DEEP SEA ELECTRONICS

DSEL401 MKII Operator Manual

Document Number: 057-221

Author: Ashley Senior

Deep Sea Electronics Ltd.
Highfield House
Hunmanby
North Yorkshire
YO14 0PH
England

Sales Tel: +44 (0) 1723 890099

E-mail: sales@deepseaelectronics.com
Website: www.deepseaelectronics.com

DSEL401 MKII Operator Manual

Amendments Since Last Publication

Issue	Comments
1	Initial release
2	Updated to latest release supporting hybrid applications and Mains switching
3	Updated sections Glossary of Terms, Bibliography, J1939-75, Adding an External Sounder, Instrumentation Icons, Alarm Icons, Menu Navigation, Home, Mains, Load, Info, Event Log, Engine Tier 4 Information, Scheduler, Alternative Configurations and Front Panel Configuration.
4	Updated sections DC Voltage Sensing, Alternate Topology Diagrams, Instrumentation Icons, DC Voltage Instrumentation for DC Sensing Update.
5	Updated sections Front Panel Editor and document style.

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

TABLE OF CONTENTS

SECTION **PAGE**

1 INTRODUCTION

This document details the installation and operation requirements of the DSEL401 MKII module.

The manual forms part of the product and must be kept for the entire life of the product. If the product is passed or supplied to another party, ensure that this document is passed to them for reference purposes.
This is not a *controlled document.* Updates are not automatically informed. Any future updates of this document are included on the DSE website at www.deepseaelectronics.com

The DSEL401 MKII module have been designed to allow the operator to start and stop the generator of a lighting tower and if required, stagger the loading of the lights to the generator automatically.

Additionally, the DSEL401 MKII module can automatically switch the lights on and off depending upon the generator set's fuel level to conserve fuel.

The user also has the facility to view the system operating parameters via the LCD display.

The DSEL401 MKII module monitors the engine, indicating the operational status and fault conditions, automatically shutting down the engine and giving a true first up fault condition of an engine. The LCD indicates the fault.

The powerful ARM microprocessor contained within the module allows for incorporation of a range of complex features:

- *Icon based LCD display*
- ***True RMS** Voltage, Current monitoring*
- *USB Communications*
- *Engine parameter monitoring.*
- *Fully configurable inputs for use as alarms or a range of different functions.*
- *Engine ECU interface to **electronic engines**.*

Using a PC and the DSE Configuration Suite software allows alteration of selected operational sequences, timers, alarms and operational sequences. Additionally, the module's integral front panel configuration editor allows adjustment of this information.

A robust plastic case designed for front panel mounting houses the module. Connections are via locking plug and sockets.

Access to critical operational sequences and timers for use by qualified engineers, can be protected by a security code. Module access can also be protected by PIN code. Selected parameters can be changed from the module's front panel.

The module is housed in a robust plastic case suitable for panel mounting. Connections to the module are via locking plug and sockets.

1.1 CLARIFICATION OF NOTATION

Clarification of notation used within this publication.

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

1.2 GLOSSARY OF TERMS

Term	Description
DSEL4xx MKII,	All modules in the DSEL4xx MKII range.
DSEL401 MKII,	DSEL401 MKII module/controller
CAN	Controller Area Network Vehicle standard to allow digital devices to communicate to one another.
CT	Current Transformer An electrical device that takes a large AC current and scales it down by a fixed ratio to a smaller current.
DM1	Diagnostic Message 1 A DTC that is currently active on the engine ECU.
DTC	Diagnostic Trouble Code The name for the entire fault code sent by an engine ECU.
ECU/ECM	Engine Control Unit/Management An electronic device that monitors engine parameters and regulates the fuelling.
FMI	Failure Mode Indicator A part of DTC that indicates the type of failure, e.g. high, low, open circuit etc.
OC	Occurrence Count A part of DTC that indicates the number of times that failure has occurred.
PGN	Parameter Group Number A CAN address for a set of parameters that relate to the same topic and share the same transmission rate.
PLC	Programmable Logic Controller A programmable digital device used to create logic for a specific purpose.
SCADA	Supervisory Control And Data Acquisition A system that operates with coded signals over communication channels to provide control and monitoring of remote equipment
SPN	Suspect Parameter Number A part of DTC that indicates what the failure is, e.g. oil pressure, coolant temperature, turbo pressure etc.

1.3 BIBLIOGRAPHY

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

1.3.1 INSTALLATION INSTRUCTIONS

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

DSE Part	Description
053-172	DSEL401 MKII Installation Instructions

1.3.2 MANUALS

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

DSE Part	Description
057-004	Electronic Engines and DSE Wiring Guide
057-151	DSE Configuration Suite PC Software Installation & Operation Manual
057-222	DSEL401 MKII Configuration PC Software Manual

1.3.3 TRAINING GUIDES

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

DSE Part	Description
056-005	Using CTs With DSE Products
056-010	Over Current Protection
056-022	Switchgear Control
056-023	Adding New CAN Files
056-026	kW, kvar, kVA and pf.
056-029	Smoke Limiting
056-030	Module PIN Codes
056-055	Alternate Configurations
056-069	Firmware Update
056-091	Equipotential Earth Bonding
056-092	Recommended Practices for Wiring Resistive Sensors
056-095	Remote Start Input Functions
056-097	USB Earth Loops and Isolation

1.3.4 THIRD PARTY DOCUMENTS

The following third party documents are also referred to:

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

2 SPECIFICATIONS

2.1 OPERATING TEMPERATURE

Module	Specification
DSEL4xx MKII	-30 ºC +70 ºC (-22 ºF +158 ºF)

2.2 REQUIREMENTS FOR UL CERTIFICATION

WARNING!: More than one live circuit exists, refer to section entitled *Typical Wiring Diagram* elsewhere in this document

Description	Specification
Screw Terminal Tightening Torque	4.5 lb-in (0.5 Nm)
Conductors	• Terminals suitable for connection of conductor size 13 AWG to 20 AWG (0.5 mm² to 2.5 mm²). • Conductor protection must be provided in accordance with NFPA 70, Article 240 • Low voltage circuits (35 V or less) must be supplied from the engine starting battery or an isolated secondary circuit. • The communication, sensor, and/or battery derived circuit conductors shall be separated and secured to maintain at least ¼" (6 mm) separation from the generator and mains connected circuit conductors unless all conductors are rated 600 V or greater.
Current Inputs	Must be connected through UL Listed or Recognized isolating current transformers with the secondary rating of 5 A max.
Communication Circuits	Must be connected to communication circuits of UL Listed equipment
Output Pilot Duty	0.5 A
Mounting	• Suitable for use in type 1 Enclosure Type rating with surrounding air temperature -22 ºF to +158 ºF (-30 ºC to +70 ºC) • Suitable for pollution degree 3 environments when voltage sensing inputs do not exceed 300 V. When used to monitor voltages over 300 V device to be installed in an unventilated or filtered ventilation enclosure to maintain a pollution degree 2 environment.
Operating Temperature	-22 ºF to +158 ºF (-30 ºC to +70 ºC)
Storage Temperature	-40 ºF to +176 ºF (-40 ºC to +80 ºC)

2.3 TERMINAL SPECIFICATION

NOTE: For purchasing additional connector plugs from DSE, see the section entitled Maintenance, Spares, Repair and Servicing elsewhere in this document.

Description	Specification	
Connection Type	Two part connector. Male part fitted to module Female part supplied in module packing case - Screw terminal, rising clamp, no internal spring.	 Example showing cable entry and screw terminals of a 10 way connector
Minimum Cable Size	0.5 mm² (AWG 20)	
Maximum Cable Size	2.5 mm² (AWG 13)	
Tightening Torque	0.5 Nm (4.5 lb-in)	
Wire Strip Length	7 mm (9/32”)	

2.4 POWER SUPPLY REQUIREMENTS

Description	Specification
Minimum Supply Voltage	8 V continuous
Cranking Dropouts	Able to survive 0 V for 100 ms providing the supply was at least 10 V before the dropout and recovers to 5 V afterwards.
Maximum Supply Voltage	35 V continuous (60 V protection)
Reverse Polarity Protection	-35 V continuous
Maximum Operating Current	115 mA at12 V 120 mA at 24 V
Maximum Standby Current	51 mA at 12 V 47 mA at 24 V
Maximum Current When In Sleep Mode	35 mA at 12 V 32 mA at 24 V
Maximum Current When In Deep Sleep Mode	Less than 10 µA at 12 V Less than 10 µA at 24 V

2.4.1 MODULE SUPPLY INSTRUMENTATION DISPLAY

Description	Specification
Range	0 V to 70 V DC Maximum continuous operating voltage of 35 V DC
Resolution	0.1 V
Accuracy	1% full scale (±0.7 V)

2.5 GENERATOR SENSING

2.5.1 AC VOLTAGE & FREQUENCY SENSING

NOTE: If a digital input configured to *Mains Supply Active* is active, the module assumes the AC voltage input for the Mains. The supply switching must be handled externally.

Description	Specification
Measurement Type	True RMS conversion
Sample Rate	5 kHz or better
Harmonics	Up to 11th
Input Impedance	400 kΩ phase to neutral
Phase To Neutral	15 V (minimum required for sensing frequency) to 415 V AC (absolute maximum) Suitable for 345 V nominal (±20 % for under/overvoltage detection)
Phase To Phase	25 V (minimum required for sensing frequency) to 720 V AC (absolute maximum) Suitable for 600 V nominal (±20 % for under/overvoltage detection)
Common Mode Offset From Earth	100 V AC (max)
Resolution	1 V AC phase to neutral 2 V AC phase to phase
Accuracy	±1 % of full scale phase to neutral ±2 % of full scale phase to phase
Minimum Frequency	3.5 Hz
Maximum Frequency	75.0 Hz
Frequency Resolution	0.1 Hz
Frequency Accuracy	±0.2 Hz

2.5.2 DC VOLTAGE SENSING

Description	Specification
Measurement Type	True RMS
Sample Rate	5 kHz or better
Harmonics	Up to 11th
Input Impedance	400 kΩ pole to mid-wire
Pole To Mid-Wire	15 V to 415 V DC (absolute maximum)
Pole to Pole	25 V to 720 V DC (absolute maximum)
Common Mode Offset From Earth	100 V DC (max)
Resolution	1 V DC pole to mid-wire 2 V DC pole to pole
Accuracy	±1 % of full scale pole to mid-wire ±2 % of full scale pole to pole

2.6 GENERATOR AC CURRENT SENSING

NOTE: Current sensing is not supported when a DC System Topopolgy is selected.

Description	Specification
Measurement Type	True RMS conversion
Sample Rate	5 kHz or better
Harmonics	Up to 11th
Nominal CT Secondary Rating	5 A
Maximum Continuous Current	5 A
Overload Measurement	No instrumentation over 5.5 A
Absolute Maximum Overload	15 A for 100 ms
Burden	0.25 V A (0.01 Ω current shunts)
Common Mode Offset	±1 V peak plant ground to CT common terminal
Resolution	0.5 % of 5 A
Accuracy	±1 % of 5 A (excluding CT error)

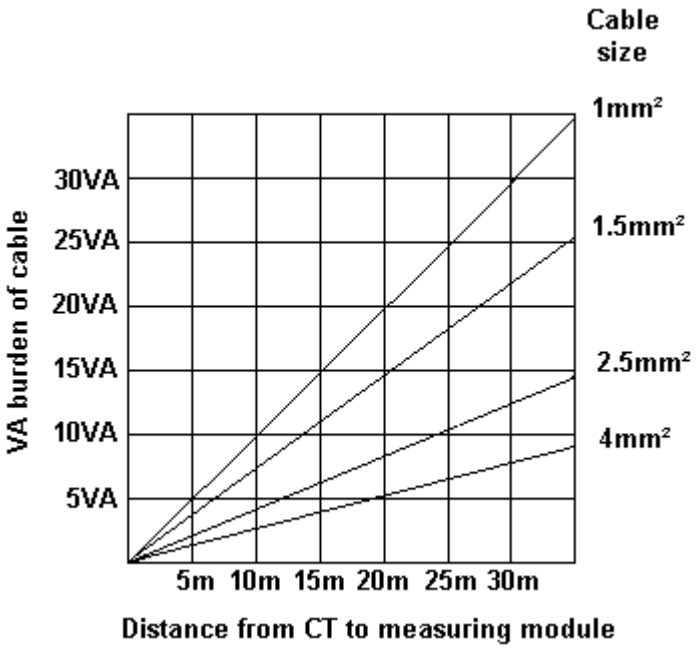
2.6.1 VA RATING OF THE CTS

NOTE: Details for 4 mm² cables are shown for reference only. The connectors on the DSE modules are only suitable for cables up to 2.5 mm².

The VA burden of the module on the CTs is 0.25 VA. However depending upon the type and length of cabling between the CTs and the module, CTs with a greater VA rating than the module are required.

The distance between the CTs and the measuring module should be estimated and cross-referenced against the chart opposite to find the VA burden of the cable itself.

If the CTs are fitted within the alternator top box, the star point (common) of the CTs should be connected to system ground (earth) as close as possible to the CTs. This minimises the length of cable used to connect the CTs to the DSE module.



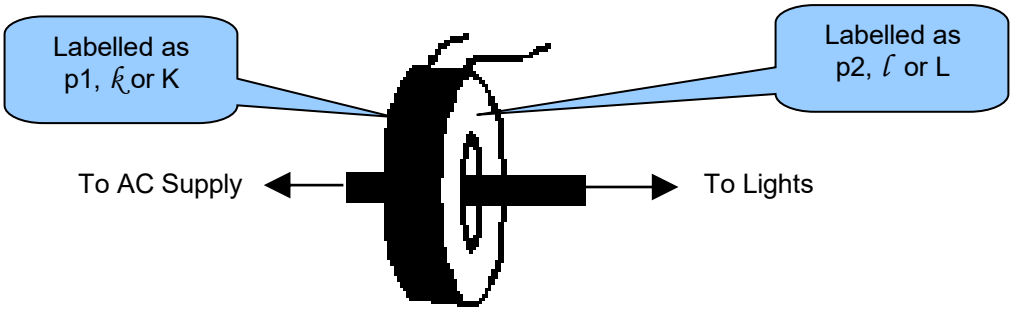
Example:
If 1.5 mm² cable is used and the distance from the CT to the measuring module is 20 m, then the burden of the cable alone is approximately 15 VA. As the burden of the DSE controller is 0.25 VA, then a CT with a rating of at least 15 VA + 0.25 VA = 15.25 VA must be used. If 2.5 mm² cables are used over the same distance of 20 m, then the burden of the cable on the CT is approximately 7 VA. CT's required in this instance is at least 7.25 VA (7 + 0.25).

2.6.2 CT POLARITY

NOTE: Take care to ensure correct polarity of the CT primary as shown above. If in doubt, check with the CT supplier.

Take care to ensure the correct polarity of the CTs. Incorrect CT orientation leads to negative kW readings when the set is supplying power. Take note that paper stick-on labels on CTs that show the orientation are often incorrectly placed on the CT (!). It is more reliable to use the labelling in the case moulding as an indicator to orientation (if available).

To test orientation, run the generator in island mode (not in parallel with any other supply) and load the generator to around 10% of the set rating. Ensure the DSE module shows positive kW for all three individual phase readings.



2.6.3 CT PHASING

Take particular care that the CTs are connected to the correct phases. For instance, ensure that the CT on phase 1 is connected to the terminal on the DSE module intended for connection to the CT for phase 1.

Additionally ensure that the voltage sensing for phase 1 is actually connected to generator phase 1. Incorrect connection of the phases as described above results in incorrect power factor (PF) measurements, which in turn results in incorrect kW measurements.

One way to check for this is to make use of a single-phase load. Place the load on each phase in turn, run the generator and ensure the kW value appears in the correct phase. For instance if the load is connected to phase 3, ensure the kW figure appears in phase 3 display and not in the display for phase 1 or 2.

2.6.4 CT CLASS

Ensure the correct CT type is chosen. For instance if the DSE module is providing overcurrent protection, ensure the CT is capable of measuring the overload level required to be protected against, and at the accuracy level required.

For instance, this may mean fitting a protection class CT (P10 type) to maintain high accuracy while the CT is measuring overload currents.

Conversely, if the DSE module is using the CT for instrumentation only (current protection is disabled or not fitted to the controller) then measurement class CTs can be used. Again, bear in mind the accuracy required. The DSE module is accurate to better than 1% of the full-scale current reading. To maintain this accuracy fit Class 0.5 or Class 1 CTs.

Check with the CT manufacturer for further advice on selecting the CTs.

2.7 INPUTS

2.7.1 DIGITAL INPUTS

Description	Specification
Number	6 configurable digital inputs (9 when analogue inputs are configured as digital inputs)
Arrangement	Contact between terminal and ground
Low Level Threshold	3.2 V minimum
High Level Threshold	8.1 V maximum
Maximum Input Voltage	+60 V DC with respect to plant supply negative
Minimum Input Voltage	-24 V DC with respect to plant supply negative
Contact Wetting Current	6 mA typical
Open Circuit Voltage	15 V or plant supply whichever is lower.

2.7.2 ANALOGUE INPUTS

2.7.2.1 OIL PRESSURE

Description	Specification
Measurement Type	Resistance measurement by measuring voltage across sensor with a fixed current applied
Arrangement	Differential resistance measurement input
Measurement Current	11 mA ±10 %
Full Scale	240 Ω
Over Range / Fail	270 Ω
Resolution	0.1 bar (1.5 psi)
Accuracy	±2 % of full scale resistance (±4.8 Ω) excluding transducer error
Max Common Mode Voltage	±2 V
Display Range	0 bar to 17.2 bar (0 psi to 250 psi) subject to limits of the sensor

2.7.2.2 COOLANT TEMPERATURE

Description	Specification
Measurement Type	Resistance measurement by measuring voltage across sensor with a fixed current applied
Arrangement	Differential resistance measurement input
Measurement Current	11 mA ±10 %
Full Scale	480 Ω
Over Range / Fail	540 Ω
Resolution	1 °C (2 °F)
Accuracy	±2 % of full scale resistance (±9.6 Ω) excluding transducer error
Max Common Mode Voltage	±2 V
Display Range	0 °C to 250 °C (32 °F to 482 °F) subject to limits of the sensor

2.7.2.3 FUEL LEVEL

Description	Specification
Measurement Type	Resistance measurement by measuring voltage across sensor with a fixed current applied
Arrangement	Differential resistance measurement input
Measurement Current	11 mA ±10 %
Full Scale	480 Ω
Over Range / Fail	540 Ω
Resolution	1 %
Accuracy	±2 % of full scale resistance (±9.6 Ω) excluding transducer error
Max Common Mode Voltage	±2 V
Display Range	0 % to 250 % subject to limits of the sensor

2.7.3 CHARGER ALTERNATOR FAIL

The charge fail input is actually a combined input and output. Whenever the generator is required to run, the terminal provides excitation current to the charge alternator field winding.

When the charge alternator is correctly charging the battery, the voltage of the terminal is close to the plant battery supply voltage. In a failed charge situation, the voltage of this terminal is pulled down to a low voltage. It is this drop in voltage that triggers the *charge failure* alarm. The level at which this operates and whether this triggers a warning or shutdown alarm is configurable using the DSE Configuration Suite Software.

Description	Specification
Minimum Voltage	0 V
Maximum Voltage	35 V
Resolution	0.2 V
Accuracy	±1 % of max measured voltage
Excitation	Active circuit constant power output
Output Power	2.5 W ±10% nominal at 12 V and 24 V
Current At 12V	210 mA
Current At 24V	105 mA

2.8 OUTPUTS

There are ten outputs fitted to the controller

2.8.1 DC OUTPUTS A & B (FUEL & START)

Description	Specification
Type	Normally used as Fuel & Start outputs. Fully configurable for other purposes if the module is configured to control an electronic engine.
Rating	10 A resistive for 10 s, 5 A resistive continuous at 35 V

2.8.2 CONFIGURABLE DC OUTPUTS C, D, E, F, G, H, I & J

Description	Specification
Number	8
Type	Fully configurable, supplied from DC positive terminal 2.
Rating	2 A resistive continuous at 35 V

2.9 COMMUNICATION PORTS

Description	Specification
USB Port	USB 2.0 Device for connection to PC running DSE configuration suite only. Max distance 6 m (18 yards)
CAN Port	**NOTE: For additional length, the DSE124 CAN Extender is available. For more information, refer to DSE Publication: *057-116 DSE124 Operator Manual*** Engine CAN Port Standard implementation of 'Slow mode', up to 250 kb/s. Non-Isolated. Internal Termination provided (120 Ω) Max distance 40 m (133 feet)

2.9.1 COMMUNICATION PORT USAGE

2.9.1.1 USB CONNECTION (PC CONFIGURATION)

NOTE: DSE stock 2 m (6.5 feet) USB type A to type B cable, DSE Part Number: 016-125. Alternatively they are purchased from any PC or IT store.

NOTE: The DC supply must be connected to the module for configuration by PC.

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

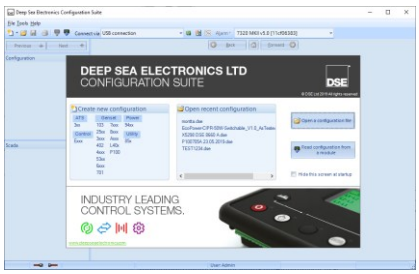
The USB port is provided to give a simple means of connection between a PC and the controller. Using the DSE Configuration Suite Software, the operator is then able to control the module, starting or stopping the generator, selecting operating modes, etc.

Additionally, the various operating parameters (such as output volts, oil pressure, etc.) of the remote generator are available to be viewed or changed.

To connect a module to a PC by USB, the following items are required:

- DSEL401 MKII Controller

- DSE Configuration Suite PC Software
  (Available from www.deepseaelectronics.com).



- USB cable Type A to Type B.
  (This is the same cable as often used between a PC and a USB printer)

  DSE stock this cable:
  PC Configuration interface lead (USB type A – type B)
  DSE Part No 016-125

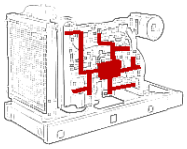
2.9.1.2 CAN PORT (J1939)

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

NOTE: For further details on connection to electronic engines, refer to DSE Publication: *057-004 Electronic Engines And DSE Wiring*

NOTE: Screened 120 Ω impedance cable specified for use with CAN must be used for the CAN link.
DSE stock and supply Belden cable 9841 which is a high quality 120 Ω impedance cable suitable for CAN use (DSE part number 016-030)

NOTE: For additional length, the DSE124 CAN & MSC Extender is available. For more information, refer to DSE Publication: *057-116 DSE124 Operator Manual*



The modules are fitted with a CAN interface as standard and are capable of receiving engine data from engine ECU/ECMs compliant with the CAN J1939 standard.

ECU/ECMs monitor the engine's operating parameters such as speed, oil pressure, coolant temperature (among others) in order to closely monitor and control the engine. The industry standard communications interface (CAN) transports data gathered by the engine's ECU/ECM using the J1939 protocol. This allows engine controllers such as DSE to access these engine parameters with no physical connection to the sensor device.

The *ECU Port* is used for point-to-point cable connection of more than one device and allows for connection to CAN Scanner, PLC and CAN controllers (to name just a few devices). The operator is then able to view the various operating parameters.

2.9.1.3 J1939-75

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

NOTE: For further details of CAN communication, see the section entitled *CAN Interface Specification (J1939-75)* elsewhere in this document.

When the J1939-75 is enabled in the module's configuration, the module's AC measurements and alarms are sent onto the CANbus using the *ECU Port*, received typically by an external monitoring device. There are two tick boxes to enable each of the two parts of the interface as shown below, these are AC measurement and AC related alarms. The module AC alarms are translated into J1939 DM1 diagnostic messages. There are no additional display screens visible on the module when these options are selected. The default CAN source address the module transmits the additional J1939-75 messages is 44. This is configurable by the generator supplier if there is another CAN device already using this source address.

The default CAN source address for additional J1939-75 messages is 44 however this may be changed by the generator supplier.

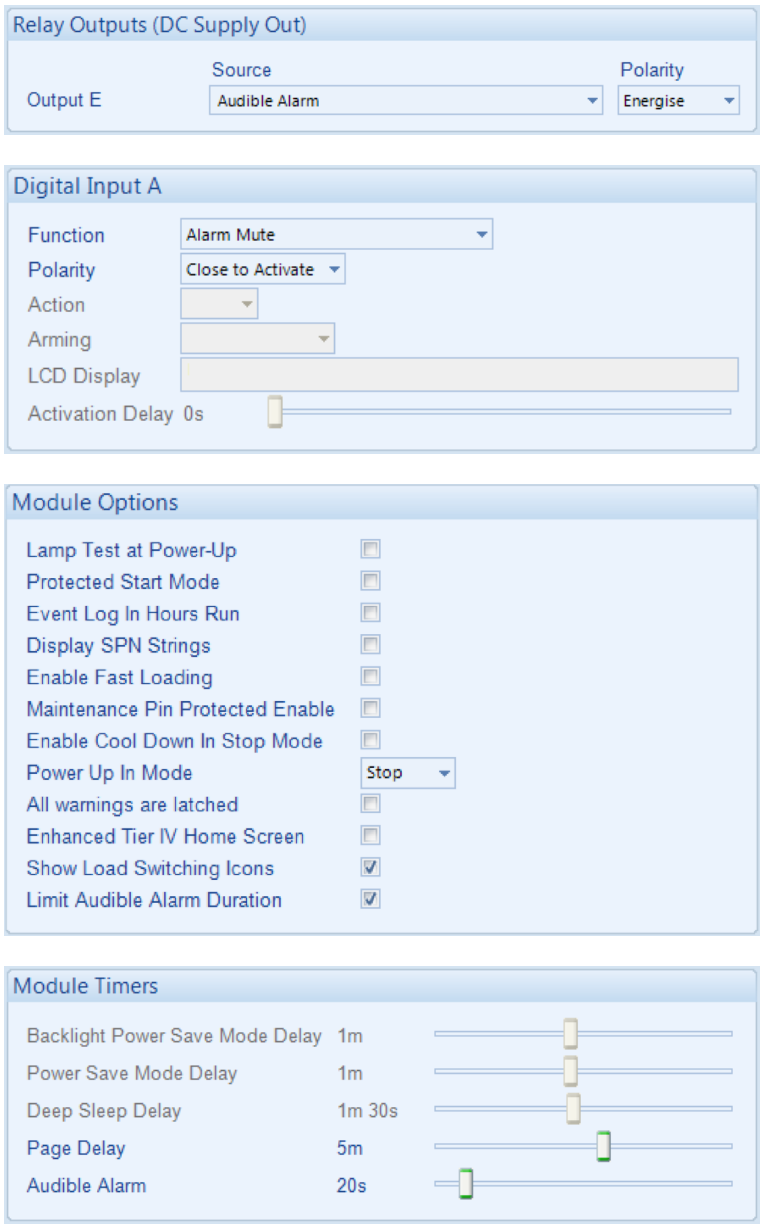
2.10 ADDING AN EXTERNAL SOUNDER

NOTE: For further details about the *Audible Alarm* and *Limit Audible Alarm Duration*, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

If an external alarm or indicator be required, this is achievable by using the DSE Configuration Suite PC software to configure an auxiliary output for *Audible Alarm,* and by configuring an auxiliary input for *Alarm Mute*.

The audible alarm output activates and de-activates at the same time as the module's internal sounder. The *Audible Alarm* output de-activates when the *Alarm Mute* input activates or after the *Audible Alarm Duration* time has ceased.

Example of configuration to achieve external sounder with external alarm mute button or an automatic mute after 1 minute and 30 seconds:



2.11 ACCUMULATED INSTRUMENTATION

NOTE: When an accumulated instrumentation value exceeds the maximum number as listed below, the value is reset and begins counting from zero again.

The number of logged *Engine Hours* and *Number of Starts* can be set/reset using the DSE Configuration Suite PC software. Depending upon module configuration, this may have been PIN number locked by the generator supplier.

