon configuration, a warning alarm may be generated when the switch is operated. When active, and the module is suitably configured (see section entitled 'Application') this prevents the engine being stopped upon critical alarm (Sometimes called War Mode or Run to Destruction)
Droop enable	This input is used to switch the engine into droop mode on CAN engines that support this function.
EJP1	For the French EJP (Effacement Jours de Pointe) tarrif system. This input is functionally identical to *Remote Start Off Load.* If this input is active, operation 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.
EJP2	For the French EJP (Effacement Jours de Pointe) tarrif system. This input is functionally identical to *Remote Start On Load.* When in auto mode, the module 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 doesn't generate start/stop requests of the engine. In both cases, synchronising takes place if required.
External Panel Lock	This input is used to provide security to the installation. If the External Panel lock input is active, the module doesn't respond to operation of the Mode select or start buttons. This allows the module to be placed into a specific mode (such as Auto) and then secured. The operation of the module is not affected and the operator is still able to view the various instrumentation pages etc. (*Front panel configuration access is still possible while the system lock is active*). **NOTE: External control sources (i.e. Simulate Start Button) are not affected by the external panel lock input and continue to operate normally.**
Fuel Pump Control	This input is used to activate the fuel Pump output control. When active the Fuel control output is active When inactive Fuel control output is not active.
Fuel Usage Alarm	This Input is used to give an input from an external fuel usage alarm.

Function	Description
Generator Closed Auxiliary IEEE 37.2 - 3 Checking or interlocking relay	This input is used to provide feedback to allow the DSE7450 to give true indication of the contactor or circuit breaker switching status. It should be connected to the generator load switching device auxiliary contact. Action: Warning (Alarm only, No shutdown)
Generator Load Inhibit IEEE 37.2 - 52 AC circuit breaker	This input is used to prevent the controller from loading the generator. If the generator is already on load, activating this input causes the controller to unload the generator. Removing the input allows the generator to be loaded again. **NOTE: This input only operates to control the generator-switching device if the DSE7450 load switching logic is attempting to load the generator. It doesn't control the generator-switching device when the mains supply is on load.**
Generator Loading Frequency OK	This input is used when the loading Frequency is within acceptable limits before allowing the generator to go on load when active
Generator loading Voltage OK	This input is used when the loading Voltage is within acceptable limits before allowing the generator to go on load when active
High Coolant Temperature Electrical Trip	This Input is used to Electrically trip the Generator breaker upon an external high coolant temperature sensor becoming active.
Inhibit Retransfer To Mains IEEE 37.2 - 3 checking or interlocking relay	When active, this input prevents the load being transferred back to the mains supply, even in the event of the generators failing.
Inhibit Scheduled Run IEEE 37.2 - 3 checking or interlocking relay	This input is used to provide a means of disabling a scheduled run.
Inhibit SMS Remote Start	This input is used to provide a means of disabling SMS Remote Start.
Lamp Test	This input is used to provide a test facility for the front panel indicators fitted to the DSE module. When the input is activated all LED's should illuminate.
Low Fuel Level Switch	A digital normally open or closed fuel level switch gives this input. It allows fuel level detection using the switch and the analogue input to be used in parallel to give protection or to be used for fuel level indication only.
Main Config Select	This input is used to select the *Main* configuration when *Alternative* configurations are enabled.
Mains closed Auxiliary IEEE 37.2 - 3 Checking or interlocking relay	This input is used to provide feedback to allow the module to give true indication of the contactor or circuit breaker switching status. It should be connected to the mains load switching device auxiliary contact. Incorrect application of this signal does not trigger an alarm condition, it is used solely for indication of the breaker status.
Mains Fail	This input is used to give indication to the module of a mains failure while the input is active.

Function	Description
Mains Load Inhibit IEEE 37.2 - 3 checking or interlocking relay	This input is used to prevent the 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. **NOTE: This input only operates to control the mains switching device if the DSE7450 load switching logic is attempting to load the mains. It does <u>not</u> control the mains switching device when the generator is on load.**
Manual Restore Contact	In the event of a remote start/mains failure, the generator is instructed to start and take load.
Oil Pressure Switch	A digital normally open or closed oil pressure switch gives this input. It allows oil pressure protection using the switch and the analogue input to be used in parallel to give protection or to be used for oil pressure indication only.
Remote Start off load	If this input is active, operation is similar to the 'Remote Start on load' function except that the generator is not instructed to take the load. This function is used where an engine only run is required e.g. for exercise.
Remote Start on load	When in auto mode, the module performs the start sequence and transfer load to the generator. In Manual mode, the load is transferred to the generator if the engine is already running, however in manual mode; this input does not generate start/stop requests of the engine.
Reset DC Battery	This input is used to indicate a new plant battery has been installed, by activating this input the *Plant Battery Status* instruments reset all to zero (Battery Run Time, Battery Charge Cycles, Battery Discharge %, Battery Charge %, Battery Power %), the *Plant Battery Manitenance Alarms (1,2,3*) and *DOD Alarms* are reset as well.
Reset DC Battery Maintenance Alarm 1-3	These inputs are used to reset the DC Battery maintenance alarms. When activated it resets the maintenance counter to the pre-configured value (i.e. 250 hours). If the maintenance alarm is configured to monitor the monthly service interval this also resets to the pre-configured period (i.e. 6 Months).
Reset Maintenance Alarm 1-3	These inputs are used to reset the maintenance alarms. When activated it resets the maintenance counter to the pre-configured value (i.e. 250 hours). If the maintenance alarm is configured to monitor the monthly service interval this also resets to the pre-configured period (i.e. 6 Months).
Simulate Auto Button	**NOTE: If a call to start is present when AUTO MODE is entered, the starting sequence begins. Call to Start comes from a number of sources depending upon module type and configuration and includes (but is not limited to) : Remote start input present, Mains failure, Scheduled run, Auxiliary mains failure input present, Telemetry start signal from remote locations.** This input mimic's the operation of the 'Auto' button and is used to provide a remotely located Auto mode push button.

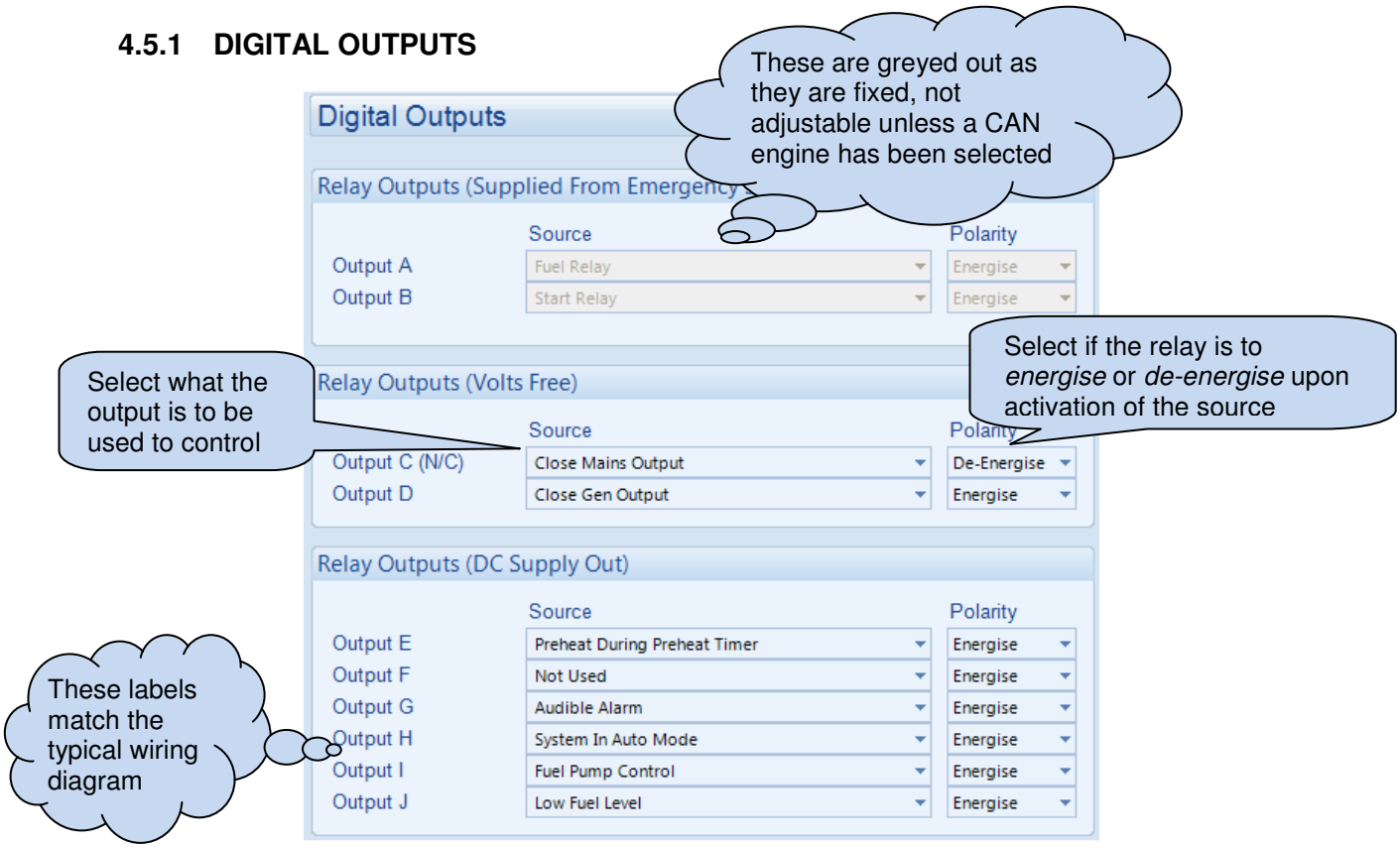
Function	Description
Simulate Lamp test \ Alarm Mute Button	This input is used to provide a test facility for the front panel indicators fitted to the module. When the input is activated all LED's should illuminate. The input also serves a second function, in that it also provides a mute signal to silence the audible alarm. The input is recognised by the module as though it was the Push button on the module itself being operated.
Simulate Mains available	This function is provided to override the module's internal monitoring function. If this input is active, the module does not respond to the state of the incoming AC mains supply.
Simulate Manual Button	This input mimic's the operation of the 'Manual' button and is used to provide a remotely located Manual mode push button.
Simulate Start Button	This input mimic's the operation of the 'Start' button and is used to provide a remotely located start push button.
Simulate Stop Button	This input mimic's the operation of the 'Stop' button and is used to provide a remotely located stop/reset push button.
Simulate Test on load button	This input mimics the operation of the 'Test' button and is used to provide a remotely located Test on load mode push button.
Smoke Limiting IEEE 37.2 – 18 accelerating or decelerating device	This input instructs the module to give a *run at idle speed* command to the engine either via an output configured to *smoke limit* or by data commands when used with supported electronic engines.
Start Pause IEEE 37.2 - 3 checking or interlocking relay	This input is intended to be used to allow the generator start sequence to commence, but not to complete. This feature is used with Air start engines for example to give a controlled start sequence. The function operates such that if the 'Start pause' input is active and an engine start is commanded, the module performs its start sequence thus: The pre-heat output (if used) is activated for the duration of the pre-heat timer. The Fuel output is then energised and the module then enters a pause state - 'Awaiting clear to start'. If the 'start pause' signal becomes inactive at this time then the module continues its normal start sequence. The 'start pause' mode uses the 'manual crank limit' timer and if this expires during the 'Awaiting clear to start' state then a 'Fail to start' alarm is generated and the set shutdown.
Stop and Panel Lock	Combined function input that instructs the module to enter **STOP MODE** and also perform the *Panel Lock* function. Once the input is active, the module does not respond to operation of the Mode select or start buttons. The operator is still able to view the various instrumentation pages etc. (*Front panel configuration access is still possible while the system lock is active*).
Transfer to Mains/ Open Generator / Battery Button IEEE 37.2 - 52 AC circuit breaker	This input is used to transfer the load to the mains supply (AMF module) when running in **MANUAL MODE** or provide the 'Open Generator' signal in a non AMF Module.)
Transfer to Generator/Open Mains / Battery Button IEEE 37.2 - 52 AC circuit breaker	This input is used to transfer the load to the generator when running in **MANUAL MODE.**.

Function	Description
Volts Lower	**NOTE: This input has no effect when using the internal analogue system to control the AVR**
	This is operational in Manual Mode only, when the breaker is open. On systems where internal relays are used to control the AVR, this input is used to decrease the volts.
Volts Raise	**NOTE: This input has no effect when using the internal analogue to control the governor.**
	This is operational in Manual Mode only, when the breaker is open. On systems where internal relays are used to control the governor, this input is used to increase the speed.

4.5 OUTPUTS

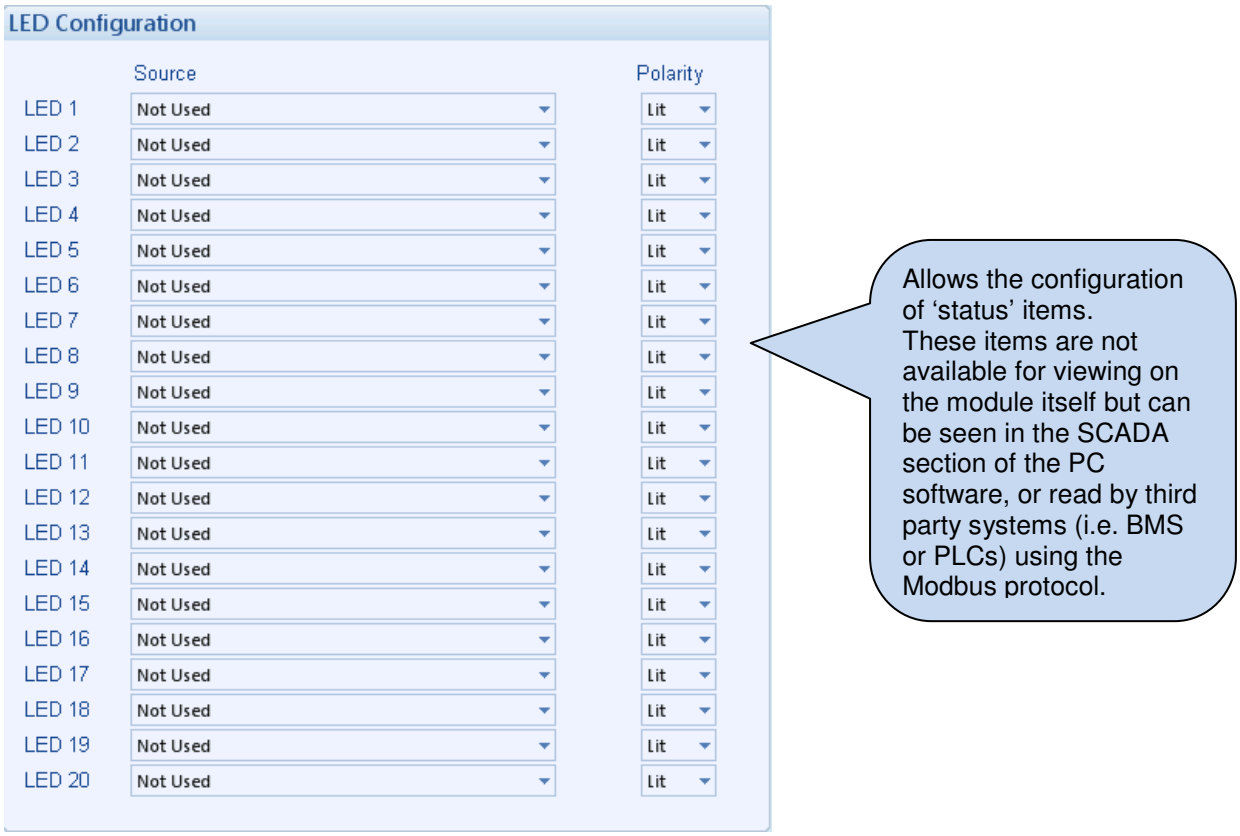
The module page is subdivided into smaller sections.
Select the required section with the mouse.

4.5.1 DIGITAL OUTPUTS



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

4.5.2 VIRTUAL LEDS



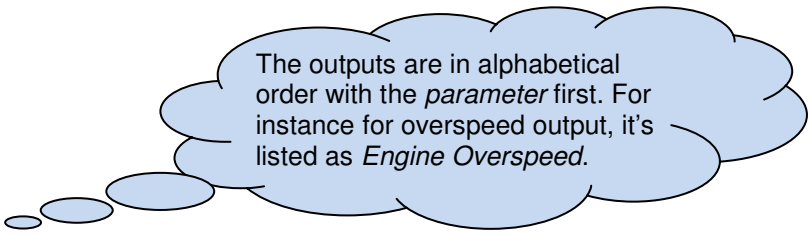
The list of output sources available for configuration of the module Virtual LEDs is listed in the section entitled *Output Sources.*

4.5.3 OUTPUT SOURCES

The list of output sources available for configuration of the module relay outputs also applies to the LED configuration and expansion relay outputs.

Under the scope of IEEE 37.2, *function numbers 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.

NOTE: Output selection is dependant on controller and the Configuration.



Output source	Activates…	Is not active….
Not Used	The output does not change state (Unused)	
Air Flap Alarm	This output indicates that the air-flap is closed; to operate it requires an input configured as 'Air-flap closed' connected to the external air-flap switch.	
Air Flap Relay	Normally used to control an air flap, this output becomes active upon an Emergency Stop or Over-speed situation.	Inactive when the set has come to rest
Alternative Config 1-3 selected	Indicates which of the three alternative configurations has been selected (if any)	
Alternative Language Select	Active when a digital input configured to *Alternative Language Select* is active.	
Alarm Mute	Indicates that an alarm mute operation is in progress by digital input	
Alarm Reset	Indicates that an alarm reset operation is in progress by digital input	
Arm Safety On Alarms	Becomes active at the end of the *safety delay* timer whereupon all alarms configured to 'From Safety On' become active	Inactive when : When the set is at rest In the starting sequence before the Safety Delay timer has expired
Audible Alarm IEEE 37.2 – 74 alarm relay	This output indicates that the internal sounder is operating to allow it to feed an external sounder. Operation of the Mute pushbutton resets this output once activated.	Inactive if the internal sounder is not operating.
Auto Button Pressed (Auto mode)	Active when the controller is in AUTO mode	Inactive in any other mode.
Auto Restore Inhibit	Indicates that a auto restore inhibit operation is in progress	
Auto Start Inhibit IEEE 37.2 – 3 Checking or Interlocking relay	Indicates that an auto start inhibit operation is in progress.	
Auxilliary Mains Failure	Indicates a Auxilliary Mains Fail is Active	
AVR Maximum Trim Limit Reached	Indicates that the analogue AVR output has reached 100%. This indicates a fault with the control of the AVR (including connection error), or that the alternator has reached its maximum capacity.	
Calling For Scheduled Run	Active during a *scheduled run* request from the inbuilt scheduler.	

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	The engine ECU has indicated that a Warning alarm is present.	Inactive when no Warning alarm from the ECU is present
CAN ECU Fail	The engine ECU has indicated that a Shutdown alarm is present.	Inactive when no Shutdown alarm from the ECU is present
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 Failure (Shutdown or warning)	Indicates that there is a charging fault with the auxiliary charging alternator	When the set is at rest During the starting sequence before the safety delay timer has expired
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 becomes active.	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 DSE7450 module selects the generator to be on load this control source becomes active for the duration of the Breaker Close Pulse timer, after which it becomes inactive again.	
Close Gen Button Pressed	Active when the close Gen button pressed on the Facia of the controller.	
Close Mains Output IEEE 37.2 – 52 ac circuit breaker	Used to control the load switching device. Whenever the DSE7450 module selects the mains to be on load this control source becomes active.	The output is inactive whenever the mains is not required to be on load
Close Mains Output Pulse IEEE 37.2 – 52 ac circuit breaker	Used to control the load switching device. Whenever the DSE7450 module selects the mains to be on load this control source becomes active for the duration of the Breaker Close Pulse timer, after which it becomes inactive again.	
Closed to Generator state	Used to be active when the status of the Generator breaker is closed.	
Closed to mains state	Used to be active when the status of the mains breaker is closed.	
Combined DC Battery Maintenance Alarm Active	Active when a Dc Battery maintenance Alarm active.	
Combined Engine Maintenance Alarm Active	Active when a Engine maintenance Alarm active.	
Combined Mains Failure	Active when the mains supply is out of limits OR the input for Auxiliary Mains Failure is active	
Combined Remote Start Output	Indicates that a remote start input is active.	
Combined Under and Over Frequency Alarm IEEE 37.2 - 81 frequency relay	Active when the generator is shutdown due to either under OR over frequency	
Combined Under and Over Frequency Warning IEEE 37.2 - 81 frequency relay	Active when the generator alarm for either under OR over frequency is active	

Output source	Activates…	Is not active….
Combined Under and Over Voltage Alarm IEEE 37.2 – 27AC under voltage relay IEEE 37.2 – 59AC over voltage relay	Active when the generator is shutdown due to either under OR overvoltage	
Combined Under and Over Voltage Warning IEEE 37.2 – 27AC under voltage relay IEEE 37.2 – 59AC over voltage relay	Active when the generator alarm for either under OR overvoltage is active	
Common Alarm IEEE 37.2 – 74 alarm relay	Active when one or more alarms (of any type) are active	The output is inactive when no alarms are present
Common Electrical Trip IEEE 37.2 – 74 alarm relay	Active when one or more E*lectrical trip* alarms are active	The output is inactive when no electrical alarms are present
Common Shutdown IEEE 37.2 – 74 alarm relay	Active when one or more *Shutdown* alarms are active	The output is inactive when no shutdown alarms are present
Common Warning IEEE 37.2 – 74 alarm relay	Active when one or more *Warning* alarms are active	The output is inactive when no warning alarms are present
Coolant Cooler Control IEEE 37.2 – 23 temperature control device	Activated by the Coolant Cooler Control in conjunction with the Coolant Temperature Sensor.	
Coolant Heater Control IEEE 37.2 – 23 temperature control device	Activated by the Coolant Heater Control in conjunction with the Coolant Temperature Sensor.	
Cooling Down	Active when the Cooling timer is in progress	The output is inactive at all other times
Data Logging Active	Active When Data Logging function active.	
DC Battery charge Overcurrent Alarm	Active When Dc Battery Charge over current alarm active	
DC Battery Float Delay in Progress	Active When DC Battery Float Delay timer active	
DC Battery High Voltage Alarm	Active When DC Battery High Voltage shutdown / Electrical trip alarm active	
DC Battery High Voltage Warning	Active When Dc Battery High Voltage warning alarm active	
DC Battery Load Overcurrent Alarm	Active When DC Battery Load Over Current alarm active	
DC Battery Low Charge State Alarm	Active When DC Battery Low Charge State shutdown / Electrical Trip alarm active	
DC Battery Low Charge State Warning	Active When DC Battery Charge State Warning alarm active	
DC Battery Low Voltage Alarm	Active When DC low Voltage alarm active	
DC Battery Low Voltage Warning	Active When DC low Voltage warning alarm active	
DC Battery Off Load	Active when Off load active	
DC Battery On Load	Active when On load active	
DC Battery Temperature High Alarm	Active When DC Battery High Temperature shutdown / Electrical trip alarm active	
DC Battery DC Battery Temperature High warning Alarm	Active When DC Battery High Voltage shutdown / Electrical trip alarm active	
DC Battery Temperature Low Alarm	Active When DC Battery Low Voltage shutdown / Electrical trip alarm active	
DC Battery Temperature Low Warning	Active When DC Battery Low Voltage Warning alarm active	

Output source	Activates…	Is not active….
DC KW Overload Alarm	Active When DC Battery High Voltage shutdown / Electrical trip alarm active	
DC KW Overload Pre-Alarm	Active When DC Battery High Voltage pre alarm active	
DC Overcurrent IDMT	Active when the DC IDMT alarm is active	
DC Overcurrent Pre-Alarm	Active When DC Overcurrent Pre-Alarm Active	
DC Power On	Active when DC power is supplied to the module	
Digital Input A - J	Active when the digital input is active	Inactive when : If the input is not active If the input is active but conditioned by *activation delay*, *safety timer* or *Arming* requirements.
Down Button Pressed	This output indicates that the Down pushbutton is being operated. Once the button is released, the output becomes inactive.	
Droop Enable	Becomes active when an input configured to *Droop enable* is active or if *Droop Enable* has been activated in the module configuration (CAN engine only)	
EJP1 / EJP2	Indicates that an input configured to EJP1 or EJP2 is active	
Emergency Stop IEEE 37.2 – 86 Lockout Relay	Active when the Emergency Stop input has been activated	
Energise to Stop	Normally used to control an *Energise to Stop* solenoid, this output becomes active when the controller wants the set to stop running.	Becomes inactive a configurable amount of time after the set has stopped. This is the *ETS hold time*.
Engine Battery High Voltage IEEE 37.2 – 59DC Over Voltage Relay	This output indicates that a Battery Over voltage alarm has occurred.	Inactive when battery voltage is not High
Engine Battery Low Voltage	This output Indicates that a battery under voltage has occured	Inactive when battery voltage in not Low
Engine Maintainance Alarm 1-3 due	Indicates that the specified maintenance alarm is due	
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 is the *Fail to stop* timer.	
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.	
Fan Control	Energises when the engine becomes available (up to speed and volts). This output is designed to control an external cooling fan. When the engine stops, the cooling fan remains running for the duration of the Fan Overrun Delay.	
Flexible Sensor x Active	Indicates that the respective flexible sensor alarm is active.	
Flexible Sensor x High (Pre-) Alarm	Indicates that the respective flexible sensor's relevant High Alarm or High Pre-alarm is active.	
Flexible Sensor x Low (Pre-) Alarm	Indicates that the respective flexible sensor's relevant Low Alarm or Low Pre-alarm is active.	
Fuel Fill Start	Indicates when fuel fill starts	
Fuel Fill End	Indicates when the end of the fueling event.	
Fuel Pump Control IEEE 37.2 – 71 level switch	Becomes active when the *Fuel level* falls below the *Fuel Pump Control ON* setting and is normally used to transfer fuel from the bulk tank to the day tank.	If the output is already active it becomes inactive when the *Fuel level* is above the *Fuel Pump Control OFF* settings.

Output source	Activates…	Is not active….
Fuel Relay	Becomes active when the controller requires the governor/fuel system to be active.	Becomes inactive whenever the set should be stopped, including between crank attempts, upon controlled stops and upon fault shutdowns.
Fuel Usage Alarm	Becomes active when the amount of fuel used over a set time period exceeds the set value.	
Gen Over Frequency Overshoot Alarm	Becomes active when the *Over-Frequency Overshoot Shutdown* is active.	
Gen Over Frequency Overshoot Warning	Becomes active when the *Over-Frequency Overshoot Warning* is active.	
Gas Choke On	Becomes active during starting for the duration of the Gas Choke timer. Normally used to choke a gas engine.	Inactive at all other times
Gas Ignition	Becomes active during starting.	Becomes inactive a configurable amount of time after the *fuel relay* becomes inactive. This is the *Gas ignition off* timer.
Generator at Rest	This output indicates that the generator is not running.	
Generator Available	Becomes active when the generator is available to take load.	Inactive when Loading voltage and loading frequency have not been reached After electrical trip alarm During the starting sequence before the end of the warming timer.
Generator Closed Aux	Active when the *Generator closed auxiliary* input is active	
Generator Excite IEEE 37.2 – 31 separate excitation device	Used to control the excitation of the main alternator (AC).	Becomes inactive when the set is stopped.
Generator Failed to Close IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the generator contactor or breaker. It is only used if the module is configured to use 'Generator Closed Auxiliary' feedback.	
Generator Failed to Open IEEE 37.2 - 48 Incomplete Sequence Relay	This output source is intended to be used to indicate a failure of the generator contactor or breaker. It is only used if the module is configured to use 'Generator Closed Auxiliary' feedback.	
Generator Load Inhibited	This output indicates that a digital input that has been configured as '*Generator Load Inhibit'* is active. Refer to the '*Edit Inputs*' section of this manual for details.	
Generator High Voltage Alarm IEEE 37.2 – 59AC over voltage relay	Active when the generator voltage exceeds the *High Voltage Shutdown* setting	
Generator High Voltage Warning IEEE 37.2 – 59AC over voltage relay	Active when the generator voltage exceeds the *High Voltage Warning* setting	
Generator Low Voltage Shutdown IEEE 37.2 – 27AC under voltage relay	Active when the generator voltage falls below the *Low Voltage Shutdown*	Inactive when The set is stopped During starting sequence before the safety delay time has expired.
Generator Low Voltage Warning IEEE 37.2 – 27AC under voltage relay	Active when the generator voltage falls below the *Low Voltage Warning* setting	Inactive when The set is stopped During starting sequence before the safety delay time has expired.

Output source	Activates…	Is not active….
Generator Off Load	Active when generator running and generator breaker open	
Generator On Load	Active when generator running and generator breaker closed	
Generator Overcurrent Pre-Alarm	Active When When Generator Pre-Alarm is active.	
Generator Under Frequency Warning(Alarm) / Shutdown IEEE 37.2 – 81 frequency relay	Active when the generator falls below the *low frequency Warning/ Shutdown* setting	Inactive when The set is stopped During starting sequence before the safety delay time has expired.
Generator Over Frequency Warning(Alarm) / Shutdown	Active when the generator rises above the *high frequency Warning/ Shutdown* setting	Inactive when The set is stopped During starting sequence before the safety delay time has expired.
Generator Phase Rotation Alarm	This output indicates that the module has detected a phase sequence error from the generator output.	
Generator Stopping	This output source indicates that the engine has been instructed to stop but has not yet come to rest. Once the engine comes to a standstill this output becomes in-active.	
High Coolant Temperature Electrical Trip	Active when the Coolant Temperature exceeds the High Coolant Temperature Electrical Trip setting	
High Coolant Temperature Shutdown	Active when the Coolant Temperature exceeds the High Coolant Temperature Shutdown setting	
High Coolant Temperature Warning	Active when the Coolant Temperature exceeds the High Coolant Temperature Warning setting	
High Inlet Temperature Shutdown	Active when the Inlet Temperature exceeds the High Inlet Temperature Shutdown setting	
High Inlet Temperature Warning	Active when the Inlet Temperature exceeds the High Inlet Temperature Warning setting	
Inhibit Sms Start	Indicates when the Inhibit SMS Start is active.	
Inhibit Retransfer to Mains	Indicates when mains fails,Gens fails and mains not enough capacity to take load inhibit retransfer.	
Inhibit Scheduled Run	Active when the digital input configured for *Inhibit Scheduled Run* is active	
kW Overload Shutdown / Electrical Trip / Alarm	Active when the measured kW are above the setting of the *kW overload shutdown / electrical trip alarm*. Used to give alarms on overload, control a dummy load breaker or for load shedding functionality.	
kW Overload Warning	Active when the measured kW are above the setting of the *kW overload warning alarm*. Used to give alarms on overload, control a dummy load breaker or for load shedding functionality.	
Lamp Test	This output indicates that the module is performing a lamp test. Once the lamp test is completed, the output becomes inactive again. The output is used to feed a lamp test on external modules or panel lamps.	
Lamp Test/Mute + Tick Buttons pressed	This output indicates that both Lamp Test/Mute pushbutton and Tick pushbutton are pressed simultaneously. Once one of the buttons is released, the output becomes inactive.	
Left Button Pressed	This output indicates that the Left pushbutton is being operated. Once the button is released, the output becomes inactive.	
Loading Frequency Not Reached	Indicates that the generator frequency has not reached the configured *loading frequency* during the starting process.	
Loading Voltage Not Reached	Indicates that the generator voltage has not reached the configured *loading voltage* during the starting process.	
Loss of Mag Pickup Signal	Active when the controller senses the loss of signal from the magnetic pickup probe	

Output source	Activates…	Is not active….
Louvre Control	Normally used to drive ventilation louvres for the generator set, this output becomes active when the fuel relay becomes active	Inactive when the fuel relay becomes inactive.
Low Coolant Temperature	Active when the Coolant Temperature falls below the Low Coolant Temperature alarm setting	
Low Fuel Level IEEE 37.2 – 71 level switch	Active when the Fuel Level falls below the *Fuel Level Low* setting	
Low Oil Pressure Shutdown IEEE 37.2 - 63 pressure switch	Active when the *Oil Pressure* falls below the *Low Oil Pressure Shutdown* setting	Inactive when The set is stopped During starting sequence before the safety delay time has expired.
Low Oil Pressure Warning IEEE 37.2 - 63 pressure switch	Active when the *Oil Pressure* falls below the *Low Oil Pressure Warning* setting	Inactive when The set is stopped During starting sequence before the safety delay time has expired.
MPU open circuit	This output indicates that the module has detected an open circuit failure in the Magnetic Pickup transducer circuit.	
Main Config Selected	Indicates that the main configuration fail has been selected	
Mains Closed Aux	Active when the *Mains closed auxiliary* input is active	
Mains failed to close	This output indicates the mains breaker failed to close	
Mains failed to open	This output indicates the mains breaker failed to open	
Mains Failure IEEE 37.2 - 81 frequency relay IEEE 37.2 – 27AC under voltage relay IEEE 37.2 – 59AC over voltage relay	The output indicates that one or more of the module's sources of determining mains failure is active. The output is inactive when the mains supply is healthy	
Mains Load Inhibited	Active e when the mains is inhibited to take load.	
Mains Off Load	Active when the mains breaker is not closed	
Mains On Load	Active when the mains breaker closed	
Mains Phase Rotation Alarm	Active when the Mains Phase rotation alarm is active.	
Mains High Frequency IEEE 37.2 - 81 frequency relay	Active when the mains frequency exceeds the *High Frequency* setting	
Mains High Voltage IEEE 37.2 – 59AC overvoltage relay	Active when the mains voltage exceeds the *High Voltage* setting	
Mains Low Frequency IEEE 37.2 - 81 frequency relay	Active when the mains frequency falls below the *Low Frequency* setting	
Mains Low Voltage IEEE 37.2 – 27AC under voltage relay	Active when the mains voltage falls below the *Low Voltage* setting	
Maintenance Alarm 1,2,3 Due	Indicates that the specified maintenance alarm is due	
Manual Button Pressed	This output indicates that the Manual pushbutton is being operated. Once the button is released, the output becomes inactive.	
Manual Mode	Active when the controller is in MANUAL mode	Inactive in any other mode.
Manual Restore Contact	Active when manual restore contact is active	
MPU Open Circuit	Active when the *MPU Open Circuit* alarm is enabled and active.	
Mute/Lamp Test Button Pressed	This output indicates that the alarm mute / Lamp test pushbutton is being operated. Once the button is released, the output becomes inactive.	
No loading Command	Active when no Loading command Active	
Oil Pressure Sender Open Circuit	Active when the *Oil Pressure Sensor* is detected as being *open circuit*.	
Open Generator Button Pressed	Active when the Open gen Button is active.	

Output source	Activates…	Is not active….
Open Gen Output IEEE 37.2 – 52 ac circuit breaker	Used to control the load switching device. Whenever the module selects the generator to be off load this control source becomes active.	Inactive whenever the generator is required to be on load
Open Gen Output Pulse IEEE 37.2 – 52 ac circuit breaker	Used to control the load switching device. Whenever the module selects the generator to be off load this control source becomes active for the duration of the Breaker Open Pulse timer, after which it returns 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 becomes active.	The output is inactive whenever the mains is required to be on load
Open Mains Output Pulse IEEE 37.2 – 52 ac circuit breaker	Used to control the load switching device. Whenever the module selects the mains to be off load this control source becomes active for the duration of the Breaker Open Pulse timer, after which it becomes inactive again.	
Over Current IDMT Alarm IEEE 37.2 – 51 ac time overcurrent relay	Active when an overcurrent condition has caused the *Overcurrent IDMT* alarm to trigger	
Over Current Immediate Warning IEEE 37.2 – 50 instantaneous overcurrent relay	Active when an overcurrent condition exceeds the *Overcurrent alarm Trip* setting. At the same time, the controller begins following the *IDMT curve*. If the overload condition exists for an excess time, the *Overcurrent IDMT* alarm becomes activate.	
Over Frequency Warning IEEE 37.2 - 81 frequency relay	Active when the generator frequency exceeds the *High Frequency Warning* setting	
Over Frequency Shutdown IEEE 37.2 - 81 frequency relay	Active when the generator frequency exceeds the *High Frequency Shutdown* setting	
Over Speed Shutdown IEEE 37.2 – 12 over speed device	Active if the engine speed exceeds the *Over Speed Shutdown* setting	
Over Speed Warning IEEE 37.2 – 12 over speed device	Active if the engine speed exceeds the *Over Speed Warning* setting	
Overspeed Overshoot Alarm / Warning	Active if the overspeed / overshoot parameters during the safety on timer.	
Panel Locked	This output indicates that the module '*Panel Lock*' is active. If the Panel lock input is active, the module does not respond to operation of the Mode select or start buttons. This allows the module to be placed into a specific mode (such as Auto) and then secured. The operation of the module is not affected and the operator is still able to view the various instrumentation pages etc. (*Front panel configuration access is barred while system lock is active*).	
Panel Locked By Digital Input	This output indicates that a digital input that has been configured as '*Panel Lock*' is active. If the Panel lock input is active, the module does not respond to operation of the Mode select or start buttons. This allows the module to be placed into a specific mode (such as Auto) and then secured. The operation of the module is not affected and the operator is still able to view the various instrumentation pages etc. (*Front panel configuration access is barred while system lock is active*). Refer to the '*Edit Inputs*' section of this manual for details.	
Panel Locked By Telemetry	This output indicates that remote '*Panel Lock*' via telemetry is active. If the Panel lock is active, the module does not respond to operation of the Mode select or start buttons. This allows the module to be controller remotely without local interference. The operation of the module is not affected and the local operator is still able to view the various instrumentation pages etc. (*Front panel configuration access is barred while system lock is active*).	
Plant Battery Available	Active when the Plant battery has been charged to full charge level and the float charge timer has expired.	Inactive when the battery charge has fallen below the depth of discharge level.

