



# DEEP SEA ELECTRONICS PLC DSE402 MKII WATERPROOF KEYSTART CONTROLLER

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*DSE402 MKII Operator Manual Issue 2*



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**DSE Model DSE402 MKII WATERPROOF KEYSTART CONTROLLER Operators Manual**

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**Amendments since last publication**

Issue no.	Comments
1	First Release
2	Amended dimensions of Panel cut out & drawing dimensions

**Clarification of notation used within this publication.**

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

## TABLE OF CONTENTS

Section	Page
<b>1 BIBLIOGRAPHY .....</b>	<b>4</b>
1.1 INSTALLATION INSTRUCTIONS.....	4
1.2 MANUALS.....	4
<b>2 INTRODUCTION .....</b>	<b>4</b>
<b>3 SPECIFICATIONS.....</b>	<b>5</b>
3.1 PART NUMBERING .....	5
3.2 TERMINAL SPECIFICATION .....	5
3.3 POWER SUPPLY REQUIREMENTS .....	5
3.4 INPUTS.....	6
3.4.1 FREQUENCY SENSING INPUT HZ , RPM.....	6
3.4.2 MAGNETIC PICKUP.....	6
3.5 CHARGE FAIL INPUT/OUTPUT .....	7
3.6 OUTPUTS.....	7
3.6.1 FUEL (A), CRANK (B),.....	7
3.6.2 PRE-HEAT.....	7
<b>4 PC CONFIGURATION.....</b>	<b>7</b>
4.1.1 PC COMMUNICATION.....	8
4.2 DIMENSIONS AND MOUNTING .....	9
4.2.1.1 DIMENSIONS.....	9
4.2.2 SILICON SEALING GASKET.....	10
4.3 APPLICABLE STANDARDS .....	11
4.3.1 ENCLOSURE CLASSIFICATIONS.....	12
IP CLASSIFICATIONS.....	12
NEMA CLASSIFICATIONS.....	13
<b>5 INSTALLATION.....</b>	<b>14</b>
5.1 TERMINAL DESCRIPTION .....	14
5.1.1 DC SUPPLY, FUEL AND START OUTPUTS.....	14
5.2 TYPICAL WIRING DIAGRAMS .....	15
5.2.1 EARTH SYSTEMS.....	16
5.2.1.1 NEGATIVE EARTH.....	16
5.2.1.2 POSITIVE EARTH.....	16
5.2.1.3 FLOATING EARTH .....	16
5.3 DESCRIPTION OF CONTROLS .....	17
5.4 DSE 402 MKII AUTOSTART CONTROL CONTROLLER .....	17
5.5 QUICKSTART GUIDE .....	18
5.1 CONTROLS.....	18
<b>6 SETTINGS AND ADJUSTMENTS .....</b>	<b>19</b>
6.1.1.1 SETTING OF NOMINAL SPEED.....	19
6.1.1.2 ADJUSTMENT OF TRIP POINTS .....	19
6.2 SHUTDOWNS / WARNINGS.....	19
<b>7 COMMISSIONING.....</b>	<b>20</b>
7.1.1 PRE-COMMISSIONING.....	20
<b>FAULT FINDING .....</b>	<b>21</b>
<b>8 MAINTENANCE, SPARES, REPAIR AND SERVICING .....</b>	<b>22</b>
8.1 PURCHASING ADDITIONAL SEALING GASKET FROM DSE .....	22
<b>9 WARRANTY .....</b>	<b>22</b>
<b>10 DISPOSAL.....</b>	<b>22</b>
10.1 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT) .....	22
10.2 ROHS (RESTRICTION OF HAZARDOUS SUBSTANCES).....	22

# 1 BIBLIOGRAPHY

This document refers to and is referred to by the following DSE publications which can be obtained from the DSE website [www.deepseapl.com](http://www.deepseapl.com)

## 1.1 INSTALLATION INSTRUCTIONS

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

DSE PART	DESCRIPTION
053-087	DSE402 MKII Installation Instruction

## 1.2 MANUALS

DSE PART	DESCRIPTION
057-138	DSE402 MKII Configuration Suite Lite Software Manual

# 2 INTRODUCTION

This document details the installation and operation requirements of the DSE 402 MKII controller is part of the DSEgenset® range of products.