Description	Specification
Engine Hours Run	Maximum 99999 hrs 59 minutes (Approximately 11yrs 4 months)
Number of Starts	1,000,000 (1 Million)
Accumulated Power	999999 kWh / kvarh / kVAh

2.12 DIMENSIONS AND MOUNTING

2.12.1 DIMENSIONS

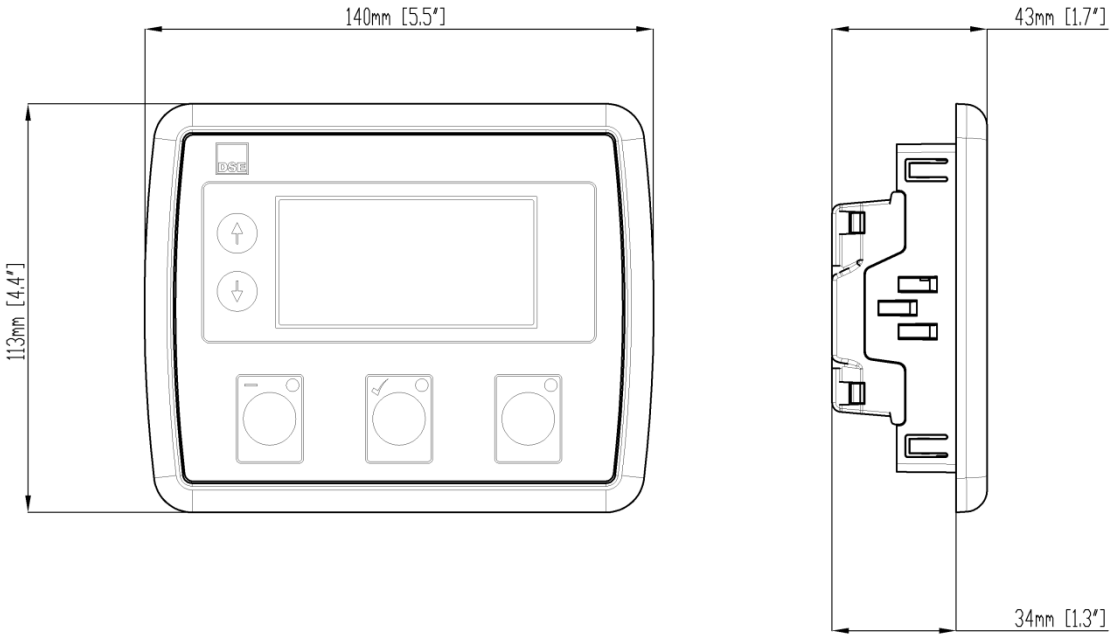
140.0 mm x 113 mm x 43 mm
(5.5 ” x 4.4 ” x 1.7 ”)

2.12.2 PANEL CUTOUT

118 mm x 92 mm
(4.6 ” x 3.6 ”)

2.12.3 WEIGHT

0.16 kg
(0.35 lb)

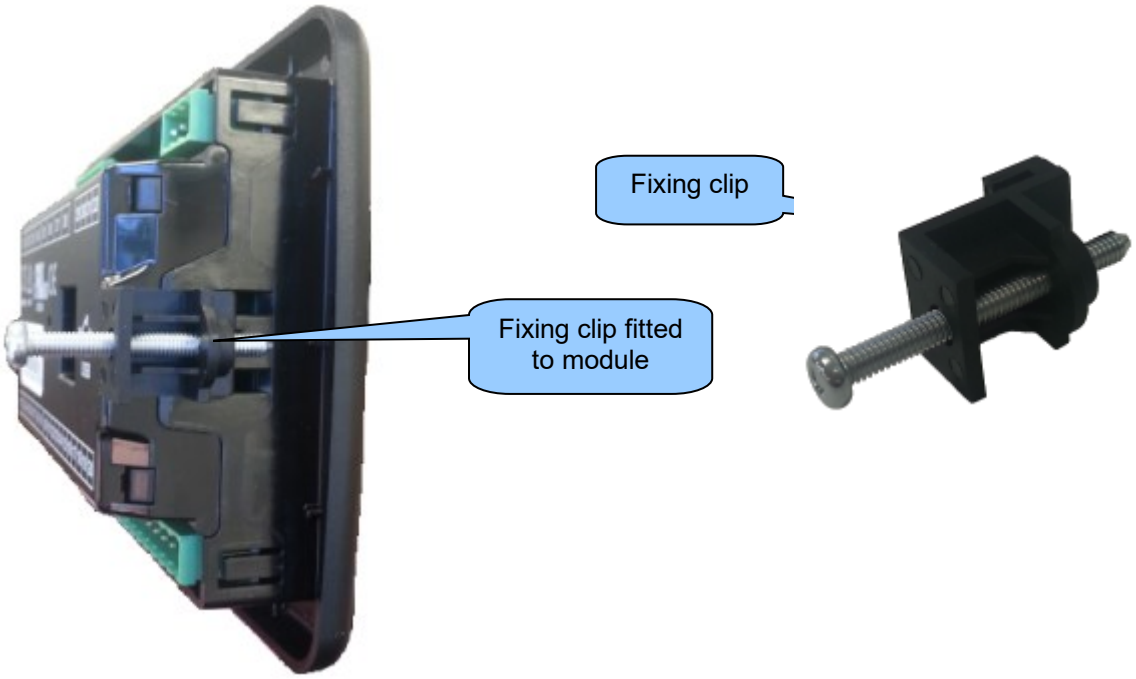


2.12.4 FIXING CLIPS

NOTE: In conditions of excessive vibration, mount the module on suitable anti-vibration mountings.

The module is held into the panel fascia using the supplied fixing clips.

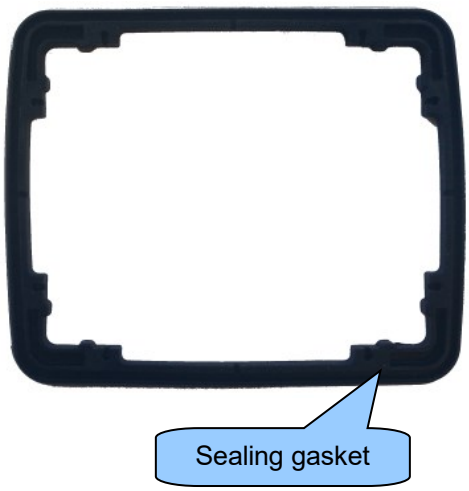
- Withdraw the fixing clip screw (turn anticlockwise) until only the pointed end is protruding from the clip.
- Insert the three ‘prongs’ of the fixing clip into the slots in the side of the module case.
- Pull the fixing clip backwards (towards the back of the module) ensuring all three prongs of the clip are inside their allotted slots.
- Turn the fixing clip screws clockwise until they make contact with the panel fascia.
- Turn the screw a quarter of a turn to secure the module into the panel fascia. Care must be taken not to over tighten the fixing clip screws



2.12.5 SILICON SEALING GASKET

NOTE: For purchasing an additional silicon gasket from DSE, see the section entitled Maintenance, Spares, Repair and Servicing elsewhere in this document.

The supplied silicon gasket provides improved sealing between module and the panel fascia.
The gasket is fitted to the module before installation into the panel fascia.
Take care to ensure the gasket is correctly fitted to the module to maintain the integrity of the seal.



2.13 APPLICABLE STANDARDS

Standard	Description
BS 4884-1	This document conforms to BS4884-1 1992 Specification for presentation of essential information.
BS 4884-2	This document conforms to BS4884-2 1993 Guide to content
BS 4884-3	This document conforms to BS4884-3 1993 Guide to presentation
BS EN 60068-2-1 (Minimum temperature)	-30 °C (-22 °F)
BS EN 60068-2-2 (Maximum temperature)	+70 °C (158 °F)
BS EN 60068-2-6 (Vibration)	Ten sweeps in each of three major axes 5 Hz to 8 Hz at ± 7.5 mm 8 Hz to 500 Hz at 2 gn
BS EN 60068-2-27 (Shock)	Three shocks in each of three major axes 15 gn in 11 ms
BS EN 60068-2-30 (Damp heat cyclic)	20 °C to 55 °C at 95% relative humidity for 48 hours
BS EN 60068-2-78 (Damp heat static)	40 °C at 95% relative humidity for 48 hours
BS EN 60950 (Electrical safety)	Safety of information technology equipment, including electrical business equipment
BS EN 61000-6-2 (Electro-magnetic Compatibility)	EMC Generic Immunity Standard (Industrial)
BS EN 61000-6-4 (Electro-magnetic Compatibility)	EMC Generic Emission Standard (Industrial)
BS EN 60529 (Degrees of protection provided by enclosures)	IP65 (front of module when installed into the control panel with the optional sealing gasket) IP42 (front of module when installed into the control panel WITHOUT being sealed to the panel)
UL508 **NEMA rating** (Approximate)	12 (Front of module when installed into the control panel with the optional sealing gasket). 2 (Front of module when installed into the control panel WITHOUT being sealed to the panel)
IEEE C37.2 (Standard Electrical Power System Device Function Numbers and Contact Designations)	Under the scope of IEEE 37.2, *function numbers can also be used to represent functions in microprocessor devices and software programs*. The controller is device number 11L-8000 (Multifunction device protecting Line (generator) –module). As the module is configurable by the generator OEM, the functions covered by the module vary. Under the module's factory configuration, the device numbers included within the module are : 2 – Time Delay Starting Or Closing Relay 3 – Checking Or Interlocking Relay 5 – Stopping Device 6 – Starting Circuit Breaker 8 – Control Power Disconnecting Device 10 – Unit Sequence Switch 11 – Multifunction Device 12 – Overspeed Device 14 – Underspeed Device 26 – Apparatus Thermal Device

Continued overleaf...

Standard	Description
IEEE C37.2 (Standard Electrical Power System Device Function Numbers and Contact Designations)	Continued… 27AC – AC Undervoltage Relay 27DC – DC Undervoltage Relay 29 – Isolating Contactor Or Switch 30 – Annunciator Relay 31 – Separate Excitation Device 37 – Undercurrent Or Underpower Relay 42 – Running Circuit Breaker 48 – Incomplete Sequence Relay 50 – Instantaneous Overcurrent Relay 52 – AC Circuit Breaker 53 – Exciter Or DC Generator Relay 54 – Turning Gear Engaging Device 59AC – AC Overvoltage Relay 59DC – DC Overvoltage Relay 62 – Time Delay Stopping Or Opening Relay 63 – Pressure Switch 71 – Level Switch 74 – Alarm Relay 81 – Frequency Relay 83 – Automatic Selective Control Or Transfer Relay 86 – Lockout Relay

2.13.1 ENCLOSURE CLASSIFICATIONS

2.13.1.1 IP CLASSIFICATIONS

The modules specification under BS EN 60529 Degrees of protection provided by enclosures

IP65 (Front of module when module is installed into the control panel with the optional sealing gasket).
IP42 (front of module when module is installed into the control panel WITHOUT being sealed to the panel)

First Digit Protection against contact and ingress of solid objects		Second Digit Protection against ingress of water	
0	No protection	0	No protection
1	Protected against ingress solid objects with a diameter of more than 50 mm. No protection against deliberate access, e.g. with a hand, but large surfaces of the body are prevented from approach.	1	Protection against dripping water falling vertically. No harmful effect must be produced (vertically falling drops).
2	Protected against penetration by solid objects with a diameter of more than 12 mm. Fingers or similar objects prevented from approach.	2	Protection against dripping water falling vertically. There must be no harmful effect when the equipment (enclosure) is tilted at an angle up to 15° from its normal position (drops falling at an angle).
3	Protected against ingress of solid objects with a diameter of more than 2.5 mm. Tools, wires etc. with a thickness of more than 2.5 mm are prevented from approach.	3	Protection against water falling at any angle up to 60° from the vertical. There must be no harmful effect (spray water).
4	Protected against ingress of solid objects with a diameter of more than 1 mm. Tools, wires etc. with a thickness of more than 1 mm are prevented from approach.	4	Protection against water splashed against the equipment (enclosure) from any direction. There must be no harmful effect (splashing water).
5	Protected against harmful dust deposits. Ingress of dust is not totally prevented but the dust must not enter in sufficient quantity to interface with satisfactory operation of the equipment. Complete protection against contact.	5	Protection against water projected from a nozzle against the equipment (enclosure) from any direction. There must be no harmful effect (water jet).
6	Protection against ingress of dust (dust tight). Complete protection against contact.	6	Protection against heavy seas or powerful water jets. Water must not enter the equipment (enclosure) in harmful quantities (splashing over).

2.13.1.2 NEMA CLASSIFICATIONS

⚠NOTE: There is no direct equivalence between IP / NEMA ratings. IP figures shown are approximate only.

12 (Front of module when module is installed into the control panel with the optional sealing gasket).
2 (front of module when module is installed into the control panel WITHOUT being sealed to the panel)

1 **IP30**	Provides a degree of protection against contact with the enclosure equipment and against a limited amount of falling dirt.
2 **IP31**	Provides a degree of protection against limited amounts of falling water and dirt.
3 **IP64**	Provides a degree of protection against windblown dust, rain and sleet; undamaged by the formation of ice on the enclosure.
3R **IP32**	Provides a degree of protection against rain and sleet:; undamaged by the formation of ice on the enclosure.
4 (X) **IP66**	Provides a degree of protection against splashing water, windblown dust and rain, hose directed water; undamaged by the formation of ice on the enclosure. (Resist corrosion).
12/12K **IP65**	Provides a degree of protection against dust, falling dirt and dripping non-corrosive liquids.
13 **IP65**	Provides a degree of protection against dust and spraying of water, oil and non-corrosive coolants.

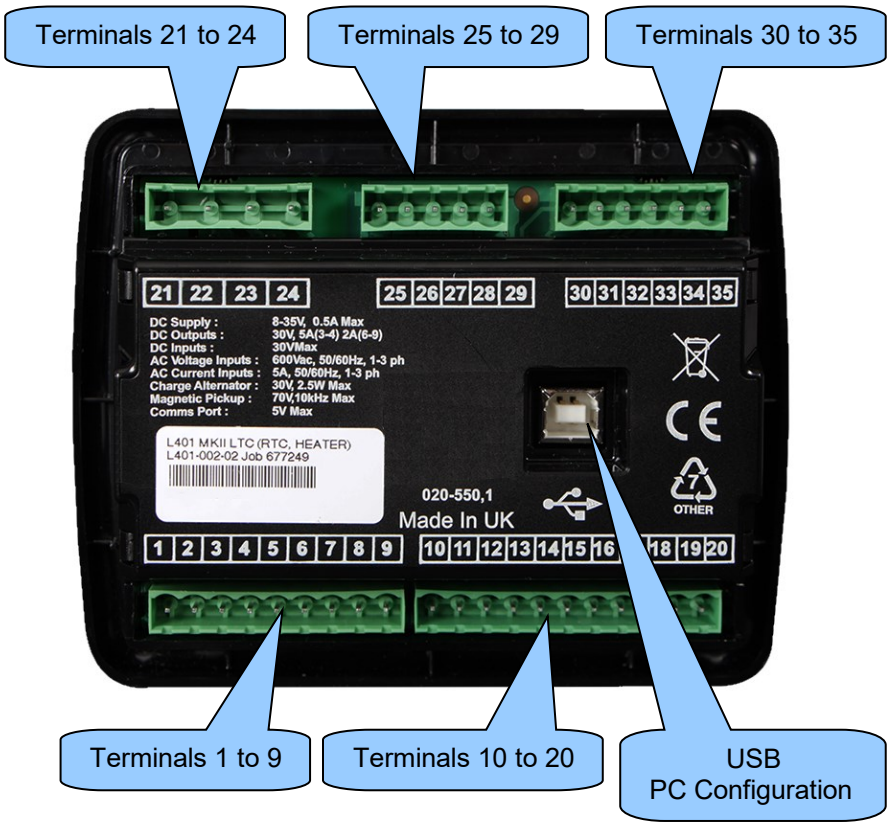
3 INSTALLATION

The module is designed to be mounted on the panel fascia. For dimension and mounting details, see the section entitled *Specification, Dimension and mounting* elsewhere in this document.

3.1 USER CONNECTIONS

NOTE: Availability of some terminals depends upon module version. Full details are given in the section entitled *Terminal Description* elsewhere in this manual.

To aid user connection, numbers are used on the rear of the module to help identify terminal functions. An example of this is shown below.



3.2 CONNECTION DESCRIPTIONS

3.2.1 DC SUPPLY, DC OUTPUTS A TO F & CHARGE FAIL INPUT

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

NOTE: When the module is configured for operation with an electronic engine, FUEL and START output requirements may be different. For further details on connection to electronic engines, refer to DSE Publication: *057-004 Electronic Engines And DSE Wiring*

Pin No	Description	Cable Size	Notes
1	DC Plant Supply Input (Negative)	2.5 mm² AWG 13	
2	DC Plant Supply Input (Positive)	2.5 mm² AWG 13	Supplies the module and DC Outputs A, B, C, D, E & F
3	DC Output A (FUEL)	2.5 mm² AWG 13	Plant Supply Positive from terminal 2. 10 A for 10 seconds, 5 A resistive continuous Fixed as FUEL relay if electronic engine is not configured.
4	DC Output B (START)	2.5 mm² AWG 13	Plant Supply Positive from terminal 2. 10 A for 10 seconds, 5 A resistive continuous Fixed as START relay if electronic engine is not configured.
5	Charge Fail / Excite	2.5 mm² AWG 13	Do not connect to ground (battery negative). If charge alternator is not fitted, leave this terminal disconnected.
6	DC Output C	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 Amp rated.
7	DC Output D	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 Amp rated.
8	DC Output E	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 Amp rated.
9	DC Output F	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 Amp rated.

3.2.2 DIGITAL OUTPUTS G TO J, ANALOGUE SENSORS & CAN

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

NOTE: It is VERY important that terminal 14 (sensor common) is soundly connected to an earth point on the ENGINE BLOCK, not within the control panel, and must be a sound electrical connection to the sensor bodies. This connection MUST NOT be used to provide an earth connection for other terminals or devices. The simplest way to achieve this is to run a SEPARATE earth connection from the system earth star point, to terminal 14 directly, and not use this earth for other connections.

NOTE: If PTFE insulating tape is used on a sensor thread which is being used as earth return for the sensor, ensure the entire thread is not insulated as this prevents the sensor body from being earthed via the engine block.

NOTE: For further details on connection to electronic engines, refer to DSE Publication: *057-004 Electronic Engines And DSE Wiring*

NOTE: Screened 120 Ω impedance cable specified for use with CAN must be used for the CAN link.
DSE stock and supply Belden cable 9841 which is a high quality 120 Ω impedance cable suitable for CAN use (DSE part number 016-030)

Pin No	Description	Cable Size	Notes
10	DC Output G	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 Amp rated.
11	DC Output H	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 Amp rated.
12	DC Output I	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 Amp rated.
13	DC Output J	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 Amp rated.
14	Sensor Common Return	0.5 mm² AWG 20	Return Feed For Sensors
15	Oil Pressure Input	0.5 mm² AWG 20	Connect To Oil Pressure Sensor
16	Coolant Temperature Input	0.5 mm² AWG 20	Connect To Coolant Temperature Sensor
17	Fuel Level Input	0.5 mm² AWG 20	Connect To Fuel Level Sensor
18	CAN Port H	0.5 mm² AWG 20	Use only 120 Ω CAN approved cable
19	CAN Port L	0.5 mm² AWG 20	Use only 120 Ω CAN approved cable
20	CAN Port Screen	Shield	Use only 120 Ω CAN approved cable

3.2.3 GENERATOR/MAINS VOLTAGE & FREQUENCY SENSING

NOTE: Refer to *Typical Wiring Diagram* and *Description Of Controls* sections elsewhere in this document for further details on the Generator and Mains switching.

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

NOTE: The below table describes connections to a three phase, four wire alternator. For alternative wiring topologies, see the Alternate Topology Wiring Diagrams section of this manual.

Pin No	Description	Cable Size	Notes
21	Generator/Mains L1 (U) / Pole 1 (P1) Voltage Monitoring	1.0 mm² AWG 18	Connect to generator/mains L1 (U) output (AC) Connect to generator Pole 1 (P1) output (DC) (Recommend 2A fuse)
22	Generator/Mains L2 (V) / Pole 2 (P2) Voltage Monitoring	1.0 mm² AWG 18	Connect to generator/mains L2 (V) output (AC) Connect to generator Pole 2 (P2) output (DC) (Recommend 2A fuse)
23	Generator/Mains L3 (W) Voltage Monitoring	1.0 mm² AWG 18	Connect to generator/mains L3 (W) output (AC) (Recommend 2A fuse)
24	Generator/Mains Neutral (N) / Mid-Point (M) Input	1.0 mm² AWG 18	Connect to generator/mains Neutral terminal (AC) Connect to generator mid-point (M) (DC)

3.2.4 CURRENT TRANSFORMERS

WARNING!: Do not disconnect this plug when the CTs are carrying current. Disconnection open circuits the secondary of the C.T.'s and dangerous voltages may then develop. Always ensure the CTs are not carrying current and the CTs are short circuit connected before making or breaking connections to the module.

NOTE: The module has a burden of 0.25 V A on the CT. Ensure the CT is rated for the burden of the controller, the cable length being used and any other equipment sharing the CT. If in doubt, consult the CT supplier.

Pin No	Description	Cable Size	Notes
25	CT Secondary for Load L1	2.5 mm² AWG 13	Connect to s1 secondary of L1 monitoring CT
26	CT Secondary for Load L2	2.5 mm² AWG 13	Connect to s1 secondary of L2 monitoring CT
27	CT Secondary for Load L3	2.5 mm² AWG 13	Connect to s1 secondary of L3 monitoring CT
28	CT Common	2.5 mm² AWG 13	Connect to s2 secondary of L1, L2 & L3 monitoring CT
29			

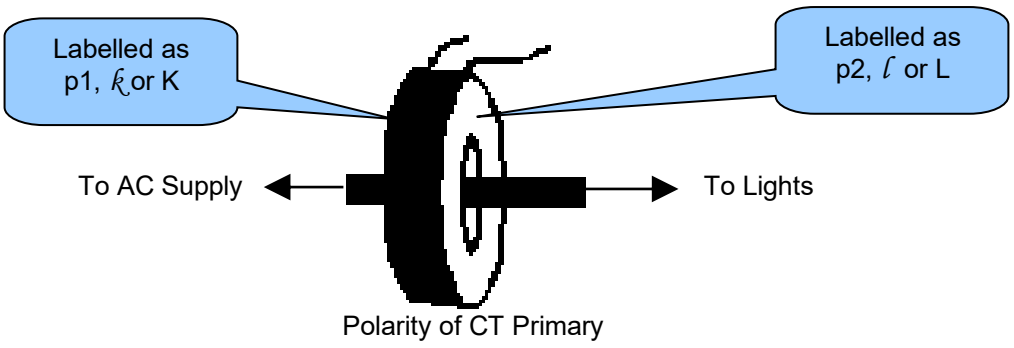
3.2.4.1 CT CONNECTIONS

p1, ƙ or K is the primary of the CT that 'points' towards the ELECTRICAL SOURCE

p2, ℓ or L is the primary of the CT that 'points' towards the LIGHTS

s1 is the secondary of the CT that connects to the DSE Module's input for the CT measuring

s2 is the secondary of the CT that must be commoned with the s2 connections of all the other CTs and connected to the CT common terminal of the module.



3.2.5 CONFIGURABLE DIGITAL INPUTS

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

Pin No	Description	Cable Size	Notes
30	Configurable digital input A	0.5 mm² AWG 20	Switch to negative
31	Configurable digital input B	0.5 mm² AWG 20	Switch to negative
32	Configurable digital input C	0.5 mm² AWG 20	Switch to negative
33	Configurable digital input D	0.5 mm² AWG 20	Switch to negative
34	Configurable digital input E	0.5 mm² AWG 20	Switch to negative
35	Configurable digital input F	0.5 mm² AWG 20	Switch to negative

3.2.6 PC CONFIGURATION INTERFACE CONNECTOR

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

NOTE: The USB connection cable between the PC and the module must not be extended beyond 6 m (20 feet). For distances over 6 m, it is possible to use a third party USB extender. Typically, they extend USB up to 50 m (55 yards). The supply and support of this type of equipment is outside the scope of Deep Sea Electronics.

CAUTION!: Care must be taken not to overload the PCs USB system by connecting more than the recommended number of USB devices to the PC. For further information, consult the PC supplier.

	Description	Cable Size	Notes	
	Socket for connection to PC with DSE Configuration Suite Software	0.5 mm² AWG 20	This is a standard USB type A to type B connector.	

3.3 TYPICAL WIRING DIAGRAM

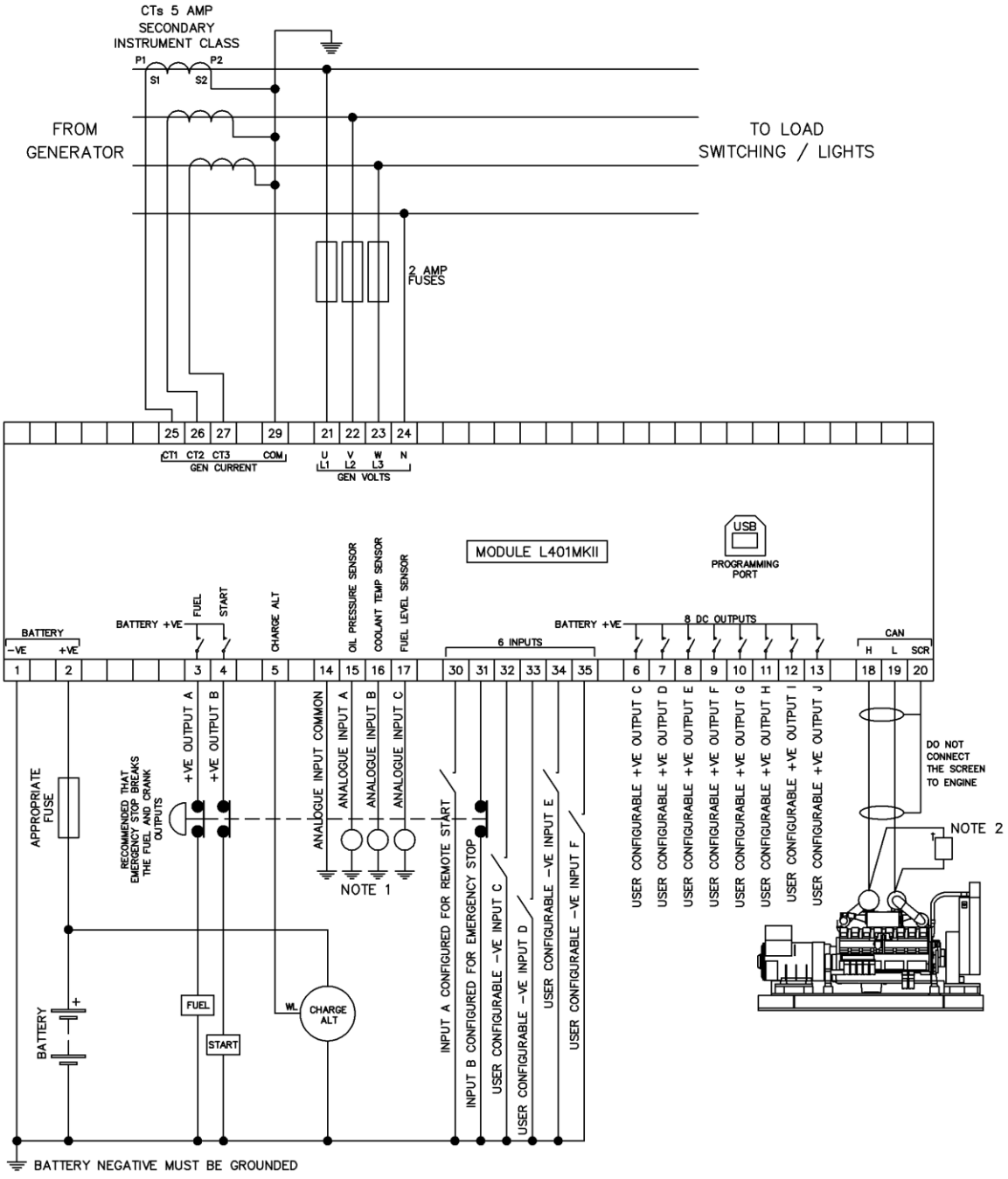
As every system has different requirements, these diagrams show only a typical system and do not intend to show a complete system.

