DEEP SEA ELECTRONICS PLC

DSE6110 MKII & DSE6120 MKII Operator Manual

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DSE6110 MKII & DSE6120 MKII Operator Manual

Amendments List

Issue	Comments	Minimum Module Version Required	Minimum Configuration Suite Version required
1	Initial release	V 1.0.0	2014.103 V 2.17.3

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

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.**

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1 INTRODUCTION

This document details the installation and operation requirements of the DSE6110 MKII & DSE6120 MKII modules, part of the DSEGenset® range of products.

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

The DSE61xx MKII series is designed to provide differing levels of functionality across a common platform. This allows the generator OEM greater flexibility in the choice of controller to use for a specific application.

The DSE61xx MKII series module has been designed to allow the operator to start and stop the generator, and if required, transfer the load to the generator either manually or automatically. Additionally, the DSE6120 MKII automatically starts and stops the generator set depending upon the status of the mains (utility) supply.

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

The DSE61xx 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 failure by the text LCD display.

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

- *Text based LCD display*
- ***True RMS** Voltage*
- *Current and Power 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**.*
- *Data Logging*

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 BIBLIOGRAPHY

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

1.1.1 INSTALLATION INSTRUCTIONS

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

DSE Part	Description
053-173	DSE6110 MKII & DSE6120 MKII Installation Instructions

1.1.2 TRAINING GUIDES

Training Guides are produced to give 'handout' sheets on specific subjects during training sessions

DSE Part	Description
056-005	Using CTs With DSE Products
056-010	Over Current Protection
056-022	Breaker Control
056-029	Smoke Limiting
056-030	Module PIN Codes

1.1.3 MANUALS

Product manuals are can be downloaded from the DSE website: www.deepseaplc.com

DSE Part	Description
057-004	Electronic Engines and DSE Wiring Guide
057-224	DSE6110 MKII & DSE6120 MKII Configuration Suite PC Software Manual

1.1.4 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 SPECIFICATION

2.1 SHORT NAMES

Short Name	Description
DSE6000,DSE6xxx MKII	All modules in the DSE6000 MKII range.
DSE6100,DSE61xx MKII	All modules in the DSE61xx MKII range.
DSE6110 MKII	DSE6110 MKII module/controller
DSE6120 MKII	DSE6120 MKII module/controller

2.2 OPERATING TEMPERATURE

Module	Description
DSE61xx MKII	-30 ºC +70 ºC (-22 ºF +158 ºF)
Display Heater Variants	-40 ºC +70 ºC (-40 ºF +158 ºF)

2.2.1 SCREEN HEATER OPERATION

Screen Heater Function	Description
Turn On When Temperature Falls Below	-10 ºC (+14 ºF)
Turn Off When Temperature Rises Above	-5 ºC (+23 ºF)

2.3 REQUIREMENTS FOR UL CERTIFICATION

Screw Terminal Tightening Torque	4.5 lb-in (0.5 Nm)
Conductors	• Terminals suitable for connection of conductor size 12 AWG to 26 AWG (0.5 mm² to 2.0 mm²). • Conductor protection must be provided in accordance with NFPA 70, Article 240 • Low voltage circuits (35 volts 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" (6mm) separation from the generator and mains connected circuit conductors unless all conductors are rated 600 Volts or greater.
Current Inputs	Must be connected through UL Listed or Recognized isolating current transformers with the secondary rating of 5A 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 300V. When used to monitor voltages over 300V device to be install 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)

2.4 TERMINAL SPECIFICATION

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

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 24)	
Maximum Cable Size	2.5 mm² (AWG 10)	

2.5 POWER SUPPLY REQUIREMENTS

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	100 mA at 12 V 105 mA at 24 V
Maximum Standby Current	60 mA at 12 V 55 mA at 24 V
Maximum Current When In Sleep Mode	40 mA at 12 V 35 mA at 24 V
Typical Power (Controller On, Heater Off)	1.2 W to 2.4 W
Typical Power (Controller In Standby, Heater Off)	0.7 W to 1.2 W

2.5.1 MODULE SUPPLY INSTRUMENTATION DISPLAY

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

2.6 VOLTAGE & FREQUENCY SENSING

Measurement Type	True RMS conversion
Sample Rate	5 kHz or better
Harmonics	Up to 11th or better
Input Impedance	300 kΩ phase to neutral
Phase To Neutral	15 V (minimum required for sensing frequency) to 415 V AC (absolute maximum) Suitable for 345 V AC 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 AC 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

2.7 CURRENT SENSING

Measurement Type	True RMS conversion
Sample Rate	5 KHz or better
Harmonics	Up to 10th or better
Nominal CT Secondary Rating	5 A
Maximum Continuous Current	5 A
Overload Measurement	3 x Nominal Range setting
Absolute Maximum Overload	50 A for 1 second
Burden	0.25 VA (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 Nominal (5 A) (excluding CT error)

2.7.1 VA RATING OF THE CTS

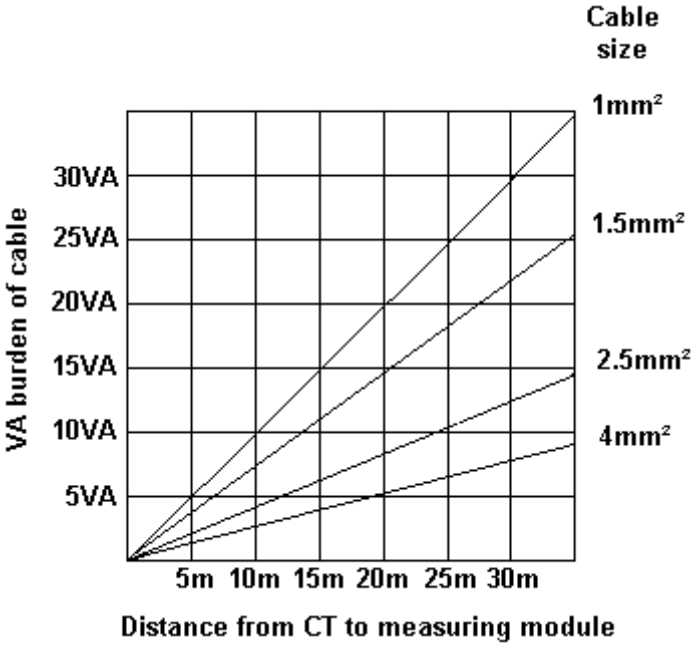
NOTE: Details for 4 mm² cables are shown for reference only. The connectors on the DSE modules are only suitable for cables up to 2.5 mm².

The VA burden of the module on the CTs is 0.5 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 0.5 VA, then a CT with a rating of at least 15 VA + 0.5 VA = 15.5 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 7.5 VA (7 + 0.5).

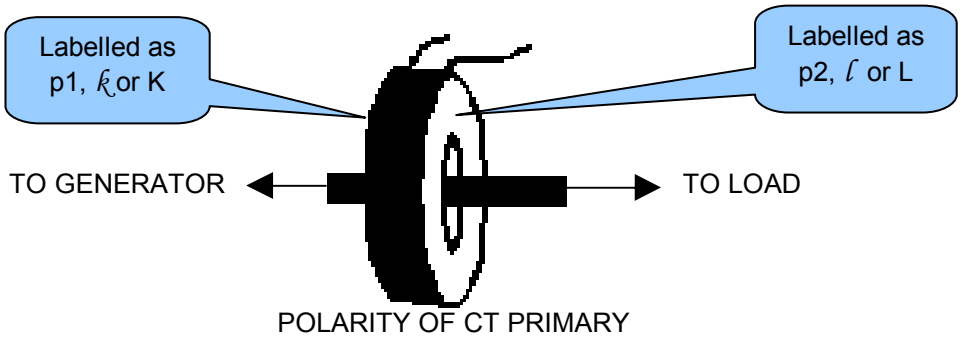


2.7.2 CT POLARITY

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.



2.7.3 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.

2.7.4 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 you wish to protect against, and at the accuracy level you require.

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 you require. The DSE module is accurate to better than 1% of the full-scale current reading. To maintain this accuracy you should fit Class 0.5 or Class 1 CTs.

You should check with your CT manufacturer for further advice on selecting your CTs

2.8 INPUTS

2.8.1 DIGITAL INPUTS

Number	6 configurable digital inputs (10 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 typical

2.8.2 ANALOGUE INPUTS

Analoge inputs A,B,C & D are flexible within the DSE6110 MKII & 6120 MKII modules

2.8.2.1 ANALOGUE INPUT A

Input Type	Flexible: Configured for *Oil Sensor* in the DSE default configuration. Flexible Options: *Not used, Digital Input, Flexible Analogue & Oil Sensor*
Flexible Input Selection	Pressure Sensor Percentage Sensor Temperature Sensor
Flexible Measured Quantity (*Analogue Input A only*)	Current Restive Voltage

2.8.2.1.1 RESISTIVE CONFIGURATION

Number	4 configurable resistive type inputs
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	360Ω
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 %, 0 °C to 250 °C (32 °F to 482 °F) or 0 bar to 17.2 bar (0 PSI to 250 PSI) subject to limits of the sensor and sensor configuration

2.8.2.1.2 0-10V INPUT CONFIGURATION

Number	1 configurable ratiometric input
Full Scale	0 V to 10 V
Resolution	1%
Accuracy	+/-2% of full scale voltage (±0.2 V) excluding transducer error
Max Common Mode Voltage	±2 V
Display Range	0 % to 250 %, 0 °C to 250 °C (32 °F to 482 °F) or 0 bar to 17.2 bar (0 PSI to 250 PSI) subject to limits of the sensor and sensor configuration

2.8.2.1.3 4-20 MA INPUT CONFIGURATION

Number	1 configurable ratiometric input
Full Scale	0 mA to 20 mA
Resolution	1%
Accuracy	+/-2% of full scale resistance (±0.4 mA) excluding transducer error
Max Common Mode Voltage	±2 V
Display Range	0 % to 250 %, 0 °C to 250 °C (32 °F to 482 °F) or 0 bar to 17.2 bar (0 PSI to 250 PSI) subject to limits of the sensor and sensor configuration

2.8.2.2 ANALOGUE INPUT B

Input Type	Flexible: Configured for *Coolant Temperature* in the DSE default configuration. Flexible Options: *Not used, Digital Input, Flexible Analogue & Coolant Temperature*
Flexible Input Selection	Pressure Sensor Percentage Sensor Temperature Sensor
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 % to 250 %, 0 °C to 250 °C (32 °F to 482 °F) or 0 bar to 17.2 bar (0 PSI to 250 PSI) subject to limits of the sensor and sensor configuration

2.8.2.3 ANALOGUE INPUT C

Input Type	Flexible: Configured for *Fuel Level Sensor* in the DSE default configuration Flexible Options: *Not used, Digital Input, Flexible Analogue & Fuel Level Sensor*
Flexible Input Selection	Pressure Sensor Percentage Sensor Temperature Sensor
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 %, 0 °C to 250 °C (32 °F to 482 °F) or 0 bar to 17.2 bar (0 PSI to 250 PSI) subject to limits of the sensor and sensor configuration

2.8.2.4 ANALOGUE INPUT D

Input Type	Flexible: Configured for *Flexible Sensor, Pressure* Sensor in the DSE default configuration. Flexible Options: *Not used, Digital Input, Flexible Analogue & Oil Sensor*
Flexible Input Selection	Pressure Sensor Percentage Sensor Temperature Sensor
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	1%
Accuracy	±2 % of full scale resistance (±4.8 Ω) excluding transducer error
Max Common Mode Voltage	±2 V
Display Range	0 % to 250 %, 0 °C to 250 °C (32 °F to 482 °F) or 0 bar to 17.2 bar (0 PSI to 250 PSI) subject to limits of the sensor and sensor configuration

2.8.3 CHARGE FAIL INPUT

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

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.

2.8.4 MAGNETIC PICKUP

NOTE: DSE supply a suitable magnetic pickup device, available in two body thread lengths:
DSE Part number 020-012 - Magnetic Pickup probe 5/8 UNF 2 ½" thread length
DSE Part number 020-013 - Magnetic Pickup probe 5/8 UNF 4" thread length

Type	Differential input
Minimum Voltage	0.5 V RMS
Max Common Mode Voltage	±2 V
Maximum Voltage	Clamped to ±70 V by transient suppressers, dissipation not to exceed1 W.
Maximum Frequency	10,000 Hz
Resolution	6.25 RPM
Accuracy	±25 RPM
Flywheel Teeth	10 to 500

Magnetic Pickup devices can often be 'shared' between two or more devices. For example, one device can often supply the signal to both the DSE module and the engine governor. The possibility of this depends upon the amount of current that the magnetic pickup can supply.

2.9 OUTPUTS

2.9.1 DC OUTPUTS A & B (FUEL & START)

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 secs, 5 A resistive continuous at 35 V

2.9.2 CONFIGURABLE DC OUTPUTS C, D, E & F

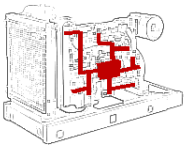
Type	Fully configurable, supplied from DC supply terminal 2.
Rating	2 A resistive continuous at 35 V

2.10 COMMUNICATION PORTS

USB Port	USB 2.0 Device for connection to PC running DSE configuration suite only. Max distance 6m (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 K bits/s Non-Isolated. Internal Termination provided (120 Ω) Max distance 40 m (133 feet)
DSENet (Expansion Comms) Port	Non-isolated Data connection 2 wire + common Half Duplex Data direction control for Transmit (by s/w protocol) Baud Rate 115K Internal termination fitted (120 Ω) Max common mode offset ±5 V Max distance 1.2 km (¾ mile)

2.10.1 CAN INTERFACE

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



Modules are fitted with the CAN interface as standard and are capable of receiving engine data from engine CAN controllers compliant with the CAN standard.
CAN enabled engine controllers monitor the engine's operating parameters such as engine speed, oil pressure, engine temperature (among others) in order to closely monitor and control the engine. The industry standard communications interface (CAN) transports data gathered by the engine controller interface. This allows generator controllers to access these engine parameters with no physical connection to the sensor device.

2.10.2 USB CONNECTION

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: *057-224 DSE6110 MKII & 6120 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:

- DSE6110 MKII & DSE6120 MKII Controller

- DSE Configuration Suite PC Software
  (Supplied on configuration suite software CD or available from www.deepseaplc.com).

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

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

2.10.3 DSENET® (EXPANSION MODULES)

NOTE: As a termination resistor is internally fitted to the controller, the controller must be the 'first' unit on the DSENet link. A termination resistor MUST be fitted to the 'last' unit on the DSENet® link. For connection details, refer to section entitled *Typical Wiring Diagram* elsewhere in this document.

NOTE: DSE6110 MKII & DSE6120 MKII modules does not support the DSE2510 or DSE2520 display modules.

DSENet® is the interconnection cable between the host controller and the expansion module(s) and must not be connect to any device other than DSE equipment designed for connection to the DSENet®

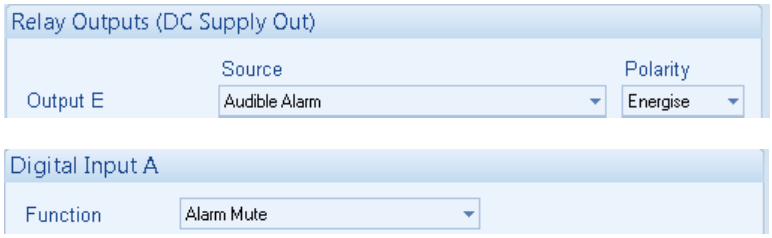
Cable Type	Two core screened and shielded twisted pair
Cable Characteristics	120 Ω Low capacitance
Recommended Cable	Belden 9841 Belden 9271
Maximum Cable Length	1200 m (¾ mile) when using Belden 9841 or direct equivalent. 600 m (656 yards) when using Belden 9271 or direct equivalent.
DSENet® Topology	"Daisy Chain" Bus with no stubs (spurs)
DSENet® Termination	120 Ω. Fitted internally to host controller. Must be fitted externally to the 'last' expansion module.
Maximum Expansion Modules	Total 6 devices made up of DSE2130 (up to 2), DSE2157 (up to 2), DSE2548 (up to 2) This gives the possibility of : Maximum 16 additional relay outputs (DSE2157) Maximum 16 additional LED indicators (DSE2548) Maximum 16 additional inputs (Can be configured as 4 digital inputs & 4 analogue resistive type inputs or 8 digital inputs when using DSE2130)

2.11 ADDING AN EXTERNAL SOUNDER

Should an external alarm or indicator be required, this can be achieved 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* (if required).

The audible alarm output activates and de-activates at the same time as the module's internal sounder. The Alarm mute input and internal ***Lamp Test / Alarm Mute*** button activate 'in parallel' with each other. Either signal mutes both the internal sounder and audible alarm output.