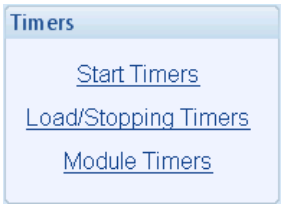
Output source	Activates…	Is not active….
Plant Battery Maintenance Alarm 1-3 Active	Active when the Plant Battery Maintenance Alarm is active.	
Plant battery On Charge	Active When the Plant Battery on charge timer is active.	
PLC Output Flag 1-40	A Series of user configured flags that is used by the PLC to control / drive internal and external functions	
Preheat During Preheat Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : The set is stopped The preheat timer has expired
Preheat Until End Of Cranking	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : The set is stopped The set has reached *crank disconnect* conditions
Preheat Until End Of Safety Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : The set is stopped The set has reached the end of the *safety delay* timer
Preheat Until End Of Warming Timer	Becomes active when the preheat timer begins. Normally used to control the engine preheat glow-plugs.	Inactive when : The set is stopped The set has reached the end of the *warming* timer
Protections Disabled	Indicates the protection system of the module has been disabled by configuration or by digital input configured to perform this disabling function.	
Remote Control 1-10	A series of output sources that are controlled by remote control in the SCADA section of the software. They are used to control external circuits or used in the *control logic* section of the configuration suite.	
Remote Start Off Load	This output indicates that a digital input that has been configured as '*Remote Start off load*' is active. This output could be used to pass the remote start signal on to elsewhere in the control system.	
Remote Start On Load	This output indicates that a digital input that has been configured as '*Remote Start on load*' is active. This output could be used to pass the remote start signal on to elsewhere in the control system.	
Reset DC Battery Maintenance Alarm 1-3	This input is active when Reset DC Battery Maintenance Alarm 1-3 is active	
Reset Maintenance 1-3	This input is active when Reset Maintenance Alarm 1-3 is active	
Reset Plant Battery	This input is active when Reset Plant Battery Alarm is active	
Return delay in progress	This output source is active to indicate that the return timer is running.	
Right Button Pressed	This output indicates that the Right pushbutton is being operated. Once the button is released, the output becomes inactive.	
Short Circuit		
Short Circuit Generator	This output indicates that the module has detected a short circuit on the generator output.	
Shutdown Blocked	Indicates that a *Shutdown* type alarm is active but that the shutdown function has been blocked because the *Protections Disabled* function is active.	
Simulate Auto Button	This output is active whilst the Simulate Auto button is active	
Simulate Mains Available	This output is active whilst the Simulate Mains is within limits (available)	
Simulate Manual Button	This output is active whilst the Simulate Manual button is active	
Simulate Start Button	This output is active whilst the Simulate Start button is active	
Simulate Stop Button	This output is active whilst the Simulate Stop button is active	
Simulate Test On Load Button	This output is active whilst the Simulate Test On Load button is active	

Output source	Activates…	Is not active….
Simulate Transfer to Generator Button	This output is active whilst the Simulate Transfer to Gen button is active	
Simulate Transfer to Mains Button	This output is active whilst the Simulate Transfer to mains button is active	
Smoke Limiting	Becomes active when the controller requests that the engine runs at idle speed. As an output, this is used to give a signal to the *Idle input* of an engine speed governor (if available)	Becomes inactive when the controller requests that the engine runs at rated speed.
SMS Remote Start Off Load	This output indicates that the SMS Remote Start off load is now enabled	
SMS Remote Start On Load	This output indicates that the SMS Remote Start on load is now enabled	
Start Button Pressed	This output indicates that the stop pushbutton is being operated. Once the button is released, the output becomes inactive	
Start Paused	This output is active when the Start Pause input is active	
Start Delay in Progress	This output source becomes active to indicate that the module's internal start delay timer is running. Once this timer expires the module with initiate its start sequence.	
Start Relay IEEE 37.2 – 54 turning gear engaging device	Active when the controller requires the cranking of the engine.	
Starting Alarm	This output is used to supply an external sounder with a signal that the engine is about to start. The output becomes active AFTER the start delay time, during the pre heat delay (if used) and continues until the set starts.	
Starting Alarms Armed	This output indicates that the starting alarms are now enabled. It is used to control external logic circuitry. Starting alarms are armed as soon as the module commences starting of the engine and remain armed until the engine is at rest.	
Stop + Tick Buttons Pressed	This output indicates that both Stop pushbutton and Tick pushbutton are pressed simultaneously. Once one of the buttons is released, the output becomes inactive.	
Stop And Panel Lock	Active when the *Stop And Panel Lock* digital input is active.	
Stop Button Pressed	This output indicates that the stop pushbutton is being operated. Once the button is released, the output becomes inactive.	
System in Stop Mode	Active when the controller is in STOP mode	Inactive in any other mode.
System healthy	This output indicates that the module is in *Auto* mode and there are no alarms present.	
Stop Mode	Active when the controller is in STOP mode	Inactive in any other mode.
System healthy	This output indicates that the module is in *Auto* mode and there are no alarms present.	
System in Auto mode	This output indicates that the module is in *Auto* mode.	
System in Manual mode	This output indicates that the module is in *Manual* mode.	
System in Test mode	Active when the controller is in TEST mode	Inactive in any other mode.
Telemetry Active (Relay)	Active when the communication port is live and for a short time after transmission stops. Used as a relay or LED source.	
Telemetry Data Active (LED)	Active when data is being transmitted. This output changes continuously state (flash) upon data transfer. Normally used as an LED source rather than a relay source as this source flashes repeatedly. For a similar source more suited to drive a relay, see *Telemetry Active*.	
Test Mode Button Pressed	Active when the Test mode Button pressed	
Tick Button Pressed	Active when the Tick Button pressed	

Output source	Activates…	Is not active….
Transfer To Generator Button Pressed	Active when the Transfer To Generator Button pressed.	
Transfer To Mains Button Pressed	Active when the Transfer To Mains Button pressed.	
Under Frequency Warning IEEE 37.2 - 81 frequency relay	Active when the generator frequency falls below the *Low Frequency Warning*	Inactive when The set is stopped During starting sequence before the safety delay time has expired.
Under Frequency Shutdown IEEE 37.2 - 81 frequency relay	Active when the generator frequency falls below the *Low Frequency Shutdown*	Inactive when The set is stopped During starting sequence before the safety delay time has expired.
Under Speed Shutdown IEEE 37.2 - 14 under speed relay	Active when the engine speed falls below the *Under speed Shutdown* setting	
Under Speed Warning IEEE 37.2 - 14 under speed relay	Active when the engine speed falls below the *Under speed Warning* setting	
Up Button Pressed	This output indicates that the Up pushbutton is being operated. Once the button is released, the output becomes inactive.	
User Defined Control 1-3 active	Indicates that the specified User Defined Control (Control Logic) is active	
Voltage Lower Relay	On systems where internal relays are used to control the AVR, this input is used to increase the volts.	
Voltage Raise Relay	On systems where internal relays are used to control the AVR, this input is used to decrease the volts.	
Waiting for generator	This output indicates that the engine has been instructed to start but has not yet become available. Once the generator becomes available this output becomes in-active. (Available = Generator Frequency and Voltage levels are above the '*Loading*' levels set in the configuration)	
Waiting for Manual Restore IEEE 37.2 – 3 Checking or Interlocking relay	Becomes active when the generator is on load and the mains supply is healthy but an input configured to Manual Restore is active. This is used to signal to an operator that action is required before the set transfers back to the mains supply.	

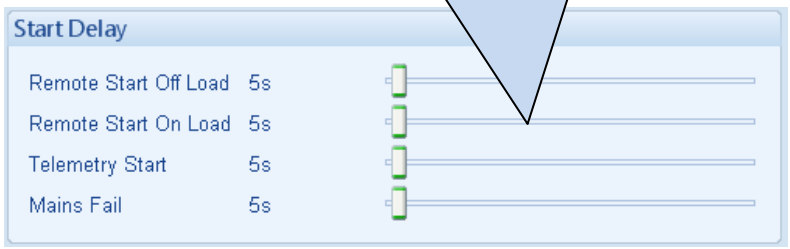
4.6 TIMERS

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

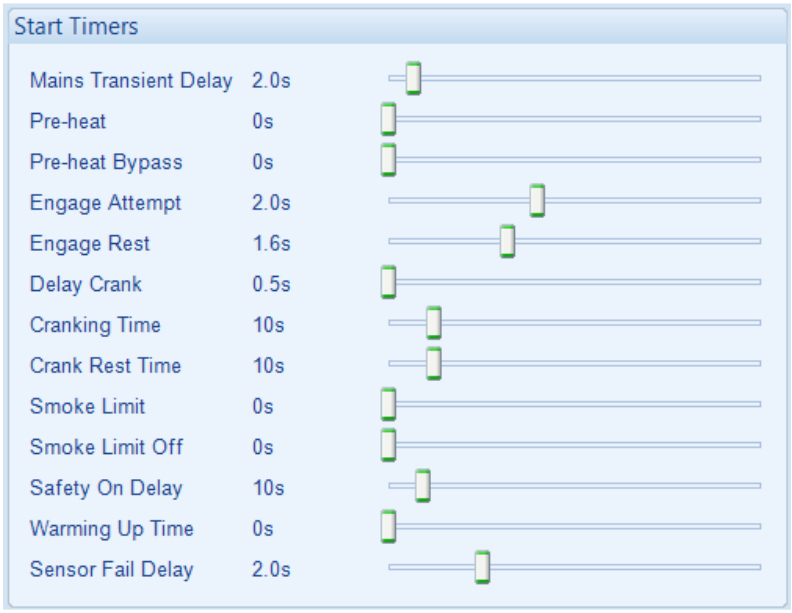


Click and drag to change the setting.
Timers increment in steps of 1 second up to one minute, then in steps of 30 seconds up to 30 minutes, then in steps of 30 minutes thereafter (where allowed by the limits of the timer).

4.6.1 START TIMERS



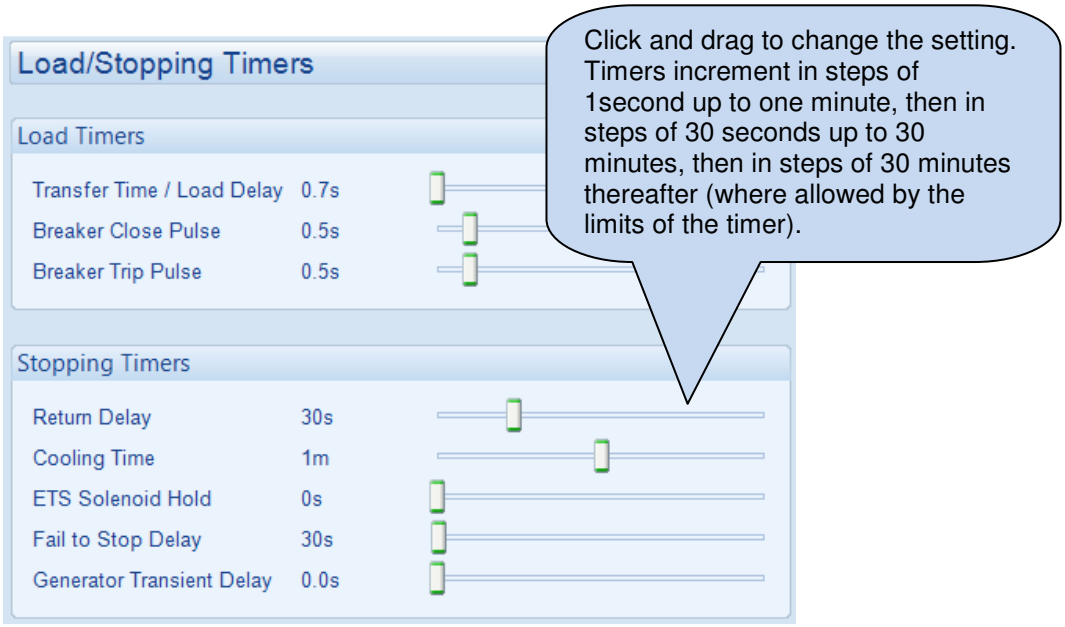
Timer	Description
Remote Start Off Load Remote Start On Load Mains fail Telemetry Start	Used to give a delay before starting in AUTO mode. This timer is activated upon the respective start command being issued. Typically this timer is applied to prevent starting upon fleeting remote start signals or short term mains failures.



Parameters detailed overleaf...

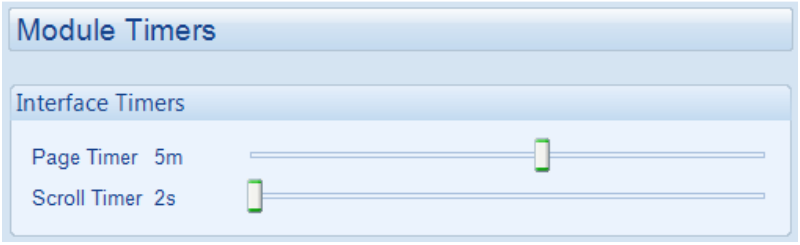
Timer	Description
Pre-heat	Give a 'pre start' time during which the *Preheat* output and *Starting alarm* becomes active (if configured)
Pre-heat bypass	Should the set be stopped, the *Pre-heat* bypass timer begins. Should the set be called to start again, before the timer expires, the pre-heat sequence is bypassed as heating is not required since the set is still warm after the last run.
Cranking time	The length of each crank attempt
Crank rest time	The time between multiple crank attempts.
Engage Attempt time	**(Only available if using Magnetic pick-up and multiple engage attempts)** This timer dictates the duration that the module attempts to engage the starter motor during each engage attempt. If the Magnetic Pick-up is not detecting movement of the flywheel when this timer expires, the engage attempt terminates. Once all engage attempts have been made, the next start attempt begins.
Engage Rest Time	**(Only available if using Magnetic pick-up and multiple engage attempts)** This timer dictates the duration that the module waits between attempts to engage to starter.
Delay Crank	This is the difference in time when the fuel relay energises and the crank relay energises.
Smoke limit	The amount of time that the engine is requested to run at *idle* speed upon starting. This is typically used to limit emissions at start up.
Smoke limit off	This should be set to a little longer than the amount of time that the set takes to run up to rated speed after removal of the command to run at *idle* speed. If this time is too short, the set could be stopped due to *under speed* failure. If the time is too long, *under speed* protection is disabled until the *Smoke limit time off* time has expired.
Safety on delay	The amount of time at start up that the controller ignores oil pressure, engine speed, alternator voltage and other *delayed* alarms. This is used to allow the engine to run up to speed before protections are activated.
Warming up time	The amount of time that the set runs BEFORE being allowed to take load. This is used to warm the engine to prevent excessive wear.
Sensor fail delay	**(Only available if using Magnetic pick-up)** This is only used if magnetic pick speed sensing is selected. Once cranking has commenced the module must receive a speed signal within this time. If no signal is present, the engine stops and a Loss of Speed Sensing alarm given.

4.6.2 LOAD / STOPPING TIMERS



Timer	Description
Transfer time/ Load Delay	This timer has two functions 1: The time between the mains load switch being opened and the generator load switch being closed (and vice versa). 2. The time between the Load Shed Control outputs (if configured) being energised and the generator being placed on load (at start up).
Breaker close pulse	The amount of time that *Breaker Close Pulse* signals is present when the request to close a breaker is given.
Breaker Trip pulse	The amount of time that *Breaker Open Pulse* signals is present when the request to open a breaker is given.
Return delay	A delay, used in auto mode only, that allows for short term removal of the request to stop the set before action is taken. This is usually used to ensure the set remains on load before accepting that the start request has been removed.
Cooling time	The amount of time that the set 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.
ETS Solenoid hold	The amount of time the *Energise to stop* solenoid is kept energised after the engine has come to rest. This is used to ensure the set has fully stopped before removal of the stop solenoid control signal.
Fail to stop delay	If the set is called to stop and is still running after the *fail to stop* delay, a *Fail to Stop* alarm is generated.
Generator transient delay	Used to delay the generator under/over volts/frequency alarms. Typically this is used to prevent spurious shutdown alarms caused by large changes in load levels.

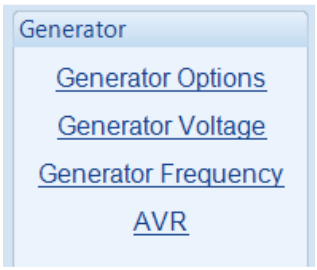
4.6.3 MODULE TIMERS



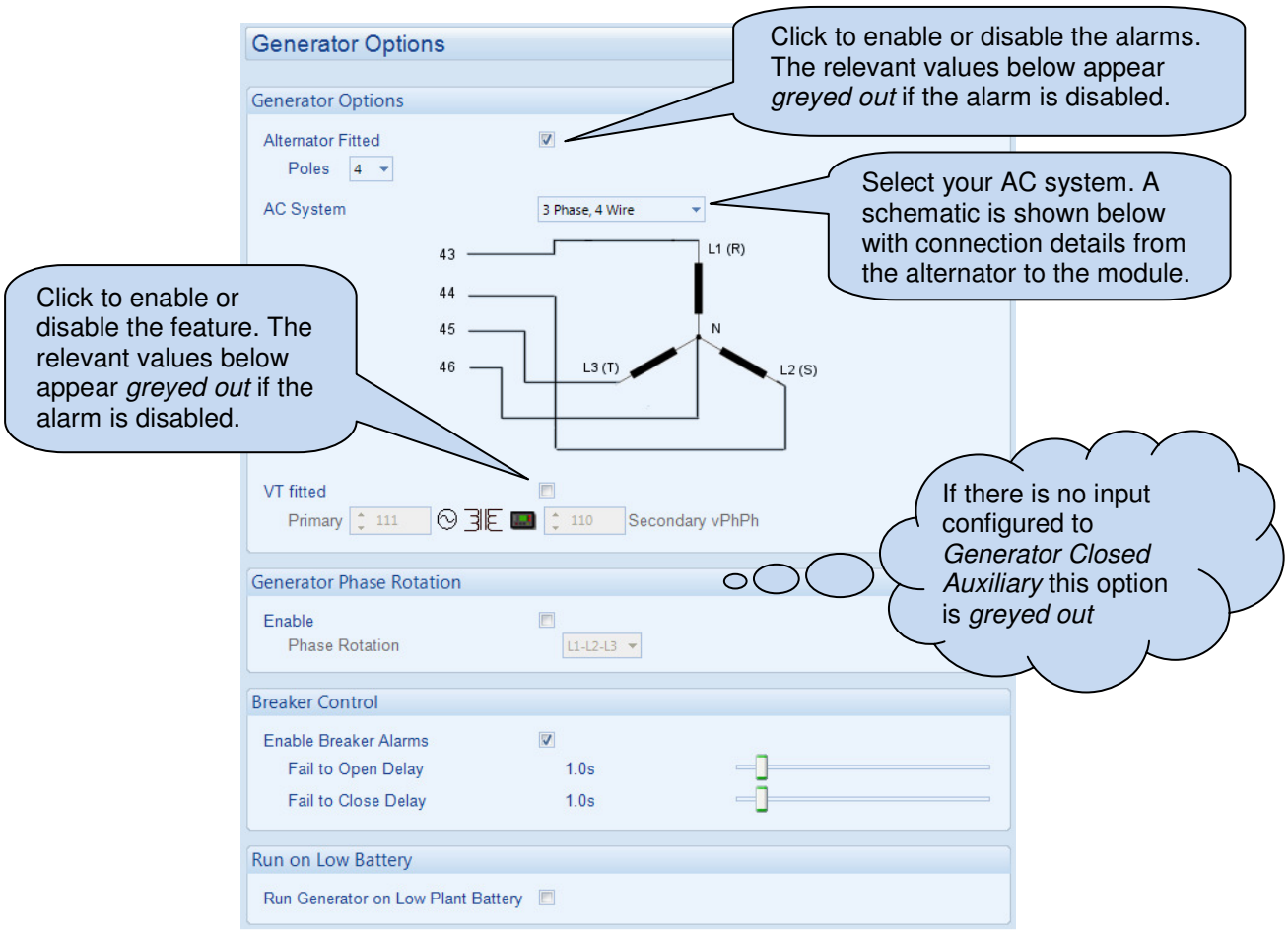
Timer	Description
LCD Page timer	If the module is left unattended for the duration of the *LCD Page Timer* it reverts to show the *Status* page.
LCD Scroll Timer	The scroll time between parameters on a selected page

4.7 GENERATOR

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



4.7.1 GENERATOR OPTIONS



These parameters are described overleaf...

Parameter	Description
Alternator fitted	☐ = There is no alternator in the system, it is an *engine only* application ☑ = An alternator is fitted to the engine, it is a generator application.
Poles	The number of poles on the alternator
VT Fitted	☐ = The voltage sensing to the controller is direct from the alternator ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the generated voltage to be within the controller voltage specification. By entering the *Primary* and *Secondary* voltages of the transformer, the controller displays the *Primary* voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (ie 11kV) also used on systems such as 600V ph-ph.

4.7.1.1 GENERATOR PHASE ROTATION

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

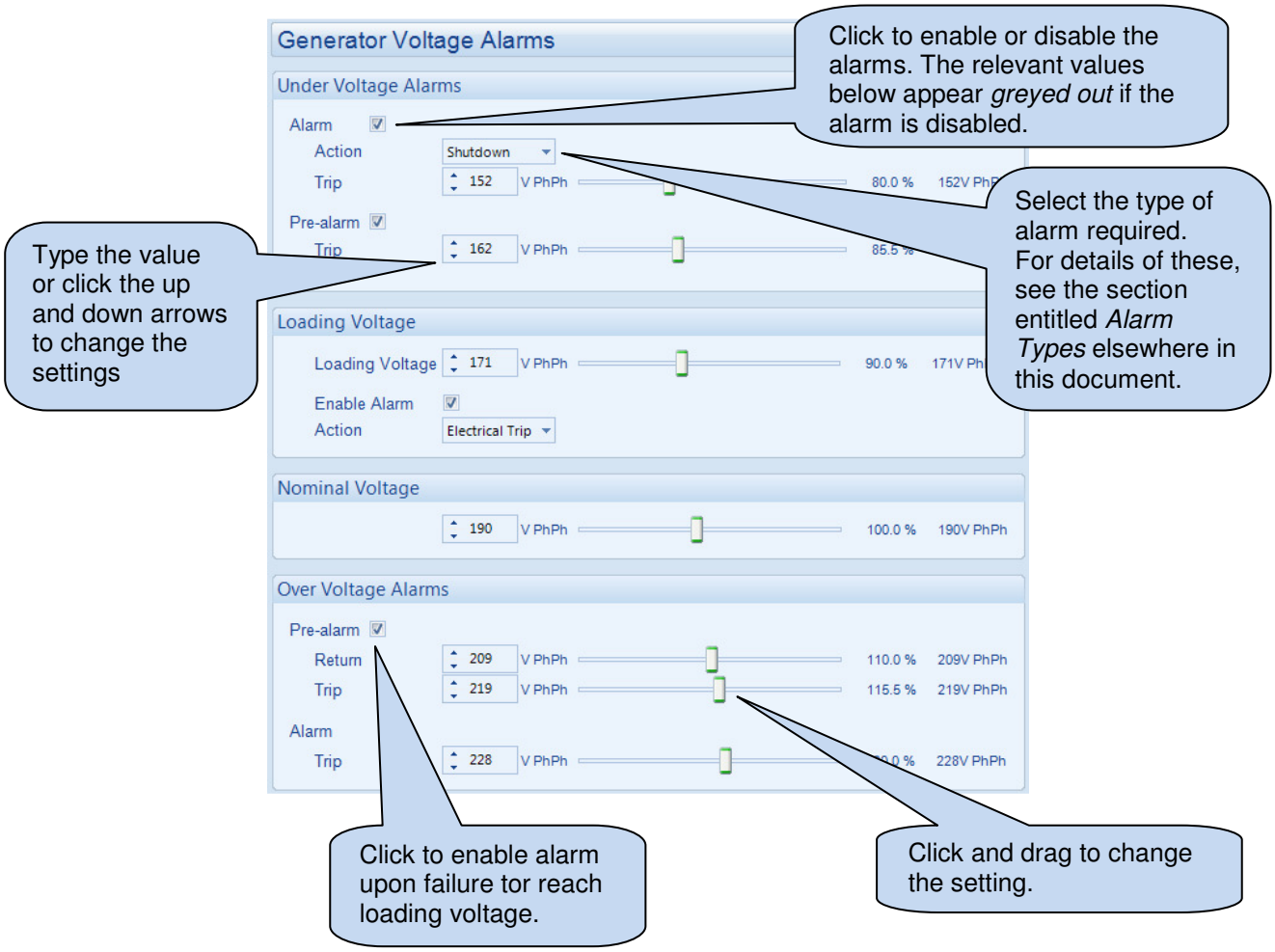
4.7.1.2 GENERATOR BREAKER CONTROL

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

4.7.1.3 RUN ON LOW PLANT BATTERY

Parameter	Description
Run on Low Plant Battery	☐ = Generator does not start on low Plant battery Voltage ☑ = Generator does start on low Plant battery Voltage

4.7.2 GENERATOR VOLTAGE ALARMS



4.7.2.1 UNDER VOLTAGE ALARMS

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

4.7.2.2 LOADING VOLTAGE

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

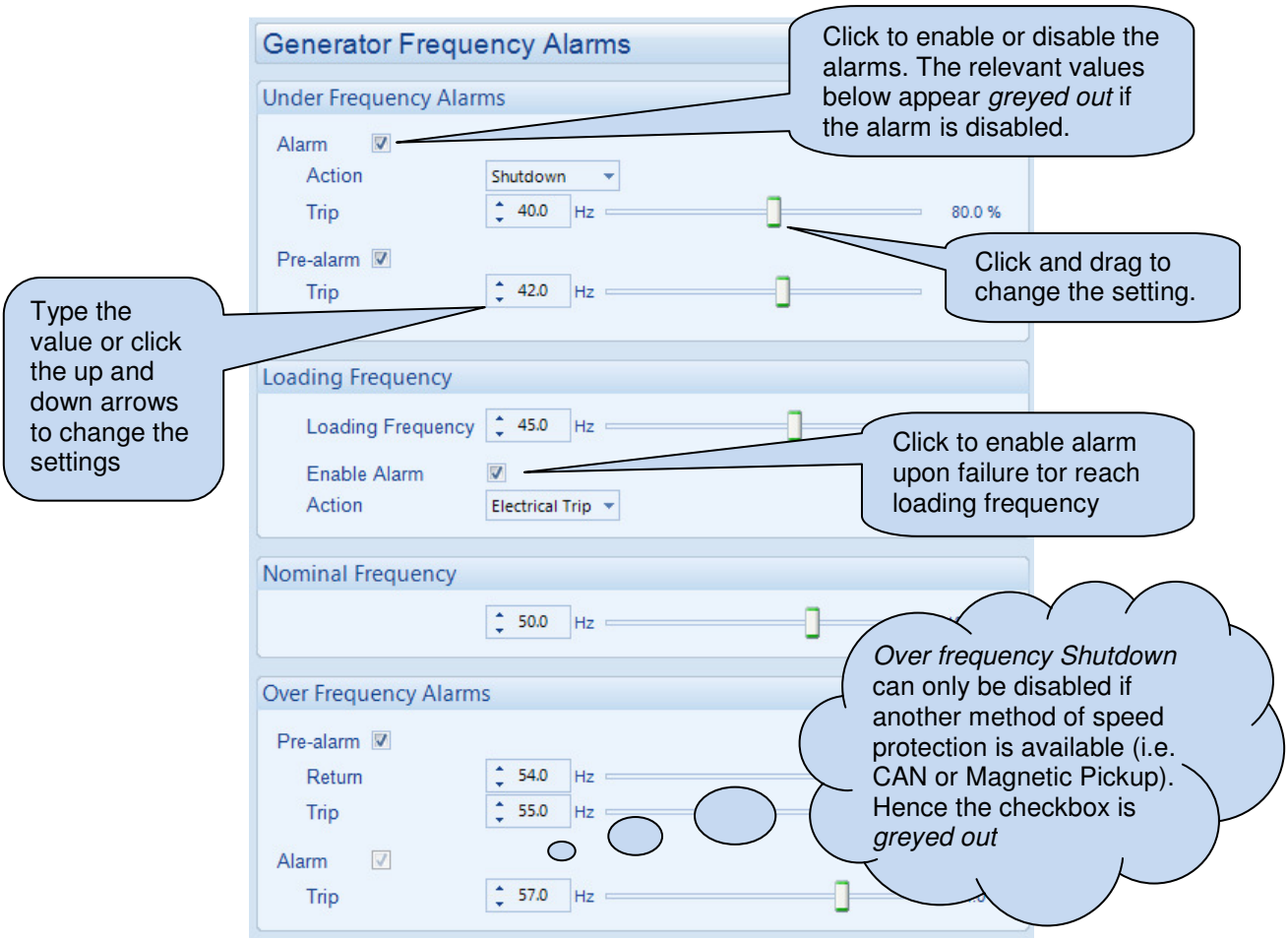
4.7.2.3 NOMINAL VOLTAGE

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

4.7.2.4 OVER VOLTAGE ALARMS

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

4.7.3 GENERATOR FREQUENCY ALARMS



4.7.3.1 UNDER FREQUENCY ALARMS

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

4.7.3.2 LOADING FREQUENCY

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

4.7.3.3 NOMINAL FREQUENCY

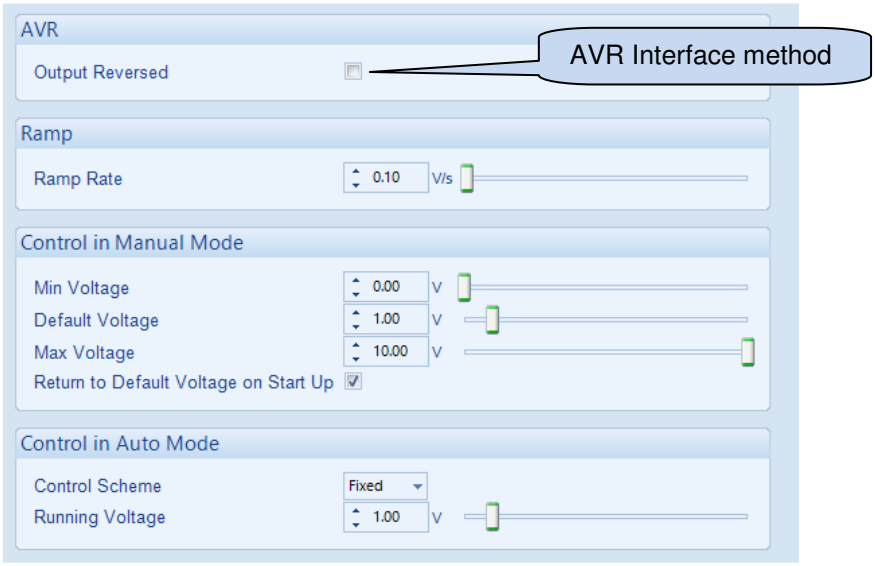
Parameter	Description
Nominal Frequency	This is used to calculate the percentages of the alarm setpoints.

4.7.3.4 OVER FREQUENCY ALARMS

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

4.7.4 AVR

These settings configure the method of interface between the DSE7450 controller and the Automatic Voltage Regulator (AVR)



Parameter	Description
AVR Output Reversed	Defines the voltage range of the *AVR Analogue Output*: ☐ = ***0 V to 10 V*** ☑ = ***-10 V to 0V***
Ramp Rate	The rate at which the DSE AVR analogue output changes to drive the AVR.

Control in Manual Mode

The default voltage control range is 0 – 10 volts, *Control in Manual Mode* configuration allows the user to limit the SW1 range if required by setting the minimum voltage and maximum voltage levels of the AVR analogue output votlage.

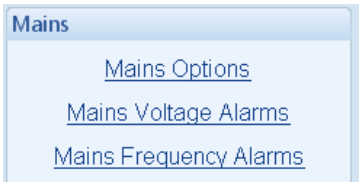
Parameter	Description
Min Voltage	**NOTE: This limits the AVR analogue output voltage in both *Manual* control scheme, *Fixed* control scheme.** The lowest voltage level SW1 provides, decreasing SW1 below this level does not allow the SW1 or AVR analogue output to drop any further.
Default Voltage	This defines the AVR analogue voltage output at startup in Manual mode and in Auto mode when *Manual* control scheme is selected.
Max Voltage	The highest voltage level SW1 reaches, increasing SW1 above this level does not allow the SW1 or AVR analogue output to increase any further.
Return to Default Voltage on Start Up	☐ = At startup, the AVR analogue voltage output is defined by the SW1 setting. ☑ = At startup, SW1 and the AVR analogue voltage output reverts to the *Default Voltage* setting.

Control in Auto Mode

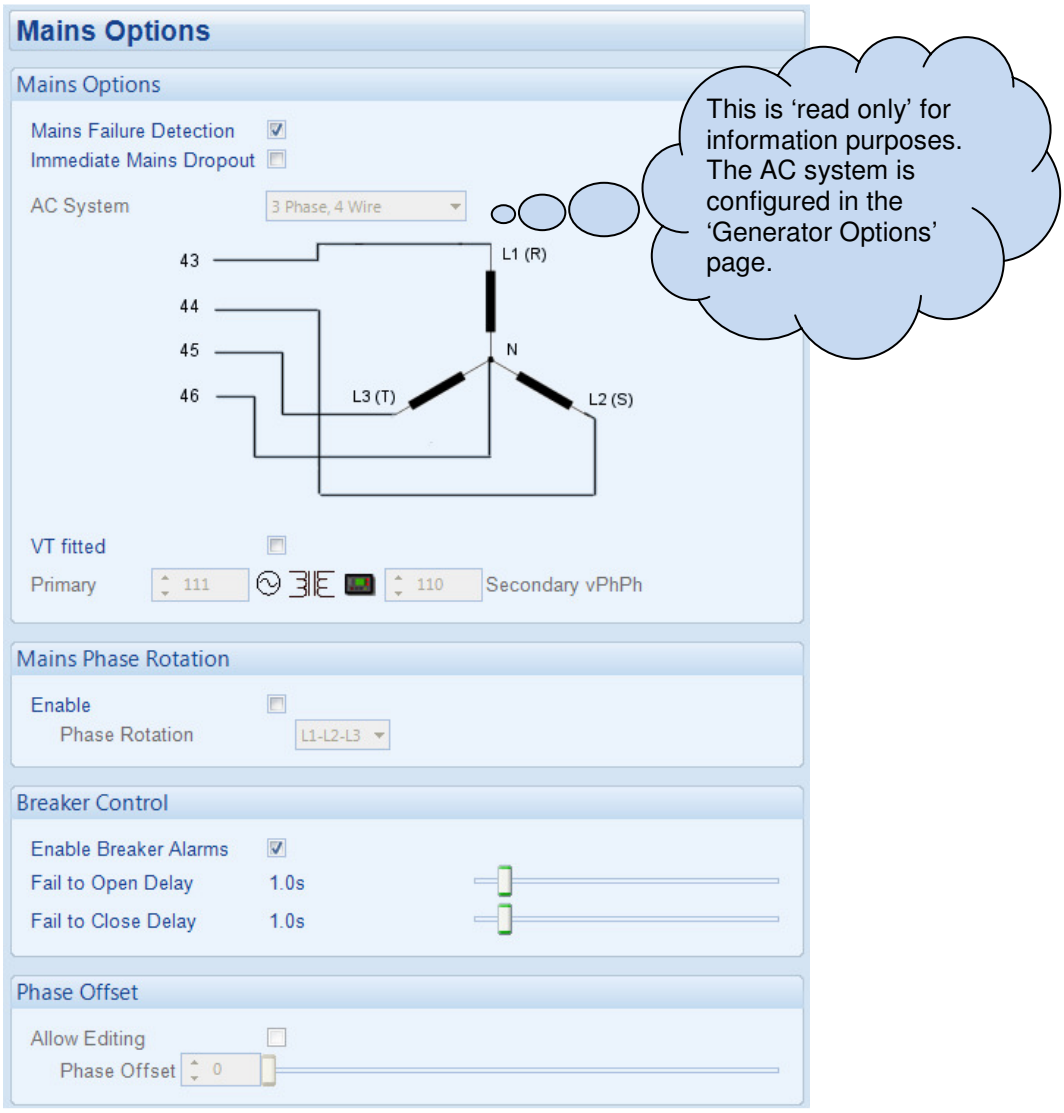
Parameter	Description
Control Scheme	This defines the voltage control scheme when running in Auto mode: **Fixed** – The AVR analogue voltage output is constantly held at the *Running Voltage* level. **Manual** – The module behaves the same as in Manual Mode
Running Voltage	The AVR analogue output voltage that is provided when the *Control Scheme* is configured to *Fixed.*

4.8 MAINS

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

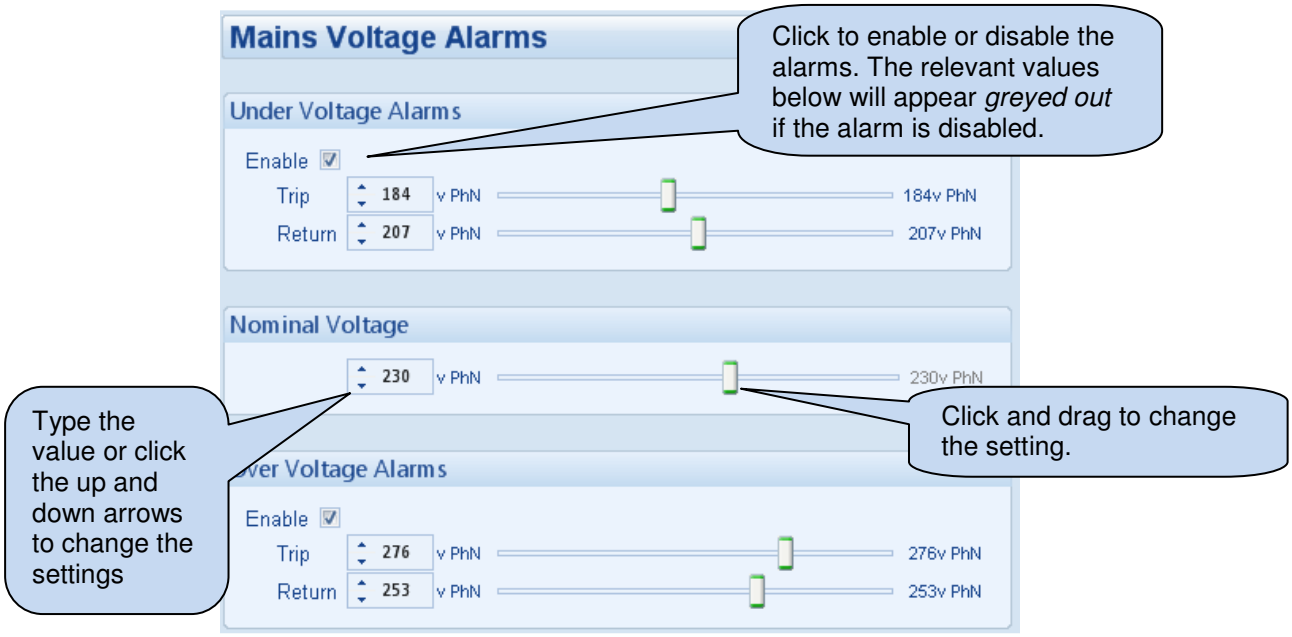


4.8.1 MAINS OPTIONS



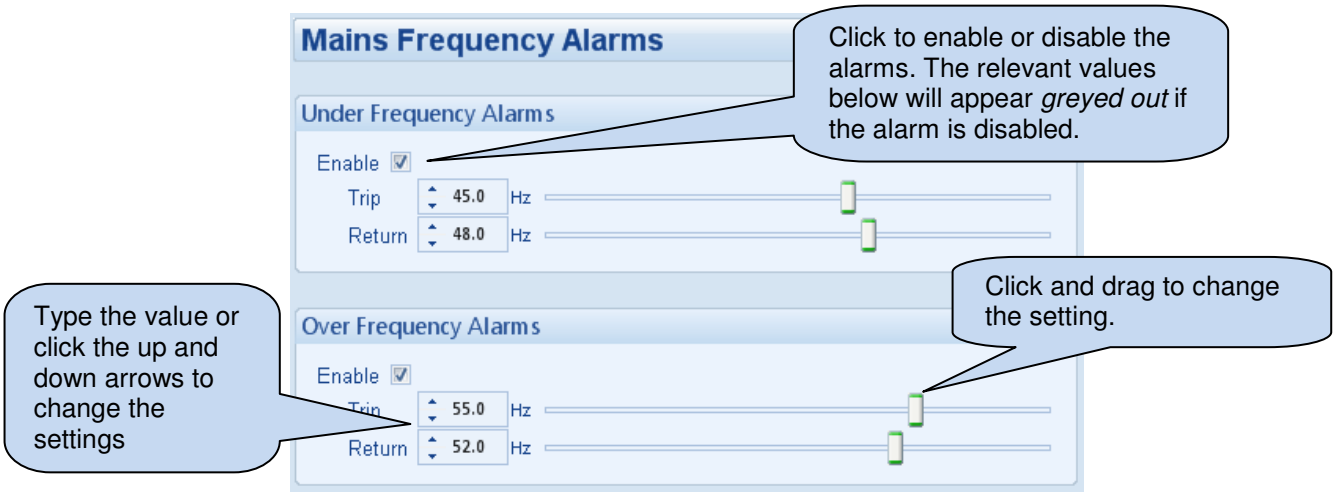
Parameter	Description
AC System	These settings are used to detail the type of AC system to which the module is connected: 3 phase 4 wire, 1 phase 2 wire, 2 phase 3 wire – L1-L2, 2 phase 3 wire – L1-L3, 3 phase 3 wire, 3 phase 4 wire delta This list is not exhaustive. DSE reserve the right to add to this list as part of our policy of continual development
Mains Phase Rotation IEEE 37.2 – 47 phase sequence relay	☐ = Mains phase rotation is not checked. ☑ = A 'mains failure' situation is generated if the phase rotation is not as configured.
Breaker Control	Timer before the fail to close alarm is activated
VT Fitted	☐ = The voltage sensing to the controller is direct from the mains ☑ = The voltage sensing to the controller is via Voltage Transformers (VTs or PTs) This is used to step down the supplied voltage to be within the modules controller voltage specification. By entering the Primary and Secondary voltages of the transformer, the controller displays the Primary voltage rather than the actual measured voltage. This is typically used to interface the DSE module to high voltage systems (ie 11kV) also used on systems such as 600V ph-ph.
Phase Offset	When using VTs this allows to set a phase offset to the mains.

