



DEEP SEA ELECTRONICS

DSEE400 Operator Manual

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DSEE400 Operator Manual

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Amendments Since Last Publication

| Amd. No. | Comments |
|----------|---|
| 1 | Initial Release |
| 1.1 | Updated panel cutout dimensions (inches). Corrected terminal descriptions (A15 to A18) |
| 2 | Rebranding to DSE Control |
| 3 | Updated Front Panel Configuration parameters Added Speed Control Editor Added Manual Speed Control Added Manual Run Time |
| 4 | Amended Connector A and Connector C Socket Terminal information Added to list of relevant Training Guides |
| 5 | Updated PWM(i) to 500 Hz max Added FPE items for Clutch Control |
| 6 | Added Maintain value and accompanying settings. Increased maintenance alarms |
| 7 | Update for v6 (hardware v2) including new PLC |

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1 INTRODUCTION

This document details the installation and operation requirements of the DSEE400 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.deepseapl.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 DSEE400 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 DSEE400 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:

- *Text 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.

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 between 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 by the following DSE publications which are obtained from the DSE website: www.deepseapl.com or by contacting DSE technical support: support@deepseapl.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 |
|----------|-----------------------------------|
| 053-180 | DSEE400 Installation Instructions |

1.3.2 TRAINING GUIDES

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

| DSE Part | Description |
|----------|---|
| 056-006 | Introduction to Comms |
| 056-017 | PC Configuration Interfacing |
| 056-023 | Adding New CAN Files |
| 056-028 | Smoke Limiting |
| 056-030 | Module PIN Codes |
| 056-051 | Sending DSEGencomm Control Keys |
| 056-055 | Alternate Configurations |
| 056-069 | Firmware Update |
| 056-075 | Adding Language Files |
| 056-076 | Reading DSEGencomm Alarms |
| 056-079 | Reading DSEGencomm Status |
| 056-080 | MODBUS |
| 056-081 | Screen Heaters |
| 056-092 | Best Practices for Wiring Resistive Sensors |

1.3.3 MANUALS

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

| DSE Part | Description |
|----------|---|
| N/A | DSEGencomm (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 |
| 057-251 | DSEE400 Configuration Suite PC Software Manual |

2 SPECIFICATION

2.1 OPERATING TEMPERATURE

| Module | Specification |
|------------------------|---------------------------------|
| DSEE400 | -30 °C +80 °C (-22 °F +176 °F) |
| Display Heater Variant | -40 °C +80 °C (-40 °F +176 °F) |

2.1.1 SCREEN HEATER OPERATION


| Screen Heater Function | Specification |
|---------------------------------------|-----------------|
| Turn On When Temperature Falls Below | -10 °C (+14 °F) |
| Turn Off When Temperature Rises Above | -5 °C (+23 °F) |

2.2 REQUIREMENTS FOR UL

| Description | Specification |
|------------------------|--|
| Conductors | Terminals suitable for connection of conductor size 16 AWG (1.3 mm ²) Conductor protection must be provided in accordance with NFPA 70, Article 240 or UL 2200 section 29. Low voltage circuits (35 V or less) must be supplied from the engine starting battery or an isolated secondary circuit. |
| Communication Circuits | Must be connected to communication circuits of UL Listed equipment |
| Output Pilot Duty | 0.5 A |
| Mounting | Suitable for use in type 1 Enclosure Type rating Suitable for pollution degree 2 environments. |
| Operating Temperature | -22 °F to +122 °F (-30 °C to +50 °C) |
| Storage Temperature | -40 °F to +176 °F (-40 °C to +80 °C) |

2.3 TERMINAL SPECIFICATION

NOTE: DSE supply the female Deutsch connectors and socket terminals. Refer to section entitled *Maintenance, Spares, Repair and Servicing* elsewhere in this document.

| Description | Specification |  Example showing a DT16-18SA-K004 connector |
|---------------------------------|--|---|
| Arrangement | Two part Deutsch connector. Male part fitted to module, female part not supplied. Deutsch socket terminals not supplied. | |
| Connector A | DT16-18SA-K004 | |
| Connector C | DT16-18SC-K004 | |
| Connector A Socket Terminals | 0462-201-16141, QTY 17 0.5 mm ² to 1.5 mm ² (AWG 20 to AWG 16) 0462-209-16141, QTY 1 2.0 mm ² (AWG 14) | |
| Connector C Socket Terminals | 0462-201-16141, QTY 16 0.5 mm ² to 1.5 mm ² (AWG 20 to AWG 16) 0462-209-16141, QTY 2 2.0 mm ² (AWG 14) | |

2.4 POWER SUPPLY REQUIREMENTS

2.4.1 MODULE SUPPLY

| 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. LEDs and backlight will not be maintained during engine cranking; however inputs and outputs remain active. |
| Maximum Supply Voltage | 35 V continuous |
| Reverse Polarity Protection | -24 V continuous |
| Maximum Operating Current | 326 mA at 12 V 164 mA at 24 V |
| Maximum Standby Current | 119 mA at 12 V 60 mA at 24 V |
| Maximum Current in Sleep Mode | 76 mA at 12 V 38 mA at 24 V |
| Typical Display Heater Power | 3.5 W |

2.4.1.1 MODULE SUPPLY INSTRUMENTATION DISPLAY

| Description | Specification |
|-------------|--|
| Range | 0 V to 70 V DC (Maximum continuous operating voltage of 35 V DC) |
| Resolution | 0.1 V |
| Accuracy | 1 % full scale (± 0.35 V) |

2.4.2 PWMI SUPPLY

| Description | Specification |
|-----------------------------|------------------|
| Minimum Supply Voltage | 5 V continuous |
| Maximum Supply Voltage | 35 V continuous |
| Reverse Polarity Protection | -24 V continuous |
| Maximum Average Current | 8 A |
| Maximum Peak Current | 12 A |

2.5 INPUTS

2.5.1 DIGITAL INPUTS

| Description | Specification |
|-------------------------|--|
| Number | 4 configurable digital inputs |
| Activation | Configurable in banks of 2 as positive or negative switching |
| Contact Wetting Current | 5 mA typical |
| Maximum Input Voltage | +35 V DC with respect to module supply negative |
| Minimum Input Voltage | -24 V DC with respect to module supply negative |

2.5.1.1 POSITIVE SWITCHING CONFIGURATION

| Description | Specification |
|----------------------|---|
| Arrangement | Contact between terminal and a positive supply with respect to the module supply negative |
| Closed Threshold | 8.1 V minimum |
| Open Threshold | 3.2 V maximum |
| Open Circuit Voltage | 0 V typical |

2.5.1.2 NEGATIVE SWITCHING CONFIGURATION

| Description | Specification |
|----------------------|---|
| Arrangement | Contact between terminal and module supply negative |
| Closed Threshold | 3.2 V maximum |
| Open Threshold | 8.1 V minimum |
| Open Circuit Voltage | 11 V typical |

2.5.2 EMERGENCY STOP

| Description | Specification |
|-----------------------|---|
| Arrangement | Contact between terminal and module supply positive |
| Closed Threshold | 5 V minimum |
| Open Threshold | 3 V maximum |
| Maximum Input Voltage | +35 V DC with respect to plant supply negative |
| Minimum Input Voltage | -24 V DC with respect to plant supply negative |
| Open Circuit Voltage | 0 V |

2.5.3 ANALOGUE INPUTS

All of the analogue inputs are flexible within the module.

2.5.3.1 ANALOGUE INPUT A

| Description | Specification |
|----------------------------|---|
| Input Type | Flexible: Configured for <i>Oil Sensor</i> in the DSE default configuration. Flexible Options: Not used, Digital Input and Flexible Analogue |
| Flexible Input Selection | Pressure Sensor Percentage Sensor Temperature Sensor |
| Flexible Measured Quantity | Current Resistive Voltage |

Resistive Configuration

| Description | Specification |
|-------------------------|--|
| Measurement Type | Resistance measurement by measuring voltage across sensor with a fixed current applied |
| Arrangement | Differential resistance measurement input |
| Measurement Current | 15 mA $\pm 10\%$ |
| Full Scale | 0 Ω to 240 Ω |
| Over Range / Fail | 350 Ω |
| Open Circuit | 1 k Ω |
| Resolution | 1 % of full scale |
| Accuracy | $\pm 2\%$ of full scale resistance ($\pm 4.8\ \Omega$) excluding sensor error |
| Max Common Mode Voltage | $\pm 2\text{ V}$ |
| Display Range | Configurable by PC Software |

0 V to 10 V Configuration

| Description | Specification |
|-------------------------|---|
| Full Scale | 0 V to 10 V |
| Over Range / Fail | 11 V |
| Resolution | 1% of full scale |
| Accuracy | $\pm 2\%$ of full-scale voltage ($\pm 0.2\text{ V}$) excluding sensor error |
| Max Common Mode Voltage | $\pm 2\text{ V}$ |
| Display Range | Configurable by PC Software |

4 mA to 20 mA Configuration

| Description | Specification |
|-------------------------|--|
| Full Scale | 0 mA to 20 mA |
| Over Range / Fail | 22 mA |
| Resolution | 1% of full scale |
| Accuracy | $\pm 2\%$ of full-scale current ($\pm 0.4\text{ mA}$) excluding sensor error |
| Max Common Mode Voltage | $\pm 2\text{ V}$ |
| Display Range | Configurable by PC Software |

2.5.3.2 ANALOGUE INPUT B TO G

| Description | Specification |
|----------------------------|---|
| Analogue Input B Type | Flexible: Configured for <i>Temperature Sensor</i> in the DSE default configuration. Flexible Options: Not used, Digital Input and Flexible Analogue |
| Analogue Input C Type | Flexible: Configured for <i>Fuel Sensor</i> in the DSE default configuration. Flexible Options: Not used, Digital Input and Flexible Analogue |
| Analogue Input D to G Type | Flexible: Configured for <i>Flexible Analogue</i> in the DSE default configuration. Flexible Options: Not used, Digital Input and Flexible Analogue |
| Flexible Input Selection | Pressure Sensor Percentage Sensor Temperature Sensor |
| Flexible Measured Quantity | Current Restive Voltage |

Resistive Configuration

| Description | Specification |
|-------------------------|--|
| Measurement Type | Resistance measurement by measuring voltage across sensor with a fixed current applied |
| Arrangement | Differential resistance measurement input |
| Measurement Current | 10 mA \pm 10 % |
| Full Scale | 0 Ω to 480 Ω |
| Over Range / Fail | 600 Ω |
| Resolution | 1 % of full scale |
| Accuracy | \pm 2 % of full-scale resistance (\pm 9.6 Ω) excluding sensor error |
| Max Common Mode Voltage | \pm 2 V |
| Display Range | Configurable by PC Software |

0 V to 10 V Configuration

| Description | Specification |
|-------------------------|--|
| Full Scale | 0 V to 10 V |
| Resolution | 1% of full scale |
| Accuracy | \pm 2% of full-scale voltage (\pm 0.2 V) excluding sensor error |
| Max Common Mode Voltage | \pm 2 V |
| Display Range | Configurable by PC Software |

4 mA to 20 mA Configuration

| Description | Specification |
|-------------------------|---|
| Full Scale | 0 mA to 20 mA |
| Resolution | 1% of full scale |
| Accuracy | \pm 2% of full-scale current (\pm 0.4 mA) excluding sensor error |
| Max Common Mode Voltage | \pm 2 V |
| Display Range | Configurable by PC Software |

2.5.4 CHARGE FAIL INPUT

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.

| Description | Specification |
|-----------------|--------------------------------------|
| Minimum Voltage | 0 V |
| Maximum Voltage | 35 V |
| Resolution | 0.2 V |
| Accuracy | ±1 % of full scale |
| Excitation | Active circuit constant power output |
| Output Power | 2.5 W nominal at module supply |
| Current At 12V | 210 mA |
| Current At 24V | 105 mA |

2.5.5 MAGNETIC PICKUP



NOTE: DSE supply a suitable magnetic pickup device, available in two body thread lengths:

DSE Part number 020-012 - Magnetic Pickup probe 5/8 UNF 2 ½" thread length

DSE Part number 020-013 - Magnetic Pickup probe 5/8 UNF 4" thread length

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.

| Description | Specification |
|-------------------------|--------------------|
| Type | Differential input |
| Minimum Voltage | 0.5 V RMS |
| Maximum Voltage | 60 V RMS |
| Max Common Mode Voltage | ±2 V peak |
| Minimum Frequency | 5 Hz |
| Maximum Frequency | 10,000 Hz |
| Resolution | 6.25 RPM |
| Accuracy | ±25 RPM |
| Flywheel Teeth | 10 to 500 |
| Open Circuit Voltage | 4 V DC typical |

2.6 OUTPUTS

2.6.1 DC OUTPUTS A & B (FUEL & START)

| Description | Specification |
|-------------|--|
| Type | Normally used as Fuel & Start outputs. Fully configurable for other purposes if the module is configured to control an electronic engine. |
| Rating | 10 A for 10 seconds, 5 A continuous at <i>Emergency Stop</i> supply. |