Example of configuration to achieve external sounder with external alarm mute button:



2.12 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.

Engine Hours Run	Maximum 99999 hrs 59 minutes (Approximately 11yrs 4 months)
Accumulated Power	999999 kWh / kVArh / kVAh

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 your generator supplier

2.13 DIMENSIONS AND MOUNTING

2.13.1 DIMENSIONS

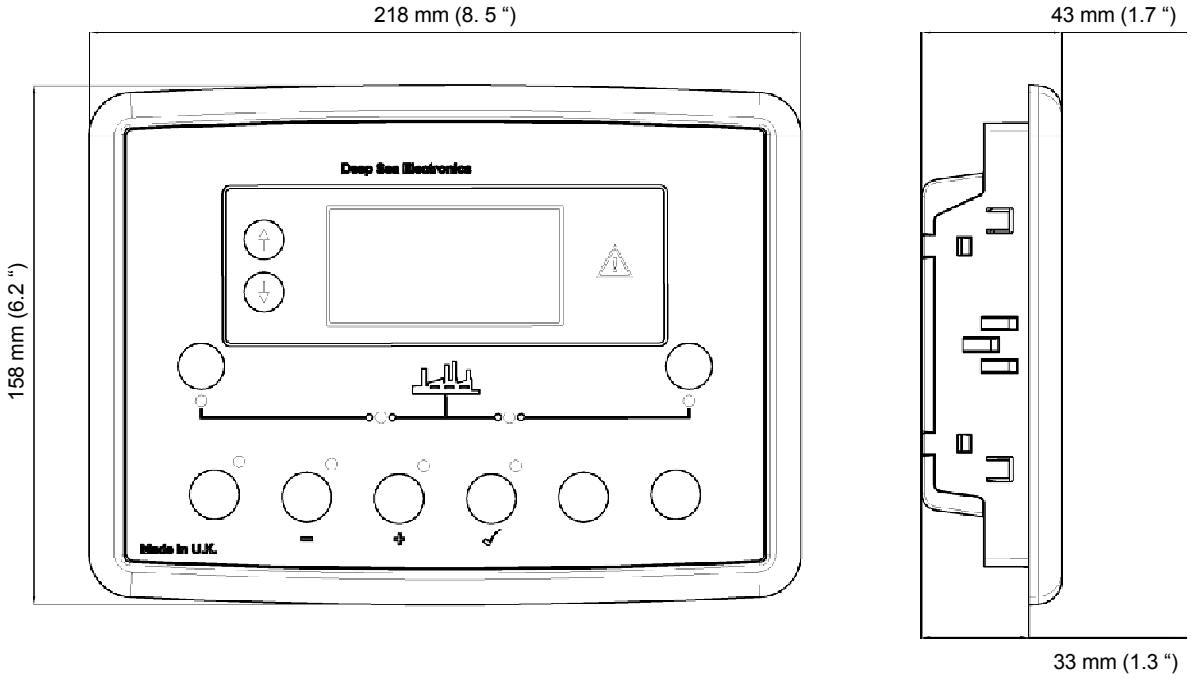
216 mm x 158 mm x 43 mm
(8.5” x 6.2” x 1.7”)

2.13.2 PANEL CUTOUT

184 mm x 137 mm
(7.2” x 5.3”)

2.13.3 WEIGHT

0.45 kg
(1.00 lb)

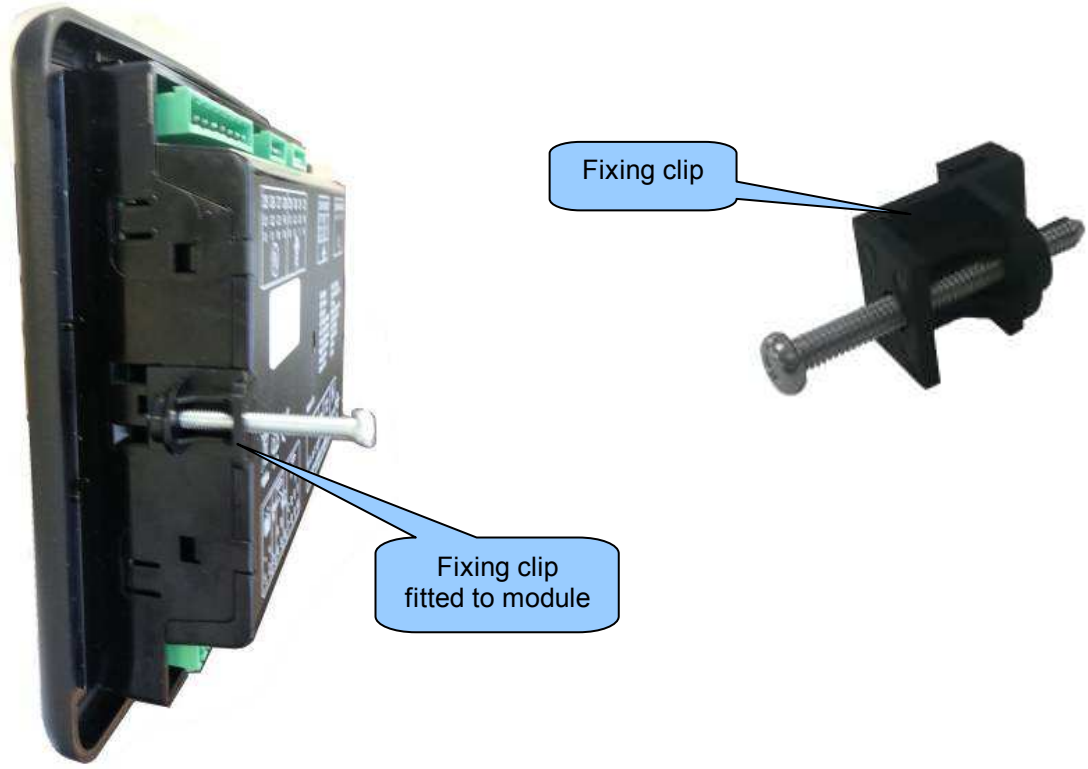


2.13.4 FIXING CLIPS

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.

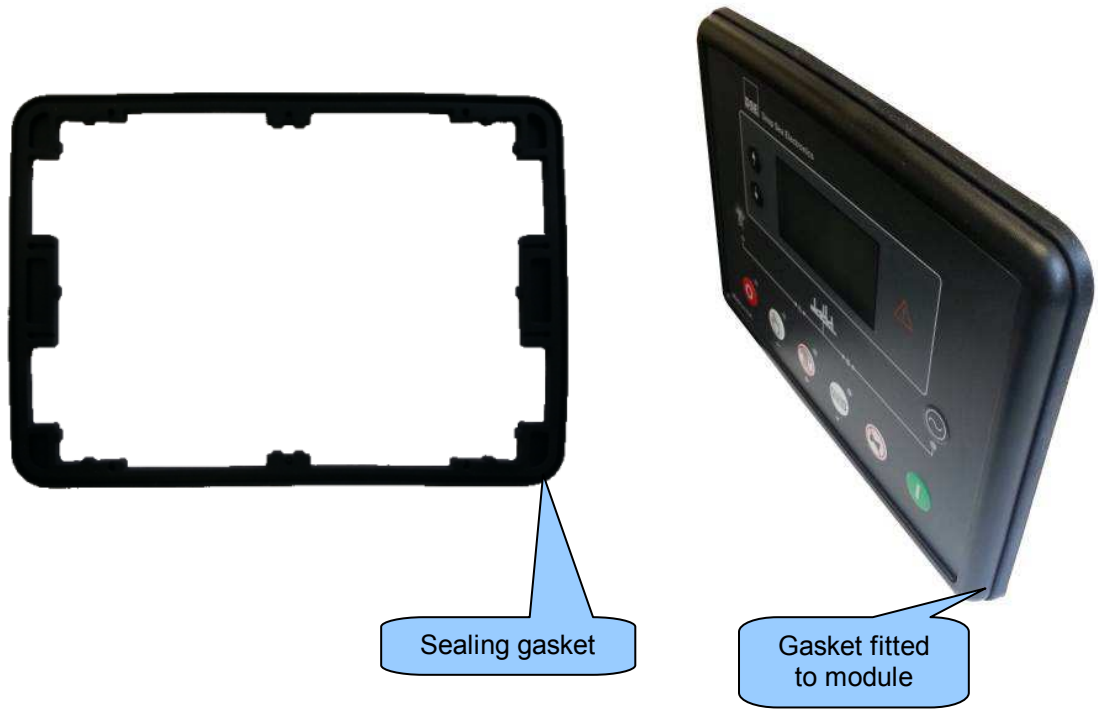
- Withdraw the fixing clip screw (turn anticlockwise) until only the pointed end is protruding from the clip.
- Insert the three 'prongs' of the fixing clip into the slots in the side of the module case.
- Pull the fixing clip backwards (towards the back of the module) ensuring all three prongs of the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



2.13.5 SILICON SEALING GASKET

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

The optional 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.



2.13.6 APPLICABLE STANDARDS

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 60950	Safety of information technology equipment, including electrical business equipment
BS EN 61000-6-2	EMC Generic Immunity Standard (Industrial)
BS EN 61000-6-4	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 27AC – AC Undervoltage Relay 27DC – DC Undervoltage Relay 29 – Isolating Contactor Or Switch 30 – Annunciator Relay 31 – Separate Excitation Device 42 – Running Circuit Breaker

Continued overleaf...

IEEE C37.2 (Standard Electrical Power System Device Function Numbers and Contact Designations)	Continued… 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

2.13.7 ENCLOSURE CLASSIFICATIONS

2.13.7.1 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).

2.13.7.2 NEMA CLASSIFICATIONS

THE MODULES NEMA RATING (APPROXIMATE)

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)

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

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.

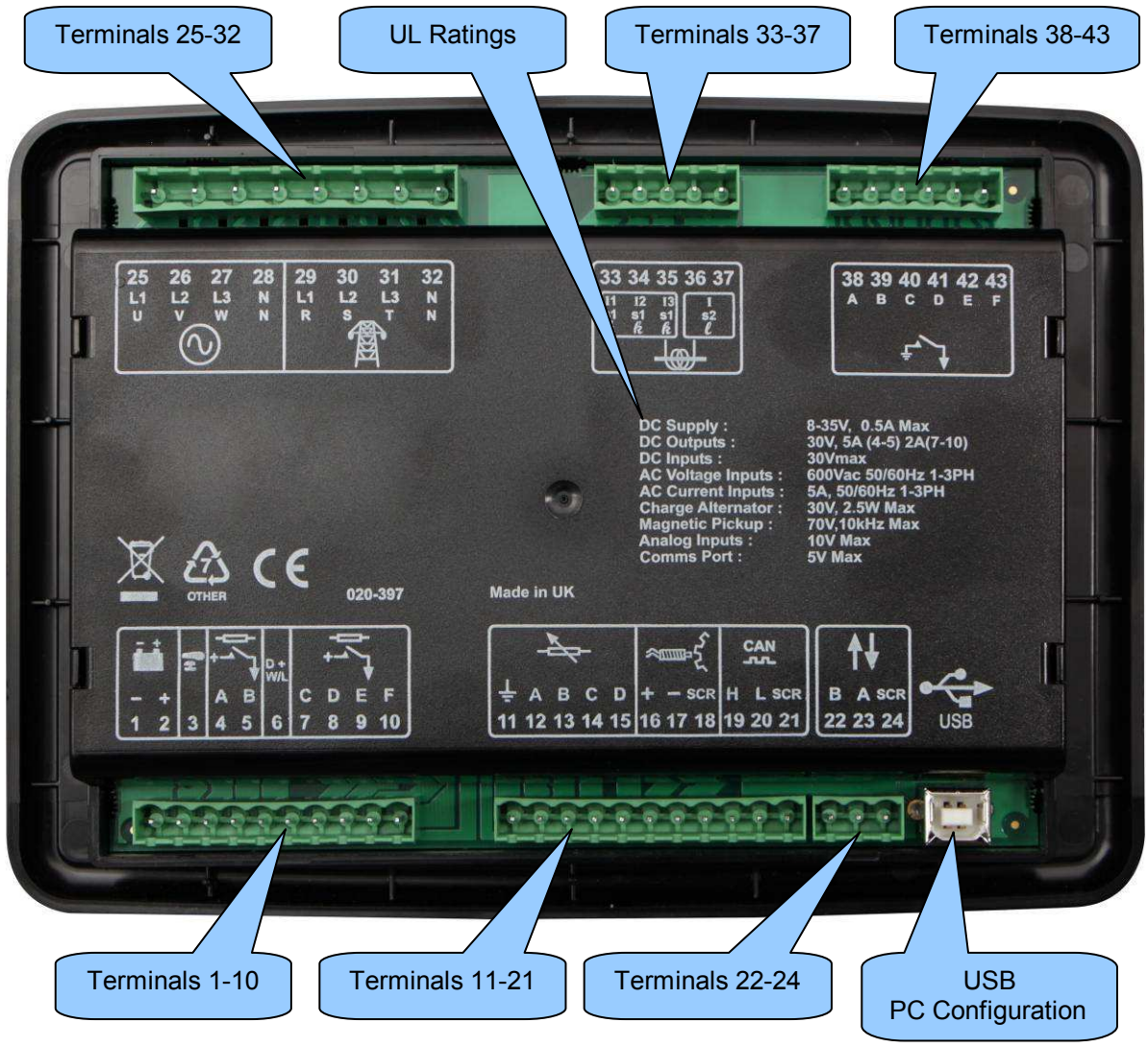
3 INSTALLATION

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 TERMINAL DESCRIPTION

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, icons are used on the rear of the module to help identify terminal functions. An example of this is shown below.



3.1.1 DC SUPPLY, ESTOP INPUT, DC OUTPUTS & CHARGE FAIL INPUT

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*

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & 6120 MKII Configuration Software Manual.*

	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	Emergency Stop Input	2.5 mm² AWG 13	Plant Supply Positive. Also supplies DC Outputs A & B. (Recommended Maximum Fuse 20 A)
	4	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.
	5	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.
D + W/L	6	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.
	7	DC Output C	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 A rated.
	8	DC Output D	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 A rated.
	9	DC Output E	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 A rated.
	10	DC Output F	1.0 mm² AWG 18	Plant Supply Positive from terminal 2. 2 A rated.

3.1.2 ANALOGUE SENSORS, MPU, CAN

NOTE: It is VERY important that terminal 11 (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 11 directly, and not use this earth for other connections.

NOTE: If you use PTFE insulating tape on the sensor thread when using earth return sensors, ensure you do not insulate the entire thread, 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)

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & 6120 MKII Configuration Software Manual.*

	Pin No	Description	Cable Size	Notes
	11	Sensor Common Return	0.5 mm² AWG 20	Return Feed For Sensors
	12	Oil Pressure Input	0.5 mm² AWG 20	Connect To Oil Pressure Sensor
	13	Coolant Temperature Input	0.5mm² AWG 20	Connect To Coolant Temperature Sensor
	14	Fuel Level Input	0.5 mm² AWG 20	Connect To Fuel Level Sensor
	15	Flexible Sensor Input	0.5 mm² AWG 20	Connect To Additional Sensor (User Configurable)
	16	Magnetic Pickup Positive	0.5 mm² AWG 20	Connect To Magnetic Pickup Device
	17	Magnetic Pickup Negative	0.5 mm² AWG 20	Connect To Magnetic Pickup Device
	18	Magnetic Pickup Screen	Shield	Connect To Ground At One End Only
CAN	19	CAN Port H	0.5 mm² AWG 20	Use Only 120 Ω CAN Approved Cable
	20	CAN Port L	0.5 mm² AWG 20	Use Only 120 Ω CAN Approved Cable
	21	CAN Port Screen	Shield	Use Only 120 Ω CAN Approved Cable

3.1.3 DSENET®

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & 6120 MKII Configuration Software Manual.*

NOTE: As a termination resistor is internally fitted to the controller, the controller must be the 'first' unit on the DSENet link. A termination resistor MUST be fitted to the 'last' unit on the DSENet® link. For connection details, refer to section entitled *Typical Wiring Diagram* elsewhere in this document.

