DEEP SEA ELECTRONICS
DSEE800 Operator Manual

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DSEE800 Operator Manual

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Amendments List Since Last Publication

Issue	Comments
1	Initial release
2	Updated for V1.2.12, and Tier IV engine DPF parameters added. FPE and Running Configuration Editor edited to match the latest updates in the controller.
3	DPF function enhancements added. PWMi output control added Flexible outputs added CAN Engine interface updated Multi Instrument Screens added
4	Rebranded to DSEControl
5	Inclusion of DEF level, Fuel Tank Bund Level High and Water In Fuel alarms.
6	Updated for V3.1

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.

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1 INTRODUCTION

This document details the installation and operation requirements of the DSEE800 module, part of the DSEControl® 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.* You will not be automatically informed of updates. Any future updates of this document will be included on the DSE website at www.deepseaelectronics.com

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

The DSEE800 module has been designed to allow the operator to start and stop the engine, control engine speed manually or automatically and if required, transfer the load to engine either manually or automatically.

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

The DSEE800 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 LCD display.

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

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

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

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

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

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

1.1 CLARIFICATION OF NOTATION

Clarification of notation used within this publication.

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

1.2 GLOSSARY OF TERMS

Term	Description
DSEE000, DSEExxx	All modules in the DSEExxx range.
DSEE400	DSEE400 module/controller
CAN	Controller Area Network Vehicle standard to allow digital devices to communicate to one another.
BMS	Building Management System A digital/computer based control system for a building's infrastructure.
DEF	Diesel Exhaust Fluid (AdBlue) A liquid used as a consumable in the SCR process to lower nitric oxide and nitrogen dioxide concentration in engine exhaust emissions.
DM1	Diagnostic Message 1 A DTC that is currently active on the engine ECU.
DM2	Diagnostic Message 2 A DTC that was previously active on the engine ECU and has been stored in the ECU's internal memory.
DPF	Diesel Particulate Filter A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas.
DPTC	Diesel Particulate Temperature Controlled Filter A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas which is temperature controlled.
DTC	Diagnostic Trouble Code The name for the entire fault code sent by an engine ECU.
ECU/ECM	Engine Control Unit/Management An electronic device that monitors engine parameters and regulates the fuelling.
FMI	Failure Mode Indicator A part of DTC that indicates the type of failure, e.g. high, low, open circuit etc.

Continued over page…

Term	Description
HEST	High Exhaust System Temperature Initiates when DPF filter is full in conjunction with an extra fuel injector in the exhaust system to burn off accumulated diesel particulate matter or soot.
HMI	Human Machine Interface A device that provides a control and visualisation interface between a human and a process or machine.
OC	Occurrence Count A part of DTC that indicates the number of times that failure has occurred.
PGN	Parameter Group Number A CAN address for a set of parameters that relate to the same topic and share the same transmission rate.
PLC	Programmable Logic Controller A programmable digital device used to create logic for a specific purpose.
PWM	Pulse Width Modulation A digital output control signal used to create a square wave signal switching betwwen on and off within a voltage range over time used for precise control.
SCADA	Supervisory Control And Data Acquisition A system that operates with coded signals over communication channels to provide control and monitoring of remote equipment
SCR	Selective Catalytic Reduction A process that uses DEF with the aid of a catalyst to convert nitric oxide and nitrogen dioxide into nitrogen and water to reduce engine exhaust emission.
SPN	Suspect Parameter Number A part of DTC that indicates what the failure is, e.g. oil pressure, coolant temperature, turbo pressure etc.

1.3 BIBLIOGRAPHY

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

1.3.1 INSTALLATION INSTRUCTIONS

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

DSE Part	Description
053-090	DSEE800 Installation Instructions

1.3.2 TRAINING GUIDES

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

DSE Part	Description
056-006	Introduction to Comms
056-023	Adding New CAN Files
056-030	Module PIN Codes
056-051	Sending DSEGencom Control Keys
056-055	Alternate Configurations
056-069	Firmware Update
056-075	Adding Language Files
056-076	Reading DSEGencom Alarms
056-079	Reading DSEGencom Status
056-080	MODBUS

1.3.3 MANUALS

Product manuals are downloaded from the DSE website: www.deepseaelectronics.com

DSE Part	Description
N/A	DSEGencom (MODBUS protocol for DSE controllers)
057-004	Electronic Engines and DSE Wiring Guide
057-151	DSE Configuration Suite PC Software Installation & Operation Manual
057-220	Options for Communications with DSE Controllers
057-203	DSEE800 Configuration Suite PC Software Manual

1.3.4 THIRD PARTY DOCUMENTS

The following third party documents are also referred to:

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

2 SPECIFICATION

2.1 REQUIREMENT FOR UL

Specification	Description
Screw Terminal Tightening Torque	4.5 lb-in (0.5 Nm)
Conductors	Terminals suitable for connection of conductor size 13 AWG to 20 AWG (0.5 mm² to 2.5 mm²). Conductor protection must be provided in accordance with NFPA 70, Article 240 Low voltage circuits (35 V or less) must be supplied from the engine starting battery or an isolated secondary circuit.
Current Inputs	Must be connected through UL Listed or Recognized isolating current transformers with the secondary rating of 5 A max.
Communication Circuits	Must be connected to communication circuits of UL Listed equipment
DC Output Pilot Duty	0.5 A
Mounting	Suitable for flat surface mounting in Type 1 Enclosure Type rating with surrounding air temperature -22 ºF to +122 ºF (-30 ºC to +50 ºC) Suitable for pollution degree 3 environments.

2.2 TERMINAL SPECIFICATION

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

Description	Specification	
Connection Type	Two part connector. • Male part fitted to module • Female part supplied in module packing case - Screw terminal, rising clamp, no internal spring.	 Example showing cable entry and screw terminals of a 10 way connector
Minimum Cable Size	0.5 mm² (AWG 24)	
Maximum Cable Size	2.5 mm² (AWG 10)	

2.3 POWER SUPPLY REQUIREMENTS

Description	Specification
Minimum Supply Voltage	5 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	510 mA at 12 V 238 mA at 24 V
Maximum Standby Current	226 mA at 12 V 107 mA at 24 V
Maximum Current When In Off Mode	180 mA at 12 V 86 mA at 24 V

2.3.1 MODULE SUPPLY INSTRUMENTATION DISPLAY

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

2.4 INPUTS

2.4.1 DIGITAL INPUTS

Description	Specification
Number	11 configurable digital inputs (23 when ratiometric inputs are configured as digital inputs)
Configuration	Negative or positive switching activation via PC Software
Switching Activation	When configured to negative switching, connect the input terminal to the plant supply negative terminal
	When configured to positive switching, connect the input terminal to a positive source with respect to the plant supply negative terminal
Level Threshold	When configured to negative switching, below 4 V guarantees an active condition
	When configured to positive switching, above 5.0 V guarantees an active condition
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	12 V typical when configured to negative switching
	0 V typical when configured to positive switching

2.4.2 RATIOMETRIC INPUTS

2.4.2.1 DIGITAL INPUT CONFIGURATION

Description	Specification
Number	12 configurable ratiometric inputs
Negative Switching Activation	Connect the input terminal to the plant supply negative terminal
Low Level Threshold	2.1 V minimum
High Level Threshold	6.6 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	12 V typical

2.4.2.2 RESISTIVE INPUT CONFIGURATION

Description	Specification
Number	12 configurable ratiometric 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	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%, -200 °C to 1300 °C (-328 °F to 2372 °F) or 0 bar to 17.2 bar (0 PSI to 250 PSI) subject to limits of the sensor and sensor configuration

2.4.2.3 0-10V INPUT CONFIGURATION

Description	Specification
Number	12 configurable ratiometric inputs
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%, -200 °C to 1300 °C (-328 °F to 2372 °F) or 0 bar to 17.2 bar (0 PSI to 250 PSI) subject to limits of the sensor and sensor configuration

2.4.2.4 4-20MA INPUT CONFIGURATION

Description	Specification
Number	12 configurable ratiometric inputs
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	00% to 250%, -200 °C to 1300 °C (-328 °F to 2372 °F) or 0 bar to 17.2 bar (0 PSI to 250 PSI) subject to limits of the sensor and sensor configuration

2.4.3 CHARGE FAIL INPUT

Description	Specification
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 engine 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.

2.4.4 PULSE PICKUP

Description	Specification
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 exceed 1 W.
Maximum Frequency	10,000 Hz
Resolution	6.25 RPM
Accuracy	±25 RPM
Pulse Per Revolution	0.1 to 500.0

NOTE: DSE stock pickup devices available in two body thread lengths:
DSE Part number 020-012 - Magnetic Pickup probe 5/8 UNF 2½" thread length
DSE Part number 020-013 - Magnetic Pickup probe 5/8 UNF 4" thread length

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.

2.5 OUTPUTS

2.5.1 DC OUTPUTS A & B (FUEL & START)

Description	Specification
Arrangement	Supplied from Emergency Stop terminal 3
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 seconds, 5 A resistive continuous at plant supply.

2.5.2 CONFIGURABLE VOLT-FREE OUTPUTS C & D

Description	Specification
Type	Normally open
Rating	5 A at 35 V DC 8 A resistive at 250 V AC

2.5.3 CONFIGURABLE DC OUTPUTS E, F, G & H

Description	Specification
Arrangement	Supplied from DC supply terminal 2
Type	Fully configurable
Rating	2 A resistive continuous at plant supply

2.5.4 CONFIGURABLE PWM & PWMI OUTPUTS I, J, K & L

2.5.4.1 PWM & PWMI OUTPUT CONFIGURATION

Description	Specification
Number	4 configurable outputs
Arrangement	Supplied from dedicated input supply
Average Current Rating	4 A (2 A when frequency is above 250 Hz)
Peak Current Rating	6 A
Voltage Rating	Dedicated input supply
Minimum Frequency	20 Hz
Maximum Frequency	500 Hz
Minimum Load Impedance	3 Ω at 12 V, 6 Ω at 24 V
Resolution	0.5% of range selection
Accuracy	+/-1% of range selection

2.5.4.2 DC OUTPUT CONFIGURATION

Description	Specification
Number	4 configurable outputs
Arrangement	Supplied from dedicated input supply
Type	Fully configurable
Rating	4 A resistive continuous at dedicated input supply

2.5.5 GOVERNOR CONTROL OUTPUT

Description	Specification
Arrangement	Supplied from DC supply terminal 2
Type	Isolated DC output, voltage controlled
Voltage Range	-5 V to +10 V DC
Max Common Mode Voltage	±1 kV
Resolution	Less than 1 mV
Accuracy	± 5%
Minimum Load	500 Ω

2.6 COMMUNICATION PORTS

Description	Specification
USB Slave Port	Type B USB 2.0 For connection to PC running DSE Configuration Suite Max distance 6 m (20 feet)
USB Host Port	Type A USB 2.0 Capability to add a maximum of 16 GB USB storage device for data recording only
Serial Communication	RS232 and RS485 are both fitted but and provide independent operation
RS232 Serial Port	Non – isolated Max Baud rate 115K baud subject to configuration TX, RX, RTS, CTS, DSR, DTR, DCD Male 9 way D type connector Max distance 15 m (50 feet)
RS485 Serial Port	Isolated Data connection 2 wire + common Half Duplex Data direction control for Transmit (by s/w protocol) Max Baud Rate 115K baud subject to configuration External termination required (120 Ω) Max common mode offset 70 V (on board protection transorb) Max distance 1.2 km (¾ mile)
Ethernet Port	RJ45 Ethernet connection for TCP/IP Auto detecting 10/100 Mbit Ethernet port Auto MDIX to remove need for crossover cables Max distance 100m (328 feet) between routers
CAN Port	Engine CAN Port Standard implementation of 'Slow mode', up to 250K bits/s Non-Isolated. Internal Termination provided (120 Ω) Max distance 40 m (133 feet) **NOTE: For additional length, the DSE124 CAN Extender is available. Please refer to DSE Publication: 057-116 DSE124 Operator Manual for more information.**
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)

2.7 COMMUNICATION PORT USAGE

2.7.1 USB CONNECTION

2.7.1.1 USB SLAVE PORT (CONFIGURATION)

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 engine, selecting operating modes, etc.

Additionally, the various operating parameters (such as coolant temperature, oil pressure, etc.) of the engine are available to be viewed or changed.

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

- DSEE800 Controller



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



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



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

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

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

2.7.1.2 USB HOST PORT (USB STORAGE DEVICE CONNECTION)

USB Type A connection for an of external USB storage device of maximum 16 GB for instrumentation data logging.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

2.7.2 RS232 PORT

The RS232 port on the controller supports the Modbus RTU protocol and is for connection to a single Modbus master device only.

The MODBUS register table for the controller is available upon request from the DSE Technical Support Department.

RS232 is for short distance communication (max 15m) and is typically used to connect the controller to a telephone or GSM modem for more remote communications.

The various operating parameters (such as coolant temperature, oil pressure, etc.) of the remote engine are viewed or changed.

NOTE: For a single module to PC connection and distances up to 6 m (20 feet) the USB connection method is more suitable and provides for a lower cost alternative to RS485 (which is more suited to longer distance connections).

Many PCs are not fitted with an internal RS232 serial port. DSE DOES NOT recommend the use of USB to RS232 convertors but can recommend PC add-ons to provide the computer with an RS232 port.

2.7.2.1 RECOMMENDED PC RS232 SERIAL PORT ADD-ONS

Remember to check these parts are suitable for your PC. Consult your PC supplier for further advice.

- Brainboxes PM143 PCMCIA RS232 card (for laptop PCs)



- Brainboxes VX-001 Express Card RS232 (for laptops and nettops PCs)



- Brainboxes UC246 PCI RS232 card (for desktop PCs)



- Brainboxes PX-246 PCI Express 1 Port RS232 1 x 9 Pin (for desktop PCs)



Supplier:
Brainboxes
Tel: +44 (0)151 220 2500
Web: http://www.brainboxes.com
Email: Sales: sales@brainboxes.com

NOTE: DSE have no business tie to Brainboxes. Over many years, our own engineers have used these products and are happy to recommend them.

2.7.2.2 RECOMMENDED EXTERNAL MODEMS

- Multitech Global Modem – MultiModem ZBA (PSTN)
  DSE Part Number 020-252
  (Contact DSE Sales for details of localisation kits for these modems)



- Sierra Fastrak Xtend GSM modem kit (PSU, Antenna and modem)*
  DSE Part number 0830-001-01



NOTE: For GSM modems a SIM card is required, supplied by your GSM network provider:

For SMS only, a 'normal' voice SIM card is required. This enables the controller to send SMS messages to designated mobile phones upon status and alarm conditions.

For a data connection to a PC running DSE Configuration Suite Software, a 'special' CSD (Circuit Switched Data) SIM card is required that enables the modem to answer an incoming data call. Many 'pay as you go' services do not provide a CSD (Circuit Switched Data) SIM card.

2.7.2.3 RS485 PORT

The RS485 port on the controller supports the Modbus RTU protocol and is for connection to a single Modbus master device only.

The DSE MODBUS register table for the controller is available upon request from the DSE Technical Support Department.

RS485 is used for point-to-point cable connection of more than one device (maximum 32 devices) and allows for connection to PCs, PLCs and Building Management Systems (to name just a few devices).

One advantage of the RS485 interface is the large distance specification (1.2 km when using Belden 9841 (or equivalent) cable. This allows for a large distance between the module and a PC running the DSE Configuration Suite software. The operator is then able to control the module, starting or stopping the engine, selecting operating modes, etc.

The various operating parameters (such as coolant temperature, oil pressure, etc.) of the remote engine are viewed or changed.

NOTE: For a single module to PC connection and distances up to 6 m (20 feet) the USB connection method is more suitable and provides for a lower cost alternative to RS485 (which is more suited to longer distance connections).

Many PCs are not fitted with an internal RS485 serial port. DSE DOES NOT recommend the use of USB to RS485 convertors but can recommend PC add-ons to provide the computer with an RS485port.

2.7.2.4 RECOMMENDED PC RS485 SERIAL PORT ADD-ONS

Remember to check these parts are suitable for your PC. Consult your PC supplier for further advice.

- Brainboxes PM154 PCMCIA RS485 card (for laptops PCs)
  Set to ‘Half Duplex, Autogating” with ‘CTS True’ set to ‘enabled’



- Brainboxes VX-023 ExpressCard 1 Port RS422/485 (for laptops and nettop PCs)



- Brainboxes UC320 PCI Velocity RS485 card (for desktop PCs)
  Set to ‘Half Duplex, Autogating” with ‘CTS True’ set to ‘enabled’



- Brainboxes PX-324 PCI Express 1 Port RS422/485 (for desktop PCs)



Supplier:
Brainboxes
Tel: +44 (0)151 220 2500
Web: http://www.brainboxes.com
Email: Sales: sales@brainboxes.com

NOTE: DSE have no business tie to Brainboxes. Over many years, our own engineers have used these products and are happy to recommend them.

2.7.3 ETHERNET PORT

The Ethernet port on the controller supports the Modbus TCP protocol and is for connection for up to five Modbus master devices.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

The DSE MODBUS register table for the controller is available upon request from the DSE Technical Support Department.

Ethernet is used for point-to-point cable connection of more than one device and allows for connection to PCs, PLCs and Building Management Systems (to name just a few devices).

One advantage of the Ethernet interface is the ability to interface into an existing LAN (Local Area Network) connection for remote connection via an internet connection. This allows for a large distance between the module and a PC running the DSE Configuration Suite software. The operator is then able to control the module, starting or stopping the engine, selecting operating modes, etc.