Genset manufacturers and panel builders may use these diagrams as a starting point; however, refer to the completed system diagram provided by the system manufacturer for complete wiring detail.

Further wiring suggestions are available in the following DSE publications, available at www.deepseaelectronics.com.

DSE Part	Description
056-005	Using CTs With DSE Products
056-022	Switchgear Control
056-091	Equipotential Earth Bonding
056-092	Best Practices for Wiring Resistive Sensors
057-004	Electronic Engines and DSE Wiring

3.3.1 TYPICAL WIRING DIAGRAM FOR THE GENERATOR APPLICATION



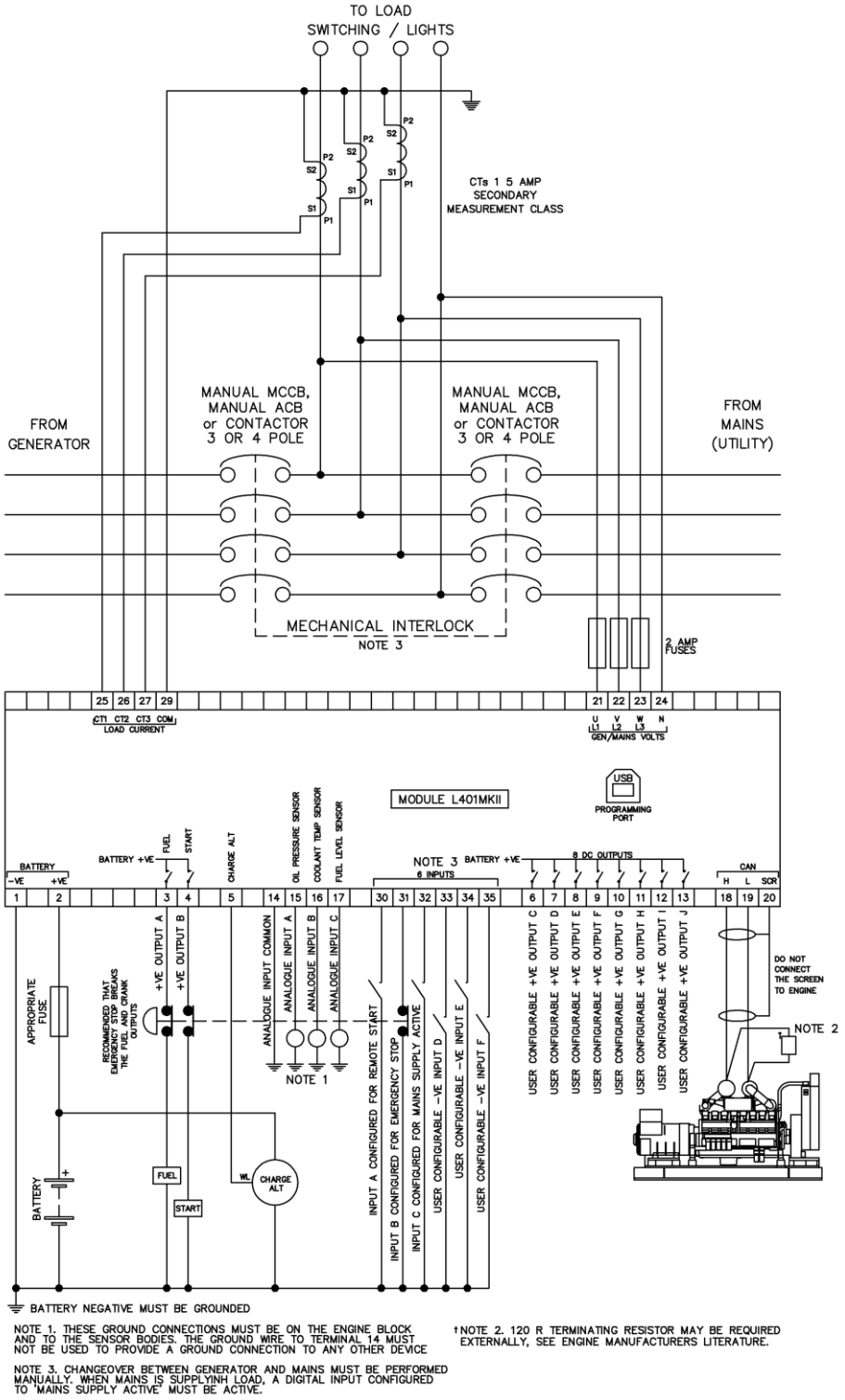
NOTE 1. THESE GROUND CONNECTIONS MUST BE ON THE ENGINE BLOCK AND TO THE SENSOR BODIES. THE GROUND WIRE TO TERMINAL 14 MUST NOT BE USED TO PROVIDE A GROUND CONNECTION TO ANY OTHER DEVICE

† NOTE 2. 120 R TERMINATING RESISTOR MAY BE REQUIRED EXTERNALLY, SEE ENGINE MANUFACTURERS LITERATURE.

3.3.2 TYPICAL WIRING DIAGRAM FOR GENERATOR/MAINS SWITCHING

NOTE: The Generator/Mains switching must be controlled external to the DSE module.

NOTE: It is advised that the *Mains Supply Active* digital input is connected to the Mains breaker's closed auxiliary. This is to ensure that when the Mains breaker is closed, the DSE module knows the supply sensed is the Mains.



3.3.3 EARTH SYSTEMS

3.3.3.1 NEGATIVE EARTH

The typical wiring diagrams located within this document show connections for a negative earth system (the battery negative connects to Earth)

3.3.3.2 POSITIVE EARTH

When using a DSE module with a Positive Earth System (the battery positive connects to Earth), the following points must be followed:

- Follow the typical wiring diagram as normal for all sections EXCEPT the earth points
- All points shown as Earth on the typical wiring diagram must connect to BATTERY NEGATIVE (not earth).

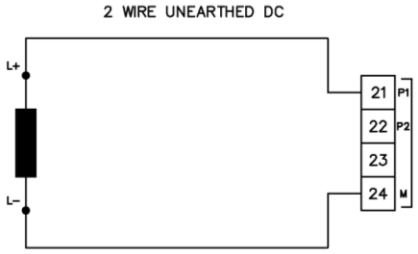
3.3.3.3 FLOATING EARTH

Where neither the battery positive nor battery negative terminals are connected to earth the following points must to be followed

- Follow the typical wiring diagram as normal for all sections EXCEPT the earth points
- All points shown as Earth on the typical wiring diagram must connect to BATTERY NEGATIVE (not earth).

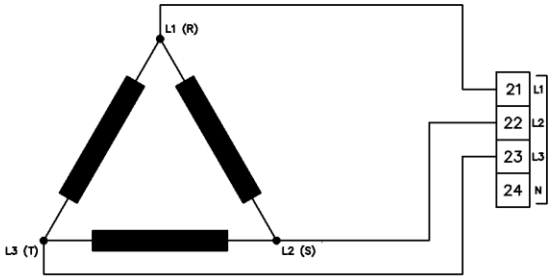
3.3.4 ALTERNATE TOPOLOGY WIRING DIAGRAMS

3.3.4.1 DC TOPOLOGIES

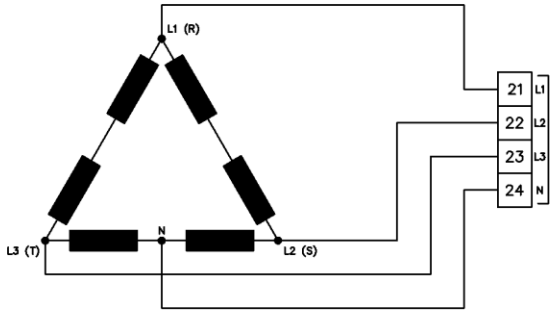


3.3.4.2 AC TOPOLOGIES

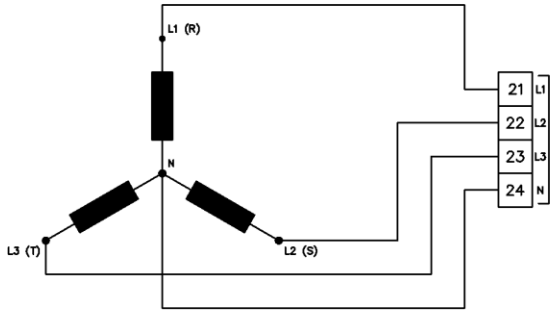
3 PHASE, 3 WIRE



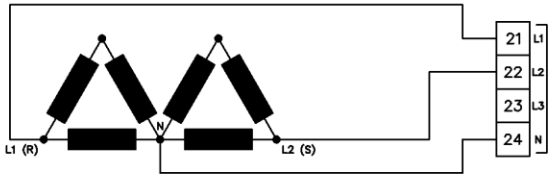
3 PHASE, 4 WIRE DELTA



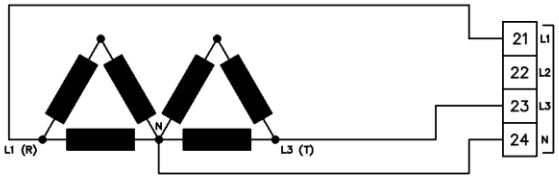
3 PHASE, 4 WIRE



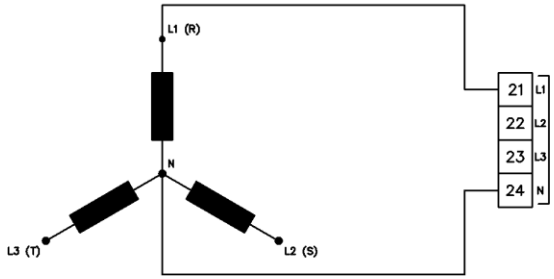
2 PHASE, 3 WIRE (L1 – L2)



2 PHASE, 3 WIRE (L1 – L3)



SINGLE PHASE, 2 WIRE

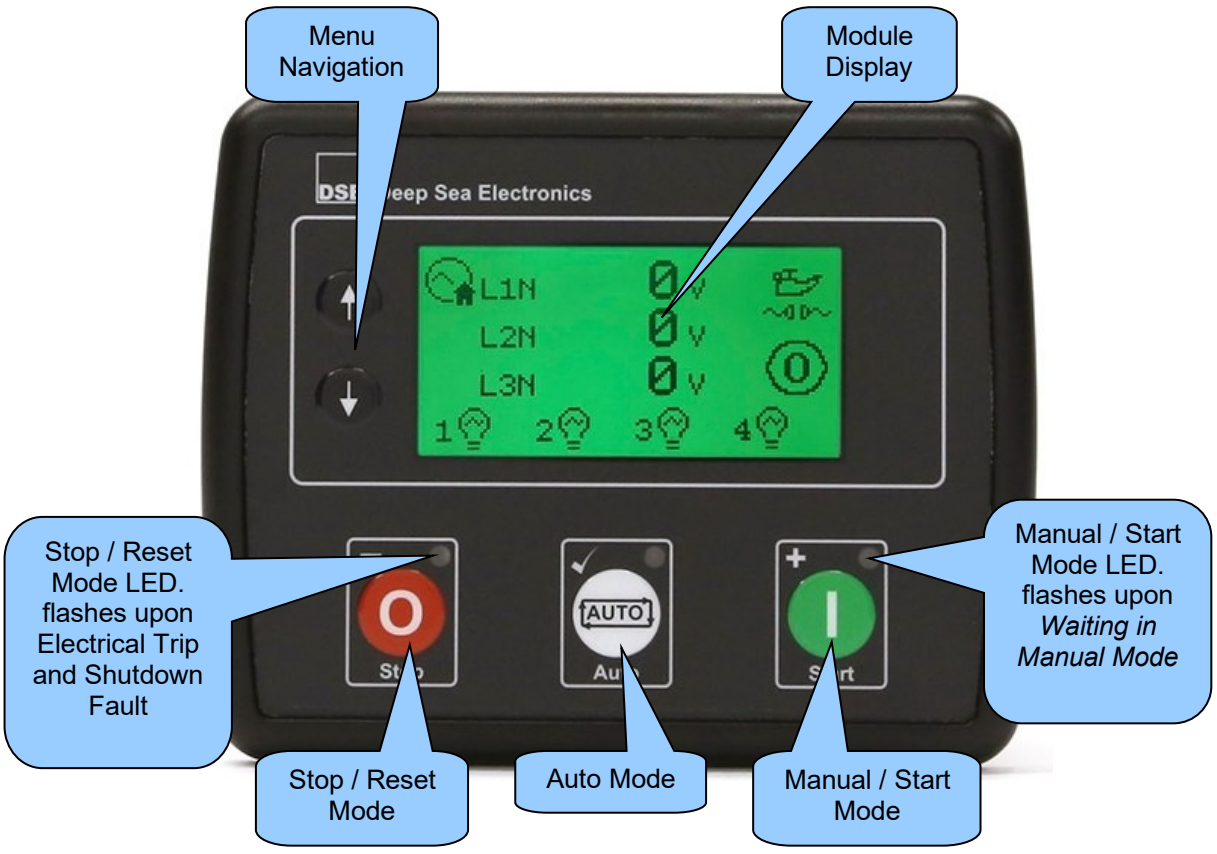


4 DESCRIPTION OF CONTROLS

CAUTION: The module may instruct an engine start event due to external influences. Therefore, it is possible for the engine to start at any time without warning. Prior to performing any maintenance on the system, it is recommended that steps are taken to remove the battery and isolate supplies.

NOTE: The following descriptions detail the sequences followed by a module containing the standard 'factory configuration'. Always refer to the configuration source for the exact sequences and timers observed by any particular module in the field.

Control of the module is via push buttons mounted on the front of the module with ***Stop/Reset Mode*** O, ***Auto Mode*** AUTO and ***Manual/Start Mode*** I functions. For normal operation, these are the only controls which need to be operated. Details of their operation are provided later in this document.



4.1 CONTROL PUSH-BUTTONS

NOTE: When the digital input for *Mains Supply Active* is active, the operation of *Manual/Start Mode* and *Auto Mode* are altered. For further details on operation when the *Mains Supply Active* digital input is active, refer to the section entitled *Mains Supply* elsewhere in this document.

Icon	Description
	**Stop/Reset Mode** This button places the module into its ***Stop/Reset Mode*** . This clears any alarm conditions for which the triggering criteria have been removed. If the engine is running and the module is put into Stop mode, the module automatically instructs the generator to unload *('**Light Output 1, 2, 3 & 4** becomes inactive (if used))*. The fuel supply de-energises and the engine comes to a standstill. Should any form of **remote start signal** be present while operating in this mode, a start does not occur.
	**Auto Mode** This button places the module into its ***Auto Mode*** . This mode allows the module to control the function of the generator automatically. The module monitors the ***Remote Start*** input and battery charge status and once a start request is made, the set is automatically started and placed on load *('**Light Output 1, 2, 3 & 4** becomes active in an order dictated by configurable timers (if used))*. Upon removal of the starting signal, the module removes the load from the generator and shut the set down observing the *Stop Delay* timer and *Cooling Down* timer as necessary *('**Light Output 1, 2, 3 & 4** deactivate in an order dictated by configurable timers (if used))*. The module then awaits the next start event. For further details, see the more detailed section of *Operation* elsewhere in this manual.
	**Manual/Start Mode** This button starts the engine and runs it on load *('**Light Output 1, 2, 3 & 4** becomes active in an order dictated by configurable timers (if used))* if the option for *Auto Light Initiation When Start In Manual Mode* is configured or off load. To place the generator on load when *Auto Light Initiation When Start In Manual Mode* is not configured, digital inputs or module display screens configured to control this function. For further details, see the more detailed section of *Operation* elsewhere in this manual.
	**Menu Navigation** Used for navigating the instrumentation, event log and configuration screens. For further details, see the more detailed section of *Operation* elsewhere in this manual.

4.2 MODULE DISPLAY

The module's display contains the following sections. Description of each section are viewed in the sub sections.

<table>
<tr><td>Inst. Icon</td><td>Instrumentation</td><td>Unit</td><td rowspan="2">Alarm Icon</td></tr>
<tr><td>Active Config</td><td>Instrumentation</td><td>Unit</td></tr>
<tr><td>Auto Run</td><td>Instrumentation</td><td>Unit</td><td rowspan="2">Mode / FPE Icon</td></tr>
<tr><td colspan="3">Light Output Icons</td></tr>
</table>

4.2.1 INSTRUMENTATION ICONS

When viewing instrumentation pages, an icon is displayed in the ***Inst. Icon*** section to indicate what section is currently being displayed.

Icon	Details
	The default home page which displays generator voltage instrumentation screen or engine tier 4 information
	Generator AC voltage and frequency instrumentation screen
	Generator DC voltage instrumentation screen
	Mains voltage and frequency instrumentation screen
	Generator current instrumentation screen
	Mains current instrumentation screen
	Current and load instrumentation screen
	Engine speed instrumentation screen
	Hours run instrumentation screen
	Battery voltage instrumentation screen
	Oil pressure instrumentation screen
	Coolant temperature instrumentation screen
	Flexible sensor instrumentation screen
	Appears when the event log is being displayed
	Current time held in the unit
	The current value of the scheduler run time and duration
	ECU diagnostic trouble codes
	Oil filter maintenance timers
	Air filter maintenance timers
	Fuel filter maintenance timers
	Engine oil temperature (measured from CAN) instrumentation screen
	Inlet manifold temperature (measured from CAN) instrumentation screen

Continued overleaf…

Icon	Details
	Exhaust temperature 1 (measured from CAN) instrumentation screen
	Exhaust temperature 2 (measured from CAN) instrumentation screen
	Coolant pressure 1 (measured from CAN) instrumentation screen
	Coolant pressure 2 (measured from CAN) instrumentation screen
	Turbo pressure 1 (measured from CAN) instrumentation screen
	Turbo pressure 2 (measured from CAN) instrumentation screen
	Fuel consumption (measured from CAN) instrumentation screen
	Fuel pressure (measured from CAN) instrumentation screen
	Total fuel used (measured from CAN) instrumentation screen
	Fuel level instrumentation screen
	Soot level as a percentage (measured from CAN) instrumentation screen
	Ash level as a % (measured from CAN) instrumentation screen
	DEF tank level (measured from CAN) instrumentation screen
	DEF fluid temperature (measured from CAN) instrumentation screen
	DEF consumption (measured from CAN) instrumentation screen
	String of text for DEF inducement reason (taken from CAN)
	String of text for DEF inducement severity (taken from CAN)
	EGR pressure (measured from CAN) instrumentation screen
	EGR temperature (measured from CAN) instrumentation screen
	Ambient air temperature (measured from CAN) instrumentation screen
	Air intake temperature (measured from CAN) instrumentation screen

4.2.2 ACTIVE CONFIGURATION

An icon is displayed in the ***Active Config*** section to indicate the active configuration within the currently selected within the controller.

Icon	Description
	Appears when the main configuration is selected.
	Appears when the alternative configuration is selected.

4.2.3 AUTO RUN ICON

When running in Auto Mode and on the Home () page, an icon is displayed in the ***Auto Run*** section to indicate the source of the auto start signal.

Icon	Description
	Appears when a remote start input is active
	Appears when a low battery run is active
	Appears when a scheduled run is active

4.2.4 MODE OR FPE ICON

NOTE: For further details about the Front Panel Editor, see the section entitled *Front Panel Editors* elsewhere in this manual.

An icon is displayed in the ***Mode / FPE Icon*** section to indicate the mode or editor the controller is currently in.

Icon	Description
	Appears when the engine is at rest and the unit is in stop mode.
	Appears when the engine is at rest and the unit is in auto mode.
	Appears when the engine is at rest and the unit is waiting for a manual start.
	Appears when the engine is at rest and the periodic ECU wake up is active.
	Appears when a timer is active, for example cranking time, crank rest etc.
	Appears before starting or when the preheat timer is active.
	Appears when the warming up timer is active.
	Appears when the engine is running, and all timers have expired, either on or off load. The animation speed is reduced when running in idle mode.
	Appears when the unit is in the configuration editor.
	Appears when the unit is in the operator editor.

4.2.5 LIGHT OUTPUT ICONS

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

Icons are displayed in the ***Light Output Icons*** section indicates which of the light control outputs are configured and if they are active.

Icon	Description
	Appears when the corresponding light output has been configured and is not active.
	Appears when the corresponding light output has been configured and is active.
	Appears when a timer to delay the light output activating or de-activating is in progress

4.2.6 INOPERABLE ICONS

When the module is inoperable, a large icon is displayed which takes uses the entire display.

Icon	Description
	Appears when a configuration is being written to the module via the USB connection.
	Appears if either the configuration file or engine file becomes corrupted.

4.2.7 BACKLIGHT

The LCD backlight is on if the unit has sufficient voltage while the unit is turned on, unless the unit is cranking for which the backlight is turned off, or the *Power Save Mode* input function is been activated.

4.2.8 ALARM ICONS (PROTECTIONS)

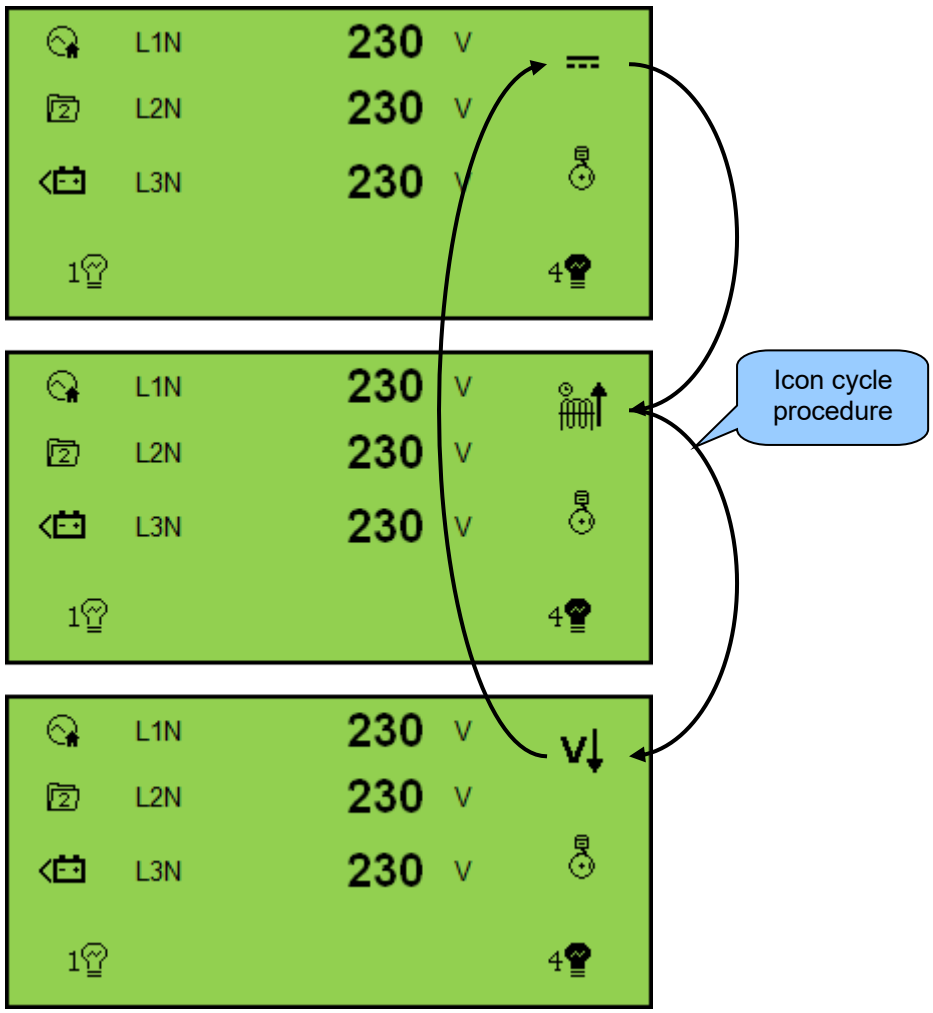
An icon is displayed in the ***Alarm Icon*** section to indicate the alarm that is current active on the controller.

In the event of a warning alarm, the LCD only displays the ***Alarm Icon***. In the event of an electrical trip or shutdown alarm, the module displays the ***Alarm Icon*** and the ***Stop/Reset Mode*** button LED begins to flash.

If multiple alarms are active at the same time, the ***Alarm Icon*** automatically cycles through all the appropriate icons to indicate each alarm which is active.

Example:

If the DSE controller was sensing a charge alternator failure alarm, delay over current alarm and an AC under voltage alarm at the same time, it would cycle through all of the icons to show this.



4.2.8.1 WARNING ALARM ICONS

Warnings are non-critical alarm conditions and do not affect the operation of the generator system, they serve to draw the operators attention to an undesirable condition.

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

By default, warning alarms are self-resetting when the fault condition is removed. However enabling *All Warnings Are Latched* in the configuration causes warning alarms to latch until reset manually. This is enabled using the DSE Configuration Suite in conjunction with a compatible PC.

Icon	Fault	Description
	Auxiliary Inputs	The module detects that an auxiliary input which has been user configured to create a fault condition has become active.
	Analogue Input Configured As Digital	The module detects that an analogue input configured as a digital input to create a fault condition has become active.
	Fail To Stop	The module has detected a condition that indicates that the engine is running when it has been instructed to stop. **NOTE: 'Fail to Stop' could indicate a faulty oil pressure sensor. If engine is at rest check oil sensor wiring and configuration.**
	Charge Failure	The auxiliary charge alternator voltage is low as measured from the W/L terminal.
	Low Fuel Level	The level detected by the fuel level sensor is below the low fuel level setting.
	High Fuel Level	The level detected by the fuel level sensor is above the high fuel level pre-set pre-alarm setting.
	Battery Under Voltage	The DC supply has fallen below or risen above the low volts setting level.
	Battery Over Voltage	The DC supply has risen above the high volts setting level.
V	**Generator/Mains Under Voltage**	The generator output voltage has fallen below the pre-set pre-alarm setting after the Safety On timer has expired. Or, the mains output voltage has fallen below the pre-set pre-alarm setting when the *Mains Supply Active* is active.
V	**Generator/Mains Over Voltage**	The generator/mains output voltage has risen above the pre-set pre-alarm setting.
Hz	**Generator/Mains Under Frequency**	The generator output frequency has fallen below the pre-set pre-alarm setting after the Safety On timer has expired. Or, the mains output frequency has fallen below the pre-set pre-alarm setting when the *Mains Supply Active* is active.
Hz	**Generator/Mains Over Frequency**	The generator/mains output frequency has risen above the pre-set pre-alarm setting.
ECM	**CAN ECU Fault**	The engine ECU has detected an alarm
CAN	**CAN Data Fail**	The module is configured for CAN operation and does not detect data on the engine CAN data link.

Additional warning alarms are viewed overleaf.

Icon	Fault	Description
	**Immediate Over Current**	The measured current has risen above the configured trip level.
	**Delayed Over Current**	The measured current has risen above the configured trip level for a configured duration.
	**Low Current**	The measured current has fallen below the configured trip level. This is used to detect lamp failure.
	**Oil Filter Maintenance Alarm**	Maintenance due for oil filter.
	**Air Filter Maintenance Alarm**	Maintenance due for air filter
	**Fuel Filter Maintenance Alarm**	Maintenance due for fuel filter.
	**Water In Fuel**	The module or engine ECU has detected there is water in the fuel.
	**DPTC Filter**	The engine ECU has detected that the DPTC Filter is active
	**HEST Active**	The engine ECU has detected that exhaust gas recirculation temperature is high.
	**DEF Level**	The engine ECU has detected that the DEF level is low.
	**SCR Inducement**	The engine ECU has detected that the SCR inducement is active
	**Tank Bund Level High**	The module has detected that the fuel has leaked in the bund of the fuel tank.

4.2.8.2 ELECTRICAL TRIP ALARM ICONS

Electrical trips are latching and stop the Generator but in a controlled manner. On initiation of the electrical trip condition the module de-energises all the **'Light Output'** outputs to remove the load from the generator. Once this has occurred the module starts the Cooling timer and allows the engine to cool off-load before shutting down the engine. The alarm must be accepted and cleared, and the fault removed to reset the module.

Electrical trips are latching alarms and to remove the fault, press the ***Stop/Reset Mode*** button on the module.