	Pin No	Description	Cable Size	Notes
	22	DSENet Expansion B	0.5 mm² AWG 20	Use only 120 Ω CAN and RS485 approved cable
	23	DSENet Expansion A	0.5 mm² AWG 20	Use only 120 Ω CAN and RS485 approved cable
	24	DSENet Expansion Screen	Shield	Use only 120 Ω CAN and RS485 approved cable

3.1.4 GENERATOR / MAINS VOLTAGE & FREQUENCY SENSING

NOTE: Terminals 29 to 32 not fitted to DSE6110 MKII

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

	Pin No	Description	Cable Size	Notes
	25	Generator L1 (U) Voltage Monitoring	1.0 mm² AWG 18	Connect to generator L1 (U) output (AC) (Recommend 2 A fuse)
	26	Generator L2 (V) Voltage Monitoring	1.0 mm² AWG 18	Connect to generator L2 (V) output (AC) (Recommend 2 A fuse)
	27	Generator L3 (W) Voltage Monitoring	1.0 mm² AWG 18	Connect to generator L3 (W) output (AC) (Recommend 2 A fuse)
	28	Generator Neutral (N) Input	1.0 mm² AWG 18	Connect to generator Neutral terminal (AC)
	29	Mains L1 (R) Voltage Monitoring	1.0 mm² AWG 18	Connect to Mains L1 (R) output (AC) (Recommend 2 A fuse)
	30	Mains L2 (S) Voltage Monitoring	1.0 mm² AWG 18	Connect to Mains L2 (S) output (AC) (Recommend 2 A fuse)
	31	Mains L3 (T) Voltage Monitoring	1.0 mm² AWG 18	Connect to Mains L3 (T) output (AC) (Recommend 2 A fuse)
	32	Mains Neutral (N) Input	1.0 mm² AWG 18	Connect to Mains Neutral terminal (AC)

3.1.5 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 0.5VA 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 your CT supplier.

	Pin No	Description	Cable Size	Notes
	33	CT Secondary for L1	2.5 mm² AWG 13	Connect to s1 secondary of L1 monitoring CT
	34	CT Secondary for L2	2.5 mm² AWG 13	Connect to s1 secondary of L2 monitoring CT
	35	CT Secondary for L3	2.5 mm² AWG 13	Connect to s1 secondary of L3 monitoring CT
	36 37	CT Common	2.5 mm² AWG 13	Connect to s2 secondary of L1, L2 & L3 monitoring CTs and ground

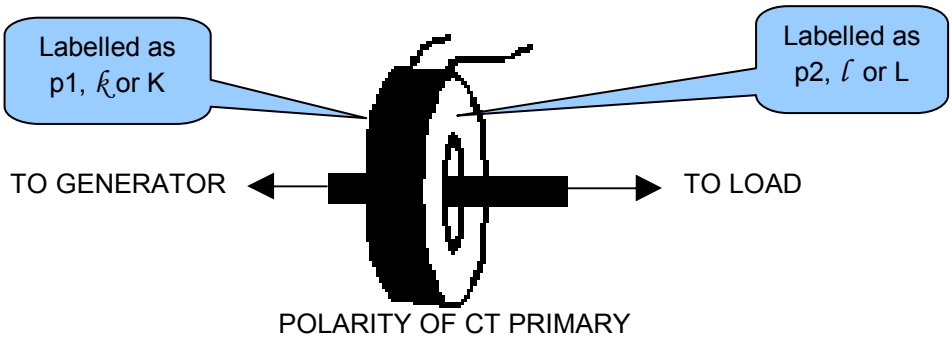
3.1.5.1 CT CONNECTIONS

p1, *k* or K is the primary of the CT that 'points' towards the GENERATOR

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

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 should be commoned with the s2 connections of all the other CTs and connected to the CT common terminal of the module.



3.1.6 CONFIGURABLE DIGITAL INPUTS

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & 6120 MKII Configuration Software Manual.*

	Pin No	Description	Cable Size	Notes
	38	Configurable Digital Input A	0.5 mm² AWG 20	Switch To Negative
	39	Configurable Digital Input B	0.5 mm² AWG 20	Switch To Negative
	40	Configurable Digital Input C	0.5 mm² AWG 20	Switch To Negative
	41	Configurable Digital Input D	0.5 mm² AWG 20	Switch To Negative
	42	Configurable Digital Input E	0.5 mm² AWG 20	Switch To Negative
	43	Configurable Digital Input F	0.5 mm² AWG 20	Switch To Negative

3.1.7 PC CONFIGURATION INTERFACE CONNECTOR

NOTE: The USB connection cable between the PC and the module must not be extended beyond 5 m (yards). For distances over 5 m, it is possible to use a third party USB extender. Typically, they extend USB up to 50 m. The supply and support of this type of equipment is outside the scope of Deep Sea Electronics PLC.

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 your PC supplier.

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & 6120 MKII Configuration Software Manual.*

	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. 

3.2 TYPICAL WIRING DIAGRAM

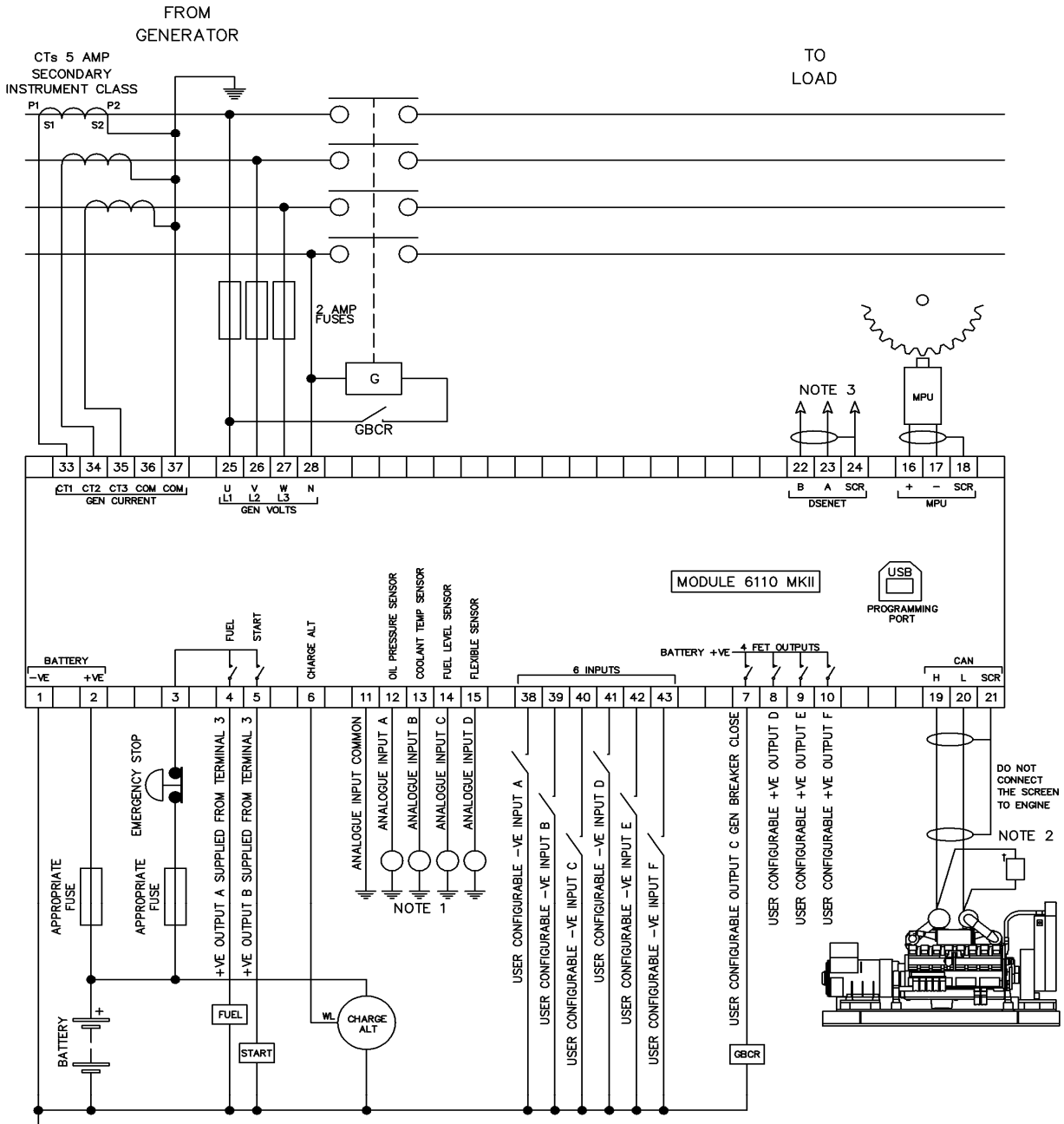
As every system has different requirements, these diagrams show only a TYPICAL system and do not intend to show a complete system.

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

Further wiring suggestions are available in the following DSE publications, available at www.deepseaplc.com to website members.

DSE Part	Description
056-022	Breaker Control (Training guide)
057-004	Electronic Engines and DSE Wiring

3.2.1 DSE6110 MKII TYPICAL WIRING DIAGRAM (3 PHASE 4 WIRE)



BATTERY NEGATIVE MUST BE GROUNDED

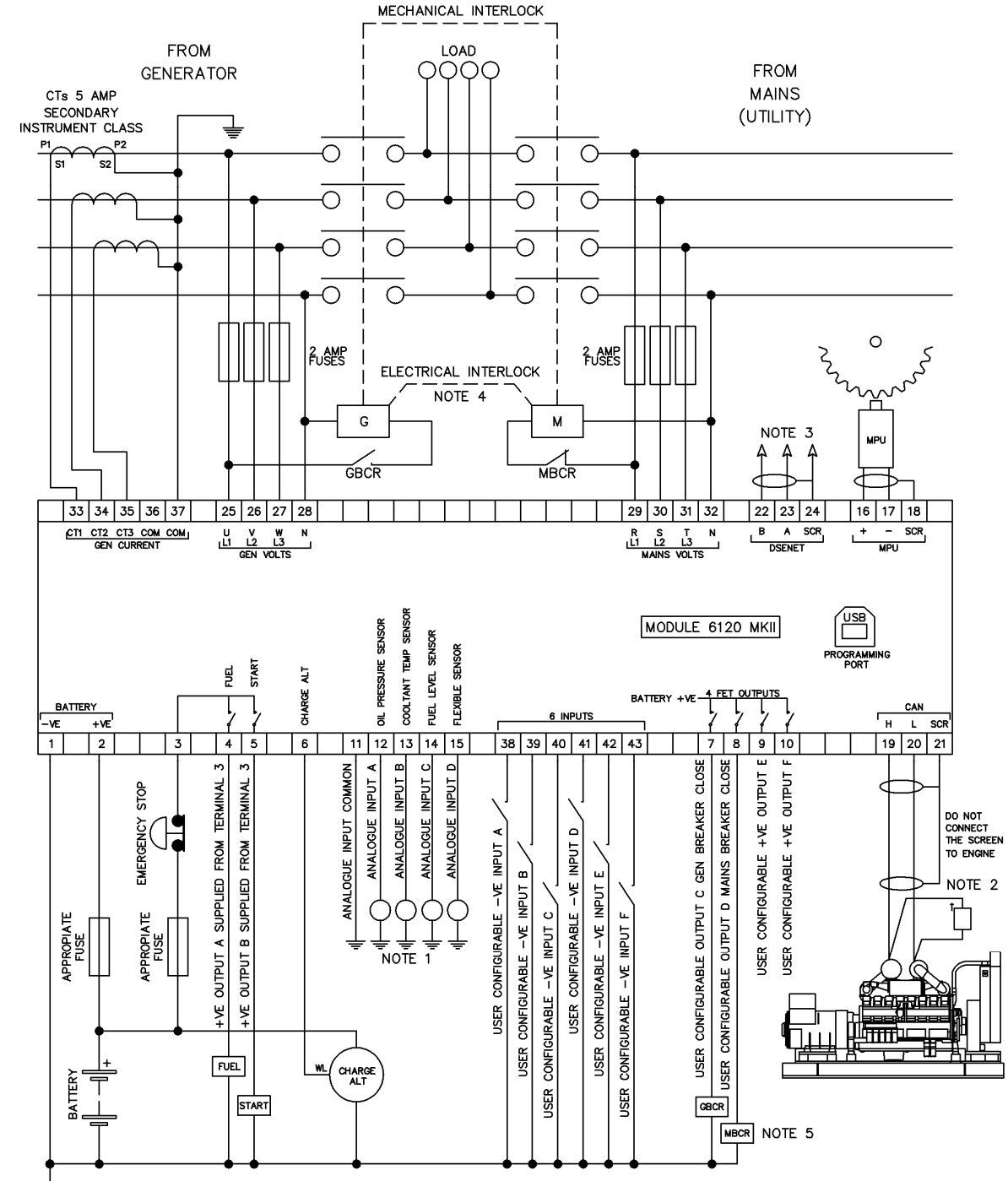
NOTE 1. THESE GROUND CONNECTIONS MUST BE ON THE ENGINE BLOCK, AND MUST BE TO THE SENSOR BODIES.

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

NOTE 3. MUST BE FITTED AS FIRST OR LAST UNIT ON DSENET WITH NO TERMINATION RESISTOR. THE SUBSEQUENT FIRST OR LAST UNIT ON DSENET MUST BE FITTED WITH A 120 OHM TERMINATION RESISTOR ACROSS TERMINALS A AND B.

3.2.2 DSE6120 MKII TYPICAL WIRING DIAGRAM (3 PHASE 4 WIRE)

.



BATTERY NEGATIVE MUST BE GROUNDED

NOTE 1. THESE GROUND CONNECTIONS MUST BE ON THE ENGINE BLOCK, AND MUST BE TO THE SENSOR BODIES.

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

NOTE 3. MUST BE FITTED AS FIRST OR LAST UNIT ON DSENET WITH NO TERMINATION RESISTOR. THE SUBSEQUENT FIRST OR LAST UNIT ON DSENET MUST BE FITTED WITH A 120 OHM TERMINATION RESISTOR ACROSS TERMINALS A AND B.

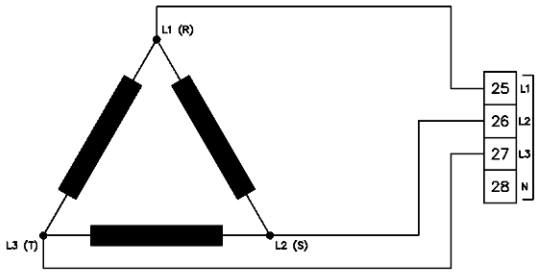
NOTE 4. IT IS RECOMMENDED THAT THE GENERATOR AND MAINS SWITCHING DEVICES ARE MECHANICALLY AND ELECTRICALLY INTERLOCKED.

NOTE 5. MAINS BREAKER CLOSED OUTPUT SHOULD BE CONFIGURED FOR DE−ENERGISE CLOSE MAINS, AND USE THE NORMALLY CLOSED CONTACTS OF MBCR

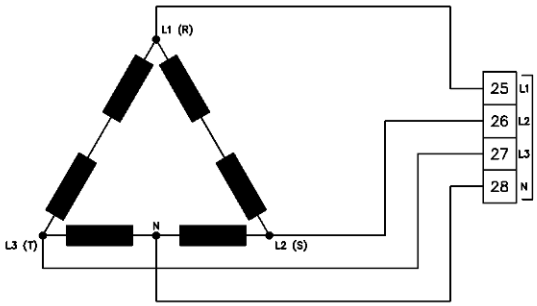
3.3 ALTERNATE TOPOLOGY WIRING DIAGRAMS

3.3.1 GENERATOR

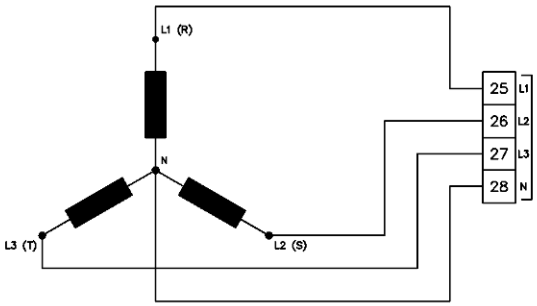
3 PHASE, 3 WIRE



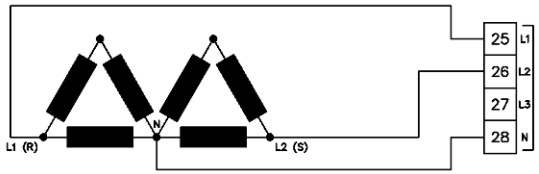
3 PHASE, 4 WIRE DELTA



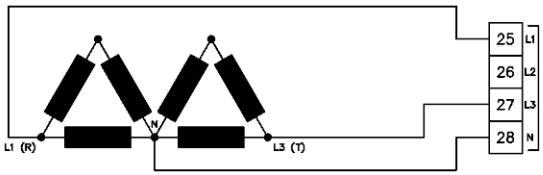
3 PHASE, 4 WIRE



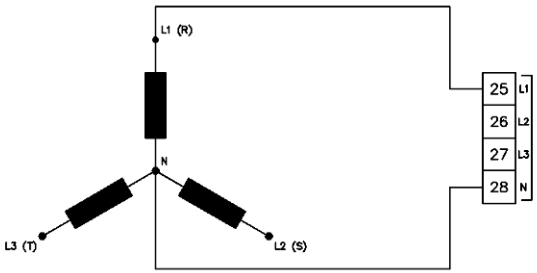
2 PHASE, 3 WIRE (L1 – L2)