The manual forms part of the product and should be kept for the entire life of the product. If the product is passed or supplied to another party, ensure that this document is passed to them for reference purposes.

This is not a *controlled document*. 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](http://www.deepseapl.com)

The model 402 is a waterproof key start controller. The controller is used to start and stop a engine, indicating fault conditions, automatically shutting down the engine for configured conditions and indicating the engine fault by a steady (WARNING) Shutdown (FLASHING) red LED.

Operation of the module is via a 3 position 'waterproof' key-switch with STOP (O), RUN (I) and START (II) positions. Turning the switch to the 'I' position will initiate a pre-heat relay . Pre-heat operation is indicated by a LED. Once the timer has expired the pre-heat relay will de-energise and the LED will extinguish. The preheat timer output can be configured.

The FUEL relay will then energise and on crank disconnect the Safety On delay timer will commence.

Pre-heat mode can be overridden at any time by turning the switch from the 'I' position to the 'II' position while the preheat LED is illuminated.

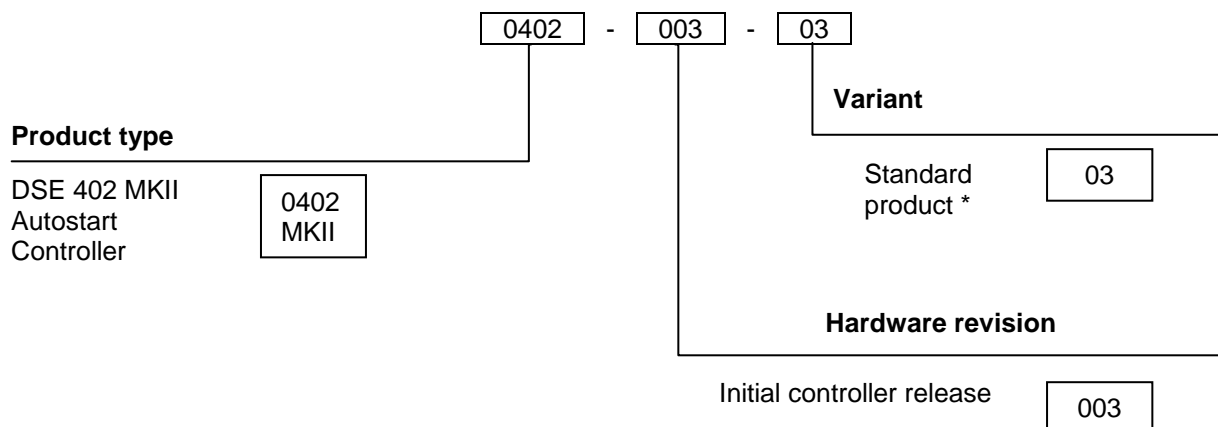
The Model 402 as described above can be configured for (AUTO), when the key position is left in RUN (I) a remote switch can be operated away from the controller to start and stop the engine.

Using a PC and the Configuration Suite Lite software along with the P813 interface allows configuration of selected operational sequences.

The Model 402 is resin encapsulated in a robust plastic case, designed for front panel mounting and supplied with a silicone seal to give IP 66 protection for the front of controller. Connections are via locking plug to Key switch and ¼ inch spade connectors.

### 3 SPECIFICATIONS

#### 3.1 PART NUMBERING



\* Standard product is Magnetic Pickup that can also be configured to sense frequency Hz or RPM using P813 interface and DSE Configuration Suite Lite software.

At the time of this document production, there are no variants of DSE402 MK II product.