NOTE: The alarm condition must be rectified before a reseting. If the alarm condition remains, it is not possible to reset the unit (The exception to this is the Low Oil Pressure alarm and similar 'active from safety on' alarms, as the oil pressure is low with the engine at rest).

Icon	Fault	Description
	**Auxiliary Inputs**	The module detects that an auxiliary input which has been user configured to create a fault condition has become active.
	**Analogue Input Configured As Digital**	The module detects that an analogue input configured as a digital input to create a fault condition has become active.
	**Low Fuel Level**	The level detected by the fuel level sensor is below the low fuel level setting.
	**High Fuel Level**	The level detected by the fuel level sensor is above the high fuel level pre-set alarm setting.
	**Delayed Over Current**	The measured current has risen above the configured trip level for a configured duration.
	**Low Current**	The measured current has fallen below the configured trip level. This is used to detect lamp failure.
	**Water In Fuel**	The module or engine ECU has detected there is water in the fuel.
	**DPTC Filter**	The engine ECU has detected that the DPTC Filter is active
	**DEF Level**	The engine ECU has detected that the DEF level is low.
	**SCR Inducement**	The engine ECU has detected that the SCR inducement is active
	**Tank Bund Level High**	The module has detected that the fuel has leaked in the bund of the fuel tank.

4.2.8.3 SHUTDOWN ALARM ICONS

Shutdown alarms are latching and immediately stop the Generator. On initiation of the shutdown condition the module de-energises all the **'Light Output'** outputs to remove the load from the generator. Once this has occurred, the module shuts the generator set down immediately to prevent further damage. The alarm must be accepted and cleared, and the fault removed to reset the module.

Shutdowns are latching alarms and to remove the fault, press the ***Stop/Reset Mode*** button on the module.

NOTE: The alarm condition must be rectified before a reseting. If the alarm condition remains, it is not be possible to reset the unit (The exception to this is the Low Oil Pressure alarm and similar 'active from safety on' alarms, as the oil pressure is low with the engine at rest).

Icon	Fault	Description
	Auxiliary Inputs	The module detects that an auxiliary input which has been user configured to create a fault condition has become active.
	Analogue Input Configured As Digital	The module detects that an analogue input configured as a digital input to create a fault condition has become active.
	Fail To Start	The engine has failed to start after the configured number of start attempts
	Low Oil Pressure	The module detects that the engine oil pressure has fallen below the low oil pressure pre-alarm setting level after the Safety On timer has expired.
	Engine High Coolant Temperature	The module detects that the engine coolant temperature has exceeded the high engine temperature pre-alarm setting level after the Safety On timer has expired.
	Under Speed	The engine speed has fallen below the under speed pre alarm setting
	Over Speed	The engine speed has risen above the over speed pre alarm setting
	Charge Failure	The auxiliary charge alternator voltage is low as measured from the W/L terminal.
	Low Fuel Level	The level detected by the fuel level sensor is below the low fuel level setting.
	High Fuel Level	The level detected by the fuel level sensor is above the high fuel level pre-set alarm setting.
	Battery Under Voltage	The DC supply has fallen below or risen above the low volts setting level.
	Battery Over Voltage	The DC supply has risen above the high volts setting level.
V	**Generator/Mains Under Voltage**	The generator output voltage has fallen below the pre-set pre-alarm setting after the Safety On timer has expired. Or, the mains output voltage has fallen below the pre-set pre-alarm setting when the *Mains Supply Active* is active.
V	**Generator/Mains Over Voltage**	The generator/mains output voltage has risen above the pre-set pre-alarm setting.

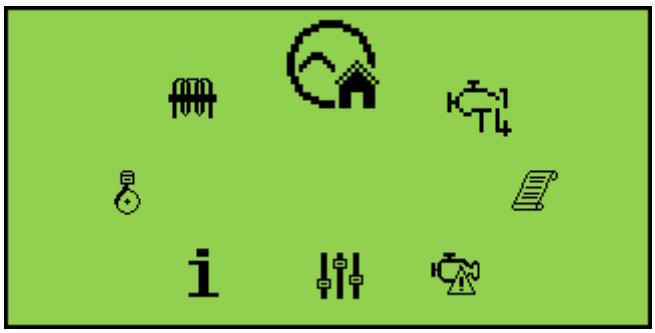
Additional shutdown alarms are viewed overleaf.

Icon	Fault	Description
	**Generator/Mains Under Frequency**	The generator output frequency has fallen below the pre-set pre-alarm setting after the Safety On timer has expired. Or, the mains output frequency has fallen below the pre-set pre-alarm setting when the *Mains Supply Active* is active.
	**Generator/Mains Over Frequency**	The generator/mains output frequency has risen above the pre-set pre-alarm setting.
	**CAN ECU Fault**	The engine ECU has detected an alarm – CHECK ENGINE LIGHT Contact Engine Manufacturer for support.
	**CAN Data Fail**	The module is configured for CAN operation and does not detect data on the engine CAN data link.
	**Emergency Stop**	The emergency stop button has been depressed. This failsafe (normally closed to emergency stop) input and immediately stops the set when the signal be removed.
	**Oil Pressure Sensor Open Circuit**	The oil pressure sensor has been detected as being open circuit.
	**Coolant Temperature Sensor Open Circuit**	The coolant temperature sensor has been detected as being open circuit.
	**Delayed Over Current**	The measured current has risen above the configured trip level for a configured duration.
	**Low Current**	The measured current has fallen below the configured trip level. This is used to detect lamp failure.
	**Oil Filter Maintenance Alarm**	Maintenance due for oil filter.
	**Air Filter Maintenance Alarm**	Maintenance due for air filter
	**Fuel Filter Maintenance Alarm**	Maintenance due for fuel filter.
	**Water In Fuel**	The module or engine ECU has detected there is water in the fuel.
	**DPTC Filter**	The engine ECU has detected that the DPTC Filter is active
	**DEF Level**	The engine ECU has detected that the DEF level is low.
	**SCR Inducement**	The engine ECU has detected that the SCR inducement is active
	**Tank Bund Level High**	The module has detected that the fuel has leaked in the bund of the fuel tank.

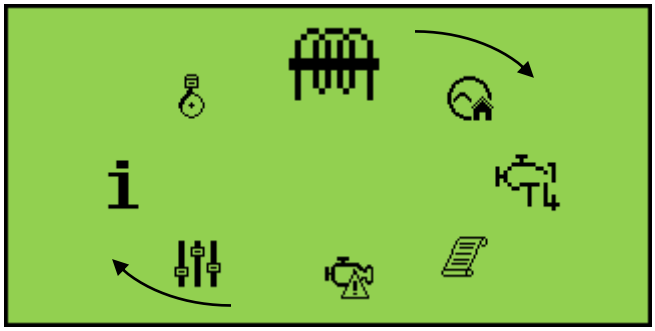
4.3 VIEWING THE INSTRUMENT PAGES

4.3.1 NAVIGATION MENU

To enter the navigation menu, press the ***Up*** and ***Down*** buttons simultaneously.



To select the required icon, press the ***Up*** button to cycle right or the ***Down*** button to cycle left until the desired instrumentation section is reached.



Once the desired icon is at the top, press the ***Auto Mode*** (✓) button to enter that instrunmentation section.

If the ***Auto Mode*** (✓) button is not pressed, the display automatically returns to the Home () page after the configured setting of the *LCD Scroll Timer*.

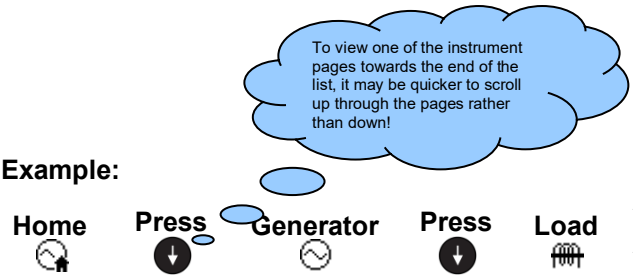
4.3.1.1 NAVIGATION MENU ICONS

Icon	Description
	Home, generator / mains voltage and frequency instrumentation
	Load current and load instrumentation
	Engine instrumentation
	Module information
	Mast and light control
	Engine DTCs (Diagnostic Trouble Codes) if active
	Event Log
	Engine Tier 4 information

4.3.2 GENERAL NAVIGATION

It is possible to scroll through the display to view different pages of information by repeatedly operating the ***Up*** and ***Down*** naviagation buttons.

Example:



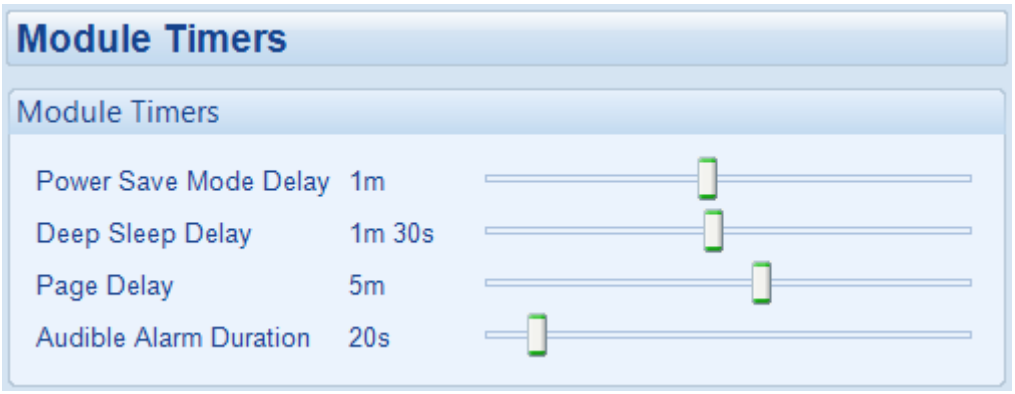
And so on until the last page is reached.

A Further press of the ***Down*** navigation button returns the display to the Home ( ) page.

Once selected, the page remains on the LCD display until the user selects a different page or, after an extended period of inactivity (*Page Delay Timer*), the module reverts back to the Home ( ) page.

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

The *Page Delay Timer* is configurable using the DSE Configuration Suite Software or by using the Front Panel Editor.



4.3.3 HOME

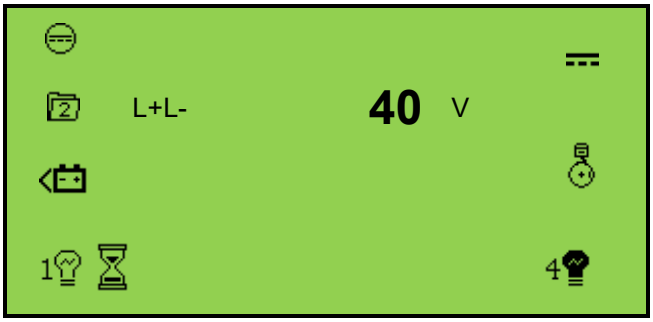
NOTE: Depending upon the module's configuration, the home screen may be set to display electrical parameters or engine tier 4 information. For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

This is the page that is displayed when no other page has been selected and is automatically displayed after a period of inactivity (*Page Delay Timer)* of the module facia buttons. Depending upon configuration, the page contains the voltage reading of the generator and mains that is measured from the module's voltage inputs or engine tier 4 information read from the CAN.

4.3.3.1 AC VOLTAGE INSTRUMENTATION

- Generator Voltage (ph-N)
- Generator Voltage (ph-ph)

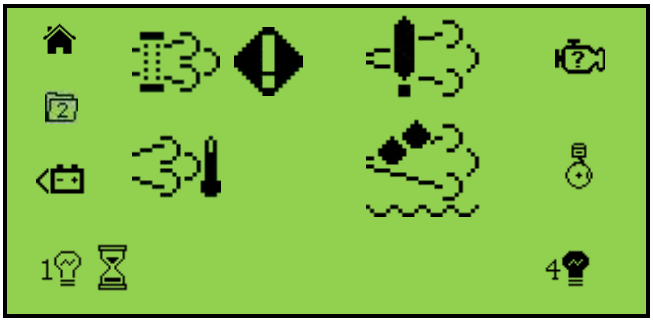
4.3.3.2 DC VOLTAGE INSTRUMENTATION



- Generator Voltage (pole-midpoint)

4.3.3.3 ENGINE TIER 4 INSTRUMENTATION

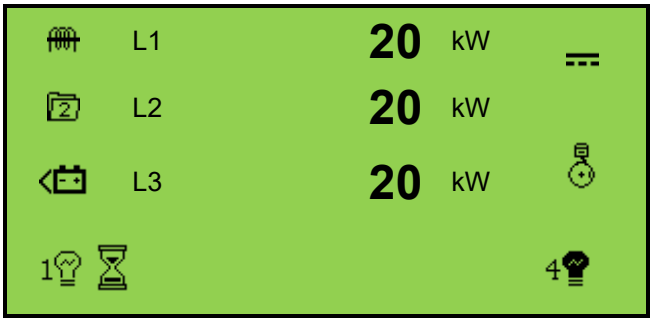
NOTE: For more information on the engine tier 4 icons, refer to the section entitled *Engine Tier 4 Information* else where in this manual.



4.3.4 GENERATOR

NOTE: Generator instrumentation is only displayed when the *Mains Supply Active* digital input is not active. When the *Mains Supply Active* digital input is active, the Generator instrumenation is replaced with Mains instrumentation.

These pages contain electrical values of the generator (alternator), measured or derived from the module's voltage and current inputs.



- Generator Voltage (ph-ph or pole-pole)
- Generator Frequency
- Generator Current
- Generator Load per Phase (kW)
- Generator Total Load (kW)
- Generator Load per Phase (kV A)
- Generator Total Load (kV A)
- Generator Load per Phase (kvar)
- Generator Total Load (kvar)
- Generator Power Factor per Phase
- Generator Power Factor Average
- Generator Accumulated Load (kW h, kVA h, kvar h)

4.3.6 MAINS

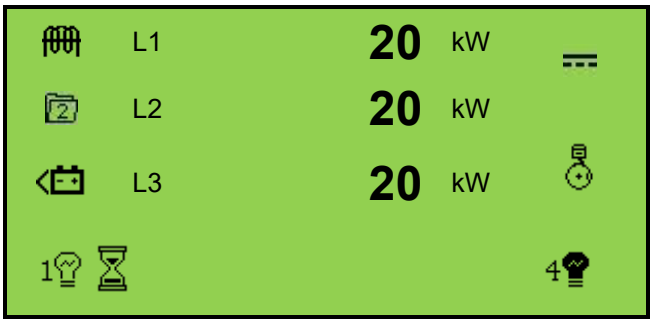
NOTE: Mains instrumentation is only displayed when the *Mains Supply Active* digital input is active. When the *Mains Supply Active* digital input is not active, the Mains instrumenation is replaced with Generator instrumentation.

These pages contain electrical values of the mains, measured from the module's voltage and current inputs.

- Mains Voltage (ph-ph)
- Mains Frequency
- Mains Current

4.3.7 LOAD

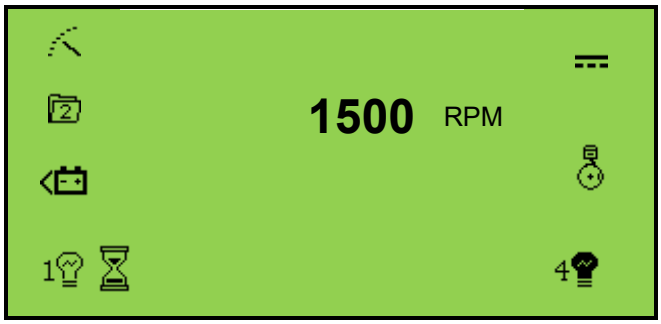
These pages contain electrical values of the load, measured or derived from the module's voltage and current inputs. The power values displayed depend on which supply is on load.



- Generator Current (A)
- Mains Current (A)
- Load ph-N (kW)
- Total Load (kW)
- Load ph-N (kVA)
- Total Load (kVA)
- Load ph-N (kVAr)
- Total Load (kVAr)
- Power Factor ph-N
- Power Factor Average
- Accumulated Load (kWh, kVAh, kVArh)

4.3.8 ENGINE

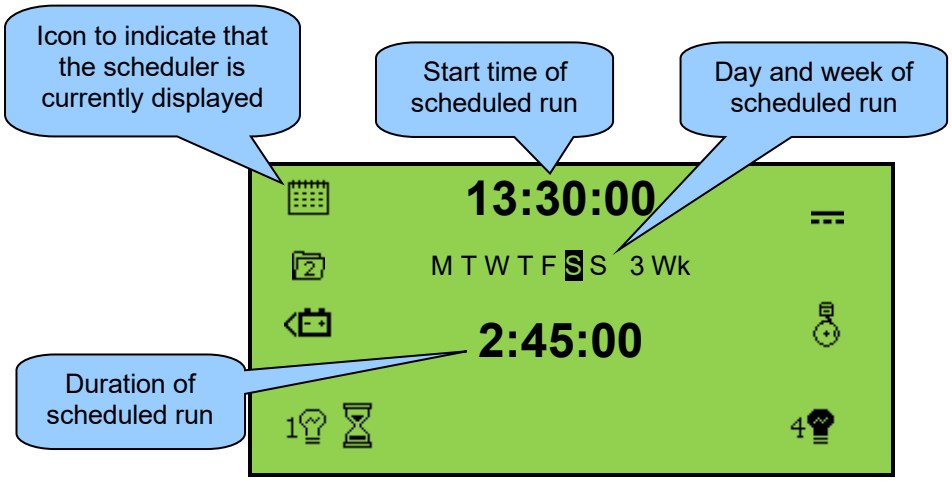
These pages contain instrumentation gathered about the engine measured or derived from the module's inputs, some of which may be obtained from the engine ECU.



- Engine Speed
- Engine Run Time
- Engine Battery Voltage
- Engine Charge Alternator Voltage
- Engine Coolant Temperature
- Engine Oil Pressure
- Engine Fuel Level or Flexible Sensor
- Engine Maintenance Due – Oil
- Engine Maintenance Due – Air
- Engine Maintenance Due – Fuel

4.3.9 INFO

These pages contain information about the controller.



- Module's date and time
- Module's latitude, longitude and UTC offset used for automatic time calculation
- Scheduler settings
- Product description and USB identification number
- Application and Engine Version

4.3.9.1 SCHEDULER EDITING FROM INTRUMENTATION SCREENS

The DSE module allows editing of the scheduler from the instrumentation screen whilst in ***Stop/Reset Mode*** O without needing to enter the *Front Panel Editor*. This is only possible when *Scheduler Edit From Fascia* is enabled in the module's configuration.

Scheduler Edit From Fascia ☑

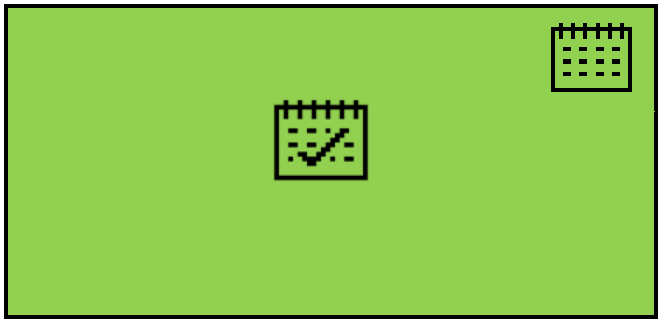
Enabling the *Scheduler Enable From Fascia* option in the DSE module configuration adds two pages on the module's display. This allows the user to enable/disable the Scheduler and to select the Schedule period.

Scheduler Enable From Fascia ☑

To access the scheduler editor, navigate to one of the scheduler pages and press and hold the ***Stop/Reset Mode*** O button. Use the ***Stop/Reset Mode*** O (-) or ***Manual/Start Mode*** I (+) buttons to cycle through the editor. To edit the parameters press the ***Auto Mode*** AUTO (✔) button and then use the ***Stop/Reset Mode*** O (-) or ***Manual/Start Mode*** I (+) buttons to change the value. The displayed value or icon begins to flash to show it is being edited. Press the ***Auto Mode*** AUTO (✔) button to accept the new value. Press and hold ***Auto Mode*** AUTO (✔) button to exit the editor and save the changes.

The scheduler pages on the instrumentation screen list the following for 8 scheduled start/stop sequence.

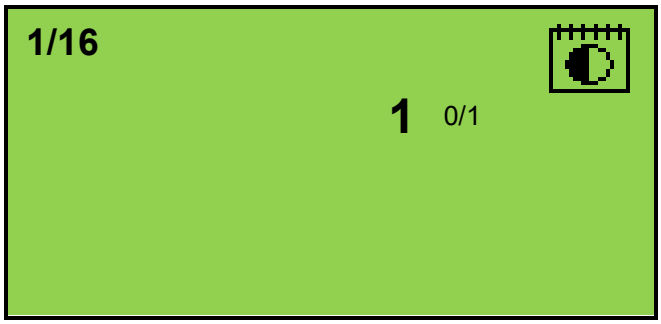
- Scheduler Enable option, icons detailed below.



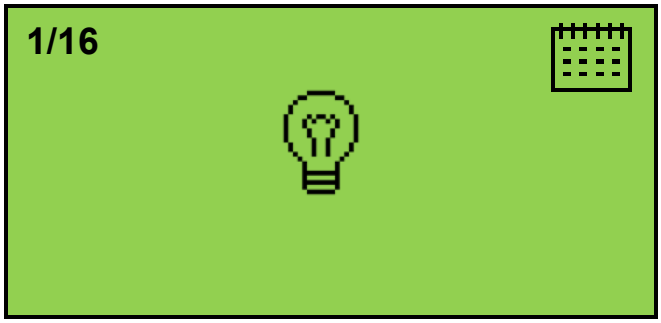
Icon	Description
	Select to disable the *Scheduler*.
	Select to enable the *Scheduler*.

- *Schedule Period* to indicate *Weekly*, *Monthly*, or *Daily*.

- *Auto Mode* where 0 uses configured time and 1 uses sun rise/set calculations.

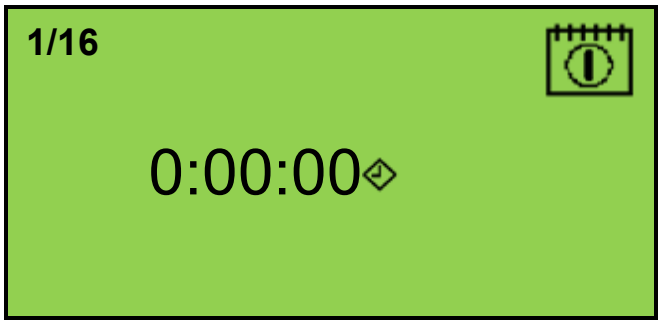


- *Run Mode*, icons detailed below.

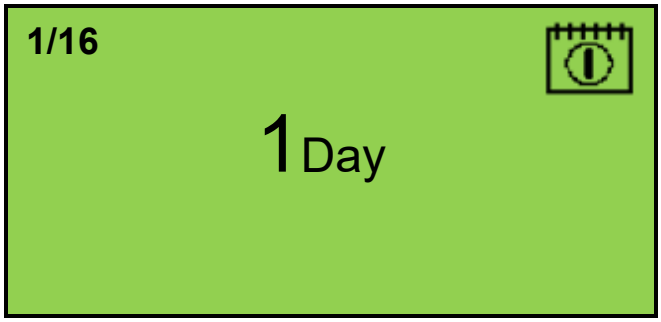


Icon	Description
	Select for *Off Load*.
	Select for *On Load*.
	Select for *Lights Only*.

- Start time (00:00:00)

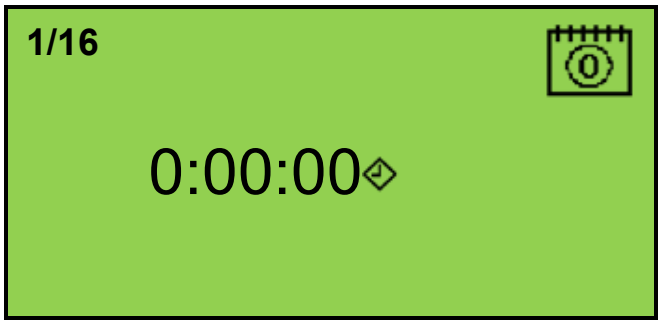


- Start Day. Select the day of the week (1=Monday, 2=Tuesday, 3=Wednesday, 4=Thursday, 5=Friday, 6=Saturday, 7=Sunday)



- Start Week. Select the week of month (1,2,3,4).

- Duration (00:00:00)



4.3.10 ENGINE DTC (ECU ALARMS)

If the DSE module is connected to an ECU, This page contains active *Diagnostic Trouble Codes (DTC)* only if the engine ECU generating a fault code. These are alarm conditions are detected by the engine ECU and displayed by the DSE controller.

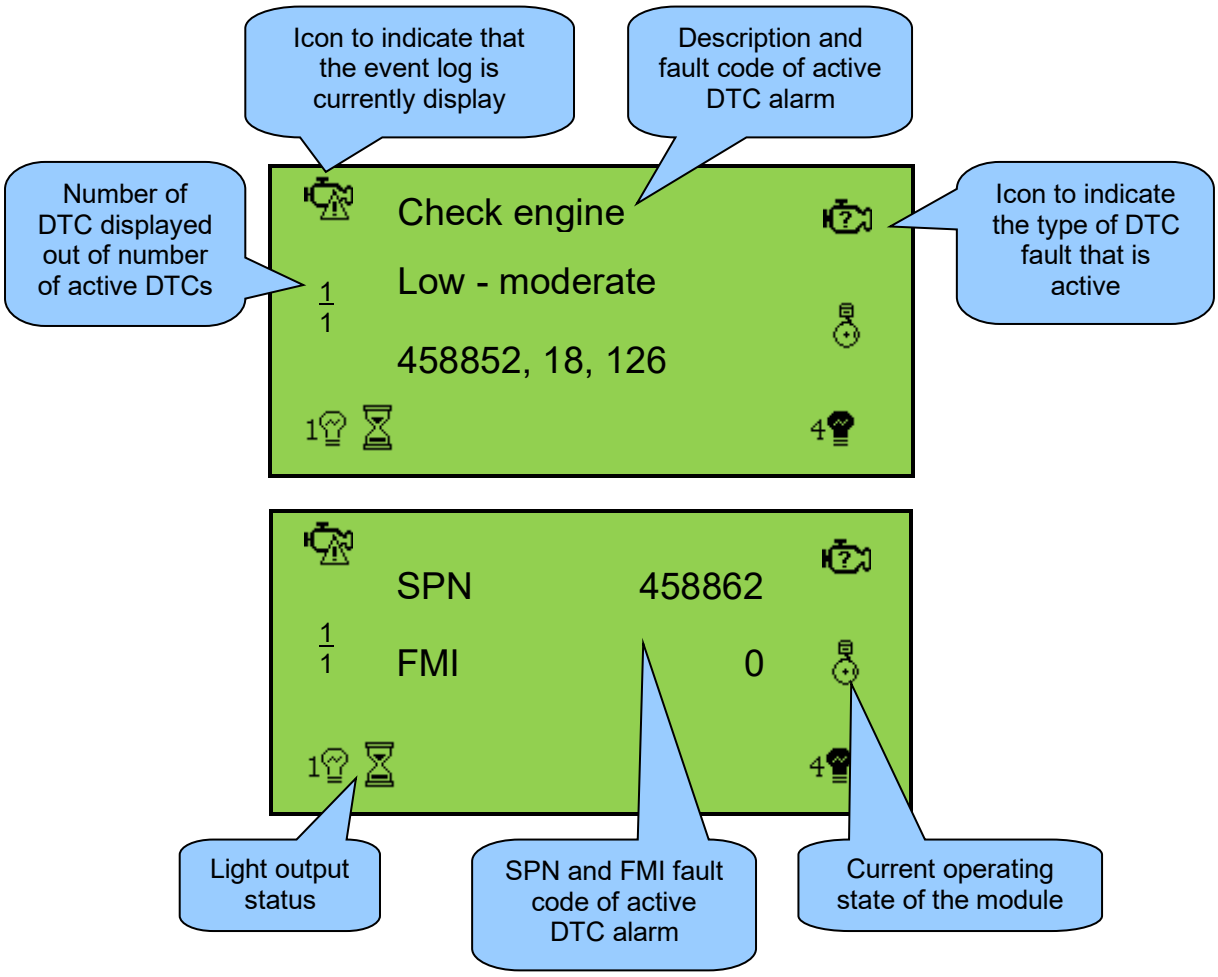
4.3.10.1 VIEWING ACTIVE ENGINE DTC

To view the engine DTC(s), press the ***Up*** and ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the ***DTC*** section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.