2.6.2 CONFIGURABLE DC OUTPUTS C & D

| Description | Specification |
|-------------|--|
| Type | Fully configurable, supplied from module supply. |
| Rating | 2 A resistive at module supply. |

2.6.3 CONFIGURABLE PWMI OUTPUTS E & F

2.6.3.1 CONFIGURED AS DC OUTPUTS

| Description | Specification |
|-------------|--|
| Type | Fully configurable, supplied from PWMi supply. |
| Rating | 4 A resistive at PWMi supply. |

2.6.3.2 CONFIGURED AS PWMI OUTPUTS

| Description | Specification |
|---------------------------|---|
| Type | Fully configurable, supplied from PWMi supply. |
| Rating (250 Hz to 500 Hz) | 2 A resistive at PWMi supply. |
| Rating (0 Hz to 250 Hz) | 4 A resistive at PWMi supply. |
| Minimum Frequency | 20 Hz |
| Maximum Frequency | 500 Hz |
| Minimum Load Impedance | 3 Ω at 12 V, 6 Ω at 24 V, |
| Accuracy | ± 1 % of full scale |
| Resolution | 1 mA for 0 A to 2 A range, 2 mA for 0 A to 4 A range. |
| Minimum Voltage | 5 V DC |

2.6.4 GOVERNOR OUTPUT

2.6.4.1 0 V TO 10 V CONFIGURATION

| Description | Specification |
|------------------------|-------------------------|
| Output Range | 0 V to 10 V floating. |
| Minimum Load Impedance | 1 k Ω |
| Resolution | 5 mV |
| Accuracy | ± 1 % of full scale |

2.6.4.2 0 MA TO 20 MA CONFIGURATION

| Description | Specification |
|------------------------|-------------------------|
| Output Range | 0 mA to 20 mA floating. |
| Maximum Load Impedance | 500 Ω |
| Resolution | 5 μ A |
| Accuracy | ± 1 % of full scale |

2.7 COMMUNICATION PORTS



NOTE: All communication ports can be used at the same time.

| Description | Specification |
|-------------------|--|
| USB Slave Port | Type B USB 2.0 For connection to PC running DSE Configuration Suite Max distance 6 m (20 feet) |
| RS485 Serial Port | Isolated Data connection 2 wire + common Half Duplex Data direction control for Transmit (by s/w protocol) Max Baud Rate 115 kbaud 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) |
| ECU Port | <div> NOTE: For additional length, the DSE124 CAN Extender is available. For more information, refer to DSE Publication: 057-116 DSE124 Operator Manual </div> 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) |

2.8 COMMUNICATION PORT USAGE

2.8.1 USB SLAVE PORT (PC CONFIGURATION)

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

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

NOTE: For further details of module configuration, refer to DSE Publication: *057-251 DSEE400 Configuration Software Manual*.

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

DSEE400 Controller



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



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



2.8.2 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.

2.8.2.1 CABLE SPECIFICATION

NOTE: DSE recommend Belden 9841 (or equivalent) cable for RS485 communication. This is rated to a maximum cable length of 1.2 km. DSE Stock Belden 9841 cable, DSE Part Number: 016-030.

| Description | Specification |
|-----------------------|---|
| Cable Type | Two core screened and shielded twisted pair |
| Cable Characteristics | 120 Ω impedance Low capacitance |
| Recommended Cable | Belden 9841 Belden 9271 |
| Maximum Cable Length | 1200 m ($\frac{3}{4}$ mile) when using Belden 9841 or direct equivalent. 600 m (656 yards) when using Belden 9271 or direct equivalent. |
| RS485 Topology | "Daisy Chain" Bus with no stubs (spurs) |
| RS485 Termination | 120 Ω . Not fitted internally to module. Must be fitted externally to the 'first' and 'last' device on the RS485 link. |

2.8.2.2 RECOMMENDED PC RS485 SERIAL PORT ADD-ONS

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

NOTE: For further details of setting up the devices below, refer to the manufacture whose details are below.

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)

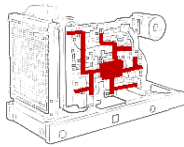


Supplier:
Brainboxes
Tel: +44 (0)151 220 2500
Web: <http://www.brainboxes.com>
Email: Sales: sales@brainboxes.com

2.8.3 ECU PORT (J1939)

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

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



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

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

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

2.9 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).

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

The screenshot displays two configuration windows from the DSE Configuration Suite software. The top window, titled "Relay Outputs (DC Supply Out)", shows "Output E" with a "Source" dropdown set to "Audible Alarm" and a "Polarity" dropdown set to "Energise". The bottom window, titled "Digital Input A", shows "Function" set to "Alarm Mute", "Polarity" set to "Close to Activate", and "Action" set to a default value. The "Arming" dropdown is also visible. The "LCD Display" section shows a horizontal bar, and the "Activation Delay" is set to "0s" with a slider control.

2.10 ACCUMULATED INSTRUMENTATION

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

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

| Description | Specification |
|------------------|--|
| Engine Hours Run | Maximum 99999 hrs 59 minutes (Approximately 11yrs 4 months) |
| Number of Starts | 99,999 |

2.11 DIMENSIONS AND MOUNTING

2.11.1 DIMENSIONS

189 mm x 125 mm x 54 mm
(7.5 " x 4.9 " x 2.1 ")

2.11.2 PANEL CUTOUT

148 mm x 112 mm
(5.8 " x 4.4 ")

2.11.3 MOUNTING HOLE SPACING

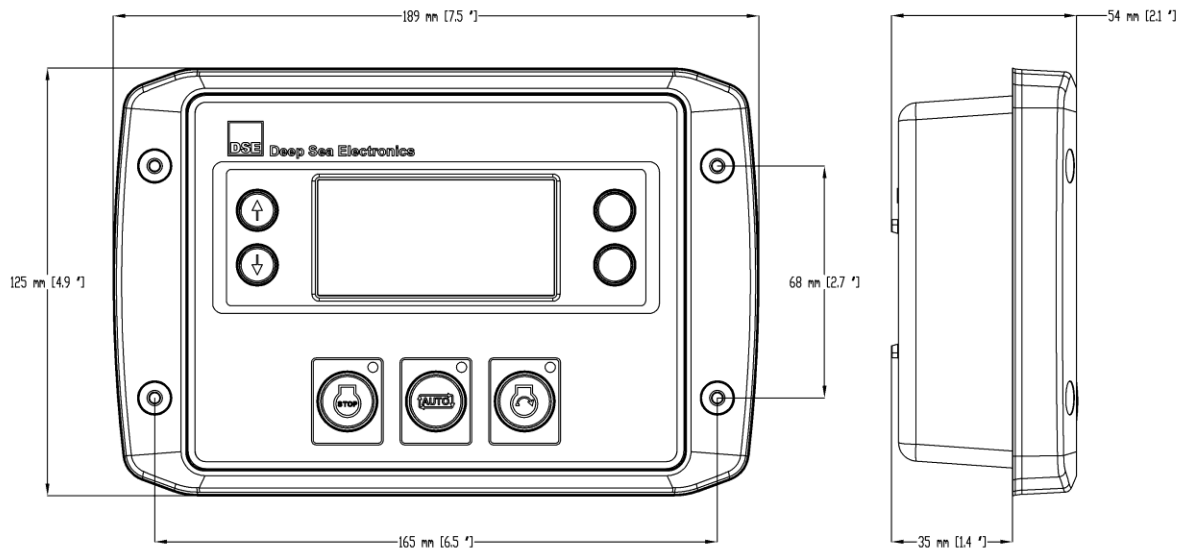
165 mm x 68 mm
(6.5 " x 2.7 ")

2.11.4 MOUNTING DIAMETER

Suitable for M4
(5/32 " diameter)

2.11.5 WEIGHT

0.4 kg
(0.88 lb)



2.11.6 SILICON SEALING GASKET

The silicon gasket is moulded into the module's case and provides improved sealing between module and panel fascia.



2.12 APPLICABLE STANDARDS

| Standard | Description |
|---|---|
| BS 4884-1 | This document conforms to BS4884-1 1992 Specification for presentation of essential information. |
| BS 4884-2 | This document conforms to BS4884-2 1993 Guide to content |
| BS 4884-3 | This document conforms to BS4884-3 1993 Guide to presentation |
| BS EN 60068-2-1 (Minimum temperature) | -30 °C (-22 °F) |
| BS EN 60068-2-2 (Maximum temperature) | +80 °C (178 °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) | IP67 (Front and back of module when installed into a control panel with connectors mated and USB bung seal inserted). |
| UL508 NEMA rating (Approximate) | 6 (Front and back of module when installed into a control panel with connectors mated and USB bung seal inserted). |
| IEEE C37.2 (Standard Electrical Power System Device Function Numbers and Contact Designations) | <p>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).</p> <p>As the module is configurable by the engine OEM, the functions covered by the module vary. Depending on module configuration, the device numbers included within the module could be:</p> <ul style="list-style-type: none"> 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.

2.12.1 ENCLOSURE CLASSIFICATIONS

2.12.1.1 IP CLASSIFICATIONS

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

IP67 (Front and back of module when installed into a control panel with connectors mated and USB bung seal inserted).

| First Digit | Second Digit |
|--|--|
| Protection against contact and ingress of solid objects | 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). |
| | 7 Protection against the effects of temporary immersion in water. |

2.12.1.2 NEMA CLASSIFICATIONS



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

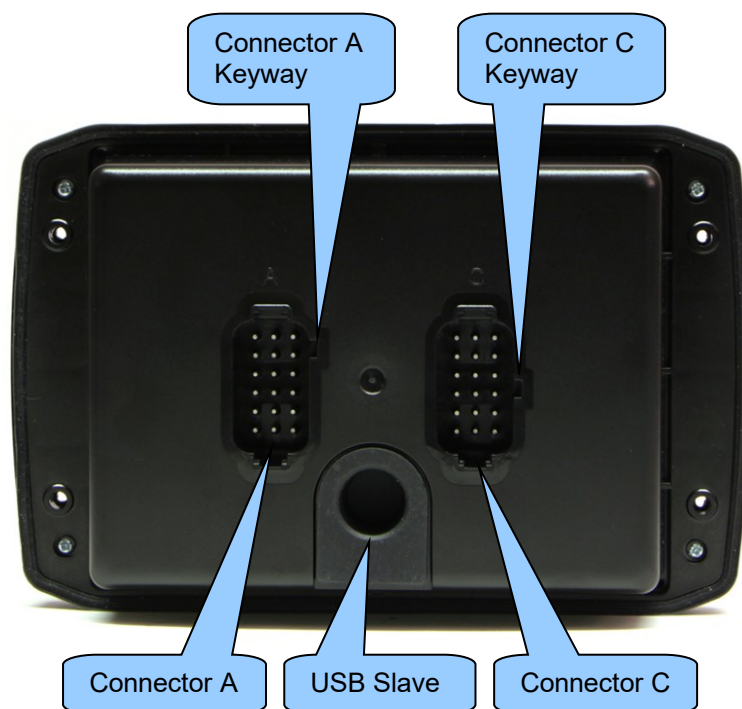
6 (Front and back of module when installed into a control panel with connectors mated and USB bung seal inserted).

| | |
|-----------------------|--|
| 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). |
| 6 IP67 | Provides a degree of protection against temporary submersion in water. Not intended for continuous submersion. |
| 12/12K IP65 | Provides a degree of protection against dust, falling dirt and dripping non corrosive liquids. |
| 13 IP65 | Provides a degree of protection against dust and spraying of water, oil and non corrosive coolants. |

3 INSTALLATION

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

3.1 USER CONNECTIONS



3.2 CONNECTION DESCRIPTIONS

NOTE: It is VERY important that terminals A11 & C4 (sensor commons) are connected to an earth point on the ENGINE BLOCK, not within the control panel, and must be a sound electrical connection to the sensor bodies. This connection **MUST NOT** be used to provide an earth connection for other terminals or devices. The simplest way to achieve this is to run a **SEPARATE** earth connection from the system earth star point, to terminals A11 & C4 directly, and not use this earth for other connections.

NOTE: If PTFE insulating tape is used on the sensor thread when using earth return sensors, ensure not to insulate the entire thread, as this prevents the sensor body from being earthed via the engine block.

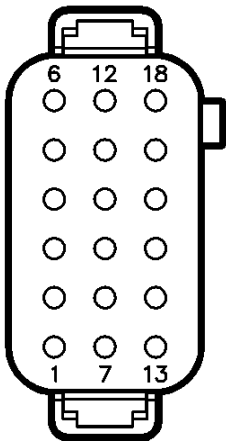
3.2.1 CONNECTOR A

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: 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 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: *057-251 DSEE400 Configuration Software Manual*.