4.8.2 MAINS VOLTAGE ALARMS



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

4.8.3 MAINS FREQUENCY ALARMS

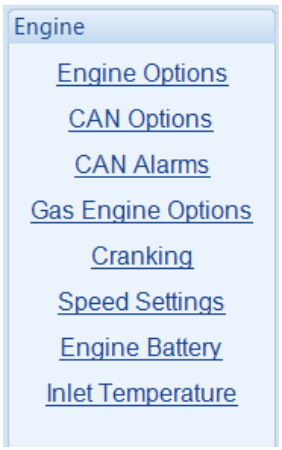


Parameters described overleaf...

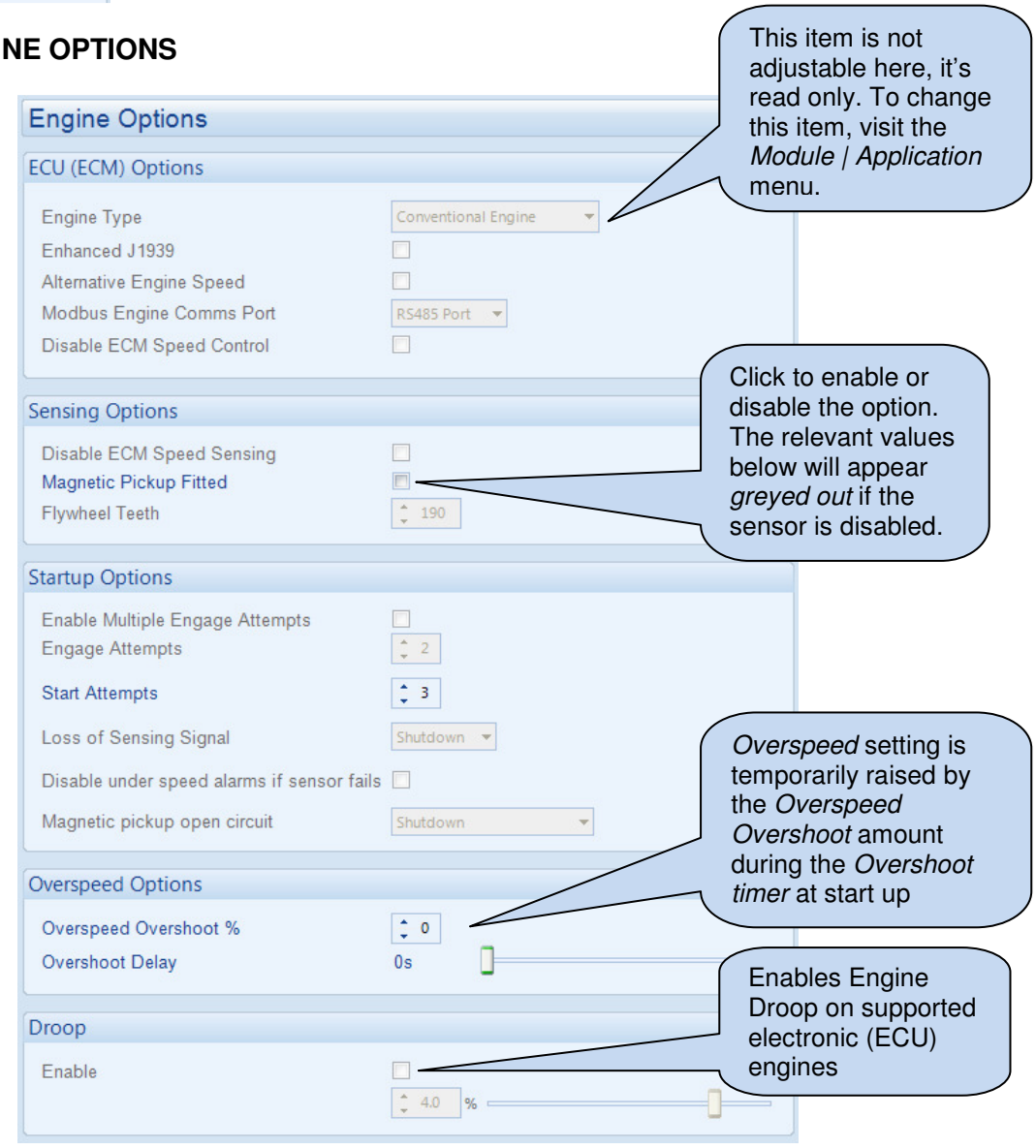
Alarm	IEEE designation
Mains Under Frequency IEEE 37.2 – 81 Frequency Relay 	☐ = Mains Under Frequency detection is disabled ☑ = Mains Under Frequency gives an alarm in the event of the mains frequency falling below the configured *Under Frequency Trip* value. The *Under Frequency Trip* value is adjustable 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.

4.9 ENGINE

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



4.9.1 ENGINE OPTIONS



Parameters detailed overleaf...

4.9.1.1 SENSING OPTIONS

Parameter	Description
Disable ECM Speed Sensing	☐ = An ECM is fitted to the DSE module and being used for speed sensing. ☑ = An ECM is fitted to the DSE module but another form of speed sensing fitted to the DSE module is being used.
Magnetic pickup fitted	☐ = Magnetic pickup device is not fitted to the DSE module. ☑ = A low impedance magnetic pickup device is fitted to the DSE module to measure engine speed. Specifications of the DSE module Magnetic Pickup Input are contained within the Operators manual
Flywheel teeth	The number of teeth on the engine flywheel. This is read by the magnetic pickup device.

4.9.1.2 STARTUP OPTIONS

Parameter	Description
Enable Multiple Engage Attempts	☐ = Only one engage attempt per start attempt is given. If no magnetic pickup pulses are detected during cranking, the *Loss of Sensing* alarm is given. ☑ = If no magnetic pickup pulses are detected during cranking, it is assumed that the starter has not engaged to turn the engine. The starter is withdrawn and re-energised for the configured number of *Engage Attempts*
Start Attempts	The number of starting attempts the module 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.
Loss of sensing signal	If the speed sensing signal is lost during engine running (or not present during cranking when *Multiple Engage Attempts* is enabled), an alarm is generated : *Shutdown:* The generator is removed from load and the set is immediately stopped. *Warning:* The generator continues to run, however a warning alarm is raised.
Disable under speed alarms if sensor fails	☐ = Under speed alarms activate even if speed sensor has failed. ☑ = Under speed alarms are disabled when the speed sensor fails.
Magnetic Pickup Open Circuit	If the magnetic pickup device is not detected, an alarm is generated : *Shutdown:* The generator is removed from load and the set is immediately stopped. *Warning:* The generator continues to run, however a warning alarm is raised.

4.9.1.3 OVERSPEED OPTIONS

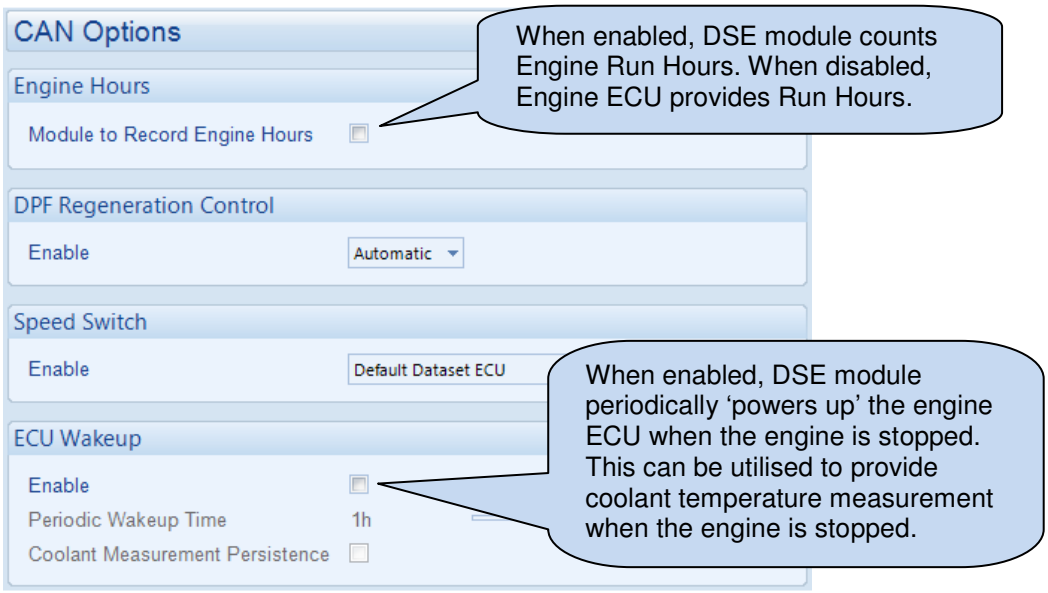
Parameter	Description
Overspeed overshoot % Overspeed overshoot delay	To prevent spurious overspeed alarms at engine start up, the module includes configurable *overspeed overshoot* protection. This allows the engine speed to 'overshoot' the Overspeed / Over frequency setting during the starting process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

4.9.1.4 DROOP

NOTE: Droop options are available only where supported by the Engine ECU over the CAN or Modbus datalink. Contact engine manufacturer for further details.

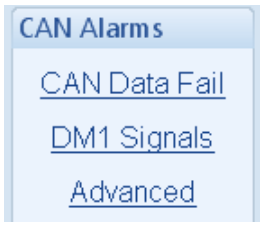
Parameter	Description
Enable Droop %	☐ = Engine droop is not enabled. ☑ = Where supported by the electronic engine ECU, the module enables droop in the engine ECU governor at the %age configured.

4.9.1.5 CAN OPTIONS

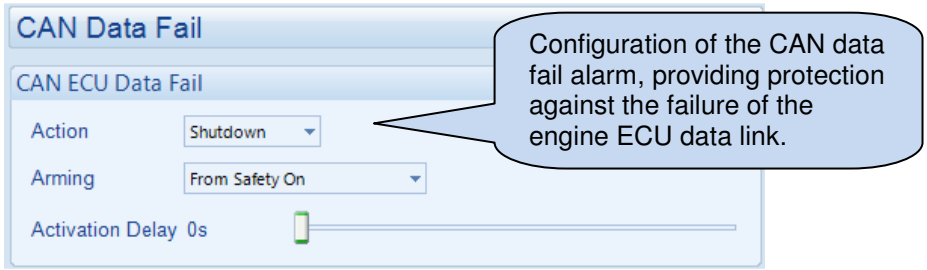


4.9.2 CAN ALARMS

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

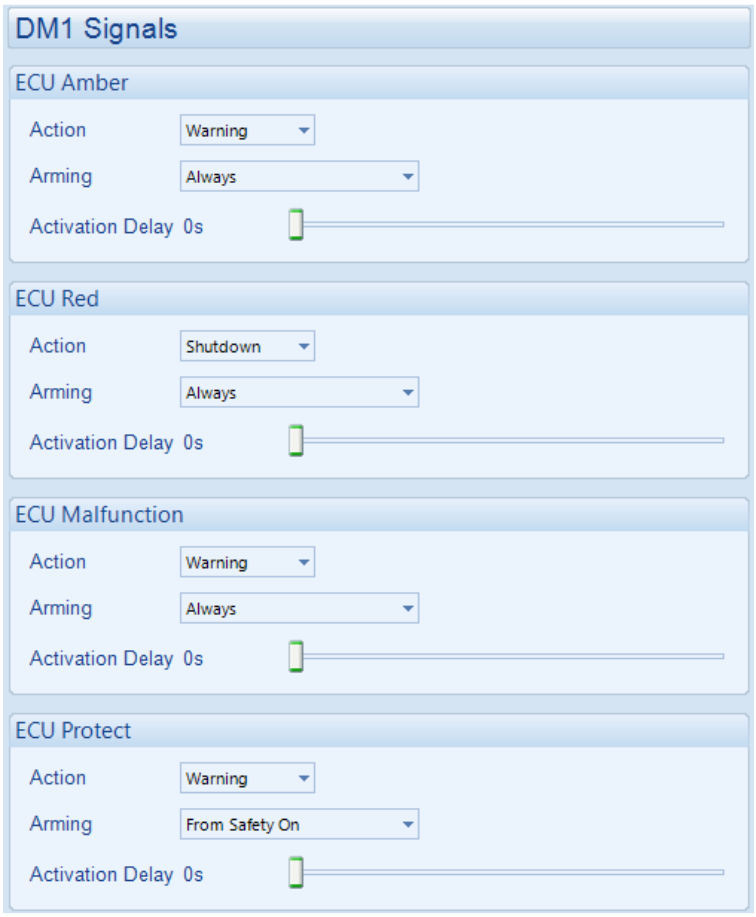


4.9.2.1 CAN DATA FAIL



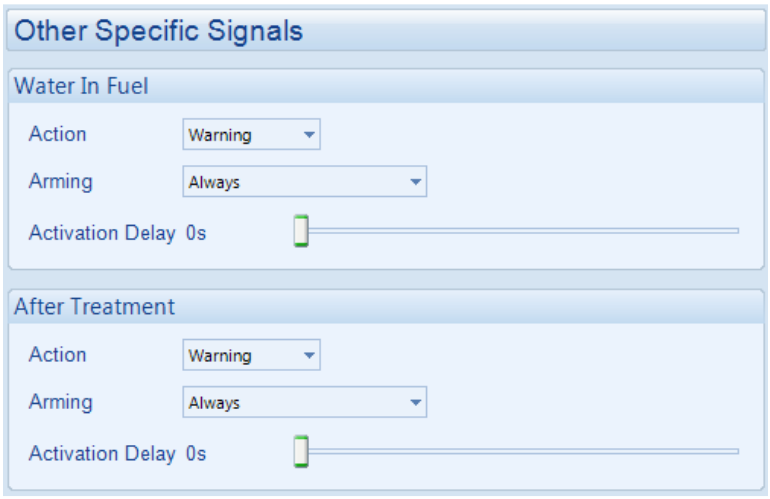
4.9.2.2 DM1 SIGNALS

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

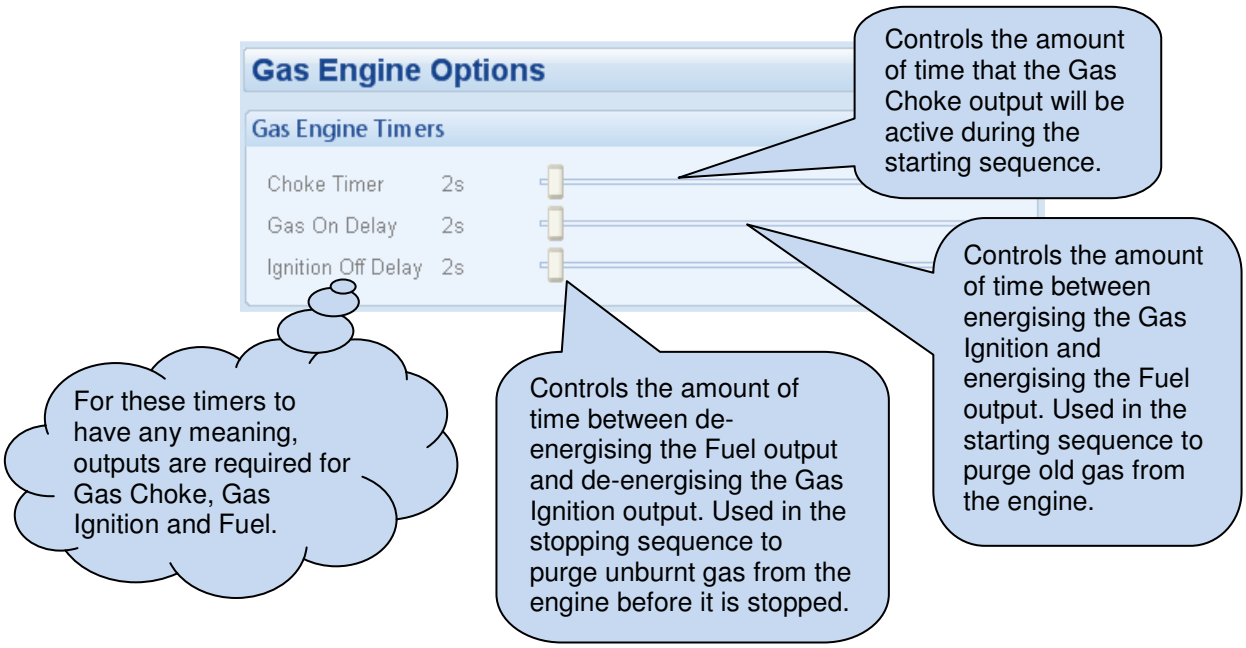


4.9.2.3 ADVANCED

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



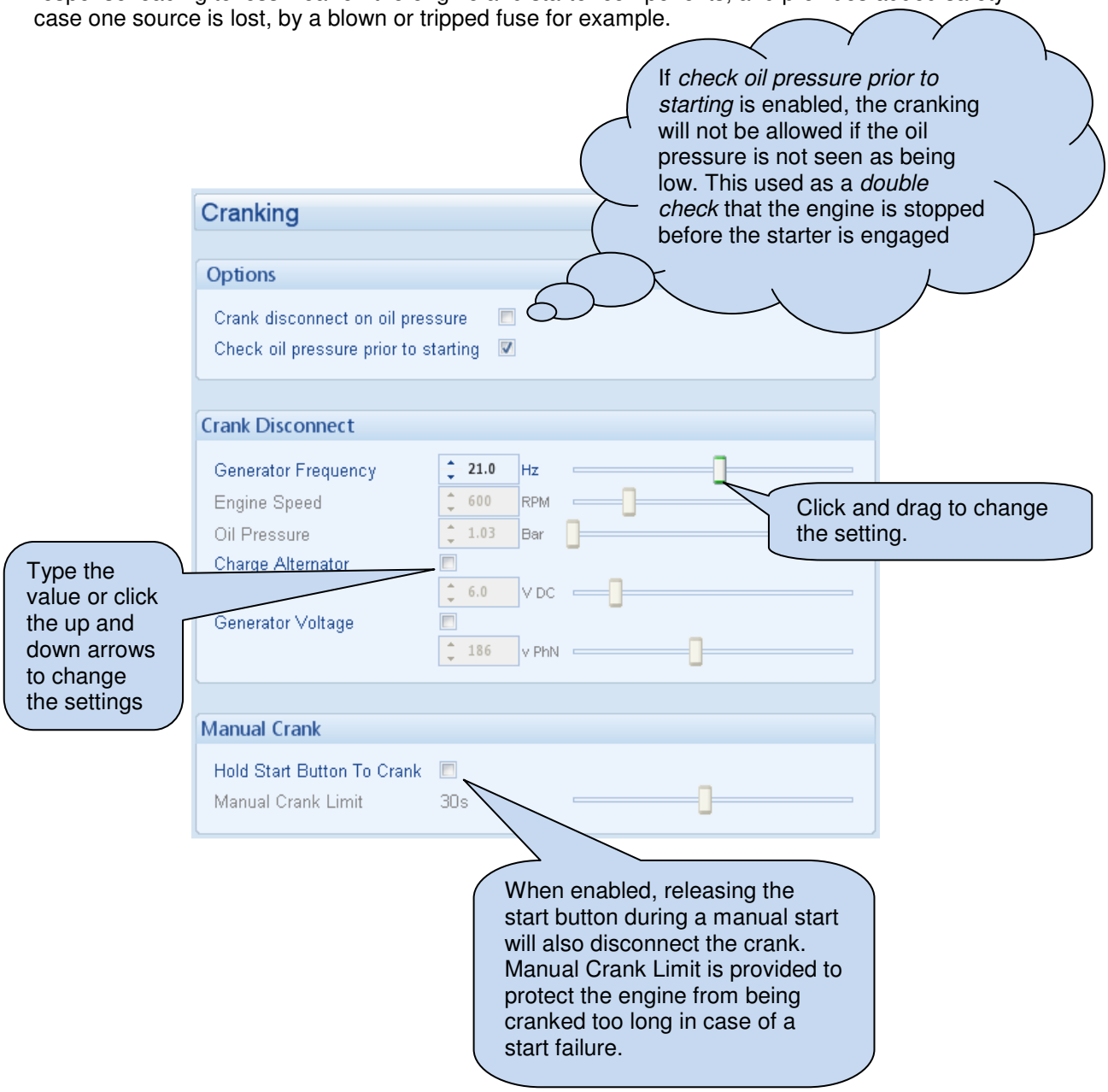
4.9.4 GAS ENGINE OPTIONS



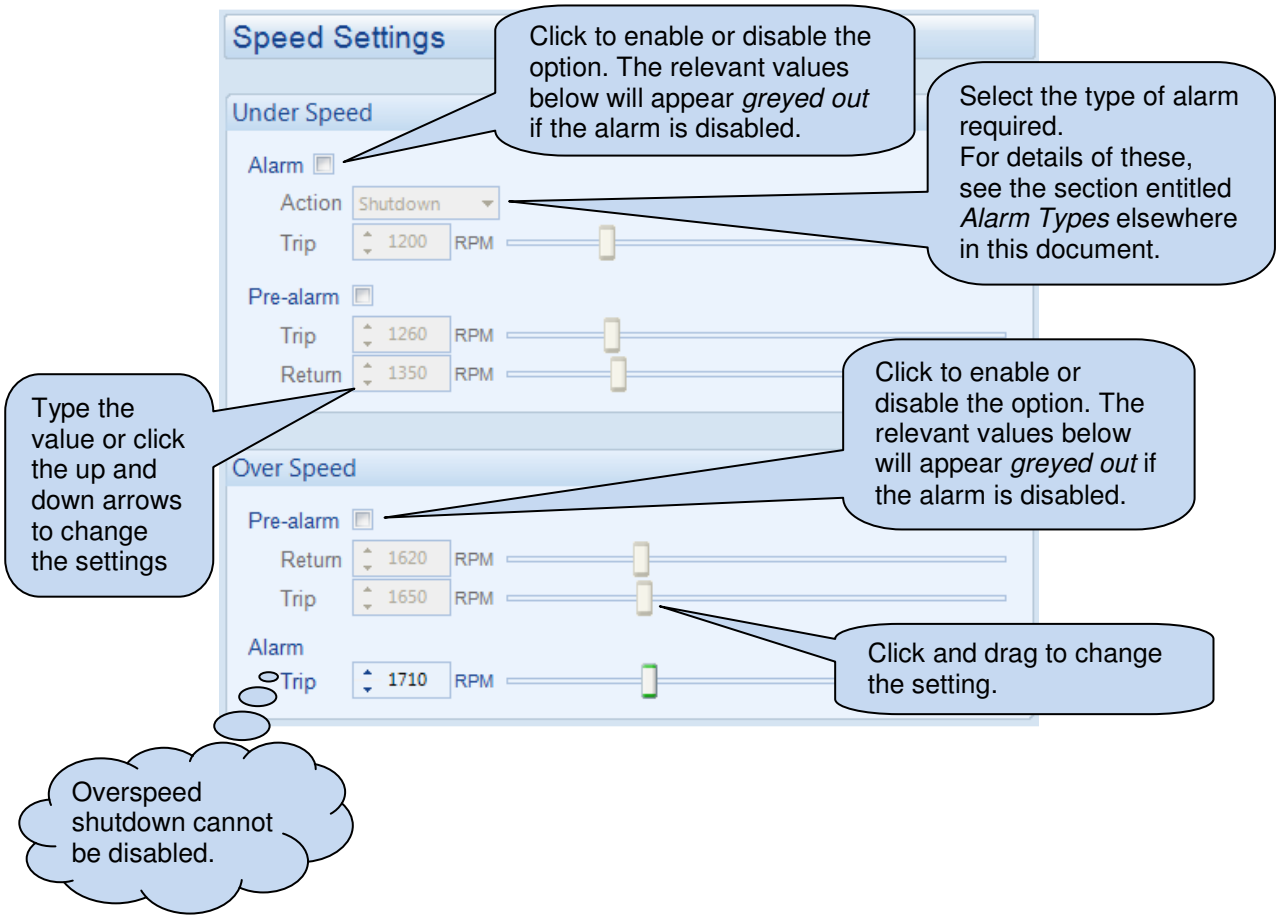
4.9.5 CRANKING

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



4.9.6 SPEED SETTINGS



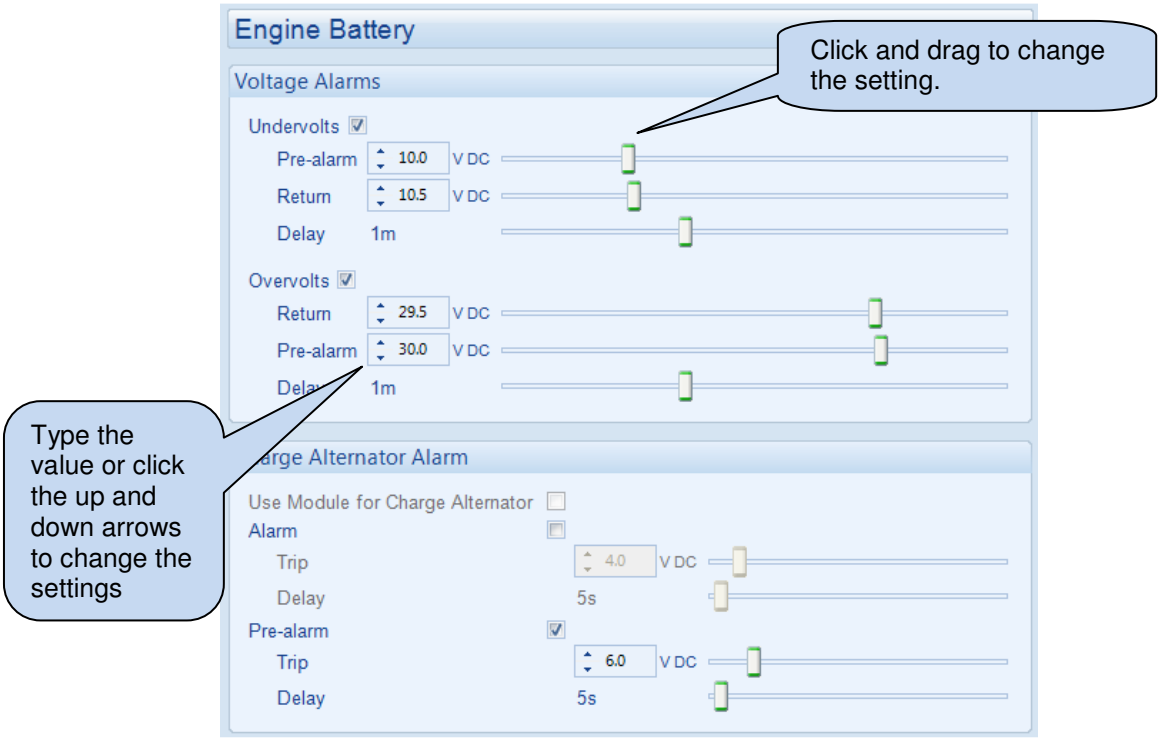
4.9.6.1 UNDER SPEED

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

4.9.6.2 OVER SPEED

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

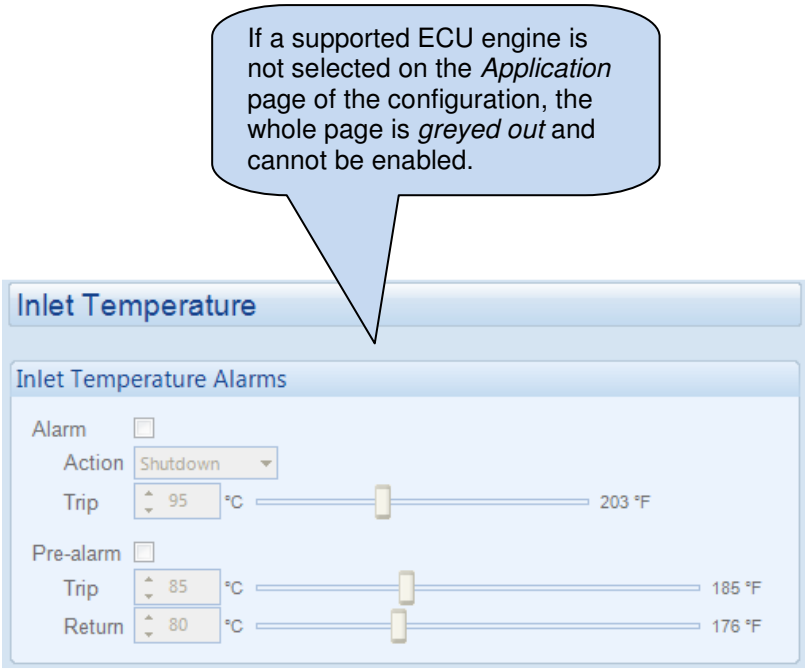
4.9.7 ENGINE BATTERY



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

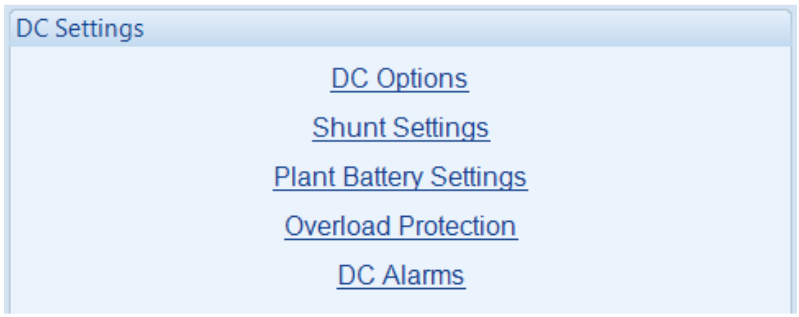
4.9.8 INLET TEMPERATURE

Provides inlet temperature alarms when the module is used in conjunction with electronic (ECU) engines that support the reading of inlet temperature.



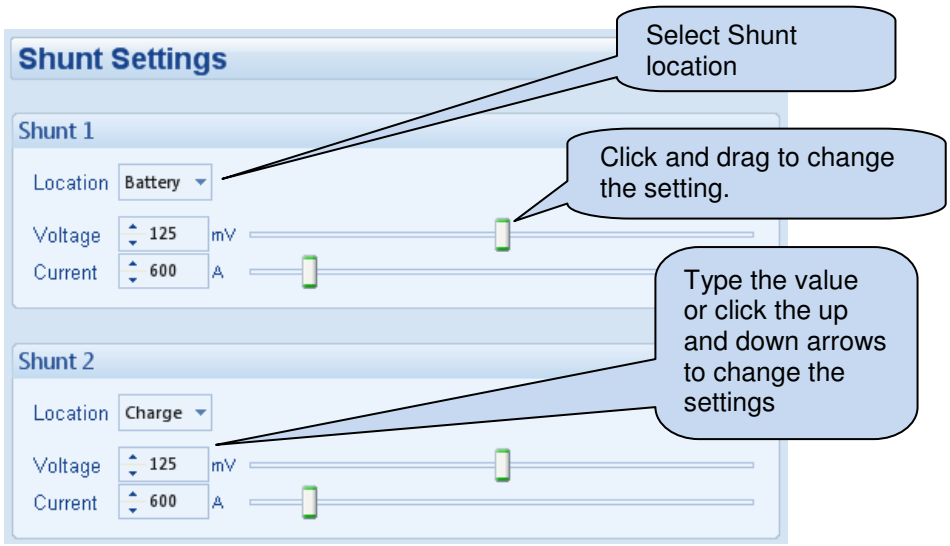
4.10 DC SETTINGS

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



4.10.1 DC OPTIONS

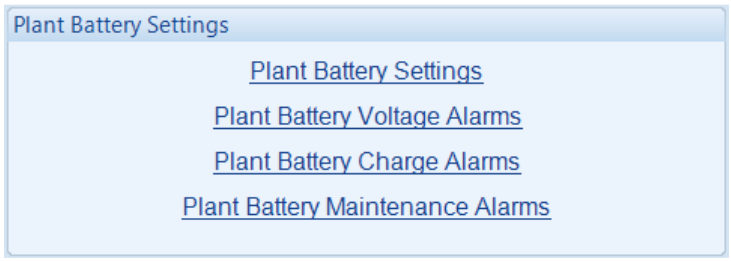
4.10.2 SHUNT SETTINGS



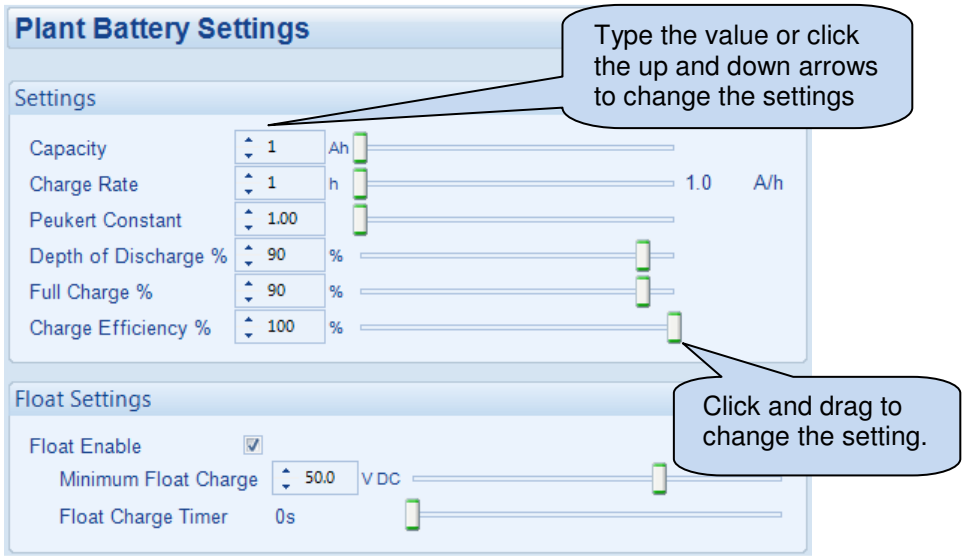
Parameter	Description
Location	**Battery:** The Shunt is located between the DC bus and the battery. **Charge:** The Shunt is located on the incoming DC bus. **Load:** The Shunt is located between the DC bus and the load.
Voltage	The shunt voltage rating in millivolts.
Current	The shunt current rating.

4.11 PLANT BATTERY SETTINGS

The *Plant Battery Settings* page is subdivided into smaller sections.
Select the required section with the mouse.

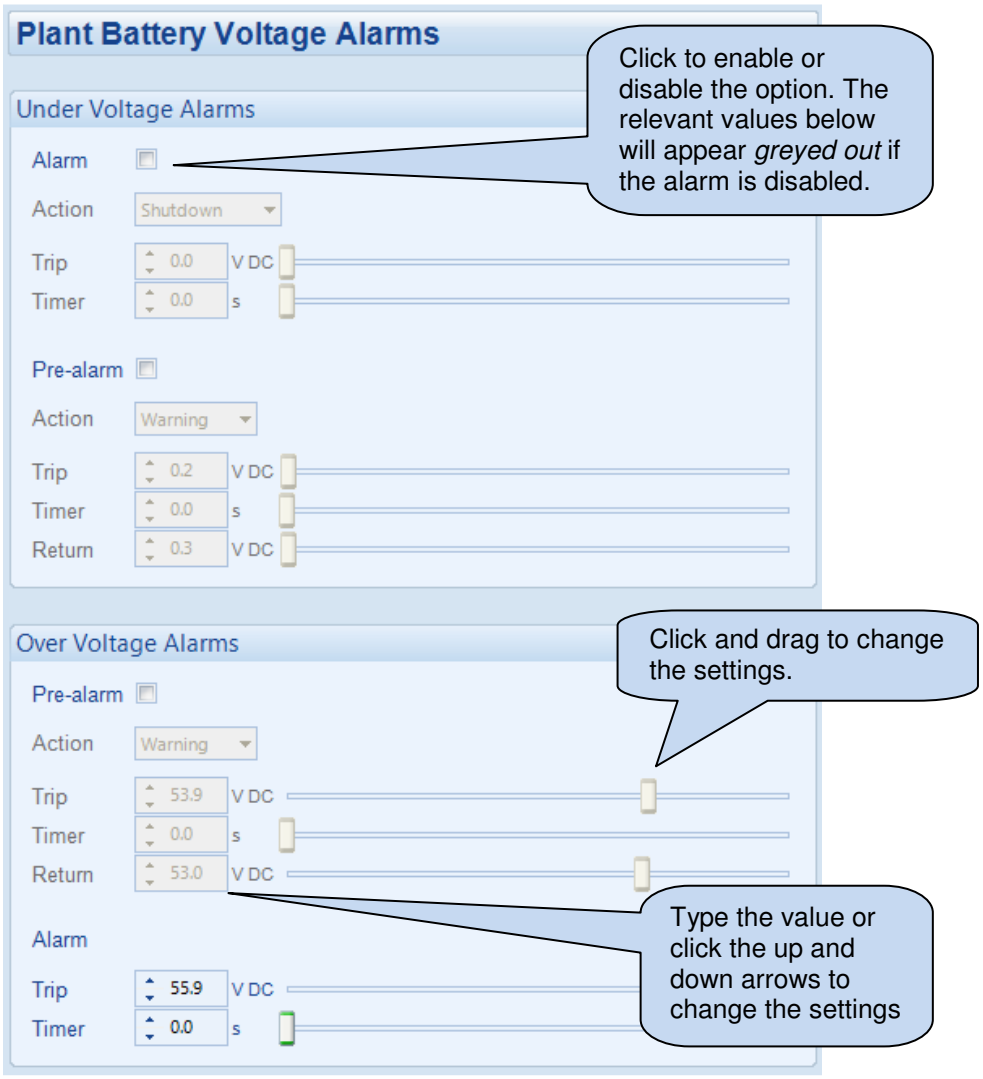


4.11.1.1 PLANT BATTERY SETTINGS



Settings	Description
Capacity	Ampere hour rating of the battery.
Charge Rate	The rate setting for charging the Plant battery,
Peukert Constant	See Charging Scheme Information elsewhere in this manual
Depth Of Discharge%	This is the percentage the battery discharges before the battery starts to start to charge.
Full Charge %	The percentage the Plant battery charges to before float charge.
Charge Efficiency %	Charge efficiency percentage of the *Plant Battery*. This parameter is useful for some *Plant Battery* types which do not support float charging. It is used to accommodate inefficiencies during charging. The charging current applied to the Plant Battery recorded in the DSE7450, is reduced by the *Charge Efficiency %*. This applies only when charging the Plant Battery. During Plant Battery discharge, the Charge Efficiency % is NOT used, therefore the Battery Discharge % recorded by the DSE7450 is the true discharge level.
Float Enable	☐ = Float charge is disabled ☑ = Float charge is enabled
Minimum Float Charge	Setting of the float Voltage charge level
Float Charge Timer	Time the float charge continues after reaching the full charge percentage of the plant battery.

4.11.1.2 PLANT BATTERY VOLTAGE

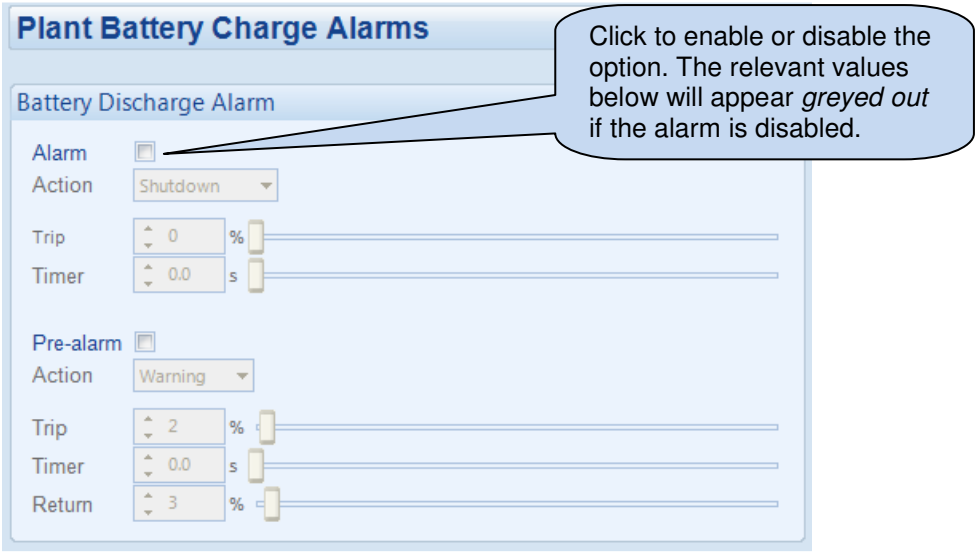


Parameter	Description
Plant Battery Under Voltage Alarm	☐ = Plant BatteryUnder Volts does NOT give an alarm ☑ = Plant Battery Under Volts gives an alarm in the event of the Plant Battery voltage falls below the configured *Under Volts Alarm Trip* value for longer than theconfigured *Timer*. The *DC Undervolts Alarm Trip* value is adjustable to suit user requirements.
Action	Select the type of alarm required from the list: ***Shutdown*** ***Electrical Trip*** For details of these, see the section entitled *Alarm Types* elsewhere in this document.
Plant Battery Under Voltage Pre-Alarm	☐ = Plant Battery Under Volts does NOT give a warning alarm ☑ = Plant Battery Under Volts gives a warning alarm in the event of the Plant Battery voltage falls below the configured *Under Volts Pre-Alarm Trip* value for longer than the configured *Timer*. The *DC Undervolts Pre-Alarm Trip* value is adjustable to suit user requirements. The *Warning* is automatically reset when the Plant Battery voltage rises above the configured *Return* level.