To view the active DTC(s) alarms, repeatedly press ***Up*** or ***Down*** buttons until the LCD screen displays the alarm.

Continuing to press the ***Up*** or ***Down*** buttons cycles through the other DTC alarms.

To exit the active DTC(s) alarm section, press the ***Up*** or ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the desired intrunmentation section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.



NOTE: For details on these code meanings, refer to the ECU instructions provided by the engine manufacturer, or contact the engine manufacturer for further assistance.

NOTE: For further details on connection to electronic engines, refer to DSE Publication: *057-004 Electronic Engines And DSE Wiring*

Icon	Fault	DTC Description
	**Check Engine Fault**	The engine ECU has detected a fault not recognised by the DSE module, contact engine manufacturer for support.
	**Low Oil Pressure**	The engine ECU has detected that the engine oil pressure has fallen below its configured low oil pressure alarm level.
	**Under Speed**	The engine ECU has detected that the engine speed has fallen below it's configured under speed alarm level.
	**Over Speed**	The engine ECU has detected that the engine speed has risen above it's configured over speed alarm level.
	**Charge Failure**	The engine ECU has detected that the engine's charge alternator output has fallen below its configured alarm level.
	**Low Fuel Level**	The engine ECU has detected that the engine's fuel level has fallen below its configured low fuel level alarm.
	**Battery Under/Over Voltage**	The engine ECU has detected that the engine's DC supply has fallen below or risen above its configured alarm level.

4.3.11 EVENT LOG

This module's event log contains a list of the last 50 record electrical trip or shutdown events and the engine hours at which they occurred.

Once the log is full, any subsequent electrical trip or shutdown alarms overwrites the oldest entry in the log. Hence, the log always contains the most recent shutdown alarms. The module logs the alarm, along with the engine running hours.

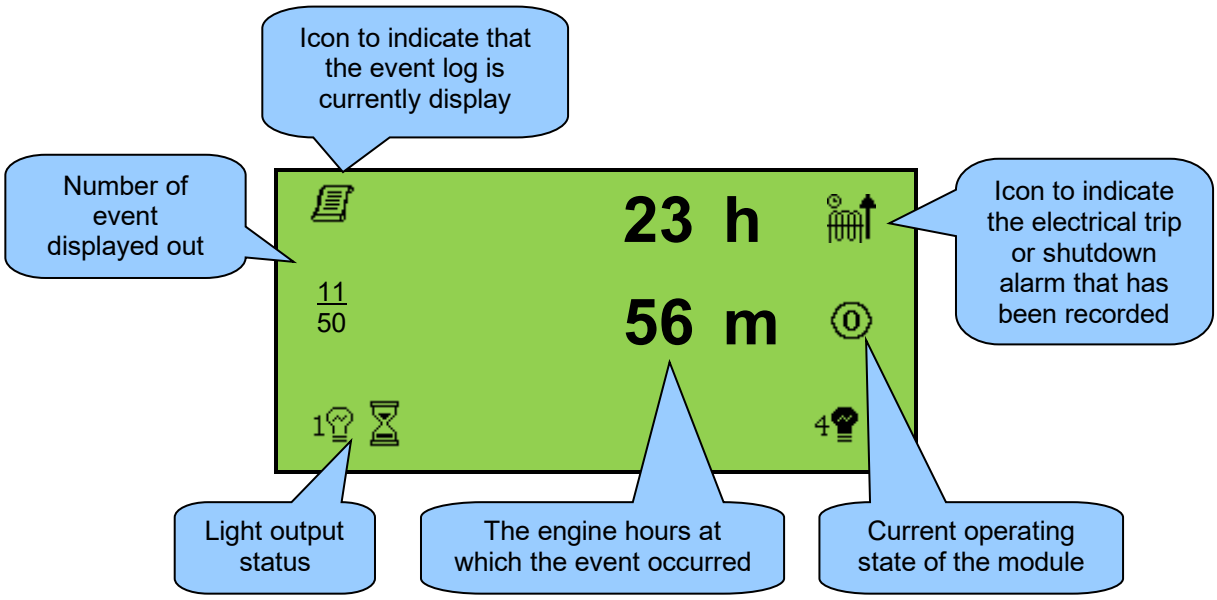
4.3.11.1 VIEWING THE EVENT LOG

To view the engine DTC(s), press the ***Up*** and ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the ***Event Log*** section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.

To view the event log, repeatedly press ***Up*** or ***Down*** buttons until the LCD screen displays the desired event.

Continuing to press the ***Up*** or ***Down*** buttons cycles through the past alarms after which the display shows the most recent alarm and the cycle begins again.

To exit the event log, press the ***Up*** or ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the desired intrunmentation section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.



The events shown in the below table are recorded into the module's event log in addition to all electrical trip and shutdown alarms.

Icon	Event	Description
	Module Power Up	The module was powered up

4.3.12 ENGINE TIER 4 INFORMATION

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

NOTE: For details on these icon meanings, refer to the ECU instructions provided by the engine manufacturer, or contact the engine manufacturer for further assistance.

NOTE: For further details on connection to electronic engines, refer to DSE Publication: *057-004 Electronic Engines And DSE Wiring*

If the DSE module is connected to an ECU, This page contains active *Engine Tier 4 Lamps* only if the engine ECU is generating a fault code. These are alarm conditions are detected by the engine ECU and displayed by the DSE controller.

To view the *Engine Tier 4 Lamps* or *DPF Inhibit Control* page, press the (up) or (down) buttons until the LCD screen displays the desired event.

Continuing to press down the (up) or (down) buttons cycles through the past alarms after which the display shows the most recent alarm and the cycle begins again.

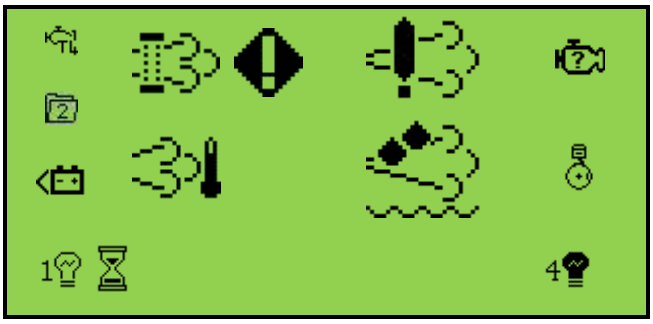
To view the *Engine Tier 4 Lamps* or *DPF Inhibit Control* page, press both (up) and (down) buttons simultaneously, the navigation menu is then displayed. Once entered, cycle to the *Engine Tier 4* ( ) section and enter.

To view the *Engine Tier 4 Lamps* or *DPF Inhibit Control* pages, press the (up) or (down) buttons until the LCD screen displays the desired page.

To exit the *Engine Tier 4* section, press the (up) and (down) buttons simultaneously to enter the navigation menu. Once entered, cycle to the desired intrunmentation section.

4.3.12.1 ENGINE TIER 4 LAMPS

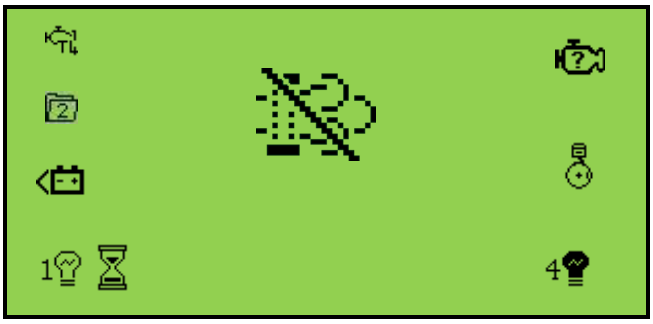
NOTE: Depending upon the module's configuration, the home screen may be set to display engine tier 4 information. For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*



Icon	Fault	Description
	**ECU Amber Alarm**	The module received an Amber fault condition from the engine ECU.
	**ECU Red Alarm**	The module received a Red fault condition from the engine ECU.
	**DPF Stop**	The module received a fault indication from the engine ECU informing that the *Diesel Particulate Filter* has been stopped.
	**DPF Warning**	The module received a fault condition from the engine ECU informing that the *Diesel Particulate Filter* has a fault condition.
	**HEST Active**	The module received a fault indication from the engine ECU informing that the *High Exhaust System Temperature* is active.
	**DEF Low Level**	The module received a fault condition from the engine ECU informing that the *Diesel Exhaust Fluid Low Level* is active.
	**SCR Inducement**	The module received a fault indication from the engine ECU informing that the *Selective Catalytic Reduction Inducement* is active.

4.3.12.2 DPF INHIBIT CONTROL

To inhibit or enable the DPF Control, press the ***Auto Mode*** (AUTO) (✔) button.



Icon	Fault	Description
	**DPF Active**	The module received a fault indication from the engine ECU informing that the *Diesel Particulate Filter* is active.
	**DPF Inhibited**	The module received a fault indication from the engine ECU informing that the *Diesel Particulate Filter* has been inhibited.

4.3.13 MAST AND LIGHT CONTROL

If the DSE module has been configured to do so, the raising and lowering of the light mast and the turning on and off of the lights is controlled manually from the Mast and Light Control pages.

4.3.13.1 VIEWING THE MAST CONTROL

NOTE: The Mast Control page is only operable if the module is in *Stop/Reset Mode* or *Manual/Start Mode*, if the *Emergency Stop* alarm is not active and if an input is configured for *Holding Supports Open* is active. For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

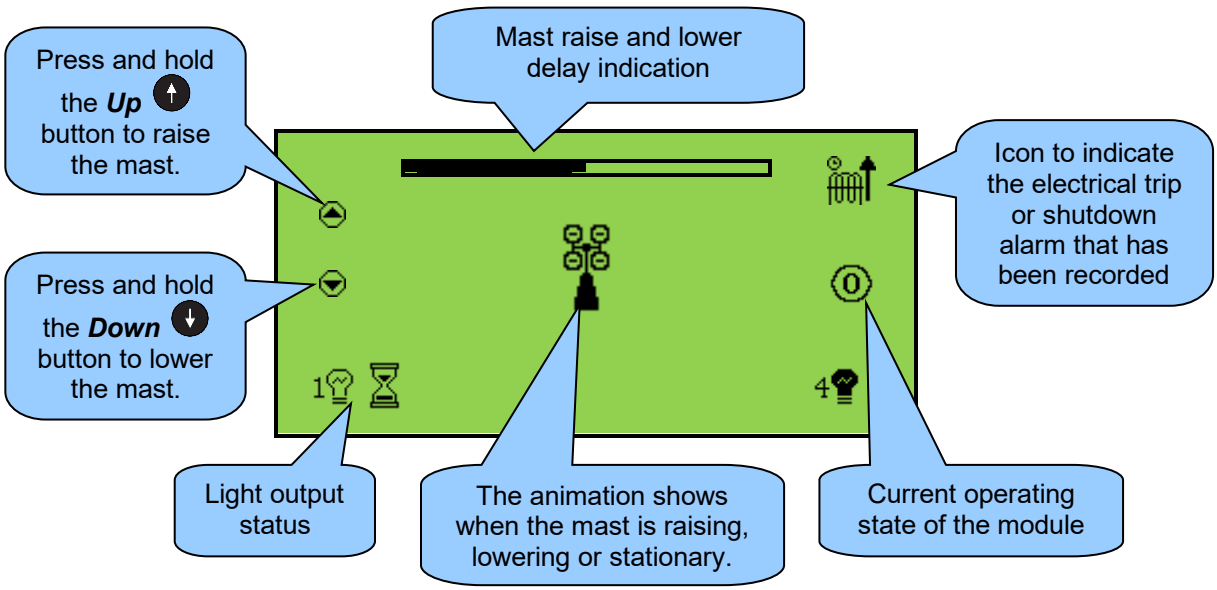
NOTE: For further details on Mast Control in *Auto Mode*, see the section entitled *Operation* elsewhere in this manual.

To view the mast control, press the ***Up*** and ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the ***Mast and Light Control*** section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.

To view the mast control, repeatedly press ***Up*** or ***Down*** buttons until the LCD screen displays the mast control page.

Continuing to press the ***Up*** or ***Down*** buttons cycles through the light control pages and then back to the mast control page.

To exit the mast control page, press the ***Up*** or ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the desired intrunmentation section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.



4.3.13.2 VIEWING THE AUTO LIGHT CONTROL

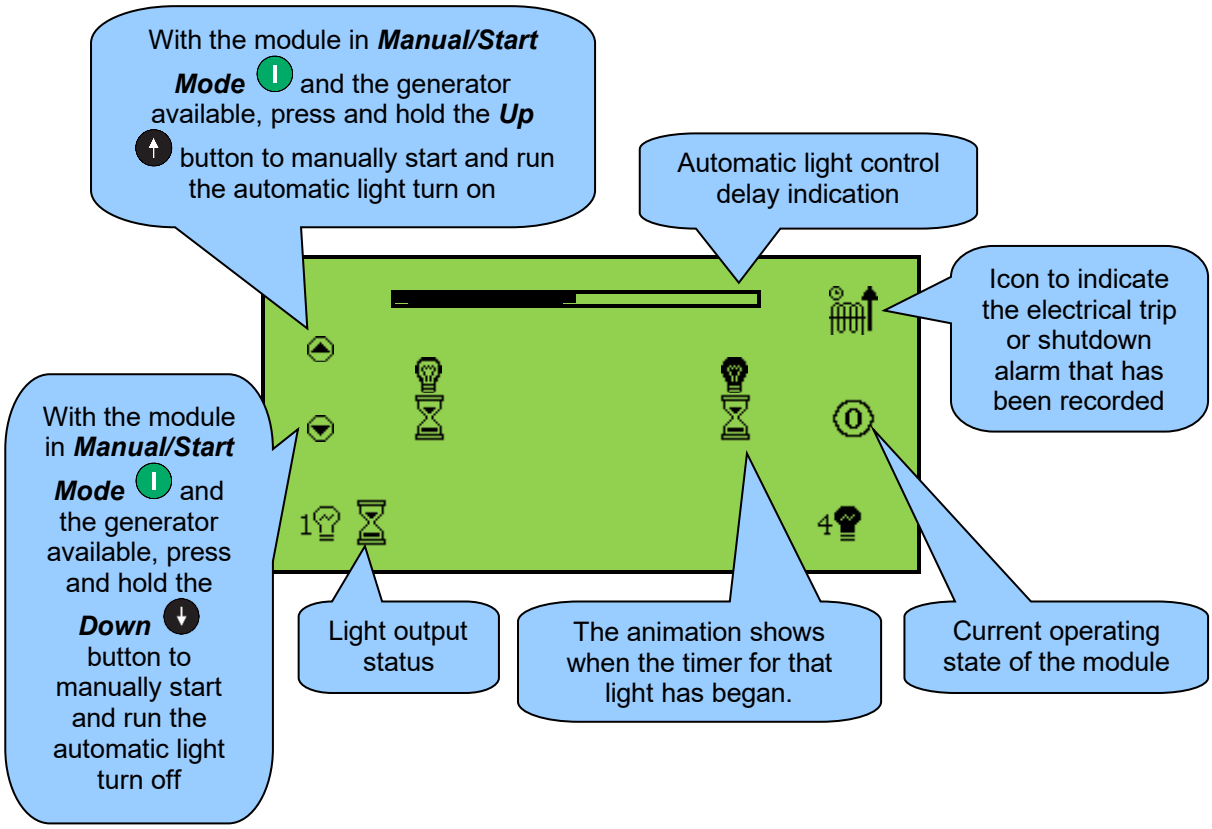
NOTE: The Auto Light Control page is only viewable if the module is configured for this function. For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

To view the auto light control, press the ***Up*** and ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the ***Mast and Light Control*** section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.

To view the auto light control, repeatedly press ***Up*** or ***Down*** buttons until the LCD screen displays the auto light control page.

Continuing to press the ***Up*** or ***Down*** buttons cycles through the other mast and light control pages and then back to the auto light control page.

To exit the auto light control, press the ***Up*** or ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the desired intrunmentation section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.



4.3.13.3 VIEWING THE INDIVIDUAL LIGHT CONTROL

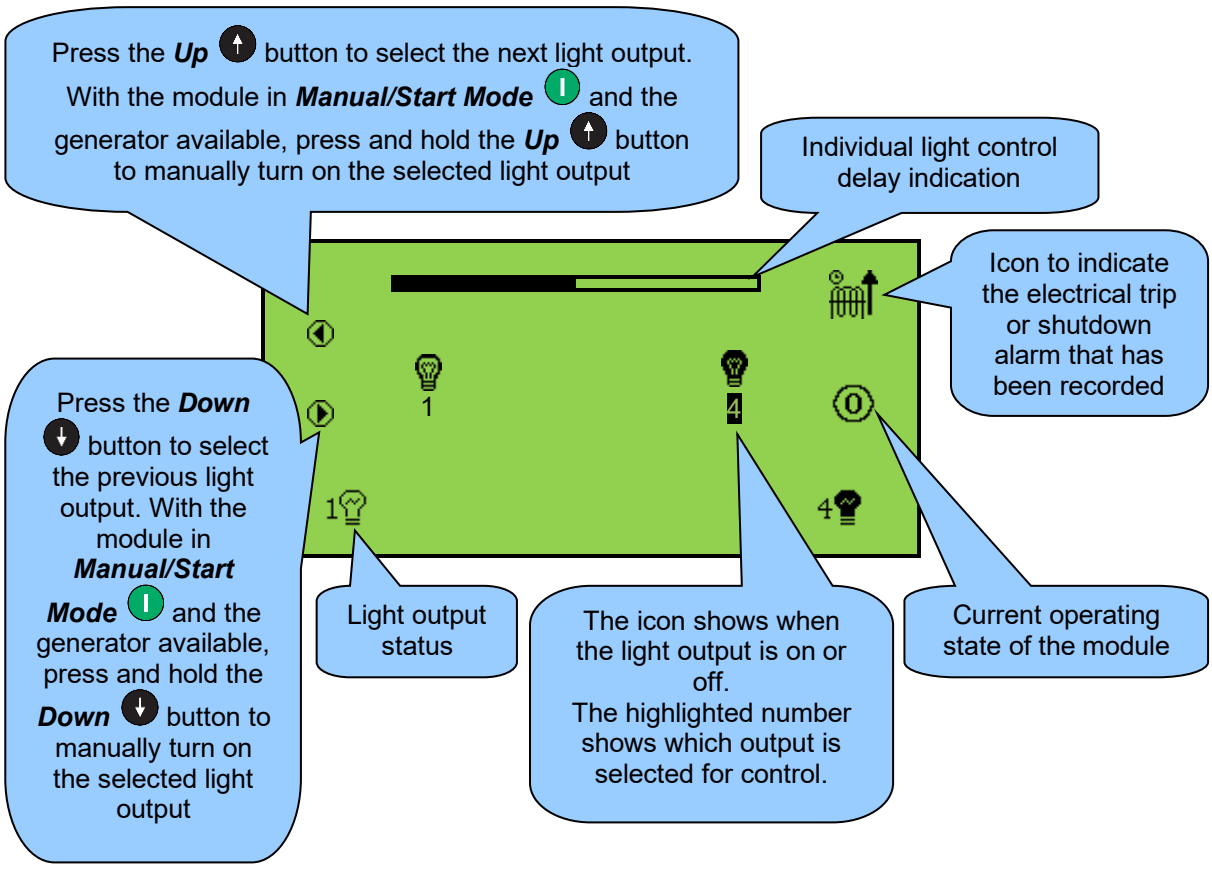
NOTE: The All Light Control page is only viewable if the module is configured for this function. For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

To view the individual light control, press the ***Up*** and ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the ***Mast and Light Control*** section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.

To view the individual light control, repeatedly press ***Up*** or ***Down*** buttons until the LCD screen displays the individual light control pages.

Continuing to press the ***Up*** or ***Down*** buttons cycles through the other mast and light control pages and then back to the individual light control pages.

To exit the individual light control, press the ***Up*** or ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the desired intrunmentation section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.



4.3.13.4 VIEWING THE ALL LIGHT CONTROL

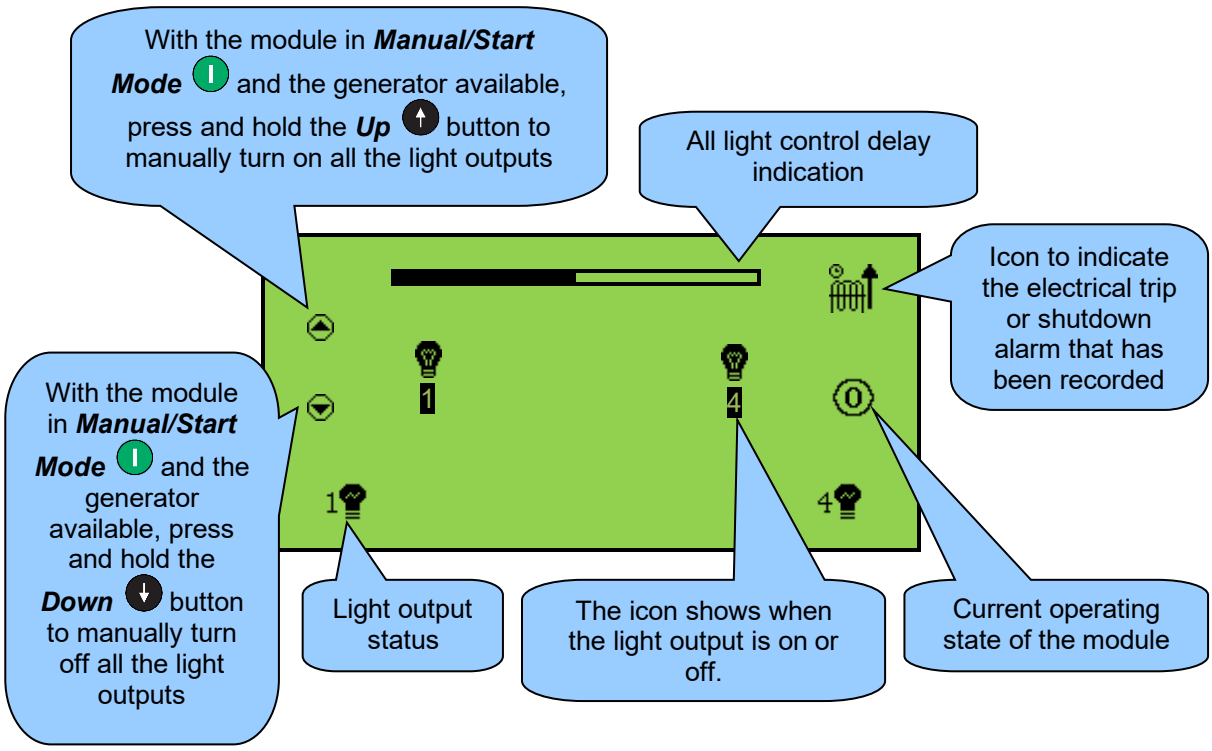
NOTE: The All Light Control page is only viewable if the module is configured for this function. For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

To view the all light control, press the ***Up*** and ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the ***Mast and Light Control*** section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.

To view the all light control, repeatedly press ***Up*** or ***Down*** buttons until the LCD screen displays the auto light control page.

Continuing to press the ***Up*** or ***Down*** buttons cycles through the other mast and light control pages and then back to the auto light control page.

To exit the all light control, press the ***Up*** or ***Down*** buttons simultaneously to enter the navigation menu. Once entered, cycle to the desired intrunmentation section using the ***Up*** or ***Down*** buttons and press the ***Auto Mode*** (✓) button to enter.



5 OPERATION

NOTE: The following descriptions detail the sequences followed by a module containing the standard 'factory configuration'. Always refer to the configuration source for the exact sequences and timers observed by any particular module in the field.

5.1 QUICKSTART GUIDE

This section provides a quick start guide to the module's operation.

5.1.1 STARTING THE ENGINE

NOTE: For further details, see the section entitled *Operation* elsewhere in this manual.

5.1.2 STOPPING THE ENGINE

NOTE: For further details, see the section entitled *Operation* elsewhere in this manual.

5.2 STOP/RESET MODE

NOTE: If a digital input configured to *Panel Lock* is active, changing module modes is not possible. Viewing the instruments and event logs is NOT affected by panel lock.

Stop/Reset Mode is activated by pressing the ***Stop/Reset Mode*** button.
The ***Stop/Reset*** icon is displayed to indicate ***Stop/Reset Mode*** operations.

In ***Stop/Reset Mode***, the module removes the generator from load *('**Light Output 1, 2, 3 & 4** deactivate immediately (if used and necessary))* before stopping the engine if it is already running.

If the engine does not stop when requested, the ***Fail To Stop*** alarm is activated (subject to the setting of the *Fail to Stop* timer). To detect the engine at rest the following must occur:

- Engine speed is zero as detected by the CANbus ECU
- Generator AC Voltage and Frequency must be zero.
- Engine Charge Alternator Voltage must be zero.
- Oil pressure switch and/or sensor must indicate low oil pressure.

When the engine has stopped, it is possible to send configuration files to the module from DSE Configuration Suite PC software and to enter the Front Panel Editor to change parameters.

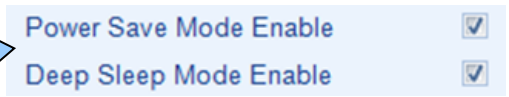
Any latched alarms are reset when ***Stop/Reset Mode*** is entered as long as the fault is no longer active.

The engine is not started when in ***Stop/Reset Mode***. If remote start signals are given, the input is ignored until ***Auto Mode*** is entered.

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

When the unit is configured for `Power Save Mode' and has been left in ***Stop/Reset Mode*** with no presses of the fascia buttons, the module enters Power Save Mode. To 'wake' the module, press any fascia control buttons or activate Digital Input A. The same is true for Deep Sleep Mode.

Power Save & Deep Sleep Modes in the DSE Configuration Suite Software



5.3 AUTOMATIC MODE

NOTE: If a digital input configured to external *panel lock* is active, changing module modes is not possible. Viewing the instruments and event logs is NOT affected by panel lock.

NOTE: If a digital input configured to *Mains Supply Active* is active, the L401MKII don't respond to any remote start signals, it assumes the Mains is available and the AC voltage supply to the L401MKII is assumed to be the Mains voltage. The mast and light control operates normal in this condition as long as the Mains voltaage and frequency are within the configured limits.

Auto Mode is activated by pressing the ***Auto Mode*** button.

The ***Auto Mode*** icon is displayed to indicate ***Auto Mode*** operations if no alarms are present.

Auto mode allows the generator to operate fully automatically, starting and stopping as required with no user intervention.

5.3.1 WAITING IN AUTO MODE

If a starting request is made, the starting sequence begins.
Starting requests come from the following sources:

- Activation of an auxiliary input that has been configured to *Remote Start On/Off Load* or *Photocell Start*.
- Activation of the inbuilt exercise scheduler.

5.3.2 STARTING SEQUENCE

To allow for 'false' start requests, the *Start Delay* timer begins.

When all start requests be removed during the *Start Delay* timer, the unit returns to a stand-by state.

If a start request is still present at the end of the *Start Delay* timer, the fuel relay is energised and the engine is cranked.

NOTE: If the unit has been configured for CAN, compatible ECU's receive the start command via CAN and transmit the engine speed to the DSE controller.

If the engine fails to fire during this cranking attempt then the starter motor is disengaged for the *Crank Rest* duration after which the next start attempt is made. If this sequence continues beyond the set number of attempts, the start sequence is terminated and the display shows ***Fail to Start***.

When the engine fires the starter motor is disengaged. Speed detection is factory configured to be derived from the main alternator output frequency.

Additionally, rising oil pressure can be used disconnect the starter motor (but cannot detect under speed or over speed).

After the starter motor has disengaged, the *Safety On Delay* timer activates, allowing Oil Pressure, High Engine Temperature, Under-speed, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault.