2 PHASE, 3 WIRE (L1 – L3)

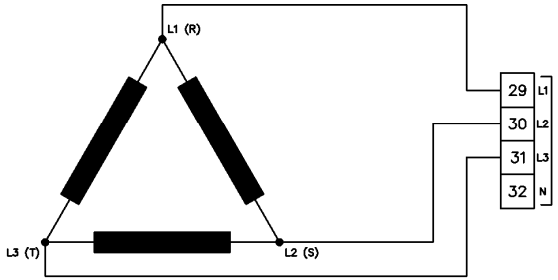


SINGLE PHASE, 2 WIRE

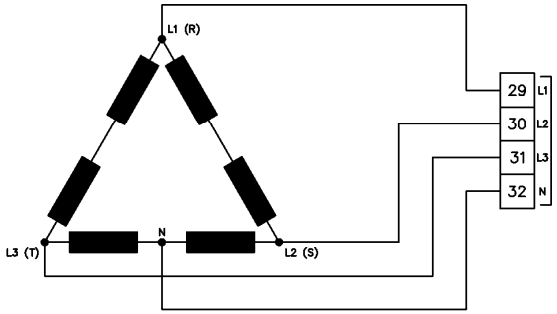


3.3.2 MAINS (6120 MKII ONLY)

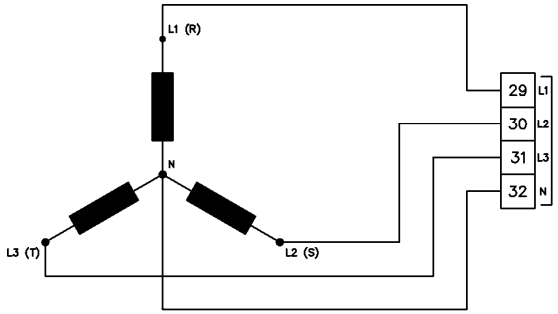
3 PHASE, 3 WIRE



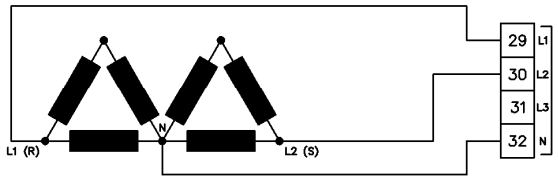
3 PHASE, 4 WIRE DELTA



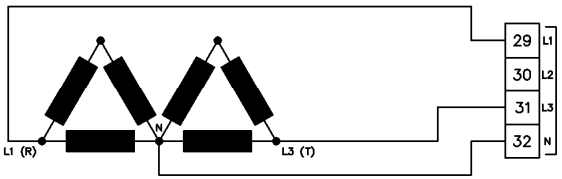
3 PHASE, 4 WIRE



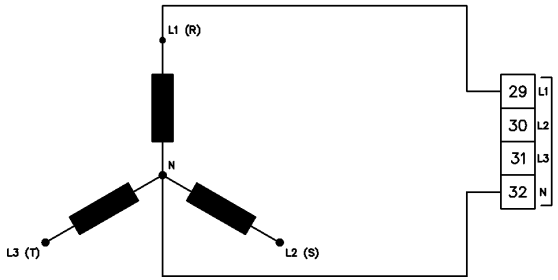
2 PHASE, 3 WIRE (L1 – L2)



2 PHASE, 3 WIRE (L1 – L3)



SINGLE PHASE, 2 WIRE



3.4 EARTH SYSTEMS

3.4.1 NEGATIVE EARTH

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

3.4.2 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 should connect to BATTERY NEGATIVE (not earth).

3.4.3 FLOATING EARTH

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

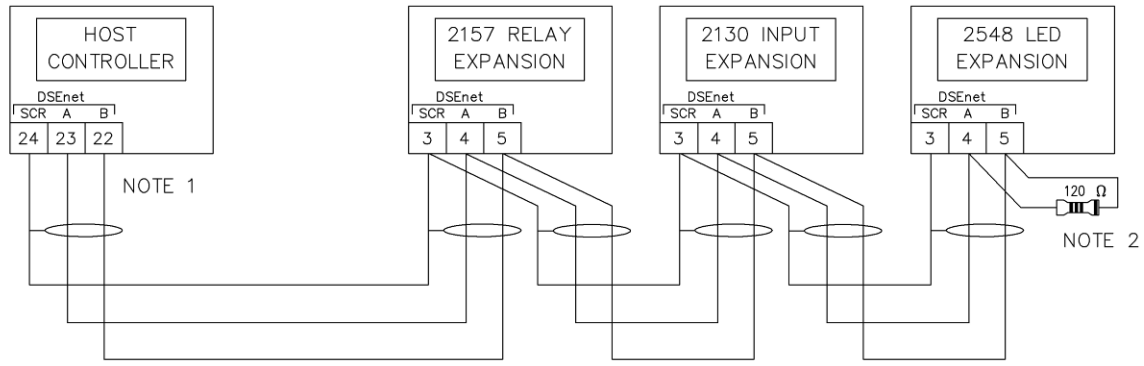
- Follow the typical wiring diagram as normal for all sections EXCEPT the earth points
- All points shown as Earth on the typical wiring diagram should connect to BATTERY NEGATIVE (not earth).

3.5 TYPICAL ARRANGEMENT OF DSENET®

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

Six (6) devices can be connected to the DSENet®, made up of the following devices :

Device	Maximum Number Supported
DSE2130 Input Expansion	2
DSE2157 Relay Output Expansion	2
DSE2548 LED Expansion	2



NOTE 1

AS A TERMINATING RESISTOR IS INTERNALLY FITTED TO THE HOST CONTROLLER, THE HOST CONTROLLER MUST BE THE FIRST UNIT ON THE DSEnet

NOTE 2

A 120 OHM TERMINATION RESISTOR MUST BE FITTED TO THE LAST UNIT ON THE DSEnet

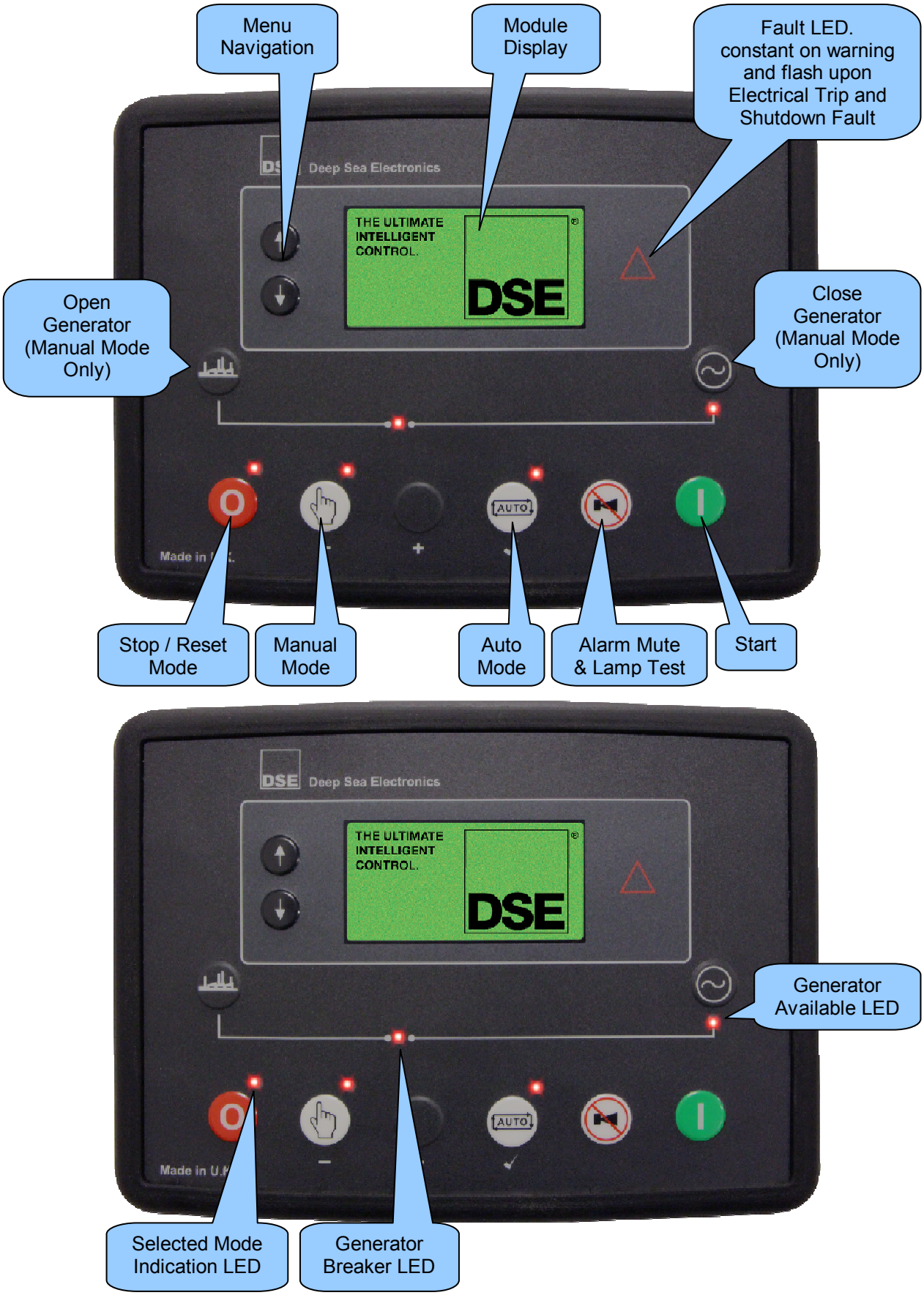
4 DESCRIPTION OF CONTROLS

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.

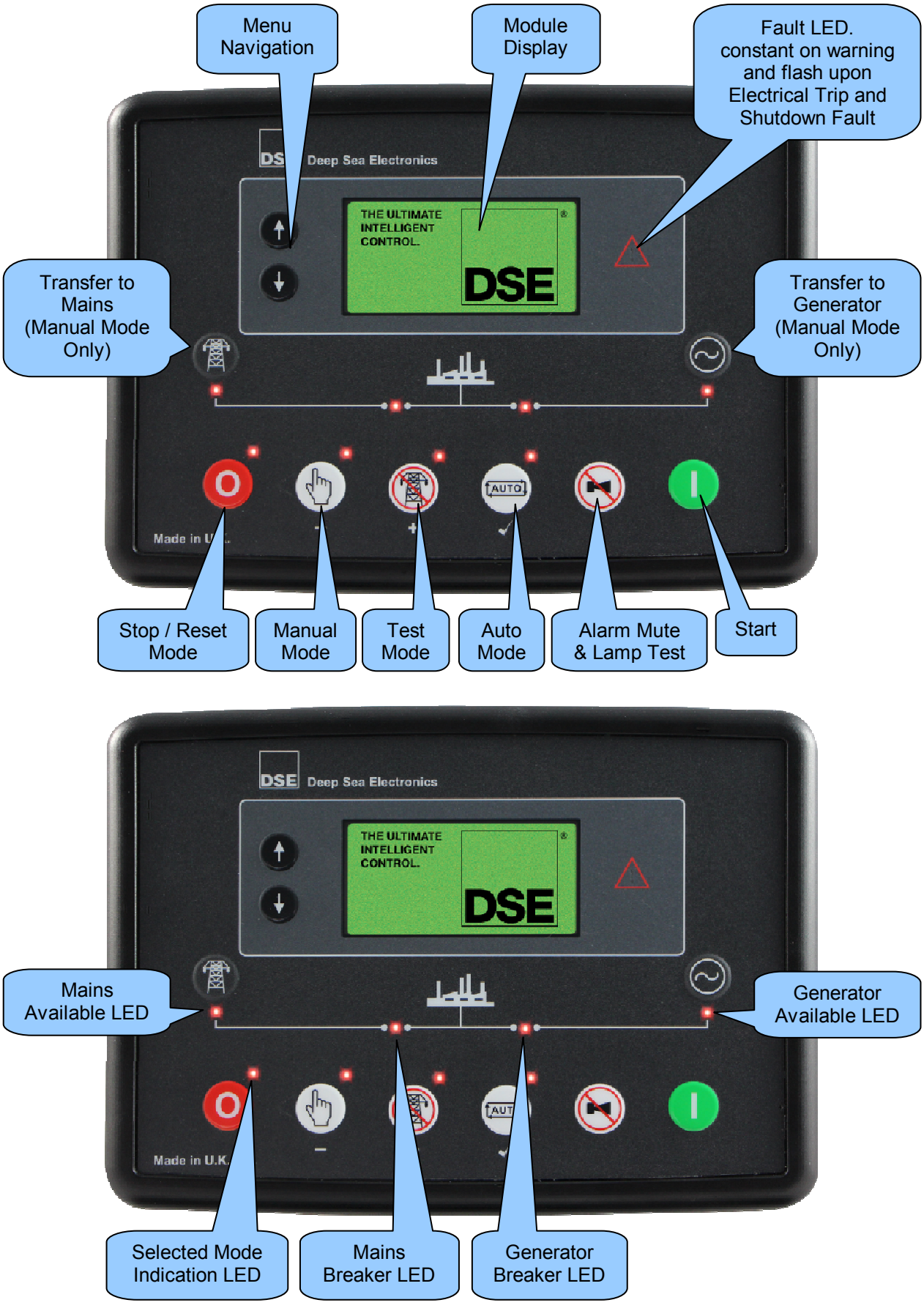
NOTE: The following descriptions detail the sequences followed by a module containing the standard 'factory configuration'. Always refer to your configuration source for the exact sequences and timers observed by any particular module in the field.

Control of the module is via push buttons mounted on the front of the module with *Stop/Reset Mode*, *Manual Mode*, *Test Mode* (DSE6120 MKII Only), *Auto Mode* and *Start* 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 DSE6110 MKII



4.2 DSE6120 MKII



4.3 CONTROL PUSH-BUTTONS

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 (*Close Generator and Delayed Load Output 1, 2, 3 & 4 become inactive (if used)*). The fuel supply de-energises and the engine comes to a standstill. Should any form of *remote start signal* be present when in *Stop Mode* the generator remains at rest
	**Manual Mode** This button places the module into its *Manual Mode* . Once in *Manual Mode* , the module responds to the *Start* button to start the generator and run it off load. To place the generator on load, use the *Transfer to Generator* button. The module automatically instructs the changeover device to place the generator on load *('Close Generator' and Delayed Load Output 1, 2, 3 & 4 becomes active (if used))*. To place the generator off load, use the *Transfer to Mains* or *Open Generator* buttons. The module automatically instructs the changeover device to place the generator off load *(Close Generator and Delayed Load Output 1, 2, 3 & 4 becomes inactive (if used))*. Additional digital inputs can be assigned to perform these functions. If the engine is running off-load in *Manual Mode* and a remote start signal becomes present, the module automatically instructs the changeover device to place the generator on load *('Close Generator' and 'Delayed Load Output 1, 2, 3 & 4' becomes active (if used))*. Upon removal of the *Remote Start Signal*, the generator remains on load until either selection of the *Stop/Reset Mode* or *Auto Mode* . *For further details, please see section entitled 'Operation' elsewhere in this manual.*
	**Test Mode (DSE6120 MKII Only)** This button places the module into its *Test Mode* . Once in *Test Mode* , the module responds to the *Start* button to start the generator and run it off load. Once the set has started the set automatically be placed on load (*Close Generator* and *Delayed Load Output 1, 2, 3 & 4* become active in order from lowest to highest (if used)). *For further details, please see section entitled 'Operation' elsewhere in this manual.*

Icon	Description
	**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 once a start request is made, the set is automatically started and placed on load *(Close Generator and Delayed Load Output 1, 2, 3 & 4 become active in order from lowest to highest (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* timer as necessary *(Close Generator and Delayed Load Output 1, 2, 3 & 4 become inactive at once (if used))*. The module then waits for the next start event. *For further details, please see section entitled Operation elsewhere in this manual.*
	**Alarm Mute / Lamp Test** This button de-activates the audible alarm output (if configured) and illuminates all of the LEDs on the module's facia.
	**Start** This button is only active in the *Stop/Reset Mode*, *Manual Mode* and *Test Mode*. Pressing the *Start* button in *Stop/Reset Mode* powers up the ECU but does not start the engine. This can be used to check the status of the CAN communication and to prime the fuel system. Pressing the *Start* button in *Manual Mode* or *Test Mode* starts the generator and runs it off load in *Manual Mode* or on load in *Test Mode*.