Parameters are continued overleaf…

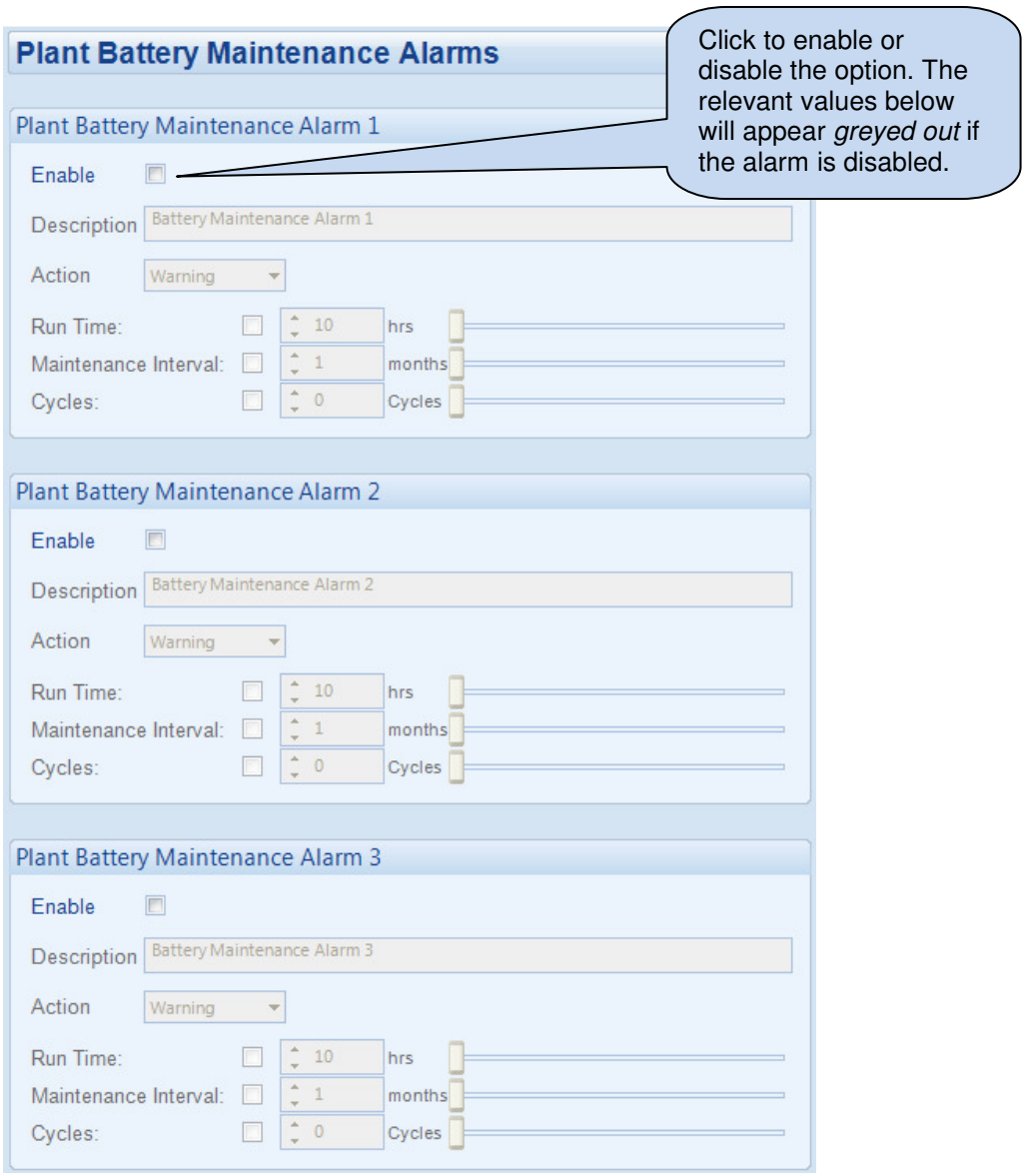
Parameter	Description
Plant Battery Over Voltage Pre-Alarm	☐ = Plant Battery Over Volts does NOT give a warning alarm ☑ = Plant Battery Over Volts gives a warning alarm in the event of the Plant Battery voltage falls below the configured *Over Volts Pre-Alarm Trip* value for longer than the configured *Timer*. The *DC Overvolts Pre-Alarm Trip* value is adjustable to suit user requirements. The *Warning* is automatically reset when the Plant Battery voltage falls below the configured *Return* level.
Plant Battery Over Voltage Alarm	☐ = Plant Battery Over Volts does NOT give an alarm ☑ = Plant Battery Over Volts gives an alarm in the event of the Plant Battery voltage falls below the configured *Over Volts Alarm Trip* value for longer than the configured *Timer*. The *DC Overvolts Alarm Trip* value is adjustable to suit user requirements.

4.11.1.3 PLANT BATTERY CHARGE



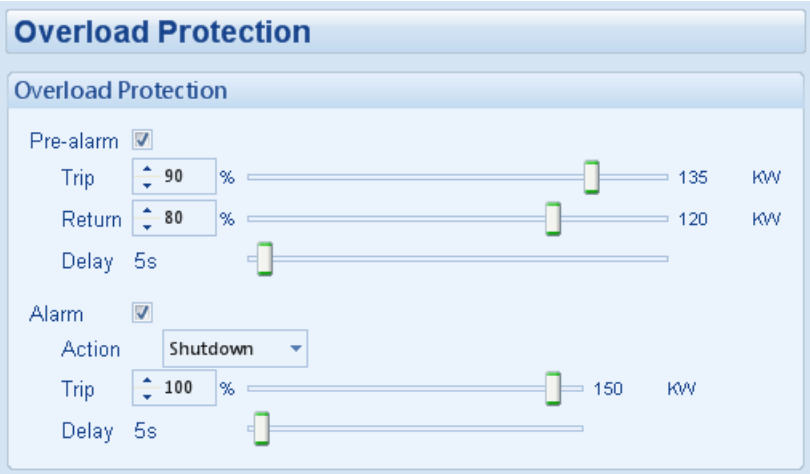
Options	Description
Pre alarm	☐ = Pre-alarm is disabled ☑ = If the temperature exceeds the *trip* setting, an alarm is generated. The temperature must fall below the *return* setting to cease the alarm.
Electrical Trip	☐ = Electrical trip is disabled ☑ = If the temperature exceeds the *trip* setting,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

4.11.1.4 PLANT BATTERY MAINTENANCE



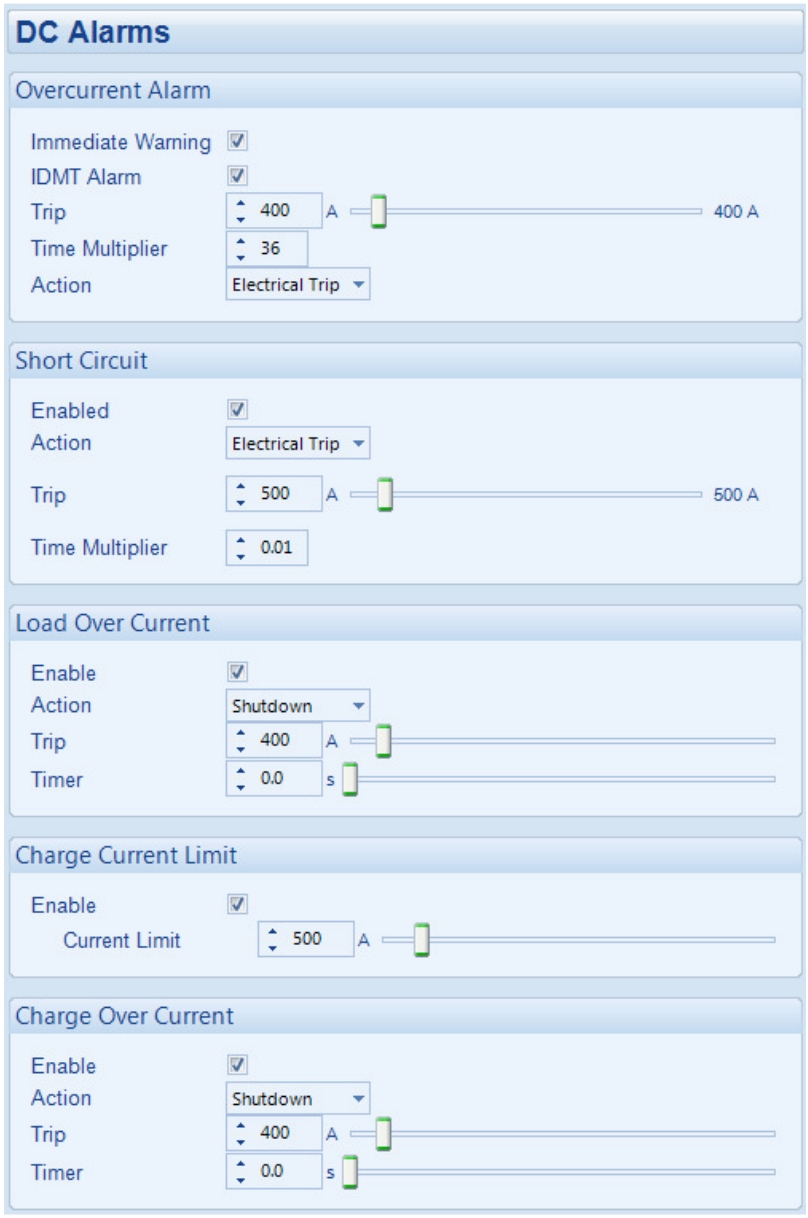
Options	Description
Pre alarm	☐ = Pre-alarm is disabled ☑ = If the temperature exceeds the *trip* setting, an alarm is generated. The temperature must fall below the *return* setting to cease the alarm.
Electrical Trip	☐ = Electrical trip is disabled ☑ = If the temperature exceeds the *trip* setting,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

4.11.2 OVERLOAD PROTECTION



Parameter	Description
Overload Protection Pre-Alarm	☐ = Overload Protection warning is disabled. ☑ = The *kW Overload Warning* activates when the kW level exceeds the *Trip* setting for longer than the configured *Delay* time. The *Warning* is automatically reset when the KW level falls below the configured *Return* percentage level.
Overload Protection Alarm	☐ = Overload Protection alarm is disabled. ☑ = The *kW Overload Alarm* activates when the kW level exceeds the *Trip* setting for longer than the configured *Delay* time.
Action	Select the action for the *kW Overload Alarm:* *Electrical Trip* *Shutdown*

4.11.3 DC ALARMS



4.12 PLANT BATTERY CHARGING SCHEME

4.12.1 START REQUEST

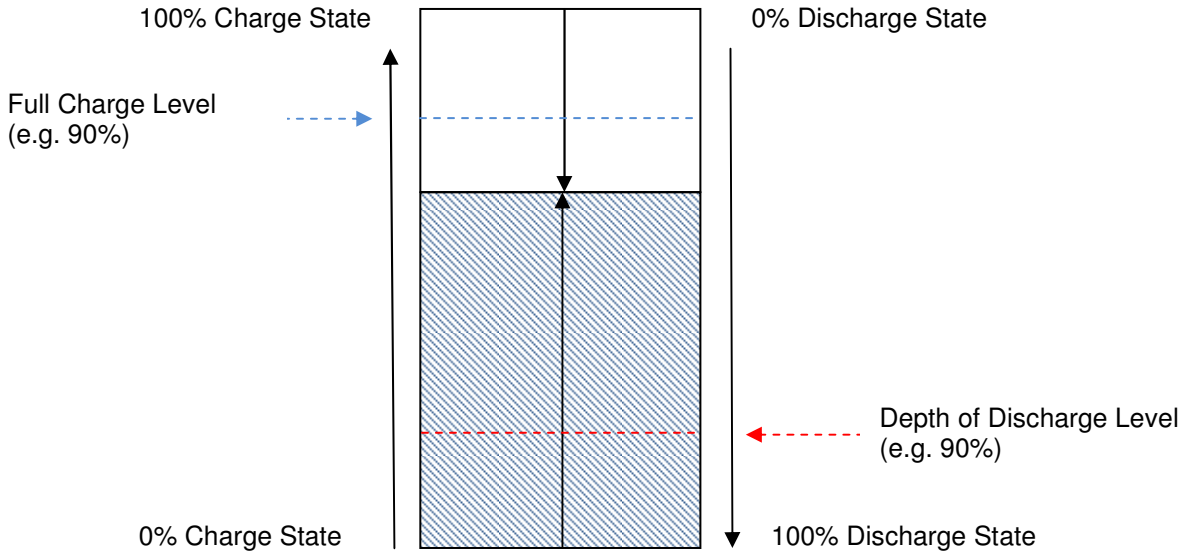
Starting requests are from the following sources:

The Plant Battery discharges below the level of the Depth of Discharge (DOD) setting
The DC voltage falls beneath the low Plant Battery Voltage alarm level

Starting requests are removed when:

The Plant Battery has been charged to the *Full Charge Level* and has been in the *Floating* charge state for the duration of the configured *Float Charge Timer*.

4.12.2 PLANT BATTERY CHARGE STATE



Charge Status	Description	
Discharged	When the Plant Batteries have fallen below the *Depth of Discharge Level*	
Discharging	When the Plant Batteries' charge current is negative (discharging)	
Charging	When the generator is running and the *Charge Current* is positive.	
	Bulk Stage	When the Charge Current is greater then the Battery Charge Rate and when the Battery Voltage is less then the Minimum Float Voltage Level
	Absorption Stage	When the Plant Battery Voltage is above the Minimum Float Voltage Level
Floating	When the Plant Batteries' voltage has fallen below the *Minimum Float Charge Voltage* and the *Charge Current* has fallen bellow the *Charge Rate Current*.	
OK	When the Plant Batteries have been charged to the *Full Charge Level* and has been in the *Floating* charge state for the duration of the configured *Float Charge Timer*.	

4.12.3 CALCULATING EFFECTIVE BATTERY CAPACITY

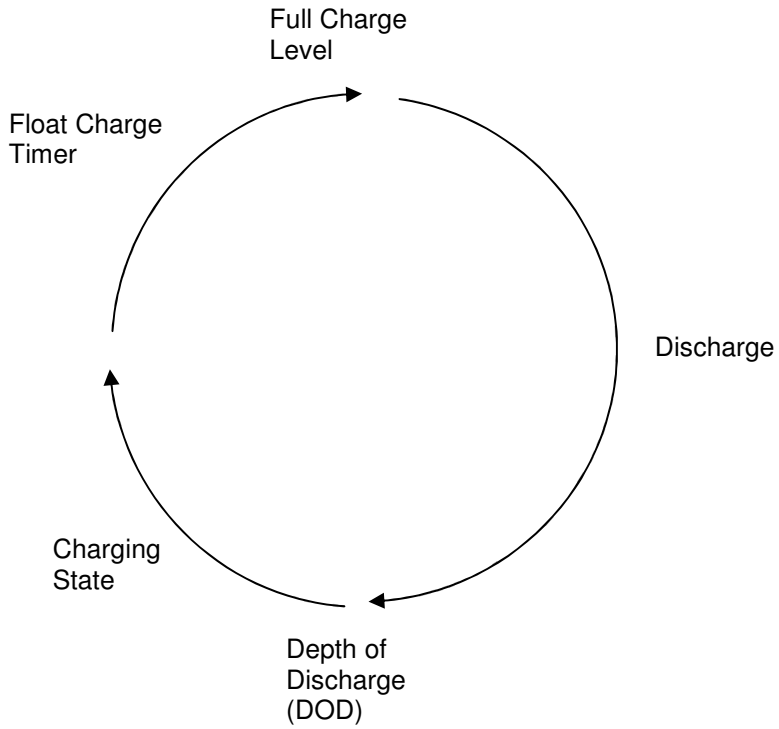
The effective battery capacity is calculated whilst the battery is charging upon a fixed formula:
$It = C\ (C / IH)^{K-1}$

Where: C is the rated capacity (amp hours) of the Plant Batteries combined
IH is the charge rate (amps per hour)
It is the effective battery capacity
K is Peukert's Constant (obtained from the battery data sheet or when the battery is calibrated) or by the calculated Peukert's Constant

4.12.4 CHARGE CYCLE

A single charge cycle is determined by the following sequence:

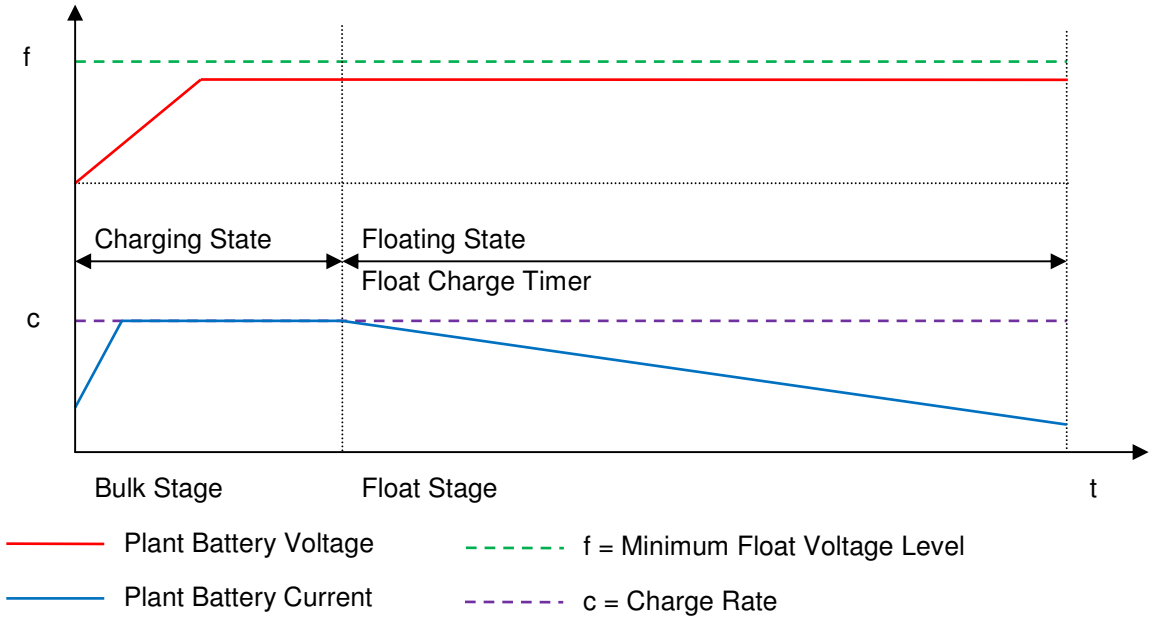
1. Plant Batteries fall below Depth of Discharge (DOD) Level
2. Plant Batteries are charged to the *Full Charge Level*
3. Plant Batteries start to discharge and reach *Depth of Discharge (DOD)*



4.12.5 DETERMINING THE CHARGE MODE

TWO STAGE CHARGER

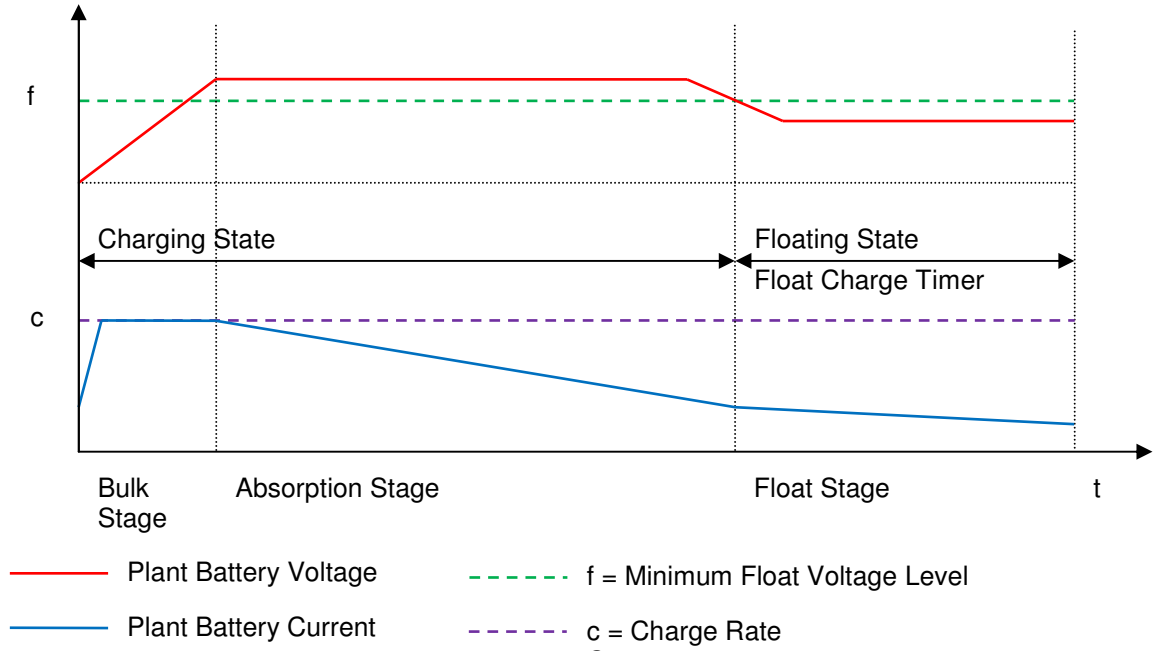
NOTE: When using a two stage charger, the Minimum Float Voltage Level must be set higher than the float voltage produced by the rectifying device as shown below.



The charge modes for a two stage charger are determined as follows:

Charge Status	Description	
Discharged	When the Plant Batteries have fallen below the *Depth of Discharge Level*	
Discharging	When the Plant Batteries' charge current is negative (discharging)	
Charging	When the generator is running and the *Charge Current* is positive.	
	Bulk Stage	When the Charge Current is greater then the Battery Charge Rate and when the Battery Voltage is less then the Minimum Float Voltage Level
Floating	When the Plant Batteries' voltage has fallen below the *Minimum Float Charge Voltage* and the *Charge Current* has fallen bellow the *Charge Rate Current*.	
Ok	When the Plant Batteries have been charged to the *Full Charge Level* and has been in the *Floating* charge state for the duration of the configured *Float Charge Timer*.	

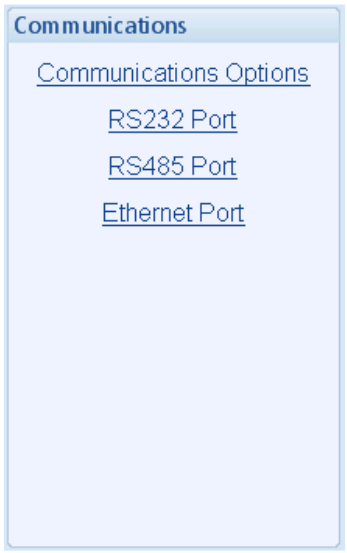
4.12.6 THREE STAGE CHARGER



The charge modes for a three stage charger are determined as follows:

Charge Status	Description	
Discharged	When the Plant Batteries have fallen below the *Depth of Discharge Level*	
Discharging	When the Plant Batteries' charge current is negative (discharging)	
Charging	When the generator is running and the *Charge Current* is positive.	
	Bulk Stage	When the Charge Current is greater then the Battery Charge Rate and when the Battery Voltage is less then the Minimum Float Voltage Level
	Absorption Stage	When the Plant Battery Voltage is above the Minimum Float Voltage Level
Floating	When the Plant Batteries' voltage has fallen below the *Minimum Float Charge Voltage* and the *Charge Current* has fallen bellow the *Charge Rate Current*.	
OK	When the Plant Batteries have been charged to the *Full Charge Level* and has been in the *Floating* charge state for the duration of the configured *Float Charge Timer*.	

4.13 COMMUNICATIONS

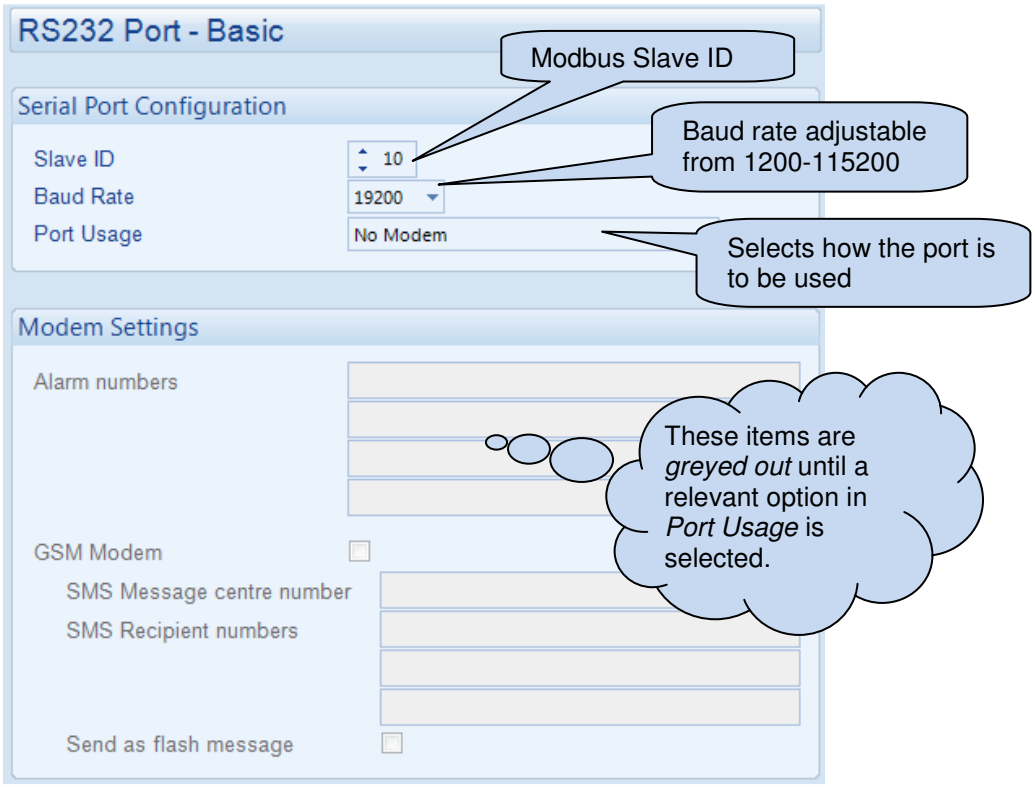


4.13.1 COMMUNICATIONS OPTIONS

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

4.13.2 RS232 PORT

4.13.2.1 BASIC



SERIAL PORT CONFIGURATION

Timer	Description
Port usage	Only one of the two serial ports is used at any one time (RS232 or RS485) The options are : **No Modem** – RS232 ports is used for direct RS232 connection to PLC, BMS etc **Incoming modem calls** – RS232 port connected to modem, used to accept incoming calls only. **Incoming and outgoing modem (Sequence)** – RS232 port connected to modem used to accept incoming calls and also make calls upon shutdown alarms. **Outgoing modem alarms (Sequence)** - RS232 port connected to modem, used to make calls upon shutdown alarms. **Incoming and outgoing modem (Cyclic)** – RS232 port connected to modem used to accept incoming calls and also make calls upon shutdown alarms. **Outgoing modem alarms (Cyclic)** - RS232 port connected to modem, used to make calls upon shutdown alarms.

MODEM SETTINGS

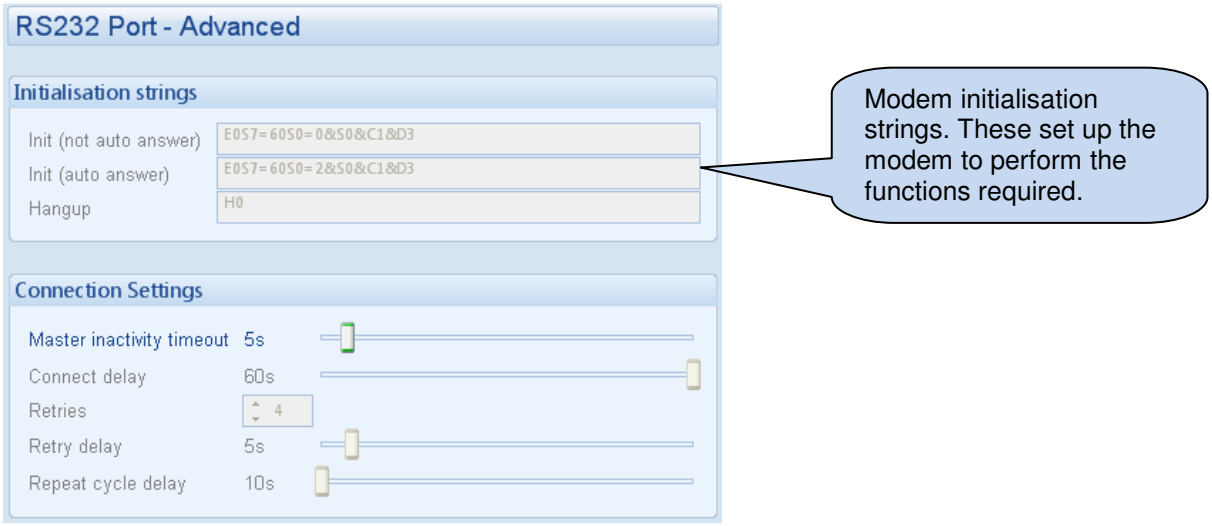
Timer	Description
Alarm Number	The phone number that the module dials upon an alarm condition. This number must be connected to a PC modem on a PC running the Configuration Suite Software.
GSM Modem	☐ = The connected modem is a fixed line telephone modem ☑ = The connected modem is a GSM (cellular) modem. The GSM signal strength meter and GSM operator are shown on the module display.
SMS Message Centre Modem	The Message centre used so send SMS messages. This number is usually stored on the SIM card and need not be entered here. A number is only needed here if it is not stored on the SIM card.
SMS Recipient Numbers	Numbers of the cell phones to send SMS messages to. Leave blank if SMS function is not required.
Send as flash message	This type of message sends an instant message

GSM modem

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

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

4.13.2.2 ADVANCED



INITIALISATION STRINGS

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

Factory set initialisation strings

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

Silent operation

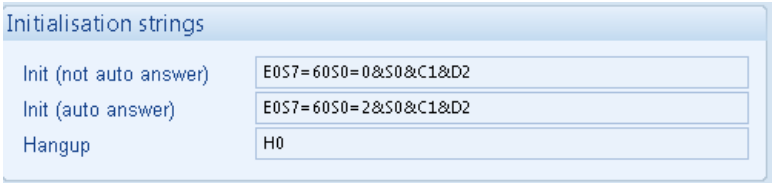
The modem connected to the controller usually makes dialling noises and ‘squeal’ in the initial stages of making a data call. To control this noise, add the following command to the end of the initialisation string:

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

Wavecom Fastrak Xtreme GSM Modem initialisation strings

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

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



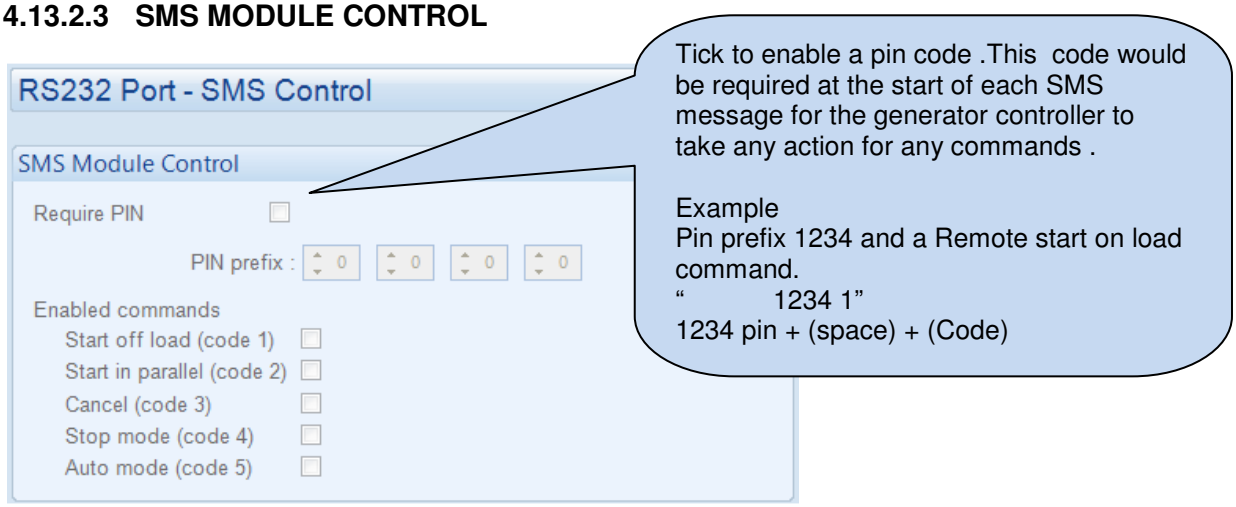
OTHER MODEMS

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

CONNECTION SETTINGS

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

4.13.2.3 SMS MODULE CONTROL



The SMS commands listed below.

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

4.13.3 TROUBLESHOOTING MODEM COMMUNICATIONS

4.13.3.1 MODEM COMMUNICATION SPEED SETTING

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

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

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

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

When connected, enter the following command:

AT+IPR=9600 and press <ENTER>

This sets the modem to 9600 baud.

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

Enter the following command:

AT&W and press <ENTER>

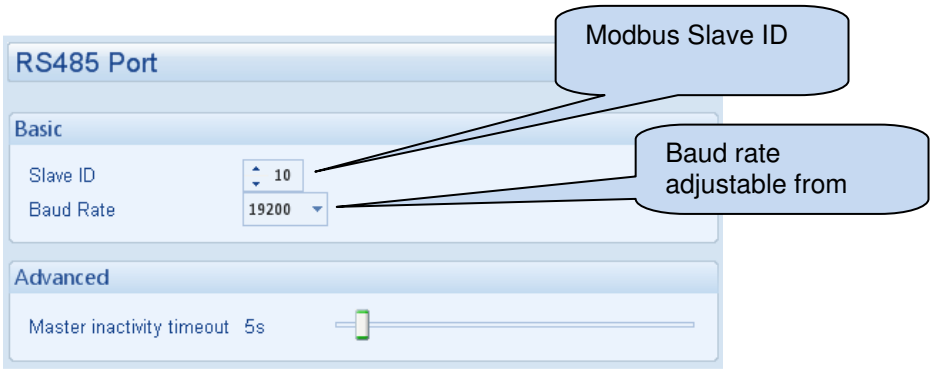
This saves the new setting in the modem. Power is now removed. The next time power is applied, the modem starts with the new settings (Baud rate = 9600), suitable to communicate with the DSE module.

4.13.3.2 GSM MODEM CONNECTION

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

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

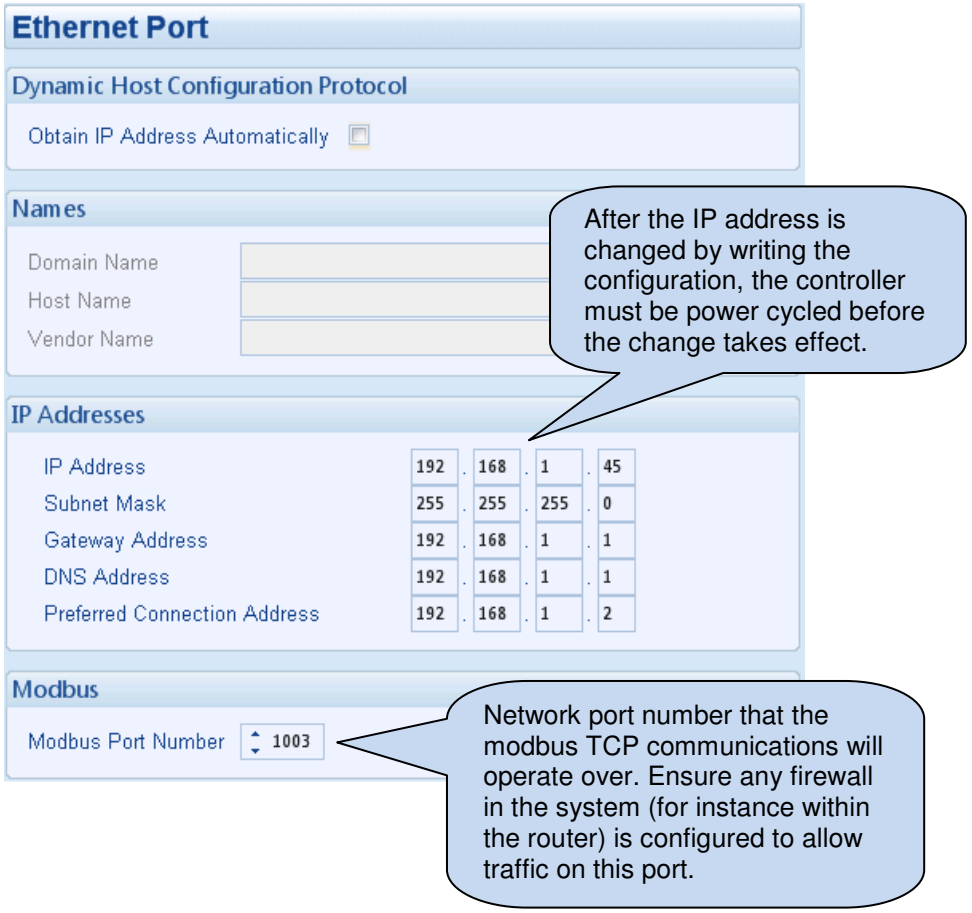
4.13.4 RS485 PORT



Timer	Description
Master inactivity timeout	The module *looks* by default at the USB port for communications. When activity is detected on the RS232 or RS485 port, the module *switches* to look at the relevant port for further data. If no data activity is detected on the port for the duration of the *master inactivity timer*, it reverts to looking at the USB port. This should be set longer than the time between modbus polls from the master.

4.13.5 ETHERNET PORT

NOTE: Consult the network administrator of the host network before changing these settings.
Incorrect settings could cause network errors in the existing network. These settings must only be changed by qualified network administrators.



Firewall configuration for internet access

As modem/routers differ enormously in their configuration, it is not possible for DSE to give a complete guide to their use with the module. However it is possible to give a description of the requirements in generic terms. For details of how to achieve the connection to your modem/router you are referred to the supplier of your modem/router equipment.

The module makes its data available to a configurable TCP port number.

You must configure your modem/router to allow inbound traffic on this port. For more information you are referred to your WAN interface device (modem/router) manufacturer.

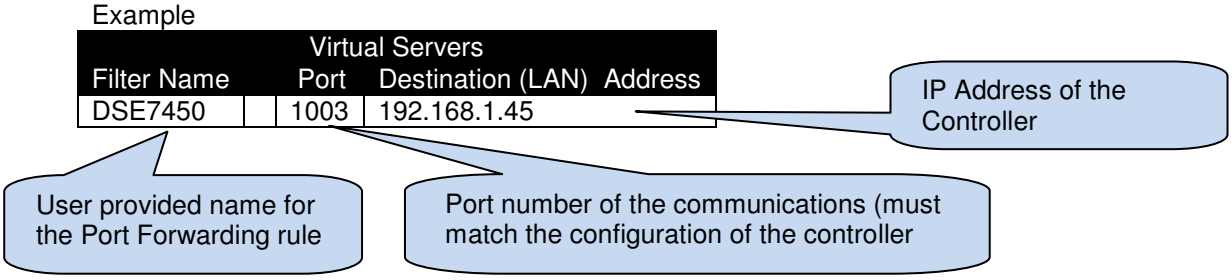
Incoming traffic (virtual server)

Network Address and Port Translation (NAPT) allows a single device, such as the modem/router gateway, to act as an agent between the Internet (or "public external network") and a local (or "internal private") network. This means that only a single, unique IP address is required to represent an entire group of computers.