5.3.3 ENGINE RUNNING

NOTE: The loading signals remain inactive until the Oil Pressure has risen. This prevents excessive wear on the engine.

Once the engine is running and all starting timers have expired, the animated ***Engine Running*** icon is displayed.

Once the generator is available and if configured, the lighting mast raises for the duration of the *Mast Up Timer* or until an input configured for *Light Mast Fully Open* activates.

The generator is then placed on load *('***Light Output 1, 2, 3 & 4** *becomes active in an order dictated by configurable timers (if used))* if configured to do so.
If all start requests are removed, the *Stopping Sequence* begins.

5.3.4 STOPPING SEQUENCE

The *Return Delay* timer operates to ensure that the starting request has been permanently removed and isn't just a short term removal. If another start request be made during the *Cooling Down* timer, the set returns on load.

If there are no starting requests at the end of the *return delay* timer, the load is removed from the generator *('**Light Output 1, 2, 3 & 4** deactivate in an order dictated by configurable timers (if used))*.

Once the generator is off load and if configured, the lighting mast lowers for the duration of the *Mast Down Timer* or until an input configured for *Light Mast Fully Closed* activates and then the *Cooling* Timer is initiated.

The *Cooling Down* timer allows the set to run off load and cool sufficiently before being stopped. This is particularly important where turbo chargers are fitted to the engine.

After the *Cooling Down* timer has expired, the set is stopped.

Upon removal of the starting signal, the module removes the load from the generator and shut the set down observing the *Stop Delay* timer and *Cooling Down* timer as necessary. The module then awaits the next start event.

5.4 MANUAL/START MODE

NOTE: If a digital input configured to panel lock is active, changing module modes is not be possible. Viewing the instruments and event logs is NOT affected by panel lock.

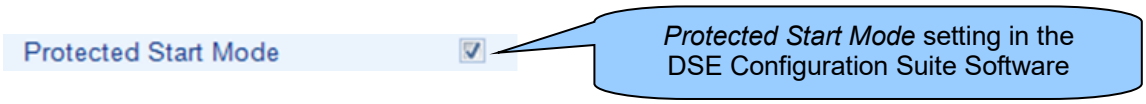
Manual mode allows the operator to start the set manually, and if required change the state of the Light Outputs via configured digital inputs or the *Mast and Light Control* pages on the module's screen.

5.4.1 WAITING IN MANUAL MODE

To begin the starting sequence, press the ***Manual/Start Mode*** button. If '*protected start*' is disabled, the start sequence begins immediately.

NOTE: For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

If *Protected Start* is enabled, the ***Waiting in Manual Mode*** icon is displayed and the LED above the ***Manual/Start Mode*** button flashes to indicate ***Waiting in Manual Mode***.
The ***Manual/Start Mode*** button must be pressed once more to begin the start sequence.



5.4.2 STARTING SEQUENCE

NOTE: There is no *start delay* in this mode of operation.

The fuel relay is energised and the engine is cranked.

NOTE: If the unit has been configured for CAN, compatible ECU's receives the start command via CAN.

If the engine fails to fire during this cranking attempt then the starter motor is disengaged for the *Crank Rest* duration after which the next start attempt is made. If this sequence continues beyond the set number of attempts, the start sequence is terminated and the display shows ***Fail to Start***.

When the engine fires the starter motor is disengaged. Speed detection is factory configured to be derived from the main alternator output frequency.

Additionally, rising oil pressure can be used disconnect the starter motor (but cannot detect under speed or over speed).

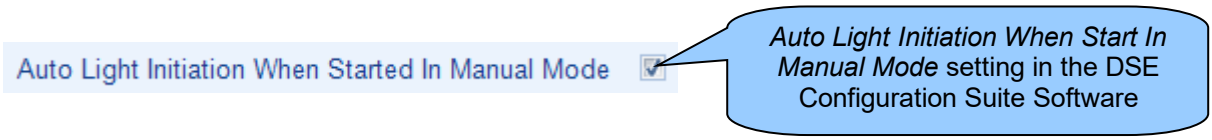
After the starter motor has disengaged, the *Safety On Delay* timer activates, allowing Oil Pressure, High Engine Temperature, Under-speed, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault.

5.4.3 ENGINE RUNNING

NOTE: The load transfer signal remains inactive until the Oil Pressure has risen. This prevents excessive wear on the engine.

Once the engine is running and all starting timers have expired, the animated ***Engine Running*** icon is displayed.

The generator may be placed on load automatically *('**Light Output 1, 2, 3 & 4** becomes active in an order dictated by configurable timers (if used))* if the option for *Auto Light Initiation When Start In Manual Mode* is configured.



If *Auto Light Initiation When Start In Manual Mode* is not enabled, a loading request comes from a number of sources.

- Activation of an auxiliary input that has been configured to *Light Output Activate 1, 2, 3 or 4.*
- Activation of the various light control pages if configured.
- Activation of the inbuilt exercise scheduler if configured for 'on load' runs.

Once the generator has been placed on load, it is not automatically removed. To manually remove the load either:

- Press the ***Auto Mode*** button to return to automatic mode. The set observes all auto mode start requests and stopping timers before beginning the *Auto Mode Stopping Sequence*.
- Press the ***Stop/Reset Mode*** button to remove load and stop the generator.
- Activation of an auxiliary input that has been configured to *Inhibit Light Output 1, 2, 3 or 4.*
- Deactivation of an auxiliary input that has been configured to *Light Output Activate 1, 2, 3 or 4.*
- Activation of the various light control pages.

5.4.4 STOPPING SEQUENCE

In ***Manual/Start Mode*** the generator continues to run until either:

The ***Stop/Reset Mode*** button is pressed. The lights and generator are turned off immediately.

- The ***Auto Mode*** button is pressed. The set observes all auto mode start requests and stopping timers before beginning the *Auto Mode Stopping Sequence*.

5.5 MAINS SUPPLY

NOTE: Refer to the *Typical Wiring Diagram for Generator/Mains Switching* elsewhere in this document for further information.

The module uses the same generator voltage inputs to sense the Mains supply voltages. The generator and mains switching must be controlled externally. When the *Mains Supply Active* digital input function is activated the module assumes the voltage sensed is the Mains supply. The *Mains Supply Activ*e signal must be connected through the mains switch auxiliary to feed the module's input, this ensures that when the mains breaker is closed the *Mains Supply Active* input is active.

This feature is to allow the lighting tower to be powered by an external mains source. When active, the *Mains Supply Active* input inhibits the starting and stopping of the generator.

In ***Auto Mode*** , the remote start requests only respond to the control of the lights and the mast, the generator doesn't start when the *Mains Supply Active* is activated.

In ***Manual/Start Mode*** , the generator doesn't start but the mast and lights control are available.

When the Mains supply is out of the configured limits, all lights and mast control outputs turn off. The module resumes control of these outputs once the Mains supply returns to its return levels.

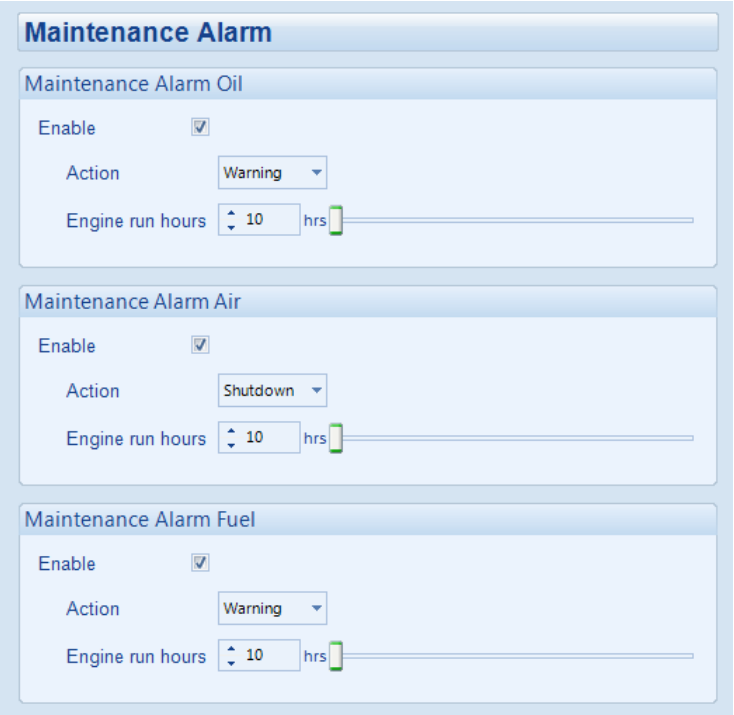
The Mains instrumentation is represented by the following icon as shown in the screen above.

Activating the *Controlled Shutdown* input inhibits the remote start request, causing to turn off the lights and lower the mast.

5.6 MAINTENANCE ALARM

Depending upon module configuration one or more levels of engine maintenance alarm may occur based upon a configurable schedule.

Example 1



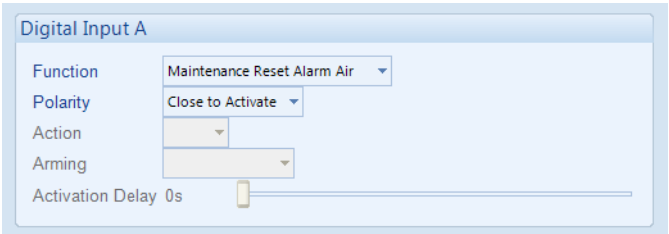
Screen capture from DSE Configuration Suite Software showing the configuration of the Maintenance Alarm for Oil, Air and Fuel.

When activated, the maintenance alarm activates either a **warning** (set continues to run) or **shutdown** (running the set is not possible).

Resetting the maintenance alarm is normally actioned by the site service engineer after performing the required maintenance.
The method of reset is either by:

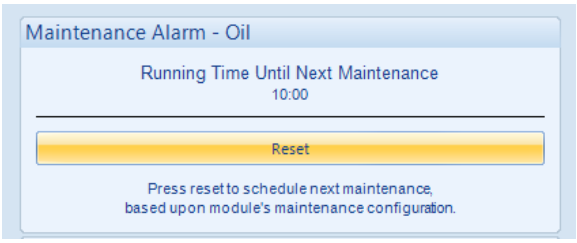
- Activating an input that has been configured to Maintenance Reset Alarm x, where x is the type of maintenance alarm (Air, Fuel or Oil).
- Pressing the maintenance reset button in the DSE Configuration Suite, Maintenance section.
- Pressing and holding the ***Stop/Reset Mode*** button for 10 seconds on the desired Maintenance Alarm status page. This can be protected by a PIN number.

Example 2



Screen capture from DSE Configuration Suite Software showing the configuration of a digital input for Maintenance Reset Alarm Air.

Example 3



Screen capture from DSE Configuration Suite Software showing the Maintenance Alarm Reset 'button' in the DSE Configuration Suite SCADA | MAINTENANCE section.

5.7 SCHEDULER

NOTE: The DSEL401 MKII's Scheduler also supports the *Lights Only* run mode for the Hybrid Generator applications, allowing to turn On the lights regardless of the generator or mains state.

NOTE: The DSEL401 MKII allows the Scheduler to be configured from the Scheduler display page when the *Scheduler Edit From Fascia* is enabled. Refer to section entitled *Scheduler Editing From Instrumentation Screens* elsewhere in this document.

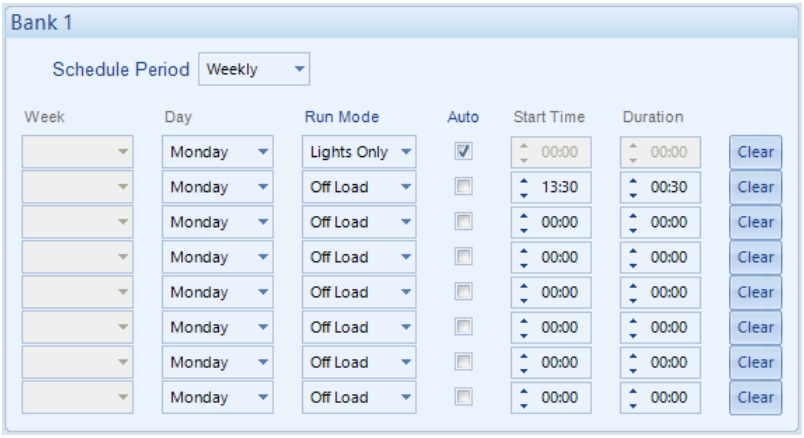
The controller contains an inbuilt exercise run scheduler, capable of automatically starting and stopping the set, and Lights Only Run mode for the hybrid generator applications which turns on the lights over the batteries without starting the set. The scheduler has two banks of up to 8 scheduled start/stop sequences can be configured to repeat on a daily or 7-day or 28-day cycle.

Scheduled runs may be on load, off load or lights only depending upon module configuration.

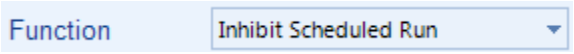
Example

Screen capture from DSE Configuration Suite Software showing the configuration of the Exercise Scheduler.

In this example the lights illuminate on Monday based on the sunrise and sunset settings, then starts at 13:30 on Tuesday and runs for 30 minutes.



The *Inhibit Scheduled Run* input function is available to prevent scheduler from operating if required.



5.7.1 STOP MODE

- Scheduled runs do not occur when the module is in ***Stop/Reset Mode*** O.

5.7.2 MANUAL/START MODE

- Scheduled runs do not occur when the module is in ***Manual/Start Mode*** I waiting for a manual start.
- Activation of a Scheduled Run 'On Load' when the module is operating OFF LOAD in ***Manual/Start Mode*** I forces the set to run ON LOAD.
- Activation of a Scheduled Run 'Lights Only' when the module is operating OFF LOAD in ***Manual/Start Mode*** I doesn't cause any mast or light control.

5.7.3 AUTO MODE

- Scheduled runs operate ONLY if the module is in ***Auto Mode*** with no Shutdown or Electrical Trip alarm present.
- If the module is in ***Stop/Reset Mode*** or ***Manual/Start Mode*** when a scheduled run begins, the engine is not started. However, if the module is moved into ***Auto Mode*** during a scheduled run, the engine is called to start.
- Depending upon configuration by the system designer, an external input can be used to inhibit a scheduled run.
- If the engine is running OFF LOAD in ***Auto Mode*** and a scheduled run configured to 'On Load' begins, the set is placed ON LOAD for the duration of the Schedule.
- Activation of a Scheduled Run 'Lights Only' in ***Auto Mode*** causes the mast to move up and the lights to turn On.
- If the engine is running OFF LOAD in ***Auto Mode*** and a scheduled run configured to 'Lights Only' begins, the module does not respond to the scheduled run.

5.8 ALTERNATIVE CONFIGURATIONS

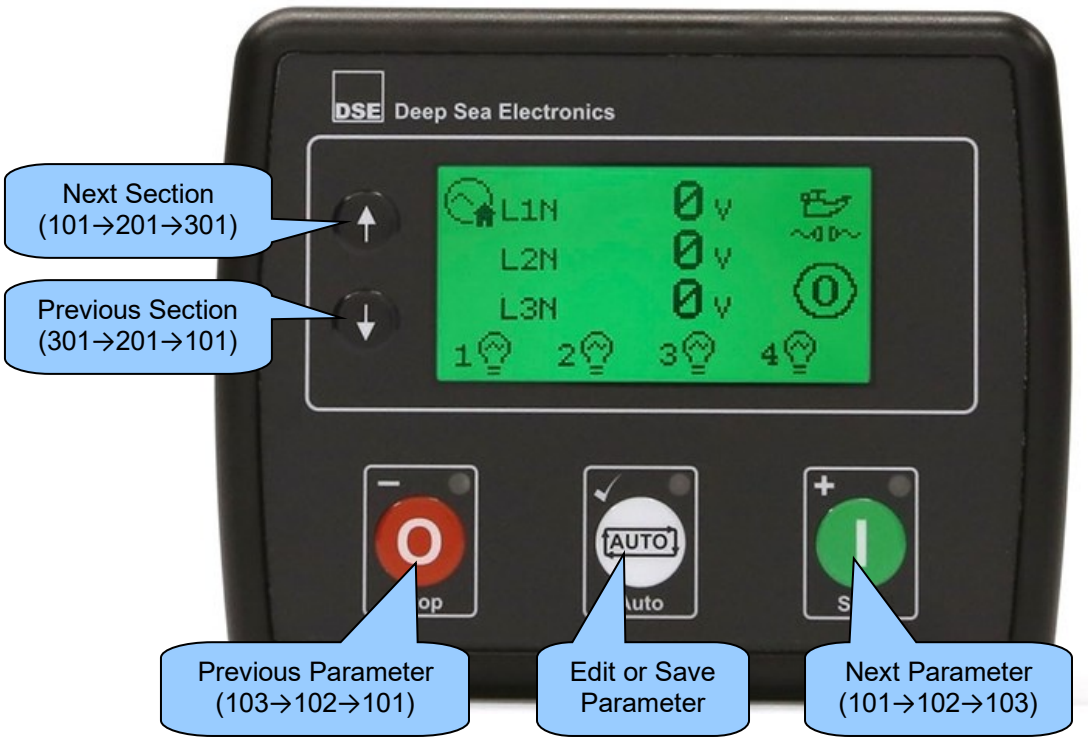
Depending upon the configuration of the system by the generator supplier, the system may have selectable configurations (for example to select between 50 Hz and 60 Hz). If this has been enabled the generator supplier is to advise how this selection is to be made (usually by operating an external selector switch or by selecting the required configuration file in the module's front panel configuration editor).

6 FRONT PANEL CONFIGURATION

NOTE: Depending upon module configuration, some values in the *Front Panel Configuration Editors* may not be available. For more information refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

This configuration mode allows the operator to fully configure the module through its display without the use of the DSE Configuration Suite PC Software.

Use the module's facia buttons to traverse the menu and make value changes to the parameters:



6.1 ACCESSING & OPERATING THE FRONT PANEL EDITORS

NOTE: More comprehensive module configuration is possible via PC configuration software. For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual.*

6.1.1 ENTERING THE EDITORS

NOTE: The PIN number is not set by DSE when the module leaves the factory. If the module has a PIN code set, this has been set by the generator supplier who must be contacted if the code is required. If the code has been 'lost' or 'forgotten', the module must be returned to the DSE factory to have the module's code removed. A charge is made for this procedure. NB - This procedure cannot be performed away from the DSE factory.

NOTE: The PIN number is automatically reset when the editor is exited (manually or automatically) to ensure security.

- Press ***Stop/Reset Mode*** (-) and ***Auto Mode*** (✔) buttons together to enter the editor mode.
- Press ***Up*** and ***Down*** naviagation buttons to select the ***Configuration Editor*** or ***Operator Editor***. The selected edtior begins to flash.
- Press the ***Auto Mode*** (✔) button to enter the selected editor.
- If a module security PIN has been set for the ***Configuration Editor***, the PIN request is shown
- Press the ***Up*** and ***Down*** buttons to adjust first digit to the correct value.
- Press the ***Manual/Start Mode*** (+) button when the first digit is correctly entered. The digit just entered now shows '#' for security.
- Repeat this process for the other digits of the PIN number. Press ***Stop/Reset Mode*** (-) to move back to adjust one of the previous digits.
- When ***Auto Mode*** (✔) button is pressed after editing the final PIN digit, the PIN is checked for validity. If the number is not correct, editor is exited.

6.1.2 EDITING A PARAMETER

NOTE: Pressing and holding the *Stop/Reset Mode* (-) or *Manual/Start Mode* (+) buttons enables an auto-repeat functionality.

- Once in the selected editor, press the ***Up*** and ***Down*** navigation buttons to cycle through it in increments of 100.
- Press the ***Stop/Reset Mode*** (-) or ***Manual/Start Mode*** (+) buttons to cycle through the editor in increments of 1.
- When viewing the parameter to be edited, press the ***Auto Mode*** (✔) button, the value begins to flash.
- Press the ***Stop/Reset Mode*** (-) or ***Manual/Start Mode*** (+) buttons to adjust the value to the required setting.
- Press the ***Auto Mode*** (✔) button to save the current value, the value ceases flashing.

6.1.3 EXITING THE EDITORS

NOTE: The editor automatically exits after 5 minutes of inactivity to ensure security.

- Press and hold the ***Auto Mode*** (✔) button to save and exit the editor, press and hold the ***Stop/Reset Mode*** (-) to exit without saving. The ***Configuration Editor*** or ***Operator Editor*** is removed from the display.

6.2 ADJUSTABLE PARAMETERS IN CONFIGURATION EDITOR

6.2.1 MODULE SETTINGS

Configuration Parameters – Module (Page 1)		
101	Contrast	0 (%)
102	Fast Loading Enabled	On (1), Off (0)
103	All Warnings Latched	On (1), Off (0)
104	Lamp Test At Start-up	On (1), Off (0)
105	Power Save Mode Enable	On (1), Off (0)
106	Deep Sleep Mode Enable	On (1), Off (0)
107	Protected Start Enable	On (1), Off (0)
108	Event Log Display Format	On (1), Off (0)
109	Power Up Mode	0 (Power Up Mode)
110	DTC String Enable	On (1), Off (0)
111	Pin Protected Maintenance Reset	On (1), Off (0)
112	Stop Button Cooldown	On (1), Off (0)
113	Use Module Oil Pressure	On (1), Off (0)
114	Use Module Coolant Temp	On (1), Off (0)
115	Use Module Engine Hours	On (1), Off (0)
116	Use Module RPM	On (1), Off (0)
117	Use Module Charge Alt	On (1), Off (0)
118	Disable CAN Speed Control	On (1), Off (0)
119	Auto Light Control In Manual	On (1), Off (0)
120	Manual Light Sequence Control Display	On (1), Off (0)
121	Manual Individual Light Control Display	On (1), Off (0)
122	Manual All Light Control Display	On (1), Off (0)
123	Voltage Display	On (1), Off (0)
124	Frequency Display	On (1), Off (0)
125	Current Display	On (1), Off (0)
126	kW Display	On (1), Off (0)
127	kvar Display	On (1), Off (0)
128	kV A Display	On (1), Off (0)
129	PF Display	On (1), Off (0)
130	kW h Display	On (1), Off (0)
131	kvar h Display	On (1), Off (0)
132	kV A h Display	On (1), Off (0)
133	Mains Supply Voltage Display	On (1), Off (0)
134	Mains Supply Hz Display	On (1), Off (0)

6.2.2 CANSETTINGS

Configuration Parameters – CAN Application (Page 2)		
201	CAN Alternative Engine Speed	On (1), Off (0)
202	CAN ECU Data Fail Enable	On (1), Off (0)
203	CAN ECU Data Fail Action	0 (Action)
204	CAN ECU Data Fail Delay	0 s

6.2.3 DIGITAL INPUT SETTINGS

Configuration Parameters – Digital Inputs (Page 3)		
301	Low Fuel Shutdown Light Output 1 Enable	On (1), Off (0)
302	Low Fuel Shutdown Light Output 1 Level	0 %
303	Low Fuel Shutdown Light Output 1 Timer	0 s
304	Low Fuel Shutdown Light Output 2 Enable	On (1), Off (0)
305	Low Fuel Shutdown Light Output 2 Level	0 %
306	Low Fuel Shutdown Light Output 2 Timer	0 s
307	Low Fuel Shutdown Light Output 3 Enable	On (1), Off (0)
308	Low Fuel Shutdown Light Output 3 Level	0 %
309	Low Fuel Shutdown Light Output 3 Timer	0 s
310	Low Fuel Shutdown Light Output 4 Enable	On (1), Off (0)
311	Low Fuel Shutdown Light Output 4 Level	0 %
312	Low Fuel Shutdown Light Output 4 Timer	0 s
313	Digital Input A Source	0 (Input Source)
314	Digital Input A Polarity	0 (Polarity)
315	Digital Input A Action (If Source = User Config)	0 (Action)
316	Digital Input A Arming (If Source = User Config)	0 (Arming)
317	Digital Input A Activation Delay (If Source = User Config)	0 s
318	Digital Input B Source	0 (Input Source)
319	Digital Input B Polarity	0 (Polarity)
320	Digital Input B Action (If Source = User Config)	0 (Action)
321	Digital Input B Arming (If Source = User Config)	0 (Arming)
322	Digital Input B Activation Delay (If Source = User Config)	0 s
323	Digital Input C Source	0 (Input Source)
324	Digital Input C Polarity	0 (Polarity)
325	Digital Input C Action (If Source = User Config)	0 (Action)
326	Digital Input C Arming (If Source = User Config)	0 (Arming)
327	Digital Input C Activation Delay (If Source = User Config)	0 s
328	Digital Input D Source	0 (Input Source)
329	Digital Input D Polarity	0 (Polarity)
330	Digital Input D Action (If Source = User Config)	0 (Action)
331	Digital Input D Arming (If Source = User Config)	0 (Arming)
332	Digital Input D Activation Delay (If Source = User Config)	0 s
333	Digital Input E Source	0 (Input Source)
334	Digital Input E Polarity	0 (Polarity)
335	Digital Input E Action (If Source = User Config)	0 (Action)
336	Digital Input E Arming (If Source = User Config)	0 (Arming)
337	Digital Input E Activation Delay (If Source = User Config)	0 s
338	Digital Input F Source	0 (Input Source)
339	Digital Input F Polarity	0 (Polarity)
340	Digital Input F Action (If Source = User Config)	0 (Action)
341	Digital Input F Arming (If Source = User Config)	0 (Arming)
342	Digital Input F Activation Delay (If Source = User Config)	0 s
343	Analogue Input A (Set As Digital) Source	0 (Input Source)
344	Analogue Input A (Set As Digital) Polarity	0 (Polarity)
345	Analogue Input A (Set As Digital) Action (If Source = User Config)	0 (Action)
346	Analogue Input A (Set As Digital) Arming (If Source = User Config)	0 (Arming)
347	Analogue Input A (Set As Digital) Activation Delay (If Source = User Config)	0 s
348	Analogue Input B (Set As Digital) Source	0 (Input Source)
349	Analogue Input B (Set As Digital) Polarity	0 (Polarity)

More input parameters overleaf...