#### 3.2 TERMINAL SPECIFICATION

Connection type	Two part connector. <ul style="list-style-type: none"> <li>• Male part fitted to controller</li> <li>• Female part is via ¼" Crimp Connectors (not supplied)</li> </ul>
Minimum cable size	0.5mm <sup>2</sup> (AWG 24) (check crimp specification)
Maximum cable size	2.5mm <sup>2</sup> (AWG 10) (check crimp specification)

#### 3.3 POWER SUPPLY REQUIREMENTS

Minimum supply voltage	8V continuous
Cranking dropouts	Able to survive 0V for 50mS providing the supply was at least 10V before the dropout and recovers to 5V afterwards. This is more than sufficient to allow the controller to operate during engine cranking where the battery supply often falls as low as 4V (on a 12V system!)  This is achieved without the need for internal batteries or other external requirements.
Maximum supply voltage	35V continuous (60V protection for surges)
Reverse polarity protection	-35V continuous
Maximum operating current	170mA at 24V 120mA at 12V
Maximum standby current	In stop position consumption is zero

### 3.4 INPUTS


Number	(4) Auxiliary, Oil Pressure, Coolant Temp, Set Nominal Speed
Arrangement	Contact between terminal and ground
Low level threshold	2.1V minimum
High level threshold	6.6V maximum
Maximum input voltage	+50V DC with respect to plant supply negative
Minimum input voltage	-24V DC with respect to plant supply negative
Contact wetting current	2.5mA typical
Open circuit voltage	12V typical

#### 3.4.1 FREQUENCY SENSING INPUT HZ , RPM

Measurement type	Frequency
Input Impedance	900K $\Omega$ ph-N
Phase to Neutral	15V to 333V AC (max)
Minimum frequency	3.5Hz
Maximum frequency	75.0Hz
Frequency resolution	0.1Hz
Frequency accuracy	$\pm 0.2$ Hz

#### 3.4.2 MAGNETIC PICKUP

Type	Differential input
Minimum voltage	0.6V RMS
Max common mode voltage	$\pm 2$ V
Maximum frequency	10,000Hz
Resolution	6.25 RPM
Accuracy	$\pm 25$ RPM

 **NOTE : DSE can supply a suitable magnetic pickup device, available in two body thread lengths :**  
**DSE Part number 020-012 - Magnetic Pickup probe 5/8 UNF 2½" thread length**  
**DSE Part number 020-013 - Magnetic Pickup probe 5/8 UNF 4" thread length**

Magnetic Pickup devices can often be 'shared' between two or more devices. For example, one device can often supply the signal to both the DSE402 MKII speed switch and the engine governor. The possibility of this depends upon the amount of current that the magnetic pickup can supply.

### 3.5 CHARGE FAIL INPUT/OUTPUT

Minimum voltage	0V
Maximum voltage	35V (plant supply)
Resolution	0.2V
Accuracy	±1% of max measured voltage (±0.35V)
Excitation	Active circuit constant power output
Output Power	2.5W Nominal @12V and 24V
Current at 12V	210mA
Current at 24V	104mA

The charge fail input is actually a combined input and output.

Whenever the generator is required to run, the terminal provides excitation current to the charge alternator field winding.

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

### 3.6 OUTPUTS

#### 3.6.1 FUEL (A), CRANK (B),

Type	Normally used for Preheat, Fuel and Start outputs.
Rating	15A resistive @ 35V

#### 3.6.2 PRE-HEAT

Type	configurable output (Common Alarm, Energise to stop, Pre-heat)
Rating	2A resistive @ 35V

## 4 PC CONFIGURATION

P813 Interface	USB2.0 Device for connection to PC running DSE configuration suite Lite only Max distance 6m (yards)
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### 4.1.1 PC COMMUNICATION

Using the DSE (P813 interface lead package available from Deep Sea PLC) with all the below items, the DSE 402 MKII controller can be connected to a computer to enable simple configuration of parameters. Connection details can be seen in the DSE 402 MKII Configuration Suite Lite software manual (Part no 057-138).