The various operating parameters (such as coolant temperature, oil pressure, etc.) of the remote engine are viewed or changed.

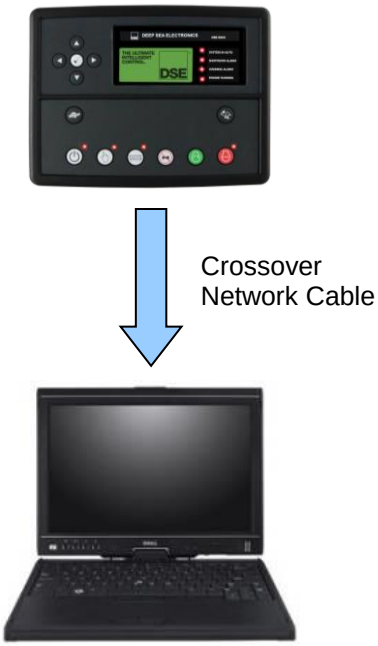
NOTE: For a single module to PC connection and distances up to 6 m (20 feet) the USB connection method is more suitable and provides for a lower cost alternative to Ethernet (which is more suited to longer distance connections).

NOTE: DSE stock 2 m (6.5 feet) Ethernet Cable, DSE Part Number: 016-137. Alternatively they can be purchased from any PC or IT store.

2.7.3.1 DIRECT PC CONNECTION

Requirements

- Crossover Ethernet cable (see Below)
- PC with Ethernet port

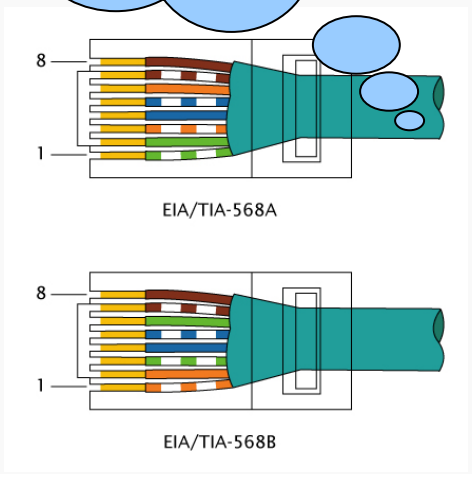


Crossover Cable Wiring Detail

Two pairs crossed, two pairs uncrossed
10baseT/100baseT crossover

For the advanced Engineer, a crossover cable is a CAT5 cable with one end terminated as T568A and the other end terminated as T568B.

Pin	Connection 1 (T568A)	Connection 2 (T568B)
1	white/green stripe	white/orange stripe
2	green solid	orange solid
3	white/orange stripe	white/green stripe
4	blue solid	blue solid
5	white/blue stripe	white/blue stripe
6	orange solid	green solid
7	white/brown stripe	white/brown stripe
8	brown solid	brown solid



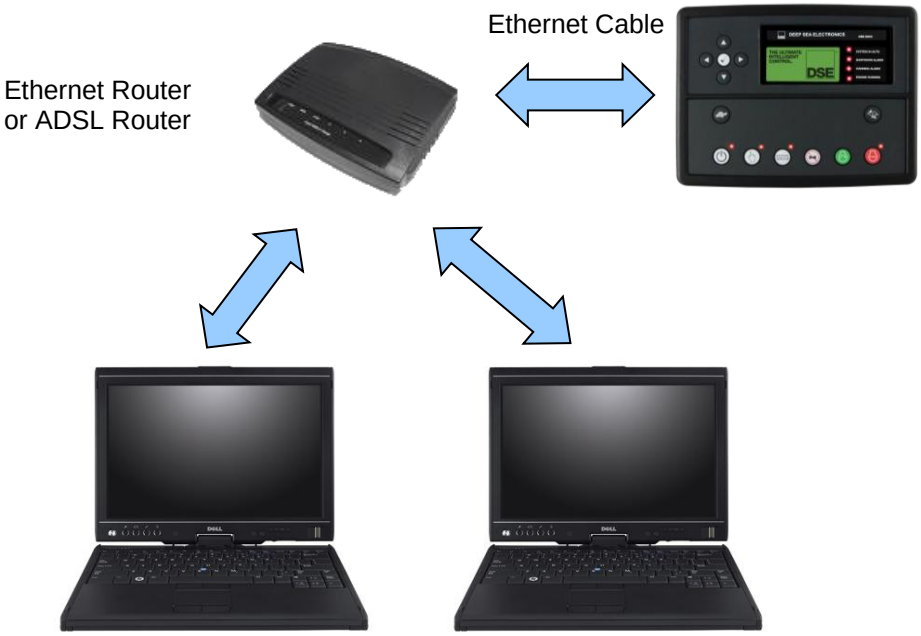
NOTE: This cable can be purchased from any PC or IT store.

2.7.3.2 CONNECTION TO BASIC ETHERNET

Requirements

- Ethernet cable (see below)
- Working Ethernet (company or home network)

- PC with Ethernet port

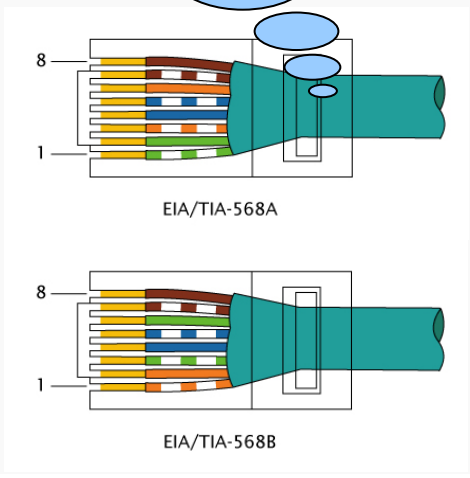


Ethernet Cable Wiring Detail

10baseT/100baseT

For the advanced Engineer, this cable has both ends terminated as T568A or T568B.

Pin	Connection 1 (T568A)	Connection 2 (T568A)
1	white/green stripe	white/green stripe
2	green solid	green solid
3	white/orange stripe	white/orange stripe
4	blue solid	blue solid
5	white/blue stripe	white/blue stripe
6	orange solid	orange solid
7	white/brown stripe	white/brown stripe
8	brown solid	brown solid

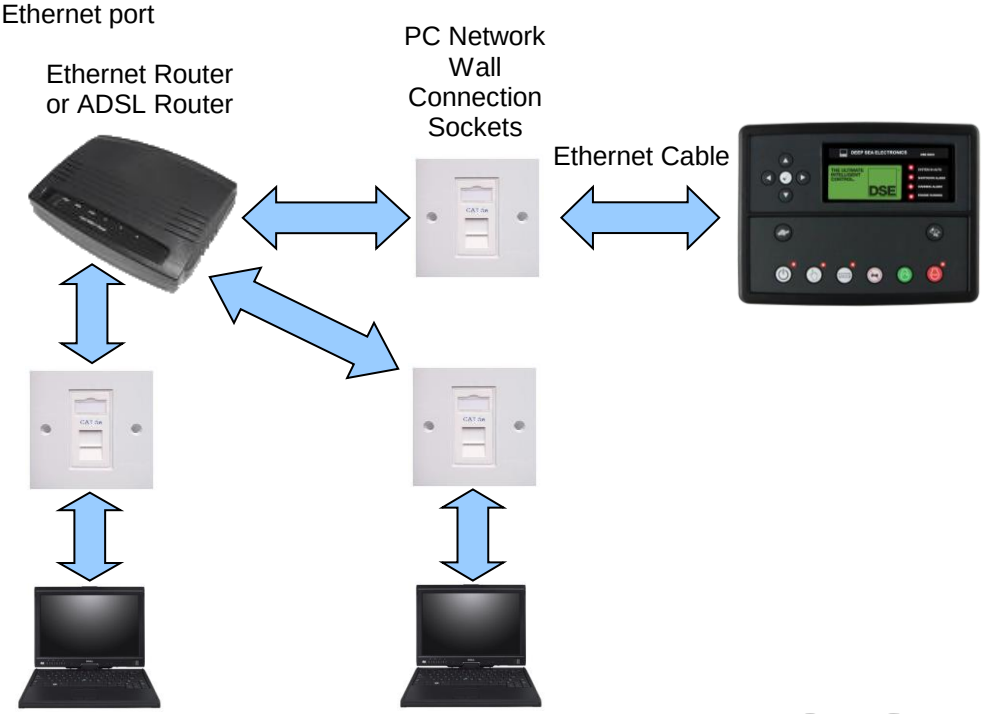


NOTE: DSE stock 2 m (6.5 feet) Ethernet Cable, DSE Part Number: 016-137. Alternatively they can be purchased from any PC or IT store.

2.7.3.3 CONNECTION TO COMPANY INFRASTRUCTURE ETHERNET

Requirements

- DSE module with the ability to connect to Ethernet
- Ethernet cable (see below)
- Working Ethernet (company or home network)
- PC with Ethernet port

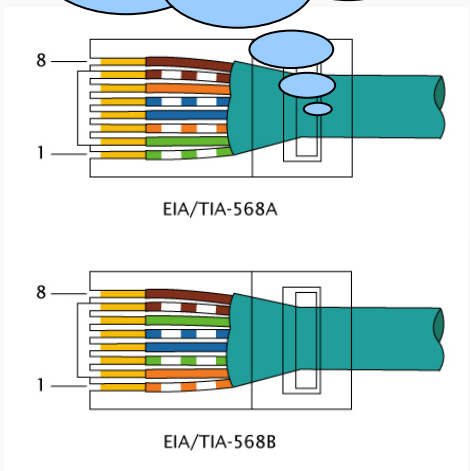


Ethernet Cable Wiring Detail

10baseT/100baseT

Pin	Connection 1 (T568A)	Connection 2 (T568A)
1	white/green stripe	white/green stripe
2	green solid	green solid
3	white/orange stripe	white/orange stripe
4	blue solid	blue solid
5	white/blue stripe	white/blue stripe
6	orange solid	orange solid
7	white/brown stripe	white/brown stripe
8	brown solid	brown solid

For the advanced Engineer, this cable has both ends terminated as T568A or T568B.

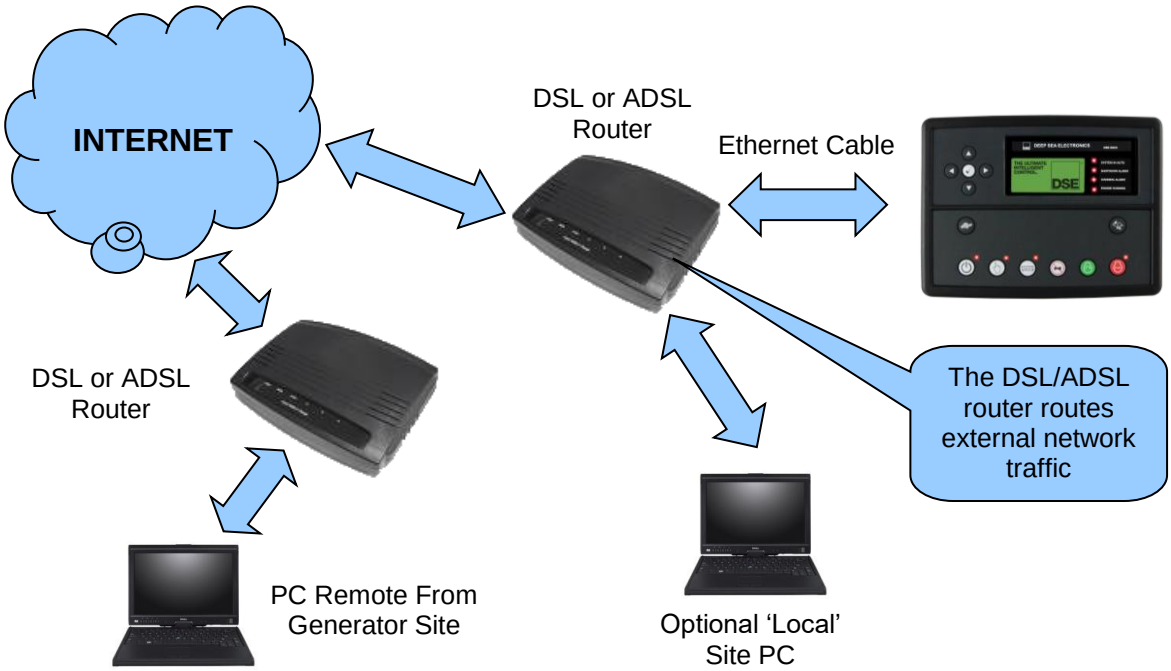


NOTE: DSE stock 2 m (6.5 feet) Ethernet Cable, DSE Part Number: 016-137. Alternatively they can be purchased from any PC or IT store.

2.7.3.4 CONNECTION TO THE INTERNET

Requirements

- Ethernet cable (see below)
- Working Ethernet (company or home network)
- Working Internet connection (ADSL or DSL recommended)

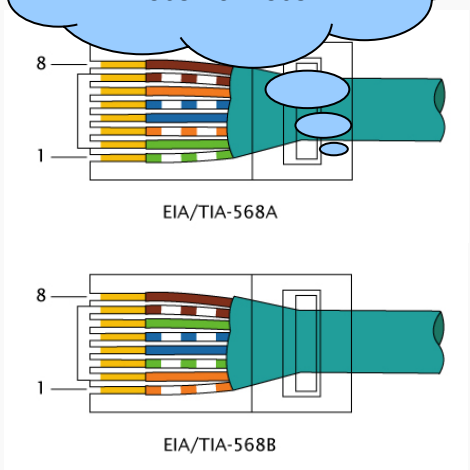


Ethernet Cable Wiring Detail

10baseT/100baseT

Pin	Connection 1 (T568A)	Connection 2 (T568A)
1	white/green stripe	white/green stripe
2	green solid	green solid
3	white/orange stripe	white/orange stripe
4	blue solid	blue solid
5	white/blue stripe	white/blue stripe
6	orange solid	orange solid
7	white/brown stripe	white/brown stripe
8	brown solid	brown solid

For the advanced Engineer, this cable has both ends terminated as T568A or T568B.



NOTE: DSE stock 2 m (6.5 feet) Ethernet Cable, DSE Part Number: 016-137. Alternatively they can be purchased from any PC or IT store.

2.7.3.5 FIREWALL CONFIGURATION FOR INTERNET ACCESS

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

The module makes its data available over Modbus TCP and as such communicates over the Ethernet using a Port configured via the DSE Configuration Suite software.

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

It is also important to note that if the port assigned (setting from software “Modbus Port Number”) is already in use on the LAN, the module cannot be used and another port must be used.

Outgoing Firewall Rule

As the module makes its user interface available to standard web browsers, all communication uses the chosen port. It is usual for a firewall to make the same port outgoing open for communication.

Incoming Traffic (Virtual Server)

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

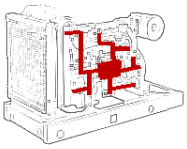
For our application, this means that the WAN IP address of the modem/router is the IP address we need to access the site from an external (internet) location.

When the requests reach the modem/router, we want this passed to a ‘virtual server’ for handling, in our case this is the module.

Result: Traffic arriving from the WAN (internet) on port xxx is automatically sent to IP address set within the configuration software on the LAN for handling.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

2.7.4 CAN PORT



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 engine controllers to access these engine parameters with no physical connection to the sensor device.

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

2.7.5 DSENET® (EXPANSION 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®

Description	Specification
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 20 devices made up of DSE2130 (up to 4), DSE2131 (up to 4), DSE2133 (up to 4), DSE2152 (up to 4), DSE2157 (up to 10), DSE2548 (up to 10) This gives the possibility of : Maximum 32 additional 0-10 V or 4-20 mA outputs (DSE2152) Maximum 80 additional relay outputs (DSE2157) Maximum 80 additional LED indicators Maximum 24 additional RTD or thermocouple inputs (DSE2133). Maximum 32 additional inputs (Can be configured as either digital, or resistive when using DSE2130) Maximum 40 additional ratiometric inputs (All can be configured as either digital, resistive, 0-10 V or 4-20 mA when using DSE2131)

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: DSEE800 module does not support the DSE2510 or DSE2520 display modules.

2.8 SOUNDER

The module features an internal sounder to draw attention to warning, shutdown and Controlled Shutdown alarms.

Description	Specification
Sounder Level	64 db at 1 m

2.8.1 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 the internal sounder and audible alarm output.