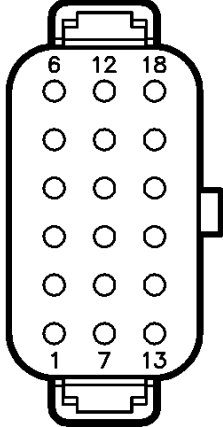
| DT16-18SA-K004 Connector | Pin No | Description | Cable Size | Notes |
|---|--------|------------------------------------|-------------------------------|--|
|  | A1 | DC Output C | 1.0 mm ² AWG 17 | Plant Supply Positive from terminal A7. 2 A DC rated. |
| | A2 | DC Output D | 1.0 mm ² AWG 17 | Plant Supply Positive from terminal A7. 2 A DC rated. |
| | A3 | Emergency Stop Input | 2.0 mm ² AWG 14 | Plant Supply Positive. Supplies DC Outputs A & B. |
| | A4 | DC Output A (Fuel) | 1.5 mm ² AWG 16 | Plant Supply Positive from terminal A3. 5 A DC continuous rated Fixed as fuel relay if electronic engine is not configured. |
| | A5 | DC Output B (Start) | 1.5 mm ² AWG 16 | Plant Supply Positive from terminal A3. 5 A DC continuous rated Fixed as start relay if electronic engine is not configured. |
| | A6 | Digital Input A | 1.0 mm ² AWG 17 | Switch To Negative or Positive depending upon module configuration. |
| | A7 | DC Plant Supply Input (Positive) | 1.0 mm ² AWG 17 | Supplies the module and DC Outputs C & D |
| | A8 | ECU Port Screen | Screen | Use only 120 Ω CAN or RS485 approved cable |
| | A9 | ECU Port L | 0.5 mm ² AWG 20 | Use only 120 Ω CAN or RS485 approved cable |
| | A10 | ECU Port H | 0.5 mm ² AWG 20 | Use only 120 Ω CAN or RS485 approved cable |
| | A11 | Analogue Sensor A, B ,C & D Common | 1.5 mm ² AWG 16 | Ground Return For Analogue Sensors A, B ,C & D. |
| | A12 | Digital Input B | 1.0 mm ² AWG 17 | Switch To Negative or Positive depending upon module configuration. |
| | A13 | DC Plant Supply Input (Negative) | 1.0 mm ² AWG 17 | Connect to ground where applicable. |
| | A14 | Charge Fail / Excite | 1.5 mm ² AWG 16 | Do not connect to ground (battery negative). If charge alternator is not fitted, leave this terminal disconnected. |
| | A15 | Analogue Sensor Input D | 1.0 mm ² AWG 17 | Connect To Additional Sensor (User Configurable). |
| | A16 | Analogue Sensor Input C | 1.0 mm ² AWG 17 | Connect To Fuel Level Sensor. |
| | A17 | Analogue Sensor Input B | 1.0 mm ² AWG 17 | Connect To Coolant Temperature Sensor. |
| | A18 | Analogue Sensor Input A | 1.0 mm ² AWG 17 | Connect To Oil Pressure Sensor. |

3.2.2 CONNECTOR C

NOTE: A 120 Ω termination resistor must be fitted across terminals RS485 A and RS485 B if the DSE module is the first or last device on the R485 link.

NOTE: Screened 120 Ω impedance cable specified for use with RS485 must be used for the RS485 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: 057-251 DSEE400 Configuration Software Manual.



| DT16-18SC-K004 Connector | Pin No | Description | Cable Size | Notes |
|--|-----------|---------------------------------|-------------------------------|---|
|  | C1 | Governor B | 0.5 mm ² AWG 20 | Use Screened Cable |
| | C2 | RS485 A (-) | 0.5 mm ² AWG 20 | Use only 120 Ω CAN or RS485 approved cable |
| | C3 | RS485 Screen | Screen | Use only 120 Ω CAN or RS485 approved cable |
| | C4 | Analogue Sensor E, F & G Common | 1.5 mm ² AWG 16 | Ground Return For Analogue Sensors E, F & G. |
| | C5 | Analogue Sensor Input E | 1.0 mm ² AWG 17 | Connect To Additional Sensor (User Configurable). |
| | C6 | Analogue Sensor Input F | 1.0 mm ² AWG 17 | Connect To Additional Sensor (User Configurable). |
| | C7 | Governor A | 0.5 mm ² AWG 20 | Use Screened Cable |
| | C8 | RS485 B (+) | 0.5 mm ² AWG 20 | Use only 120 Ω CAN or RS485 approved cable |
| | C9 | Magnetic Pickup Positive | 0.5 mm ² AWG 20 | Connect To Magnetic Pickup Device. Use Screened Cable. |
| | C10 | Magnetic Pickup Negative | 0.5 mm ² AWG 20 | Connect To Magnetic Pickup Device. Use Screened Cable. |
| | C11 | Magnetic Pickup Screen | Screen | Connect To Ground At One End Only |
| | C12 | Analogue Sensor Input G | 1.0 mm ² AWG 17 | Connect To Additional Sensor (User Configurable). |
| | C13 | PWMI Supply Input (Negative) | 2.0 mm ² AWG 14 | Connect to ground where applicable. |
| | C14 | PWMI Supply Input (Positive) | 2.0 mm ² AWG 14 | Supplies the PWMI Outputs E & F. |
| | C15 | PWMI Output F | 1.5 mm ² AWG 16 | Plant Supply Positive from terminal C14. 4 A rated. |
| | C16 | PWMI Output E | 1.5 mm ² AWG 16 | Plant Supply Positive from terminal C14. 4 A rated. |
| | C17 | Digital Input D | 1.0 mm ² AWG 17 | Switch To Negative or Positive depending upon module configuration. |
| | C18 | Digital Input C | 1.0 mm ² AWG 17 | Switch To Negative or Positive depending upon module configuration. |

3.2.3 USB SLAVE (PC CONFIGURATION) CONNECTOR

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

CAUTION!: Care must be taken not to overload the PC's 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: 057-251 *DSEE400 Configuration Software Manual*.

| | Description | Cable Size | Notes |
|---|---|-------------------------------|--|
|  | Socket for connection to PC with DSE Configuration Suite Software | 0.5 mm ² AWG 20 | This is a standard USB type A to type B connector.  |

3.3 TYPICAL WIRING DIAGRAM

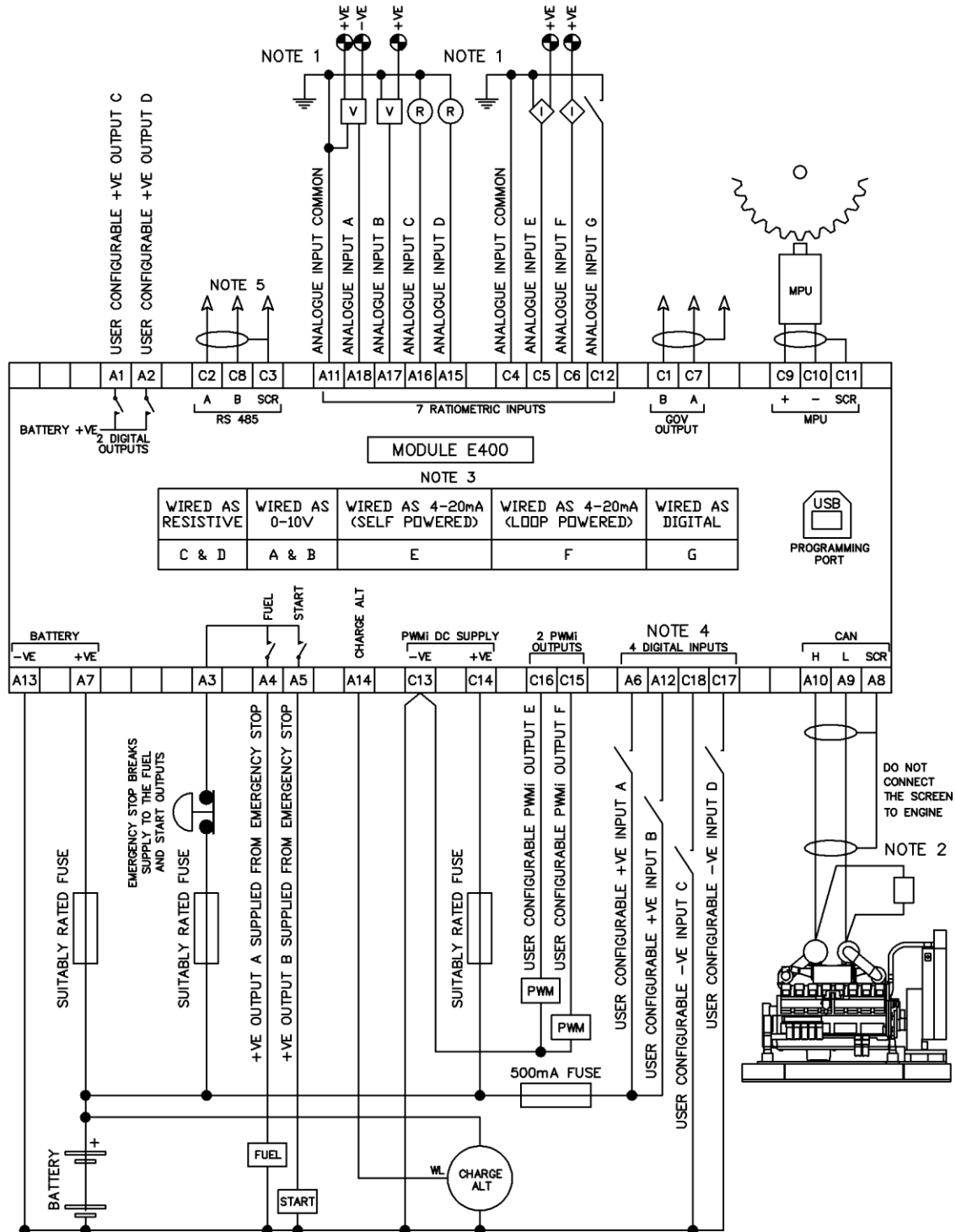
As every system has different requirements, these diagrams show only a typical system and do not intend to show a complete system.

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

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

| DSE Part | Description |
|-----------------|-----------------------------------|
| 057-004 | Electronic Engines and DSE Wiring |

Installation



BATTERY NEGATIVE MUST BE GROUND

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

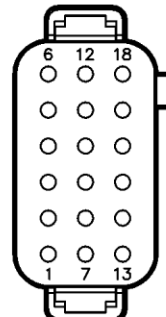
NOTE 2. 120 Ω TERMINATING RESISTOR MAY BE REQUIRED EXTERNALLY, SEE ENGINE MANUFACTURERS LITERATURE.

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.

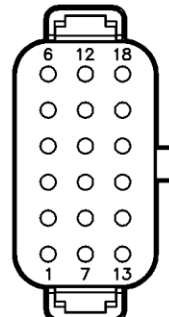
NOTE 4. DIGITAL INPUTS CAN BE CONFIGURED AS EITHER +VE OR -VE SWITCHING.

NOTE 5. AN EXTERNAL 120 Ω TERMINATING RESISTOR MUST BE FITTED IF THE CONTROLLER IS THE FIRST OR LAST UNIT ON THE RS485 LINK

CONNECTOR A



CONNECTOR C



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 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).

4 DESCRIPTION OF CONTROLS








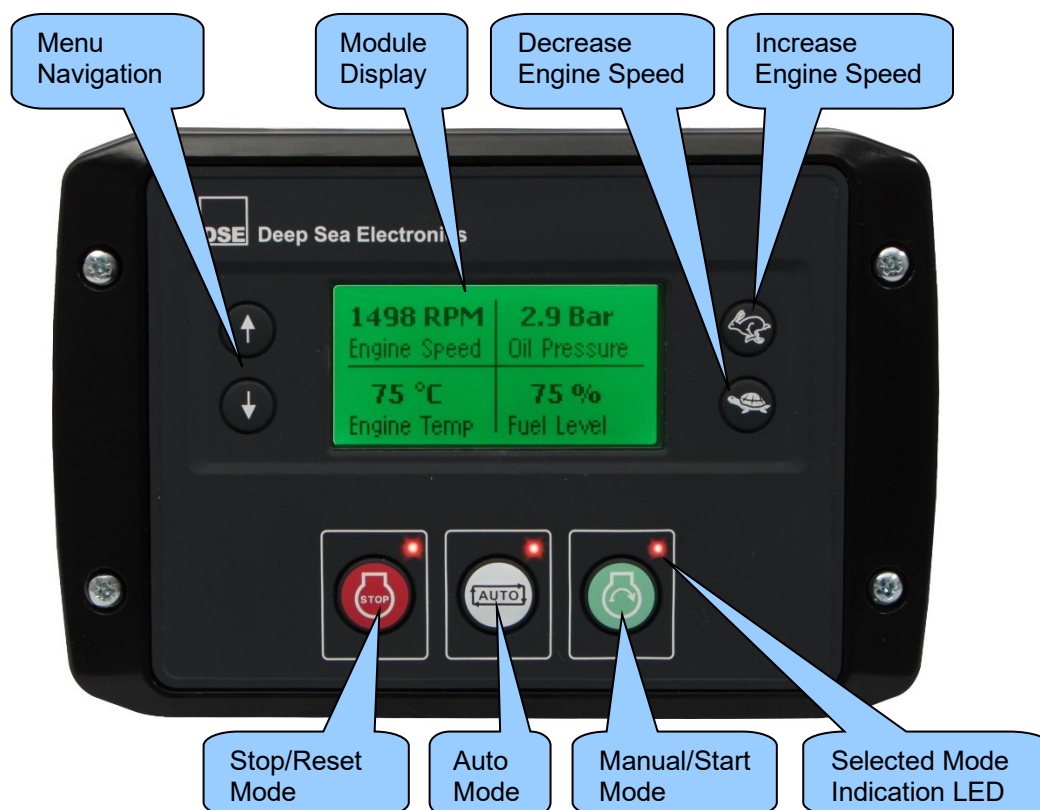
CAUTION: The module may instruct an engine start event due to external influences. Therefore, it is possible for the engine to start at any time without warning. Prior to performing any maintenance on the system, it is recommended that steps are taken to remove the battery and isolate supplies.