Configuration Parameters – Inputs (Page 3)		
350	Analogue Input B (Set As Digital) Action (If Source = User Config)	0 (Action)
351	Analogue Input B (Set As Digital) Arming (If Source = User Config)	0 (Arming)
352	Analogue Input B (Set As Digital) Activation Delay (If Source = User Config)	0 s
353	Analogue Input C (Set As Digital) Source	0 (Input Source)
354	Analogue Input C (Set As Digital) Polarity	0 (Polarity)
355	Analogue Input C (Set As Digital) Action (If Source = User Config)	0 (Action)
356	Analogue Input C (Set As Digital) Arming (If Source = User Config)	0 (Arming)
357	Analogue Input C (Set As Digital) Activation Delay (If Source = User Config)	0 s

6.2.4 OUTPUT SETTINGS

Configuration Parameters – Outputs (Page 4)		
401	Digital Output A Source	0 (Output Source)
402	Digital Output A Polarity	0 (Output Polarity)
403	Digital Output B Source	0 (Output Source)
404	Digital Output B Polarity	0 (Output Polarity)
405	Digital Output C Source	0 (Output Source)
406	Digital Output C Polarity	0 (Output Polarity)
407	Digital Output D Source	0 (Output Source)
408	Digital Output D Polarity	0 (Output Polarity)
409	Digital Output E Source	0 (Output Source)
410	Digital Output E Polarity	0 (Output Polarity)
411	Digital Output F Source	0 (Output Source)
412	Digital Output F Polarity	0 (Output Polarity)
413	Digital Output G Source	0 (Output Source)
414	Digital Output G Polarity	0 (Output Polarity)
415	Digital Output H Source	0 (Output Source)
416	Digital Output H Polarity	0 (Output Polarity)
417	Digital Output I Source	0 (Output Source)
418	Digital Output I Polarity	0 (Output Polarity)
419	Digital Output J Source	0 (Output Source)
420	Digital Output J Polarity	0 (Output Polarity)

6.2.5 TIMER SETTINGS

Configuration Parameters – Timers (Page 5)	
501	Start Delay
502	Preheat Timer
503	Crank Time
504	Crank Rest Time
505	Smoke Limiting
506	Smoke Limiting Off
507	Safety On Delay
508	Warm Up Time
509	Return Delay
510	Cooling Time
511	ETS Solenoid Hold
512	Failed To Stop Delay
513	Generator Transient Delay
514	Light Start-Up Timer 1
515	Light Start-Up Timer 2
516	Light Start-Up Timer 3
517	Light Start-Up Timer 4
518	Light Shutdown Timer 1
519	Light Shutdown Timer 2
520	Light Shutdown Timer 3
521	Light Shutdown Timer 4
522	Light Re-Strike Timer 1
523	Light Re-Strike Timer 2
524	Light Re-Strike Timer 3
525	Light Re-Strike Timer 4
526	Mast Up Timer
527	Mast Down Timer
528	Power Save Mode Delay
529	Deep Sleep Mode Delay
530	Page Timer
531	Cooldown Idle Time
532	Delay Crank
533	Mains Supply Transient Delay
534	Audible Alarm Timer Enable
535	Audible Alarm Timer Delay

6.2.6 GENERATOR SETTINGS

Configuration Parameters – Generator (Page 6)		
601	Alternator Fitted	On (1), Off (0)
602	Alternator Poles	0
603	Under Voltage Shutdown Enable	On (1), Off (0)
604	Under Voltage Shutdown Trip	0 V
605	Under Voltage Warning Enable	On (1), Off (0)
606	Under Voltage Warning Trip	0 V
607	RESERVED	
608	Loading Voltage	0 V
609	Over Voltage Warning Enable	On (1), Off (0)
610	Over Voltage Warning Return	0 V
611	Over Voltage Warning Trip	0 V
612	Over Voltage Shutdown Trip	0 V
613	Under Frequency Shutdown Enable	On (1), Off (0)
614	Under Frequency Shutdown Trip	0.0 Hz
615	Under Frequency Warning Enable	On (1), Off (0)
616	Under Frequency Warning Trip	0.0 Hz
617	Loading Frequency	0.0 Hz
618	Nominal Frequency	0.0 Hz
619	Over Frequency Warning Enable	On (1), Off (0)
620	Over Frequency Warning Return	0.0 Hz
621	Over Frequency Warning Trip	0.0 Hz
622	Over Frequency Shutdown Enable	On (1), Off (0)
623	Over Frequency Shutdown Trip	0.0 Hz
624	System Topology	0 (System Topology)
625	CT Enable	On (1), Off (0)
626	CT Primary	0 A
627	Full Load Rating	0 A
628	Immediate Over Current Enable	On (1), Off (0)
629	Delayed Over Current Alarm Enable	On (1), Off (0)
630	Delayed Over Current Alarm Action	0 (Action)
631	Over Current Delay Time	0 s
632	Over Current Trip	0 %
633	Low Current Alarm Enable	On (1), Off (0)
634	Low Current Alarm Action	0 (Action)
635	Low Current Alarm Percentage	0%
636	Low Current Alarm Delay	0 s
637	Light 1 Current Rating	0.0 A
638	Light 2 Current Rating	0.0 A
639	Light 3 Current Rating	0.0 A
640	Light 4 Current Rating	0.0 A
641	Mains Supply Low Voltage Alarm Enable	0.0 A
642	Mains Low Voltage Alarm Trip	0 V
643	Mains Low Voltage Alarm Return	0 V
644	Mains Low Voltage Warning Enable	On (1), Off (0)
645	Mains Low Voltage Warning Trip	0 V
646	Mains Low Voltage Warning Return	0 V
647	Mains High Voltage Warning Enable	On (1), Off (0)
648	Mains High Voltage Warning Return	0 V
649	Mains High Voltage Warning Trip	0 V
650	Mains High Voltage Alarm Enable	On (1), Off (0)
651	Mains High Voltage Alarm Return	0 V
652	Mains High Voltage Alarm Trip	0 V

More configuration parameters overleaf...

Configuration Parameters – Generator (Page 6)		
653	Mains Low Frequency Alarm Enable	On (1), Off (0)
654	Mains Low Frequency Alarm Trip	0.0 Hz
655	Mains Low Frequency Alarm Return	0.0 Hz
656	Mains Low Frequency Warning Enable	On (1), Off (0)
657	Mains Low Frequency Warning Trip	0.0 Hz
658	Mains Low Frequency Warning Return	0.0 Hz
659	Mains High Frequency Warning Enable	On (1), Off (0)
660	Mains High Frequency Warning Return	0.0 Hz
661	Mains High Frequency Warning Trip	0.0 Hz
662	Mains High Frequency Alarm Enable	On (1), Off (0)
663	Mains High Frequency Alarm Return	0.0 Hz
664	Mains High Frequency Alarm Trip	0.0 Hz

6.2.7 ENGINE SETTINGS

Configuration Parameters – Engine (Page 7)		
701	Start Attempts	0
702	Gas Choke Timer (Gas Engine Only)	0 s
703	Gas On Delay (Gas Engine Only)	0 s
704	Gas Ignition Off Delay (Gas Engine Only)	0 s
705	Crank Disconnect On Oil Pressure Enable	On (1), Off (0)
706	Check Oil Pressure Prior To Starting	On (1), Off (0)
707	Crank Disconnect On Oil	0.00 bar
708	Crank Disconnect On Frequency	0.0 Hz
709	Crank Disconnect On Engine Speed	0 RPM
710	Under Speed Enable	On (1), Off (0)
711	Under Speed Trip	0 RPM
712	Over Speed Trip	0 RPM
713	Low Battery Voltage Enable	On (1), Off (0)
714	Low Battery Voltage Trip	0.0 V
715	Low Battery Voltage Return	0.0 V
716	Low Battery Voltage Delay	0 s
717	High Battery Voltage Enable	On (1), Off (0)
718	High Battery Voltage Return	0.0 V
719	High Battery Voltage Trip	0.0 V
720	High Battery Voltage Delay	0 s
721	Charge Alt Shutdown Enable	On (1), Off (0)
722	Charge Alt Shutdown Trip	0.0 V
723	Charge Alt Shutdown Delay	0 s
724	Charge Alt Warning Enable	On (1), Off (0)
725	Charge Alt Warning Trip	0.0 V
726	Charge Alt Warning Delay	0 s
727	Low Battery Engine Start Arming	On (1), Off (0)
728	Low Battery Engine Start Threshold	0.0 V
729	Low Battery Engine Start Delay	0 s
730	Low Battery Engine Start Run Time	0 s
731	Auto Retry For Start Attempt Enable	On (1), Off (0)
732	Auto Retry For Start Attempts	0
733	J1939-75 Instruments	On (1), Off (0)
734	J1939-75 Alarms	On (1), Off (0)
735	CAN TX Messages Address	0
736	CAN TX Instruments Address	0
737	Tier 4 Home Screen	On (1), Off (0

More engine parameters overleaf...

Configuration Parameters – Engine (Page 7)		
738	Engine Start Pause Time	0 s
739	Block Heater Enable	On (1), Off (0)
740	Block Heater Temperature	0.00 °C
741	Block Heater Time	0 s
742	Pre Heat Enable	On (1), Off (0)
743	Pre Heat Temperature	0.00 °C
744	Pre Heat Time	0 s
745	Post Heat Enable	On (1), Off (0)
746	Post Heat Temperature	0.00 °C
747	Post Heat Time	0 s
748	Crank Disconnect on Oil Delay	0 s

6.2.8 ALTERNATE CONFIGURATION SETINGS

Configuration Parameters – Alternate Configuration (Page 8)		
801	Default Configuration	Main (1), Alternative (0)
802	Enable Configuration	On (1), Off (0)
803	CAN Alternative Engine Speed	On (1), Off (0)
804	Under Voltage Shutdown Enable	On (1), Off (0)
805	Under Voltage Shutdown Trip	0 V
806	Under Voltage Warning Enable	On (1), Off (0)
807	Under Voltage Warning Trip	0 V
808	RESERVED	
809	Loading Voltage	0 V
810	Over Voltage Warning Enabled	On (1), Off (0)
811	Over Voltage Warning Trip	0 V
812	Over Voltage Warning Return	0 V
813	Over Voltage Shutdown Trip	0 V
814	Under Frequency Shutdown Enable	On (1), Off (0)
815	Under Frequency Shutdown Trip	0.0 Hz
816	Under Frequency Warning Enable	On (1), Off (0)
817	Under Frequency Warning Trip	0.0 Hz
818	Loading Frequency	0.0 Hz
819	Nominal Frequency	0.0 Hz
820	Over Frequency Warning Enable	On (1), Off (0)
821	Over Frequency Warning Trip	0.0 Hz
822	Over Frequency Warning Return	0.0 Hz
823	Over Frequency Shutdown Enable	On (1), Off (0)
824	Over Frequency Shutdown Trip	0.0 Hz
825	CT Primary	0 A
826	Full Load Rating	0 A
827	Immediate Over Current Enable	On (1), Off (0)
828	Delayed Over Current Alarm Enable	On (1), Off (0)
829	Delayed Over Current Alarm Action	0 (Action)
830	Over Current Delay Timer	0 s
831	Over Current Trip	0 %
832	System Topology	0 (System Topology)
833	Under Speed Shutdown Enable	On (1), Off (0)
834	Under Speed Shutdown Trip	0 RPM
835	Over Speed Shutdown Trip	0 RPM
836	Low Current Alarm Enable	On (1), Off (0)
837	Low Current Alarm Action	0 (Action)
838	Low Current Alarm Threshold	0%
839	Low Current Alarm Delay	0 s

More alternative configuration parameters overleaf...

Configuration Parameters – Alternate Configuration (Page 8)		
840	Light 1 Current Rating	0 A
841	Light 2 Current Rating	0 A
842	Light 3 Current Rating	0 A
843	Light 4 Current Rating	0 A
844	Mains Supply Low Voltage Alarm Enable	On (1), Off (0)
845	Mains Supply Low Voltage Alarm Trip	0 V
846	Mains Supply Low Voltage Alarm Return	0 V
847	Mains Supply Low Voltage Warning Enable	On (1), Off (0)
848	Mains Supply Low Voltage Warning Trip	0 V
849	Mains Supply Low Voltage Warning Return	0 V
850	Mains Supply Low Voltage Warning Enable	On (1), Off (0)
851	Mains Supply Low Voltage Warning Return	0 V
852	Mains Supply Low Voltage Warning Trip	0 V
853	Mains Supply High Voltage Alarm Enable	On (1), Off (0)
854	Mains Supply High Voltage Alarm Return	0 V
855	Mains Supply High Voltage Alarm Trip	0 V
856	Mains Supply Low Frequency Alarm Enable	On (1), Off (0)
857	Mains Supply Low Frequency Alarm Trip	0.0 Hz
858	Mains Supply Low Frequency Alarm Return	0.0 Hz
859	Mains Supply Low Frequency Warning Enable	On (1), Off (0)
860	Mains Supply Low Frequency Warning Trip	0.0 Hz
861	Mains Supply Low Frequency Warning Return	0.0 Hz
862	Mains Supply High Frequency Warning Enable	On (1), Off (0)
863	Mains Supply High Frequency Warning Return	0.0 Hz
864	Mains Supply High Frequency Warning Trip	0.0 Hz
865	Mains Supply High Frequency Alarm Enable	On (1), Off (0)
866	Mains Supply High Frequency Alarm Return	0.0 Hz
867	Mains Supply High Frequency Alarm Trip	0.0 Hz

6.2.9 SCHEDULER SETTINGS

Configuration Parameters – Scheduler (Page 9)		
901	Enable Scheduler	On (1), Off (0)
902	Schedule Bank A Period	Weekly(0), Monthly(1), Daily (2)
903	Schedule 1 Auto Mode	On (1), Off (0)
904	Schedule 1 Mode	Off Load (0), On Load (1), Lights Only (2)
905	Schedule 1 Start Time	0:00:00
906	Schedule 1 Day	0 (1=Monday)
907	Schedule 1 Week	1,2,3,4
908	Schedule 1 Duration	0 s
909	Schedule 2 Auto Mode	On (1), Off (0)
910	Schedule 2 Mode	Off Load (0), On Load (1), Lights Only (2)
911	Schedule 2 Start Time	0:00:00
912	Schedule 2 Day	0 (1=Monday)
913	Schedule 2 Week	1,2,3,4
914	Schedule 2 Duration	0 s
915	Schedule 3 Auto Mode	On (1), Off (0)
916	Schedule 3 Mode	Off Load (0), On Load (1), Lights Only (2)
917	Schedule 3 Start Time	0:00:00
918	Schedule 3 Day	0 (1=Monday)
919	Schedule 3 Week	1,2,3,4
920	Schedule 3 Duration	0 s
921	Schedule 4 Auto Mode	On (1), Off (0)
922	Schedule 4 Mode	Off Load (0), On Load (1), Lights Only (2)
923	Schedule 4 Start Time	0:00:00
924	Schedule 4 Day	0 (1=Monday)
925	Schedule 4 Week	1,2,3,4
926	Schedule 4 Duration	0 s
927	Schedule 5 Auto Mode	On (1), Off (0)
928	Schedule 5 Mode	Off Load (0), On Load (1), Lights Only (2)
929	Schedule 5 Start Time	0:00:00
930	Schedule 5 Day	0 (1=Monday)
931	Schedule 5 Week	1,2,3,4
932	Schedule 5 Duration	0 s
933	Schedule 6 Auto Mode	On (1), Off (0)
934	Schedule 6 Mode	Off Load (0), On Load (1), Lights Only (2)
935	Schedule 6 Start Time	0:00:00
936	Schedule 6 Day	0 (1=Monday)
937	Schedule 6 Week	1,2,3,4
938	Schedule 6 Duration	0 s
939	Schedule 7 Auto Mode	On (1), Off (0)
940	Schedule 7 Mode	Off Load (0), On Load (1), Lights Only (2)
941	Schedule 7 Start Time	0:00:00
942	Schedule 7 Day	0 (1=Monday)
943	Schedule 7 Week	1,2,3,4
944	Schedule 7 Duration	0 s
945	Schedule 8 Auto Mode	On (1), Off (0)
946	Schedule 8 Mode	Off Load (0), On Load (1), Lights Only (2)
947	Schedule 8 Start Time	0:00:00
948	Schedule 8 Day	0 (1=Monday)
949	Schedule 8 Week	1,2,3,4
950	Schedule 8 Duration	0 s

More scheduler parameters overleaf...

Configuration Parameters – Scheduler (Page 9)		
951	Schedule Bank A Period	Weekly(0), Monthly(1), Daily (2)
952	Schedule 9 Auto Mode	On (1), Off (0)
953	Schedule 9 Mode	Off Load (0), On Load (1), Lights Only (2)
954	Schedule 9 Start Time	0:00:00
955	Schedule 9 Day	0 (1=Monday)
956	Schedule 9 Week	1,2,3,4
957	Schedule 9 Duration	0 s
958	Schedule 10 Auto Mode	On (1), Off (0)
959	Schedule 10 Mode	Off Load (0), On Load (1), Lights Only (2)
960	Schedule 10 Start Time	0:00:00
961	Schedule 10 Day	0 (1=Monday)
962	Schedule 10 Week	1,2,3,4
963	Schedule 10 Duration	0 s
964	Schedule 11 Auto Mode	On (1), Off (0)
965	Schedule 11 Mode	Off Load (0), On Load (1), Lights Only (2)
966	Schedule 11 Start Time	0:00:00
967	Schedule 11 Day	0 (1=Monday)
968	Schedule 11 Week	1,2,3,4
969	Schedule 11 Duration	0 s
970	Schedule 12 Auto Mode	On (1), Off (0)
971	Schedule 12 Mode	Off Load (0), On Load (1), Lights Only (2)
972	Schedule 12 Start Time	0:00:00
973	Schedule 12 Day	0 (1=Monday)
974	Schedule 12 Week	1,2,3,4
975	Schedule 12 Duration	0 s
976	Schedule 13 Auto Mode	On (1), Off (0)
977	Schedule 13 Mode	Off Load (0), On Load (1), Lights Only (2)
978	Schedule 13 Start Time	0:00:00
979	Schedule 13 Day	0 (1=Monday)
980	Schedule 13 Week	1,2,3,4
981	Schedule 13 Duration	0 s
982	Schedule 14 Auto Mode	On (1), Off (0)
983	Schedule 14 Mode	Off Load (0), On Load (1), Lights Only (2)
984	Schedule 14 Start Time	0:00:00
985	Schedule 14 Day	0 (1=Monday)
986	Schedule 14 Week	1,2,3,4
987	Schedule 14 Duration	0 s
988	Schedule 15 Auto Mode	On (1), Off (0)
989	Schedule 15 Mode	Off Load (0), On Load (1), Lights Only (2)
990	Schedule 15 Start Time	0:00:00
991	Schedule 15 Day	0 (1=Monday)
992	Schedule 15 Week	1,2,3,4
993	Schedule 15 Duration	0 s
994	Schedule 16 Auto Mode	On (1), Off (0)
995	Schedule 16 Mode	Off Load (0), On Load (1), Lights Only (2)
996	Schedule 16 Start Time	0:00:00
997	Schedule 16 Day	0 (1=Monday)
998	Schedule 16 Week	1,2,3,4
999	Schedule 16 Duration	0 s

6.2.10 TIME AND DATE SETTINGS

Configuration Parameters – Time (Page 10)		
1001	Time of Day	0:00:00
1002	Day of Month	1-31
1003	Month of Year	1-12
1004	Year	0-99
1005	Enable Daylight Saving	(0) No Daylight Saving, (1) Daylight Saving
1006	Daylight Saving Offset	0 hours
1007	Latitude	0 °
1008	Longitude	0 °
1009	Time Zone Offset	0 hours
1010	Sunset Offset	0 hours
1011	Sunrise Offset	0 hours

6.2.11 MAINTENANCE ALARM SETTINGS

Configuration Parameters – Maintenance Alarms (Page 11)		
1101	Oil Maintenance Alarm Enable	On (1), Off (0)
1102	Oil Maintenance Alarm Action	0 (Action)
1103	Oil Maintenance Alarm Engine Hours	0 h
1104	Air Maintenance Alarm Enable	On (1), Off (0)
1105	Air Maintenance Alarm Action	0 (Action)
1106	Air Maintenance Alarm Engine Hours	0 h
1107	Fuel Maintenance Alarm Enable	On (1), Off (0)
1108	Fuel Maintenance Alarm Action	0 (Action)
1109	Fuel Maintenance Alarm Engine Hours	0 h

6.2.12 ANALOGUE SENSOR SETTINGS

Configuration Parameters – Analogue Inputs (Page 12)		
1201	Analogue Input A Sensor Type	0 (Sensor Type)
1202	Analogue Input A Sensor Selection	0 (Pressure Sensor List)
1203	Low Oil Pressure Enable	On (1), Off (0)
1204	Low Oil Pressure Trip	0 bar
1205	Oil Pressure Sensor Open Circuit	On (1), Off (0)
1206	Analogue Input B Sensor Type	0 (Sensor Type)
1207	Analogue Input B Sensor Selection	0 (Temperature Sensor List)
1208	High Engine Temperature Trip	0.00 °C
1209	Temperature Sensor Open Circuit	On (1), Off (0)
1210	Analogue Input C Sensor Usage	Flexible Sensor (1), Fuel Level Sensor (0)
1211	Analogue Input C Sensor Type	0 (Sensor Type)
1212	Analogue Input C Sensor Selection	0 (Pressure / Temperature / Percentage Sensor List)
1213	Flexible Sensor C Arming	0 (Arming)
1214	Flexible Sensor C Low Alarm Action	0 (Action)
1215	Flexible Sensor C Low Alarm Trip	0 % / bar / °C
1216	RESERVED	
1217	Flexible Sensor C Low Pre-Alarm Enable	On (1), Off (0)
1218	Flexible Sensor C Low Pre-Alarm Trip	0 % / bar / °C
1219	Flexible Sensor C Low Pre-Alarm Return	0 % / bar / °C
1220	RESERVED	
1221	Flexible Sensor C High Pre-Alarm Enable	On (1), Off (0)
1222	Flexible Sensor C High Pre-Alarm Return	0 % / bar / °C
1223	Flexible Sensor C High Pre-Alarm Trip	0 % / bar / °C
1224	RESERVED	
1225	RESERVED	
1226	Flexible Sensor C High Alarm Action	0 (Action)
1227	Flexible Sensor C High Alarm Trip	0 % / bar / °C
1228	RESERVED	
1229	RESERVED	
1230	Fuel Sensor C Low Shutdown Enable	On (1), Off (0)
1231	Fuel Sensor C Low Shutdown Trip	0 %
1232	Fuel Sensor C Low Shutdown Delay	0 s
1233	Fuel Sensor C Low Pre-Alarm Enable	On (1), Off (0)
1234	Fuel Sensor C Low Pre-Alarm Trip	0 %
1235	Fuel Sensor C Low Pre-Alarm Return	0 %
1236	Fuel Sensor C Low Pre-Alarm Delay	0 s
1237	Fuel Sensor C High Pre-Alarm Enable	On (1), Off (0)
1238	Fuel Sensor C High Pre-Alarm Return	0 %
1239	Fuel Sensor C High Pre-Alarm Trip	0 %
1240	Fuel Sensor C High Pre Alarm Delay	0 s
1241	RESERVED	
1242	Fuel Sensor C High Alarm Action	0 (Action)
1243	Fuel Sensor C High Alarm Trip	0 %
1244	Fuel Sensor C High Alarm Delay	0 s
1245	Fuel Sensor Units	0 (Fuel Sensor Units)
1246	Fuel Tank Size	0

6.3 ADJUSTABLE PARAMETERS IN OPERATOR EDITOR

6.3.1 SCHEDULER SETTINGS

Configuration Parameters – Scheduler (Page 9)		
901	Enable Scheduler	On (1), Off (0)
902	Schedule Bank A Period	Weekly(0), Monthly(1), Daily (2)
903	Schedule 1 Auto Mode	On (1), Off (0)
904	Schedule 1 Mode	Off Load (0), On Load (1), Lights Only (2)
905	Schedule 1 Start Time	0:00:00
906	Schedule 1 Day	0 (1=Monday)
907	Schedule 1 Week	1,2,3,4
908	Schedule 1 Duration	0 s
909	Schedule 2 Auto Mode	On (1), Off (0)
910	Schedule 2 Mode	Off Load (0), On Load (1), Lights Only (2)
911	Schedule 2 Start Time	0:00:00
912	Schedule 2 Day	0 (1=Monday)
913	Schedule 2 Week	1,2,3,4
914	Schedule 2 Duration	0 s
915	Schedule 3 Auto Mode	On (1), Off (0)
916	Schedule 3 Mode	Off Load (0), On Load (1), Lights Only (2)
917	Schedule 3 Start Time	0:00:00
918	Schedule 3 Day	0 (1=Monday)
919	Schedule 3 Week	1,2,3,4
920	Schedule 3 Duration	0 s
921	Schedule 4 Auto Mode	On (1), Off (0)
922	Schedule 4 Mode	Off Load (0), On Load (1), Lights Only (2)
923	Schedule 4 Start Time	0:00:00
924	Schedule 4 Day	0 (1=Monday)
925	Schedule 4 Week	1,2,3,4
926	Schedule 4 Duration	0 s
927	Schedule 5 Auto Mode	On (1), Off (0)
928	Schedule 5 Mode	Off Load (0), On Load (1), Lights Only (2)
929	Schedule 5 Start Time	0:00:00
930	Schedule 5 Day	0 (1=Monday)
931	Schedule 5 Week	1,2,3,4
932	Schedule 5 Duration	0 s
933	Schedule 6 Auto Mode	On (1), Off (0)
934	Schedule 6 Mode	Off Load (0), On Load (1), Lights Only (2)
935	Schedule 6 Start Time	0:00:00
936	Schedule 6 Day	0 (1=Monday)
937	Schedule 6 Week	1,2,3,4
938	Schedule 6 Duration	0 s
939	Schedule 7 Auto Mode	On (1), Off (0)
940	Schedule 7 Mode	Off Load (0), On Load (1), Lights Only (2)
941	Schedule 7 Start Time	0:00:00
942	Schedule 7 Day	0 (1=Monday)
943	Schedule 7 Week	1,2,3,4
944	Schedule 7 Duration	0 s
945	Schedule 8 Auto Mode	On (1), Off (0)
946	Schedule 8 Mode	Off Load (0), On Load (1), Lights Only (2)
947	Schedule 8 Start Time	0:00:00
948	Schedule 8 Day	0 (1=Monday)
949	Schedule 8 Week	1,2,3,4
950	Schedule 8 Duration	0 s

More scheduler parameters overleaf...

Configuration Parameters – Scheduler (Page 9)		
951	Schedule Bank A Period	Weekly(0), Monthly(1), Daily (2)
952	Schedule 9 Auto Mode	On (1), Off (0)
953	Schedule 9 Mode	Off Load (0), On Load (1), Lights Only (2)
954	Schedule 9 Start Time	0:00:00
955	Schedule 9 Day	0 (1=Monday)
956	Schedule 9 Week	1,2,3,4
957	Schedule 9 Duration	0 s
958	Schedule 10 Auto Mode	On (1), Off (0)
959	Schedule 10 Mode	Off Load (0), On Load (1), Lights Only (2)
960	Schedule 10 Start Time	0:00:00
961	Schedule 10 Day	0 (1=Monday)
962	Schedule 10 Week	1,2,3,4
963	Schedule 10 Duration	0 s
964	Schedule 11 Auto Mode	On (1), Off (0)
965	Schedule 11 Mode	Off Load (0), On Load (1), Lights Only (2)
966	Schedule 11 Start Time	0:00:00
967	Schedule 11 Day	0 (1=Monday)
968	Schedule 11 Week	1,2,3,4
969	Schedule 11 Duration	0 s
970	Schedule 12 Auto Mode	On (1), Off (0)
971	Schedule 12 Mode	Off Load (0), On Load (1), Lights Only (2)
972	Schedule 12 Start Time	0:00:00
973	Schedule 12 Day	0 (1=Monday)
974	Schedule 12 Week	1,2,3,4
975	Schedule 12 Duration	0 s
976	Schedule 13 Auto Mode	On (1), Off (0)
977	Schedule 13 Mode	Off Load (0), On Load (1), Lights Only (2)
978	Schedule 13 Start Time	0:00:00
979	Schedule 13 Day	0 (1=Monday)
980	Schedule 13 Week	1,2,3,4
981	Schedule 13 Duration	0 s
982	Schedule 14 Auto Mode	On (1), Off (0)
983	Schedule 14 Mode	Off Load (0), On Load (1), Lights Only (2)
984	Schedule 14 Start Time	0:00:00
985	Schedule 14 Day	0 (1=Monday)
986	Schedule 14 Week	1,2,3,4
987	Schedule 14 Duration	0 s
988	Schedule 15 Auto Mode	On (1), Off (0)
989	Schedule 15 Mode	Off Load (0), On Load (1), Lights Only (2)
990	Schedule 15 Start Time	0:00:00
991	Schedule 15 Day	0 (1=Monday)
992	Schedule 15 Week	1,2,3,4
993	Schedule 15 Duration	0 s
994	Schedule 16 Auto Mode	On (1), Off (0)
995	Schedule 16 Mode	Off Load (0), On Load (1), Lights Only (2)
996	Schedule 16 Start Time	0:00:00
997	Schedule 16 Day	0 (1=Monday)
998	Schedule 16 Week	1,2,3,4
999	Schedule 16 Duration	0 s

6.3.2 TIME AND DATE SETTINGS

Configuration Parameters – Time (Page 10)		
1001	Time of Day	0:00:00
1002	Day of Month	1-31
1003	Month of Year	1-12
1004	Year	0-99
1005	Enable Daylight Saving	(0) No Daylight Saving, (1) Daylight Saving
1006	Daylight Saving Offset	0 hours
1007	Latitude	0 °
1008	Longitude	0 °
1009	Time Zone Offset	0 hours
1010	Sunset Offset	0 hours
1011	Sunrise Offset	0 hours

6.4 SELECTABLE PARAMETER SETTINGS

6.4.1 INPUT SOURCES

Input Sources	
0	User Configured
1	Alarm Mute
2	Alarm Reset
3	Alternative Configuration
4	Auto Start Inhibit
5	Coolant Temperature Switch
6	Emergency Stop
7	External Panel Lock
8	Inhibit Light Output 1
9	Inhibit Light Output 2
10	Inhibit Light Output 3
11	Inhibit Light Output 4
12	Lamp Test
13	Light Output Activation 1
14	Light Output Activation 2
15	Light Output Activation 3
16	Light Output Activation 4
17	Low Fuel Level Switch
18	Oil Pressure Switch
19	Override Fuel Shutdown
20	Photocell Start
21	Remote Start Off Load
22	Remote Start On load
23	Simulate Stop Button
24	Simulate Auto Button
25	Simulate Start Button
26	Smoke Limiting
27	Maintenance Reset Oil
28	Maintenance Reset Air
29	Maintenance Reset Fuel
30	Mast Fully Open
31	Mast Fully Closed
32	Holding Supports Open
33	Controlled Stop
34	Mains Supply Active
35	Light Output Override
36	Power Save Mode
37	Inhibit Scheduled Run
38	Disable Mast Control
39	Raise Lower Mast
40	DPF Auto Regen Inhibit
41	DPF Force Regen
42	DPF Regen Interlock
43	Water In Fuel
44	Fuel Bund Level High

6.4.2 OUTPUT SOURCES

Output Sources	
0	Not Used
1	Air Filter Maintenance
2	Air Flap Relay
3	Audible Alarm
4	System In Auto Mode
5	Battery Over Volts Warning
6	Battery Under Volts Warning
7	CAN ECU Data Fail
8	CAN ECU Error
9	CAN ECU Fail
10	CAN ECU Power
11	CAN ECU Stop
12	Charge Alternator Shutdown
13	Charge Alternator Warning
14	Common Alarm
15	Common Electrical Trip
16	Common Shutdown
17	Common Warning
18	Cooling Down
19	Digital Input A
20	Digital Input B
21	Digital Input C
22	Digital Input D
23	Digital Input E
24	Digital Input F
25	Analogue Input A (Digital)
26	Analogue Input B (Digital)
27	Analogue Input C (Digital)
28	Emergency Stop
29	Energise To Stop
30	Fail To Start
31	Fail To Stop
32	Fuel Filter Maintenance
33	Fuel Relay
34	Fuel Senor Trip 1
35	Fuel Senor Trip 2
36	Fuel Senor Trip 3
37	Fuel Senor Trip 4
38	Gas Choke On
39	Gas Ignition
40	Generator Available
41	Generator Over Voltage Shutdown
42	Generator Under Voltage Shutdown
43	Generator Over Current
44	Generator Delayed Over Current
45	High Coolant Temperature (Shutdown)
46	Light Output 1
47	Light Output 2
48	Light Output 3
49	Light Output 4

More output sources overleaf...