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



2.9 ACCUMULATED INSTRUMENTATION

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

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

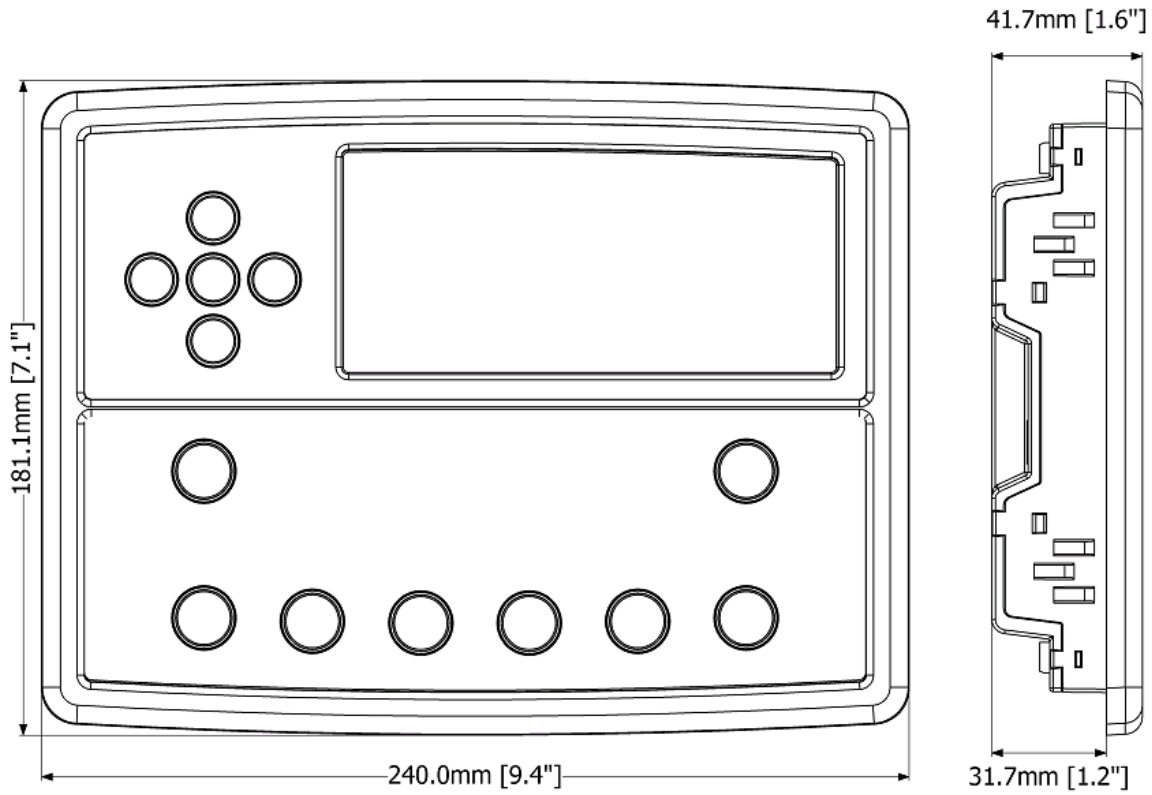
The number of logged Engine Hours and Number of Starts can be set/reset using the DSE Configuration Suite PC software. Depending upon module configuration, this may have been PIN locked by your engine supplier

2.10 DIMENSIONS AND MOUNTING

2.10.1 DIMENSIONS
240 mm x 181 mm x 42 mm
(9.4” x 7.1” x 1.6”)

2.10.2 PANEL CUTOUT
220 mm x 160 mm
(8.7” x 6.3”)

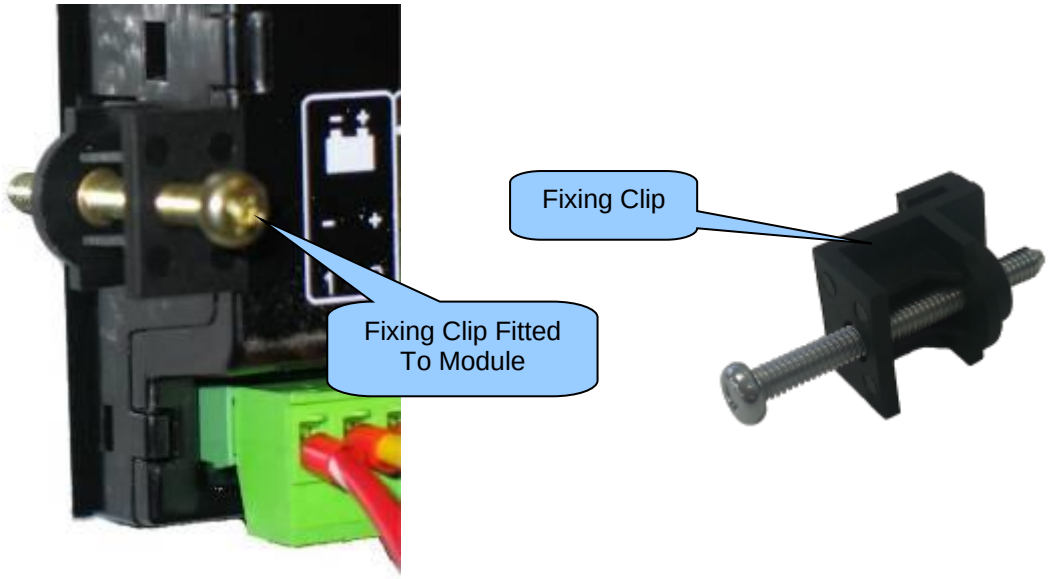
2.10.3 WEIGHT
0.7 kg
(1.4 lb)



2.10.4 FIXING CLIPS

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.



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

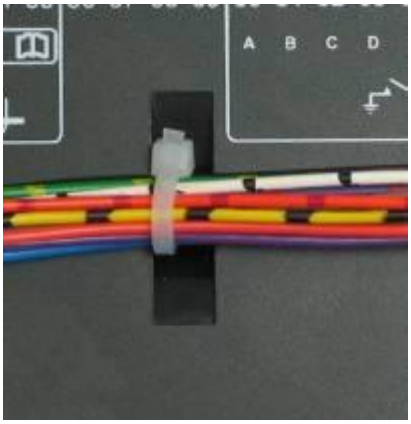
2.10.5 CABLE TIE FIXING POINTS

Integral cable tie fixing points are included on the rear of the module's case to aid wiring. This additionally provides strain relief to the cable loom by removing the weight of the loom from the screw connectors, thus reducing the chance of future connection failures.

Care should be taken not to over tighten the cable tie (for instance with cable tie tools) to prevent the risk of damage to the module case.



Cable Tie Fixing Point

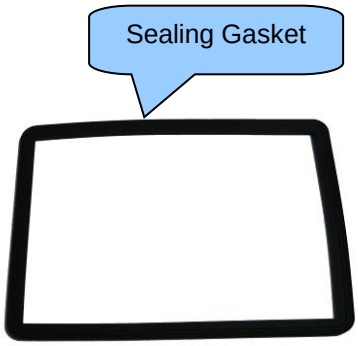


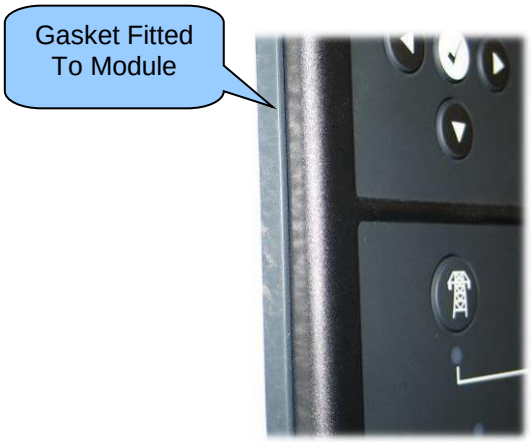
With Cable And Tie In Place

2.10.6 SILICON SEALING GASKET

NOTE: For purchasing an additional silicon gasket from DSE, please 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.





2.10.7 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) (-40ºC (-40 °F) when display heater in use)
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 (engine) –module). As the module is configurable by the engine 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 5 – Stopping Device 6 – Starting Circuit Breaker 11 – Multifunction Device 12 – Overspeed Device 14 – Underspeed Device 18 – Accelerating or Decelerating Device 19 – Starting-to-running transition contactor 26 – Apparatus Thermal Device 27DC – DC Undervoltage Relay 29 – Isolating Contactor Or Switch 30 – Annunciator Relay 54 – Turning Gear Engaging Device 59DC – DC Overvoltage Relay 62 – Time Delay Stopping Or Opening Relay 63 – Pressure Switch 71 – Level Switch 74 – Alarm Relay 83 – Automatic Selective Control Or Transfer Relay 86 – Lockout Relay

In line with our policy of continual development, Deep Sea Electronics, reserve the right to change specification without notice.

2.10.8 ENCLOSURE CLASSIFICATIONS

2.10.8.1 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).

2.10.8.2 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.

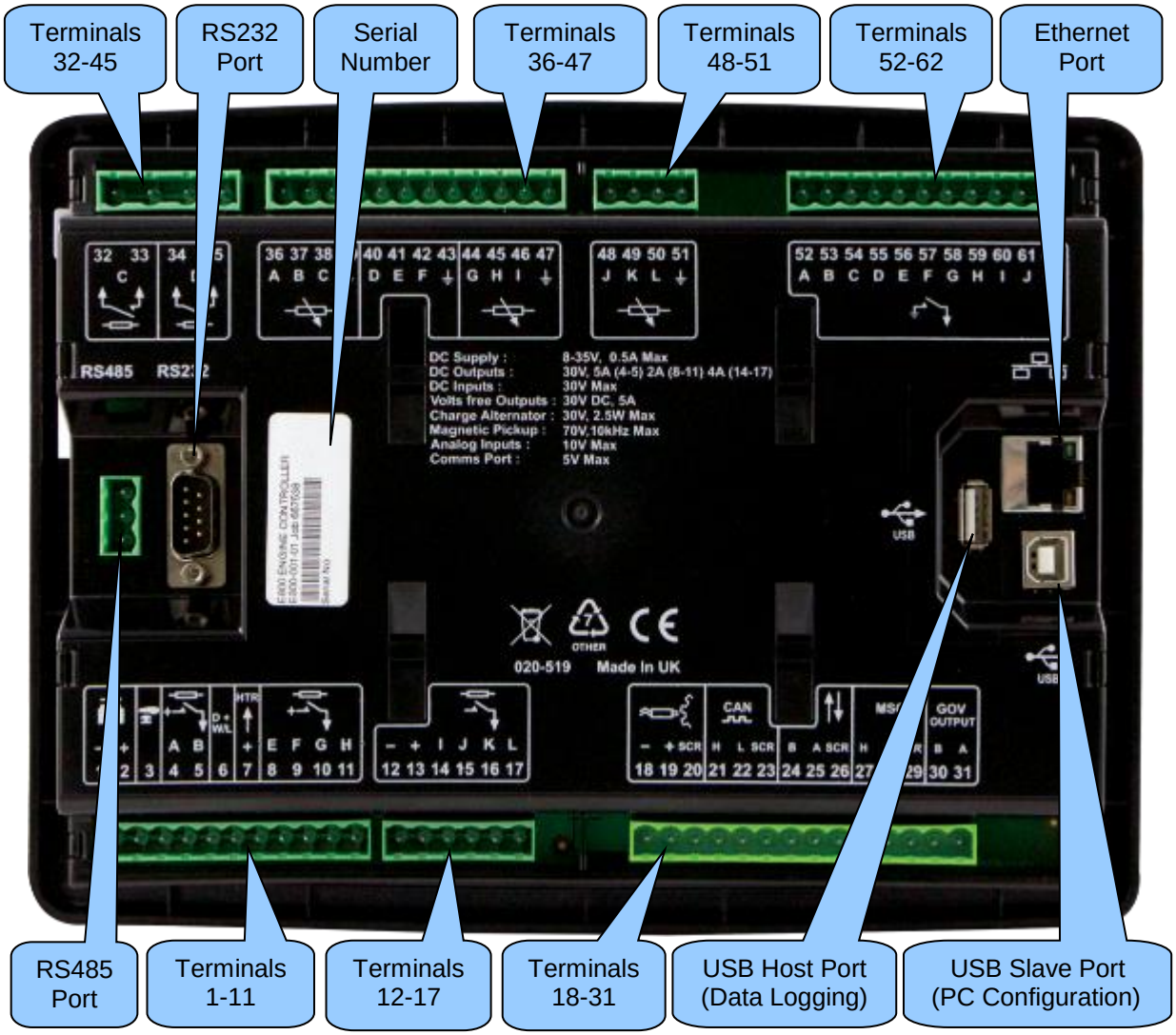
3 INSTALLATION

The module is designed to be mounted on the panel fascia. 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 USER CONNECTIONS

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

NOTE: For dimension and mounting details, see the section entitled *Specification, Dimension and Mounting* elsewhere in this document.



3.2 CONNECTION DESCRIPTION

3.2.1 DC SUPPLIES, E-STOP INPUT, DC OUTPUTS & CHARGE FAIL INPUT

	Pin No	Description	Cable Size	Notes
	1	DC Plant Supply Input (Negative)	2.5 mm² AWG 13	Connect to ground where applicable
	2	DC Plant Supply Input (Positive)	2.5 mm² AWG 13	Supplies the module and DC Outputs A, B, E, F, G & H
	3	Emergency Stop Input	2.5 mm² AWG 13	Plant Supply Positive. Also supplies DC Outputs A & B.
	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.
	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	Display Heater Supply	1.0 mm² AWG 18	Supplies the module's display heater only
	8	Configurable DC Output E	1.0 mm² AWG 18	2 A DC output from terminal 2
	9	Configurable DC Output F	1.0 mm² AWG 18	2 A DC output from terminal 2
	10	Configurable DC Output G	1.0 mm² AWG 18	2 A DC output from terminal 2
	11	Configurable DC Output H	1.0 mm² AWG 18	2 A DC output from terminal 2

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: *057-203 DSEE800 Configuration Software Manual.*

3.2.2 PWM OUTPUTS & SUPPLY

	Pin No	Description	Cable Size	Notes
	12	PWM Supply Input (Negative)	1.0 mm² AWG 18	Connect to ground where applicable
	13	PWM Supply Input (Positive)	1.0 mm² AWG 18	Supplies the module's PWM Outputs I, J, K & L
	14	Configurable PWM Output I	2.5 mm² AWG 13	4 A PWM output supplied from terminal 13.
	15	Configurable PWM Output J	2.5 mm² AWG 13	4 A PWM output supplied from terminal 13.
	16	Configurable PWM Output K	2.5 mm² AWG 13	4 A PWM output supplied from terminal 13.
	17	Configurable PWM Output L	2.5 mm² AWG 13	4 A PWM output supplied from terminal 13.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

3.2.3 PULSE PICKUP, CAN, DSENET, MSC & GOVERNOR

	Pin No	Description	Cable Size	Notes
	18	Pulse Pickup Positive	0.5 mm² AWG 20	Connect to magnetic pickup device or charge alternator tachometer output
	29	Pulse Pickup Negative	0.5 mm² AWG 20	Connect to magnetic pickup device or charge alternator tachometer output
	20	Pulse Pickup Screen	Shield	Connect to ground at one end only
CAN	21	CAN Port H	0.5 mm² AWG 20	Use only 120 Ω CAN and RS485 approved cable
	22	CAN Port L	0.5 mm² AWG 20	Use only 120 Ω CAN and RS485 approved cable
	23	CAN Port Screen	Shield	Use only 120 Ω CAN and RS485 approved cable
	24	DSENet Expansion B	0.5 mm² AWG 20	Use only 120 Ω CAN and RS485 approved cable
	25	DSENet Expansion A	0.5 mm² AWG 20	Use only 120 Ω CAN and RS485 approved cable
	26	DSENet Expansion Screen	Shield	Use only 120 Ω CAN and RS485 approved cable
MSC	27	MSC H	0.5 mm² AWG 20	Use only 120 Ω CAN and RS485 approved cable
	28	MSC L	0.5 mm² AWG 20	Use only 120 Ω CAN and RS485 approved cable
	29	MSC Screen	Shield	Use only 120 Ω CAN and RS485 approved cable
GOV OUTPUT	30	Governor Output B	0.5 mm² AWG 20	Connect to voltage or wiper input of governor speed input
	31	Governor Output A	0.5 mm² AWG 20	Connect to 0 V reference of governor speed input

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

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: *057-203 DSEE800 Configuration Software Manual.*

3.2.4 VOLT-FREE OUTPUTS C & D

	Pin No	Description	Cable Size	Notes
	32	Configurable Normally Open Volt-Free Output C	0.5 mm² AWG 20	
	33			
	34	Configurable Normally Open Volt-Free Output D	0.5 mm² AWG 20	
	35			

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

3.2.5 RATIOMETRIC INPUTS A TO I

	Pin No	Description	Cable Size	Notes
	36	Oil Pressure Input (Ratiometric Input A)	0.5 mm² AWG 20	Connect to oil pressure sensor
	37	Configurable Ratiometric Input B	0.5 mm² AWG 20	Connect to coolant temperature sensor
	38	Configurable Ratiometric Input C	0.5 mm² AWG 20	Connect to fuel level sensor
	39	Ratiometric Input A, B & C Common	0.5 mm² AWG 20	Return feed for ratiometric input A, B & C
	40	Configurable Ratiometric Input D	0.5 mm² AWG 20	
	41	Configurable Ratiometric Input E	0.5 mm² AWG 20	
	42	Configurable Ratiometric Input F	0.5 mm² AWG 20	
	43	Ratiometric Input D, E & F Common	0.5 mm² AWG 20	Return feed for ratiometric input D, E & F
	44	Configurable Ratiometric Input G	0.5 mm² AWG 20	
	45	Configurable Ratiometric Input H	0.5 mm² AWG 20	
	46	Configurable Ratiometric Input I	0.5 mm² AWG 20	
	47	Ratiometric Input G, H & I Common	0.5 mm² AWG 20	Return feed for ratiometric input G, H & I

NOTE: It is VERY important that terminal 39, 43 & 47 (sensor commons) are soundly connected to an earth point on the ENGINE BLOCK when inputs are in use, 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 terminals 39, 43 & 47 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 of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

3.2.6 RATIOMETRIC INPUTS J TO L

	Pin No	Description	Cable Size	Notes
	48	Configurable Ratiometric Input J	0.5 mm² AWG 20	
	49	Configurable Ratiometric Input K	0.5 mm² AWG 20	
	50	Configurable Ratiometric Input L	0.5 mm² AWG 20	
	51	Ratiometric Input J, K & L Common	0.5 mm² AWG 20	Return feed for ratiometric input J, K & L

NOTE: It is VERY important that terminal 51 (sensor common) is soundly connected to an earth point on the ENGINE BLOCK when inputs are in use, 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 51 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 of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

3.2.7 DIGITAL INPUTS A TO K

	Pin No	Description	Cable Size	Notes
	52	Configurable Digital Input A	0.5 mm² AWG 20	Configurable as positive or negative switching in a group of three (A, B & C)
	53	Configurable Digital Input B	0.5 mm² AWG 20	
	54	Configurable Digital Input C	0.5 mm² AWG 20	
	55	Configurable Digital Input D	0.5 mm² AWG 20	Configurable as positive or negative switching in a group of three (D, E & F)
	56	Configurable Digital Input E	0.5 mm² AWG 20	
	57	Configurable Digital Input F	0.5 mm² AWG 20	
	58	Configurable Digital Input G	0.5 mm² AWG 20	Configurable as positive or negative switching in a group of five (G, H, I, J & K)
	59	Configurable Digital Input H	0.5 mm² AWG 20	
	60	Configurable Digital Input I	0.5 mm² AWG 20	
	61	Configurable Digital Input J	0.5 mm² AWG 20	
	62	Configurable Digital Input K	0.5 mm² AWG 20	

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

3.2.8 USB SLAVE (PC CONFIGURATION) CONNECTOR

	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. 