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

















Control of the module is via push buttons mounted on the front of the module with

Stop/Reset Mode , **Auto Mode** , **Manual/Start 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.













4.1 CONTROL PUSH BUTTONS

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



| Icon | Description |
|---|---|
|  | <p>Stop / Reset Mode</p> <p>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' becomes <i>inactive (if used)</i>). The fuel supply de-energises and the engine comes to a standstill. Should any form of <i>start signal</i> be present while operating in this mode, a start does <u>not</u> occur.</p> <p><i>For further details, see section entitled 'Operation' elsewhere in this manual.</i></p> |
|  | <p>Auto Mode</p> <p>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 <i>remote start</i> input and once a start request is made, the set is automatically started.</p> <p>Upon removal of the starting signal, the module removes the load from the engine and shut the set down observing the <i>stop delay</i> timer and <i>cooling</i> timer as necessary. The module then waits for next start event.</p> <p>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 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.</p> <p><i>For further details, see section entitled 'Operation' elsewhere in this manual.</i></p> |
|  | <p>Manual/Start Mode</p> <p>This button places the module into its Manual/Start Mode . Once in Manual/Start Mode , the module starts 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 <i>active (if used)</i>). The engine remains on load until Stop/Reset Mode  or Auto Mode  are selected or the engine speed decreases below the configured value.</p> <p>Also, in Manual/Start 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.</p> <p><i>For further details, see section entitled 'Operation' elsewhere in this manual.</i></p> |

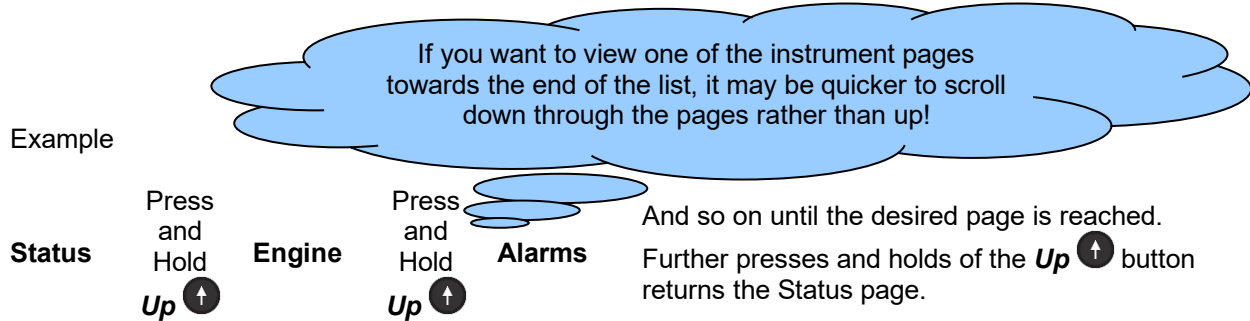
 **NOTE:** For further details, see section entitled *Operation* elsewhere in this manual.

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

4.2 VIEWING THE INSTRUMENT PAGES

NOTE: Depending upon the module's configuration, some display screens may be disabled. For further details of module configuration, refer to DSE Publication: 057- 251 *DSEE400 Configuration Software Manual*.

It is possible to scroll to display the different pages of information by pressing and holding the **Up**  or **Down**  buttons.

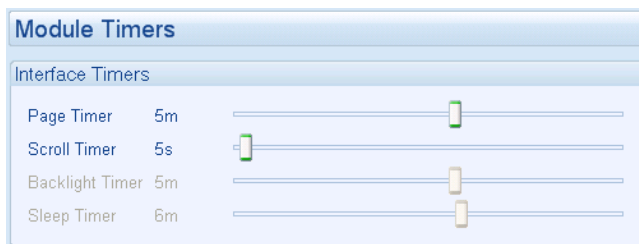


The complete order and contents of each information page are given in the following sections.



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 PC Software.


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



To re-enable 'auto scroll' press the **Up**  or **Down**  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 any page, the display shows the Alarms page to draw the operator's attention to the alarm condition.

4.2.1 STATUS



NOTE: Press the *Instrumentation Scroll*   buttons on the *Status Page* to view other Configurable Status Screens if configured. For further details of module configuration, refer to DSE Publication: 057- 251 *DSEE400 Configuration Software Manual*.

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.

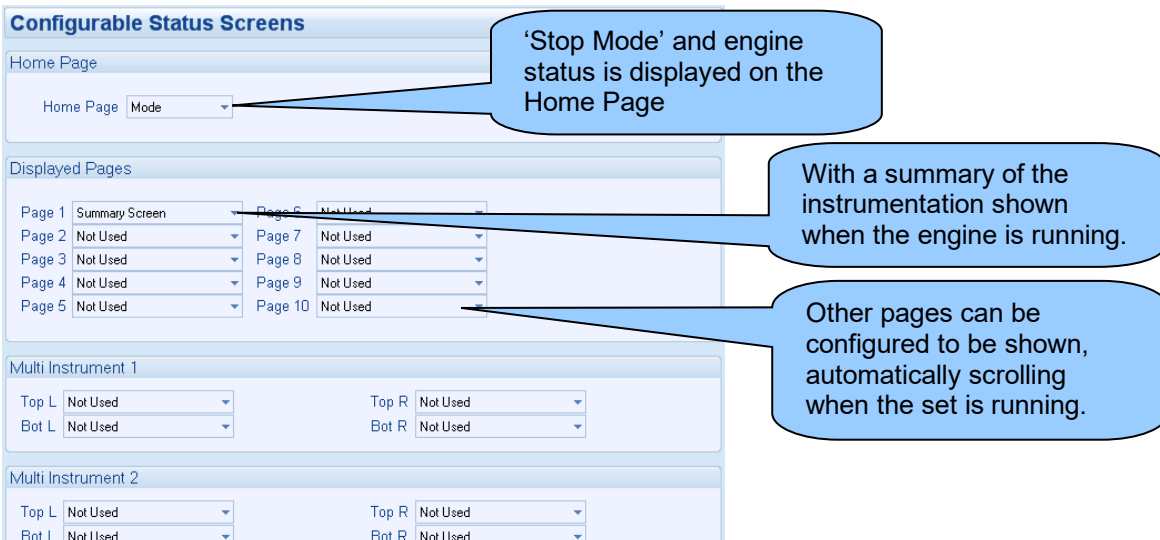
This page changes with the action of the controller for example when the engine is running and available:

| | | |
|----------------|-------|---|
| Status | 22:31 | Factory setting of <i>Status</i> screen showing engine stopped... |
| Engine at Rest | | |
| Stop Mode | | |

| | | |
|---------------------|----------------|-----------------------|
| Status | 22:31 | ...and engine running |
| Engine Speed | 850 RPM | |
| Tgt 900 RPM | 4.50 V | |

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

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



Configurable Status Screens

Home Page: Home Page Mode

Displayed Pages:

| | | | |
|--------|----------------|---------|----------|
| Page 1 | Summary Screen | Page 6 | Not Used |
| Page 2 | Not Used | Page 7 | Not Used |
| Page 3 | Not Used | Page 8 | Not Used |
| Page 4 | Not Used | Page 9 | Not Used |
| Page 5 | Not Used | Page 10 | Not Used |

Multi Instrument 1:

| | | | |
|-------|----------|-------|----------|
| Top L | Not Used | Top R | Not Used |
| Bot L | Not Used | Bot R | Not Used |




Multi Instrument 2:

| | | | |
|-------|----------|-------|----------|
| Top L | Not Used | Top R | Not Used |
| Bot L | Not Used | Bot R | Not Used |

Callouts:

- 'Stop Mode' and engine status is displayed on the Home Page
- With a summary of the instrumentation shown when the engine is running.
- Other pages can be configured to be shown, automatically scrolling when the set is running.

4.2.1.1 ENGINE LOCKED OUT

| | | |
|-------------------|-------|---|
| Status | 22:31 | <i>Engine Locked Out</i> indicates that the engine cannot be started due to an active <i>Shutdown</i> or <i>Controlled Shutdown Alarm</i> on the module. Press and hold the Up  or Down  buttons to scroll to the alarms page to investigate. Press the Stop/Reset Mode  |
| Engine Locked Out | | |

button to clear the alarm, if the alarm does not clear the fault is still active.

4.2.2 ENGINE



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

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









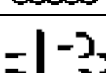
| Engine |
|----------|
| 1500 RPM |

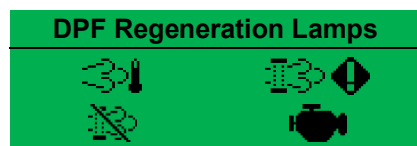
| | |
|----------------------------|--|
| Active Configuration | After Treatment Exhaust Gas Temperature* |
| Engine Speed | Engine Oil Level* |
| Oil Pressure | Engine Crank Case Pressure* |
| Coolant Temperature | Engine Coolant Level* |
| Engine Battery Volts | Engine Injector Rail Pressure* |
| Engine Run Time | Engine Exhaust Temperature* |
| Engine Fuel Level | Intercooler Temperature* |
| Oil Temperature* | Turbo Oil Pressure* |
| Coolant Pressure* | Fan Speed* |
| Inlet Temperature* | Water In Fuel* |
| Exhaust Temperature* | Air Inlet Pressure* |
| Fuel Temperature* | ECU Regeneration* |
| Turbo Pressure* | ECU Regeneration Icons* |
| Fuel Pressure* | Engine Soot Levels* |
| Fuel Consumption* | DEF Tank Level* |
| Fuel Used* | DEF Tank Temperature* |
| Flexible Sensors | DEF Reagent Cons* |
| Engine Maintenance Alarm 1 | SCR After Treatment Status* |
| Engine Maintenance Alarm 2 | ECU ECR DEF Icons* |
| Engine Maintenance Alarm 3 | DEF Counter Minimum* |
| Engine Maintenance Alarm 4 | DPTC Filter Status* |
| Engine Maintenance Alarm 5 | Engine ECU Link* |
| After Treatment Fuel Used* | Tier 4 Engine Information* |

4.2.2.1 DPF REGENERATION LAMPS

NOTE: For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 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 <i>Diesel Particulate Filter</i> is active. |
|  | DPF Inhibited | The module received a fault indication from the engine ECU informing that the <i>Diesel Particulate Filter</i> has been inhibited. |
|  | DPF Stop | The module received a fault indication from the engine ECU informing that the <i>Diesel Particulate Filter</i> has been stopped. |
|  | DPF Warning | The module received a fault condition from the engine ECU informing that the <i>Diesel Particulate Filter</i> has a fault condition. |
|  | HEST Active | The module received a fault indication from the engine ECU informing that the <i>High Exhaust System Temperature</i> is active. |
|  | DEF Low Level | The module received a fault condition from the engine ECU informing that the <i>Diesel Exhaust Fluid Low Level</i> is active. |
|  | SCR Inducement | The module received a fault indication from the engine ECU informing that the <i>Selective Catalytic Reduction Inducement</i> is active. |

Example:

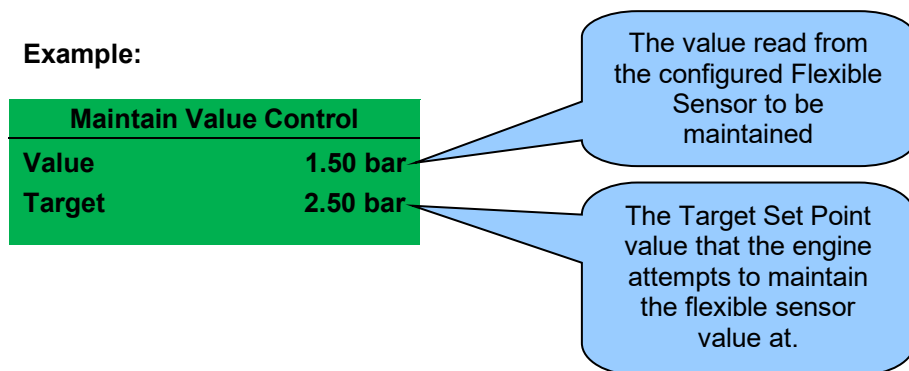
4.2.2.2 MAINTAIN VALUE CONTROL

NOTE: Only active when *Maintain Value Control* is enabled. For further details of module configuration, refer to DSE Publication: *057-251 DSEE400 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: *057-251 DSEE400 Configuration Software Manual*.