For our application, this means that the WAN IP address of the modem/router is the IP address we need to access the site from an external (internet) location.

When requests reach the modem/router, we want this passed to a 'virtual server' for handling.

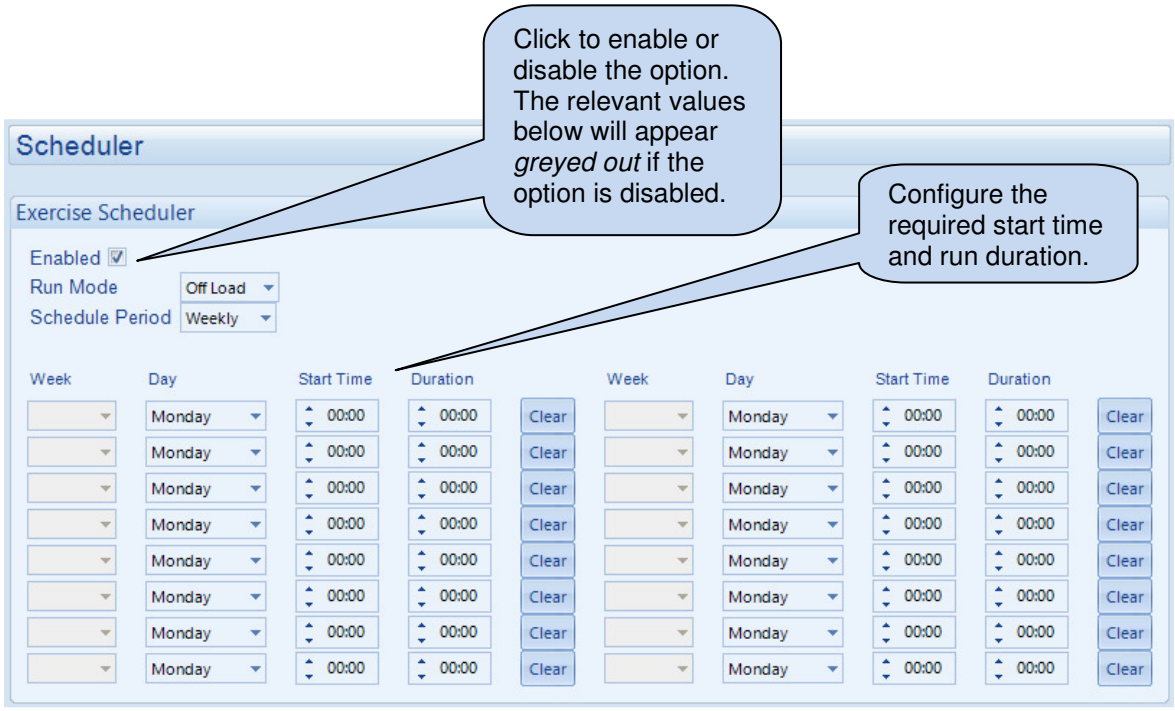
Example



Result : Traffic arriving from the WAN (internet) on port 1003 is automatically sent to IP address 192.168.1.3 on the LAN for handling.

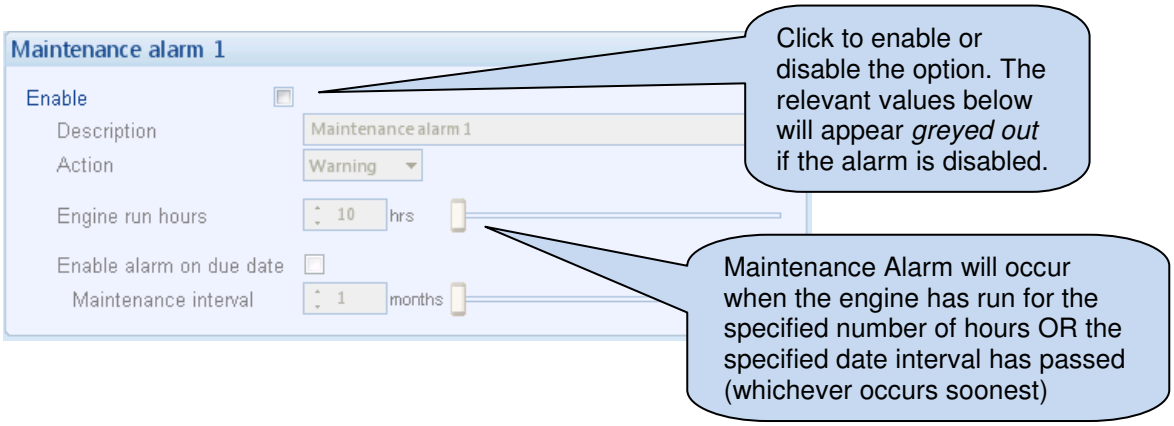
4.14 SCHEDULER

The Exercise Scheduler is used to give up to 16 scheduled runs. This run schedule is configurable to repeat every 7 days (weekly) or every 28 days (monthly). The run is *on load* or *off load.*



4.15 MAINTENANCE ALARM

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

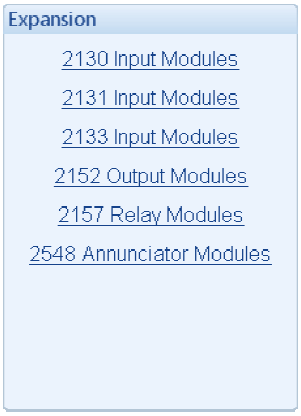


There are two ways to reset the maintenance alarm:

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

4.16 EXPANSION

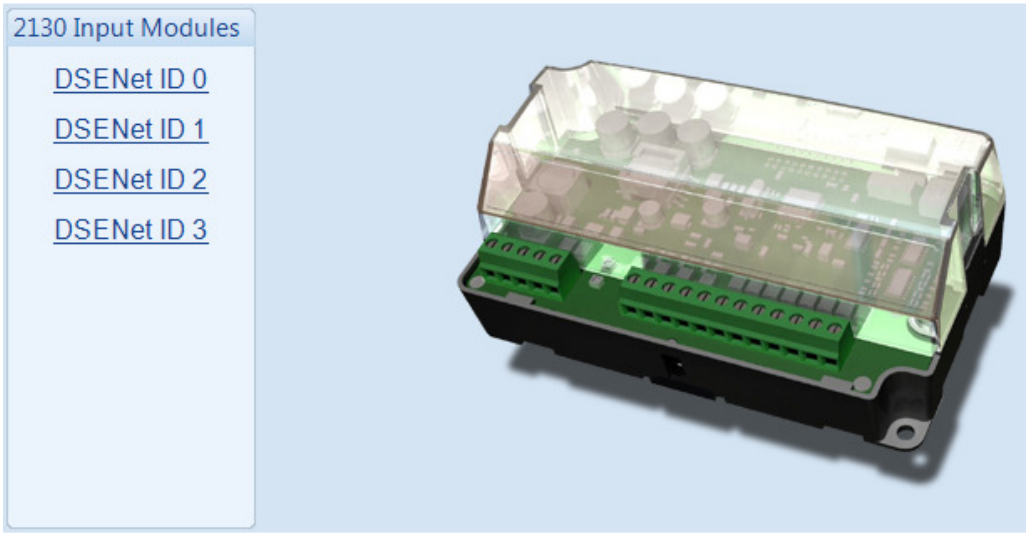
The *Expansion* page is subdivided into smaller sections.
Select the required section with the mouse.



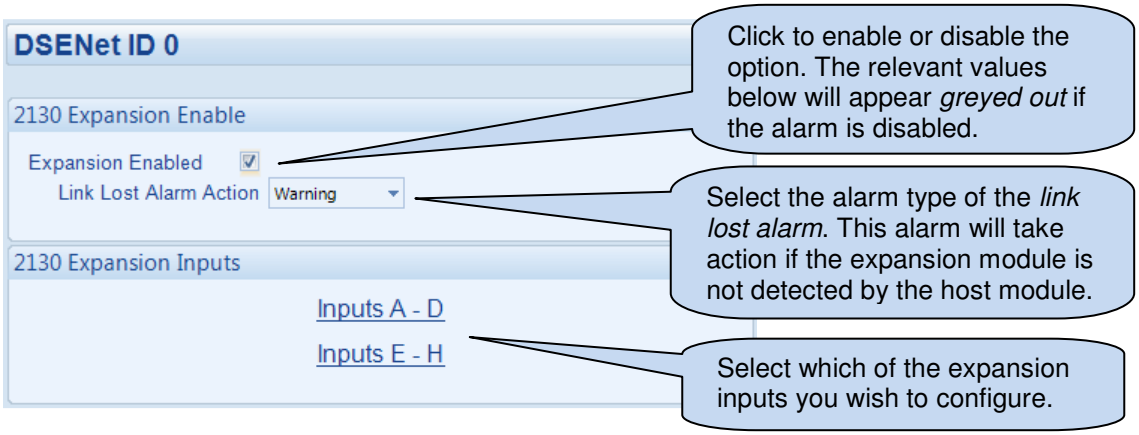
See overleaf for description of the different expansion modules.

4.16.1 DSE2130 INPUT MODULES

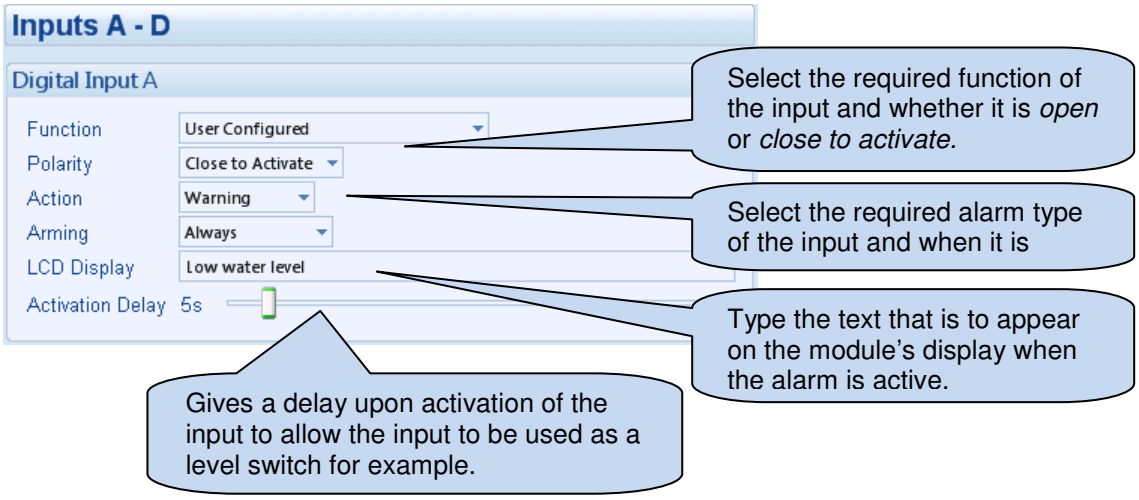
Select the DSENet ID of the input expansion you wish to configure. The ID of the expansion input module is set by rotary decimal switch accessible under the removable cover of the device.



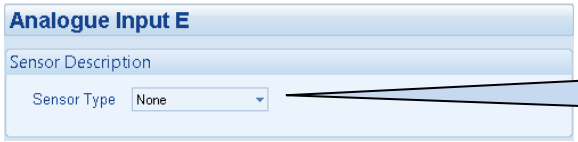
The following is then shown:



4.16.1.1 DIGITAL INPUTS (A-D)



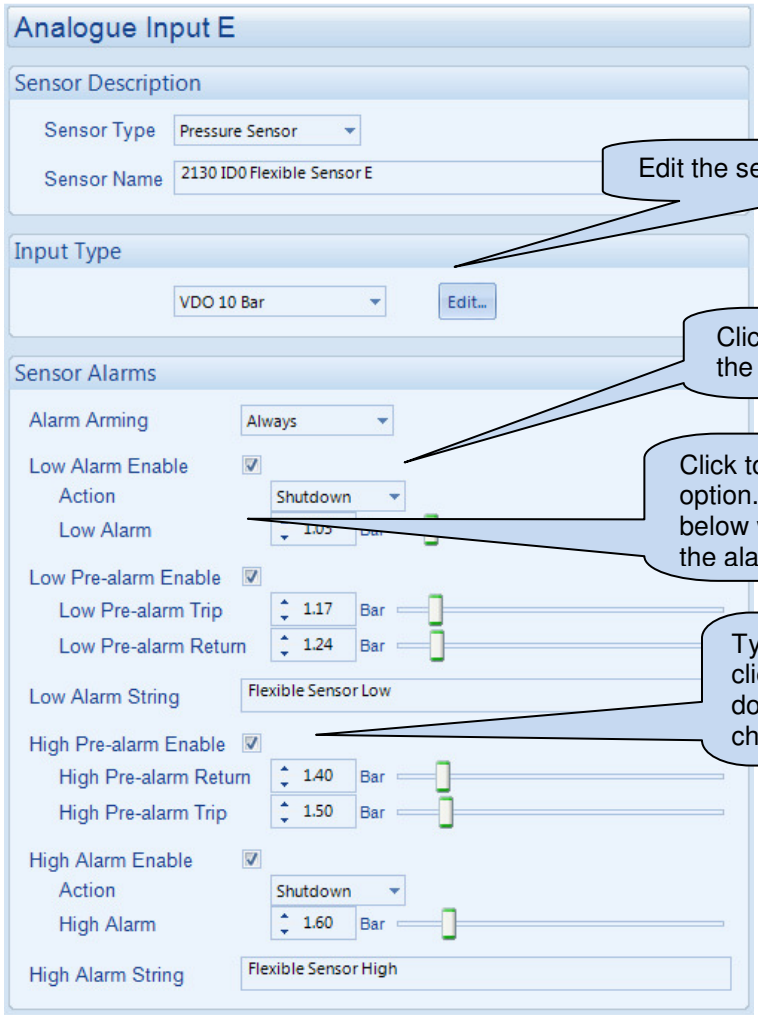
4.16.1.2 ANALOGUE INPUTS (E-H)



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

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

Used as an Analogue Input



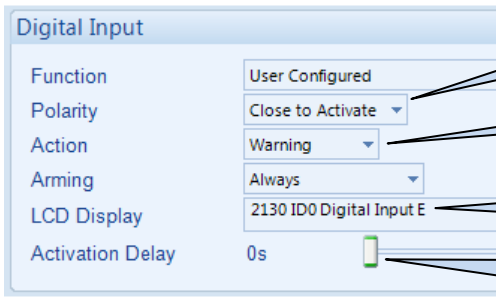
Edit the sensor curve if required.

Click and drag to change the setting.

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

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

Used as a Digital Input



Select the required function of the input and whether it is *open* or *close to activate.*

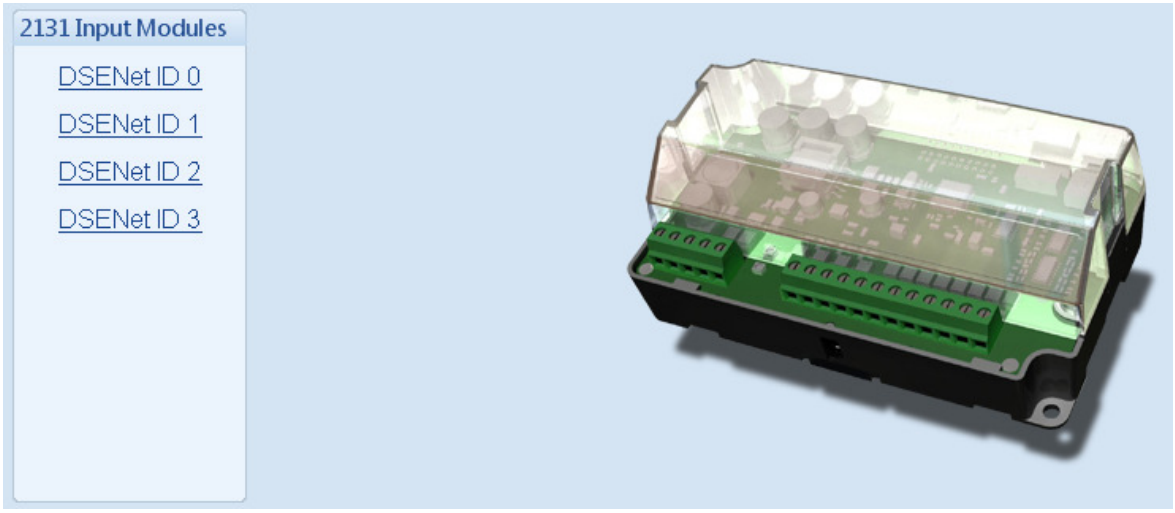
Select the required alarm type of the input and when it is active.

Type the text that is to appear on the module's display when the alarm is active.

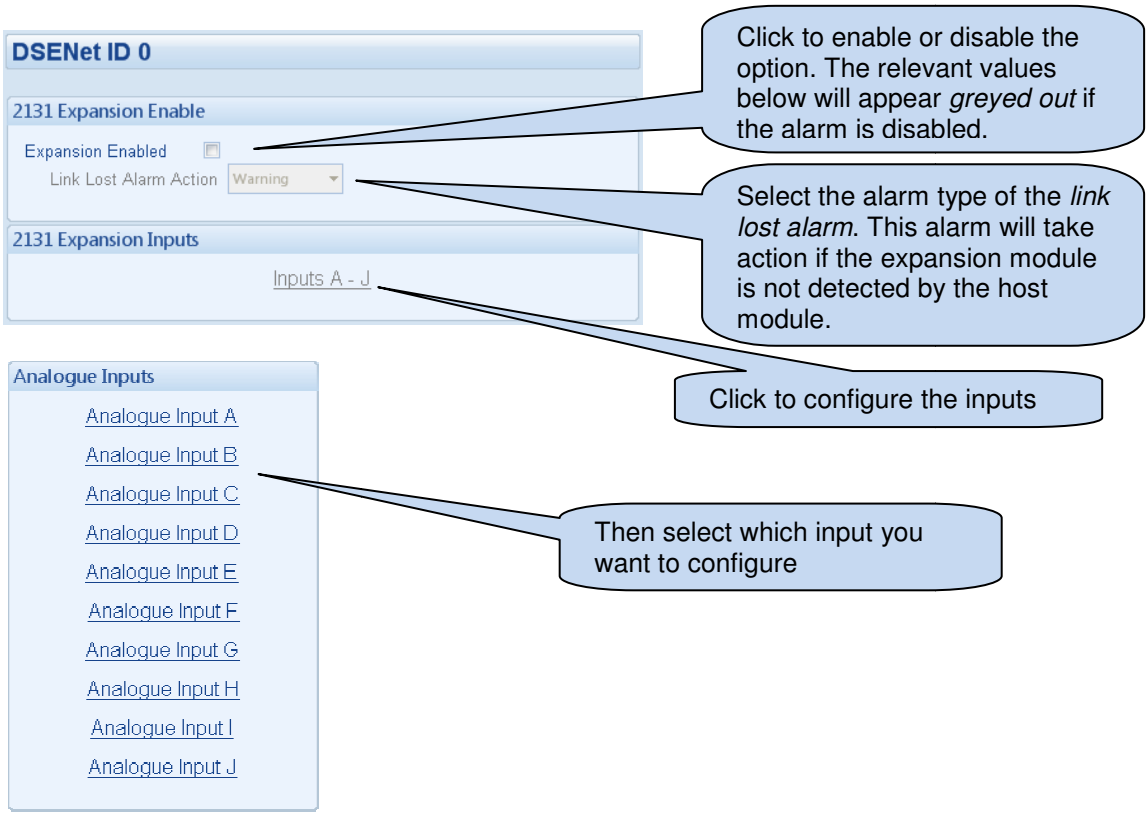
Gives a delay upon activation of the input to allow the input to be used as a liquid level switch for example.

4.16.2 DSE2131 RATIOMETRIC EXPANSION INPUT MODULE

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

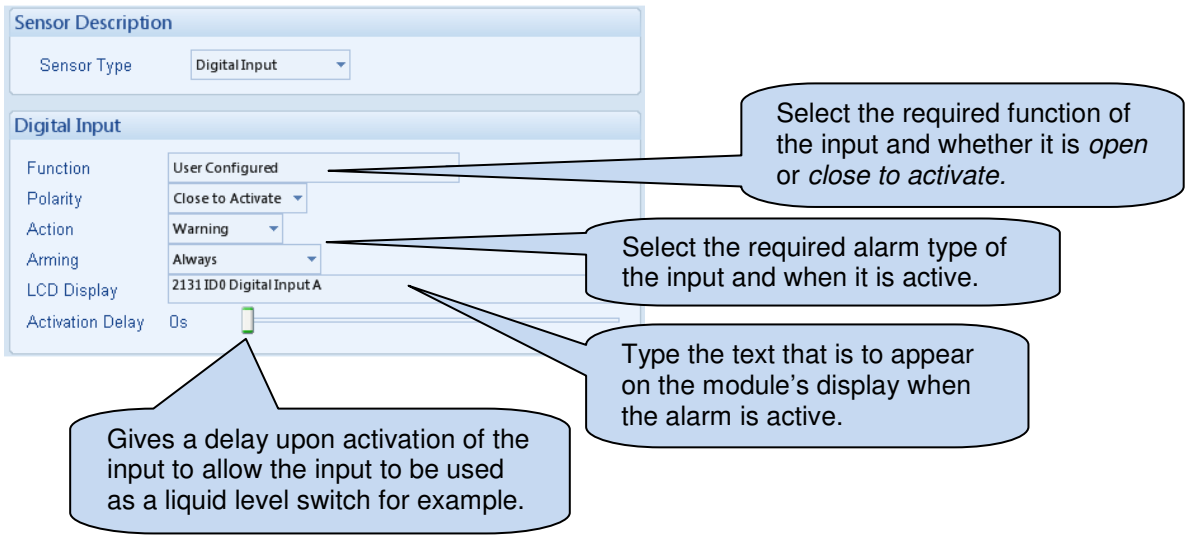


The following is then shown:

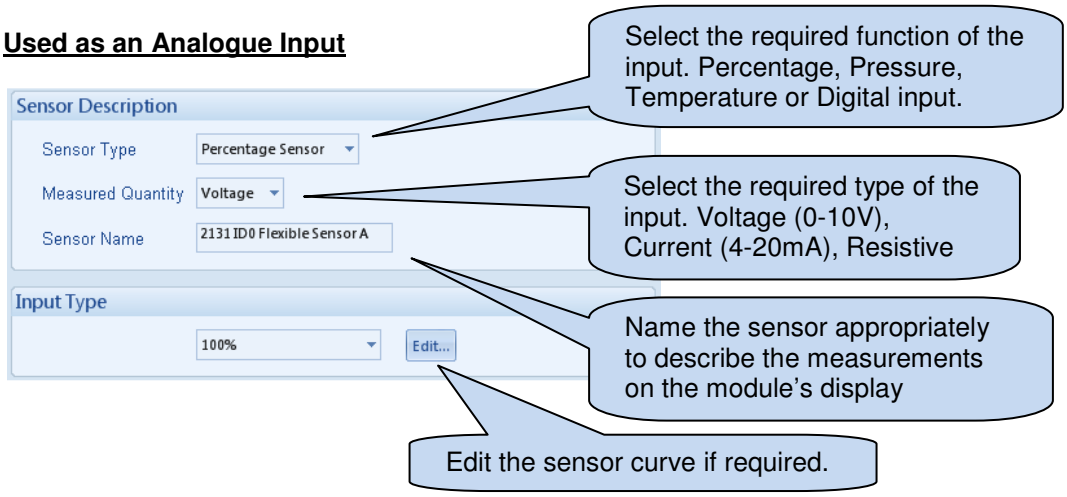


Depending upon your selection of *Sensor Type*, one of the following configuration screens are shown :

Used as a Digital Input

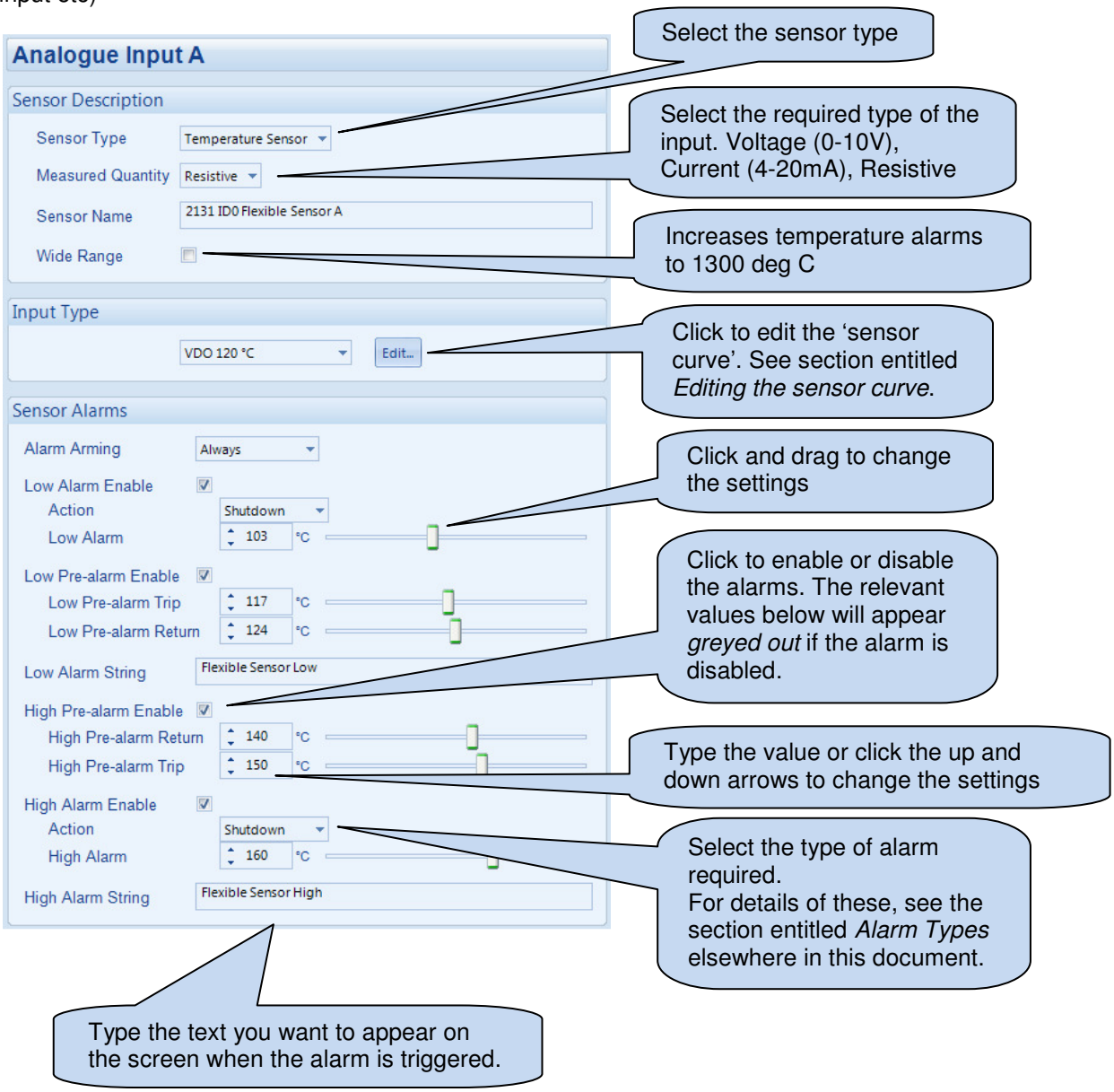


Used as an Analogue Input

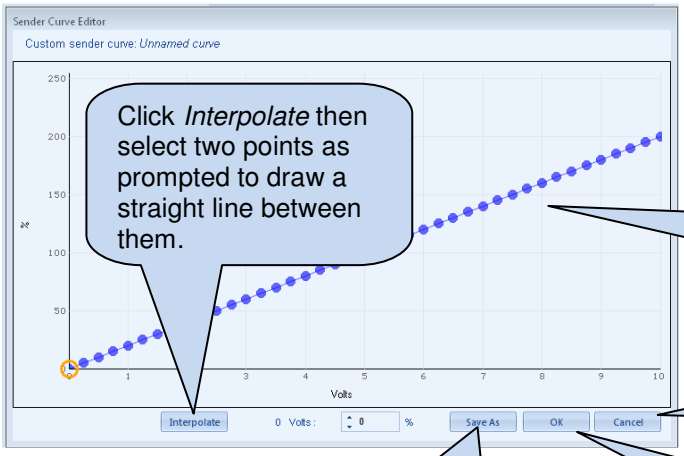


4.16.2.1 EXPANSION FLEXIBLE SENSOR

The following screen shot shows the configuration when set for *Temperature Sensor.* When set to other Sensor Type, consult the relevant manual section for details (Digital inputs, Oil Pressure input etc)



4.16.2.2 EDITING THE SENSOR CURVES



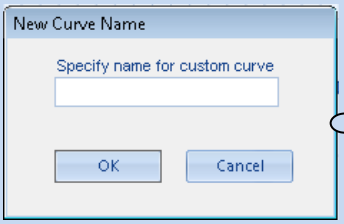
Click *Interpolate* then select two points as prompted to draw a straight line between them.

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

Click CANCEL to ignore and lose any changes you have made

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

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



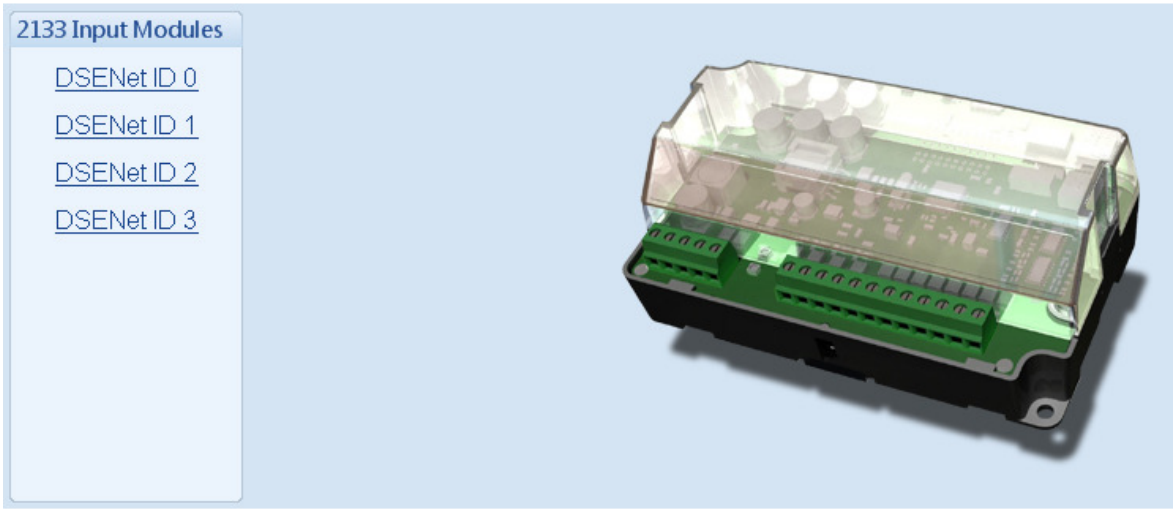
Click OK to save the curve.

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

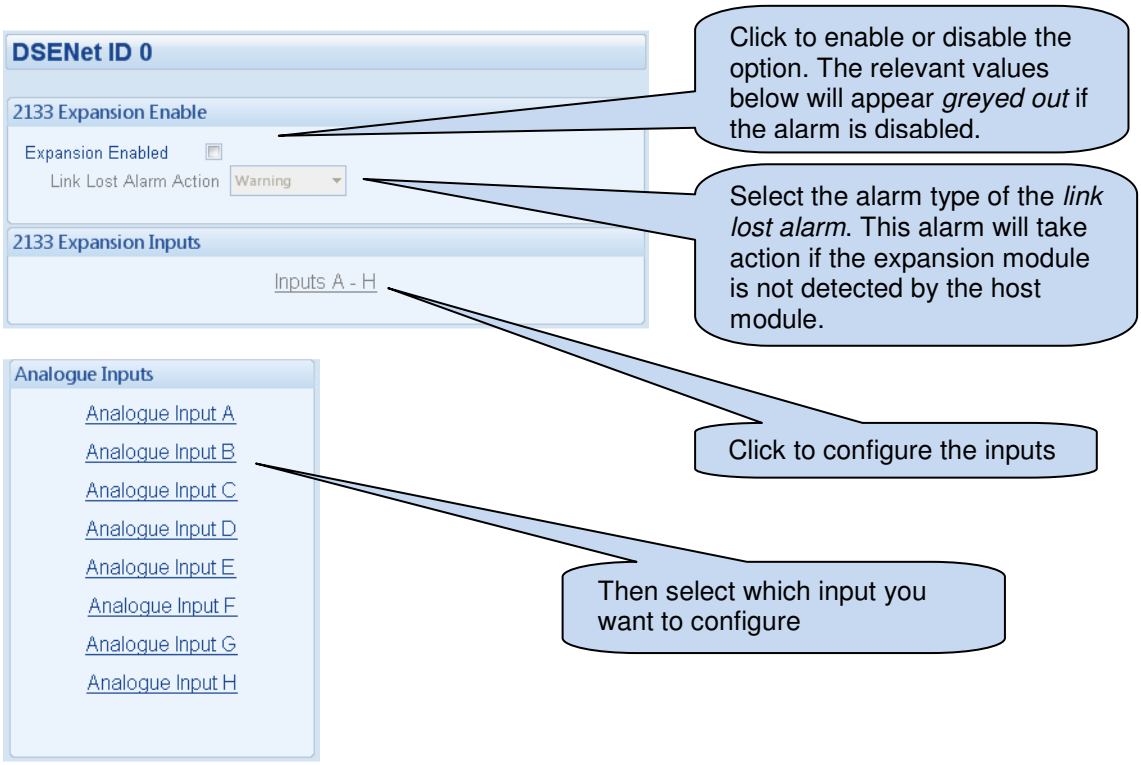
Hint: Deleting, renaming or editing custom sensor curves that have been added is performed in the main menu, select *Tools | Curve Manager*.
.