NOTE: The USB connection cable between the PC and the module must not be extended beyond 6 m (20 feet). For distances over 6 m, it is possible to use a third party USB extender. Typically, they extend USB up to 50 m (164 yards). The supply and support of this type of equipment is outside the scope of Deep Sea Electronics Ltd.

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: *057-203 DSEE800 Configuration Software Manual.*

3.2.9 USB HOST (DATA LOGGING) CONNECTOR

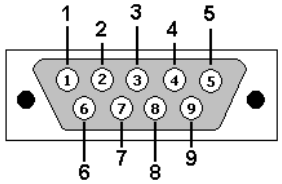
	Description	Storage Size	Notes
	Socket for connection to USB storage device for data logging	Maximum 16 GB	USB storage device must be formatted as FAT, not FAT32.

NOTE: For further details on how to add and remove a USB storage device, refer to section entitled *Data Logging Pages* elsewhere in this document.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

3.2.10 RS232 CONNECTOR

	Description	Notes
	Socket for connection to a modem or PC with DSE Configuration Suite Software	Supports Modbus RTU protocol or external modem



View looking into the male connector on the module

PIN No	Notes
1	Received Line Signal Detector (Data Carrier Detect)
2	Received Data
3	Transmit Data
4	Data Terminal Ready
5	Signal Ground
6	Data Set Ready
7	Request To Send
8	Clear To Send
9	Ring Indicator

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

3.2.11 RS485 CONNECTOR

	Description	Cable	Notes
	Socket for connection to PC with DSE Configuration Suite Software	Belden 9841	Supports Modbus RTU protocol



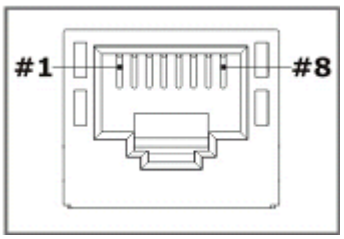
PIN No	Notes
A (-)	Connect to RXD- and TXD-
B (+)	Connect to RXD+ and TXD+
SCR	Signal Ground

NOTE: A 120 Ω termination resistor must be fitted across terminals A and B if the DSE module is the first or last device on the R485 link.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

3.2.12 ETHERNET CONNECTOR

	Description	Cable	Notes
	Socket for connection to PC or network with DSE Configuration Suite Software	Ethernet Cable	Supports Modbus TCP protocol



View looking into the female connector on the module

PIN No	Notes
1	TXD+
2	TXD-
3	RXD+
4	Do not connect
5	Do not connect
6	RXD-
7	Do not connect
8	Do not connect

NOTE: For further details on how utilise an Ethernet connection, refer to section entitled *Communication Port Usage* elsewhere in this document.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

3.3 TYPICAL WIRING DIAGRAM

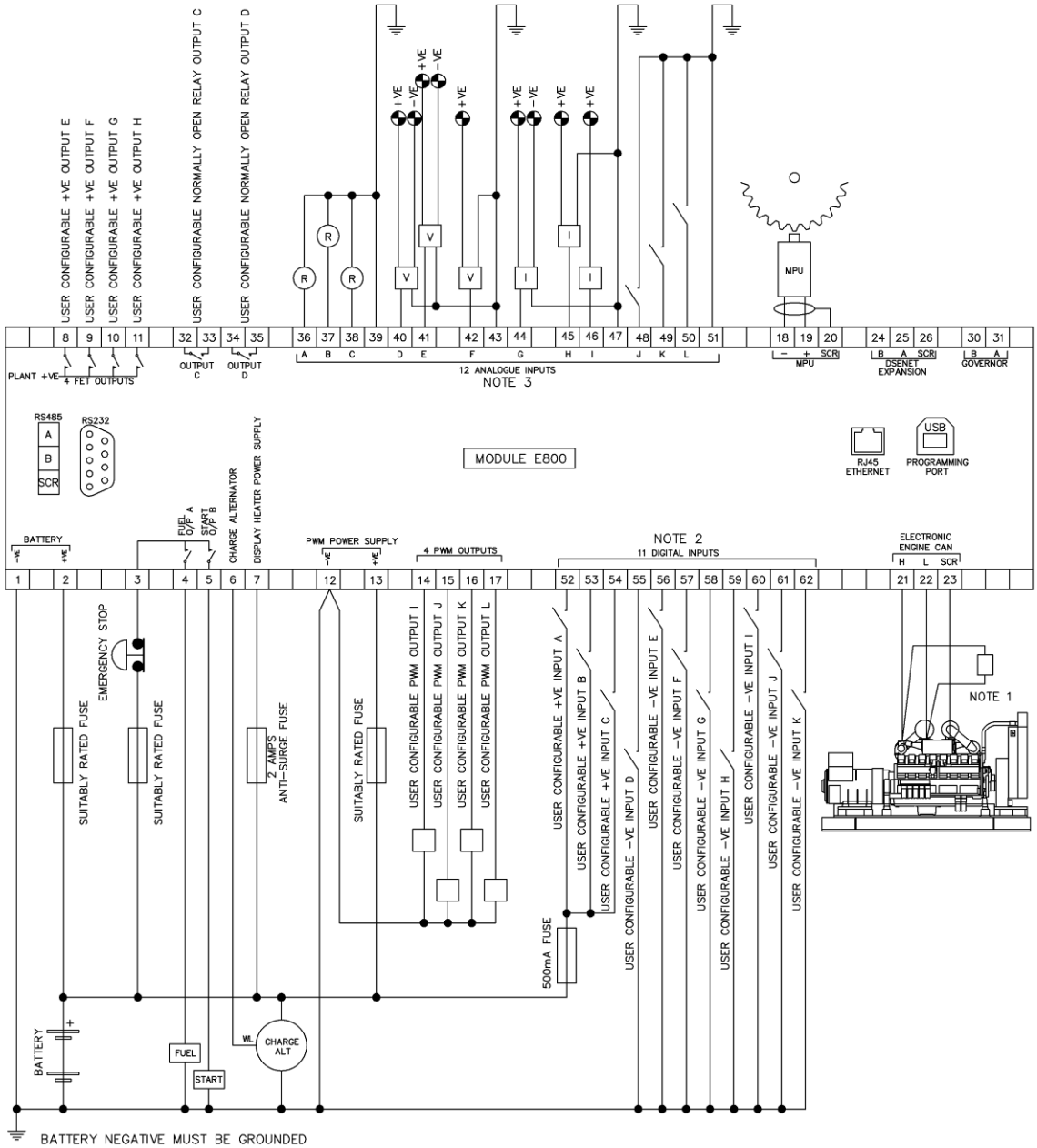
As every system has different requirements, these diagrams show only a TYPICAL system and do not intend to show a complete system.

Engine 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.deepseaelectronics.com to website members.

DSE Part	Description
057-004	Electronic Engines and DSE Wiring

3.3.1 DSEE800 TYPICAL WIRING DIAGRAM



BATTERY NEGATIVE MUST BE GROUNDED

NOTE 1
120 R TERMINATING RESISTOR MAY BE REQUIRED EXTERNALLY
SEE ENGINE MANUFACTURERS LITERATURE

NOTE 2
DIGITAL INPUTS CAN BE CONFIGURED AS EITHER +VE OR −VE,
PROGRAMMABLE IN BANKS OF 3.

NOTE 3
ANALOGUE INPUTS CAN BE CONFIGURED AS EITHER A DIGITAL INPUT, RESISTIVE INPUT, 0−10V INPUT, 4−20mA INPUT OR ANY COMBINATION OF THE ABOVE

WIRED AS RESISTIVE	WIRED AS 0-10V(TYPE 1)	WIRED AS 0-10V(TYPE 2)	WIRED AS 4-20mA (SELF POWERED TYPE 1)	WIRED AS 4-20mA (SELF POWERED TYPE 2)	WIRED AS 4-20mA (LOOP POWERED)	WIRED AS DIGITAL
A,B&C	D&E	F	G	H	I	J,K&L

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

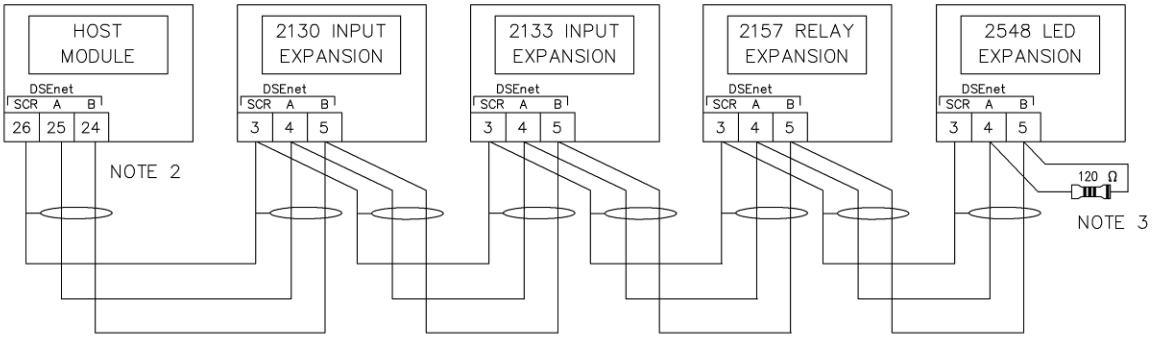
- Follow the typical wiring diagram as normal for all sections EXCEPT the earth points
- All points shown as Earth on the typical wiring diagram should connect to BATTERY NEGATIVE (not earth).

3.5 TYPICAL ARRANGEMENT OF DSENET®

Twenty (20) devices can be connected to the DSENet®, made up of the following devices :

Device	Maximum Number Supported
DSE2130 Input Expansion	4
DSE2131 Ratiometric Input Expansion	4
DSE2133 RTD/Thermocouple Intput Expansion	4
DSE2152 Analogue Output Expansion	4
DSE2157 Relay Output Expansion	10
DSE2548 LED Expansion	10

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*



NOTE 2

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

NOTE 3

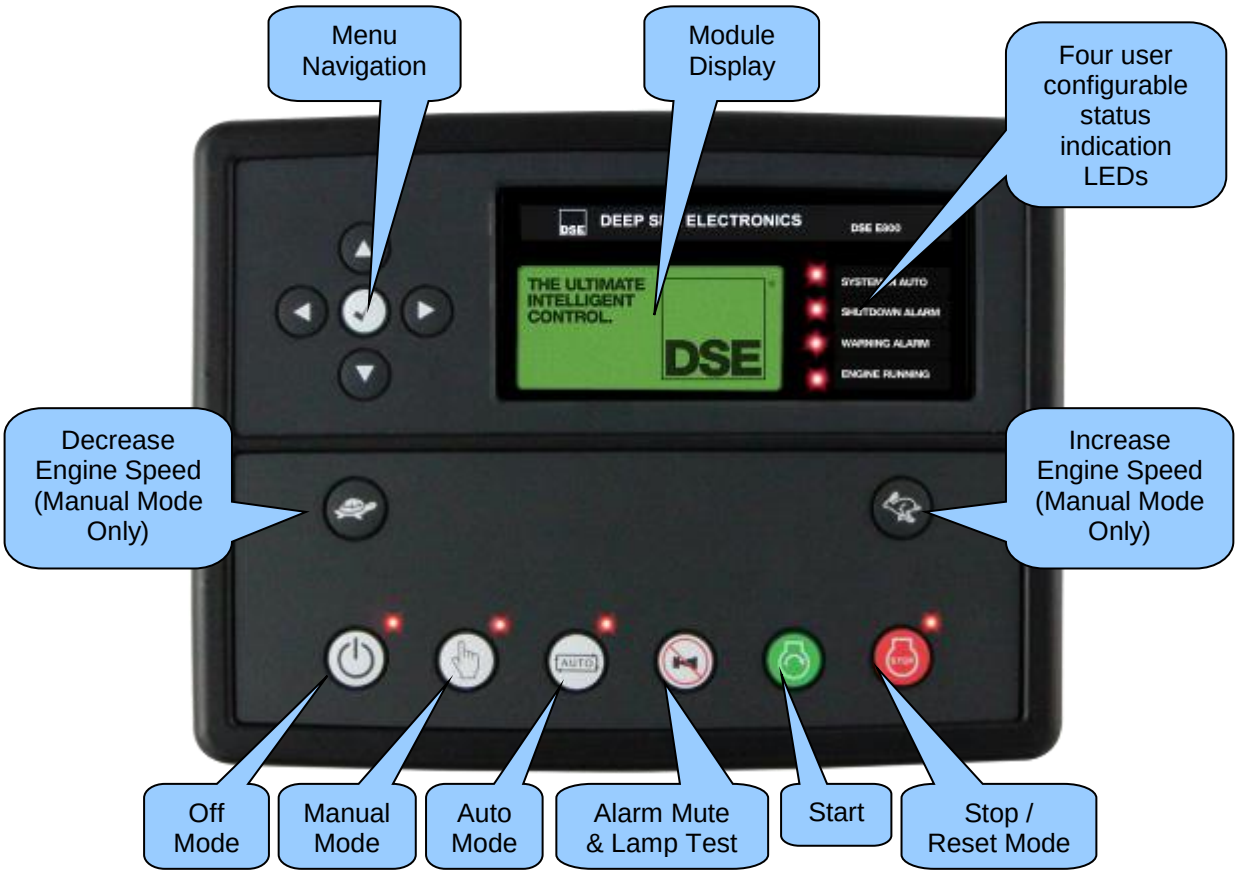
A 120 OHM TERMINATION RESISTOR MUST BE FITTED TO THE LAST UNIT ON THE DSEnet

4 DESCRIPTION OF CONTROLS

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 ***Off Mode***, ***Manual Mode***, ***Auto Mode***, **Alarm Mute/Lamp Test**, ***Start***, ***Stop/Reset Mode***, ***Increase Engine Speed*** and ***Decrease Engine Speed*** functions. For normal operation, these are the only controls which need to be operated. Details of their operation are provided later in this document.

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.



4.1 CONTROL PUSH-BUTTONS

Icon	Description
	**Off Mode** This button is only active in the ***Stop/Reset Mode***. Pressing the ***Off Mode*** button reduces the module's power consumption by turning off the modules display. Pressing the ***Off Mode*** button again to reawaken the module. The module awakens in ***Stop/Reset Mode***. *For further details, see section entitled 'Operation' elsewhere in this manual.*
	**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 engine. The module monitors the engine speed and once the configured value has been met, the engine is automatically placed on load *('**Clutch Control**' becomes active (if used))*. The engine remains on load until ***Stop/Reset Mode*** or ***Auto Mode*** are selected or the engine speed decreases below the configured value. Also in ***Manual Mode***, the module responds to the ***Increase Engine Speed*** and ***Decrease Engine Speed*** buttons after the engine's priming stage. The engine speed can be increased and decreased within the boundaries configured in the module's configuration. *For further details, see section entitled 'Operation' elsewhere in this manual.*
	**Auto Mode** This button places the module into its ***Auto Mode***. This mode allows the module to control the function of the engine automatically. The module monitors the *remote start* input and once a start request is made, the set is automatically started and placed on load *('**Clutch Control**' becomes active (if used))*. Upon removal of the starting signal, the module removes the load from the engine and shut the set down observing the *stop delay* timer and *cooling* timer as necessary *('**Clutch Control**' become inactive (if used))*. The module then waits for next start event. Also in ***Auto Mode***, the module responds to the ***Increase Engine Speed*** and ***Decrease Engine Speed*** buttons after the engine's priming stage if the module is configured automatic speed control is configured to '***Fixed Speed***'. The engine speed can be increased and decreased within the boundaries configured in the module's configuration. *For further details, see section entitled 'Operation' elsewhere in this manual.*

Icon	Description
	**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*** and ***Manual Mode***. Pressing the ***Start*** button in ***Stop/Reset Mode*** powers 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*** starts the engine. *For further details, see section entitled 'Operation' elsewhere in this manual.*
	**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/Reset Mode***, the module automatically instructs the engine to unload *('**Clutch Control**' 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 while operating in this mode, a start does not occur. *For further details, see section entitled 'Operation' elsewhere in this manual.*

Icon	Description
	**Decrease Engine Speed** This button is only active in the ***Auto Mode*** (if speed control is configured to '***Fixed Speed***') or ***Manual Mode***. Pressing the ***Decrease Engine Speed*** button decreases the engine's speed within the configured boundaries. *For further details, see section entitled 'Operation' elsewhere in this manual.*
	**Increase Engine Speed** This button is only active in the ***Auto Mode*** (if speed control is configured to '***Fixed Speed***') or ***Manual Mode***. Pressing the ***Increase Engine Speed*** button increases the engine's speed within the configured boundaries. *For further details, see section entitled 'Operation' elsewhere in this manual.*
	**Navigation Keys** Used for navigating the instrumentation, event log and configuration screens. *For further details, please see section entitled 'Operation' elsewhere in this manual.*

4.2 VIEWING THE INSTRUMENT PAGES

It is possible to scroll to display the different pages of information by repeatedly operating the ***Next & Previous Page*** buttons.