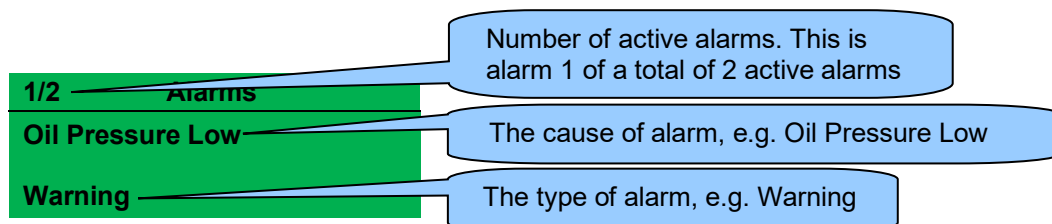
Depending upon module configuration, this page allows the user to raise or lower *Target Set Point* of the *Maintain Value Control* parameter by selecting the *Speed Up*  or *Speed Down*  buttons.



Example:



4.2.3 ALARMS

When an alarm is active, the LCD display jumps to display the *Alarms Page*.



The LCD displays multiple alarms such as “*Coolant Temp High*”, “*Emergency Stop*” and “*Low Coolant Warning*”. These automatically scroll in the order that they occurred or press the **Up**  or **Down**  buttons scroll through manually.

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

Example:

| | |
|-------------------------|---------------|
| 1/2 | Alarms |
| Oil Pressure Low | |
| Warning | |

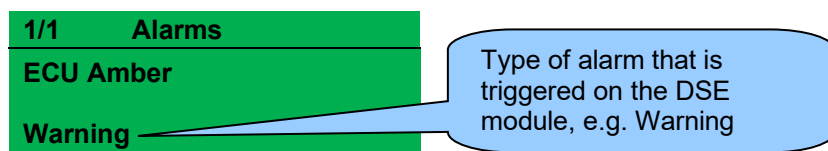
| | |
|--------------------------|---------------|
| 2/2 | Alarms |
| Coolant Temp High | |
| Shutdown | |


4.2.3.1 ECU ALARMS (CAN FAULT CODES / DTC)

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

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

When connected to a suitable CAN engine, the controller displays alarm status messages from the ECU in the *Alarms* section of the display.



Press and hold the **Up**  button to access the list of *Engine DTCs* (Diagnostic Trouble Codes) from the ECU which are DM1 messages.

| | |
|-----------------------------------|-----------------|
| 1/2 | ECU DTCs |
| Water Level Low | |
| SPN=131166 , FMI=8, OC=127 | |

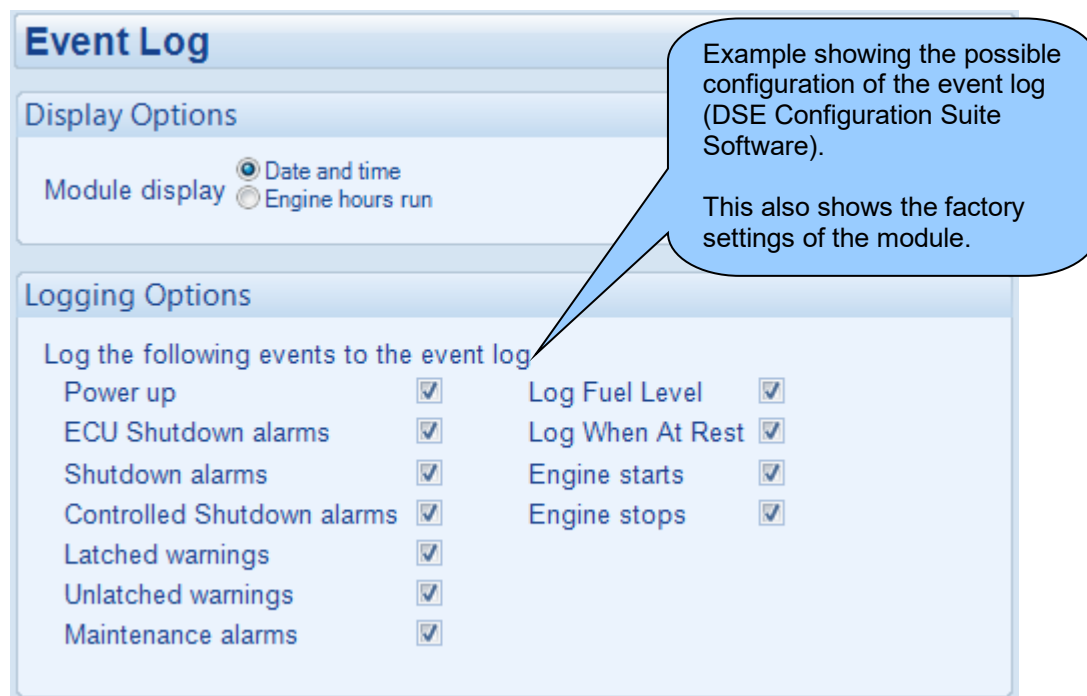
The DM1 DTC is interpreted by the module and is shown on the module's display as a text message. In addition to this, the manufacturer's DTC is shown below.

4.2.4 EVENT LOG



NOTE: For further details of module configuration, refer to DSE Publication: 057- 251 *DSEE400 Configuration Software Manual*.

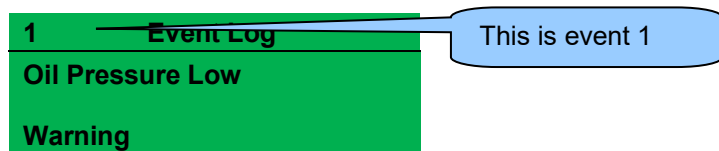
The module maintains a log of past alarms and/or selected status changes. At the time of writing, the modules log is capable of storing the last 250 log entries.


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.






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

To view the event log, repeatedly press and hold the **Up**  or **Down**  buttons until the LCD screen displays the *Event Log* page.



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

Continuing to press the **Down**  button cycles through the past events after which, the display shows the most recent alarm and the cycle begins again.

To exit the event log and return to viewing the instruments, press and hold the **Up**  or **Down**  buttons to select the next instrumentation page.

4.2.5 SERIAL PORT

This section is included to give information about the RS485 serial port

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

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

Connected to an R485 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.

| Serial Port | |
|--------------|--------------|
| Baud | 19200 |
| SlaveID | 1 |
| RS485 | |

RS485 Port

Basic

Slave ID

Baud Rate

Advanced

Master inactivity timeout 5s

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

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)

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).

4.2.6 ABOUT


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 | E400 |
| Application | V1.0.12 |
| USB ID | BC614E |

Variant: E400

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

| About | |
|------------|--------|
| Bootloader | V2.0.3 |

Bootloader: Firmware Update bootloader software version.

| About | |
|-------------|-------------|
| Engine Type | Volvo EMS2b |
| Version | V1.21 |

Engine Type: The name of the engine file selected in the configuration


Version: Engine type file version.

| About | |
|-----------------|----------------|
| LCD Temperature | 20 °C 68 °F |


LCD Temperature: The current operating temperature of the module's LCD display.

4.2.7 PLC INSTRUMENTS

 **NOTE:** PLC Instrument page is only available on hardware version E400-002-## or above.

 **NOTE:** Depending upon the module's configuration, some display screens may be disabled. For further details of module configuration, refer to DSE Publication: 057-251 *DSE400 Configuration Suite PC Software Manual* and 057-314 *Advanced PLC Programming Guide for DSE Controllers*.

Contains values from various elements from the module's internal PLC editor to enable the user to view them from the module's fascia.



Press the **Instrumentation Scroll**  buttons scroll through the **PLC Instruments** parameters if configured.

Coil Example:

| PLC Instruments |
|-----------------|
| New Coil 1 |
| 0 |



Counter Example:

| PLC Instruments |
|-----------------|
| New Counter 1 |
| 5 |

Counter 1: The name of the Counter as configured in the PLC.
Value: The value the Counter currently contains. This value can be edited from the fascia by pressing and holding the **Tick**  and then using the **Instrumentation Scroll**  button to change the value.

Persistent Variable Example:

| PLC Instruments |
|----------------------|
| New Persistent Var 1 |
| 127 |

Persistent Variable: The name of the Persistent Variable as configured in the PLC.
Value: The value the Persistent Variable currently contains. This value can be edited from the fascia by pressing and holding the **Tick**  and then using the **Instrumentation Scroll**  button to change the value.

String Example:


| PLC Instruments | |
|------------------|------|
| New String Var 1 | Test |

String: The name of the string as configured in the PLC.

Timer Example:

| PLC Instruments | |
|-----------------|------------|
| New Timer 1 | 00:00:02.5 |

Timer 1: The name of the timer as configured in the PLC.

Value: The time configured in the PLC.
This value can be edited from the fascia by pressing and holding the *Tick*  and then using the

Instrumentation Scroll  button to change the value.

Variable Example:

| PLC Instruments | |
|-----------------|----|
| New Variable 1 | 58 |

Variable: The name of the Variable as configured in the PLC.

Value: The value the Variable currently contains.

Delay On Timer Example:

| PLC Instruments | |
|-----------------|----------|
| TON – 1 | |
| Actual | 00:14:07 |
| Set Point | 00:50:30 |

TON – 1: The name of the Delay On Timer as configured in the PLC.

Actual: The time the timer has currently reached.

Set Point: The time at which the timer stops incrementing

Delay Off Timer Example:

| PLC Instruments | |
|-----------------|----------|
| TOF – 2 | |
| Actual | 00:17:01 |
| Set Point | 00:41:30 |

TOF – 2: The name of the Delay Off Timer as configured in the PLC.

Actual: The time the timer has currently reached.

Set Point: The time at which the timer stops incrementing

Counter Example:

| PLC Instruments | |
|-----------------|----|
| Counter 1 | |
| Actual | 5 |
| Set Point | 15 |

Counter 1: The name of the counter as configured in the PLC.

Actual: The number the counter has currently reached.

Set Point: The number at which the counter stops incrementing

5 OPERATION

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

5.1 QUICKSTART GUIDE

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

5.1.1 STARTING THE ENGINE

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



5.1.2 STOPPING THE ENGINE

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






5.2 STOP/RESET MODE

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

NOTE: For further details of module configuration, refer to DSE Publication: 057- 251 *DSEE400 Configuration Suite Software Manual*.


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**  operation.

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


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

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

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

Any latched alarms are reset when **Stop/Reset Mode**  is entered if the fault has been cleared

The engine is not started when in **Stop/Reset Mode** . If 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, no form of communication active and configured for *Power Save Mode*, the module enters *Power Save Mode*. To 'wake' the module, press any fascia control buttons.

Power Save Mode in the
DSE Configuration Suite
Software


Power Save Mode Enable





5.2.1 ECU OVERRIDE

NOTE: *Protected Start Mode* must be enabled to activate this feature, refer to DSE Publication: 057-251 *DSEE400 Configuration Suite Software Manual*.

Pressing the **Start**  button in **Stop/Reset Mode**  powers up the engine's ECU but does not start the engine. This is used to check the status of the CAN communication and to prime the fuel system.

When an ECU override is active, the module displays "ECU override" on the status screen, the ECU override timer begins and the start LED flashes to indicate the module is armed and ready to start the engine on the next **Start**  button press.

ECU override remains active until a start command is issued, the timer has lapsed, **Auto Mode**  is entered and a scheduled start becomes active or **Auto Mode**  is entered and an auto start state becomes active.

Protected Start Mode in the DSE Configuration Suite Software

Protected Start Mode




5.3 AUTOMATIC MODE

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

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.


5.3.1 WAITING IN AUTO MODE

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

- Activation of a digital input that has been configured to *Remote Start*.
- Activation of an analogue sensor reaching a certain configured value.
- Activation of the inbuilt exercise scheduler.
- Instruction from external remote telemetry devices using the RS485 interface.

5.3.2 STARTING SEQUENCE

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

 **NOTE:** For further details of module configuration, refer to DSE Publication: 057- 251 *DSEE400 Configuration Software Manual*.

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

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

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


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

The starter motor is disengaged when the engine fires. Speed detection is factory configured to be measured from a Magnetic Pickup mounted on the flywheel but can additionally be configured to be measured from the CAN link to the engine ECU.

Additionally, rising oil pressure or engine charge alternator voltage 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.

5.3.3 ENGINE RUNNING

 **NOTE:** The *Clutch Control Output* signal remains inactive until the engine is available. This prevents excessive wear on the engine.

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 all start requests are removed, the *Stopping Sequence* begins.

When *Speed Control in Auto* is set to *Manual*; refer to section entitled *Manual Speed Control* elsewhere in this document.

5.3.4 STOPPING SEQUENCE

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

If there are no starting requests at the end of the *Return Delay* timer, the **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.