Output Sources	
50	Low Oil Pressure (Shutdown)
51	System In Manual Mode
52	Oil Filter Maintenance
53	Oil Pressure Open Circuit
54	Generator Over Frequency Shutdown
55	Over Speed Shutdown
56	Preheat During Preheat Timer
57	Preheat Until End of Crank
58	Preheat Until End of Safety Timer
59	Preheat Until End of Warming
60	Smoke Limiting
61	Start Relay
62	System In Stop Mode
63	Temperature Senor Open Circuit
64	Generator Under frequency Shutdown
65	Under Speed Shutdown
66	Generator Over Frequency Overshoot
67	Over Speed Overshoot
68	Low Current Alarm
69	Display Heater Fitted & Active
70	Flexible Senor C High Shutdown
71	Flexible Senor C High Warning
72	Flexible Senor C Low Warning
73	Flexible Senor C Low Shutdown
74	Fuel Sensor High Shutdown
75	Fuel Sensor High Warning
76	Fuel Sensor Low Warning
77	Fuel Sensor Low Shutdown
78	Mast Up
79	Mast Down
80	Mains Supply High Frequency
81	Mains Supply Low Frequency
82	Mains Supply High Voltage
83	Mains Supply Low Voltage
84	Gen/Mains High Frequency
85	Gen/Mains High Voltage
86	Gen/Mains Low Frequency
87	Gen/Mains Low Voltage
88	Combined Mains Supply Failure
89	Combined Gen/Mains Failure
90	Mains Supply Active
91	RESERVED
92	Gen Under Frequency Warning
93	Gen Over Frequency Warning
94	Gen Low Voltage Warning
95	Gen High Voltage Warning
96	SCR Inducement
97	Water in Fuel
98	DEF Level Low
99	DPTC Filter
100	HEST Active
101	DPF Regeneration in Progress
102	DPF Non-Mission State
103	DPF Forced Regen Requested
104	DPF Regen Interlock Active

More output sources overleaf...

Output Sources	
105	DPF Auto Regen Inhibit Request
106	Mains High Frequency Warning
107	Mains Low Frequency Warning
108	Mains High Voltage Warning
109	Mains Low Voltage Warning
110 to 113	RESERVED
114	Block Heater
115	Fuel Pull in Coil
116 to 119	RESERVED
120	Overspeed Delayed Shutdown
121	Gen High Frequency Overshoot Warning
122	Gen High Frequency Delayed Warning
123	Gen High Frequency Delayed Shutdown
124	Oil Pressure Switch
125	Coolant Temperature Switch
126	Fuel Level Switch
127	Low Battery Start
128	Generator Within Standards
129	Bund Tank
130	Controlled Stop

6.4.3 ALARM ACTION

Alarm Action	
Index	**Action**
0	Electrical Trip
1	Shutdown
2	Warning

6.4.4 FLEXIBLE SENSOR ALARM ACTION

Flexible Sensor Alarm Action	
Index	**Action**
0	None
1	Shutdown
2	Electrical Trip

6.4.5 POWER UP MODE

Power Up Mode	
Index	**Mode**
0	Stop
1	Manual
2	Auto

6.4.6 SENSOR TYPE

Sensor Type	
Index	**Type**
0	None
1	Digital Input
2	Percentage Sensor
3	Pressure Sensor
4	Temperature Sensor

6.4.7 SYSTEM TOPOLOGY

AC System	
Index	**Type**
0	2 Phase 3 Wire (L1-L2)
1	2 Phase 3 Wire (L1-L3)
2	3 Phase 3 Wire
3	3 Phase 4 Wire
4	3 Phase 4 Wire Delta (L1-N-L2)
5	3 Phase 4 Wire Delta (L1-N-L2)
6	3 Phase 4 Wire Delta (L1-N-L2)
7	Single Phase 2 Wire
8	Single Phase 3 Wire (L1-L2)
9	Single Phase 3 Wire (L1-L3)
10	2 Wire Unearthed DC

6.4.8 DIGITAL INPUT ALARM ARMING

Digital Input Alarm Arming	
Index	**Arming**
0	Always
1	From Safety On
2	From Starting
3	Never

6.4.9 DIGITAL INPUT POLARITY

Digital Input Polarity	
Index	**Polarity**
0	Close to Activate
1	Open to Activate

6.4.10 DIGITAL OUTPUT POLARITY

Output Polarity	
Index	**Polarity**
0	Energise
1	De-Energise

6.4.11 FUEL UNITS

Fuel Units	
Index	**Units**
0	Litres
1	Imperial Gallons
2	US Gallons

6.4.12 PRESSURE SENSOR LIST

Pressure Sensor List	
Index	**Type**
0	Not used
1	Dig Closed for Alarm
2	Dig Open for Alarm
3	VDO 5 bar
4	VDO 10 bar
5	Datcon 5 bar
6	Datcon 10 bar
7	Datcon 7 bar
8	Murphy 7 bar
9	CMB812
10	Veglia
11	User Defined

6.4.13 TEMPERATURE SENSOR LIST

Temperature Senor List	
Index	**Type**
0	Not Used
1	Dig Closed for Alarm
2	Dig Open for Alarm
3	VDO 120 °C
4	Datcon High
5	Datcon Low
6	Murphy
7	Cummins
8	PT100
9	Veglia
10	Beru
11	User Defined

6.4.14 PERCENTAGE SENSOR LIST

Percentage Sensor List	
Index	**Type**
0	Not Used
1	Dig Closed for Alarm
2	Dig Open for Alarm
3	VDO Ohm (10-180)
4	VDO Tube (90-0)
5	US Ohm (240-33)
6	GM Ohm (0-90)
7	GM Ohm (0-30)
8	Ford (73-10)
9	User Defined

7 COMMISSIONING

Before the system is started, it is recommended that the following checks are made:-

- The unit is adequately cooled and all the wiring to the module is of a standard and rating compatible with the system. Check all mechanical parts are fitted correctly and that all electrical connections (including earths) are sound.

- The unit **DC** supply is fused and connected to the battery and that it is of the correct polarity.

NOTE: If Emergency Stop feature is not required, link this input to the DC Negative or disable the input. For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Software Manual*.

- The Emergency Stop input is wired to an external **normally closed** switch connected to **DC negative.**

- To check the start cycle operation, take appropriate measures to prevent the engine from starting (disable the operation of the fuel solenoid). After a visual inspection to ensure it is safe to proceed, connect the battery supply. Press the ***Manual/Start Mode*** button the unit start sequence commences.

- The starter engages and operates for the pre-set crank period. After the starter motor has attempted to start the engine for the pre-set number of attempts, the LCD displays ***Fail to Start***. Press the ***Stop/Reset Mode*** button to reset the unit.

- Restore the engine to operational status (reconnect the fuel solenoid). Press the ***Manual/Start Mode*** button. This time the engine starts and the starter motor disengages automatically. If not then check that the engine is fully operational (fuel available, etc.) and that the fuel solenoid is operating. The engine now runs up to operating speed. If not, and an alarm is present, check the alarm condition for validity, then check input wiring. The engine continues to run for an indefinite period. It is possible at this time to view the engine and alternator parameters.

- Press the ***Auto Mode*** button, the engine runs for the pre-set cooling down period, then stop. The generator stays in the standby mode. If not check that there is not a signal present on the **Remote start** input.

- Initiate an automatic start by supplying the remote start signal (if configured). The start sequence commences and the engine runs up to operational speed. Once the generator is available the light outputs (if configured) activates. If not, check the wiring to the light output contactors. Check the *Warming Up* timer has timed out.

- Remove the remote start signal. The return sequence begins. After the pre-set time, the generator is unloaded. The generator then runs for the pre-set *Cooling Down* timer, then shutdown into its standby mode.

- Set the modules internal clock/calendar to ensure correct operation of the scheduler and event logging functions. For details of this procedure see section entitled *Front Panel Configuration*

- If, despite repeated checking of the connections between the controller and the customer's system, satisfactory operation cannot be achieved, then the customer is requested to the DSE Technical Support Department

8 FAULT FINDING

8.1 STARTING

Symptom	Possible Remedy
Unit is inoperative Read/Write configuration does not operate	Check the battery and wiring to the unit. Check the DC supply. Check the DC fuse.
Unit shuts down	Check DC supply voltage is not above 35 V or below 9 V Check the operating temperature is not above 70 °C. Check the DC fuse.
Fail to Start is activated after pre-set number of attempts to start	Check wiring of fuel solenoid. Check fuel. Check battery supply. Check battery supply is present on the Fuel output of the module. Check the speed-sensing signal is present on the module's inputs. Refer to engine manual.
Continuous starting of generator when in the ***Auto Mode***	Check that there is no signal present on the "Remote Start" input. Check configured polarity is correct. Check the mains supply is available and within configured limits
Generator fails to start on receipt of Remote Start signal.	Check Start Delay timer has timed out. Check signal is on "Remote Start" input. Confirm correct configuration of input is configured to be used as "Remote Start". Check that the oil pressure switch or sensor is indicating low oil pressure to the controller. Depending upon configuration, then set does not start if oil pressure is not low.
Pre-heat inoperative	Check wiring to engine heater plugs. Check battery supply. Check battery supply is present on the Pre-heat output of module. Check pre-heat configuration is correct.
Starter motor inoperative	Check wiring to starter solenoid. Check battery supply. Check battery supply is present on the Starter output of module. Ensure oil pressure switch or sensor is indicating the "low oil pressure" state to the controller.

8.2 LOADING

Symptom	Possible Remedy
Engine runs but the lights do not turn on	Check Warm up timer has timed out. Ensure *Inhibit Light Input 1, 2, 3 or 4* are not active on the module inputs. Check connections to the lights. Note that the set may not take load in ***Manual/Start Mode*** unless there is an active load signal.
Incorrect reading on engine gauges ***Fail To Stop*** when engine is at rest	Check engine is operating correctly. Check that sensor is compatible with the module and that the module configuration is suited to the sensor.

8.3 ALARMS

Symptom	Possible Remedy
Low Oil Pressure operates after engine has fired	Check engine oil pressure. Check oil pressure switch/sensor and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed) or that sensor is compatible with the module and is correctly configured.
High Coolant Temperature operates after engine has fired.	Check engine temperature. Check switch/sensor and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed) or that sensor is compatible with the module.
Shutdown fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
Electrical Trip fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
Warning fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
CAN ECU Warning ***CAN ECU Shutdown***	This indicates a fault condition detected by the engine ECU and transmitted to the DSE controller.
CAN Data Fail	Indicates failure of the CAN data link to the engine ECU. Check all wiring and termination resistors (if required).
Incorrect reading on Engine gauges ***Fail To Stop*** when engine is at rest	Check engine is operating correctly. Check sensor and wiring paying particular attention to the wiring to terminal 10 (refer to appendix). Check that sensor is compatible with the module and that the module configuration is suited to the sensor.

8.4 COMMUNICATIONS

Symptom	Possible Remedy
CAN Data Fail	Indicates failure of the CAN data link to the engine ECU. Check all wiring and termination resistors (if required).

8.5 INSTRUMENTS

Symptom	Possible Remedy
Inaccurate generator measurements on controller display	Check that the CT primary, CT secondary and VT ratio settings are correct for the application. Check that the CTs are wired correctly with regards to the direction of current flow (p1,p2 and s1,s2) and additionally ensure that CTs are connected to the correct phase (errors occur if CT1 is connected to phase 2). Remember to consider the power factor (kW = kV A x powerfactor). The controller is true RMS measuring so gives more accurate display when compared with an 'averaging' meter such as an analogue panel meter or some lower specified digital multimeters. Accuracy of the controller is better than 1% of full scale. Generator voltage full scale is 415 V ph-N, accuracy is ±4.15 V (1% of 415 V).

8.6 MISCELLANEOUS

Symptom	Possible Remedy
Module appears to 'revert' to an earlier configuration	When editing a configuration using the PC software it is vital that the configuration is first 'read' from the controller before editing it. This edited configuration must then be "written" back to the controller for the changes to take effect. When editing a configuration using the fascia editor, be sure to press the the ***Auto Mode*** (AUTO) (✓) button to save the change before moving to another item or exiting the fascia editor

NOTE: The above fault finding is provided as a guide check-list only. As the module is configured to provide a wide range of different features, always refer to the source of the module configuration if in doubt.

9 CAN INTERFACE SPECIFICATION (J1939-75)

The ECU port is used for live operational communications between the module and other CAN enabled devices. The specification below details all broadcast messages which are transmitted when the J1939-75 is enabled and the relevant engine file is selected.

Parameter	Description
Protocol	S.A.E. J1939 with PGNs as listed in the following subsections.
Bit Rate	250 kb/s
Isolation	±2.5 kVrms
Termination	120 Ω termination resistor, with the option for direct PCB installation.

9.1 BROADCAST MESSAGES J1939-75

NOTE: All broadcast CAN messages are priority 3 by default, it is not possible to change the priority of the configurable CAN messages. For further details of module configuration, refer to DSE Publication: *057-222 DSEL401 MKII Configuration Suite PC Software Manual.*

Parameter Groups below are broadcast by the module and are detailed in the following subsections.

NOTE: SPNs that are not implemented in the module have all bits set to '1'.

NOTE: *PDU Format* and *PDU Specific* are shown in Hexadecimal.

NOTE: Values larger than 8 bits utilise *Little-Endian* format. For example a 16 bit value, occupying two Bytes has Byte1 as the most significant Byte and Byte2 as the least significant Byte.

9.1.1 ACS - AC SWITCHING DEVICE STATUS

PGN 64913

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	91	8	250 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0DD9	3545	Generator Breaker Status - This parameter indicates the measured state of the generator circuit breaker	Byte 1 Bits 1 to 3	***000:*** Open ***001:*** Closed ***010:*** Locked Out ***011-101:*** Available for SAE assignment ***110:*** Error ***111:*** Not available	0	N/A
0DDA	3546	Utility Circuit Breaker Status - This parameter indicates the measured state of the utility circuit breaker.	Byte 1 Bits 4 to 6	***000:*** Open ***001:*** Closed ***010:*** Locked Out ***011-101:*** Available for SAE assignment ***110:*** Error ***111:*** Not available	0	N/A

9.1.2 GC1 - GENERATOR CONTROL 1

PGN 64915

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	93	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0DEF	3567	Generator Control Not In Automatic Start State - This parameter indicates whether or not the generator set is in a condition to automatically start up and provide power. If not, this status parameter is in the ACTIVE state.	Byte 1 Bits 4 to 5	***00:*** Inactive (ready to start automatically) ***01:*** Active (not ready to start automatically) ***10:*** Error ***11:*** Not available	0	N/A

9.1.3 GAAC - GENERATOR AVERAGE BASIC AC QUANTITIES

PGN 65030

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	06	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0988	2440	Generator Avg. L-L AC Voltage	Byte 1 to 2	1	0	V
098C	2444	Generator Avg. L-N AC Voltage	Byte 3 to 4	1	0	V
0984	2436	Generator Avg. AC Frequency	Byte 5 to 6	1/128 Hz/bit	0	Hz
0990	2448	Generator Avg. AC RMS Current	Byte 7 to 8	1	0	A

9.1.4 GPAAC - GENERATOR PHASE A BASIC AC QUANTITIES

PGN 65027

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	03	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0985	2437	Generator Phase A AC Frequency	Byte 5 to 6	128	0	V
0989	2441	Generator Phase A Line Line AC RMS Voltage	Byte 1 to 2	1	0	V
098D	2445	Generator Phase A Line Neutral AC RMS Voltage	Byte 3 to 4	1	0	A
0991	2449	Generator Phase A AC RMS Current	Byte 7 to 8	1	0	Hz

9.1.5 GPAACP - GENERATOR PHASE A AC POWER

PGN 65026

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	02	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0993	2453	Generator Phase A Real Power	Byte 1 to 4	1	$-2*10^9$	W
099D	2461	Generator Phase A Apparent Power	Byte 5 to 8	1	$-2*10^9$	W

9.1.6 GPAACR - GENERATOR PHASE A AC REACTIVE POWER

PGN 65025

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	00	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0999	2457	Generator Phase A Reactive Power	Byte 1 to 4	1	$-2*10^9$	Var

9.1.7 GPBAC - GENERATOR PHASE B BASIC AC QUANTITIES

PGN 65024

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	00	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0986	2438	Generator Phase B AC Frequency	Byte 5 to 6	0.0078125	0	Hz
098A	2442	Generator Phase B Line Line AC RMS Voltage	Byte 1 to 2	1	0	V
098E	2446	Generator Phase B Line Neutral AC RMS Voltage	Byte 3 to 4	1	0	V
0992	2450	Generator Phase B AC RMS Current	Byte 7 to 8	1	0	A

9.1.8 GPBACP - GENERATOR PHASE B AC POWER

PGN 65023

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	FF	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0996	2454	Generator Phase B Real Power	Byte 1 to 4	1	$-2*10^9$	W
099E	2462	Generator Phase B Apparent Power	Byte 5 to 8	1	$-2*10^9$	W

9.1.9 GPBACR - GENERATOR PHASE B AC REACTIVE POWER

PGN 65022

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	FE	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
099A	2458	Generator Phase B Reactive Power	Byte 1 to 4	1	$-2*10^9$	Var

9.1.10 GPCAC - GENERATOR PHASE C BASIC AC QUANTITIES

PGN 65021

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	FD	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0987	2439	Generator Phase C AC Frequency	Byte 5 to 6	0.0078125	0	Hz
098B	2443	Generator Phase C Line Line AC RMS Voltage	Byte 1 to 2	1	0	V
098F	2447	Generator Phase C Line Neutral AC RMS Voltage	Byte 3 to 4	1	0	V
0993	2451	Generator Phase C AC RMS Current	Byte 7 to 8	1	0	A

9.1.11 GPCACP - GENERATOR PHASE C AC POWER

PGN65020

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	FF	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0997	2455	Generator Phase C Real Power	Byte 1 to 4	1	$-2*10^9$	W
099F	2463	Generator Phase C Apparent Power	Byte 5 to 8	1	$-2*10^9$	W

9.1.12 GPCACR - GENERATOR PHASE C AC REACTIVE POWER

PGN 65019

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	FB	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
099B	2459	Generator Phase C Reactive Power	Byte 1 to 4	1	$-2*10^9$	Var

9.1.13 GTACPP - GENERATOR TOTAL AC PERCENT POWER

PGN 64911

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	8F	8	250 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0E06	3590	Generator Total Percent kW as a percentage of rated power	Byte 1 to 2	0.0078125	-251	%

9.1.14 GTACE - GENERATOR TOTAL KW HOURS EXPORT

PGN 65018

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	FA	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
09A4	2468	Generator Total kW Hours Export	Byte 1 to 4	1	0	kWh

9.1.15 GTACER - GENERATOR TOTAL AC REACTIVE ENERGY

PGN64910

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	8E	8	250 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0E09	3593	Generator Total kVAr Hours Export	Byte 1 to 4	1	0	kVArh

9.1.16 GTACP - GENERATOR TOTAL AC POWER

PGN65029

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	05	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0994	2452	Generator Total Real Power	Byte 1 to 4	1	$-2*10^9$	W
099C	2460	Generator Total Apparent Power	Byte 5 to 8	1	$-2*10^9$	VA

9.1.17 GTACR - GENERATOR TOTAL AC REACTIVE POWER

PGN65028

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	04	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0988	2456	Generator Total Reactive Power	Byte 1 to 4	1	$-2*10^9$	VAr
09A0	2464	Generator Overall Power Factor	Byte 5 to 6	-1	6.103515625E-05	pF
09D6	2518	Generator Overall Power Factor Lagging	Byte 7 to 8	1	0	+/-

9.2 BROADCAST MESSAGES ENGINE INSTRUMENTATION

NOTE: The availability of the Engine Instrumentation PGNs are dependant upon the engine file selected within the DSE module's configuration. Contact DSE technical support: support@deepseaelectronics.com for more information.

9.2.1 DD - DASH DISPLAY

PGN 65276

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	FC	8	1000 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
060	96	Ratio of volume of fuel to the total volume of fuel storage container.	Byte 2	0.4	0	%

9.2.2 EC2 - ENGINE CONFIGURATION 2

PGN64895

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	7F	8	Request

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0E56	3670	Maximum Crank Attempts per Start Attempt	Byte 1	1	0	N/A

9.2.3 EEC1- ENGINE SPEED

PGN61444

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	F0	04	8	100 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0BE	190	Engine Speed	Byte 4 - 5	0.125	0	RPM

9.2.4 EEC4 - CRANK ATTEMPT COUNT ON PRESENT START ATTEMPT

PGN65214

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	FB	8	Request

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0E57	3671	Crank Attempt Count on Present Start Attempt	Byte 6	1	0	N/A

9.2.5 EFL_P1 - OIL PRESSURE

PGN65263

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	EF	8	500 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
064	100	Oil Pressure	Byte 4	4	0	kPa

9.2.6 EOI - EMERGENCY STOP

PGN64914

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FD	92	8	250 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0E17	3607	Emergency Stop ***00:*** Off (No Shutdown Requested) ***01:*** On (Shutdown Requested) ***10:*** Reserved ***11:*** Don't care / take no action	Byte 6 Bit 6 - 8	1	0	N/A

9.2.7 ET1 - COOLANT TEMPERATURE

PGN65262

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	EE	8	1000 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
06E	110	Engine Coolant Temperature	Byte 1	1	-40	°C

9.2.8 HOURS - ENGINE HOURS REVOLUTIONS

PGN65253

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	E5	8	Request

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0F7	247	Engine Total Hours of Operation	Byte 1 -4	0.05	0	hr

9.2.9 VEP1 - VEHICLE ELECTRICAL POWER

PGN65271

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
3	0	0	FE	F7	8	1000 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
0A7	167	Charge Alternator Voltage	Byte 3 to 4	0.05	0	V
0A8	168	Plant Battery Voltage	Byte 5 to 6	0.05	0	V

9.3 DM01 - CONDITIONS ACTIVE DIAGNOSTIC TROUBLE CODES

NOTE: The availability of the Engine Alarm SPN and FMI is dependant upon the engine file selected within the DSE module's configuration. Contact DSE technical support: support@deepseaelectronics.com for more information.

NOTE: If only one DM1 alarm is active the DM1 priority will remain as six. If two or more DM1 alarms are active the priority will be seven.

PGN65226

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size (Bytes)	Rate
6/7	0	0	FE	CA	8	1000 ms

SPN						
Hex	Decimal	Instrument	Byte / Bit	Scaling	Offset	Units
04BE	1214	Suspect Parameter Number	Byte 3 Bits 1 to 19	1	0	N/A
04BF	1215	Failure Mode Identifier	Byte 5 Bits 1 to 5	1	0	N/A
06AA	1706	SPN Conversion Method	Byte 6 Bit 7	1	0	N/A

DM1 Conditions

Key	Value
Low Fault - Least Severe	17
High Fault - Least Severe	15
Low Fault - Most Severe	1
High Fault - Most Severe	0
Erratic - Incorrect Data	2

Generator Alarm Condition	SPN	Warning FMI	Shutdown FMI
Generator Average AC Frequency Under	2436	17	1
SPN Generator Average Line-Line AC RMS Voltage Over	2436	15	0
Generator Average Line-Line AC RMS Voltage Under	2440	17	1
Generator Average Line-Line AC RMS Voltage Over	2440	15	0
Generator Average Line-Neutral AC RMS Voltage Under	2444	17	1
Generator Average Line-Neutral AC RMS Voltage Over	2444	15	0
Generator Average AC RMS Current Over	2448	15	0

Engine Alarm Condition	SPN	Warning FMI	Shutdown FMI
Fuel Level Low	96	17	1
Oil Pressure Low (Analogue Sensor)	100	17	1
Oil Pressure Low (Digital Input)	100	17	1
Oil Pressure Sensor Fault	100	2	2
Coolant Temperature High (Analogue Sensor)	110	15	0
Coolant Temperature High (Digital Input)	110	15	0
Coolant Temperature Sensor Fault	110	2	2
Charge Alternator Failed	167	17	1
Plant Battery Voltage High	168	15	0
Plant Battery Voltage Low	168	17	1
Overspeed	190	15	0
Underspeed	190	17	1

10 MAINTENANCE, SPARES, REPAIR AND SERVICING

The controller is *Fit and Forget*. As such, there are no user serviceable parts within the controller. In the case of malfunction, contact the original equipment manufacturer (OEM).

10.1 PURCHASING ADDITIONAL CONNECTOR PLUGS FROM DSE

If additional plugs are required from DSE, contact our Sales department using the part numbers below.

10.1.1 PACK OF PLUGS

Module Type	Plug Pack Part Number
DSEL401 MKII	007-835

10.1.2 INDIVIDUAL PLUGS

Module Terminal Number	Plug Description	Part No.
1-9	9 way 5.08 mm	007-167
10-20	11 way 5.08 mm	007-451
21-24	4 way 10.16 mm	007-171
25-29	5 way 5.08 mm	007-445
30-35	6 way 5.08 mm	007-446
USB	PC Configuration interface lead (USB type A – USB type B)	016-125

10.2 PURCHASING ADDITIONAL FIXING CLIPS FROM DSE

Item	Description	Part No.
	Module Fixing Clips (Packet Of 2)	020-406

10.3 PURCHASING ADDITIONAL SEALING GASKET FROM DSE

Item	Description	Part No.
	Module Silicon Sealing Gasket	020-282

11 WARRANTY

DSE provides limited warranty to the equipment purchaser at the point of sale. For full details of any applicable warranty, refer to the original equipment supplier (OEM).

12 DISPOSAL

12.1 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)

If electrical and electronic equipment is used, it must be stored, collected, treated, recycled and disposed of WEEE separately from other waste.

This Page is Intentionally Blank

This Page is Intentionally Blank