To connect a DSE402 MKII controller to a PC by USB, the following items are required:

- DSE402 MKII Controller



- P813 PC Interface (USB) DSE Part number 016-125



- DSE 402 MKII DSE configuration Suite Lite software
- Available from the DSE Website [www.deepseapl.com](http://www.deepseapl.com)
- The software CD will be supplied with the P813 PC Interface (USB)



**NOTE:- The DC supply must be connected to the controller for configuration by PC.**

**NOTE:- Refer to DSE402 MKII PC Software Manual (DSE part) for further details on connecting the P813 to the controller and PC.**



## 4.2 DIMENSIONS AND MOUNTING

### 4.2.1.1 DIMENSIONS

158 mm x 112 mm x 87 mm\*

(6.2" x 4.4" x 3.4"\*)

\* excluding key switch

#### PANEL CUTOUT

132 mm x 84 mm

(5.2" x 3.3")

#### Mounting

Waterproof sealing gasket for details see elsewhere in this manual.

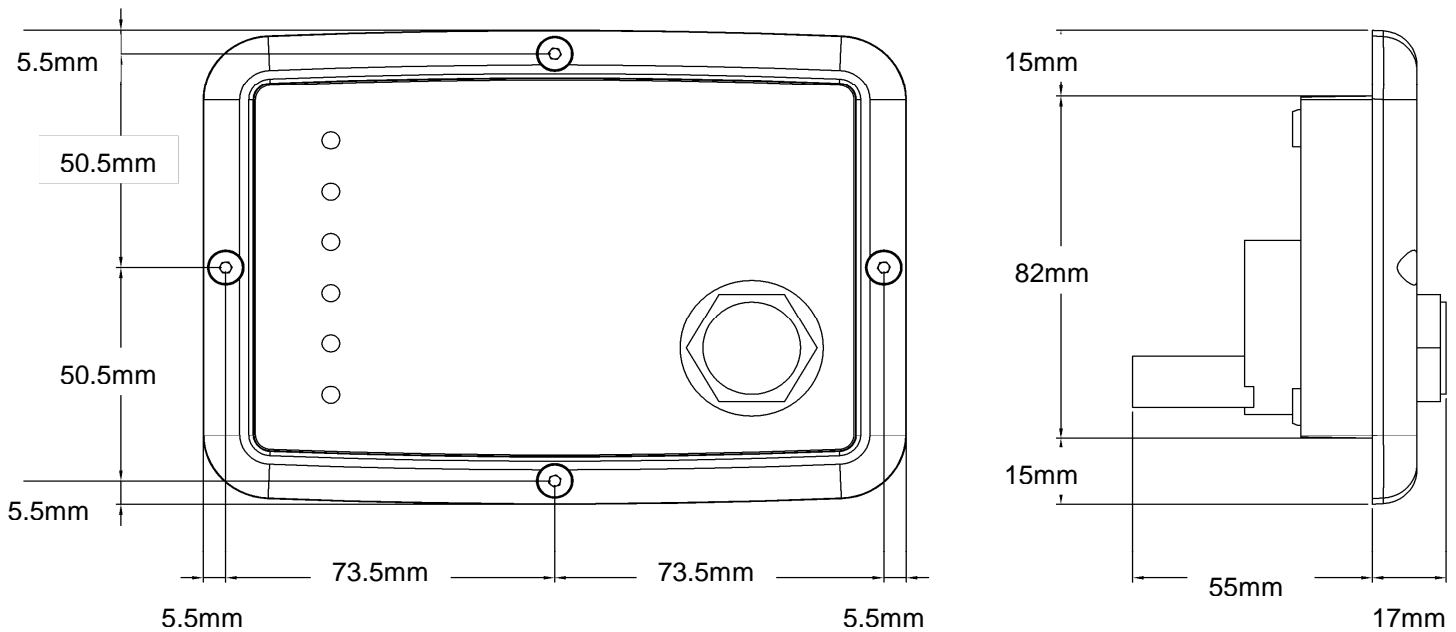
The key-switch barrel has a drain hole which exits on the underside of the switch behind the mounting flange. Ensure suitable arrangements are made if mounting the controller within an enclosure.