5.4 MANUAL/START 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/Start Mode is activated by pressing the **Manual/Start Mode**  button.


The LED above the **Manual/Start Mode**  button illuminates to indicate **Manual/Start Mode**  operations.

5.4.1 STARTING SEQUENCE

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

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

 **NOTE:** For further details of module configuration, refer to DSE Publication: 057- 251 *DSEE400 Configuration Software Manual*.

If no preheat timer is configured, the fuel relay is energised as soon as the **Manual/Start Mode**  button is pressed and the engine is cranked.

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

The starter motor is disengaged when the engine fires. Speed detection is factory configured to be measured from a Magnetic Pickup mounted on the flywheel but can additionally be configured to be measured from the CAN link to the engine ECU.


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

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




5.4.2 ENGINE RUNNING

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



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



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

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.



5.4.3 MANUAL SPEED CONTROL

Once the engine is running and available, the engine speed is adjustable between the configured *Min Speed* and *Max Speed* range. Press the **Increase Engine Speed**  button to increase the engine's speed within the configured range, the speed increases by the amount of the configured *Step Size* in rpm. When ramping is enabled, holding the **Increase Engine Speed**  button causes the speed to raise according to the ramp rate setting rather than the step size setting.


Press the **Decrease Engine Speed**  button to decrease the engine's speed within the configured range, the speed decreases by the amount of the configured *Step Size* in rpm. When ramping is enabled, holding the **Decrease Engine Speed**  button causes the speed to lower according to the ramp rate setting rather than the step size setting.


5.4.4 MANUAL RUN TIME



When the engine is running in **Manual/Start Mode**, pressing the **Manual/Start Mode**  button a second time initiates the *Run Timer*, the module runs the set for the configured *Run Timer* amount of time before initiating the *Stopping Sequence*. Another press on the **Manual/Start Mode**  button deactivates the *Run Timer* and the engine continues running in **Manual Mode**.

While the set is operating in *Manual Run Time*, the **Increase Engine Speed**  button and **Decrease Engine Speed**  buttons are used to increment and decrement the amount of the *Run Timer*.

5.4.5 STOPPING SEQUENCE

In **Manual/Start 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*

5.5 SCHEDULER

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

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


Example:

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






In this example the set starts at 09:00 on Monday and run for 5 hours off load, then start at 13:30 on Tuesday and run for 30 minutes on load and is inhibited from automatically starting on Monday from 17:00 for 12 hours.

| Week | Day | Run Mode | Start Time | Duration | Clear |
|------|---------|--------------------|------------|----------|-------|
| | Monday | Off Load | 09:00 | 05:00 | Clear |
| | Tuesday | On Load | 13:30 | 00:30 | Clear |
| | Monday | Auto Start Inhibit | 17:00 | 12:00 | Clear |
| | Monday | Off Load | 00:00 | 00:00 | Clear |
| | Monday | Off Load | 00:00 | 00:00 | Clear |
| | Monday | Off Load | 00:00 | 00:00 | Clear |
| | Monday | Off Load | 00:00 | 00:00 | Clear |
| | Monday | Off Load | 00:00 | 00:00 | Clear |



5.5.1 STOP MODE

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

5.5.2 AUTO MODE

- Scheduled runs operate only if the module is in **Auto Mode**  with no *Shutdown* or *Controlled Shutdown* alarm active.
- If the module is in **Stop/Reset Mode**  or **Manual/Start Mode**  when a scheduled run begins, the engine is not started. However, if the module is moved into **Auto Mode**  during a scheduled run, the engine is called to start.
- Depending upon configuration by the system designer, an external input can be used to inhibit a scheduled run.
- If the engine is running *Off Load* in **Auto Mode**  and a scheduled run configured to 'On Load' begins, the set is placed *On Load* for the duration of the Schedule.

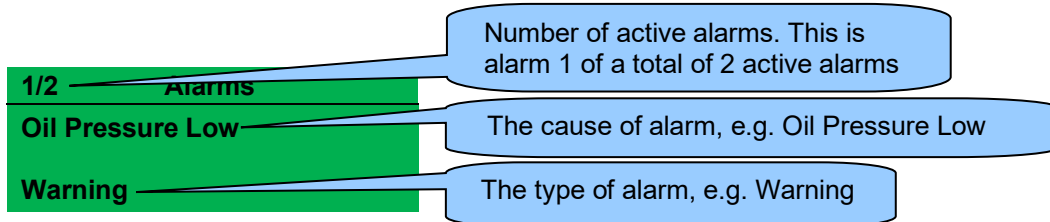
5.5.3 MANUAL/START MODE



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

6 PROTECTIONS

6.1 ALARMS

When an alarm is active, the LCD display jumps to display the *Alarms Page*.



The LCD displays multiple alarms such as “*Coolant Temp High*”, “*Emergency Stop*” and “*Low Coolant Warning*”. These automatically scroll in the order that they occurred or press the **Up**  or **Down**  buttons scroll through manually.


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

Example:

| | |
|------------------|--------|
| 1/2 | Alarms |
| Oil Pressure Low | |
| Warning | |

| | |
|-------------------|--------|
| 2/2 | Alarms |
| Coolant Temp High | |
| Shutdown | |

6.1.1 PROTECTIONS DISABLED

 **NOTE:** For further details of module configuration, refer to DSE Publication: *057-251 DSEE400 Configuration Software Manual*.

User configuration is possible to prevent *Shutdown* and *Controlled Shutdown* alarms from stopping the engine. Under such conditions, *Protections Disabled* appears on the module display to inform the operator. *Shutdown* and *Controlled Shutdown* alarms still appear however, the operator is informed the alarms are blocked.

Example:

| | |
|------------------|--------|
| 1/1 | Alarms |
| Oil Pressure Low | |
| Shutdown Blocked | |

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 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.

6.1.1.1 INDICATION AND WARNING ALARMS

During an Indication or Warning alarm:

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

6.1.1.2 SHUTDOWN AND CONTROLLED SHUTDOWN ALARMS

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

During a 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 Alarms* or *Controlled Shutdown Alarms* elsewhere in this document.
- The set continues to run.
- The *Clutch Control* output stays active
- **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 alarm is logged by the controllers *Event Log* (if configured to log that type of alarm) and logs that the shutdown was prevented.

6.1.2 ECU ALARMS (CAN FAULT CODES / DTC)

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

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

When connected to a suitable CAN engine, the controller displays alarm status messages from the ECU in the *Alarms* section of the display.

| | |
|-----------|--------|
| 1/1 | Alarms |
| ECU Amber | |
| Warning | |

Type of alarm that is triggered on the DSE module, e.g. Warning

Press and hold the **Up** button to access the list of *Engine DTCs* (Diagnostic Trouble Codes) from the ECU which are DM1 messages.

| | |
|----------------------------|----------|
| 1/2 | ECU DTCs |
| Water Level Low | |
| SPN=131166 , FMI=8, OC=127 | |

The DM1 DTC is interpreted by the module and is shown on the module's display as a text message. In addition to this, the manufacturer's DTC is shown below.


6.2 INDICATIONS

Indications are non-critical and often status conditions. They do not appear on the LCD display of the module as a text message in the *Status*, *Event Log* or *Alarms* pages. However, an output 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.
- Output activates when Digital Input A is active.

Digital Input A

| | | |
|------------------|------------------|--|
| Function | User Configured | |
| Polarity | Open to Activate | |
| Action | Indication | |
| Arming | Always | |
| LCD Display | Panel Door Open | |
| Activation Delay | 0s |  |

Relay Outputs

| | Source | Polarity |
|----------|-----------------|----------|
| Output C | Digital Input A | Energise |

6.3 WARNING ALARMS

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


Example:

| |
|--------------------------|
| 1/2 Alarms |
| Coolant Temp High |
| Warning |

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

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


If the module is configured for **CAN** and receives an “error” message from the ECU, ‘ECU Warning’ is shown on the module’s display as a warning alarm.

| Fault | Description |
|--|--|
| Analogue Input A to G (Digital) | <div>  NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual. </div> <p>The module detected that an analogue input configured as a digital input to create a fault condition became active and the appropriate LCD message is displayed.</p> |
| Calibration Fault | The module detected that its internal calibration has failed. The unit must be sent back to DSE to be investigated and repaired. Contact DSE Technical Support for more details. |
| Charge Alt Failure IEEE 37.2 – 27 DC Undervoltage Relay | The module detected that the output voltage of the charge alternator had fallen below the <i>Charge Alternator Warning Trip</i> level for the configured delay timer. |
| Coolant Temp High IEEE C37.2 – 26 Apparatus Thermal Device | The module detected that the engine coolant temperature had risen above the <i>High Coolant Temperature Pre-Alarm Trip</i> level after the <i>Safety On Delay</i> timer had expired. |
| DC Battery High Voltage IEEE 37.2 – 59 DC Overvoltage Relay | The module detected that its DC supply voltage had risen above the <i>Plant Battery Overvolts Warning Trip</i> level for the configured delay timer. |
| DC Battery Low Voltage IEEE 37.2 – 27 DC Undervoltage Relay | The module detected that its DC supply voltage had fallen below the <i>Plant Battery Undervolts Warning Trip</i> level for the configured delay timer. |
| DEF Level Low | The module received a fault condition from the engine ECU alerting about the DEF level. |


Continued over page...

| Fault | Description |
|---|---|
| Digital Input A to D | <p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that a digital input configured to create a fault condition became active and the appropriate LCD message is displayed.</p> |
| DPTC Filter | The module received a fault condition from the engine ECU alerting that the DPF/DPTC had activated. |
| ECU Amber | The module received an amber fault condition from the engine ECU. |
| ECU Data Fail | The module is configured for CAN operation but has not detected data being sent from the engine's ECU. |
| ECU Malfunc. | The module received a malfunction fault condition from the engine ECU. |
| ECU Protect | The module received a protect fault condition from the engine ECU. |
| ECU Red | The module received a red fault condition from the engine ECU. |
| Engine Over Speed IEEE C37.2 - 12 Overspeed Device | The module detected that the engine speed had risen above the <i>Over Speed Pre-Alarm Trip</i> level for the configured delay timer. |
| Engine Over Speed Delayed IEEE C37.2 - 12 Overspeed Device | The module detected that the engine speed had risen above the <i>Over Speed Trip</i> level but was below the <i>Over Speed Overshoot Trip</i> for the configured <i>Overshoot Delay</i> timer during starting. |
| Engine Under Speed IEEE C37.2 - 14 Underspeed Device | The module detected that the engine speed had fallen below the <i>Under Speed Pre-Alarm Trip</i> level for the configured delay timer after the <i>Safety On Delay</i> timer had expired. |
| Flexible Sensor A to G High | <p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that an analogue input value had risen above the <i>Flexible Sensor High Pre-Alarm Trip</i> level.</p> |
| Flexible Sensor A to G Low | <p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that an analogue input value had fallen below the <i>Flexible Sensor Low Pre-Alarm Trip</i> level.</p> |
| Fuel Level Low IEEE C37.2 - 71 Liquid Level Switch | The module detected that the engine fuel level had fallen below the <i>Low Fuel Level Trip</i> level. |
| Fuel Level Low Switch IEEE C37.2 - 71 Liquid Level Switch | The module detected that the engine low fuel level switch had activated. |
| Fuel Usage IEEE C37.2 - 80 Flow Switch | The module detected that the fuel consumption was more than the configured <i>Running Rate</i> or <i>Stopped Rate</i> . |
| HEST Active | The module received a fault condition from the engine ECU alerting that the HEST had activated. |
| Loss of Mag-PU | The module detected that the magnetic pick up was not producing a pulse output after the required <i>Crank Disconnect</i> criteria had been met. |
| Low Coolant Warning | The module detected that the engine coolant temperature had fallen below the <i>Low Coolant Temperature Pre-Alarm Trip</i> level. |

Continued over page...

| Fault | Description |
|---|--|
| Maintenance Due | <div>  NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual. </div> <p>The module detected that one of the configured maintenance alarms is due as its configured maintenance interval has expired.</p> |
| Oil Pressure Low IEEE C37.2 - 63 Pressure Switch | The module detected that the engine oil pressure had fallen below the <i>Low Oil Pressure Pre-Alarm Trip</i> level after the <i>Safety On Delay</i> timer had expired. |
| Protections Disabled | The module detected that an input configured for Protections Disable became active. |
| SCR Inducement | The module received a fault condition from the engine ECU alerting about the SCR Inducement. |
| Water in Fuel | The module received a fault condition from the engine ECU alerting that water in the fuel had been detected. |

6.4 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.

 **NOTE:** The fault condition must be resolved before the alarm can be reset. If the fault condition remains, it is not possible to reset the alarm (the exception to this is the *Coolant Temp High* alarm and similar *Active From Safety On* alarms, as the coolant temperature could be high with the engine at rest).

Controlled Shutdown Alarms are latching and stop the engine but in a controlled manner. On initiation of the controlled shutdown condition the module de-activates the **Clutch Control Output** to remove the load from the engine. Once this has occurred the module starts the *Cooling Timer* and allows the engine to cool off-load before shutting down it down. To restart the engine the fault must be cleared and the alarm reset.