Icon	Description
	**Menu Navigation** Used for navigating the instrumentation, event log and configuration screens. *For further details, please see section entitled 'Operation' elsewhere in this manual.*
	**Transfer To Generator** This button is only active in the *Manual Mode* and allows the operator to transfer the load to the generator.
	**Open Generator (DSE6110 MKII Only)** This button is only active in the *Manual Mode* and allows the operator to open the generator breaker and remove the load.
	**Transfer To Mains (DSE6120 MKII Only)** This button is only active in the *Manual Mode* and allows the operator to transfer the load to the mains.

4.4 VIEWING THE INSTRUMENT PAGES

NOTE: Depending upon the module's configuration, some display screens may be disabled. For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

It is possible to scroll to display the different pages of information by pressing and holding either of the ***Menu Navigation*** buttons for two seconds to move to the next or previous page.

If you want to view one of the instrument pages towards the end of the list, it may be quicker to scroll down through the pages rather than right!

Example

Status **Press & Hold** **Generator** **Press & Hold** **Mains**

And so on until the desired page is reached.

A further presses and holds of the ***Scroll Up*** button returns the Status page.

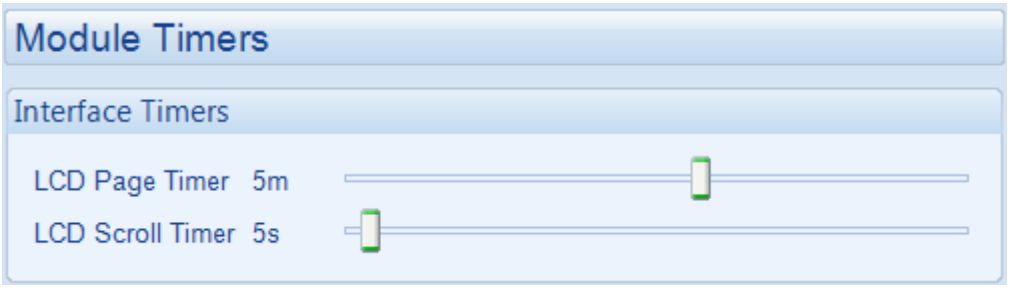
The complete order and contents of each information page are given in the following sections

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

If no buttons are pressed upon entering an instrumentation page, the instruments displayed are automatically subject to the setting of the *LCD Scroll Timer*.

The *LCD Page* and *LCD Scroll* timers are configurable using the DSE Configuration Suite Software or by using the Front Panel Editor.

The screenshot below shows the factory settings for the timers, taken from the DSE Configuration Suite PC Software.



Alternatively, to scroll manually through all instruments on the currently selected page, press either of the ***Menu Navigation*** buttons. The 'auto scroll' is disabled.

To re-enable 'auto scroll' press and hold either of the ***Menu Navigation*** buttons to scroll to the 'title' of the instrumentation page (ie Engine). A short time later (the duration of the *LCD Scroll Timer*), the instrumentation display begins to auto scroll.

When scrolling manually, the display automatically returns to the Status page if no buttons are pressed for the duration of the configurable *LCD Page Timer*.

If an alarm becomes active while viewing the status page, the display shows the Alarms page to draw the operator's attention to the alarm condition.

4.4.1 STATUS

This is the 'home' page, the page that is displayed when no other page has been selected, and the page that is automatically displayed after a period of inactivity (*LCD Page Timer)* of the module control buttons.

This page changes with the action of the controller, when the engine is running, that target speed is be displayed.

Status	**22:31**
Engine at Rest	
Stop Mode	

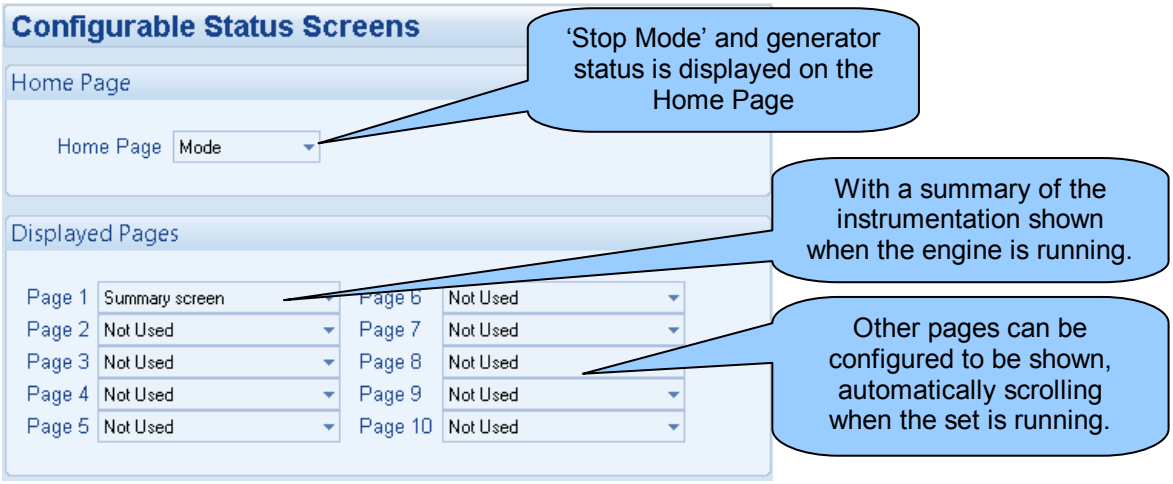
Factory setting of Status screen showing engine stopped...

Status	**22:31**
Generator Available	

...and engine running

The contents of this display vary depending upon configuration by the engine manufacturer or supplier.

The display above is achieved with the factory settings, shown below in the DSE Configuration suite software:



4.4.1.1 GENERATOR LOCKED OUT

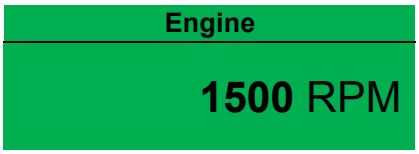
Status	**22:31**
Generator Locked Out	

Generator Locked Out indicates that the Generator cannot be started due to an active *Shutdown* or *Electrical Trip Alarm* on the module. Press and hold either of the ***Menu Navigation*** buttons to scroll to the alarms page to investigate. Press the ***Stop/Reset Mode*** button to clear the alarm, if the alarm does not clear the fault is still active.

4.4.2 ENGINE

NOTE*: For further details of support engine, refer to DSE Publication: *057-004 Electronic Engines and DSE Wiring Guide.*

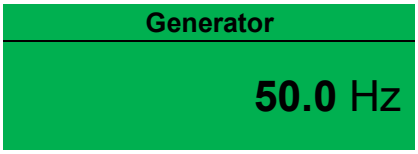
These pages contain instrumentation gathered about the engine measured or derived from the module's inputs, some of which may be obtained from the engine ECU.



- Engine Speed
- Oil Pressure
- Coolant Temperature
- Engine Battery Volts
- Engine Run Time
- Engine Fuel Level
- Oil Temperature*
- Coolant Pressure*
- Inlet Temperature*
- Exhaust Temperature*
- Fuel Temperature*
- Turbo Pressure*
- Fuel Pressure*
- Fuel Consumption*
- Fuel Used*
- Fuel Level*
- Flexible Sensors
- Engine Maintenance Alarm 1
- Engine Maintenance Alarm 2
- Engine Maintenance Alarm 3
- Engine ECU Link*
- Tier 4 Engine Information*

4.4.3 GENERATOR

These pages contain electrical values of the generator, measured or derived from the module's voltage inputs.

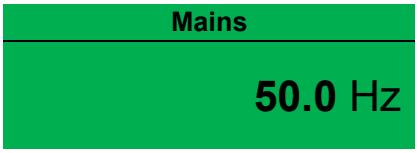


- Generator Voltage (ph-N)
- Generator Voltage (ph-ph)
- Generator Frequency
- Generator Current (A)
- Generator Load ph-N (kW)
- Generator Total Load (kW)
- Generator Load ph-N (kVA)
- Generator Total Load (kVA)
- Generator Power Factor Average
- Generator Load ph-N (kVAr)
- Generator Total Load (kVAr)
- Generator Accumulated Load (kWh, kVAh, kVArh)
- Generator Phase Sequence
- Active Configuration

4.4.4 MAINS (DSE6120 MKII ONLY)

NOTE*: Mains current and powering monitoring is only available when the CTs are configured for, and placed in the load. For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

These Pages contain electrical values of the mains, measured or derived from the module's voltage inputs.

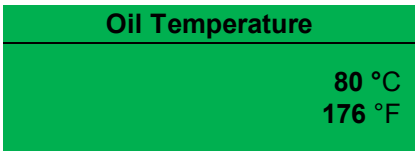


- Mains Voltage (ph-N)
- Mains Voltage (ph-ph)
- Mains Frequency
- Mains Current (A)*
- Mains Phase Sequence
- Mains Load ph-N (kW)*
- Mains Total Load (kW)*
- Mains Load ph-N (kVA)*
- Mains Total Load (kVA)*
- Mains Single Phase Power Factor*
- Mains Average Power Factor*
- Mains Load ph-N (kVAr)*
- Mains Total Load (kVAr)*
- Mains Accumulated Load (kWh, kVAh, kVArh)*

4.4.5 EXPANSION

NOTE: Depending upon the module's configuration, some display screens may be disabled. For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

When input expansion modules are configured, these pages contain measured values derived from the expansion analogue inputs.



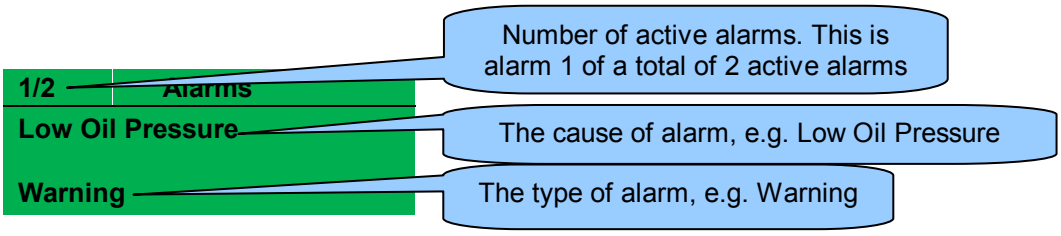
- DSE2130 ID0 Analogue Input E
- DSE2130 ID0 Analogue Input F
- DSE2130 ID0 Analogue Input G
- DSE2130 ID0 Analogue Input H
- DSE2130 ID1 Analogue Input E
- DSE2130 ID1 Analogue Input F
- DSE2130 ID1 Analogue Input G
- DSE2130 ID1 Analogue Input H

4.4.6 ALARMS

When an alarm is active, the Common Alarm LED, illuminates and a message appears on the module's display. If configured, the external audible alarm also sounds.

The external audible alarm is silenced by pressing the ***Alarm Reset / Lamp Test*** button.

The LCD display jumps from the 'Information page' to display the Alarm Page



The LCD displays multiple alarms such as "*Coolant Temperature High*", "*Emergency Stop*" and "*Low Coolant Warning*". These automatically scroll in the order that they occurred.

In the event of an alarm, the LCD displays the appropriate text. If an additional alarm then occurs, the module displays the appropriate text.

Example:

1/2 Alarms
Low Oil Pressure
Warning

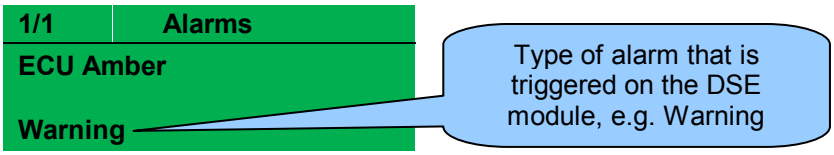
2/2 Alarms
Coolant Temperature High
Shutdown

4.4.6.1 ECU ALARMS (CAN ERROR MESSAGE / DTC)

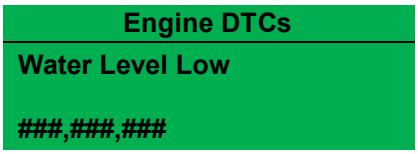
NOTE: For details on these code meanings, refer to the ECU instructions provided by the engine manufacturer, or contact the engine manufacturer for further assistance.

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

When connected to a suitable CAN engine, the controller displays alarm status messages from the ECU.



Press and hold the ***Scroll Down*** button to access the list of current active Engine DTCs (Diagnostic Trouble Codes) from the ECU.



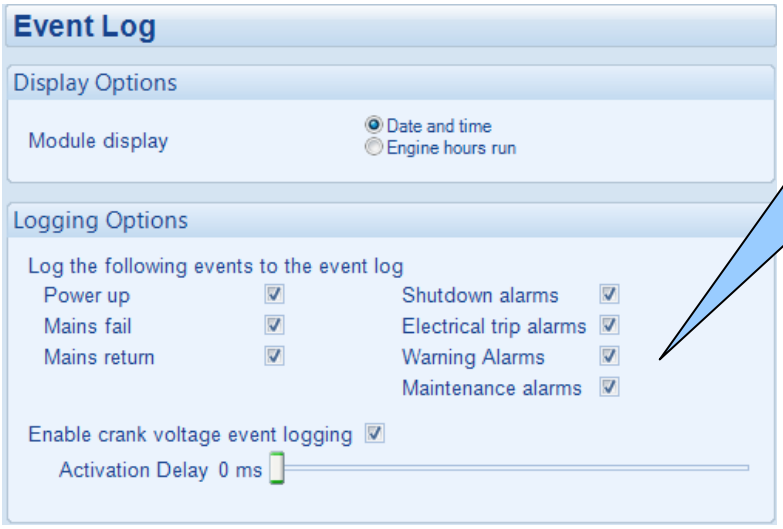
The code is interpreted by the module and shows on the display as a text message. Additionally, the manufacturer's fault code is shown below.

4.4.7 EVENT LOG

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

The module maintains a log of past alarms and/or selected status changes.
The log size has been increased in the module over past module updates and is always subject to change. At the time of writing, the modules log is capable of storing the last 50 log entries.

Under default factory settings, the event log is configured to include all possible options; however, this is configurable by the system designer using the DSE Configuration Suite software.

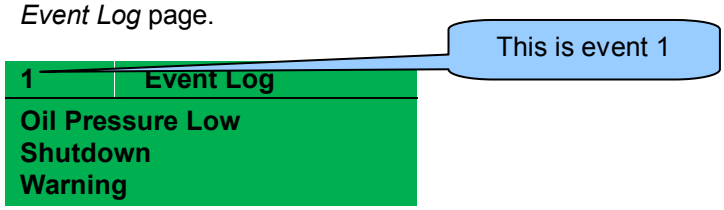


Example showing the possible configuration of the event log (DSE Configuration Suite Software).

This also shows the factory settings of the module.

When the event log is full, any subsequent event overwrites the oldest entry. Hence, the event log always contains the most recent events. The module logs the event type, along with the date and time (or engine running hours if configured to do so).

To view the event log, press and hold either of the ***Menu Navigation*** buttons to scroll to *the Event Log* page.



Press the ***Scroll Down*** button to view the next most recent event.

Continuing to press the ***Scroll Down*** button cycles through the past events after which, the display shows the most recent alarm and the cycle begins again.
To exit the event log and return to viewing the instruments, press and hold either of the ***Menu Navigation*** buttons to select the next instrumentation page.

4.4.8 LCD INICATORS

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

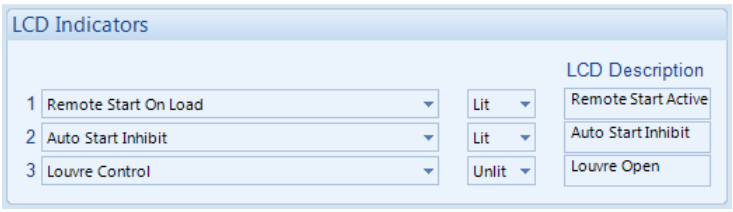
These LCD Indicators are configured by the user to indicate any one of ***100+ different functions*** based around the following:-

- **Indications** - Monitoring of a digital input and indicating associated functioning user's equipment - *Such as Battery Charger On or Louvres Open, etc*.
- **Warnings, Electrical Trip & Shutdowns Alarms** - Specific indication of a particular warning or shutdown condition, backed up by LCD indication - *Such as Low Oil Pressure Shutdown, Low Coolant level, etc.*
- **Status Indications** - Indication of specific functions or sequences derived from the modules operating state - *Such as Safety On, Pre-heating, Panel Locked, etc.*

The display below example screen is achieved using the settings shown in the below screen shot of the DSE Configuration Suite Software:

LCD Indicators

- **Remote Start Active**
- **Auto Start Inhibit**
- **Louvre Control**



4.4.9 USER DEFINED STRINGS

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

The user define strings are intended to contain generic important information about the generator such as oil service internal information. The contents of these screens vary depending upon configuration by the engine manufacturer or supplier.