Screw Size: M4

Torque Rating: 0.60 Nm

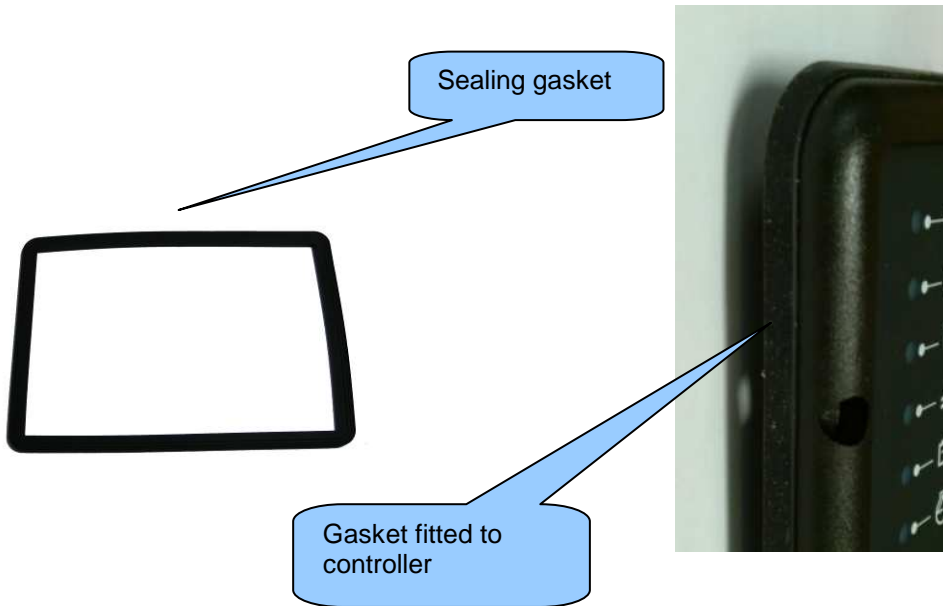
#### WEIGHT

0.3 Kg (0.661 lb)



#### 4.2.2 SILICON SEALING GASKET

The supplied silicon gasket provides improved sealing between the DSE402 MKII controller and the panel fascia. The gasket is fitted to the controller before installation into the panel fascia. Take care to ensure the gasket is correctly fitted to the controller to maintain the integrity of the seal.



### 4.3 APPLICABLE STANDARDS

<b>BS 4884-1</b>	This document conforms to BS4884-1 1992 Specification for presentation of essential information.
<b>BS 4884-2</b>	This document conforms to BS4884-2 1993 Guide to content
<b>BS 4884-3</b>	This document conforms to BS4884-3 1993 Guide to presentation
<b>BS EN 60068-2-1</b> (Minimum temperature)	-30°C (-22°F)
<b>BS EN 60068-2-2</b> (Maximum temperature)	+70°C (158°F)
<b>BS EN 60950</b>	Safety of information technology equipment, including electrical business equipment
<b>BS EN 61000-6-2</b>	EMC Generic Immunity Standard (Industrial)
<b>BS EN 61000-6-4</b>	EMC Generic Emission Standard (Industrial)
<b>BS EN 60529</b> (Degrees of protection provided by enclosures) (see overleaf)	IP66 (front of controller when installed into the control panel with the supplied sealing gasket) IP42 (front of controller when installed into the control panel WITHOUT being sealed to the panel)
<b>UL508</b> <b>NEMA rating</b> (Approximate) (see overleaf)	12 (Front of controller when installed into the control panel with the supplied sealing gasket). 2 (Front of controller when installed into the control panel WITHOUT being sealed to the panel)
<b>IEEE C37.2</b> (Standard Electrical Power System Device Function Numbers and Contact Designations)	Under the scope of IEEE 37.2, <i>function numbers can also be used to represent functions in microprocessor devices and software programs.</i>  As the controller is configurable by the generator OEM, the functions covered by the controller will vary. Under the controller's factory configuration, the device numbers included within the controller are :  2 – Time delay starting or closing relay 6 – Starting circuit breaker 30 – annunciator relay 54 – turning gear engaging device 62 – time delay stopping or opening relay 63 – pressure switch 74– alarm relay 81 – frequency relay 86 – lockout relay