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

Example

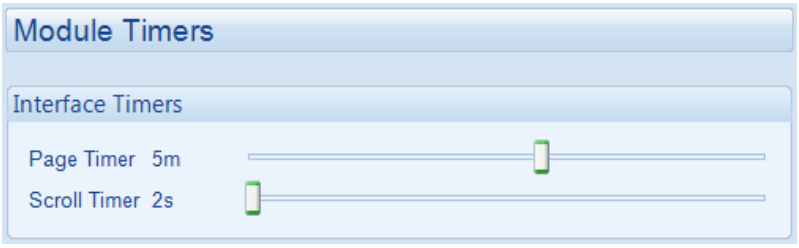
Status → Engine → Ratiometric Inputs → Further presses of the ***Next Page Button*** returns the display to the Status page.

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 shows the factory settings for the timers, taken from the DSE Configuration Suite Software.

Alternatively, to scroll manually through all instruments on the currently selected page, press the ***Instrumentation Scroll*** buttons. The 'auto scroll' is disabled.

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

To re-enable 'auto scroll' press the ***Instrumentation Scroll*** 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.

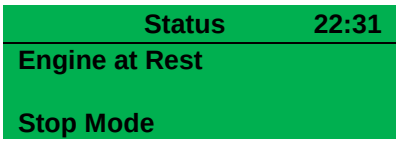
When scrolling manually, the display automatically returns to the Status page if no buttons are pressed for the duration of the configurable *LCD Page Timer*.

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.

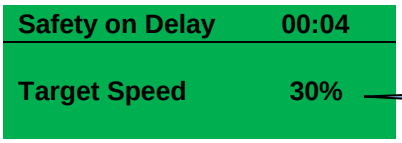
4.2.1 STATUS

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.



Factory setting of Status screen showing engine stopped...

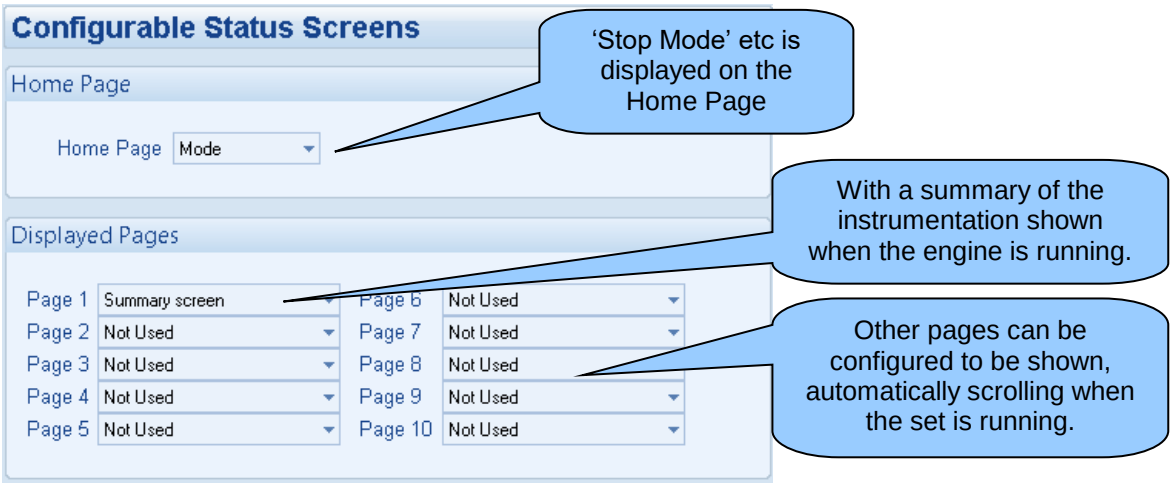


...and engine running

Target speed is given as a % of the full scale of the governor output. E.g. 30% of 10 V (full scale) = 3 V

The contents of this display may 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:



NOTE: The following sections detail instrumentation pages, accessible using the *Next & Previous Page* buttons, regardless of what pages are configured to be displayed on the 'status' screen.

4.2.1.1 ENGINE LOCKED OUT

Status	22:31
Engine Locked Out	
Stop Mode	

Engine Locked Out indicates that the engine cannot be started due to an active *Shutdown* or *Controlled Shutdown* on the module. Press the ***Next or Previous Page***  button to scroll to the alarms page to investigate. Press the ***Stop/Reset Mode***  button to clear the alarm, if the fault does not clear the fault is still active.

4.2.2 ENGINE

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

NOTE: Only active when *Maintain Value Control* is enabled. For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.***

Contains instrumentation gathered about the engine itself, some of which may be obtained using the CAN or other electronic engine link.

Active Configuration
Maintain Value Control**
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*
Flexible Sensors
Engine Maintenance Alarm 1
Engine Maintenance Alarm 2
Engine Maintenance Alarm 3
After Treatment Fuel Used*
After Treatment Exhaust Gad Temperature*
Engine Oil Level*
Engine Crank Case Pressure*
Engine Coolant Level*
Engine Injector Rail Pressure*
Engine Exhaust Temperature*
Intercooler Temperature*
Turbo Oil Pressure*
Fan Speed*
Water In Fuel*
Air Inlet Pressure*
ECU Regeneration*
ECU Regeneration Icons*
Engine Soot Levels*

Continued overleaf….

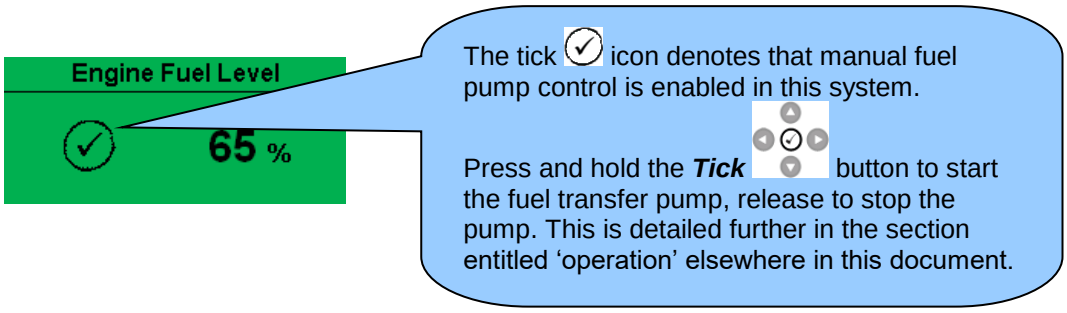
Engine continued…..

DEF Tank Level*
DEF Tank Temperature*
DEF Reagent Cons*
SCR After Treatment Status*
ECU ECR DEF Icons*
DEF Counter Minimum*
DPTC Filter Status*
Engine ECU Link*
Tier 4 Engine Information*
PWM Output E and F
PWMi Output E and F

4.2.2.1 MANUAL FUEL PUMP CONTROL

Depending upon configuration and instrument function, some of the instrumentation items may include a tick ✓ icon beside them. This denotes a further function is available, for further details refer to section entitled *Operation* elsewhere in this document.

Example:



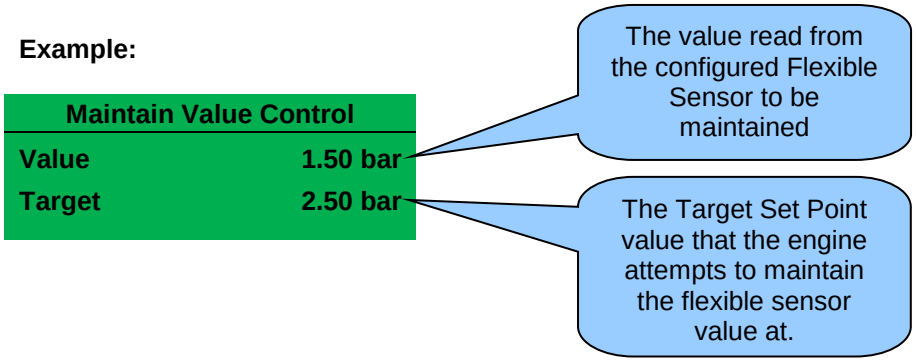
4.2.2.2 MAINTAIN VALUE CONTROL

NOTE: Only active when *Maintain Value Control* is enabled. For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

NOTE: Configuration for the *Target* value *Set Point Min / Max* are found within the Modules *Front Panel Editor* defined elsewhere in this manual and *Maintain Value Control* configured within *DSE Configuration Suite PC Software*. For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

Depending upon module configuration, this page allows the user to raise or lower *Target Set Point* of the *Maintain Value Control* parameter by selecting the *Speed Up* or *Speed Down* buttons.

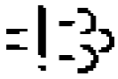
Example:



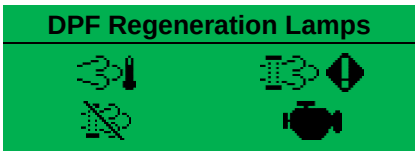
4.2.2.3 DPF REGENERATION LAMPS

NOTE: For further details of module configuration, refer to DSE Publication: *057- 203 DSEE800 Configuration Software Manual.*

Depending upon the *Engine Type* selected in the module's configuration, the *Engine* section may include the *DPF Regeneration Lamps* page. This page contains icons to show the status of various ECU functions, some of which are applicable to Tier 4 engine requirements. The icons flash at different rates to show the status of the ECU function, refer to the engine manufacturer for more information about this.

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

Example:



4.2.3 RATIOMETRIC INPUTS

Contains values of ratiometric inputs measured from the module's ratiometric input terminals.

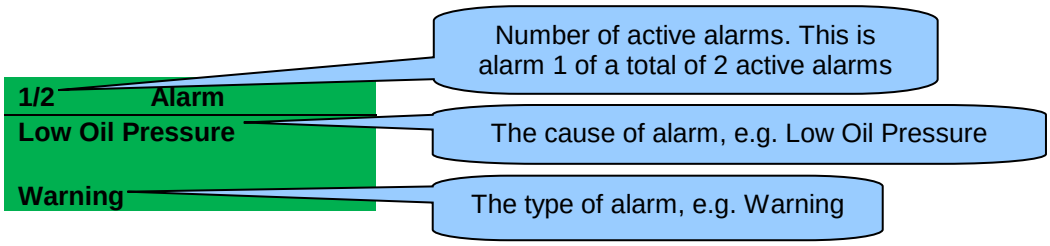
- Ratiometric Inputs A to L (Only appears if configured)

4.2.4 ALARMS

When an alarm is active, the *Internal Audible Alarm* sounds and the Common Alarm LED, if configured, illuminates.

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

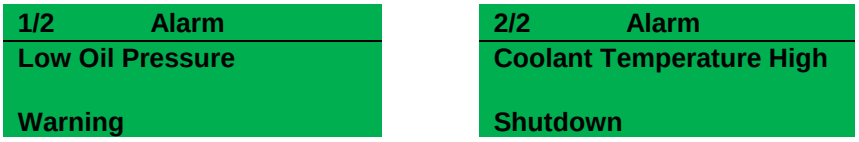
The LCD display jumps from the 'Information page' to display the Alarm Page



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.

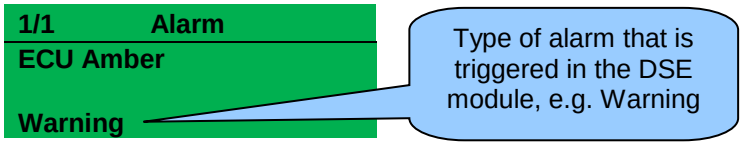
In the event of an alarm, the LCD displays the appropriate text. If an additional alarm then occurs, the module displays the appropriate text.

Example:



4.2.4.1 CAN ERROR MESSAGES

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



Press the ***Next Page*** 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.

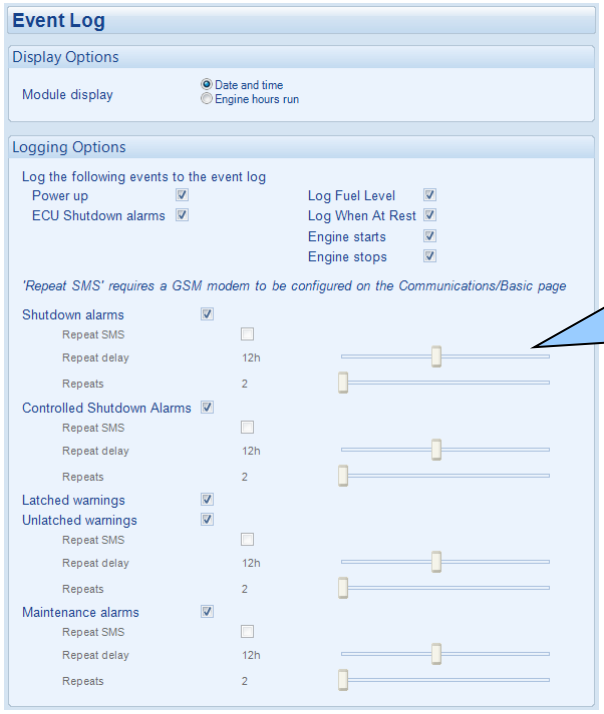
NOTE: For details on these code meanings, refer to the ECU instructions provided by the engine manufacturer, or contact the engine manufacturer for further assistance.

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

4.2.5 EVENT LOG

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 250 log entries.

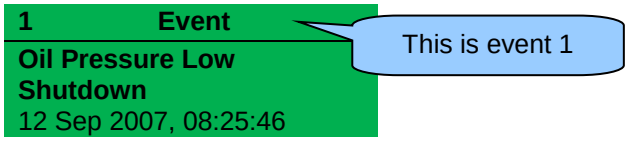
Under default factory settings, the event log is configured to include all possible options; however, this is configurable by the system designer using the DSE Configuration Suite software.



Example showing the possible configuration of the modules 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). If the module is configured and connected to a modem, an SMS message is sent on any logged event.

To view the event log, repeatedly press the ***Next or Previous Page***  buttons until the LCD screen displays 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 the ***Next or Previous Page***  buttons to select the next instrumentation page.

4.2.6 SERIAL PORT

4.2.6.1 RS232 SERIAL PORT

This section is included to give information about the RS232 serial port and external modem (if connected).

The items displayed on this page change depending upon configuration of the module. You are referred to your system supplier for further details.

NOTE: Factory Default settings are for the RS232 port to be enabled with no modem connected, operating at 19200 baud, Modbus slave address 10.

Module Connected To an RS232 Telephone Modem

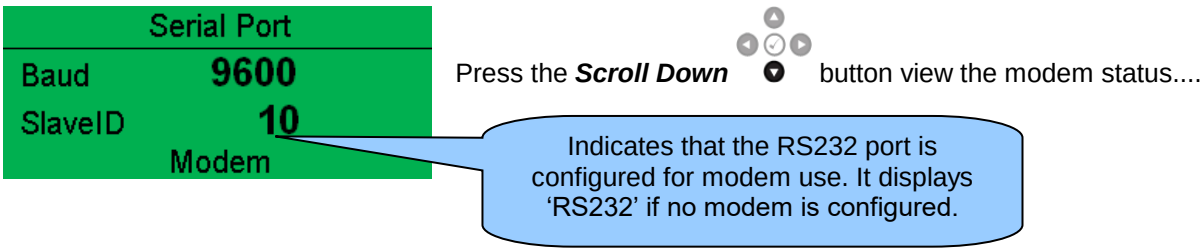
When the module is powered up, it sends 'initialisation strings' to the connected modem. It is important therefore that the modem is already powered, or is powered up at the same time as the module. At regular intervals after power up, the modem is reset, and reinitialised, to ensure the modem does not 'hang up'.

If the module does not correctly communicate with the modem, "Modem initialising' appears on the Serial Port instrument screen as shown overleaf.

If the module is set for "incoming calls" or for "incoming and outgoing calls", once the modem is dialled, it answers after two rings (using the factory setting 'initialisation strings). Once the call is established, all data is passed between the dialling PC and the module.

If the module is set for "outgoing calls" or for "incoming and outgoing calls", then the module dials out whenever an alarm is generated.

NOTE: Not all alarms generate a dial out command; this is dependant upon module configuration of the event log. Any event configured to be recorded in the event log causes the modem to dial out to a PC.



Module Connected To an RS232 GSM Modem

When the module is powered up, it sends 'initialisation strings' to the connected modem. It is important therefore that the modem is already powered, or is powered up at the same time as the module. At regular intervals after power up, the modem is reset, and reinitialised, to ensure the modem does not 'hang up'.

If the module does not correctly communicate with the modem, "Modem initialising' appears on the Serial Port instrument screen as shown overleaf.