Example:

1/2 Alarms

Coolant Temp High


Controlled Shutdown

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

Controlled Shutdown Alarms are latching alarms and to remove the fault, press the **Stop/Reset Mode**




button on the module.

| Fault | Description |
|---|--|
| Analogue Input A to G (Digital) | <p> NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that an analogue input configured as a digital input to create a fault condition became active and the appropriate LCD message is displayed.</p> |
| Calibration Fault | The module detected that its internal calibration has failed. The unit must be sent back to DSE to be investigated and repaired. Contact DSE Technical Support for more details. |
| Coolant Temp High IEEE C37.2 – 26 Apparatus Thermal Device | The module detected that the engine coolant temperature had risen above the <i>High Coolant Temperature Controlled Shutdown</i> level after the <i>Safety On Delay</i> timer had expired. |
| DEF Level Low | The module received a fault condition from the engine ECU alerting about the DEF level. |

Continued over page...


| Fault | Description |
|--|---|
| Digital Input A to D | <p>⚠ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that a digital input configured to create a fault condition became active and the appropriate LCD message is displayed.</p> |
| DPTC Filter | The module received a fault condition from the engine ECU alerting that the DPF/DPTC had activated. |
| ECU Amber | The module received an amber fault condition from the engine ECU. |
| ECU Data Fail | The module is configured for CAN operation but has not detected data being sent from the engine's ECU. |
| ECU Malfunc. | The module received a malfunction fault condition from the engine ECU. |
| ECU Protect | The module received a protect fault condition from the engine ECU. |
| ECU Red | The module received a red fault condition from the engine ECU. |
| Flexible Sensor A to G Fault | <p>⚠ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that circuit to the flexible sensor had become open circuit.</p> |
| Flexible Sensor A to G High | <p>⚠ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that an analogue input value had risen above the <i>Flexible Sensor High Alarm Trip</i> level.</p> |
| Flexible Sensor A to G Low | <p>⚠ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that an analogue input value had fallen below the <i>Flexible Sensor Low Alarm Trip</i> level.</p> |
| Fuel Level Low IEEE C37.2 - 71 Liquid Level Switch | The module detected that the engine fuel level had fallen below the <i>Low Fuel Level Trip</i> level. |
| Fuel Level Low Switch IEEE C37.2 - 71 Liquid Level Switch | The module detected that the engine low fuel level switch had activated. |
| Fuel Usage IEEE C37.2 - 80 Flow Switch | The module detected that the fuel consumption was more than the configured Running Rate or Stopped Rate. |
| Loss of Mag-PU | The module detected that the magnetic pick up was not producing a pulse output after the required Crank Disconnect criteria had been met. |

Continued over page...

| Fault | Description |
|-----------------|---|
| Maintenance Due |  NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual. |
| | The module detected that one of the configured maintenance alarms is due as its configured maintenance interval has expired. |
| SCR Inducement | The module received a fault condition from the engine ECU alerting about the SCR Inducement. |
| Water in Fuel | The module received a fault condition from the engine ECU alerting that water in the fuel had been detected. |

6.5 SHUTDOWN ALARMS

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


 **NOTE:** The fault condition must be resolved before the alarm can be reset. If the fault condition remains, it is not possible to reset the alarm (the exception to this is the *Oil Pressure Low* alarm and similar *Active From Safety On* alarms, as the oil pressure is low with the engine at rest).


Shutdown Alarms are latching and immediately stop the engine. On initiation of the shutdown condition the module de-activates the **Clutch Control Output** outputs to remove the load from the engine. Once this has occurred, the module shuts the engine down immediately to prevent further damage. To restart the engine the fault must be cleared and the alarm reset.

Example:

| | |
|------------------|-------|
| 1/2 | Alarm |
| Oil Pressure Low | |
| Shutdown | |

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

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

| Fault | Description |
|--|---|
| Analogue Input A to G (Digital) | <p> NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 <i>DSEE400 Configuration Software Manual</i>.</p> <p>The module detected that an analogue input configured as a digital input to create a fault condition became active and the appropriate LCD message is displayed.</p> |
| Calibration Fault | The module detected that its internal calibration has failed. The unit must be sent back to DSE to be investigated and repaired. Contact DSE Technical Support for more details. |
| Charge Alt Failure IEEE C37.2 – 27DC Undervoltage Relay | The module detected that the output voltage of the charge alternator had risen above the <i>Charge Alternator Shutdown Trip</i> level for the configured delay timer. |
| Coolant Sender O/C | The module detected that circuit to the engine coolant temperature sensor had become open circuit. |
| Coolant Temp High IEEE C37.2 – 26 Apparatus Thermal Device | The module detected that the engine coolant temperature had risen above the <i>High Coolant Temperature Shutdown Trip</i> level after the <i>Safety On Delay</i> timer had expired. |
| Coolant Temp High Switch IEEE C37.2 – 26 Apparatus Thermal Device | The module detected that the high engine coolant temperature switch had activated after the <i>Safety On Delay</i> timer had expired. |
| DEF Level | The module received a fault condition from the engine ECU alerting about the DEF level. |

Continued over page...

| Fault | Description |
|---|---|
| Digital Input A to D | <p>NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that a digital input configured to create a fault condition became active and the appropriate LCD message is displayed.</p> |
| DPTC Filter | The module received a fault condition from the engine ECU alerting that the DPF/DPTC had activated. |
| ECU Amber | The module received an amber fault condition from the engine ECU. |
| ECU Data Fail | The module is configured for CAN operation but has not detected data being sent from the engine's ECU. |
| ECU Malfunc. | The module received a malfunction fault condition from the engine ECU. |
| ECU Protect | The module received a protect fault condition from the engine ECU. |
| ECU Red | The module received a red fault condition from the engine ECU. |
| Emergency Stop IEEE C37.2 - 5 Stopping Device | The module detected that emergency stop button had been pressed removing a positive voltage supply from the emergency stop input terminal. This input is failsafe (normally closed to emergency stop) and immediately stops the engine when the signal is removed. |
| Engine Over Speed IEEE C37.2 - 12 Overspeed Device | The module detected that the engine speed had risen above the <i>Over Speed Alarm Trip</i> level for the configured delay timer. |
| Engine Over Speed Overshoot IEEE C37.2 - 12 Overspeed Device | The module detected that the engine speed had risen above the <i>Over Speed Overshoot Trip</i> during the configured <i>Overshoot Delay</i> timer whilst starting. |
| Engine Under Speed IEEE C37.2 - 14 Underspeed Device | The module detected that the engine speed had fallen below the <i>Under Speed Alarm Trip</i> level for the configured delay timer after the <i>Safety On Delay</i> timer had expired. |
| Failed to Start IEEE C37.2 - 48 Incomplete Sequence Relay | The module detected that the engine had failed to start as it did not meet the required Crank Disconnect criteria during the configured number of Crank Attempts. |
| Failed to Stop IEEE C37.2 - 48 Incomplete Sequence Relay | <p>NOTE: <i>Fail to Stop</i> could indicate a faulty oil pressure sensor. If engine is at rest, check the oil pressure sensor wiring and configuration.</p> <p>The module detects a condition that indicates the engine is running when the DSE module has instructed it to stop.</p> |
| Flexible Sensor A to G Fault | <p>NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.</p> <p>The module detected that circuit to the flexible sensor had become open circuit.</p> |

Continued over page...

| Fault | Description |
|--|---|
| Flexible Sensor A to G High | <p>⚠ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 <i>DSEE400 Configuration Software Manual</i>.</p> <p>The module detected that an analogue input value had risen above the <i>Flexible Sensor High Alarm Trip</i> level.</p> |
| Flexible Sensor A to G Low | <p>⚠ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 <i>DSEE400 Configuration Software Manual</i>.</p> <p>The module detected that an analogue input value had fallen below the <i>Flexible Sensor Low Alarm Trip</i> level.</p> |
| Fuel Level Low IEEE C37.2 - 71 Liquid Level Switch | The module detected that the engine fuel level had fallen below the <i>Low Fuel Level Trip</i> level. |
| Fuel Level Low Switch IEEE C37.2 - 71 Liquid Level Switch | The module detected that the engine low fuel level switch had activated. |
| Fuel Usage IEEE C37.2 – 80 Flow Switch | The module detected that the fuel consumption was more then the configured Running Rate or Stopped Rate. |
| Loss of Mag-PU | The module detected that the magnetic pick up was not producing a pulse output after the required Crank Disconnect criteria had been met. |
| Mag-PU Fault | The module detected that circuit to the magnetic pick up sensor had become open circuit. |
| Maintenance Due | <p>⚠ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057- 251 <i>DSEE400 Configuration Software Manual</i>.</p> <p>The module detected that one of the configured maintenance alarms is due as its configured maintenance interval has expired.</p> |
| Oil Press Sender Fault | The module detected that circuit to the engine oil pressure sensor had become open circuit. |
| Oil Pressure Low IEEE C37.2 - 63 Pressure Switch | The module detected that the engine oil pressure had fallen below the <i>Low Oil Pressure Shutdown Trip</i> level after the <i>Safety On Delay</i> timer had expired. |
| Oil Pressure Low Switch IEEE C37.2 - 63 Pressure Switch | The module detected that the low oil pressure switch had activated after the <i>Safety On Delay</i> timer had expired. |
| SCR Inducement | The module received a fault condition from the engine ECU alerting about the SCR Inducement. |
| Water in Fuel | The module received a fault condition from the engine ECU alerting that water in the fuel had been detected. |

6.6 MAINTENANCE ALARMS

Depending upon module configuration one or more levels of engine maintenance alarm may occur based upon a configurable schedule. Once configured, the maintenance alarms are available to adjust within the front panel editor.

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

Resetting the maintenance alarm is normally actioned by the site service engineer after performing the required maintenance.

The method of reset is either by:

- Activating an input that has been configured to Maintenance Reset Alarm 1, 2, 3, 4 or 5.
- Pressing the maintenance reset button in the DSE Configuration Suite, Maintenance section.
- Hold the stop button for 5 seconds when the alarm is displayed and the module is configured for maintenance reset by front panel.

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

The screenshot displays the 'Maintenance Alarm' configuration window. It contains three sections for 'Maintenance Alarm 1', 'Maintenance Alarm 2', and 'Maintenance Alarm 3'. Each section has the following fields:

- Enable:** A checked checkbox.
- Description:** A text box containing the alarm name (e.g., 'Maintenance Alarm 1').
- Action:** A dropdown menu set to 'Warning'.
- Engine run hours:** A numeric input set to '10' with a unit of 'hrs'.
- Enable alarm on due date:** A checked checkbox.
- Maintenance interval:** A numeric input set to '1' with a unit of 'months'.

The screenshot shows the 'Digital Input A' configuration window. The fields are as follows:

- Function:** A dropdown menu set to 'Reset Maintenance Alarm 1'.
- Polarity:** A dropdown menu set to 'Close to Activate'.
- Action:** A dropdown menu.
- Arming:** A dropdown menu.
- LCD Display:** A text box containing 'Digital Input A'.
- Activation Delay:** A slider set to '0s'.

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

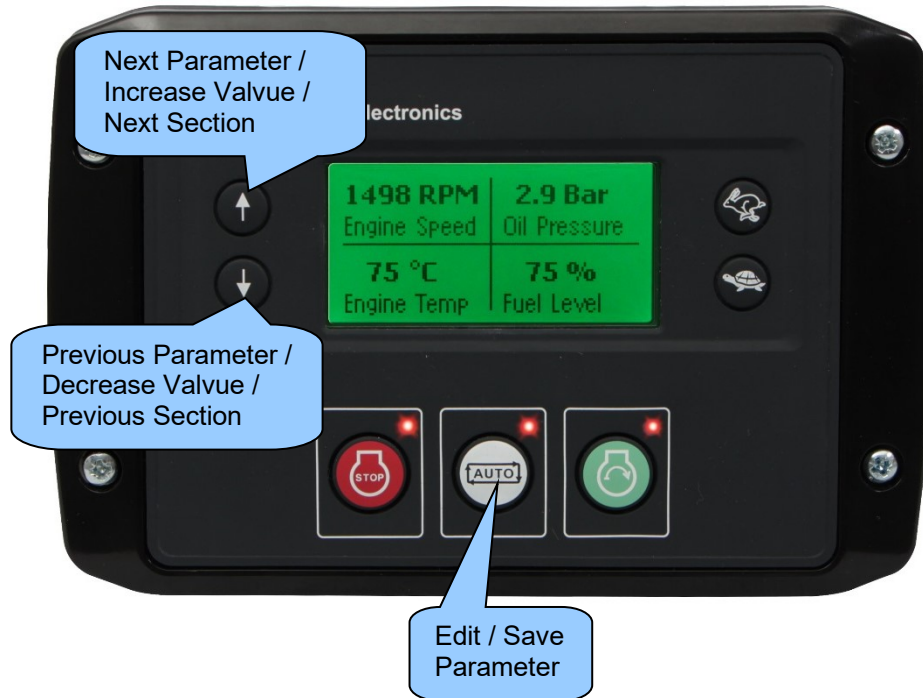
The screenshot shows the 'Maintenance Alarm Reset' window. It displays the following information:

- Maintenance Alarm 1**
- Running Time Until Next Maintenance:** 10:00
- Date Of Next Maintenance:** 11/03/2000 15:57:46
- Reset:** A large yellow button.
- Text below button:** 'Press reset to schedule next maintenance, based upon module's maintenance configuration.'