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

### 4.3.1 ENCLOSURE CLASSIFICATIONS

#### IP CLASSIFICATIONS

DSE402 MKII BS EN 60529 Degrees of protection provided by enclosures

**IP66** (Front of controller when controller is installed into the control panel with the optional sealing gasket).

**IP42** (front of controller when controller is installed into the control panel WITHOUT being sealed to the panel)

**IP54** Rear of controller(suitable grease should be applied to terminals if exposed to a harsh environment)

First Digit	Second Digit
Protection against contact and ingress of solid objects 0 No protection	Protection against ingress of water 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 interfere 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).

## NEMA CLASSIFICATIONS

### 402 MKII NEMA Rating (Approximate)

**4** (Front of controller when controller is installed into the control panel with the optional sealing gasket).

**3** (front of controller when controller is installed into the control panel WITHOUT being sealed to the panel)

**2** Rear of controller (suitable grease should be applied to terminals if exposed to a harsh environment)



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







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

## 5 INSTALLATION

The DSE402 MKII controller is designed to be mounted on the panel fascia. For dimension and mounting details, see the section entitled *Specification, Dimension and mounting* elsewhere in this document.

### 5.1 TERMINAL DESCRIPTION

#### 5.1.1 DC SUPPLY, FUEL AND START OUTPUTS

Icon	PIN No	DESCRIPTION	CABLE SIZE	NOTES
	1	DC Plant Supply Input (Positive) Minimum 8V to 35V	2.5mm <sup>2</sup> AWG 13	Recommended Maximum Fuse 30A anti-surge)
	2	Output relay (B) (Crank)	2.5 mm <sup>2</sup> AWG 13	Plant Supply Positive from terminal 1. 15 Amp rated.
	3	Output relay (C) (PRE-HEAT)	2.5mm <sup>2</sup> AWG 13	Plant Supply Positive from terminal 1. 2 Amp rated.
	4	Output relay (A) (FUEL)	2.5mm <sup>2</sup> AWG 13	Plant Supply Positive from terminal 1. 15 Amp rated.
	5	DC Plant Supply Input (Negative)	2.5mm <sup>2</sup> AWG 13	
	6	Auxiliary shutdown	1.0mm <sup>2</sup> AWG 18	Configurable input
	7	Oil Pressure	0.5mm <sup>2</sup> AWG 20	Connect to Oil pressure switch
	8	Coolant Temperature	0.5mm <sup>2</sup> AWG 20	Connect to Coolant Temperature switch
<b>D+ W/L</b>	9	Charge fail / excite	1.0mm <sup>2</sup> AWG 18	
	10	Signal +	0.5mm <sup>2</sup> AWG 20	Magnetic pickup Positive / Frequency Hz or RPM sensing
	11	Signal -	0.5mm <sup>2</sup> AWG 20	Magnetic pickup Negative / Frequency Hz or RPM sensing
	12	SET NOMINAL SPEED	1.0mm <sup>2</sup> AWG 18	Configurable Input