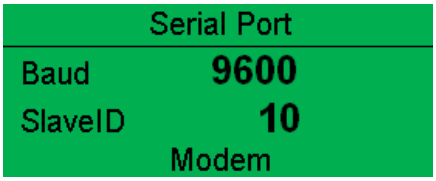
If the module is set for "incoming calls" or for "incoming and outgoing calls", once the modem is dialled, it answers after two rings (using the factory setting 'initialisation strings). Once the call is established, all data is passed between the dialling PC and the module.

If the module is set for "outgoing calls" or for "incoming and outgoing calls", then the module dials out whenever an alarm is generated.

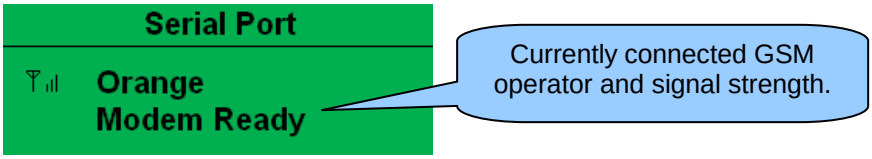
NOTE: Not all alarms generate a dial out command; this is dependant upon module configuration of the event log. Any event configured to be recorded in the event log causes the modem to dial out to a PC.

Many GSM modems are fitted with a status LED to show operator cell status and ringing indicator. These are a useful troubleshooting tool.

In the case of GSM connection problems, try calling the DATA number of the SIMCARD with an ordinary telephone. There should be two rings, followed by the modem answering the call and then 'squealing'. If this does not happen, you should check all modem connections and double check with the SIM provider that it is a DATA SIM and can operate as a data modem. DATA is NOT the same as FAX or GPRS and is often called Circuit Switched Data (CSD) by the SIM provider.



Press the ***Scroll Down***  button view the modem GSM status....

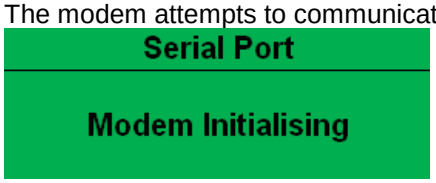


NOTE: In the case of GSM modems, it is important that a DATA ENABLED SIM is used. This is often a different number than the 'voice number' and is often called Circuit Switched Data (CSD) by the SIM provider.

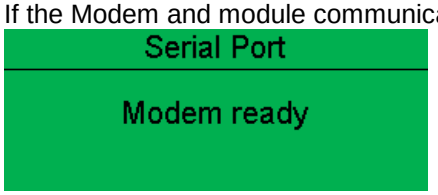
If the GSM modem is not purchased from DSE, ensure that it has been correctly set to operate at 9600 baud.

Modem Initialisation Sequence

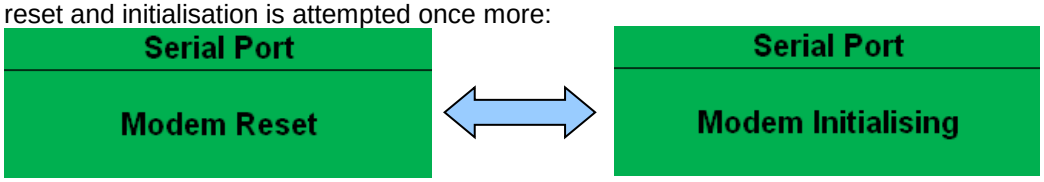
1) The modem attempts to communicate to the module



2) If the Modem and module communicate successfully:



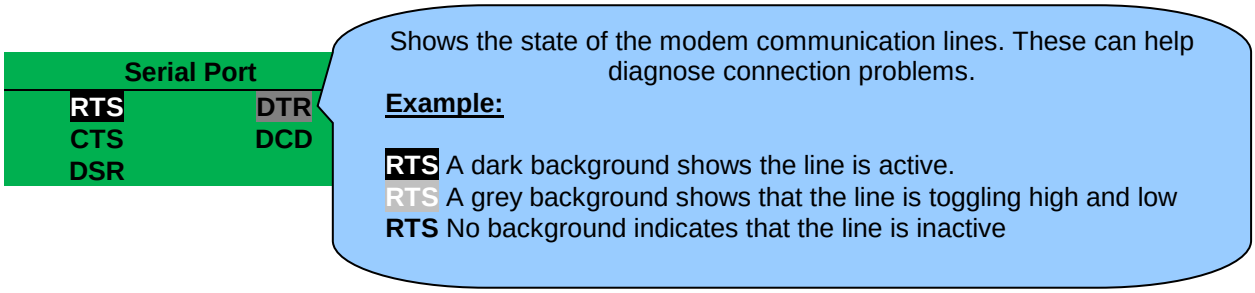
3) In case of communication failure between the modem and module, the modem is automatically reset and initialisation is attempted once more:



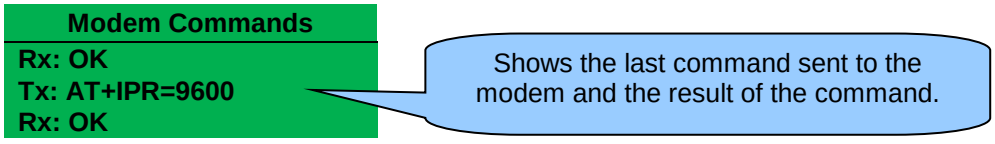
In the case of a module that is unable to communicate with the modem, the display continuously cycles between 'Modem Reset' and 'Modem Initialising' as the module resets the modem and attempts to communicate with it again, this continues until correct communication is established with the modem. In this instance, you should check connections and verify the modem operation.

Module Modem Diagnostics

Modem diagnostic screens are included; press the ***Scroll Down***  button when viewing the *RS232 Serial Port* instruments to cycle to the available screens. If you are experiencing modem communication problems, this information aids troubleshooting.



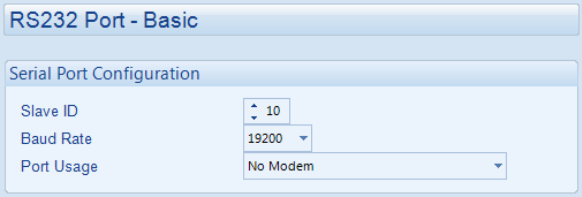
Line	Description	
RTS	Request to Send	Flow Control
CTS	Clear to Send	Flow Control
DSR	Data Set Ready	Ready to Communicate
DTR	Data Terminal Ready	Ready to Communicate
DCD	Data Carrier Detect	Modem is Connected

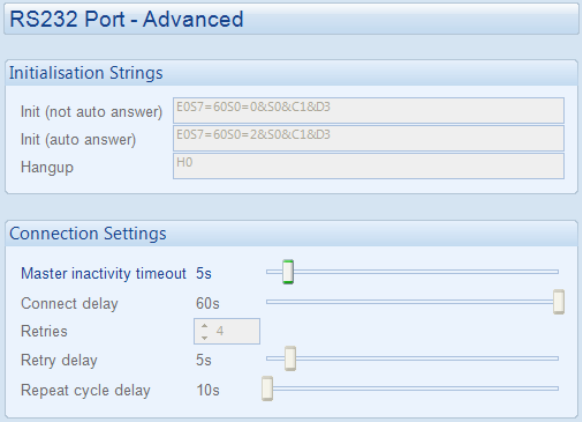


Module RS232 Port Configured For Connection to A Modbus Master

The modules operate as a modbus RTU slave device. In a modbus system, there is only one Master, typically a PLC, HMI system or PC SCADA system.

This master requests for information from the modbus slave (The module) and may (in control systems) also send request to change operating modes etc. Unless the Master makes a request, the slave is 'quiet' on the data link.





The factory settings are for the module to communicate at 19200 baud, modbus slave address 10.

To use the RS232 port, ensure that 'port usage' is correctly set using the DSE Configuration Suite Software.

'Master inactivity timeout' should be set to at least twice the value of the system scan time. For example if a modbus master PLC requests data from the module once per second, the timeout should be set to at least 2 seconds

The DSE MODBUS document containing register mappings inside the DSE module is available upon request from support@deepseaplc.com. Email your request along with the serial number of your DSE module to ensure the correct information is sent to you.

4.2.6.2 RS485 SERIAL PORT

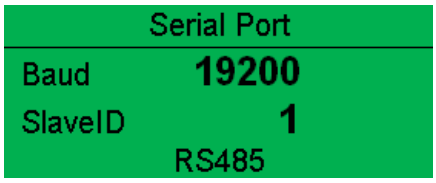
This section is included to give information about the currently selected serial port

The items displayed on this page change depending upon configuration of the module. You are referred to your system supplier for further details.

NOTE: Factory Default settings are for the RS485 port to operate at 19200 baud, modbus slave address 10.

Module RS485 Port Configured For Connection to A Modbus Master

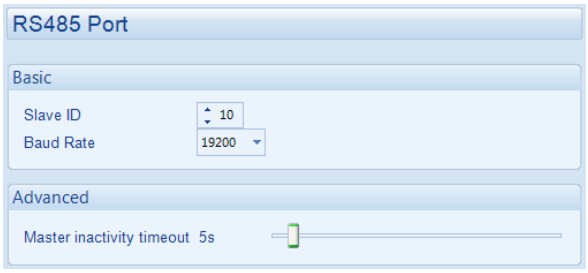
The modules operate as a modbus RTU slave device.
In a modbus system, there is only one Master, typically a PLC, HMI system or PC SCADA system.



This master requests for information from the modbus slave (The module) and may (in control systems) also send request to change operating modes etc. Unless the Master makes a request, the slave is 'quiet' on the data link.

The factory settings are for the module to communicate at 19200 baud, modbus slave address 10.

'Master inactivity timeout' should be set to at least twice the value of the system scan time. For example if a modbus master PLC requests data from the module once per second, the timeout should be set to at least 2 seconds.



The DSE MODBUS document containing register mappings inside the DSE module is available upon request from support@deepseaplc.com. Email your request along with the serial number of your DSE module to ensure the correct information is sent to you.

Typical Requests (Using Pseudo Code)

`BatteryVoltage=ReadRegister(10,0405,1)`: reads register (hex) 0405 as a single register (battery volts) from slave address 10.

`WriteRegister(10,1008,2,35701, 65535-35701)`: Puts the module into AUTO mode by writing to (hex) register 1008, the values 35701 (auto mode) and register 1009 the value 65535-35701 (the bitwise opposite of auto mode)

`Shutdown=(ReadRegister(10,0306,1) >> 12) & 1)`: reads (hex) 0306 and looks at bit 13 (shutdown alarm present)

`Warning=(ReadRegister(10,0306,1) >> 11) & 1)`: reads (hex) 0306 and looks at bit 12 (Warning alarm present)

`ControlledShutdown=(ReadRegister(10,0306,1) >> 10) & 1)`: reads (hex) 0306 and looks at bit 11 (Controlled Shutdown alarm present)

`ControlMode=ReadRegister(10,0304,2)`: reads (hex) register 0304 (control mode).

4.2.7 ABOUT

4.2.7.1 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	**E800**
Application	**V1.2.12**
USB ID	**BC614E**

- Variant (E800)
- 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	**V1.3.2**
Analogue	**V1.0.13**
Engine	**V1.24**

- Bootloader - Firmware Update bootloader software version
- Analogue – Analogue measurements software version
- Engine – Engine type file version.

4.2.7.2 ETHERNET

Whilst in the 'ABOUT' section, press the ***Scroll Down***  button to access more information about the network settings.

Network settings change be configured using DSE Configuration Suite Software. The module must be rebooted for the changes to take effect.

Network
IP Address
192.168.50.76
DHCP Disabled

- IP Address – The configured network IP address of the module
- DHCP – Dynamic Host Configuration Protocol (DHCP) has been enabled or disabled in the modules configuration.

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

Network
Subnet Mask
255.255.255.0

- Subnet Mask – The configured network subnet mask of the module.

Network
Gateway Address
192.168.49.76

- Gateway Address – The configured network gateway address of the module.

Network
DNS Address
192.168.88.99

- DNS Address – The configured network DNS address of the module.

Network
MAC Address
E8.A4.C1.0.A.C2

- MAC Address – The MAC address of the module, this cannot be changed and is unique to every Ethernet device.

DHCP
Host
Domain
Vender

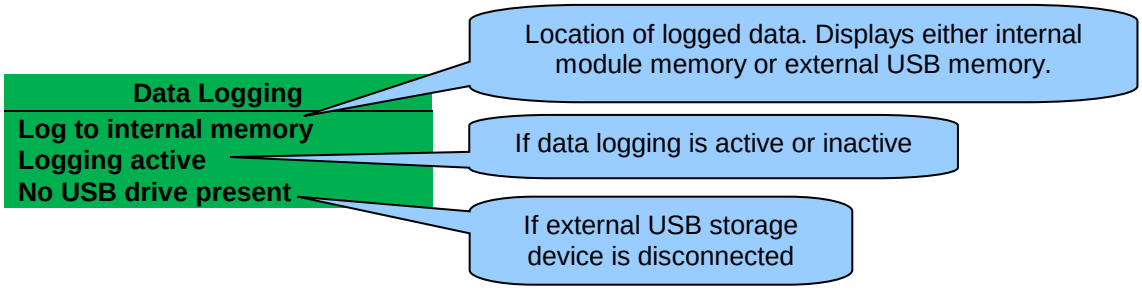
- DHCP – The DHCP settings of module if configured.

MODBUS Over IP	
TCP Port	502
Pref IP	192.168.20.11

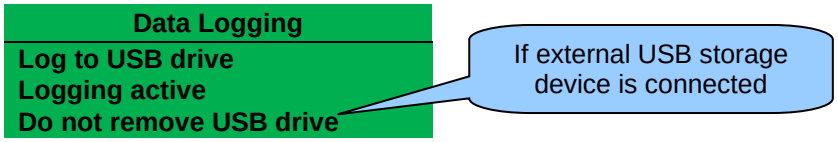
- TCP Port – The MODBUS TCP communication port number.
- Pref IP – The preferred connection IP address. The module can support up to 4 MODBUS TCP masters. If there is an additional request from another master with this IP address, it will be allowed to be the fifth MODBUS TCP master.

4.2.7.3 DATA LOGGING

Whilst in the 'ABOUT' section, press ***Scroll Down***  button to access more information about the data logging settings.

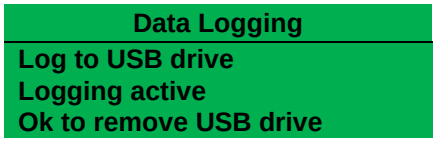


Inserting a USB storage device to the USB host connector on the rear of the module displays the following change to the page.



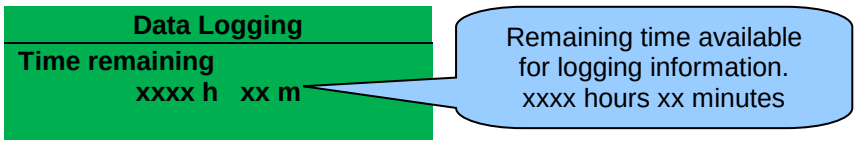
NOTE: Removal of the USB drive should only be carried out using the following method.

Press and hold the ***Tick***  button until "*Ok to remove USB drive*" is displayed.

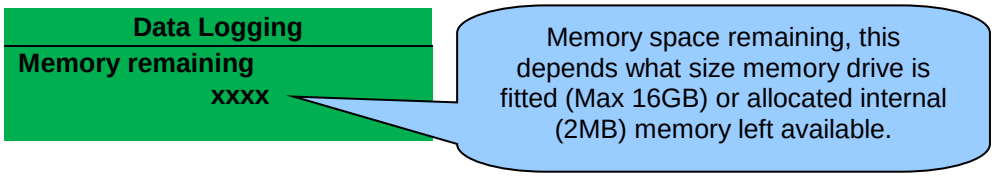


It is now safe to remove the USB drive.
This ensures the logging data file saves to memory complete and does not become corrupt.

Press ***Scroll Down***  button to view the next page.

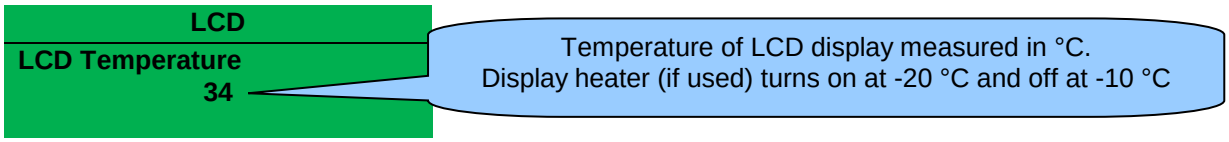


Press ***Scroll Down***  button to view the next page.



4.2.7.4 LCD

Whilst in the 'ABOUT' section, press ***Scroll Down***  button to access more information about the LCD Temperature.



4.3 USER CONFIGURABLE INDICATORS

These LEDs 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, Controlled Shutdowns & 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.*



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



5.1.2 STOPPING THE ENGINE



5.2 OFF 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.

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

The LED above the ***Off Mode*** button illuminates to indicate that the controller is in the ***Off Mode***.

In ***Off Mode***, the engine does not start manually or automatically.

Press the ***Off Mode*** button again to awaken the module. The module awakens in the ***Stop/Reset Mode***.

5.3 MANUAL 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.

Manual Mode is activated by pressing the ***Manual Mode*** button.
The LED above the ***Manual Mode*** button illuminates to indicate ***Manual Mode*** operations.

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.

The fuel relay is energised and the engine is cranked.