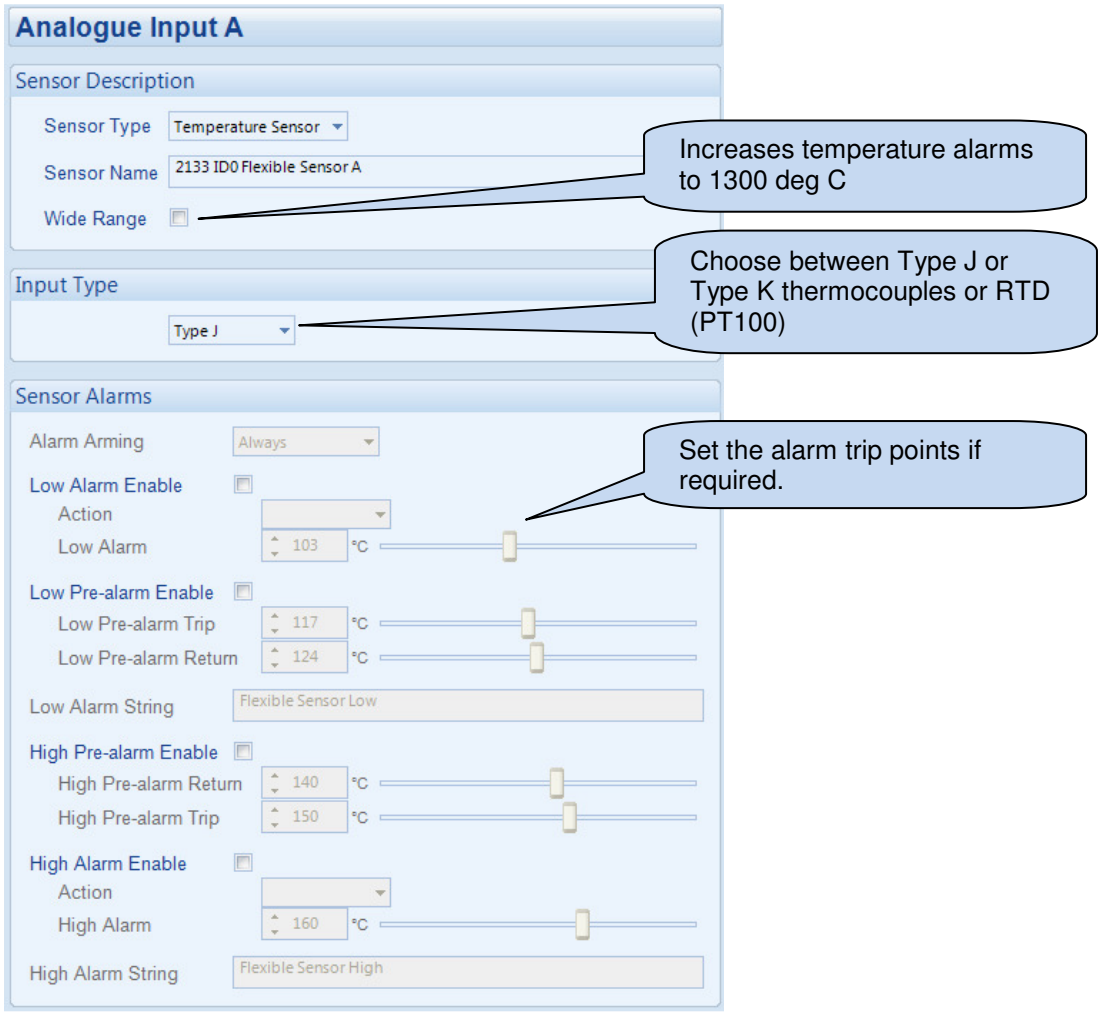
4.16.3 DSE2133 RTD / THERMOCOUPLE INPUT MODULE

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



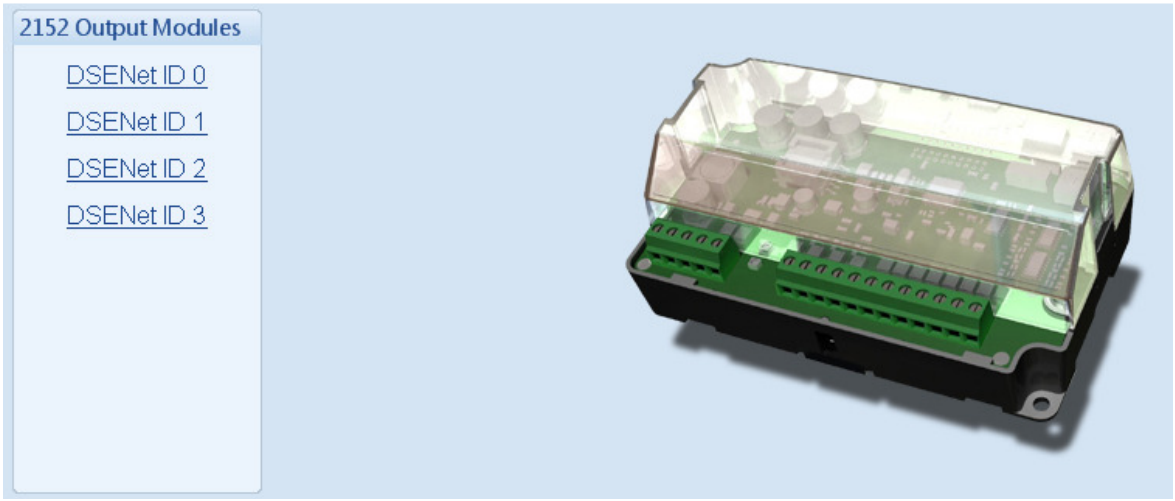
The following is then shown:



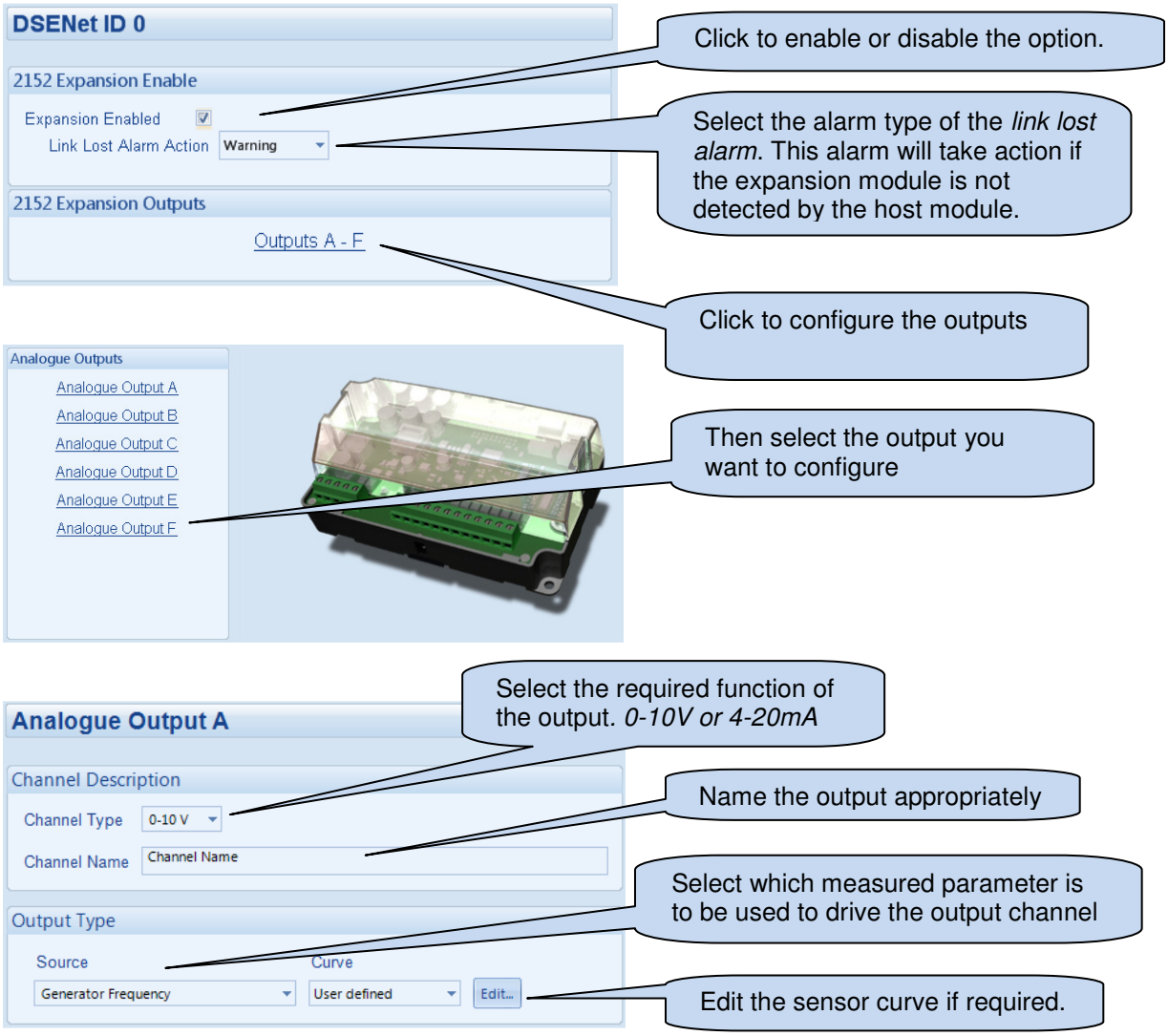

Analogue Input A
Sensor Description
Sensor Type
Temperature Sensor
Sensor Name
2133 ID0 Flexible Sensor A
Wide Range
Increases temperature alarms to 1300 deg C
Input Type
Type J
Choose between Type J or Type K thermocouples or RTD (PT100)
Sensor Alarms
Alarm Arming
Always
Low Alarm Enable
Action
Low Alarm
103
°C
Set the alarm trip points if required.
Low Pre-alarm Enable
Low Pre-alarm Trip
117
°C
Low Pre-alarm Return
124
°C
Low Alarm String
Flexible Sensor Low
High Pre-alarm Enable
High Pre-alarm Return
140
°C
High Pre-alarm Trip
150
°C
High Alarm Enable
Action
High Alarm
160
°C
High Alarm String
Flexible Sensor High

4.16.4 DSE2152 ANALOGUE OUTPUT MODULE

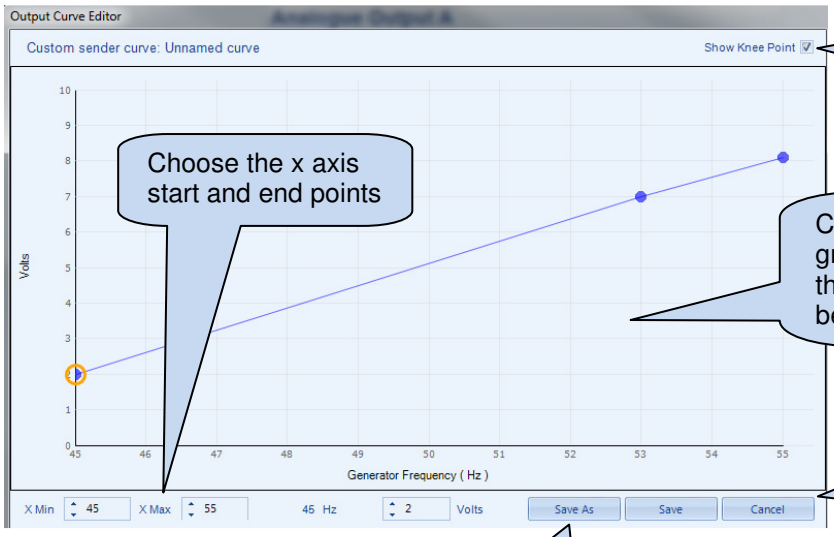
Select the DSENet ID of the output expansion you wish to configure. The ID of the expansion output module is set by rotary decimal switch accessible under the removable cover of the device.



The following is then shown:



4.16.4.1 EDITING THE OUTPUT CURVE



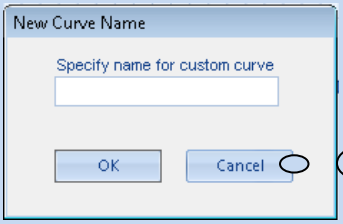
Show and hide the *knee point* (middle point) of the output curve

Choose the x axis start and end points

Click and drag the points on the graphs to change the settings. In this example 0 Hz – 55 Hz wiill be output as 2 V to 8 V.

Click CANCEL to ignore and lose any changes you have made

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



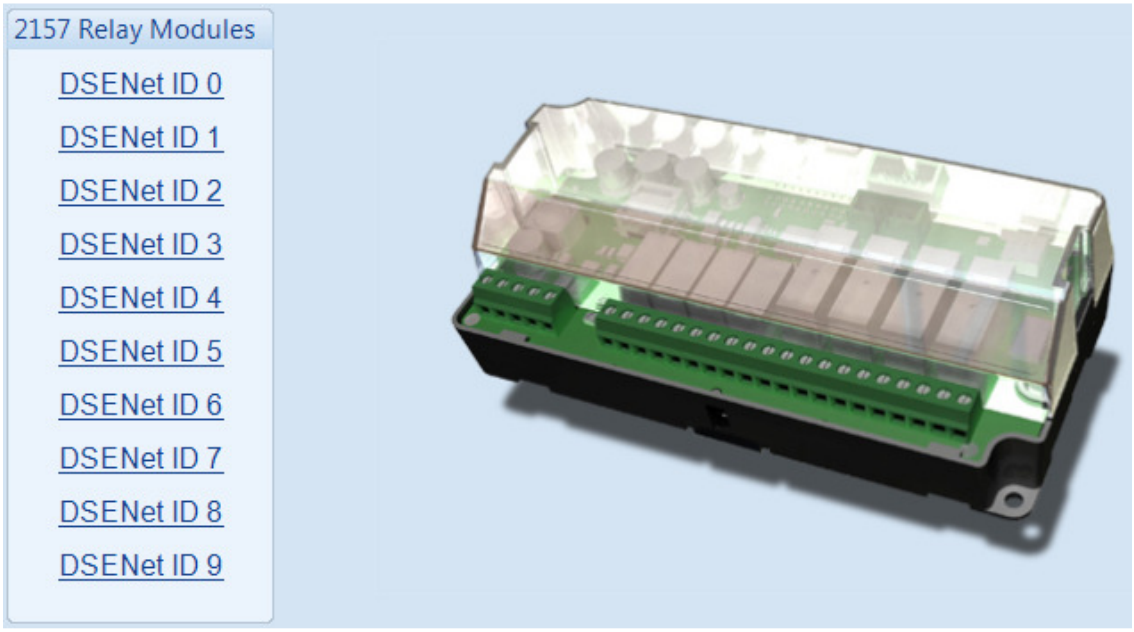
Click OK to save the curve.

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

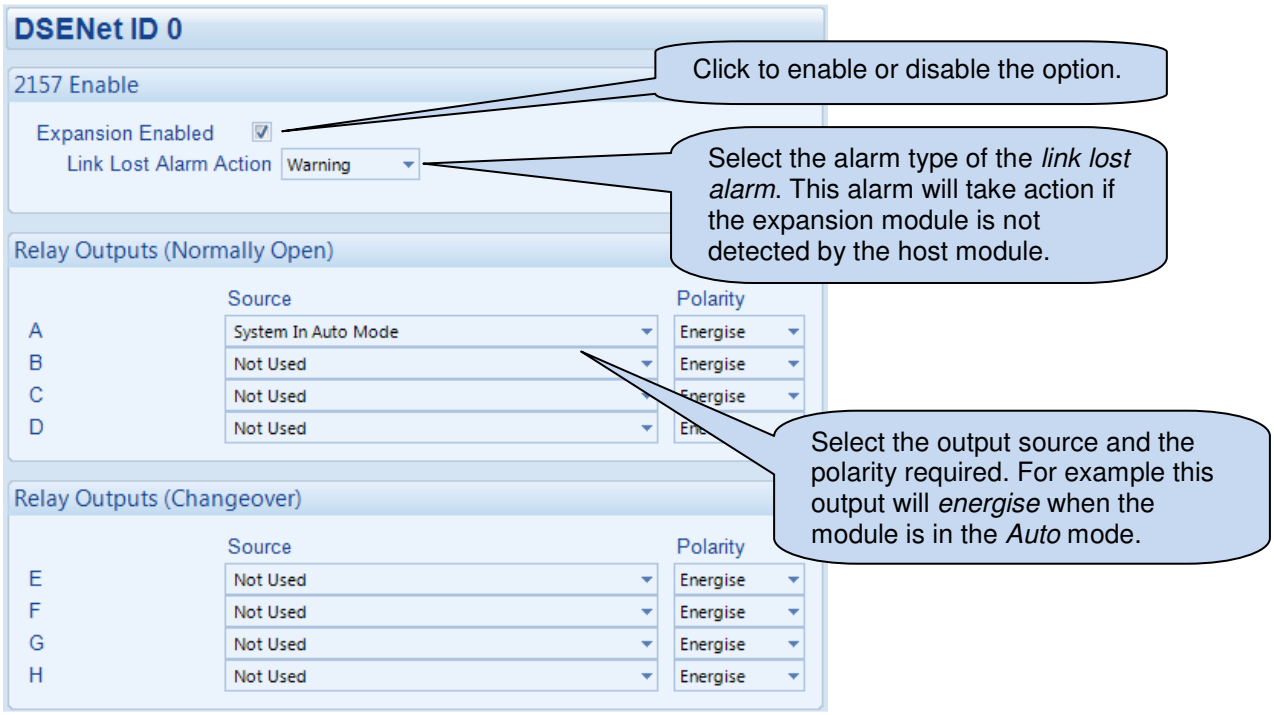
Hint: Deleting, renaming or editing custom sensor curves that have been added is performed in the main menu, select *Tools | Curve Manager*.

4.16.5 DSE2157 RELAY MODULES

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

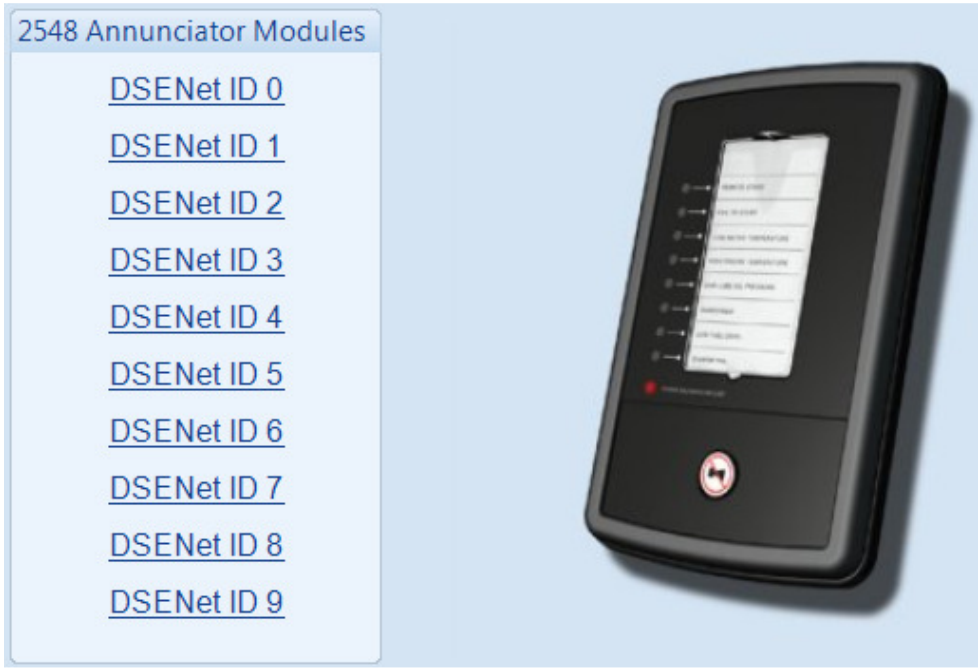


The following is then shown:

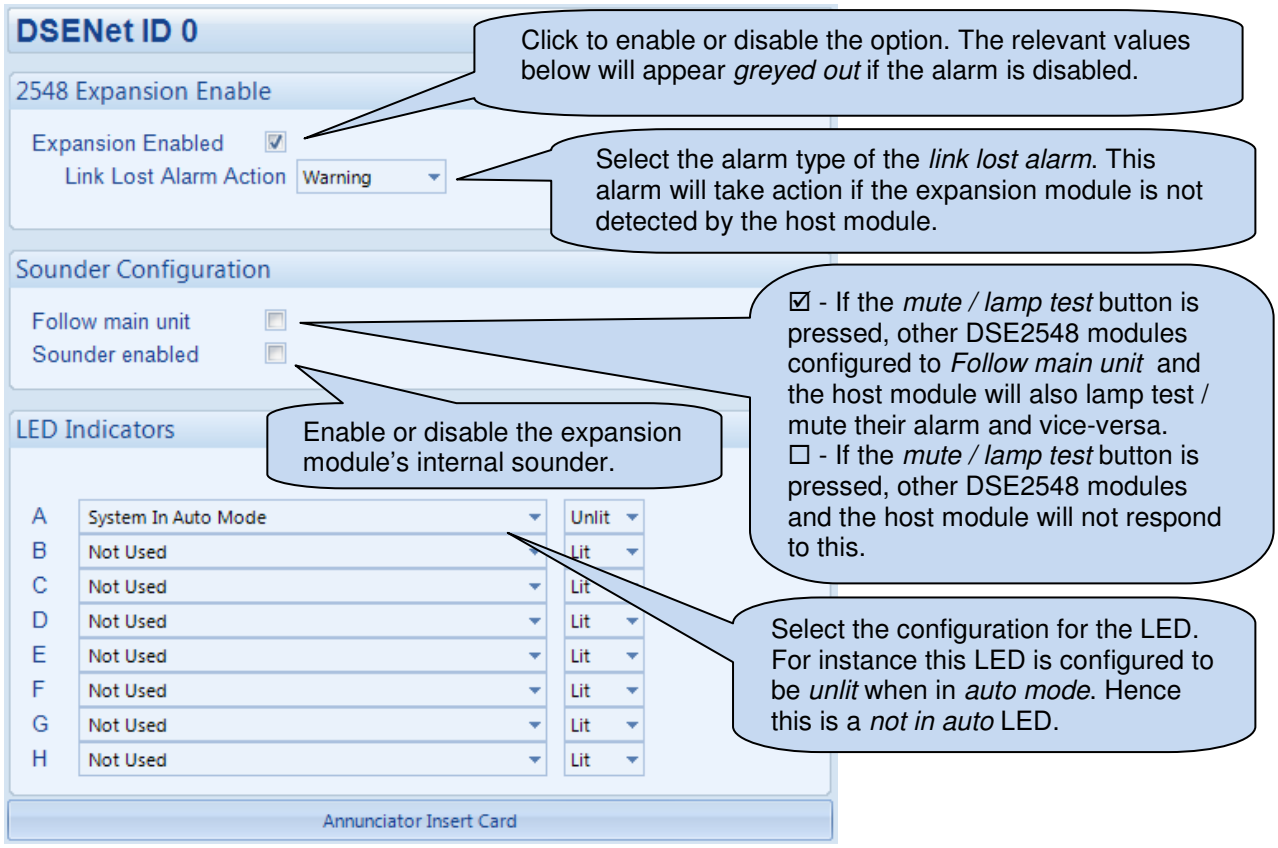


4.16.7 DSE2548 LED EXPANSION

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



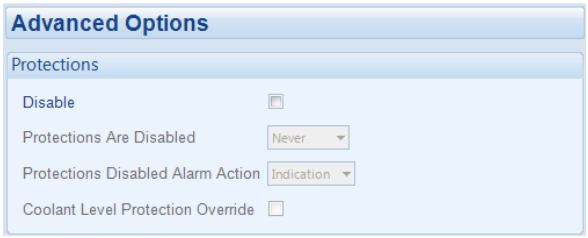
The following is then shown:



4.17 ADVANCED

These settings are provided for *advanced* users only. Take care when changing these options and ensure you fully understand the consequences of any change made.

4.17.1 ADVANCED OPTIONS



4.17.1.1 PROTECTIONS

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

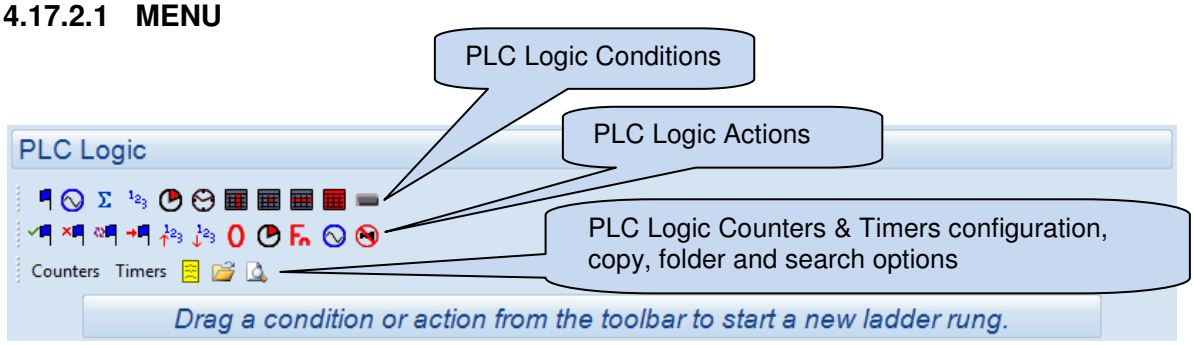
WARNING! - Enabling this feature prevents the set being stopped upon critical alarm conditions. All shutdown alarms are disabled with the exception of EMERGENCY STOP which continues to operate.

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

4.17.2 PLC LOGIC

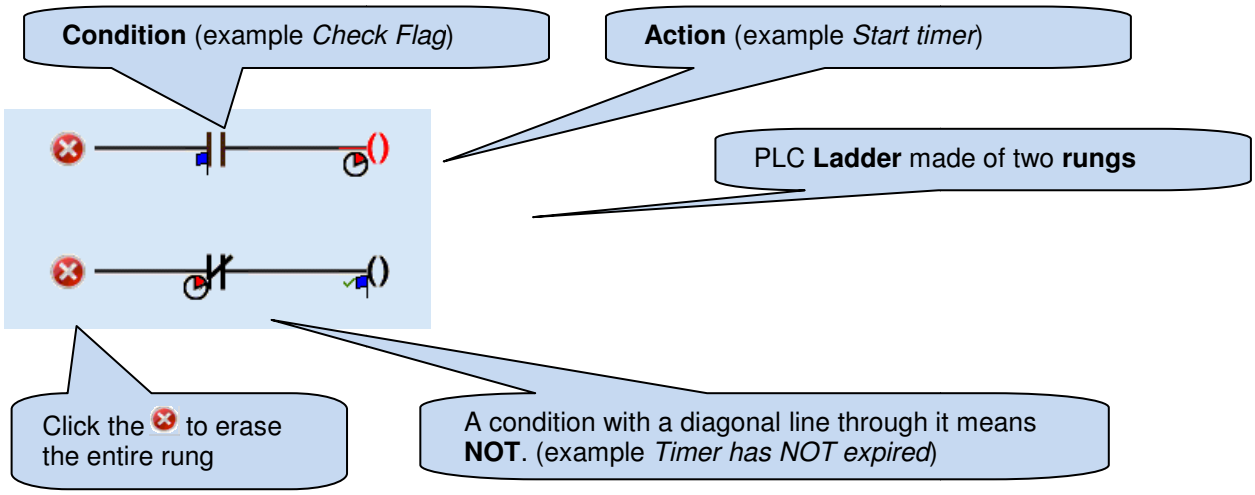
PLC Logic adds comprehensive PLC functionality to the DSE controller.
This is an advanced section, used entirely at your own risk.

4.17.2.1 MENU



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

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

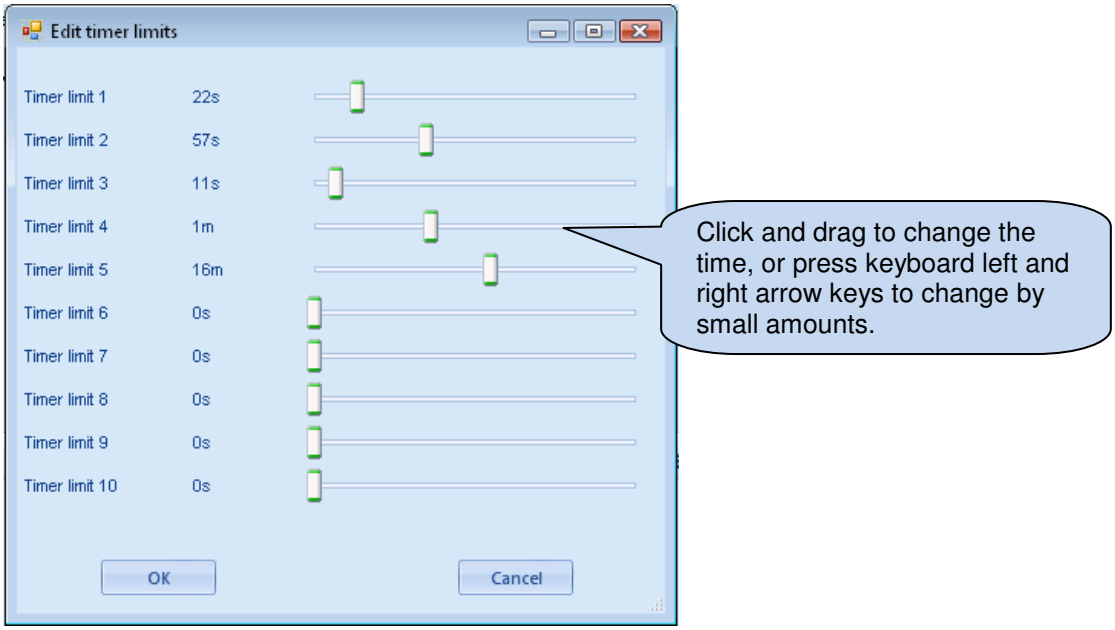


4.17.2.2 FLAGS

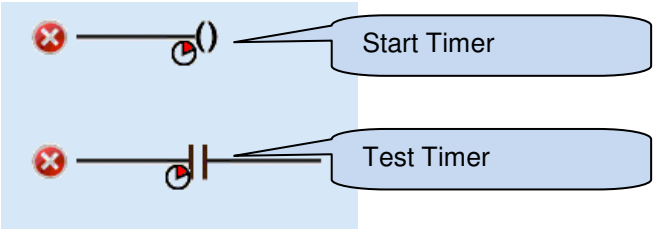
A *flag* is *set* when a condition within the DSE controller is met. For instance, if the module is in *Auto* Mode an internal flag is set. This flag is exposed as an *output source* when configuring module outputs and LEDs.
In addition to internal flags, a further twenty (40) custom flags are available (named PLC Output Flag 1-40). These are used to 'memorise' that a condition has been met, and/or used to drive module outputs and LEDs'.
For example if a timer expires, a flag is set to make a note of the timer expiring for later use in the ladder.

4.17.2.3 TIMERS

The PLC logic section contains twenty (20) user timers for use in the ladder.
A timer is configured by clicking Timers in the menu bar. The 'Edit time limits' window appears.

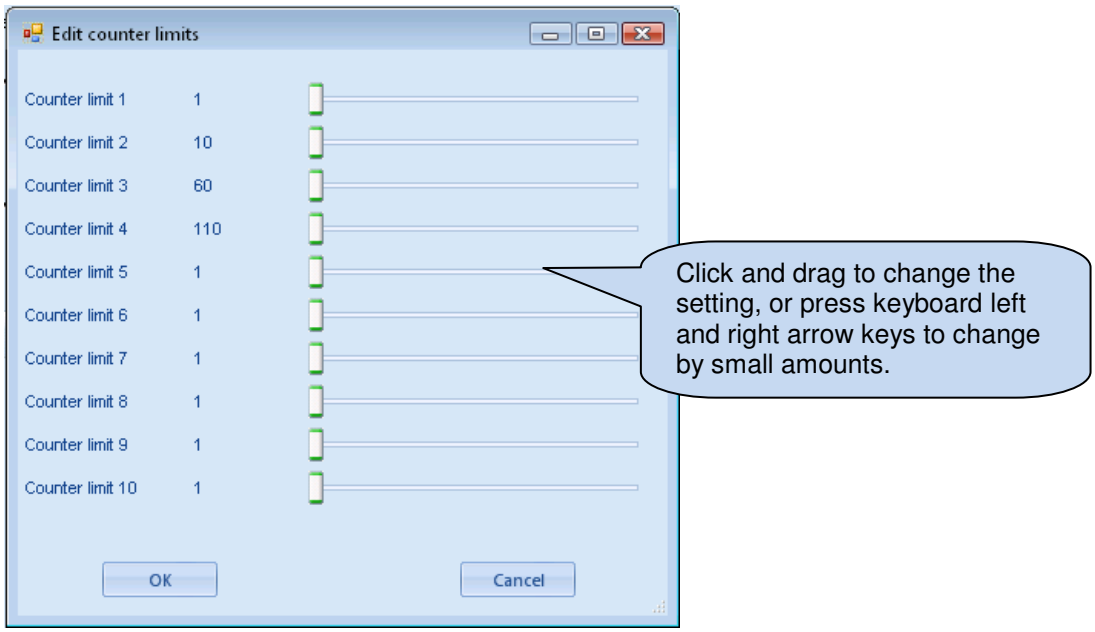


A timer is used by adding the timer action to the ladder. When this action takes place, the timer begins.
Upon the timer reaching the configured 'Timer limit', a test for the timer is successful:

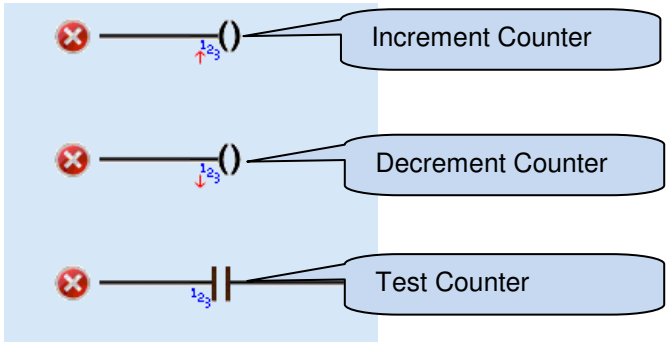


4.17.2.4 COUNTERS

The PLC logic section contains twenty (20) user counters for use in the ladder.
A counter is configured by clicking Counters in the menu bar. The 'Edit counter limits' window appears.



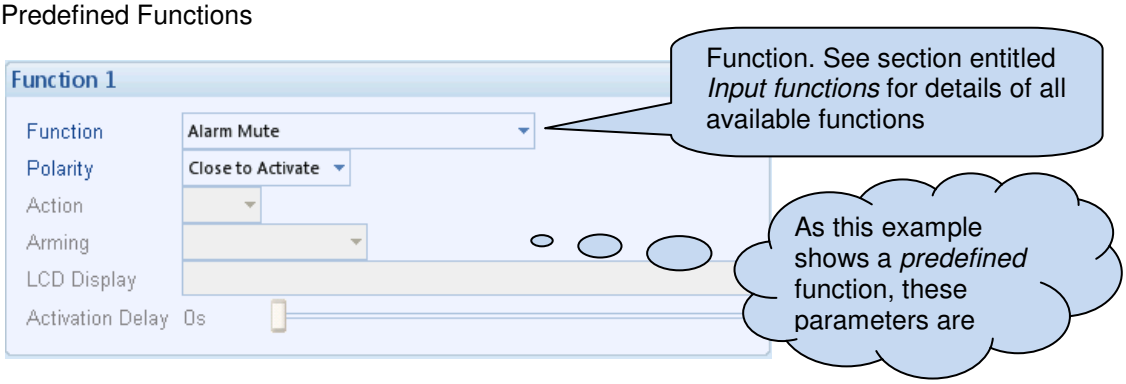
A counter is used by incrementing (adding to) or decrementing (subtracting from) to the counter on the ladder. Upon the counter reaching the configured 'Counter limit', a test for the counter is successful:



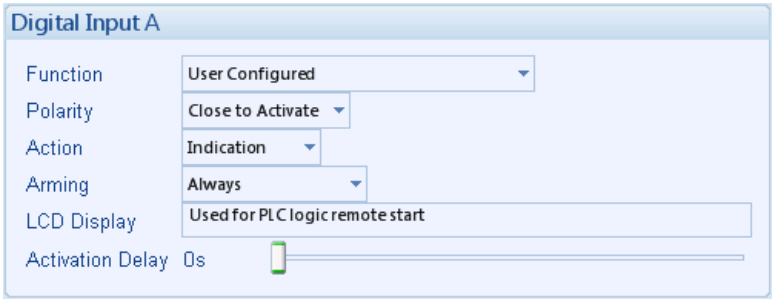
4.17.2.5 PLC FUNCTIONS

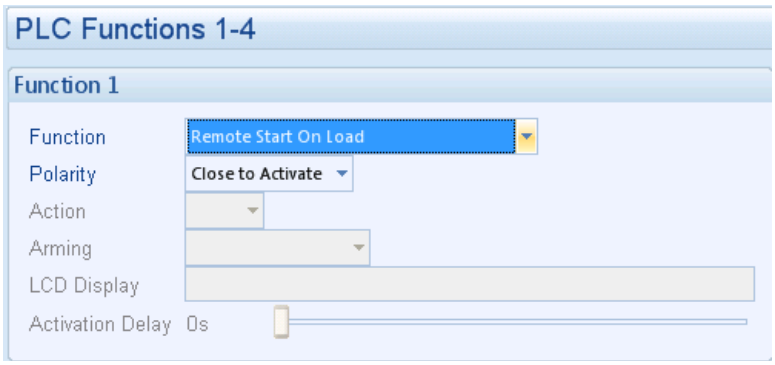
PLC Functions allow the PLC logic to create alarm conditions or drive 'virtual inputs' on the controller.
A PLC function is configured in the same way as a module digital input:

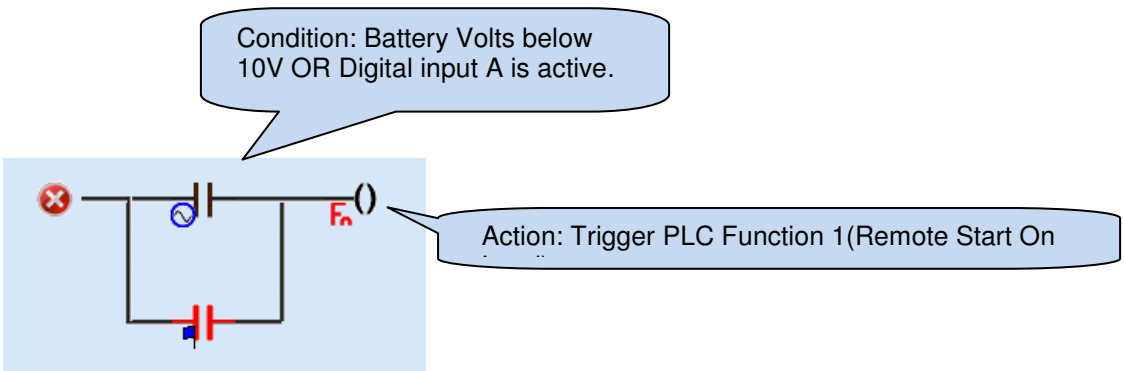
Predefined Functions



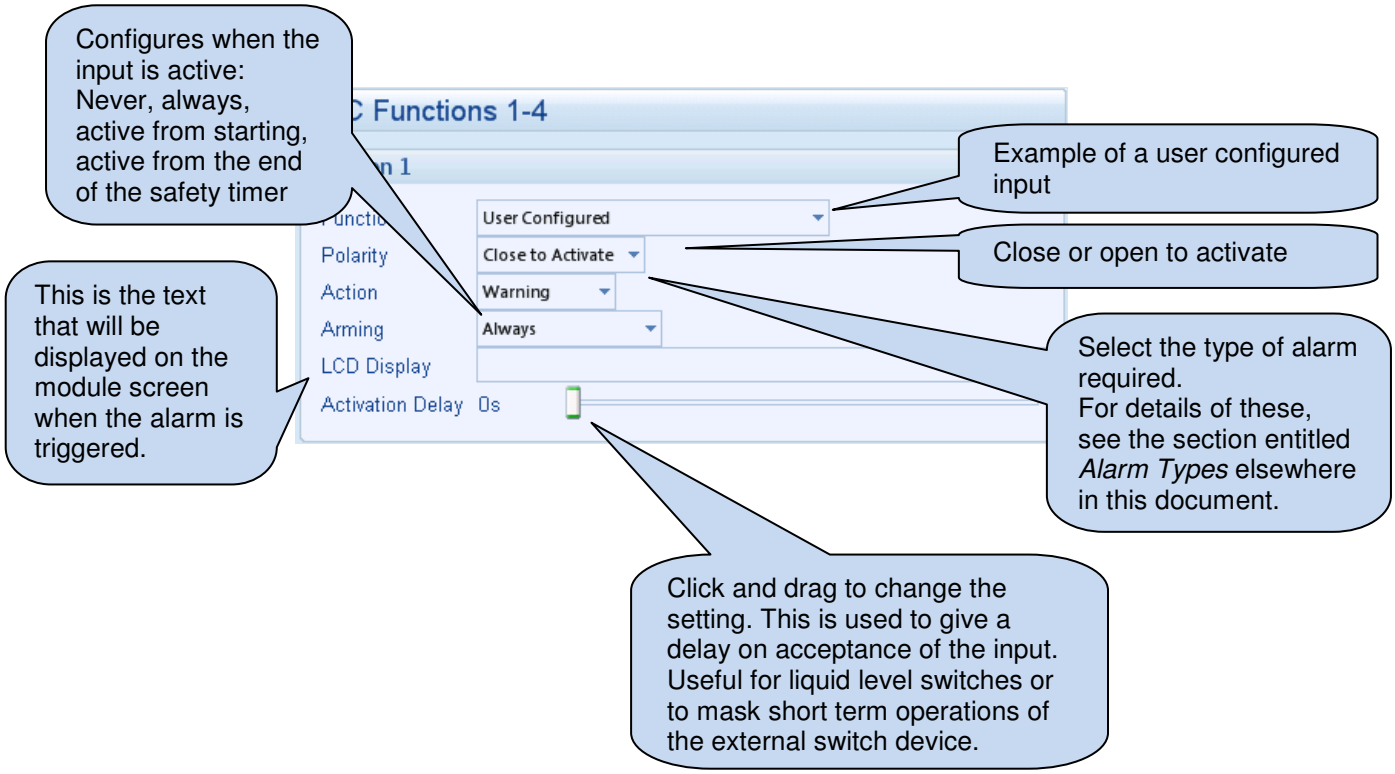
Predefined functions are only used once in the DSE Configuration Suite. For example if digital input A is configured to 'remote start on load', another input cannot be configured to the same function. Similarly, a PLC function cannot be configured to this function either.
Where this is a required function, it is achieved by setting the digital input to "User Configured", "always active", "indication", and OR'ing this into the PLC condition as follows:







User Defined alarms

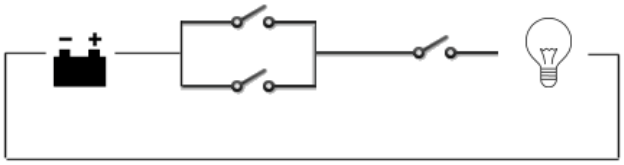


4.17.2.6 CREATING AND EDITING RUNGS

- Click a symbol in the tool bar and drag it to the bar (

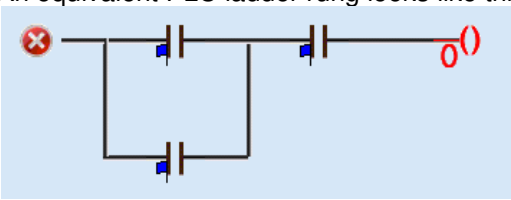
) to create the first rung in your ladder.
- Click a symbol in the tool bar and drag it to a blank space below existing rungs to create a new rung.
- Click a symbol in the tool bar and drag it to the ladder diagram to place the symbol.
- To move a placed symbol, click and drag it to its new location.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

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



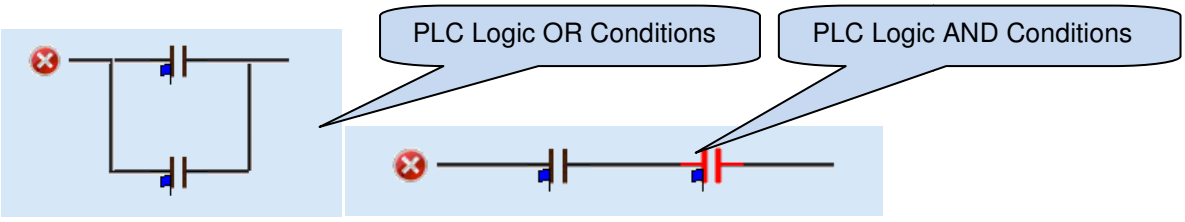
There are two switches (*Output sources)* in parallel to provide an **OR** function and one switch (*Output source)* in series to provide an **AND** function.
When the conditions are satisfied, the bulb illuminates (The action occurs).

An equivalent PLC ladder rung looks like this :

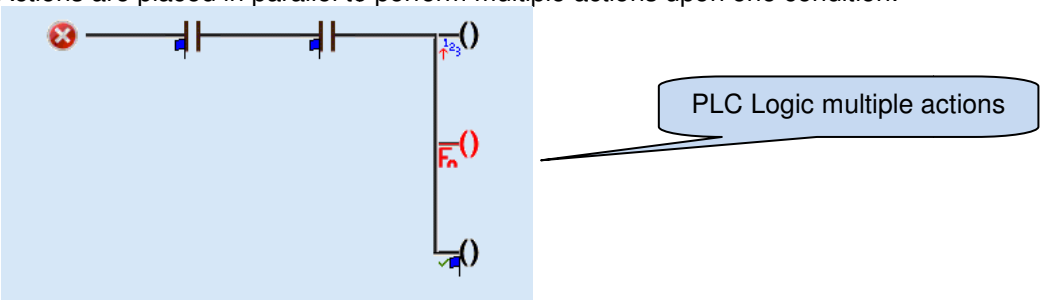


Rungs are processed in order (rung 1, rung 2, rung 3 etc). This sequence repeats every 100mS. Careless setting of the PLC logic causes toggling of an output at a rate of 100mS on/off. This may shorten the life and/or cause damage to externally connected slave relays or other connected equipment.