Under default factory settings the support strings are not viewable. They are configurable by the system designer using the DSE Configuration Suite software.

The display below example screen is achieved using the settings shown in the below screen shot of the DSE Configuration Suite Software:

Oil Service Interval

Every 500 Hours

Every 5 Months

4.4.10 ABOUT

4.4.10.1 MODULE INFORMATION

Contains important information about the module and the firmware versions. This information may be asked for when contacting DSE Technical Support Department for advice.

About	
Variant	**6120H**
Application	**V1.1.5**
USB ID	**BC614E**

- Variant (61xx MKII)
- Application Version – The version of the module's main firmware file (Updatable using the Firmware Update Wizard in the DSE Configuration Suite Software).
- USB ID – Unique identifier for PC USB connection

Press the ***Scroll Down*** button to access more information about the module.

About	
Bootloader	**V1.4.0**
Analogue	**V2.0.1**

- Bootloader - Firmware Update bootloader software version
- Analogue – Analogue measurements software version

About	
Engine Type	**Volvo EMS2b**
Version	**V1.21**

- Engine Type – The name of the engine file selected in the configuration
- Engine – Engine type file version.

4.4.10.2 SUPPORT STRINGS

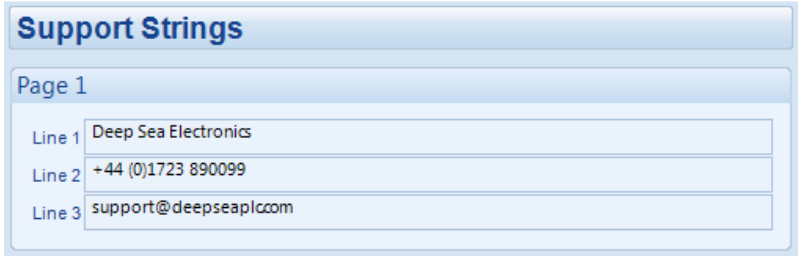
NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

The support string pages are intended to contain important information about the generator supplier company such as contact information. The contents of these screens vary depending upon configuration by the engine manufacturer or supplier.

Under default factory settings the support strings are not viewable. They are configurable by the system designer using the DSE Configuration Suite software.

The display below example screen is achieved using the settings shown in the below screen shot of the DSE Configuration Suite Software:

Support
Deep Sea Electronics
+44 (0)1723 890099
support@deepseaplc.com



5 OPERATION

NOTE: The following descriptions detail the sequences followed by a module containing the standard 'factory configuration'. Always refer to your 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*.

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

Stop/Reset Mode is activated by pressing the *Stop/Reset Mode* button.

In *Stop/Reset Mode*, the module removes the generator from load (if 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 CAN ECU
- Generator AC Voltage and Frequency must be zero.
- Engine Charge Alternator Voltage must be zero.
- Oil pressure 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 that have been cleared are reset when *Stop/Reset Mode* is entered.

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.

When left in *Stop/Reset Mode* with no presses of the fascia buttons and configured for *Power Save Mode,* the module enters *Power Save Mode*. To 'wake' the module, press any fascia control buttons.

Power Save Mode in the DSE Configuration Suite Software

5.3 MANUAL 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 is activated by pressing the *Manual Mode* button.

In *Manual Mode*, the set does not start automatically
To begin the starting sequence, press the *Start* button.

5.3.1 STARTING SEQUENCE

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

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

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

The fuel relay is energised and the engine is cranked.

If the engine fails to fire during this cranking attempt then the starter motor is disengaged for the *Crank Rest Timer* duration after which the next start attempt is made. Should this sequence continue beyond the set *Number Of Attempts*, the start sequence is terminated and the display shows *Fail to Start.*

The starter motor is disengaged when the engine fires. Speed detection is factory configured to be derived from the AC alternator output frequency, but can additionally be measured from a Magnetic Pickup mounted on the flywheel or from the CANbus link to the engine ECU depending on module configuration.

Additionally, rising oil pressure can be used to disconnect the starter motor (but cannot detect underspeed or overspeed).

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.

5.3.2 ENGINE RUNNING

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

In ***Manual Mode*** , the load is not transferred to the generator unless a 'loading request' is made. A loading request can come from a number of sources.

- Press the *Transfer to Generator* button
- Failure of mains supply (DSE6120 MKII only)
- Activation of an auxiliary input that has been configured to *Remote Start On Load or Auxiliary Mains Fail (*DSE6120 MKII Only*).*
- 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 *Open Generator* (DSE6110 MKII Only) or *Transfer to Mains* (DSE6120 MKII Only) button
- 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 *Generator Load Inhibit.*

5.3.3 STOPPING SEQUENCE

In *Manual Mode* the set does not continue to run until either:

- The *Stop/Reset Mode* button is pressed – The delayed load outputs are de-activated immediately and the set immediately stops.
- The *Auto Mode* button is pressed. The set observes all *Auto Mode* start requests and stopping timers before beginning the *Auto Mode Stopping Sequence*.

5.4 TEST 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*.

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

In *Test Mode*, the set does not start automatically.
To begin the starting sequence, press the *Start* button.

5.4.1 STARTING SEQUENCE

NOTE: There is no *Start Delay* in this mode of operation.

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

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

The fuel relay is energised and the engine is cranked.

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. Should this sequence continue beyond the set number of attempts, the start sequence is terminated and the display shows *Fail to Start.*

The starter motor is disengaged when the engine fires. Speed detection is factory configured to be derived from the AC alternator output frequency, but can additionally be measured from a Magnetic Pickup mounted on the flywheel or from the CANbus link to the engine ECU depending on module configuration.

Additionally, rising oil pressure can be used to disconnect the starter motor (but cannot detect underspeed or overspeed).

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.

5.4.2 ENGINE RUNNING

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

In *Test Mode*, the load is automatically transferred to the generator.

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

- Press the *Manual Mode* button followed by the *Open Generator* (DSE6110 MKII Only) or *Transfer to Mains* (DSE6120 MKII Only) button.
- 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 *Generator Load Inhibit.*

5.4.3 STOPPING SEQUENCE

In *Test Mode* the set continues to run until either:

- The *Stop/Reset Mode* button is pressed – The delayed load outputs are de-activated immediately and the set immediately stops.
- 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 AUTOMATIC MODE

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

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

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

5.5.1 WAITING IN AUTO MODE

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

- Failure of mains supply (DSE6120 MKII only)
- Activation of an auxiliary input that has been configured to *Remote Start or Auxiliary Mains Fail* (DSE6120 MKII Only).
- Activation of the inbuilt exercise scheduler.

5.5.2 STARTING SEQUENCE

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.

NOTE: For further details of module configuration, refer to DSE Publication: *057-224 DSE6110 MKII & DSE6120 MKII Configuration Software Manual.*

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

Should 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.

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. Should this sequence continue beyond the *Set Number Of Attempts*, the start sequence is terminated and the display shows *Fail to Start.*

The starter motor is disengaged when the engine fires. Speed detection is factory configured to be derived from the AC alternator output frequency, but can additionally be measured from a Magnetic Pickup mounted on the flywheel or from the CAN link to the engine ECU depending on module

Additionally, rising oil pressure can be used to disconnect the starter motor (but cannot detect underspeed or overspeed).

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.

5.5.3 ENGINE RUNNING

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

The generator is placed on load if configured to do so.

If all start requests are removed, the *stopping sequence* begins.

5.5.4 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. Should another start request be made during the cooling down period, 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 to the mains supply and 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.

5.6 SCHEDULER

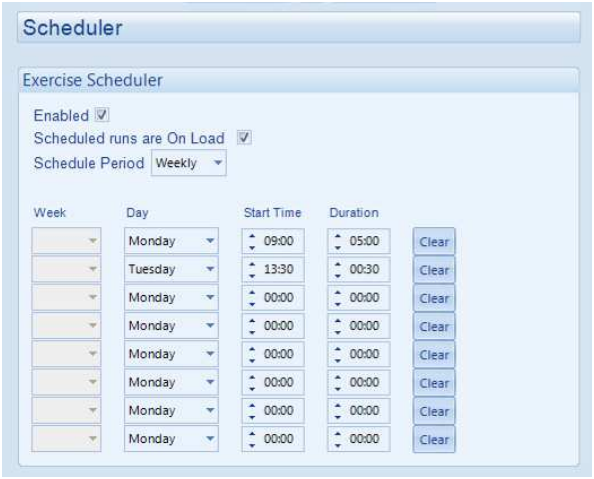
The controller contains an inbuilt exercise run scheduler, capable of automatically starting and stopping the set. Up to 8 scheduled start/stop sequences can be configured to repeat on a 7-day or 28-day cycle.

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

Example

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

In this example the set starts at 09:00 on Monday and run for 5 hours, then start at 13:30 on Tuesday and run for 30 minutes.



5.6.1 STOP MODE

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

5.6.2 MANUAL MODE

- Scheduled runs do not occur when the module is in *Manual Mode* waiting for a start request.
- Activation of a Scheduled Run 'On Load' when the module is operating OFF LOAD in *Manual Mode* forces the set to run ON LOAD.

5.6.3 TEST MODE

- Scheduled runs do not occur when the module is in *Test Mode* waiting for a start request.

5.6.4 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 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.

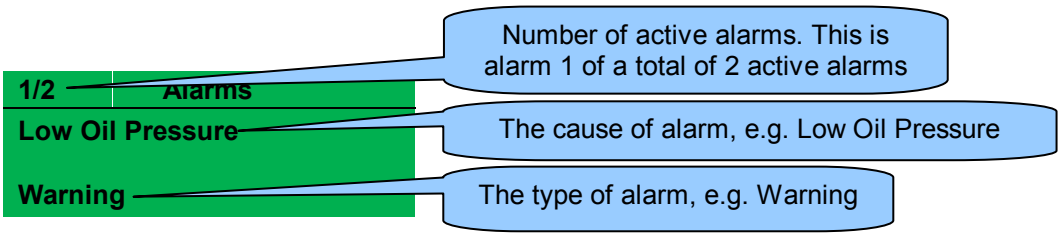
6 PROTECTIONS

6.1 ALARMS

When an alarm is active, the Common Alarm LED, illuminates and a message appears on the module's display. If configured, the external audible alarm also sounds.

The external audible alarm is silenced by pressing the ***Alarm Reset / Lamp Test*** button.

The LCD display jumps from the 'Information page' to display the Alarm Page



The LCD displays multiple alarms such as "*Coolant Temperature High*", "*Emergency Stop*" and "*Low Coolant Warning*". These automatically scroll in the order that they occurred.

In the event of an alarm, the LCD displays the appropriate text. If an additional alarm then occurs, the module displays the appropriate text.

Example:

1/2 Alarms
Low Oil Pressure
Warning

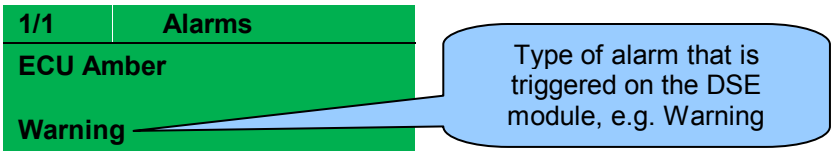
2/2 Alarms
Coolant Temperature High
Shutdown

6.1.1 ECU ALARMS (CAN ERROR MESSAGE / DTC)

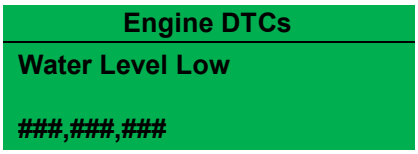
NOTE: For details on these code meanings, refer to the ECU instructions provided by the engine manufacturer, or contact the engine manufacturer for further assistance.

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

When connected to a suitable CAN engine, the controller displays alarm status messages from the ECU.



Press and hold the ***Scroll Down*** button to access the list of current active Engine DTCs (Diagnostic Trouble Codes) from the ECU.



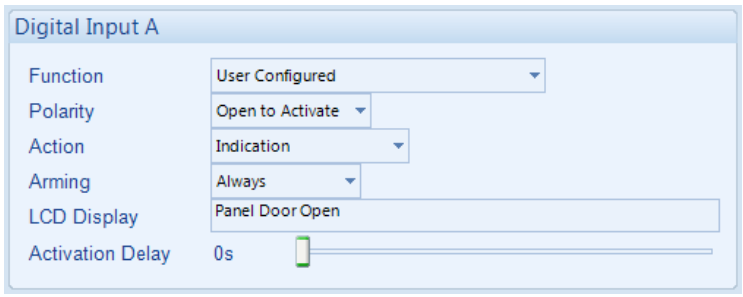
The code is interpreted by the module and shows on the display as a text message. Additionally, the manufacturer's fault code is shown below.

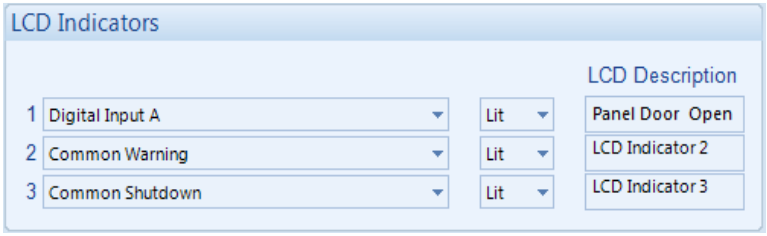
6.2 INDICATIONS

Indications are non-critical and often status conditions. They do not appear on the LCD display of the module as a text message in the *Status, Event Log* or *Alarms* pages. However, an output or LCD indicator is configured to draw the operator's attention to the event.

Example

- Input configured for indication.
- The LCD text does not appear on the module display but can be added in the configuration to remind the system designer what the input is used for.
- As the input is configured to *Indication* there is no alarm generated.
- LCD Indicator 1 'illuminates' when Digital Input A is active.
- The LCD Description allows the system designer to detail the LCD Indicator function.





Example
The LCD Indicators on the module display show the status of the configured indicator.

LCD Indicators
○ **Panel Door Open**
○ **LCD Indicator 2**
○ **LCD Indicator 3**

6.3 WARNING ALARMS

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

Example

1/2	Alarms
High Coolant Temperature	
Warning	

In the event of an alarm the LCD jumps to the alarms page, and scroll through all active alarms.

By default, warning alarms are self-resetting when the fault condition is removed. However enabling 'all warnings are latched' causes warning alarms to latch until reset manually. This is enabled using the DSE Configuration Suite in conjunction with a compatible PC.

If the module is configured for **CAN** and receives an "error" message from the ECU, 'CAN ECU Amber" is shown on the module's display as a warning alarm.

Fault	Description
Analogue Input A to D	The module detects that an input configured to create a fault condition has become active and the appropriate LCD message is displayed.
Battery Over Voltage	The DC supply has risen above the *high volts pre-set* pre-alarm setting.
Battery Under Voltage	The DC supply has fallen below or risen above the *low volts pre-set* pre-alarm setting.
CAN ECU Data Fail	The module is configured for CAN operation and does not detect data on the engine Can data link.
Charge Alternator Failure	The auxiliary charge alternator voltage is low as measured from the W/L terminal.
Coolant Temperature Sensor Fault	The module detects that the circuit to the coolant temperature sensor has been broken.
Delayed Over Current	The measured current has risen above the configured trip level for a configured duration.
Digital Inputs A to F	The module detects that a digital input which has been user configured to create a fault condition has become active and the appropriate LCD message is displayed.
ECU Amber	The module detects that the engine ECU has detected a fault causing an Amber alarm.
ECU After Treatment	The module detects that the engine ECU has detected that the after treatment is currently in progress.
ECU Malfunction	The module detects that the engine ECU has detected a fault causing a Malfunction alarm.
ECU Protect	The module detects that the engine ECU has detected a fault causing a Protect alarm.
ECU Red	The module detects that the engine ECU has detected a fault causing a Red alarm.
ECU Water In Fuel	The module detects that the engine ECU has detected that there is water in the fuel.
Expansion Unit Failure	The module detects the DSE Net link to the expansion module has failed or communications to the expansion module has been lost.