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

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

The starter motor is disengaged when the engine fires. Speed detection is derived from the Pulse Pickup Terminals which are measured from a Magnetic Pickup mounted on the flywheel, charge alternator tachometer output or from the CANbus link to the engine ECU depending on module configuration.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

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

Once the engine is running and all starting timers have expired, the engine is seen as available.

In ***Manual Mode*** , the ***Clutch Control*** output (if configured) activates automatically if the engine speed has increased above the configured engage value.

NOTE: The Clutch Control remains inactive until the Oil Pressure has risen. This prevents excessive wear on the engine.

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

- Press the ***Auto Mode*** button to return to automatic mode. The set observes all ***Auto Mode*** start requests and stopping timers before beginning the *Auto Mode Stopping Sequence*.
- Press the ***Stop/Reset Mode*** button to remove load and stop the engine.

5.3.3 STOPPING SEQUENCE

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

The ***Stop/Reset Mode*** button is pressed – The ***Clutch Control*** output is de-activated immediately and the engine 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 AUTOMATIC MODE

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

Auto Mode is activated by pressing the ***Auto Mode*** button.
The LED above the ***Auto Mode*** button illuminates to indicate ***Auto Mode*** operations.

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

5.4.1 WAITING IN AUTO MODE

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

- Activation of an auxiliary input that has been configured to *Remote Start.*
- Activation of the inbuilt exercise scheduler.

5.4.2 STARTING SEQUENCE

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.

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

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

The starter motor is disengaged when the engine fires. Speed detection is derived from the Pulse Pickup Terminals which are measured from a Magnetic Pickup mounted on the flywheel, charge alternator tachometer output or from the CANbus link to the engine ECU depending on module configuration.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

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.

5.4.3 ENGINE RUNNING

Once the engine is running and all starting timers have expired, the engine is seen as available.

The ***Clutch Control*** output (if configured) activates automatically if configured to do so.

NOTE: The Clutch Control remains inactive until the Oil Pressure has risen. This prevents excessive wear on the engine.

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

5.4.4 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 engine returns on load.

If there are no starting requests at the end of the *Return Delay* timer, the ***Clutch Control*** output (if configured) de-activates and the *Cooling Down Timer* is initiated.

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

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

5.5 STOP/RESET MODE

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

Stop/Reset Mode is activated by pressing the ***Stop/Reset Mode*** button.
The LED above the ***Stop/Reset Mode*** button illuminates to indicate ***Stop/Reset Mode*** operations.

In ***Stop/Reset Mode***, the module removes the engine from load (if necessary) before stopping if it is already running.

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

- Engine speed is zero as detected by the CANbus ECU or Pulse Pickup Input
- Charge Alternator Voltage must be zero.
- Oil pressure sensor must indicate low oil pressure

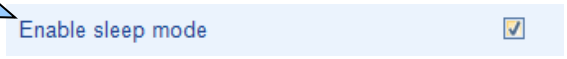
When the engine has stopped, it is possible to send configuration files to the module from DSE Configuration Suite PC software and to enter the Front Panel Editor to change parameters.

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 *Sleep Mode,* the module enters *Sleep Mode*. To 'wake' the module, press any fascia control buttons.

Sleep Mode in the DSE Configuration Suite Software



NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

5.6 SCHEDULER

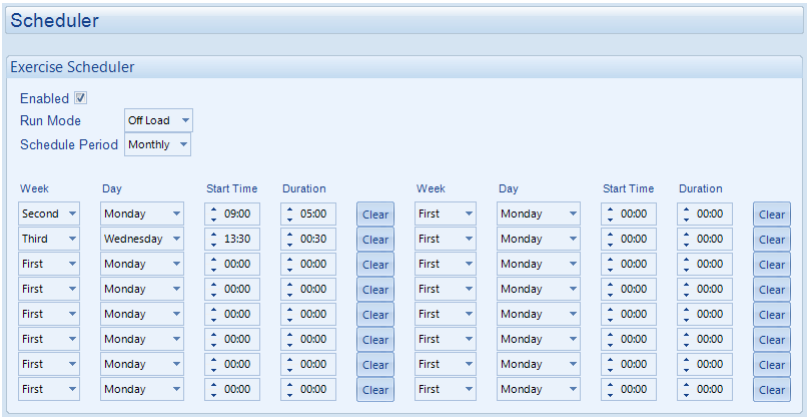
The controller contains an inbuilt exercise run scheduler, capable of automatically starting and stopping the set. Up to 16 scheduled start/stop sequences can be configured to repeat on a 7-day or 28-day cycle.

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 on Monday in the Second Week of each month at 09:00 am and runs for 5 hours, then Wednesday in the Third Week of each month at 13:30 pm and runs for 30 minutes.



5.6.1 OFF MODE

- Scheduled runs do not occur when the module is in ***Off Mode***.

5.6.2 MANUAL MODE

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

5.6.3 AUTO MODE

- Scheduled runs operate ONLY if the module is in ***Auto Mode*** with no Shutdown or Controlled Shutdown alarm present.
- If the module is in ***Off Mode***, ***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 engine is placed ON LOAD for the duration of the Schedule.

5.6.4 STOP/RESET MODE

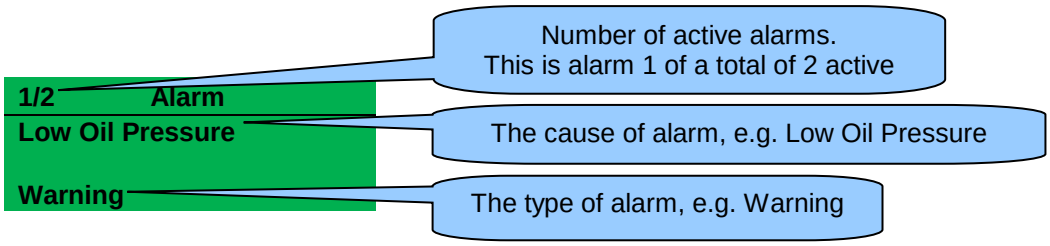
- Scheduled runs do not occur when the module is in ***Stop/Reset Mode***.

6 PROTECTIONS

When an alarm is active, the *Internal Audible Alarm* sounds and the Common Alarm LED if configured illuminates.

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

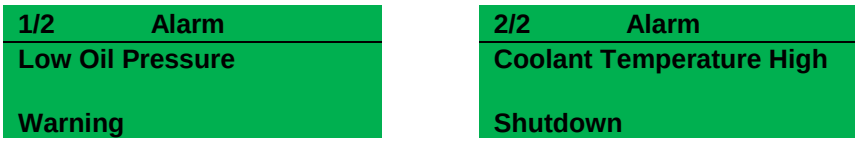
The LCD display jumps from the 'Information page' to display the Alarm Page



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.

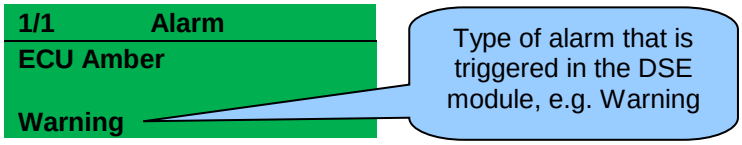
In the event of an alarm, the LCD displays the appropriate text. If an additional alarm then occurs, the module displays the appropriate text.

Example:

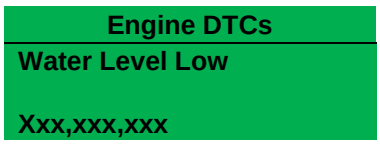


6.1 CAN ERROR MESSAGES

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



Press the ***Next Page*** 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.

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 operation of electronic engines, refer to DSE Publication: *057-004 Electronic Engines And DSE Wiring Guide*

6.2 PROTECTIONS DISABLED

User configuration is possible to prevent Shutdown & Controlled Shutdown alarms from stopping the engine. Under such conditions, *Protections Disabled* appears on the module display to inform the operator of this status.

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

When configuring this feature in the PC software, the system designer chooses to make the feature either permanently active, or only active upon operation of an external switch. The system designer provides this switch (not DSE) so its location varies depending upon manufacturer, however it normally takes the form of a key operated switch to prevent inadvertent activation. Depending upon configuration, a warning alarm may be generated when the switch is operated.

The feature is configurable in the PC configuration software for the module. Writing a configuration to the controller that has “Protections Disabled” configured, results in a warning message appearing on the PC screen for the user to acknowledge before the controller’s configuration is changed. This prevents inadvertent activation of the feature.

NOTE: For further details of module configuration, refer to DSE Publication: *057-203 DSEE800 Configuration Software Manual.*

6.2.1 INDICATION AND WARNING ALARMS

Under Indication or Warning alarms:

- The module operation is unaffected by the *Protections Disabled* feature. See sections entitled *Indications* and *Warning Alarms* elsewhere in this document.

6.2.2 SHUTDOWN AND CONTROLLED SHUTDOWN ALARMS

NOTE: The Emergency Stop input and Engine Overspeed Shutdown alarms continue to operate even when *Protections Disabled* has been activated.

Under Shutdown or Controlled Shutdown alarm conditions (excluding Emergency Stop and Overspeed):

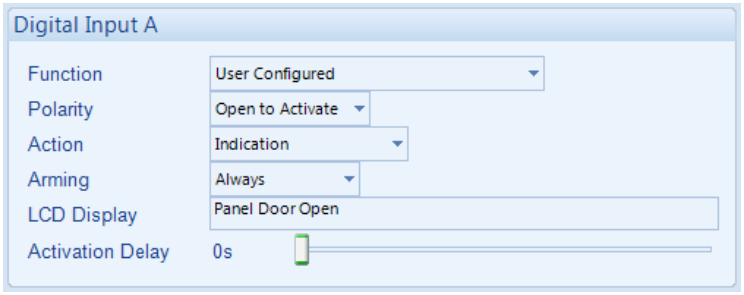
- The alarm is displayed on the screen as detailed in the section entitled *Shutdown Alarm*s or *Controlled Shutdown Alarms* elsewhere in this document.
- The set continues to run.
- The *Clutch Control* maintains active (it is not opened if already closed)
- ***Shutdown Blocked*** also appears on the LCD screen to inform the operator that the Protections Disabled feature has blocked the shutdown of the engine under the normally critical fault.
- The ‘shutdown’ alarm is logged by the controllers *Event Log (*if configured to log shutdown alarms) and logs that the Shutdown was prevented.

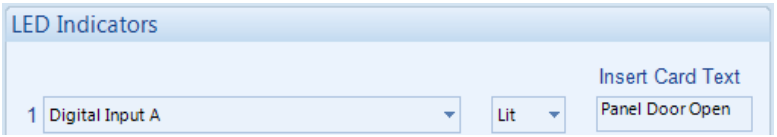
6.3 INDICATIONS

Indications are non-critical and often status conditions. They do not appear on the LCD of the module as a text message. However, an output or LED 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.
- LED Indicator to make LED1 illuminate when Digital Input A is active.
- The Insert Card Text allows the system designer to print an insert card detailing the LED function.
- Sample showing operation of the LED.



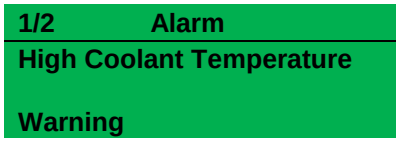




6.4 WARNING ALARMS

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



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.

Display	Reason
Ratiometric Input A to L Digital Input	If a ratiometric input has been configured to a digital input and has been configured as a warning the appropriate LCD message is displayed.
Ratiometric Input A to L High	The module detects that the value of the ratiometric input has increased pre-alarm setting.
Ratiometric Input A to L Low	The module detects that the value of the ratiometric input has fallen below pre-alarm setting.
Charge Air Temperature	The module detects that the engine ECU has detected the Charge Air Temperature has exceeded the pre-alarm trip level.
Charge Alternator Failure	The module detects the auxiliary charge alternator voltage from the W/L terminal has fallen below the pre-alarm level.
Coolant Temperature Sender Open Circuit	The module detects that the circuit to the coolant temperature sensor has been broken.
DEF Level Low	The module detects that the engine ECU has measured the DEF level to be lower than the configured *Pre-alarm* level.
Digital Input A to K	If a digital input has been configured as a warning the appropriate LCD message is displayed.
ECU After Treatment	The module detects that the engine ECU has detected that the after treatment is currently in progress.
ECU Amber	The module detects that the engine ECU has detected a fault causing an Amber alarm.
ECU Protect	The module detects that the engine ECU has detected a fault causing a Protect alarm.
ECU Malfunction	The module detects that the engine ECU has detected a fault causing a Malfunction alarm.
ECU Red	The module detects that the engine ECU has detected a fault causing a Red alarm.

Alarms continued overleaf..

Display	Reason
Battery High Voltage	The Engine DC supply has risen above the high volts setting level for the duration of the high battery volts timer
Battery Low Voltage	The Engine DC supply has fallen below the low volts setting level for the duration of the low battery volts timer
Engine Maintenance Alarm 1, 2 & 3	Indicates that the engine maintenance alarm has triggered. A visit is required by the engine service company.
Fuel Tank Bund Level High	The module detecs that the *Fuel Tank Bund Level High* input has become active, or the *Fuel Tank Bund Level High* message has been received from the ECU.
Fuel Usage	Indicates the amount of fuel measured by the fuel level sensor is in excess of the *Fuel Usage* alarm settings. This often indicates a fuel leak or potential fuel theft.
High Coolant Temperature	The module detects that the engine coolant temperature has exceeded the high engine temperature pre-alarm trip setting after the *Safety On* timer has expired.
Low Coolant Temperature	The module detects that the engine coolant temperature has fallen below the high engine temperature pre-alarm setting level.
Low Fuel Level	The level detected by the fuel level sensor is below the low fuel level setting.
Low Oil Pressure	The module detects that the engine oil pressure has fallen below the low oil pressure pre-alarm setting level after the *Safety On* timer has expired.
Loss Of Speed Sensing	The speed signal from the pulse input is not being received by the DSE controller.
Pulse Pickup Open Circuit	The module detects that the circuit to the MPU has been broken.
Overspeed	The module detects that the engine speed has risen above the overspeed pre alarm setting.
Underspeed	The module detects that the engine speed has fallen below the underspeed pre alarm setting.
Water In Fuel	The module detecs that the *Water In Fuel* input has become active, or the *Water In Fuel* message has been received from the ECU.

6.5 CONTROLLED SHUTDOWN ALARMS

NOTE: Shutdown and Controlled Shutdown alarms can be disabled by user configuration. See the section entitled *Protections Disabled* elsewhere in this document.

Controlled Shutdowns are latching and stop engine but in a controlled manner. On initiation of the Controlled Shutdown condition the module de-energises all the ***'Clutch Control'*** output to remove the load from the engine. Once this has occurred the module starts the *Cooling Down Timer* and allows the engine to cool off-load before shutting it down. The alarm must be accepted and cleared, and the fault removed to reset the module.

Example

1/2 Alarm
High Coolant Temperature

Controlled Shutdown

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

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

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

Display	Reason
Ratiometric Input A to L Digital Input	If a ratiometric input has been configured to a digital input and has been configured as a warning the appropriate LCD message is displayed.
Ratiometric Input A to L High	The module detects that the value of the ratiometric input has increased pre-alarm setting.
Ratiometric Input A to L Low	The module detects that the value of the ratiometric input has fallen below pre-alarm setting.
Charge Air Temperature	The module detects that the engine ECU has detected the Charge Air Temperature has exceed the trip level.
Digital Input A to K	If a digital input has been configured as an controlled shutdown, the appropriate LCD message is displayed.
DEF Level Low	The module detects that the engine ECU has measured the DEF level to be lower than the configured A*larm* level.
ECU After Treatment	The module detects that the engine ECU has detected that the after treatment is currently in progress.
ECU Amber	The module detects that the engine ECU has detected a fault causing an Amber alarm.
ECU Protect	The module detects that the engine ECU has detected a fault causing a Protect alarm.
ECU Malfunction	The module detects that the engine ECU has detected a fault causing a Malfunction alarm.
ECU Red	The module detects that the engine ECU has detected a fault causing a Red alarm.

Alarms continued overleaf...

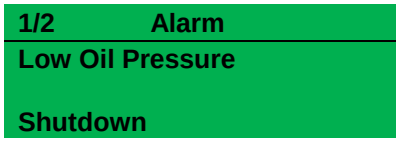
Display	Reason
Fuel Tank Bund Level High	The module detecs that the *Fuel Tank Bund Level High* input has become active, or the *Fuel Tank Bund Level High* message has been received from the ECU.
Fuel Usage	Indicates the amount of fuel measured by the fuel level sensor is in excess of the *Fuel Usage* alarm settings. This often indicates a fuel leak or potential fuel theft.
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.
Low Fuel Level	The level detected by the fuel level sensor is below the low fuel level trip setting.
Water In Fuel	The module detecs that the *Water In Fuel* input has become active, or the *Water In Fuel* message has been received from the ECU.

6.6 SHUTDOWN ALARMS

NOTE: Shutdown and Controlled Shutdown alarms can be disabled by user configuration. See the section entitled *Protections Disabled* elsewhere in this document.

Shutdown alarms are latching and immediately stop the engine. On Initiation of the Shutdown condition the module de-energises all the ***'Clutch Control'*** output to remove the load from the engine. Once this has occurred, the module shuts the engine down immediately to prevent further damage. The alarm must be accepted and cleared, and the fault removed to reset the module.

Example



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

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

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

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).