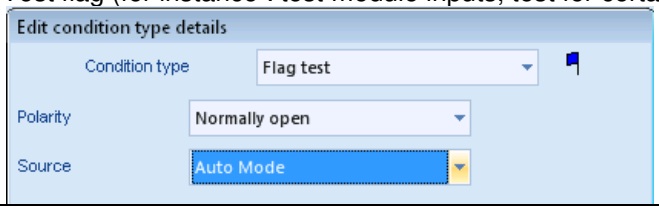
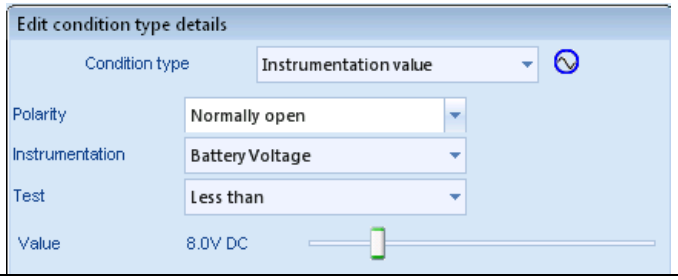
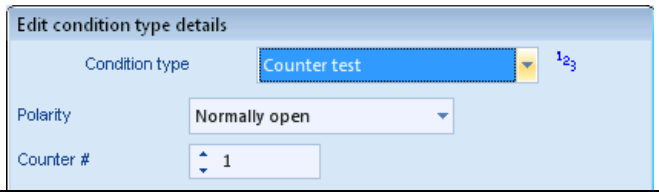
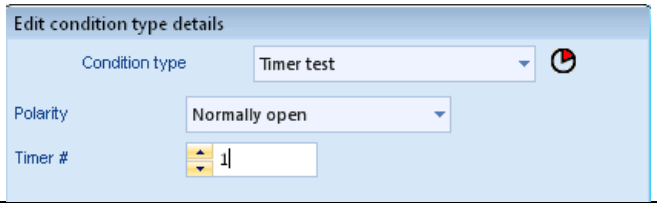
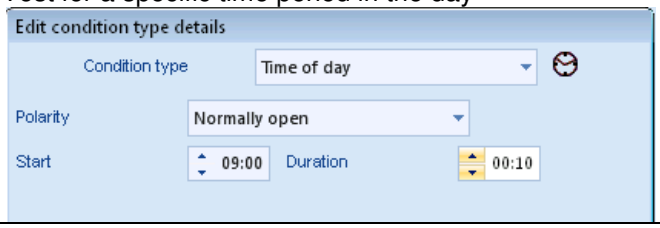
Conditions are placed in series to form an AND operation, or in parallel for form an OR operation:

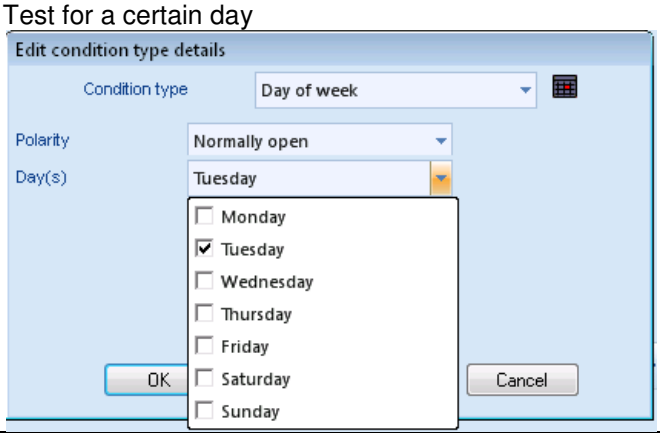
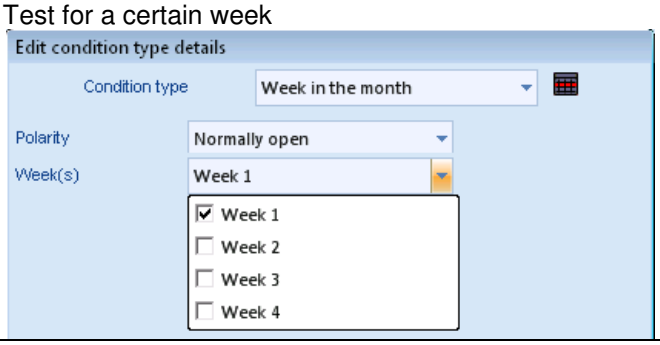
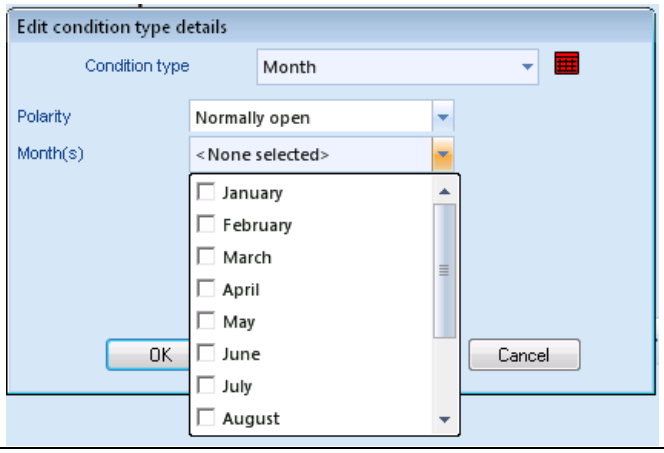
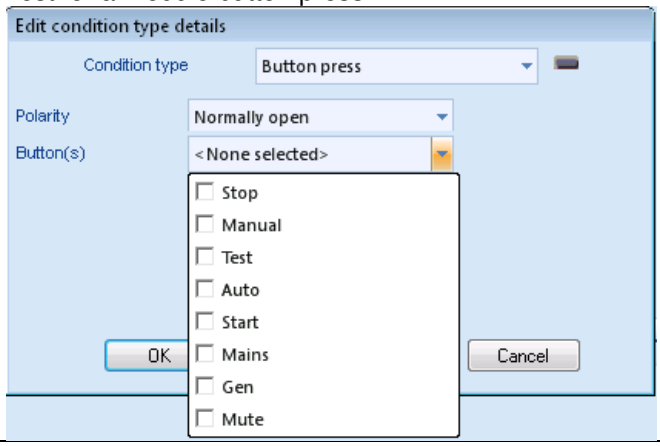


Actions are placed in parallel to perform multiple actions upon one condition:

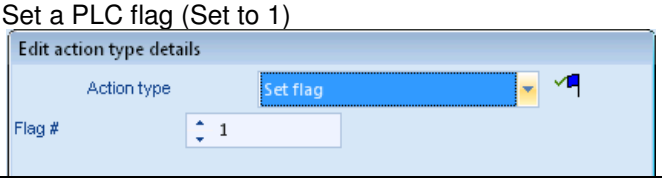
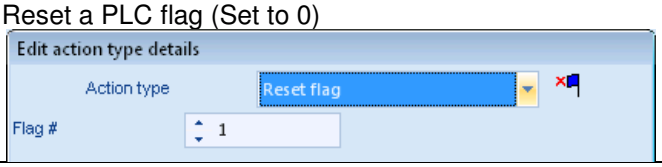
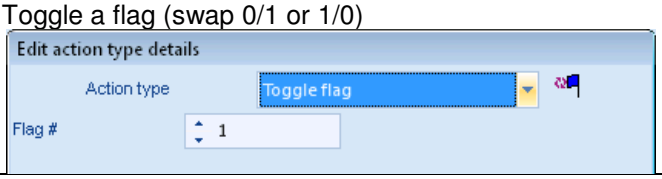
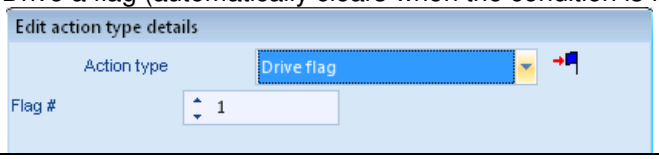
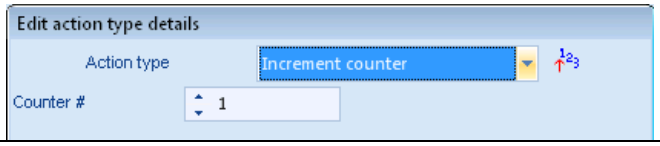
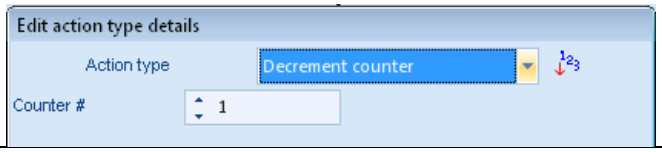
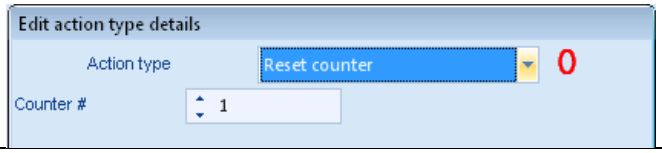
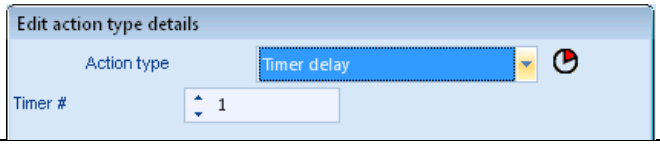


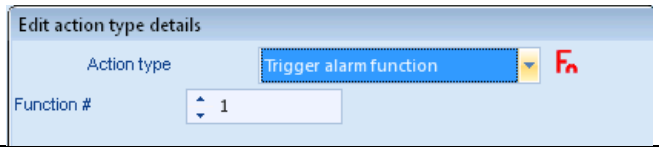
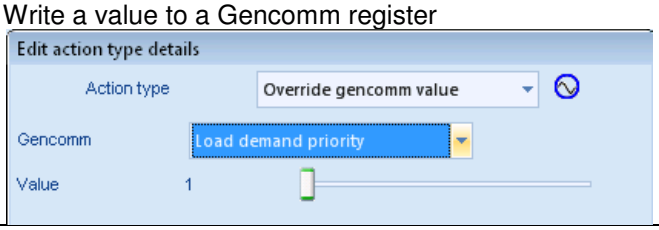
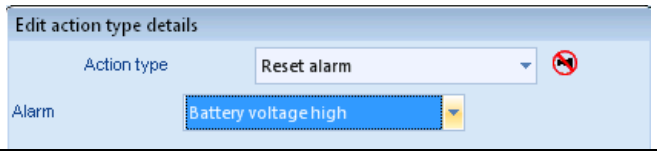
4.17.2.7 CONDITIONS

Conditions	
	Test flag (for instance : test module inputs, test for certain condition) 
	Test an instrumentation value 
	Test a counter 
	Test a timer 
	Test for a specific time period in the day 

Conditions	
	Test for a certain day 
	Test for a certain week 
	Test for a certain month 
	Test for a module button press 

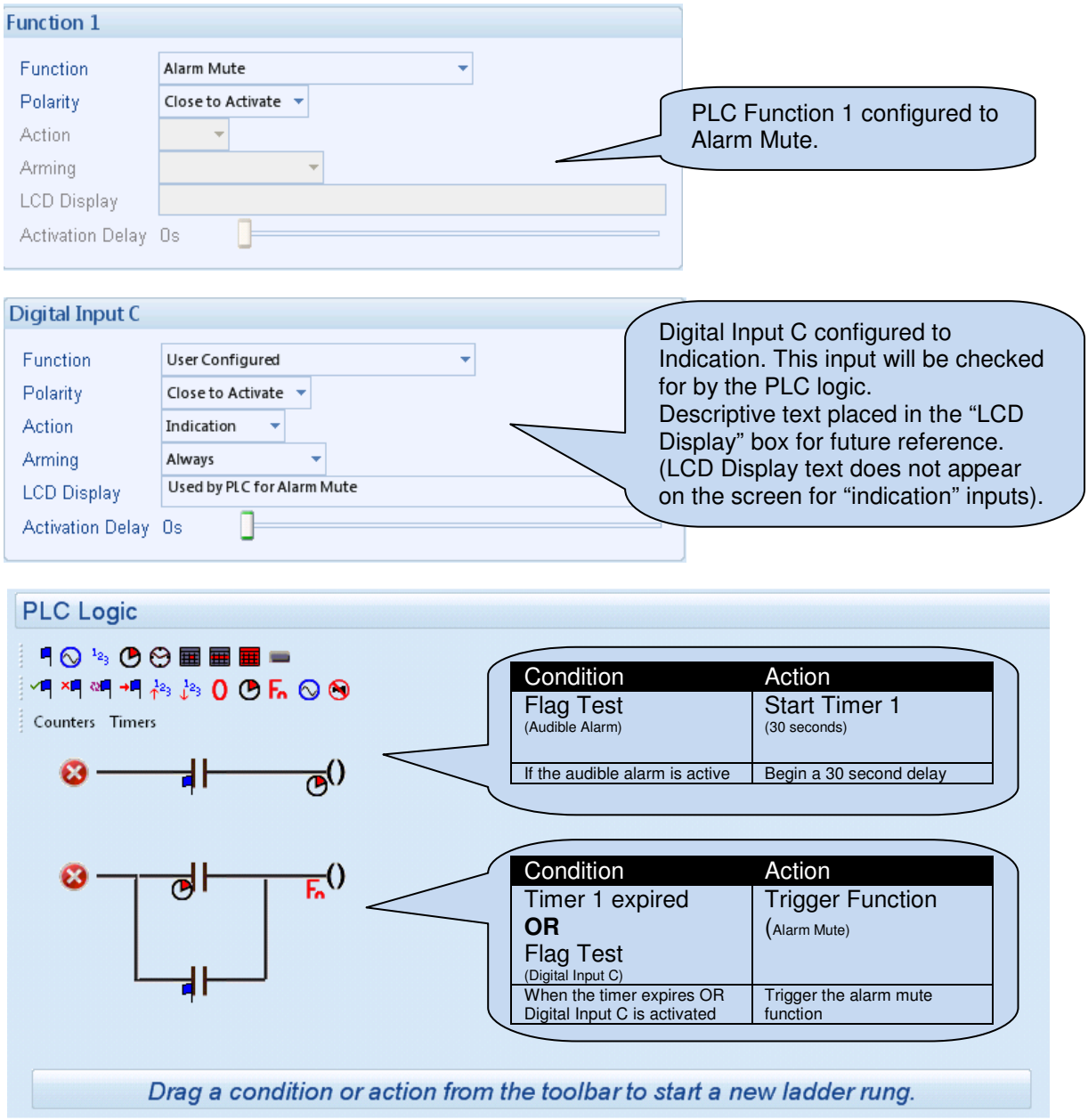
4.17.2.8 ACTIONS

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

Actions	
	Drive a PLC function 
	Write a value to a Gencomm register 
	Reset an alarm 

4.17.2.9 EXAMPLES

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



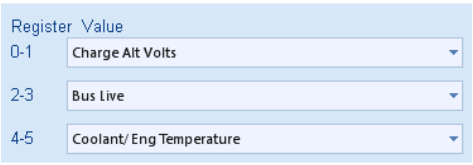
4.17.3 CONFIGURABLE GENCOMM PAGES

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

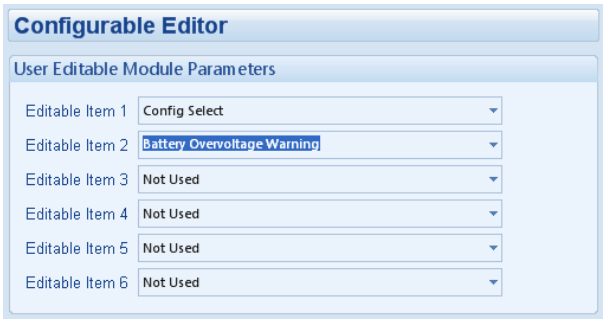
The configurable modbus pages are :

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

Example of page configuration



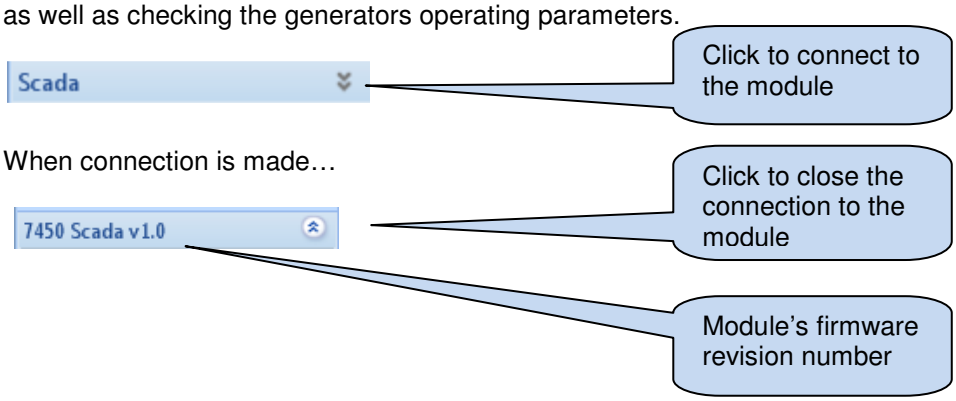
4.17.4 CONFIGURABLE EDITOR



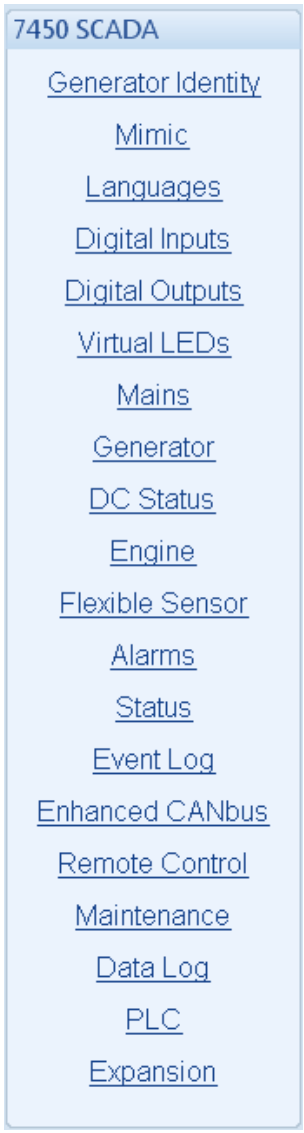
Configurable Editor Screen is available, This is to enable user preferred editable pages.

5 SCADA

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



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

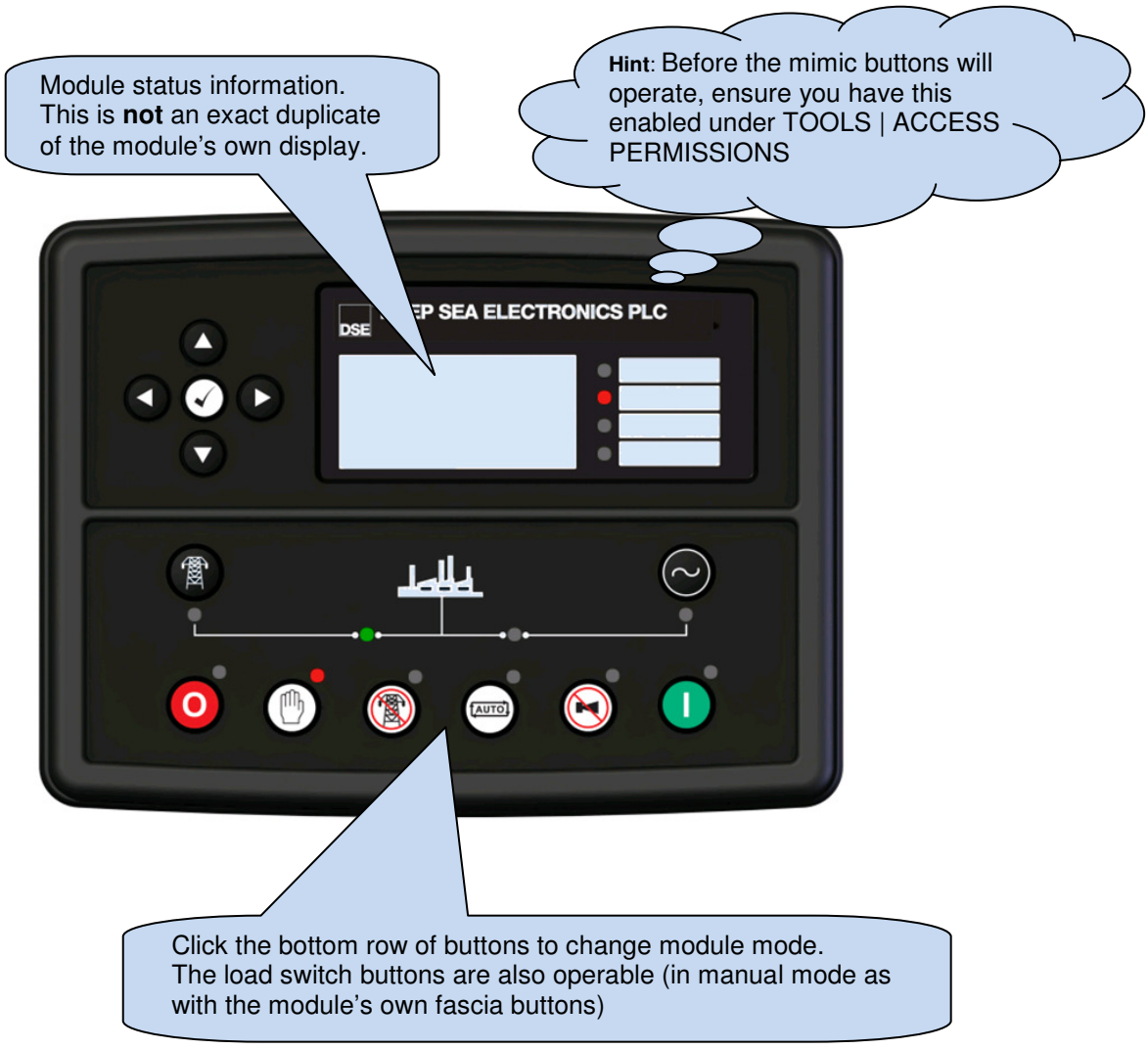


5.1 GENERATOR IDENTITY

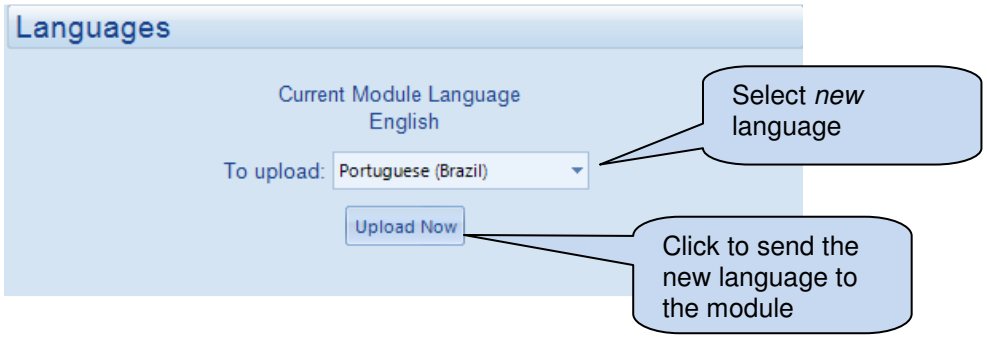
Shows the module's current settings for *Site ID* and *genset ID.*
This information is particularly helpful when the current connection is made remotely by modem or internet for example or when the connected set is one of a number of sets on an RS485 data link.

5.2 MIMIC

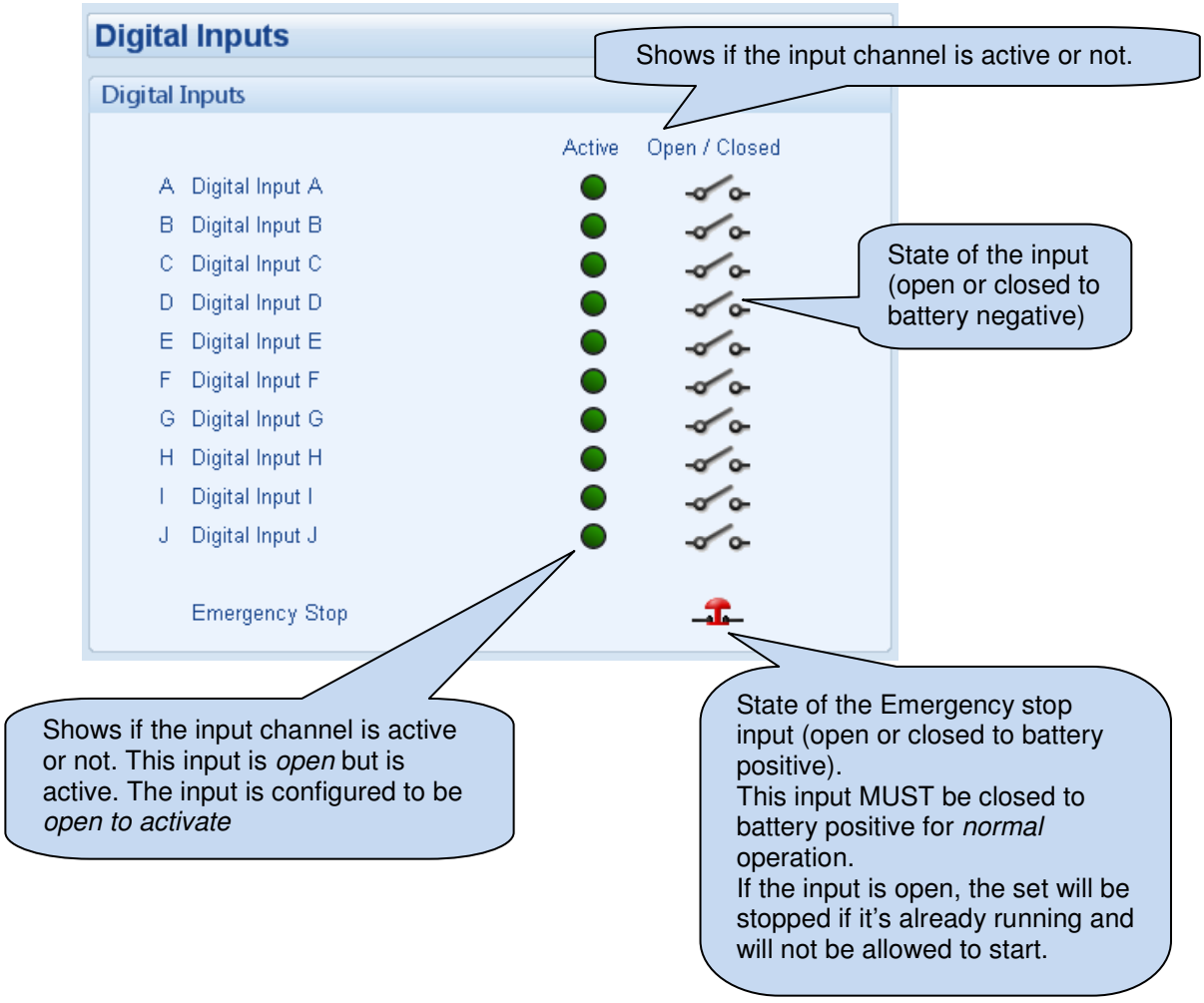
This screen provides a mimic of the control module and allows the operator to change the control mode of the module.
Only the mode control and load switch buttons are operational in the mimic display. The menu navigation buttons are inoperable.



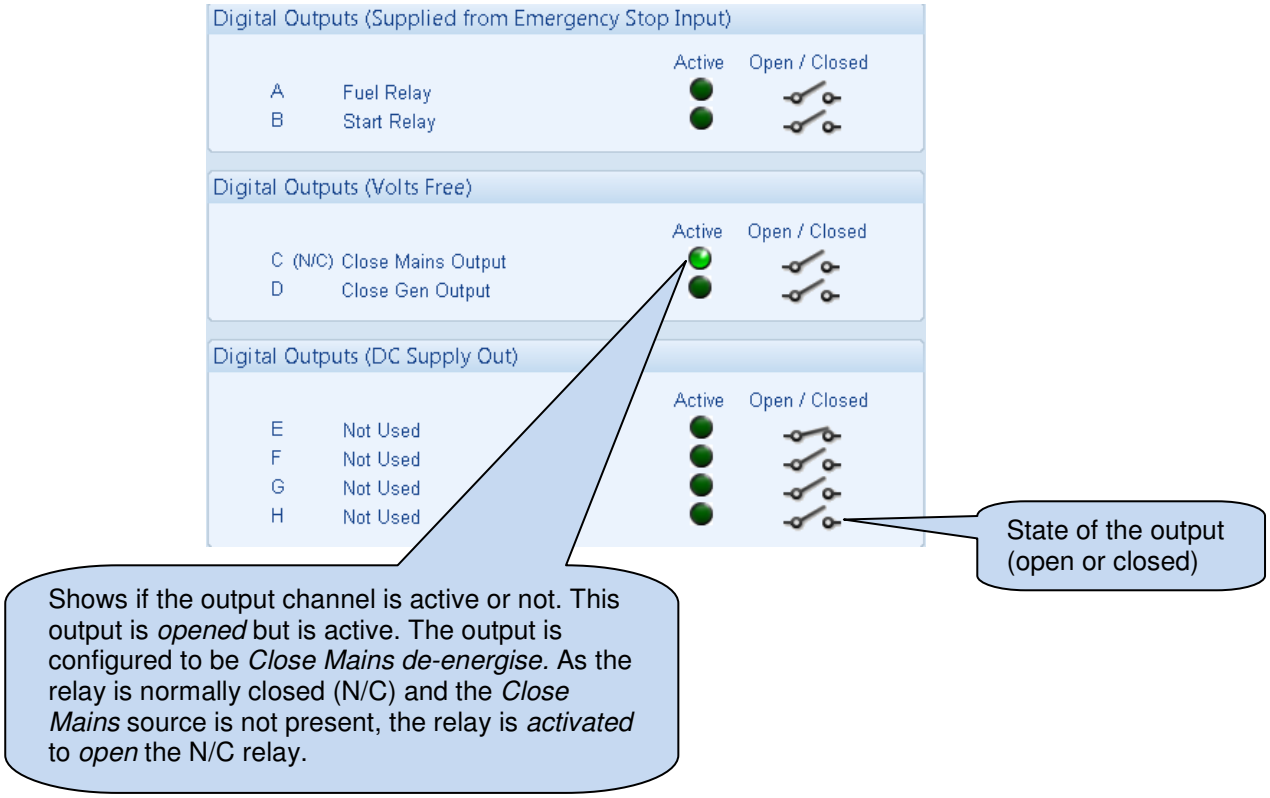
5.3 LANGUAGES



5.4 DIGITAL INPUTS

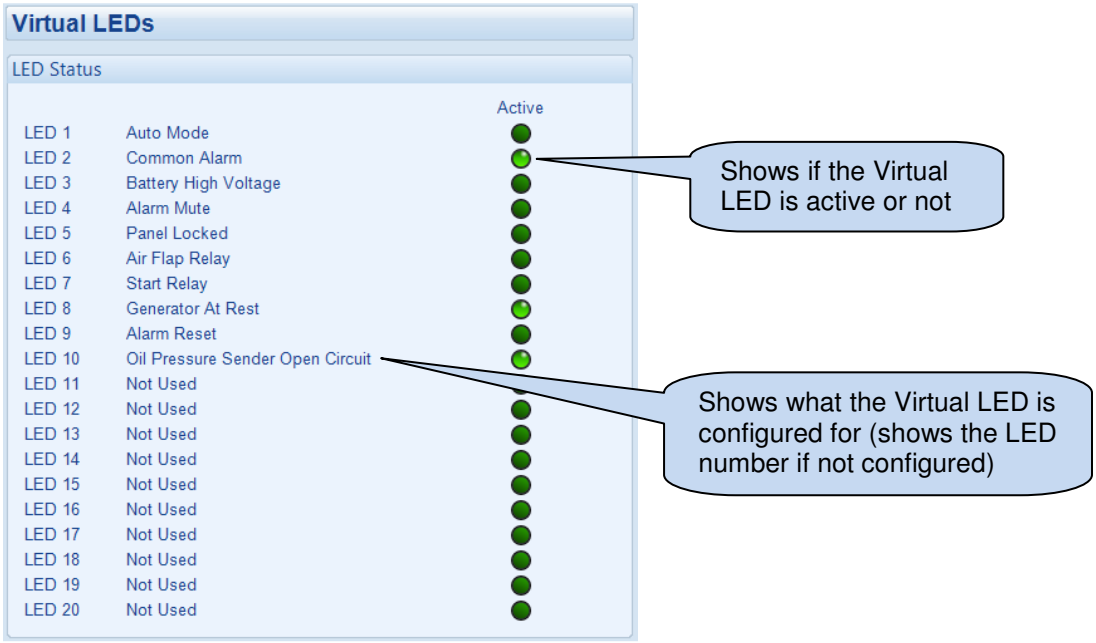


5.5 DIGITAL OUTPUTS



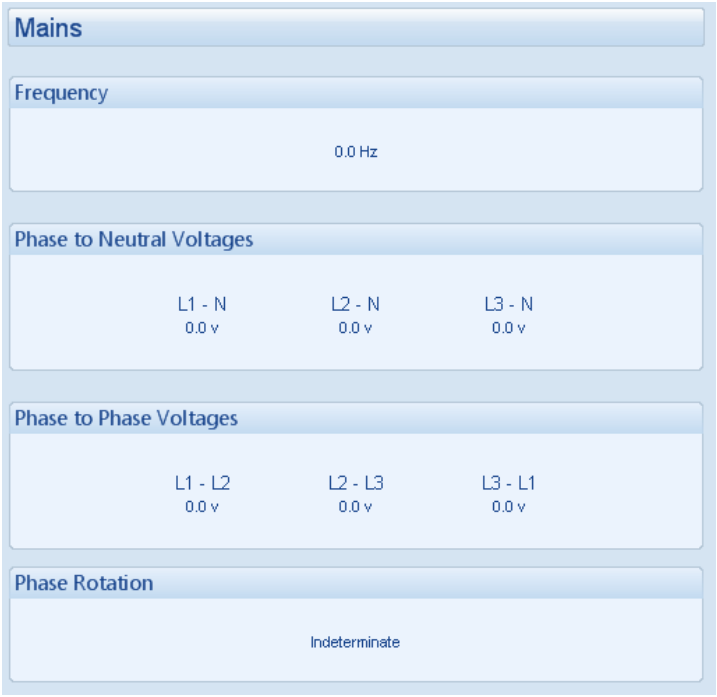
5.6 VIRTUAL LEDS

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



5.7 MAINS

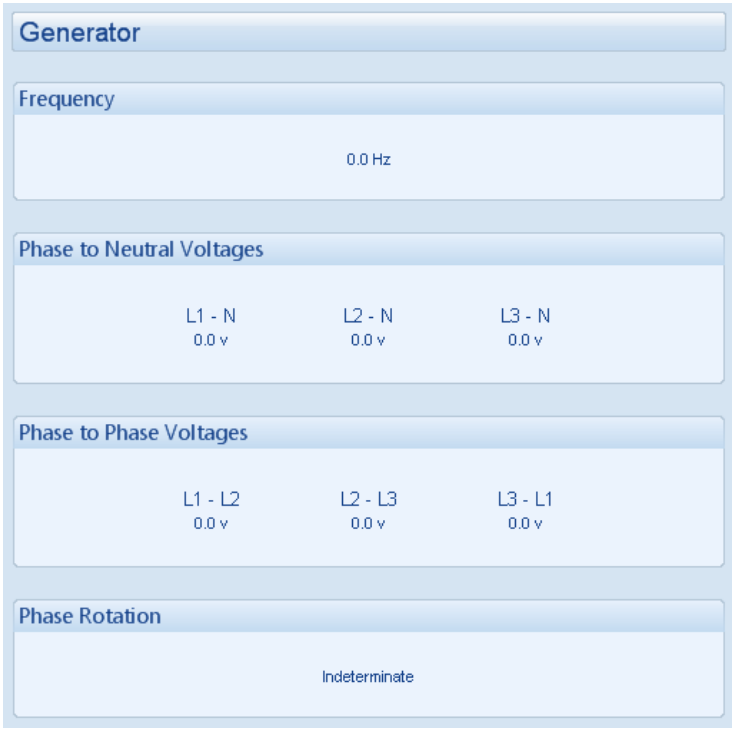
Shows the modules measurements of the mains supply



5.8 GENERATOR

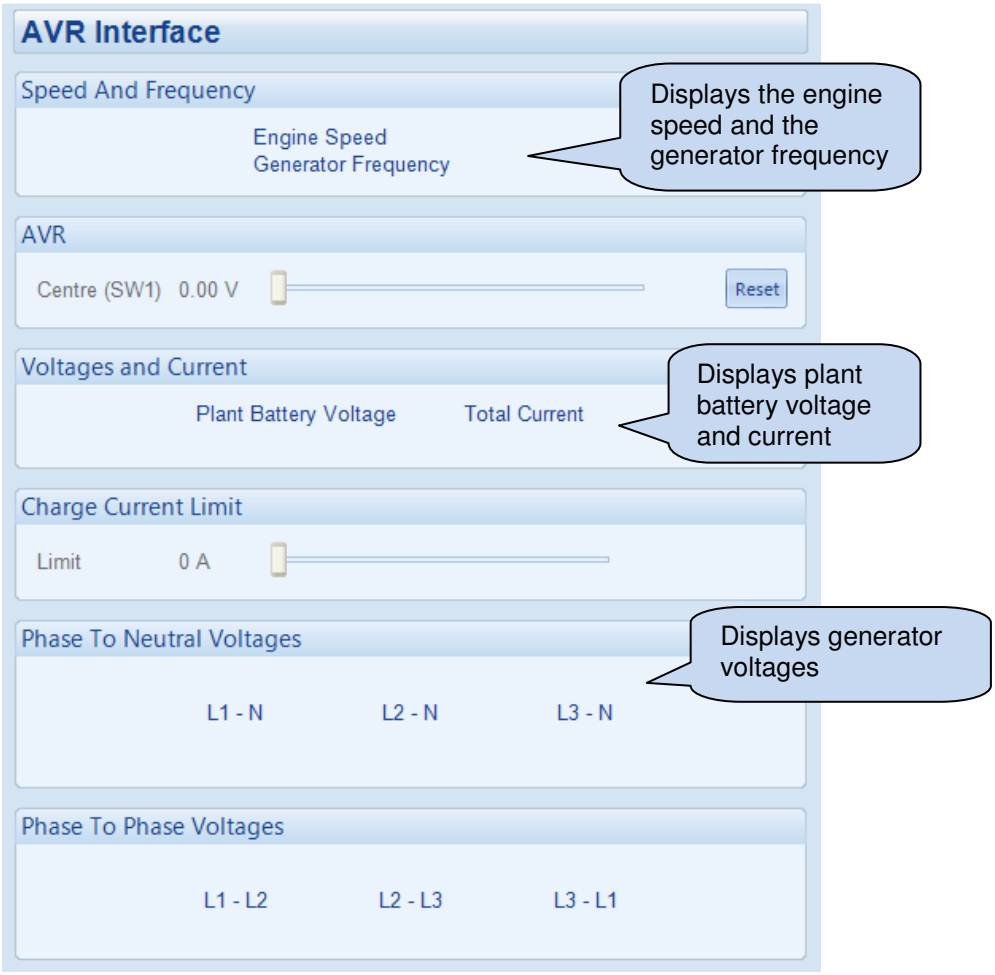
5.8.1 FREQUENCY AND VOLTAGES

Shows the modules measurements of the supply.