Fault	Description
Fail To Stop	**NOTE: *Fail to Stop* could indicate a faulty oil pressure sensor. If engine is at rest check oil sensor wiring and configuration.**
	The module has detected a condition that indicates that the engine is running when it has been instructed to stop.
Generator kW Overload	The measured kW has risen above the configured trip level for a configured duration.
High Fuel Level	The level detected by the fuel level sensor is above the *high fuel level pre-set* pre-alarm setting.
Immediate Over Current	The measured current has risen above the configured trip level.
Low Fuel Level	The level detected by the fuel level sensor is below the *low fuel level pre-set* pre-alarm setting.
Loss Of Speed Sensing Signal	The speed signal from the magnetic pickup is not being received by the DSE controller.
Maintenance Alarm 1	The module detects that the Maintenance Alarm 1 is due creating a fault condition, the appropriate LCD message is displayed.
Maintenance Alarm 2	The module detects that the Maintenance Alarm 2 is due creating a fault condition, the appropriate LCD message is displayed.
Maintenance Alarm 3	The module detects that the Maintenance Alarm 3 is due creating a fault condition, the appropriate LCD message is displayed.
Oil Pressure Sensor Fault.	The module detects that the circuit to the oil pressure sensor has been broken.
2130 ID0 Analogue Input E to H	The module detects that an analogue input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID0.
2130 ID0 Digital Input A to H	The module detects that a digital input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID0.
2130 ID1 Analogue Input E to H	The module detects that an analogue input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID1.
2130 ID1 Digital Input A to H	The module detects that a digital input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID1.

6.4 ELECTRICAL TRIP ALARMS

NOTE: The alarm condition must be rectified before a reset takes place. 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).

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 *Delayed Load Output* and the *Close Gen 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.

Example

1/2	Alarms
Generator Overcurrent	
Electrical Trip	

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

Fault	Description
Analogue Input A to D	The module detects that an input configured to create a fault condition has become active and the appropriate LCD message is displayed.
CAN ECU Data Fail	The module is configured for CAN operation and does not detect data on the engine Can data link.
Delayed Over Current	The measured current has risen above the configured trip level for a configured duration.
Digital Inputs A to F	The module detects that a digital input which has been user configured to create a fault condition has become active and the appropriate LCD message is displayed.
ECU Amber	The module detects that the engine ECU has detected a fault causing an Amber alarm.
ECU After Treatment	The module detects that the engine ECU has detected that the after treatment is currently in progress.
ECU Malfunction	The module detects that the engine ECU has detected a fault causing a Malfunction alarm.
ECU Protect	The module detects that the engine ECU has detected a fault causing a Protect alarm.
ECU Red	The module detects that the engine ECU has detected a fault causing a Red alarm.
ECU Water In Fuel	The module detects that the engine ECU has detected that there is water in the fuel.
Expansion Unit Failure	The module detects the DSE Net link to the expansion module has failed or communications to the expansion module has been lost.
Generator kW Overload	The measured kW has risen above the configured trip level for a configured duration.
High Fuel Level	The level detected by the fuel level sensor is above the high fuel level pre-set pre-alarm setting.
Low Fuel Level	The level detected by the fuel level sensor is below the low fuel level pre-set pre-alarm setting.

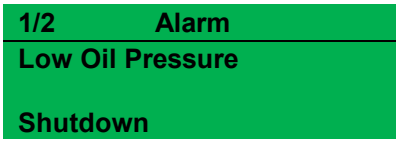
Fault	Description
Maintenance Alarm 1	The module detects that the Maintenance Alarm 1 is due creating a fault condition, the appropriate LCD message is displayed.
Maintenance Alarm 2	The module detects that the Maintenance Alarm 2 is due creating a fault condition, the appropriate LCD message is displayed.
Maintenance Alarm 3	The module detects that the Maintenance Alarm 3 is due creating a fault condition, the appropriate LCD message is displayed.
2130 ID0 Analogue Input E to H	The module detects that an analogue input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID0.
2130 ID0 Digital Input A to H	The module detects that a digital input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID0.
2130 ID1 Analogue Input E to H	The module detects that an analogue input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID1.
2130 ID1 Digital Input A to H	The module detects that a digital input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID1.

6.5 SHUTDOWN ALARMS

NOTE: The alarm condition must be rectified before a reset takes place. 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).

Shutdown alarms are latching and immediately stop the Generator. On initiation of the shutdown condition the module de-energises all the *Delayed Load Output* and the *Close Gen 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.

Example



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

Fault	Description
Analogue Input A to D	The module detects that an input configured to create a fault condition has become active and the appropriate LCD message is displayed.
CAN ECU Data Fail	The module is configured for CAN operation and does not detect data on the engine Can data link.
Charge Alternator Failure	The auxiliary charge alternator voltage is low as measured from the W/L terminal.
Coolant Temperature Sensor Fault	The module detects that the circuit to the coolant temperature sensor has been broken.
Emergency Stop	The emergency stop button is pressed. This failsafe (normally closed to emergency stop) input and immediately stops the set when the signal is removed.
Delayed Over Current	The measured current has risen above the configured trip level for a configured duration.
Digital Inputs A to F	The module detects that a digital input which has been user configured to create a fault condition has become active and the appropriate LCD message is displayed.
ECU Amber	The module detects that the engine ECU has detected a fault causing an Amber alarm.
ECU After Treatment	The module detects that the engine ECU has detected that the after treatment is currently in progress.
ECU Malfunction	The module detects that the engine ECU has detected a fault causing a Malfunction alarm.
ECU Protect	The module detects that the engine ECU has detected a fault causing a Protect alarm.
ECU Red	The module detects that the engine ECU has detected a fault causing a Red alarm.
ECU Water In Fuel	The module detects that the engine ECU has detected that there is water in the fuel.

Fault	Description
Expansion Unit Failure	The module detects the DSE Net link to the expansion module has failed or communications to the expansion module has been lost.
Generator kW Overload	The measured kW has risen above the configured trip level for a configured duration.
Generator Over Frequency	The generator output frequency has risen above the trip alarm setting.
Generator Over Voltage	The generator output voltage has risen above the trip alarm setting.
Generator Under Frequency	The generator output frequency has fallen below the trip alarm setting after the Safety On timer has expired.
Generator Under Voltage	The generator output voltage has fallen below the pre-set alarm setting after the Safety On timer has expired.
High Coolant Temperature	The module detects that the engine coolant temperature has exceeded the high engine temperature trip alarm setting level after the Safety On timer has expired.
High Fuel Level	The level detected by the fuel level sensor is above the high fuel level trip alarm setting.
Low Fuel Level	The level detected by the fuel level sensor is below the low fuel level trip alarm setting.
Low Oil Pressure	The module detects that the engine oil pressure has fallen below the low oil pressure trip alarm setting level after the Safety On timer has expired.
Loss Of Speed Sensing Signal	There is no speed signal received from the magnetic pickup connected to the controller. Check distance and position of magnetic pickup in relation to engine flywheel.
Maintenance Alarm 1	The module detects that the Maintenance Alarm 1 is due creating a fault condition, the appropriate LCD message is displayed.
Maintenance Alarm 2	The module detects that the Maintenance Alarm 2 is due creating a fault condition, the appropriate LCD message is displayed.
Maintenance Alarm 3	The module detects that the Maintenance Alarm 3 is due creating a fault condition, the appropriate LCD message is displayed.
Oil Pressure Sensor Fault.	The module detects that the circuit to the oil pressure sensor has been broken.
Over Speed	The engine speed has risen above the over speed trip alarm setting
Under Speed	The engine speed has fallen below the under speed trip alarm setting
2130 ID0 Analogue Input E to H	The module detects that an analogue input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID0.
2130 ID0 Digital Input A to H	The module detects that a digital input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID0.
2130 ID1 Analogue Input E to H	The module detects that an analogue input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID1.
2130 ID1 Digital Input A to H	The module detects that a digital input that has been user configured to create a fault condition has become active on the DSE2130 expansion module with ID1.

6.6 HIGH CURRENT SHUTDOWN / ELECTRICAL TRIP ALARM

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

6.6.1 IMMEDIATE WARNING

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

6.6.2 IDMT ALARM

If the *IDMT Alarm* is enabled, the controller begins following the IDMT 'curve' when the *trip* level is passed.

If the *Trip* is surpassed for an excess amount of time the *IDMT Alarm* triggers (*Shutdown* or *Electric trip* as selected in *Action*).

High current shutdown is a latching alarm and stops the Generator.
Remove the fault then press the *Stop/Reset Mode* button to reset the module.

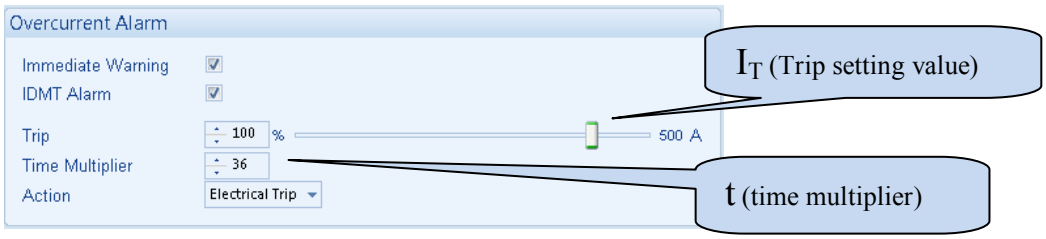
High current electrical trip is a latching alarm and removes the generator from the load, before stopping the Generator after the off load *cooling* timer.
Remove the fault then press the *Stop/Reset Mode* button to reset the module.

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

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

Where: T is the tripping time in seconds
I_A is the actual current of the most highly loaded line (L1 or L2 or L3)
I_T is the delayed over-current trip point
t is the time multiplier setting and also represents the tripping time in seconds at twice full load (when $I_A / I_T = 2$).

Factory settings for the *IDMT Alarm* when used on a brushless alternator are as follows (screen capture from the DSE Configuration Suite PC software :



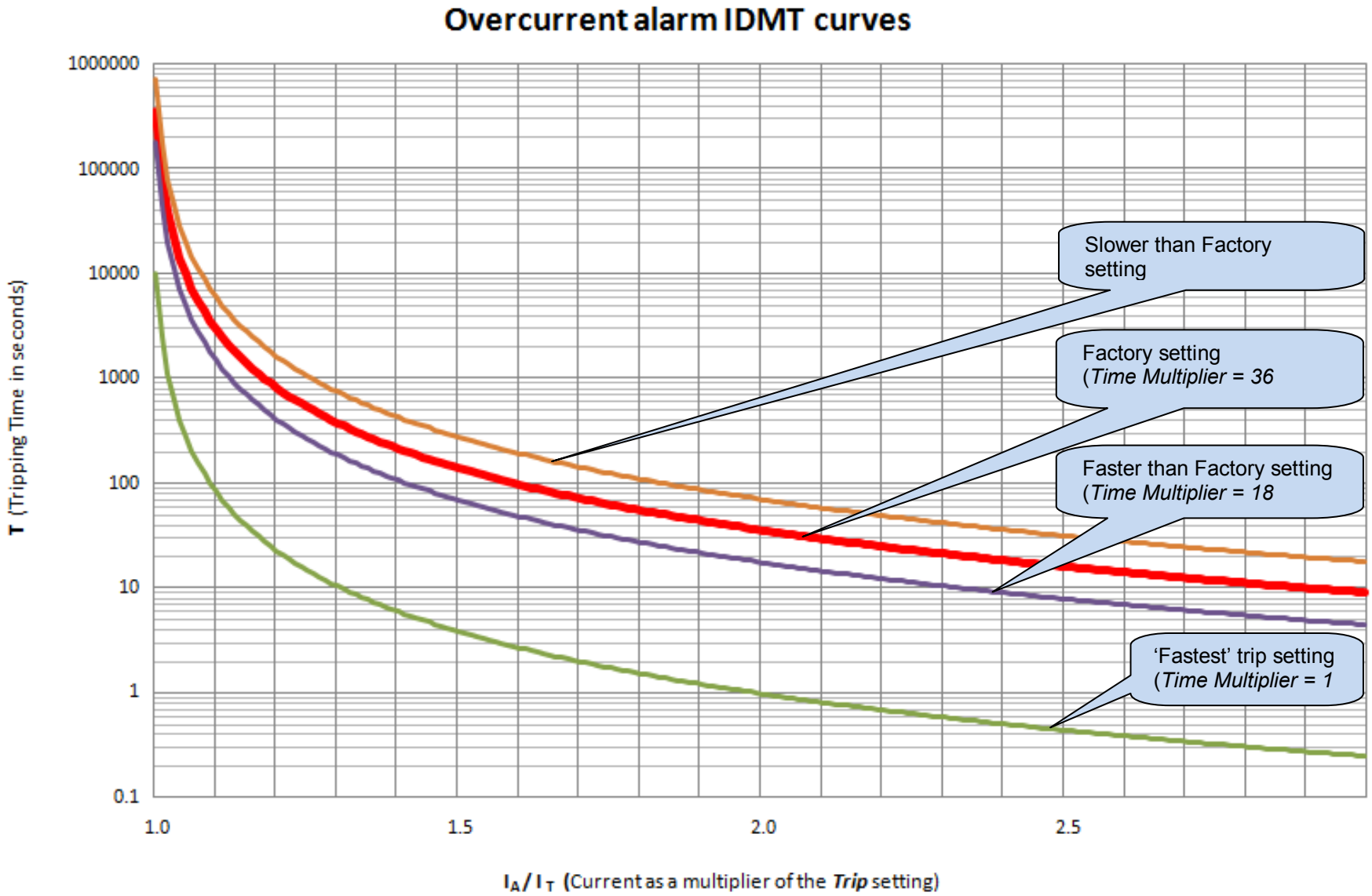
These settings provide for normal running of the generator up to 100% full load. If full load is surpassed, the *Immediate Warning* alarm is triggered, the set continues to run.
The effect of an overload on the generator is that the alternator windings begin to overheat; the aim of the *IDMT alarm* is to prevent the windings being overload (heated) too much. The amount of time that the set can be safely overloaded is governed by how high the overload condition is.

With typical settings as above, the tripping curve is followed as shown below.

This allows for overload of the set to the limits of the *Typical Brushless Alternator* whereby 110% overload is permitted for 1 hour.

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

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


Overcurrent alarm IDMT curves
1000000
100000
10000
1000
100
10
1
0.1
T (Tripping Time in seconds)
1.0
1.5
2.0
2.5
IA / IT (Current as a multiplier of the Trip setting)
Slower than Factory setting
Factory setting (Time Multiplier = 36
Faster than Factory setting (Time Multiplier = 18
'Fastest' trip setting (Time Multiplier = 1

6.7 MAINTENANCE ALARM

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

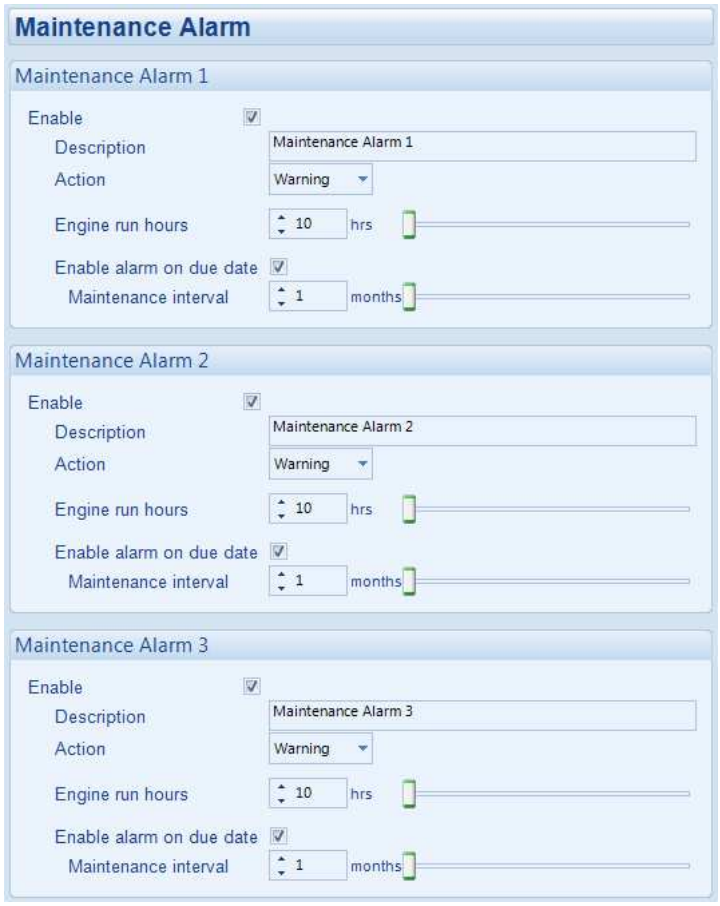
Example 1

Screen capture from DSE Configuration Suite Software showing the configuration of the Maintenance Alarm for 1, 2 and 3.

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

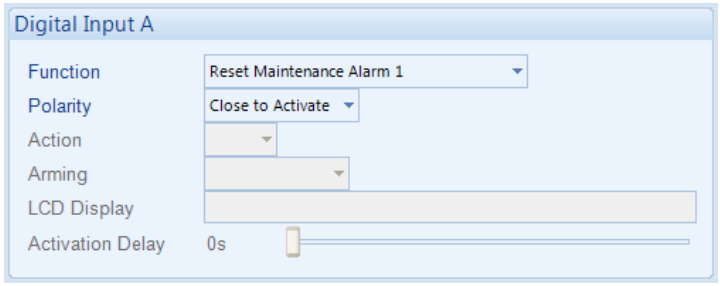
Resetting the maintenance alarm is normally actioned by the site service engineer after performing the required maintenance.
The method of reset is either by:

- Activating an input that has been configured to Reset Maintenance Alarm 1, 2 or 3.
- Pressing the maintenance reset button in the DSE Configuration Suite, Maintenance section.