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 ACCESSING THE FRONT PANEL CONFIGURATION EDITOR

 **NOTE:** More comprehensive module configuration is possible via PC configuration software. For further details of module configuration, refer to DSE Publication: 057- 251 DSEE400 Configuration Software Manual.








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

7.1.1 ENTERING PIN









 **NOTE:** The PIN is not set by DSE when the module leaves the factory. If the module has a PIN code set, the engine supplier has entered this. Contact the engine supplier if the code is required. If the code has been 'lost' or 'forgotten', the module must be returned to the DSE factory to have the PIN removed. A charge is made for this procedure. 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.

 **NOTE:** It is possible to configure the Module for differing *Read* and *Write* PIN codes. When accessing the FPE only the *Read* PIN is applies

- If a module security PIN has been set, the PIN request is then shown.
- Press the **Auto Mode**  button, the first '#' changes to '0'. Press the **Up**  or **Down**  buttons to adjust it to the correct value.
- Press and hold the **Up**  button when the first digit is correctly entered. The digit previously entered now shows as '#' for security.
- Repeat this process for the other digits of the PIN number. Press and hold the **Down**  button to adjust one of the previous digits. Press the **Auto Mode**  button to finish editing the PIN
- Press the **Auto Mode**  button to check the PIN for validity. If the number is not correct, the PIN must be re-entered.
- If the PIN has been successfully entered (or the module PIN has not been enabled), the editor is displayed.

7.1.2 EDITING A PARAMETER

- Press and hold the **Up**  or **Down**  buttons to cycle to the section to view/change.
- Press the **Up**  or **Down**  buttons to select the parameter to view/change within the currently selected section.
- To edit the parameter, press the **Auto Mode**  button to enter edit mode. The parameter begins to flash to indicate editing.
- Press the **Up**  or **Down**  buttons to change the parameter to the required value.
- Press the **Auto Mode**  to save the value. The parameter ceases flashing to indicate that it has been saved.

7.1.3 EXITING THE MAIN CONFIGURATION EDITOR



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






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

7.1.4 ADJUSTABLE PARAMETERS

| 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 °C, °F |
| | Coolant Temp High Controlled Shutdown (When Enabled) | 0 °C, °F |
| | Coolant Temperature High Shutdown (When Enabled) | 0 °C, °F |
| | 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 °C, °F |
| | Pre Heat Timer | 0 h 0 m 0 s |
| | Post Heat Temperature (When Enabled) | 0 °C, °F |
| | Post Heat Timer | 0 h 0 m 0 s |
| | Crank Duration | 0 m 0 s |
| | Crank Rest Time | 0 m 0 s |
| | Safety On Delay | 0 m 0 s |
| | Smoke Limiting | 0 m 0 s |
| | Smoke Limiting Off | 0 m 0 s |
| | Warm Up Time | 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 |




Continued over page...

| Section | Parameter As Shown On Display | Value |
|-----------------------------|--|------------------|
| Engine Continued | Charge Alternator Failure Warning | 0.0 V |
| | Charge Alternator Failure Shutdown | Active, Inactive |
| | 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 |
| | Idle Speed | 0 rpm |
| | Warming Speed | 0 rpm |
| | Cooldown Speed | 0 rpm |
| | Cranking Speed | 0 rpm |
| | Priming Speed | 0 rpm |
| | Min Speed | 0 rpm |
| | Default Running Speed | 0 rpm |
| | Max Speed | 0 rpm |
| | Cooldown at Idle Delay | 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 |
| | DPF Auto Regen Inhibit (Electronic Engines Only) | Active, Inactive |
| | DPF Manual Regen (Electronic Engines Only) | Active, Inactive |
| | DPF Manual Regen Cancel (Electronic Engines Only) | Active, Inactive |
| | DPF Regeneration Speed (Electronic Engines Only) | Active, Inactive |
| | DPF Regeneration Speed (Electronic Engines Only) | 0 rpm |
| | CAN Terminator | Active, Inactive |
| | Clutch Disengage Low Speed | 0 rpm |
| | Clutch Engage Speed | 0 rpm |
| | Clutch Disengage High Speed | 0 rpm |
| | Clutch Re-Engage Speed | 0 rpm |
| | Maintenance PIN Protect Enable | Active, Inactive |
| | Maintenance Alarm 1 | 0 h |
| | Maintenance Alarm 2 | 0 h |
| | Maintenance Alarm 3 | 0 h |
| | Maintenance Alarm 4 | 0 h |
| | Maintenance Alarm 5 | 0 h |
| Timers | LCD Page Timer | 0 h 0 m 0 s |
| | LCD Scroll Delay | 0 h 0 m 0 s |
| | Pre Heat Timer | 0 m 0 s |
| | Crank Duration Timer | 0 m 0 s |
| | Crank Rest Timer | 0 m 0 s |
| | Safety On Delay | 0 m 0 s |
| | Smoke Limiting | 0 m 0 s |
| | Smoke Limiting Off | 0 m 0 s |
| | Warm Up Time | 0 h 0 m 0 s |
| | Cool Down Time | 0 h 0 m 0 s |
| | Engine Speed Overshoot Delay | 0 m 0 s |
| | 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 |









| Section | Parameter As Shown On Display | Value |
|----------------------|---|--|
| Schedule | Schedule | Active, Inactive |
| | Schedule on Load (Only Available When Scheduler Is Active) | Off Load, On Load |
| | Schedule Period (Only Available When Scheduler Is Active) | Weekly, Monthly |
| | Schedule Time & Date Selection (1-8) | Press the Auto Mode  button to begin editing. Press and hold the Up  or Down  buttons to select the different parameters in the scheduler. Press the Up  or Down  buttons to change the value of the parameter. |
| Active Config | Active Config | Default Config |
| | Running Speed (When Enabled) | 0 rpm |
| | Min (When Enabled) | 0 (Configured Unit) |
| | Max (When Enabled) | 0 (Configured Unit) |
| | Speed at Min (When Enabled) | 0 rpm |
| | Speed at Max (When Enabled) | 0 rpm |
| | Speed Priority 1 (When Enabled) | 0 rpm |
| | Speed Priority 2 (When Enabled) | 0 rpm |
| | Speed Priority 3 (When Enabled) | 0 rpm |
| | Speed Priority 4 (When Enabled) | 0 rpm |
| | Emptying Speed (When Enabled) | 0 rpm |
| | Filling Speed (When Enabled) | 0 rpm |
| | Setpoint (When Enabled) | 0 % |
| | Deadband (When Enabled) | 0 % |
| | Engine Start Value (When Enabled) | 0 (Configured Unit) |
| | Engine Stop Value (When Enabled) | 0 (Configured Unit) |

7.1.5 ACCESSING THE SPEED CONTROL EDITOR


This allows the operator to edit the speed control parameters using the front panel buttons, without the need for entering the module PIN.



- Ensure the engine is at rest and the module is in **STOP Mode** by pressing the **Stop/Reset**  button.
- Navigate to the *Active Configuration* screen in the *Engine* section of the module's display.
- Press and hold the **Up**  or **Down**  buttons simultaneously to enter the editor, no PIN is required.

7.1.6 EDITING A PARAMETER

- Press and hold the **Up**  or **Down**  buttons to cycle to the section to view/change.
- Press the **Up**  or **Down**  buttons to select the parameter to view/change within the currently selected section.
- To edit the parameter, press the **Auto Mode**  button to enter edit mode. The parameter begins to flash to indicate editing.
- Press the **Up**  or **Down**  buttons to change the parameter to the required value.
- Press the **Auto Mode**  to save the value. The parameter ceases flashing to indicate that it has been saved.

7.1.7 EXITING THE SPEED CONTROL EDITOR

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

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

7.1.8 SPEED CONTROL EDITOR PARAMETERS

| Section | Parameter As Shown On Display | Value |
|----------------------|-----------------------------------|---------------------|
| Active Config | Active Config | Default Config |
| | Running Speed (When Enabled) | 0 rpm |
| | Min (When Enabled) | 0 (Configured Unit) |
| | Max (When Enabled) | 0 (Configured Unit) |
| | Speed at Min (When Enabled) | 0 rpm |
| | Speed at Max (When Enabled) | 0 rpm |
| | Speed Priority 1 (When Enabled) | 0 rpm |
| | Speed Priority 2 (When Enabled) | 0 rpm |
| | Speed Priority 3 (When Enabled) | 0 rpm |
| | Speed Priority 4 (When Enabled) | 0 rpm |
| | Emptying Speed (When Enabled) | 0 rpm |
| | Filling Speed (When Enabled) | 0 rpm |
| | Setpoint (When Enabled) | 0 % |
| | Deadband (When Enabled) | 0 % |
| | Engine Start Value (When Enabled) | 0 (Configured Unit) |
| | Engine Stop Value (When Enabled) | 0 (Configured Unit) |

8 COMMISSIONING




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


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

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


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


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

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

The starter engages and operates for the pre-set crank period. After the starter motor has attempted to start the engine for the pre-set number of attempts, the LCD displays *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/Start Mode  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 it does not, check that the *Remote Start* input is not active.

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 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 contact DSE Technical Support Department:

Tel: +44 (0) 1723 890099
E-mail: support@deepseaelectronics.com
Website: www.deepseaelectronics.com

9 FAULT FINDING

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

9.1 STARTING

| Symptom | Possible Remedy |
|--|--|
| Unit is inoperative | Check the battery and wiring to the unit. Check the DC supply. Check the DC fuse. |
| Read/Write configuration does not operate | |
| Unit shuts down | Check DC supply voltage is not above 35 V or below 9 V Check the operating temperature is not above 80°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, the set does not start if oil pressure is not low. |
| Pre-heat inoperative | Check wiring to engine heater plugs. Check battery supply. Check battery supply is present on the Pre-heat output of module. Check pre-heat configuration is correct. |
| Starter motor inoperative | Check wiring to starter solenoid. Check battery supply. Check battery supply is present on the Starter output of module. Ensure oil pressure switch or sensor is indicating the "low oil pressure" state to the controller. |

9.2 LOADING

| Symptom | Possible Remedy |
|---|--|
| Engine runs but does not take load | Check Warm up timer has timed out. Check connections to the clutch control mechanism. |
| Incorrect reading on Engine gauges | Check engine is operating correctly. |
| Fail to stop alarm when engine is at rest | Check that sensor is compatible with the module and that the module configuration is suited to the sensor. |


9.3 ALARMS

| Symptom | Possible Remedy |
|--|--|
| Oil pressure low 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. |
| Coolant temp high 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. |
| ECU Amber ECU Red | This indicates a fault condition detected by the engine ECU and transmitted to the DSE controller. |
| ECU 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 | Check engine is operating correctly. Check sensor and wiring paying particular attention to the wiring to terminals A11 and C4. |
| Fail to stop alarm when engine is at rest | Check that sensor is compatible with the module and that the module configuration is suited to the sensor. |

9.4 COMMUNICATIONS

| Symptom | Possible Remedy |
|---------------|---|
| ECU 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 | <p>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.</p> <p>When editing a configuration using the fascia editor, be sure to press the Auto Mode  button to save the change before moving to another item or exiting the fascia editor</p> |

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).

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


10.1 CONNECTOR A FROM DSE

| Item | Description | DSE Part No. |
|---|--|--------------|
|  | Deutsche DT16-18SA-K004 Connector and Pins | 007-850 |

10.2 CONNECTOR C FROM DSE

| Item | Description | DSE Part No. |
|--|--|--------------|
|  | Deutsche DT16-18SC-K004 Connector and Pins | 007-851 |


10.3 WIRING HARNESS WITH CONNECTOR A & C FROM DSE

| Item | Description | DSE Part No. |
|---|---|--------------|
|  | 1.2 m Wiring Harness Complete With Connector A & C. | 007-852 |


10.4 REPLACEMENT USB SEALING BUNG FROM DSE

| Item | Description | DSE Part No. |
|---|------------------|--------------|
|  | USB Sealing Bung | 007-031 |

10.5 REPLACEMENT PANEL SEALING GASKET FROM DSE

| Item | Description | DSE Part No. |
|---|----------------------|--------------|
|  | Panel Sealing Gasket | 007-545 |

10.6 USB CONFIGURATION CABLE FROM DSE

| Item | Description | DSE Part No. |
|---|--|--------------|
|  | PC Configuration interface lead (USB type A – USB type B) | 016-125 |

11 WARRANTY

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

12 DISPOSAL

12.1 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)

If 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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