5.8.2 AVR INTERFACE

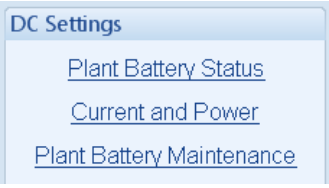
NOTE: These settings are not stored in the module configuration. They are stored in a different memory area and not transferred with the configuration. The *Backup Module* feature transfers both the configuration AND the settings of the Multiset, Governor/AVR interface and the Sync page.



Parameter	Description
Centre (SW1)	Allows the adjustment of the AVR analogue output voltage when running in Manual mode and in Auto mode when *Manual Control Scheme* is selected. The SW1 setting is equal to the voltage of the AVR analogue output.
Charge Current Limit	When *Manual Control Scheme* is selected and the battery charge current exceeds the configurable *Charge Current Limit,* the AVR analogue output voltage is reduced based on the configurable *Ramp Rate.* The AVR analogue output voltage stays at this level when the battery charge current drops below the *Charge Current Limit.* When *Fixed Control Scheme* is selected and the battery charge current exceeds the configurable *Charge Current Limit,* the AVR analogue output voltage is reduced based on the configurable *Ramp Rate.* Once the battery charge current drops below the *Charge Current Limit*; the AVR analogue output is set back to the *Running Voltage* level.

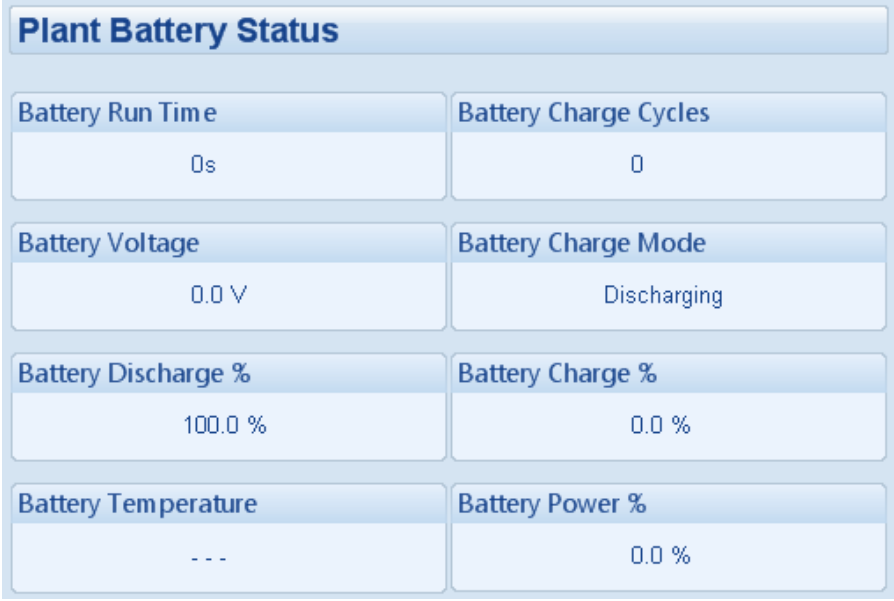
5.8.3 DC SETTINGS STATUS

Shows the modules measurements of the DC Status



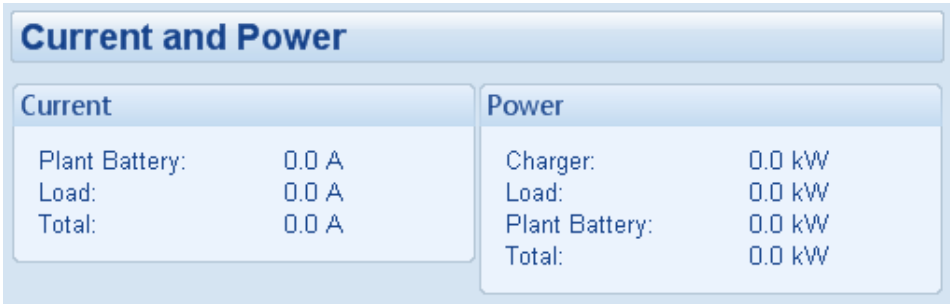
5.8.3.1 PLANT BATTERY STATUS

Shows the Battery status



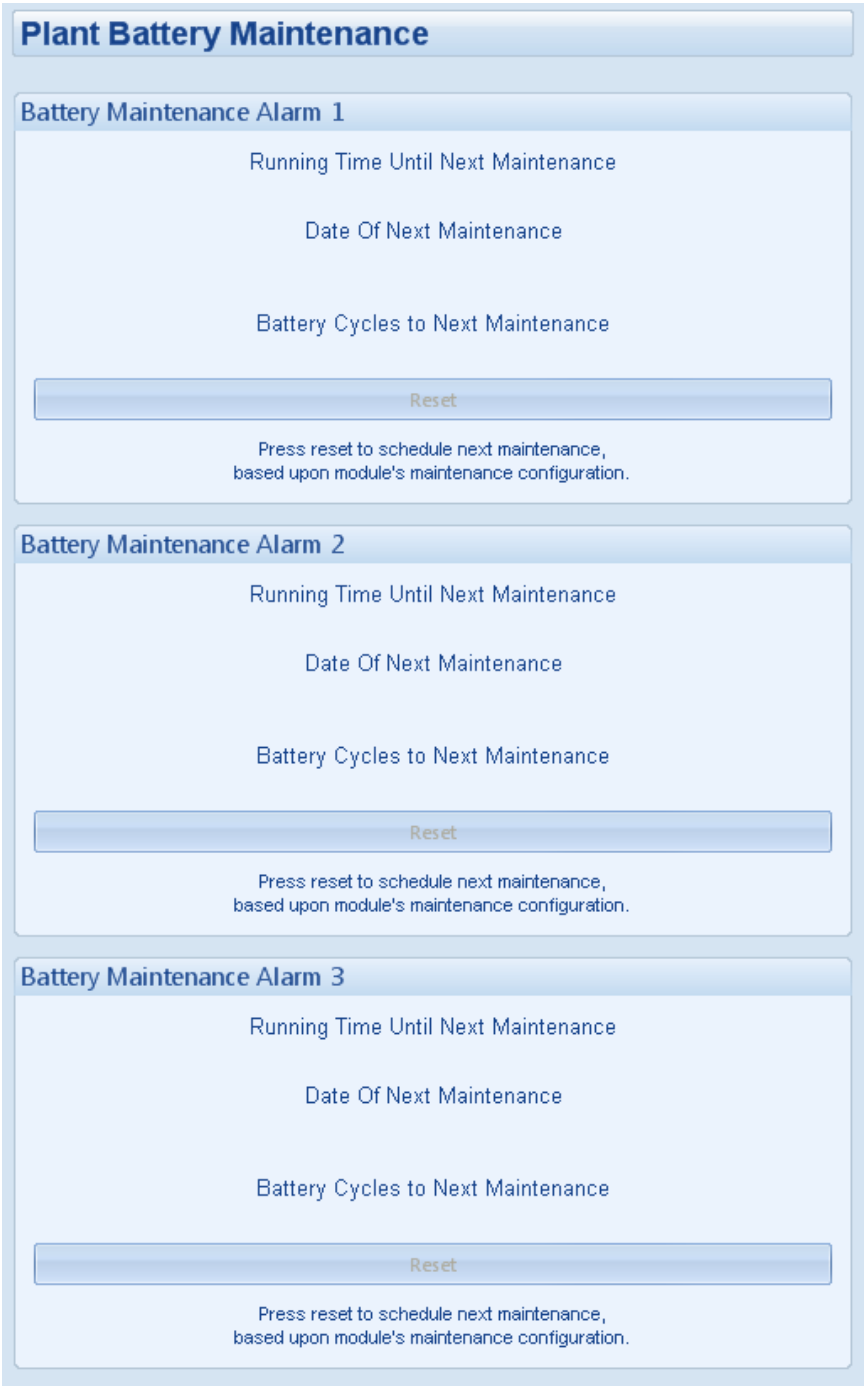
5.8.3.2 CURRENT AND POWER

Shows the Battery Maintenance Status



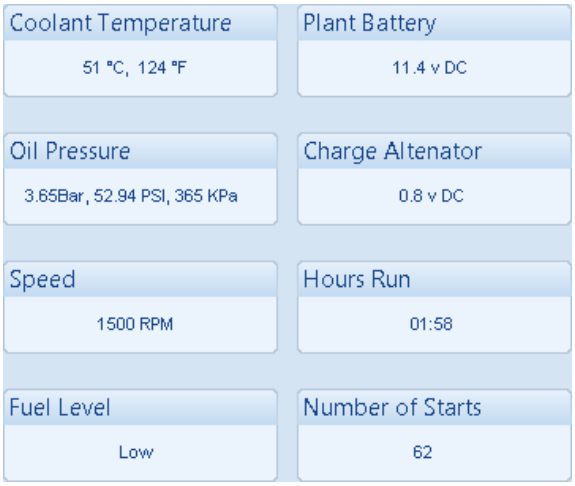
5.8.3.3 PLANT BATTERY MAINTENANCE

Shows the Battery Maintenance Status



5.9 ENGINE

Shows the modules measurements of the engine parameters.

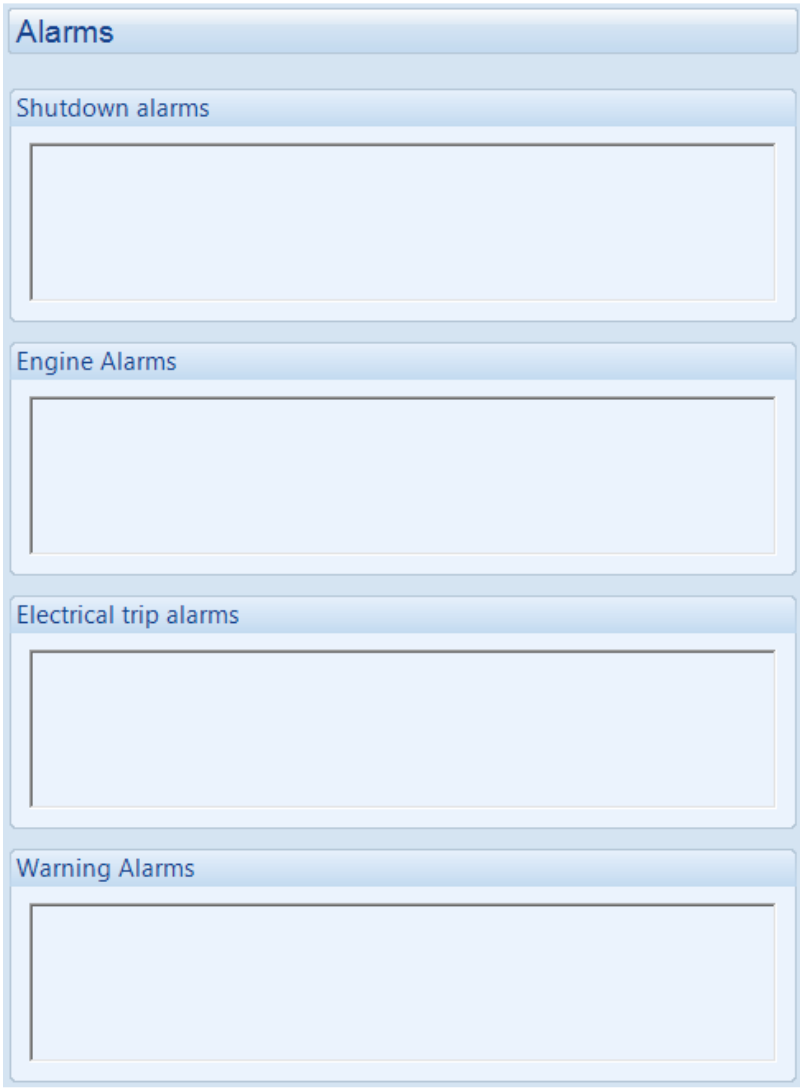


5.10 FLEXIBLE SENSOR

Shows the measurement of the Flexible Sensor (If configured)

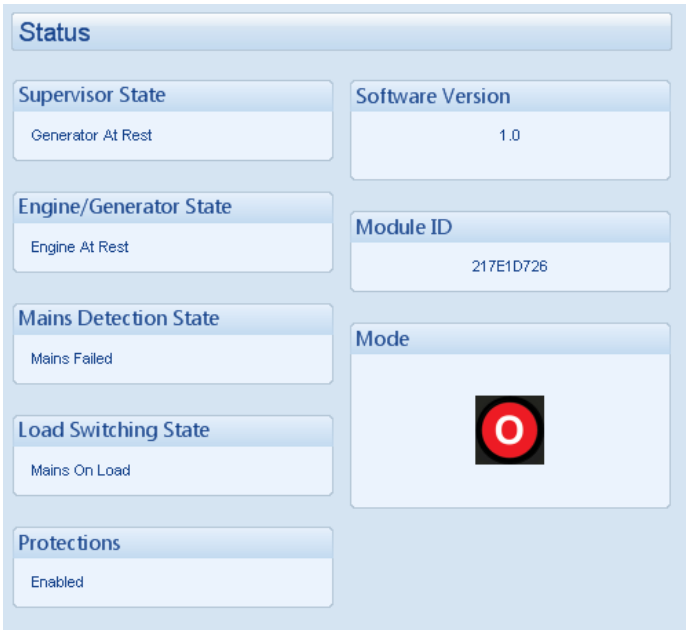
5.11 ALARMS

Shows any present alarm conditions.
For a description of the different alarm types, see the section entitled *Alarm Types* elsewhere in this manual.



5.12 STATUS

Shows the module's current status.



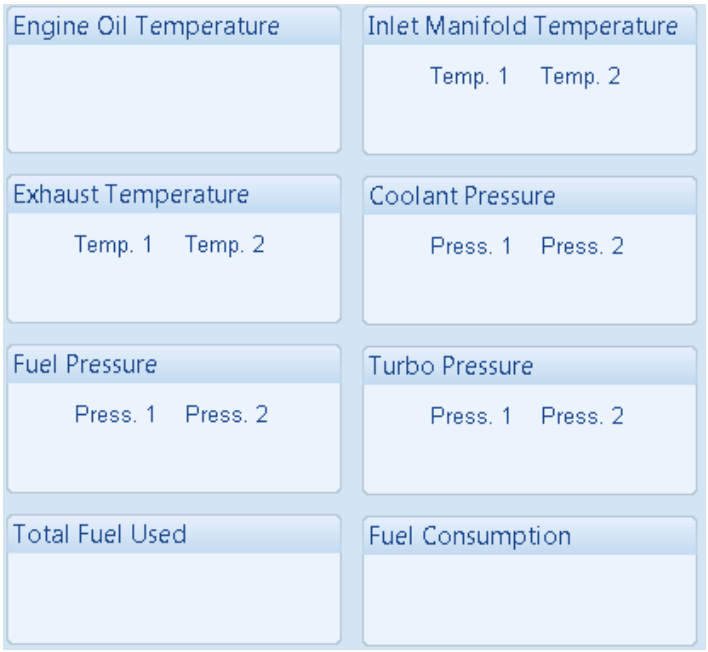
5.13 EVENT LOG

Shows the contents of the module's event log.

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

5.14 ENHANCED CANBUS

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

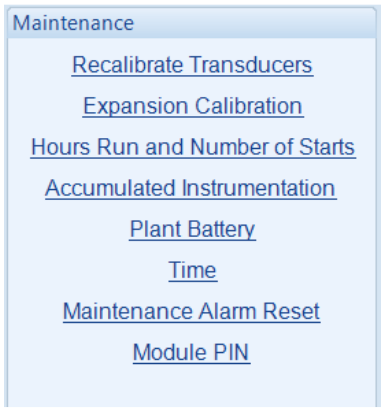


5.15 REMOTE CONTROL

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

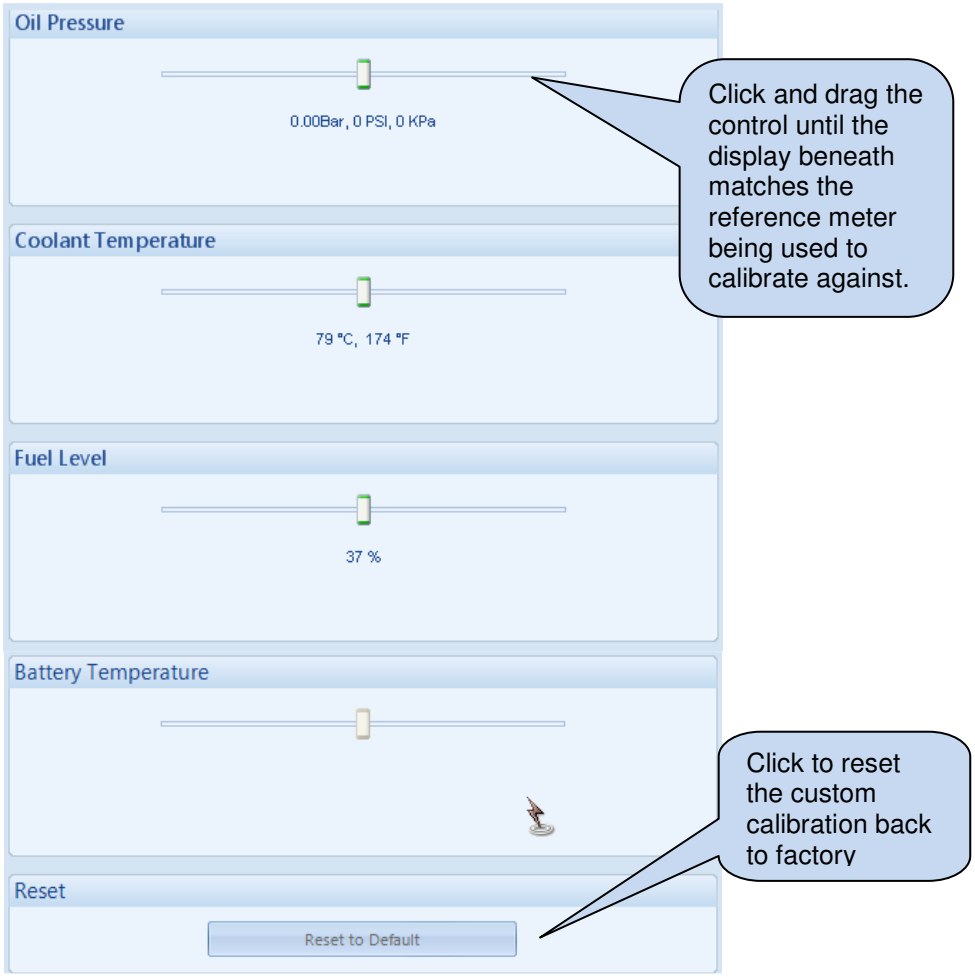
5.16 MAINTENANCE

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



5.16.1 RECALIBRATE TRANSDUCERS

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

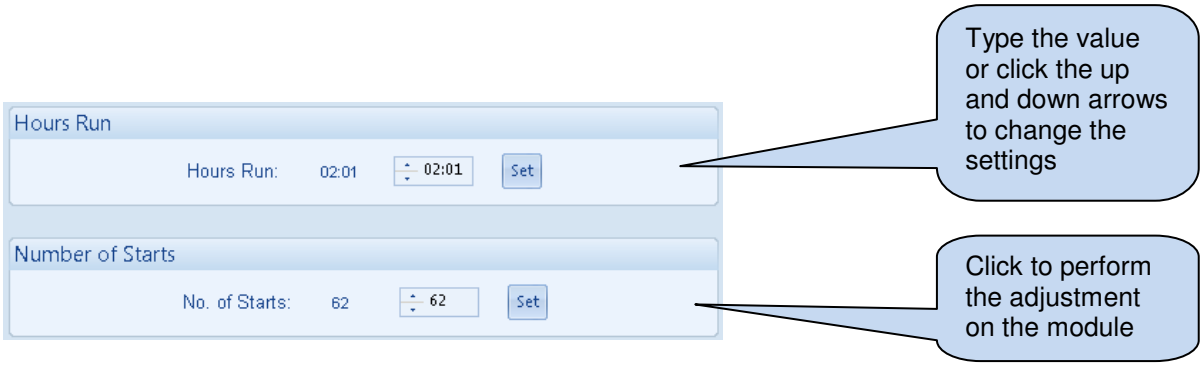


5.16.2 EXPANSION CALIBRATION

This section allows the analogue sensor inputs of the DSE2130 input expansion modules to be calibrated to remove inaccuracies caused by the tolerance of the sensor devices. The engine runs when the instruments are calibrated and reference should be made to a third party accurate sensing device to ensure accurate recalibration.

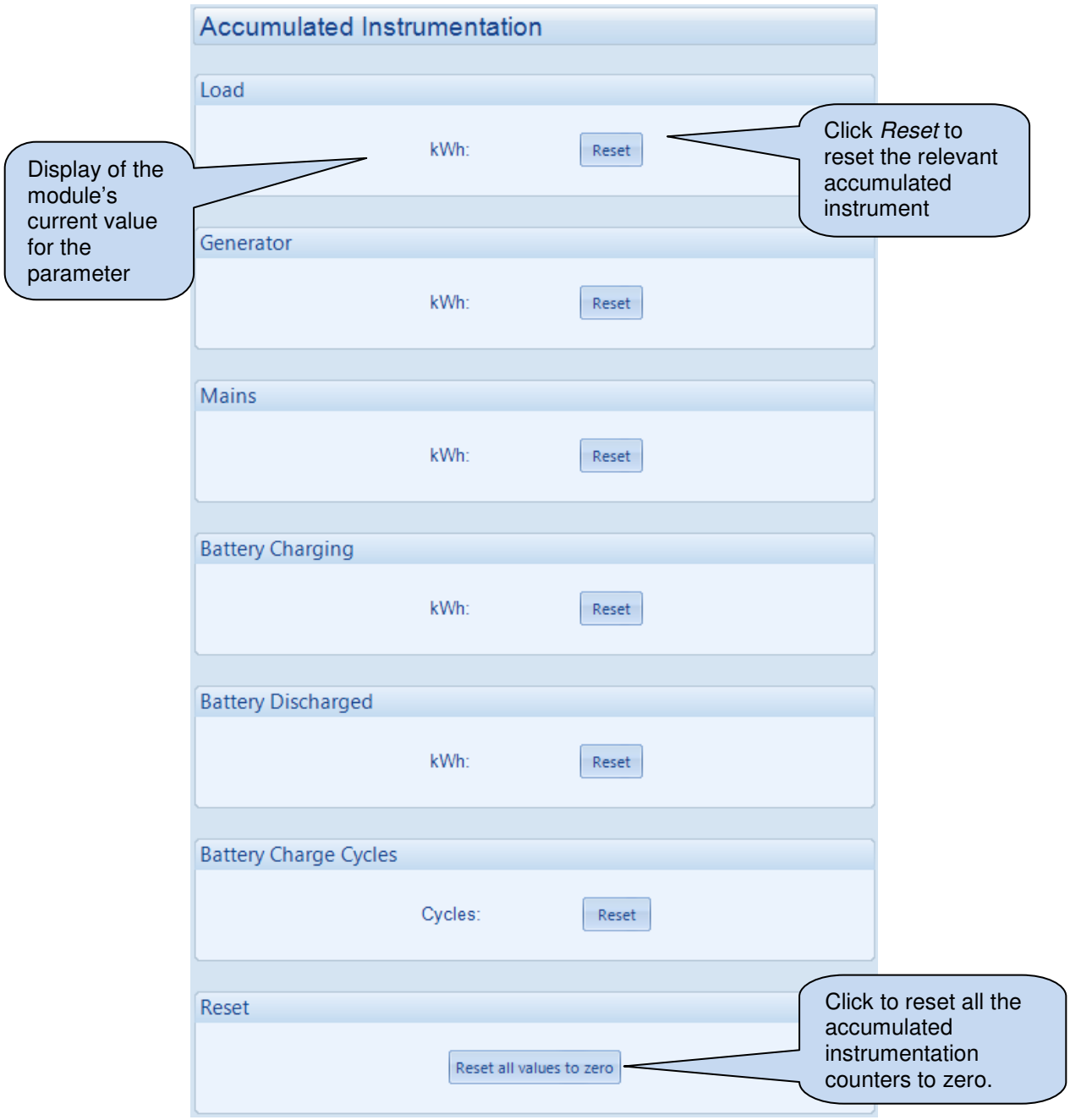
5.16.3 HOURS RUN AND NUMBER OF STARTS

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

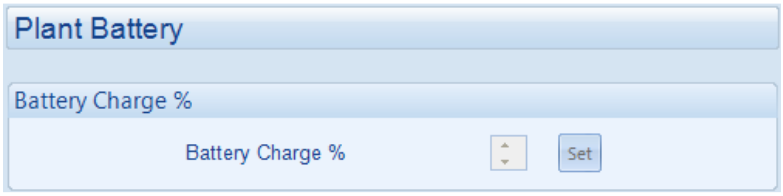


5.16.4 ACCUMULATED INSTRUMENTATION

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

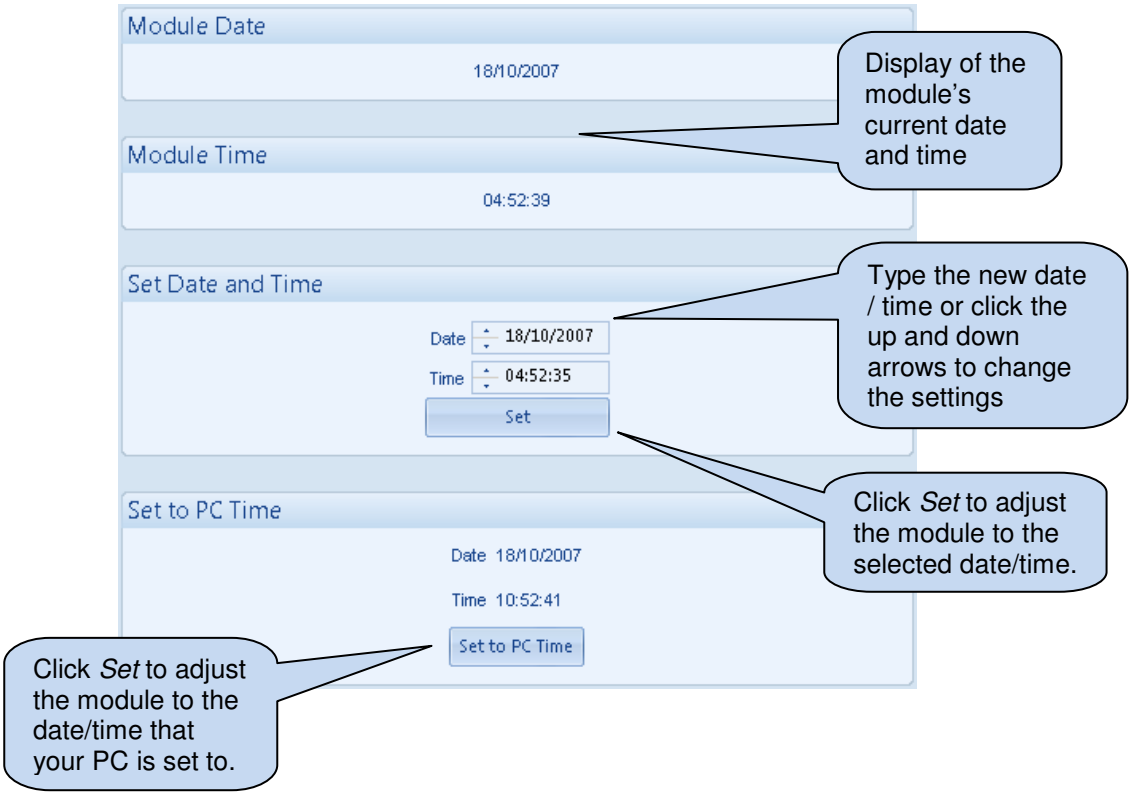


5.16.5 PLANT BATTERY



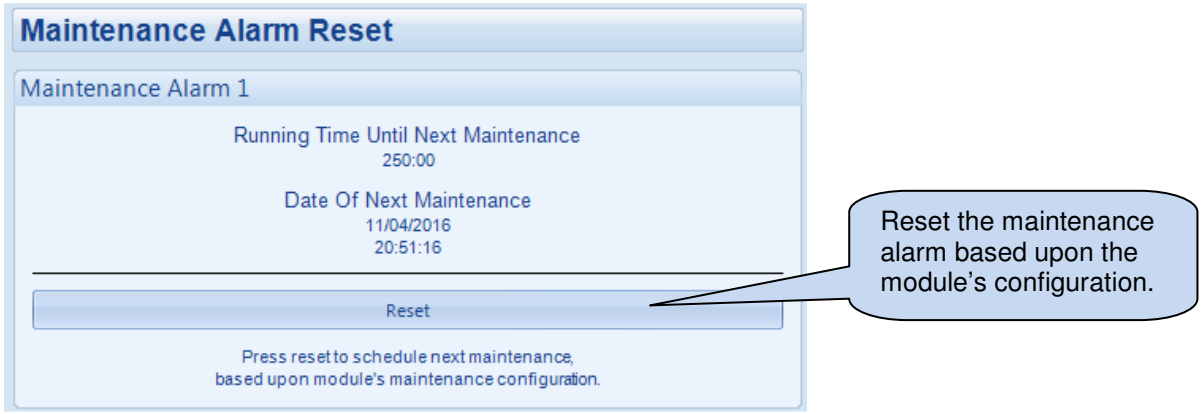
NOTE : When the float charging is disabled, the DSE7450 is not able to detect the Plant Battery's properties, therefore the user must fully charge the Plant Battery and then set the *Battery Charge %* to 100%.
If the *Charge Efficiency %* is inaccurate, the *Battery Charge %* has loss of accuracy when charging.

5.16.6 TIME



5.16.7 MAINTENANCE ALARM RESET

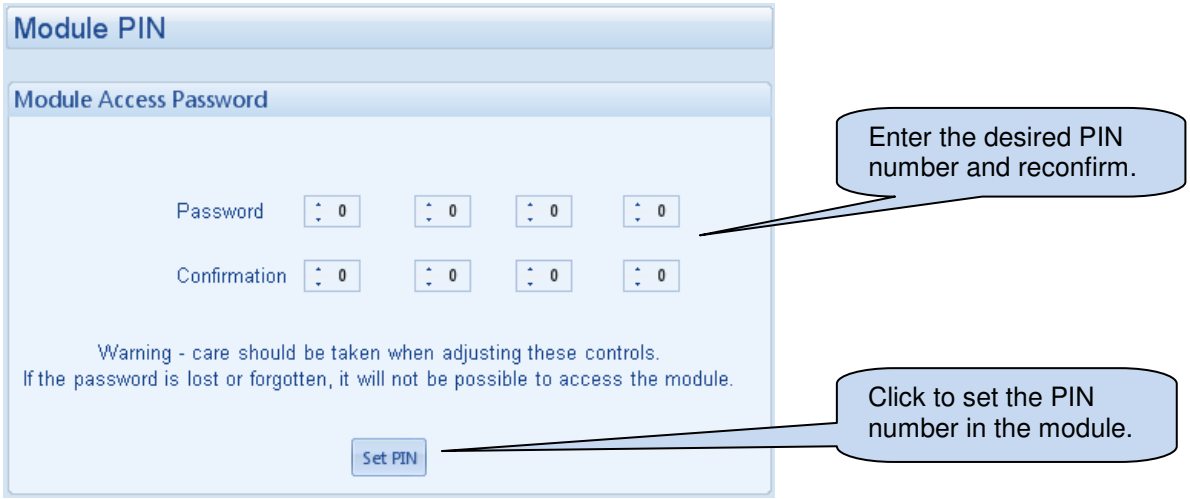
Three maintenance alarms active in the control module. Each is reset individually; only one alarm is shown below for clarity.



5.16.8 MODULE PIN

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

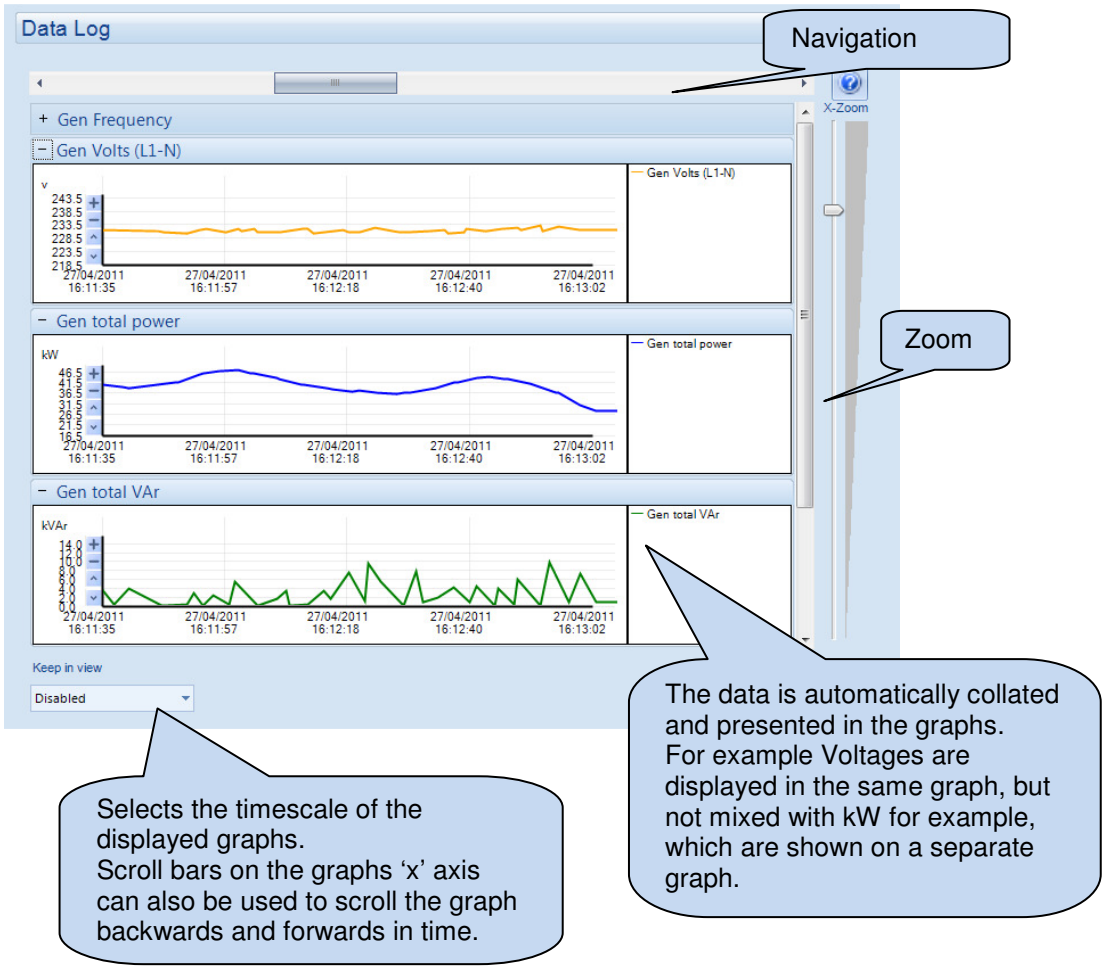
Allows a PIN (Personal Identification Number) to be set in the controller. This PIN must be entered to either access the front panel configuration editor or before a configuration file is sent to the controller from the PC software.



5.17 DATALOG

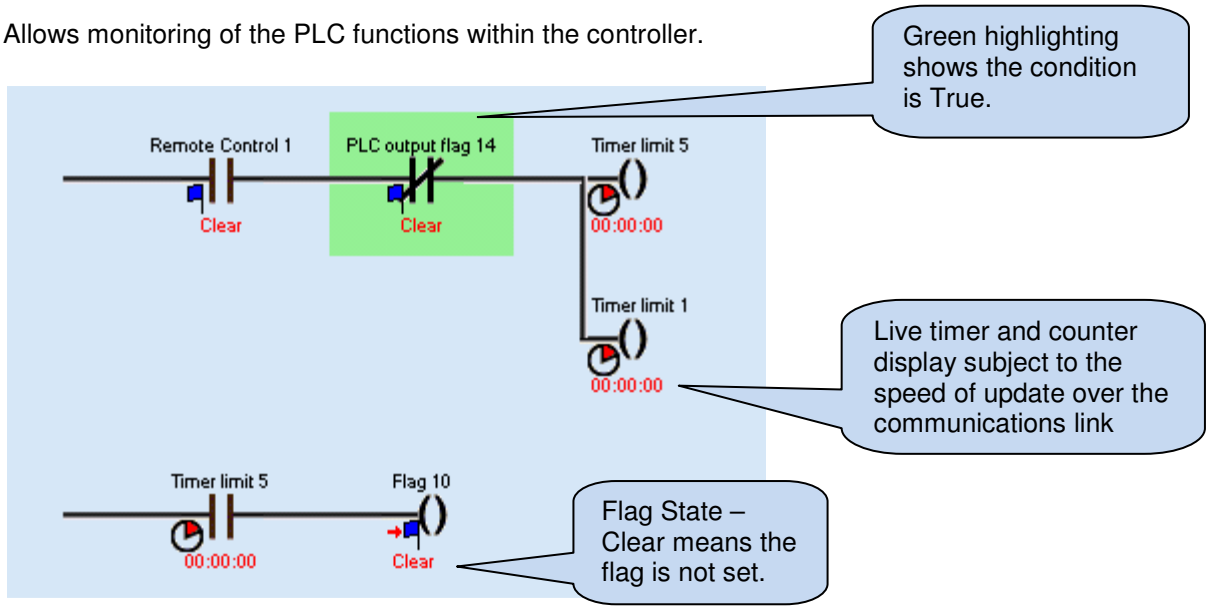
Allows viewing of the module datalog (if configured).

NOTE: Data logging is a 'live' function – Maximum 8hrs duration is shown so long as the PC is left connected to the controller.

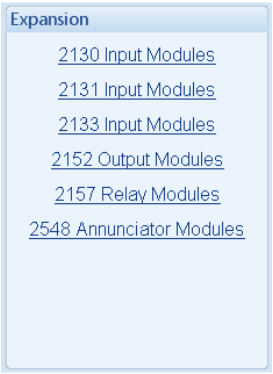


5.18 PLC

Allows monitoring of the PLC functions within the controller.



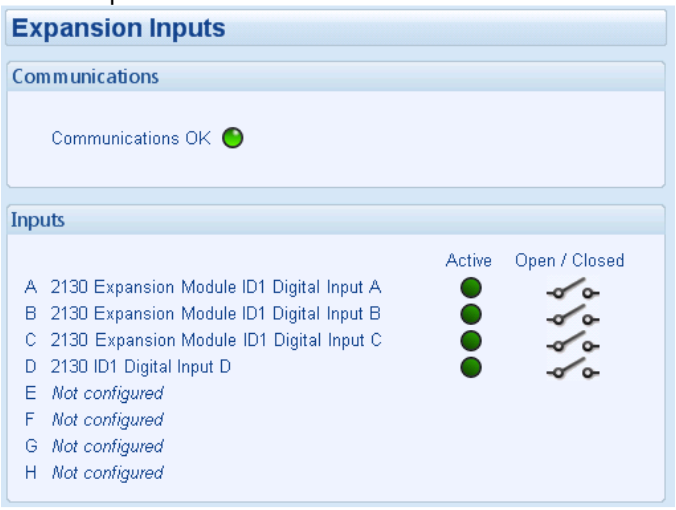
5.19 EXPANSION



5.19.1 EXPANSION INPUTS

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

For example:



6 ALARM TYPES

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

Alarm type	Description
Indication	No audible alarm or common warning signal occurs. *Indication* alarms are only used to illuminate indicators or to activate outputs.
Warning	Audible alarm and common alarm signal is generated. The set continues to run. *Warning alarms* are used to draw the operator's attention to a minor issue or to a problem that may escalate to an Electrical Trip or Shutdown Alarm if left untreated.
Electrical Trip	Audible alarm and common alarm signal is generated. The set is taken off load and the cooling timer begins, after which the set is stopped. *Electrical Trip alarms* are series issues that require the set to be taken off load. As the name implies, this is often electrical faults that occur 'after' the load breaker. The set is allowed to cool before stopping.
Shutdown	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.
Generator Locked Out	This Alarm is present when an active alarm is present preventing the generator from starting. It is advisable to look in the Alarms page of the control module either using the front panel or through SCADA. The alarm needs to be investigated and the alarm reset before the "Generator Locked out" clears.

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