Example 2

Screen capture from DSE Configuration Suite Software showing the configuration of a digital input for Reset Maintenance Alarm 1.



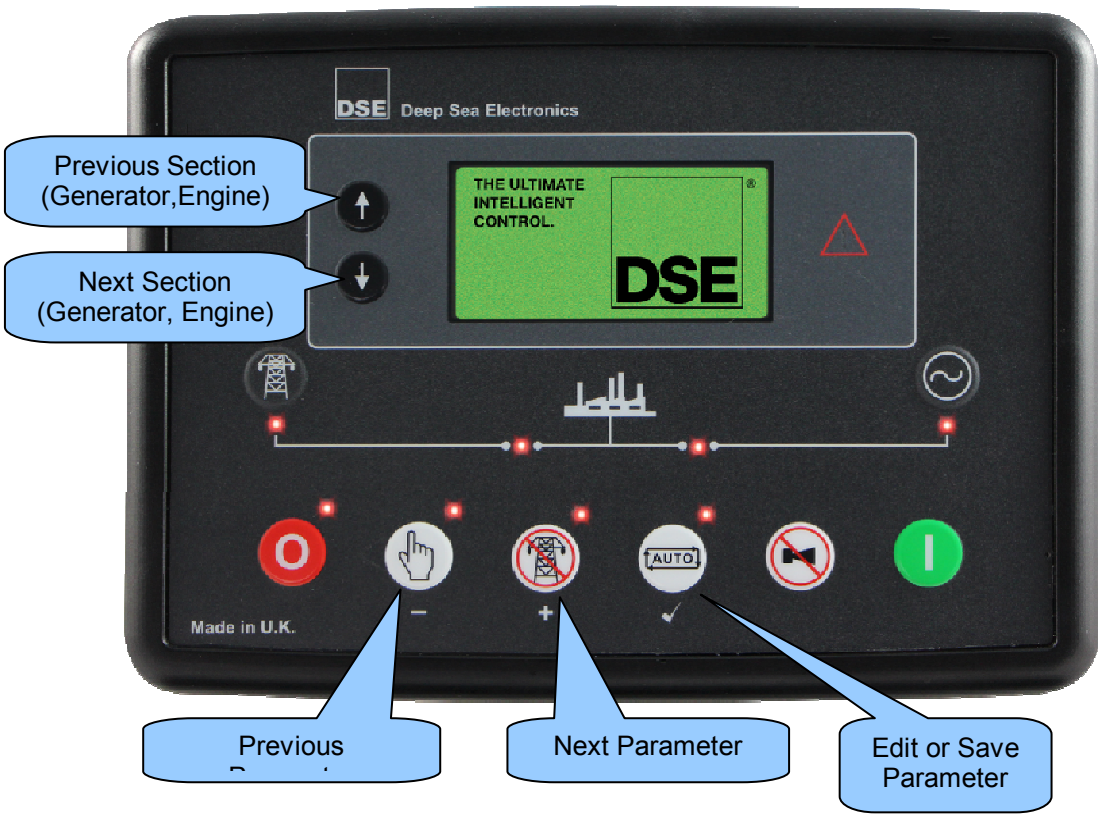
Example 3

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

7 FRONT PANEL CONFIGURATION

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:



7.1 FRONT PANEL CONFIGURATION EDTIOR

7.1.1 ACCESSING THE FRONT PANEL CONFIGURATION EDITOR

NOTE: More comprehensive module configuration is possible via PC configuration software. For further details of module configuration, refer to DSE Publication: 057- 224 DSE6110 MKII & DSE6110 MKII Configuration Software Manual.

- Ensure the engine is at rest and the module by pressing the ***Stop/Reset Mode*** button.
- Press the ***Stop/Reset Mode*** and ***Tick*** ✓ buttons together to enter the front panel configuration editor.

7.1.2 ENTERING PIN

NOTE: The PIN is not set by DSE when the module leaves the factory. If the module has a PIN code set, this has been affected by your engine supplier who should be contacted if you require the code. 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 is automatically reset when the editor is exited (manually or automatically) to ensure security.

- If a module security PIN has been set, the PIN request is then shown.
- Press the ***Tick*** ✓ button, the first '#' changes to '0'. Press the ***Previous*** **-** ***& Next*** **+** buttons to adjust it to the correct value.
- Press the ***Next*** **+** button when the first digit is correctly entered. The digit you have just entered now shows as '#' for security.
- Press the ***Scroll Down*** button to move back to adjust one of the previous digits.
- After editing the final PIN digit, press the ***Tick*** ✓ button. The PIN is then checked for validity. If the number is not correct, the PIN must re-entered.
- If the PIN has been successfully entered (or the module PIN has not been enabled), the editor is displayed.

7.1.3 EDITING A PARAMETER

NOTE: Pressing and holding the *Menu Navigation* buttons provides the auto-repeat functionality. Values can be changed quickly by holding the navigation buttons for a prolonged period of time.

- Press and hold either of the ***Menu Navigation*** buttons to cycle to the section which is required to be edited.
- Press the ***Menu Navigation*** buttons to cycle to the parameter within the section chosen to be edited.
- Press the ***Tick*** ✓ button to edit the parameter. The parameter begins to flash to indicate that the parameter is being edited.
- Press the ***Previous*** — ***& Next*** + buttons to adjust the parameter to the required value.
- Press the ***Tick*** ✓ button to stop editing the paramter. The parameter ceases flashing to indicate that it the parameter is no longer being edited.

7.1.4 EXITING THE FRONT PANEL CONFIGURATION EDITOR

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

- Press and hold the ***Stop/Reset Mode*** button to exit the editor without saving changes.
- Press and hold the ***Tick*** ✓ button to exit the editor and save the changes.

7.1.5 ADJUSTABLE PARAMETERS

Section	Parameter as Shown on Display	Values
Pin	Pin Entry	# # # #
Display	Contrast	0%
	Language	***English*** - Others
	LCD Page Timer	0 s
	Scroll Delay	2 s
	Current Date and Time	Day - hh:mm:ss
Alt Config	Default Config	Default Config
Engine	Oil Pressure Low Shutdown	0 bar
	Coolant Temp High Shutdown	0 ºC
	Start Delay	0 s
	Pre Heat Timer	0 s
	Crank Duration	0 s
	Crank Rest Time	0 s
	Safety On Delay	0 s
	Smoke Limiting	0 s
	Smoke Limiting Off	0 s
	Warm Up Time	0 s
	Cool Down Time	0 s
	Fail To Stop Delay	0 s
	Battery Under Voltage Warning	***Active***, Inactive
	Battery Under Voltage Warning	0 V
	Battery Under Voltage Warning Delay	0 s
	Battery Over Voltage Warning	***Active***, Inactive
	Battery Over Voltage Warning	0 V
	Battery Over Voltage Warning Delay	0 s
	Charge Alternator Failure Warning	***Active***, Inactive
	Charge Alternator Failure Warning	0 V
	Charge Alternator Failure Warning Delay	0 s
	Charge Alternator Failure Shutdown	***Active***, Inactive
	Charge Alternator Failure Shutdown	0 V
	Charge Alternator Failure Shutdown Delay	0 s
	Low Battery Start	Active, ***Inactive***
	Low Battery Start Level	0 V
	Low Battery Start Delay	0 s
	Low Battery Run Time	0 s

Section	Parameter as Shown on Display	Values
Generator	Under Voltage Shutdown	0 V
	Loading Voltage	0 V
	Nominal Voltage	0 V
	Over Voltage Shutdown	0 V
	Under Frequency Shutdown	0 Hz
	Loading Frequency	0 Hz
	Nominal Frequency	0 Hz
	Over Frequency Shutdown	0 Hz
	Full Load Rating	0 A
	Delayed Over Current	***Active***, Inactive
	Delayed Over Current	0 %
	AC System	Single Phase, 2 Wire ***3 Phase, 4 Wire*** 2 Phase, 3 Wire (L1 & L3) 3 Phase, 4 Wire (Delta) 2 Phase, 3 Wire (L1 & L2) 3 Phase, 3 Wire
	CT Primary	0 A
	Transient Delay	0.0 s
Mains	Under Voltage Trip	0 V
	Over Voltage Trip	0 V
	Under Frequency Trip	0 Hz
	Over Frequency Trip	0 Hz
	Transient Delay	0 s
	Return Delay	0 s
	Transfer Time	0 s
Timers	LCD Page Timer	0 s
	Scroll Delay	0 s
	Pre Heat Timer	0 s
	Crank Duration	0 s
	Crank Rest Time	0 s
	Safety On Delay	0 s
	Smoke Limiting	0 s
	Smoke Limiting Off	0 s
	Warm Up Time	0 s
	Cool Down Time	0 s
	Fail To Stop Delay	0 s
	Battery Under Voltage Warning Delay	0 s
	Battery Over Voltage Warning Delay	0 s
	Return Delay	0 s
	Generator Transient Delay	0 s
	Mains Transient Delay (DSE6120 MKII only)	0 s
	Mains Transfer Time (DSE6120 MKII only)	0 s
Scheduler	Schedule	Active, ***Inactive***
	Schedule Period	Weekly, Monthly
	Schedule On Load	Active, ***Inactive***
	Schedule 1 - 8	Day, On Time, Run Time

7.2 'RUNNING' CONFIGURATION EDITOR

7.2.1 ACCESSING THE 'RUNNING' CONFIGURATION EDITOR

- The 'running' editor can be entered whilst the engine is running. All protections remain active if the engine is running while the running editor is entered
- Press and hold together the ***Menu Navigation*** buttons to access the *Running Editor*

7.2.2 ENTERING PIN

NOTE: The PIN is not set by DSE when the module leaves the factory. If the module has a PIN code set, this has been affected by your engine supplier who should be contacted if you require the code. 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 is automatically reset when the editor is exited (manually or automatically) to ensure security.

- Even if a module security PIN has been set, the PIN is not requested whilst entering the 'running' editor.

7.2.3 EDITING A PARAMETER

- Press either of the ***Menu Navigation*** buttons to cycle to the parameter within the section chosen to be edited.
- Press the ***Tick*** ✓ button to edit the parameter. The parameter begins to flash to indicate that the parameter is being edited.
- Press the ***Previous*** **-** ***& Next*** **+** buttons to adjust the parameter to the required value.
- Press the ***Tick*** ✓ button to stop editing the paramter. The parameter ceases flashing to indicate that it the parameter is no longer being edited

7.2.4 EXITING THE 'RUNNING' CONFIGURATION EDITOR

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

- Press and hold the ***Stop/Reset Mode*** button to exit the editor without saving changes.
- Press and hold the ***Tick*** ✓ button to exit the editor and save the changes.

7.2.5 RUNNING EDITOR PARAMETERS

Section	Parameter as Shown on Display	Values
Display	Contrast	0%
	Language	English

8 COMMISSIONING

NOTE: If Emergency Stop feature is not required, link the input to the DC Positive.

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.
- The Emergency Stop input is wired to an external normally closed switch connected to DC positive.
- 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 Mode* button followed by the *Start* 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 'Failed *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 Mode* button followed by the *Start* button. This time the engine should start and the starter motor should disengage automatically. If not then check that the engine is fully operational (fuel available, etc.) and that the fuel solenoid is operating. The engine should now run up to operating speed. If not, and an alarm is present, check the alarm condition for validity, then check input wiring. The engine should continue to run for an indefinite period. It is possible at this time to view the engine and alternator parameters - refer to the 'Description of Controls' section of this manual.
- Press the *Auto Mode* button, the engine runs for the pre-set cooling down period, then stop. The generator should stay 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 delayed load outputs activate, the Generator accepts the load. If not, check the wiring to the delayed load output contactors. Check the Warming 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 period, 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

9 FAULT FINDING

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

9.1 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 Volts or below 9 Volts 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, the 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.

9.2 LOADING

Symptom	Possible Remedy
Engine runs but generator does not take load	Check Warm up timer has timed out. Ensure generator load inhibit signal is not present on the module inputs. Check connections to the switching device. Note that the set does not take load in *Manual Mode* unless there is an active load signal.
Incorrect reading on Engine gauges Fail to stop alarm 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.

9.3 ALARMS

Symptom	Possible Remedy
Low oil Pressure fault 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 engine temperature fault 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 alarm 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.

9.4 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).

9.5 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 = kVA 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).

9.6 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*** (✓) button to save the change before moving to another item or exiting the fascia editor

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, you should contact your original equipment manufacturer (OEM).

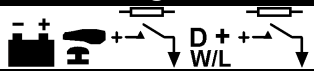
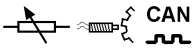
10.1 PURCHASING ADDITIONAL CONNECTOR PLUGS FROM DSE

If you require additional plugs from DSE, please contact our Sales department using the part numbers below.

10.1.1 PACK OF PLUGS

Module Type	Plug Pack Part Number
DSE6110 MKII	007-869
DSE6120 MKII	007-870

10.1.2 INDIVIDUAL PLUGS

Module Terminal Designation		Plug Description	Part No.
1-10		10 way 5.08 mm	007-450
11-21		11 way 5.08 mm	007-451
22-24		3 way 5.08 mm	007-174
25-28	 DSE6110 MKII Only	4 way 7.62 mm	007-171
25-32	 DSE6120 MKII Only	8 way 7.62 mm	007-454
33-37		5 way 5.08 mm	007-445
38-43		6 way 5.08 mm	007-446
		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

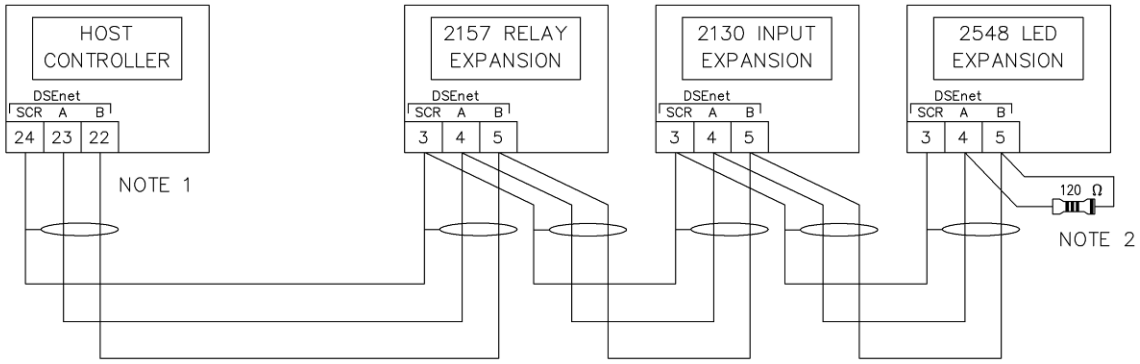
Item	Description	Part No.
	Module Silicon Sealing Gasket	020-521

10.4 DSENET EXPANSION MODULES

NOTE: A maximum of six (6) expansion modules can be connected to the DSE6110 MKII & DSE6120 MKII DSENet® Port

NOTE: DSENet® utilises an RS485 connection. Using Belden 9841 (or equivalent) cable allows for the expansion cable to be extended to a maximum of 1.2km.
DSE Stock and supply Belden 9841 cable. DSE Part Number 016-030.

Item	Max No. supported	Description	DSE Part Numbers			
			Model order number	Sales literature	Operator manual	Installation Instructions
	2	Model DSE2130 input module provides additional analogue and digital inputs for use with the controller.	2130-001-00	055-060	057-082	053-033
	2	Model DSE2157 expansion relay module provides eight additional voltage free relays for use with the controller	2157-001-00	055-061	057-083	053-034
	2	Model DSE2548 expansion LED module provides additional LED indications, internal sounder and remote lamp test/alarm mute for use with the controller.	2548-001-00	055-062	057-084	053-032



NOTE 1

AS A TERMINATING RESISTOR IS INTERNALLY FITTED TO THE HOST CONTROLLER, THE HOST CONTROLLER MUST BE THE FIRST UNIT ON THE DSEnet

NOTE 2

A 120 OHM TERMINATION RESISTOR MUST BE FITTED TO THE LAST UNIT ON THE DSEnet

11 WARRANTY

DSE Provides limited warranty to the equipment purchaser at the point of sale. For full details of any applicable warranty, you are referred to our original equipment supplier (OEM)

12 DISPOSAL

12.1 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)

If you use electrical and electronic equipment you must store, collect, treat, recycle and dispose of WEEE separately from your other waste

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