Display	Reason
Air Flap Closed Alarm	The module detects the air flap has closed.
Ratiometric Input A to L Digital Input	If a ratiometric input has been configured to a digital input and has been configured as a warning the appropriate LCD message as displayed.
Ratiometric Input A to L High	The module detects that the value of the ratiometric input has increased pre-alarm setting.
Ratiometric Input A to L Low	The module detects that the value of the ratiometric input has fallen below pre-alarm setting.
Memory Corruption	The module detects it has lost its calibration and should be sent back to DSE for repair.
Charge Alternator Failure	The module detects the auxiliary charge alternator voltage from the W/L terminal has fallen below the trip level.
Charge Air Temperature	The module detects that the engine ECU has detected the Charge Air Temperature has exceed the trip level.
Coolant Temperature Sender Open Circuit	The module detects that the circuit to the coolant temperature sensor has been broken.
Emergency Stop	The module detects that the emergency stop has been pressed from the emergency stop terminal

Alarms continued overleaf...

Display	Reason
DEF Level Low	The module detects that the engine ECU has measured the DEF level to be lower than the configured A*larm* level.
Digital Input A to K	If a digital input has been configured as an shutdown alarm, the appropriate LCD message as displayed.
ECU After Treatment	The module detects that the engine ECU has detected that the after treatment is currently in progress.
ECU Amber	The module detects that the engine ECU has detected a fault causing an Amber alarm.
ECU Protect	The module detects that the engine ECU has detected a fault causing a Protect alarm.
ECU Malfunction	The module detects that the engine ECU has detected a fault causing a Malfunction alarm.
ECU Red	The module detects that the engine ECU has detected a fault causing a Red alarm.
Engine Maintenance Alarm 1, 2 & 3	Indicates that the engine maintenance alarm has triggered. A visit is required by the engine service company.
Fail to Start	The module has detected that the engine has failed to start after the configured number of start attempts.
Fuel Tank Bund Level High	The module detecs that the *Fuel Tank Bund Level High* input has become active, or the *Fuel Tank Bund Level High* message has been received from the ECU.
Fuel Usage	Indicates the amount of fuel measured by the fuel level sensor is in excess of the *Fuel Usage* alarm settings. This often indicates a fuel leak or potential fuel theft.
Low Fuel Level	The level detected by the fuel level sensor is below the low fuel level setting.
Low Oil Pressure	The module detects that the engine oil pressure has fallen below the low oil pressure alarm trip setting level after the Safety On timer has expired.
Oil Pressure Sender Open Circuit	The module detects that the circuit to the oil pressure sensor has been broken.
Loss Of Speed Sensing	The speed signal from the pulse pickup is not being received by the DSE controller.
Pulse Pickup Open Circuit	The module detects that the circuit to the MPU has been broken.
Overspeed	The engine speed has risen above the overspeed alarm trip setting
Underspeed	The engine speed has fallen below the underspeed alarm trip setting
Water In Fuel	The module detecs that the *Water In Fuel* input has become active, or the *Water In Fuel* message has been received from the ECU.

6.7 MAINTENANCE ALARM

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

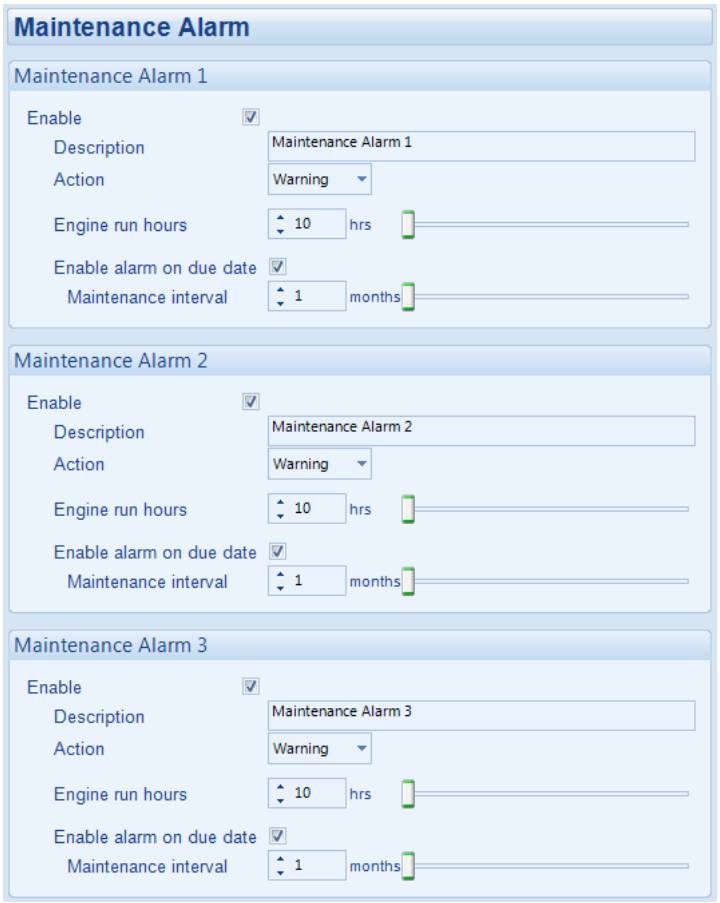
Example 1

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).

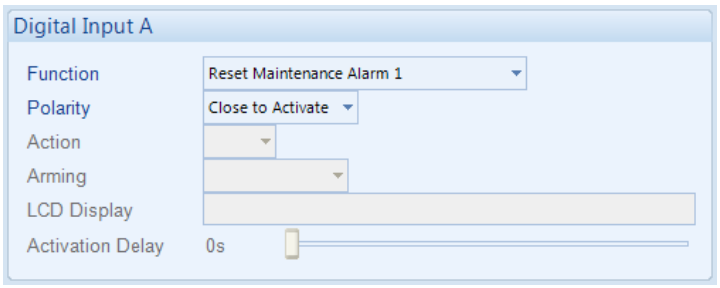
Resetting the maintenance alarm is normally actioned by the site service engineer after performing the required maintenance.
The method of reset is either by:

- 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

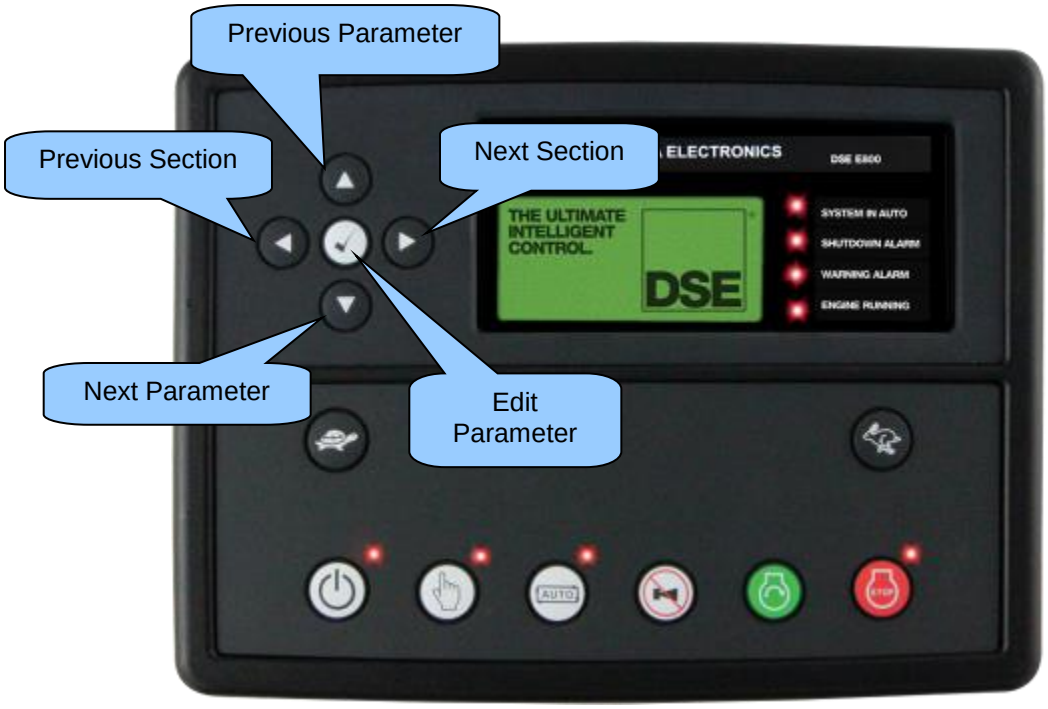
Screen capture from DSE Configuration Suite Software showing the Maintenance Alarm Reset 'button' in the DSE Configuration Suite SCADA | MAINTENANCE section.



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 MAIN CONFIGURATION EDITOR

7.1.1 ACCESSING THE MAIN CONFIGURATION EDITOR

NOTE: More comprehensive module configuration is possible via PC configuration software. For further details of module configuration, refer to DSE Publication: 057-203 DSEE800 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

- 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 ***Instrumentation Scroll*** buttons to adjust it to the correct value.
- Press the ***Next Page*** button when the first digit is correctly entered. The digit you have just entered now shows as '#' for security.
- Press the ***Previous Page*** 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.

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.

7.1.3 EDITING A PARAMETER

- Press the ***Next or Previous Page***  buttons to cycle to the section which is required to be edited. Press the ***Instrumentation Scroll***  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 ***Instrumentation Scroll***  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.

NOTE: Pressing and holding the *Instrumentation Scroll*  **buttons gives an auto-repeat functionality. Values can be changed quickly by holding the navigation buttons for a prolonged period of time.**

7.1.4 EXITING THE MAIN CONFIGURATION EDITOR

- 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.

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

7.1.5 AVAILABLE PARAMETERS TO BE EDITED

Section	Parameter As Shown On Display	Value
Display	Contrast	0 %
	Backlight Level	0 %
	Language	English
	Current Date and Time	Day:month:year, hour:minute:seconds
Engine	Oil Pressure Low Shutdown (When Enabled)	0.00 bar, kPa, psi
	Oil Pressure Low Pre Alarm (When Enabled)	0.00 bar, kPa, psi
	Coolant Temperature High Pre Alarm (When Enabled)	0 ºC, ºF
	Coolant Temp High Controlled Shutdown (When Enabled)	0 ºC, ºF
	Coolant Temperature High Shutdown (When Enabled)	0 ºC, ºF
	Start Delay Off Load	0 h 0 m 0 s
	Start Delay On Load	0 h 0 m 0 s
	Start Delay Telemetry	0 h 0 m 0 s
	Pre Heat Temperature (When Enabled)	0 ºC, ºF
	Pre Heat Timer	0 h 0 m 0 s
	Post Heat Temperature (When Enabled)	0 ºC, ºF
	Post Heat Timer	0 h 0 m 0 s
	Cranking	0 m 0 s
	Crank Rest	0 m 0 s
	Safety On Delay	0 m 0 s
	Smoke Limiting	0 m 0 s
	Smoke Limiting Off	0 m 0 s
	Warming	0 m 0 s
	Cool Down Time	0 h 0 m 0 s
	Under Speed Shutdown	Active, Inactive
	Under Speed Shutdown (When Enabled)	0 rpm
	Under Speed Warning	Active, Inactive
	Under Speed Warning (When Enabled)	0 rpm
	Over Speed Warning	Active, Inactive
	Over Speed Warning (When Enabled)	0 rpm
	Over Speed Shutdown	0 rpm
	Speed Overshoot Delay	0 m 0 s
	Speed Overshoot	0 %
	Fail To Stop Delay	0 m 0 s
	Battery Under Voltage Warning	Active, Inactive
	Battery Under Voltage Warning Delay (When Enabled)	0 h 0 m 0 s
	Battery Under Voltage Warning	0 V
	Battery Over Voltage Warning	Active, Inactive
	Battery Over Voltage Warning Delay (When Enabled)	0 h 0 m 0 s
	Battery Over Voltage Warning	0 V
	Charge Alternator Failure Warning	Active, Inactive
	Charge Alternator Warning Delay (When Enabled)	0 h 0 m 0 s
	Charge Alternator Failure Warning	0.0 V
	Charge Alternator Failure Shutdown	Active, Inactive

Continued overleaf….

Section	Parameter As Shown On Display	Value
Engine (continued)	Charge Alternator Shutdown Delay (When Enabled)	0 h 0 m 0 s
	Charge Alternator Failure Shutdown (When Enabled)	0.0 V
	Priming Delay	0 s
	Clutch Engage Speed	0 rpm
	Clutch Disengage Speed	0 rpm
	Idle Speed	0 rpm
	Warming Speed	0 rpm
	Cooldown Speed	0 rpm
	Starting	0 rpm
	Priming Speed	0 rpm
	Min Speed	0 rpm
	Default Speed	0 rpm
	Max Speed	0 rpm
	Reset Default Speed on Start-up	Active / Inactive
	Cooling at Idle	0 h 0 m 0 s
	Delayed Engine Start	0 h 0 m 0 s
	Delayed Engine Stop	0 h 0 m 0 s
	Engine Speed Transient Delay	0.0 s
	Selectable Speed Transfer Time	0 m 0.0 s
Timers	LCD Page Timer	0 h 0 m 0 s
	Scroll Delay	0 h 0 m 0 s
	Engine Pre Heat Timer (When Enabled)	0 m 0 s
	Engine Cranking	0 m 0 s
	Cranking Rest	0 m 0 s
	Safety On Delay	0 m 0 s
	Smoke Limiting	0 m 0 s
	Smoke Limiting Off	0 m 0 s
	Engine Warming	0 h 0 m 0 s
	Engine Cooling	0 h 0 m 0 s
	Engine Overspeed Overshoot	0 m 0 s
	Engine Fail To Stop Delay	0 m 0 s
	Battery Under Voltage Warning Delay	0 h 0 m 0 s
	Battery Over Voltage Warning Delay	0 h 0 m 0 s
	Return Delay	0 h 0 m 0 s
	DPF Ramp*	0 s
Schedule	Schedule	Active / Inactive
	Schedule Bank Period	Weekly / Monthly,
	On Load / Off Load / Auto Start Inhibit, Week, Start Time, Run Time and Day Selection (1-8)	Press ✓ to begin editing then up or down when selecting the different parameters.
Active Config Select	Main Configuration	Press ✓ to begin editing then up or down when selecting the different configurations
	Alternative Config 1	
	Alternative Config 2	
	Alternative Config 3	
	Alternative Config 4	

*Electronic Engines Only

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 the ***Tick***  button to enter the ‘running’ configuration editor.

7.2.2 ENTERING PIN

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

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.

7.2.3 EDITING A PARAMETER

- Press the ***Instrumentation Scroll***  buttons to cycle to the parameter 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 ***Instrumentation Scroll***  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 the parameter is no longer being edited.

NOTE: Pressing and holding the *Instrumentation Scroll*  **buttons gives an auto-repeat functionality. Values can be changed quickly by holding the navigation buttons for a prolonged period of time.**

7.2.4 AVAILABLE PARAMETERS TO BE EDITED

Section	Parameter	Values
Display	Contrast	0 %
	Backlight Level	0 %
	Language	English (United Kingdom), Other
Engine	DPF Auto Regen Inhibit	Active / Inactive
	DPF Manual Regen	Active / Inactive
	DPF Manual Regen Cancel	Active / Inactive

7.2.5 EXITING THE 'RUNNING' CONFIGURATION EDITOR

- 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.

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

8 COMMISSIONING

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

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

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

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

NOTE: If Emergency Stop feature is not required, link the input to the 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 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 engine 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 engine is available the ***Clutch Control*** output activates (if configured). If not, check the wiring to the clutch control mechanism. Check the Warming timer has timed out.

- Remove the remote start signal. The return sequence begins. After the pre-set time, the engine is unloaded. The engine 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

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 engine when in the ***Auto Mode***	Check that there is no signal present on the "Remote Start" input. Check configured polarity is correct.
Engine fails to start on receipt of Remote Start signal.	Check Start Delay timer has timed out. Check signal is on "Remote Start" input. Confirm correct configuration of input is configured to be used as "Remote Start". Check that the oil pressure switch or sensor is indicating low oil pressure to the controller. Depending upon configuration, then set does not start if oil pressure is not low.
Pre-heat inoperative	Check wiring to engine heater plugs. Check battery supply. Check battery supply is present on the Pre-heat output of module. Check pre-heat configuration is correct.
Starter motor inoperative	Check wiring to starter solenoid. Check battery supply. Check battery supply is present on the Starter output of module. Ensure oil pressure switch or sensor is indicating the "low oil pressure" state to the controller.

9.2 LOADING

Symptom	Possible Remedy
Engine runs but does not take load	Check Warm up timer has timed out. Check connections to the clutch control mechanism.
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.
Controlled Shutdown 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 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 ***Tick***  button to save the change before moving to another item or exiting the fascia editor

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

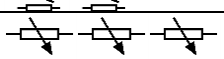
10 MAINTENANCE, SPARES, REPAIR AND SERVICING

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 INDIVIDUAL PLUGS

Module Terminal Designation	Plug Description	Part No.
1-11 	11 way 5.08 mm	007-451
12-17 	6 way 5.08 mm	007-446
18-31 	14 way 5.08 mm	007-428
32-35 	4 way 5.08 mm	007-444
36-47 	12 way 5.08 mm	007-109
51-55 	4 way 5.08 mm	007-444
60-65 	11 way 5.08 mm	007-451
RS485	3 way 5.08 mm	007-174
	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 4)	020-294

10.3 PURCHASING ADDITIONAL SEALING GASKET FROM DSE

Item	Description	Part No.
	Module Silicon Sealing Gasket	020-507

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 your original equipment supplier (OEM).

12 DISPOSAL

12.1 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)

Directive 2002/96/EC
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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