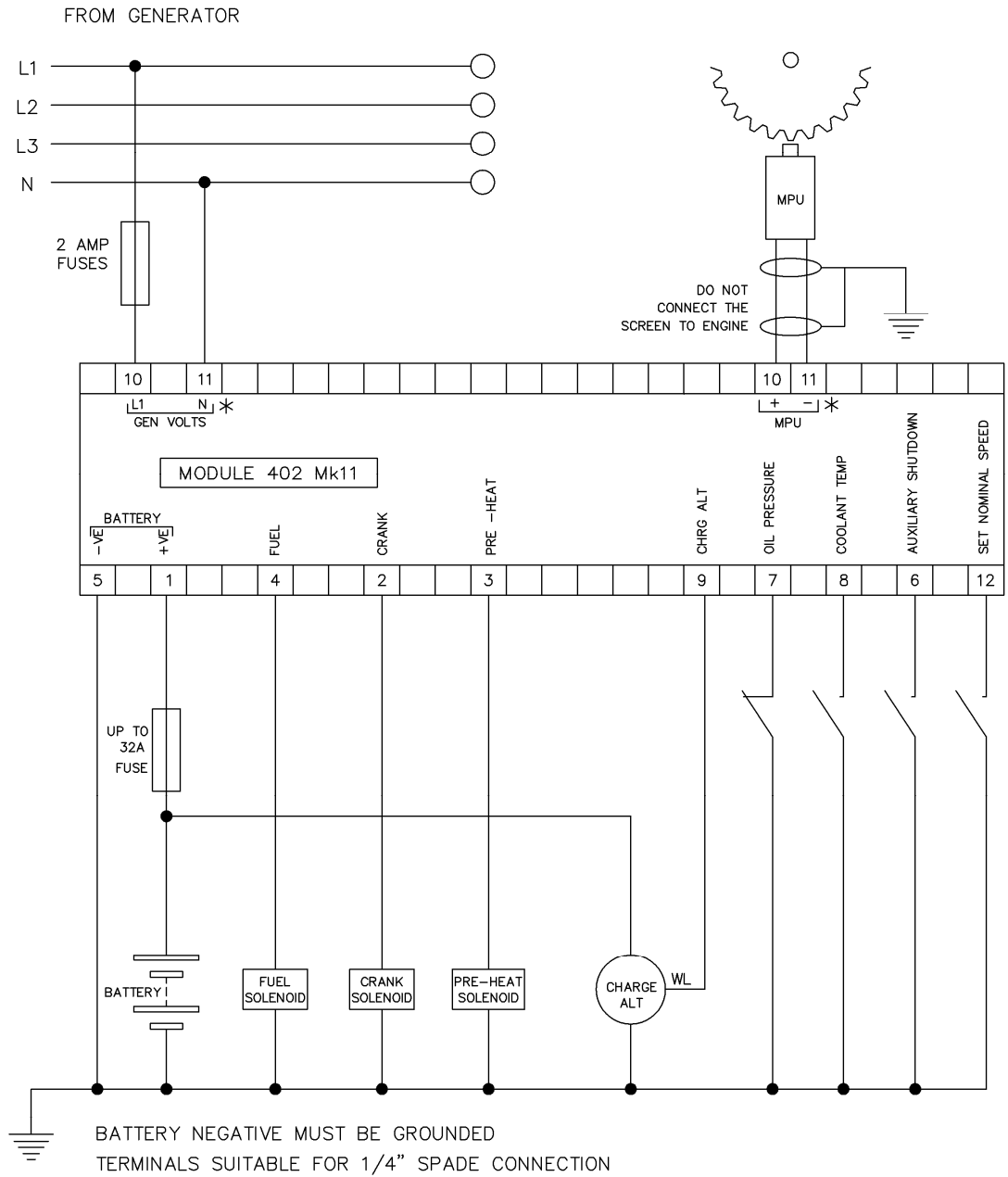
**NOTE:** - If you use PTFE insulating tape on the Oil pressure or Temperature switch thread when using earth return switches, ensure you do not insulate the entire thread, as this will prevent the switch body from being earthed via the engine block.

**NOTE:-** Screened cable must be used for connecting the Magnetic Pickup, ensuring that the screen is earthed at one end ONLY other wise the cable will act as an aerial.

## 5.2 TYPICAL WIRING DIAGRAMS

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

Further wiring suggestions are available in the following DSE publications, available at [www.deepseapl.com](http://www.deepseapl.com) to website members.



\* NOTE. CONNECT EITHER MPU OR AC VOLTS FOR SPEED REFERENCE

## **5.2.1 EARTH SYSTEMS**

### **5.2.1.1 NEGATIVE EARTH**

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

### **5.2.1.2 POSITIVE EARTH**

When using a DSE controller 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).

### **5.2.1.3 FLOATING EARTH**

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

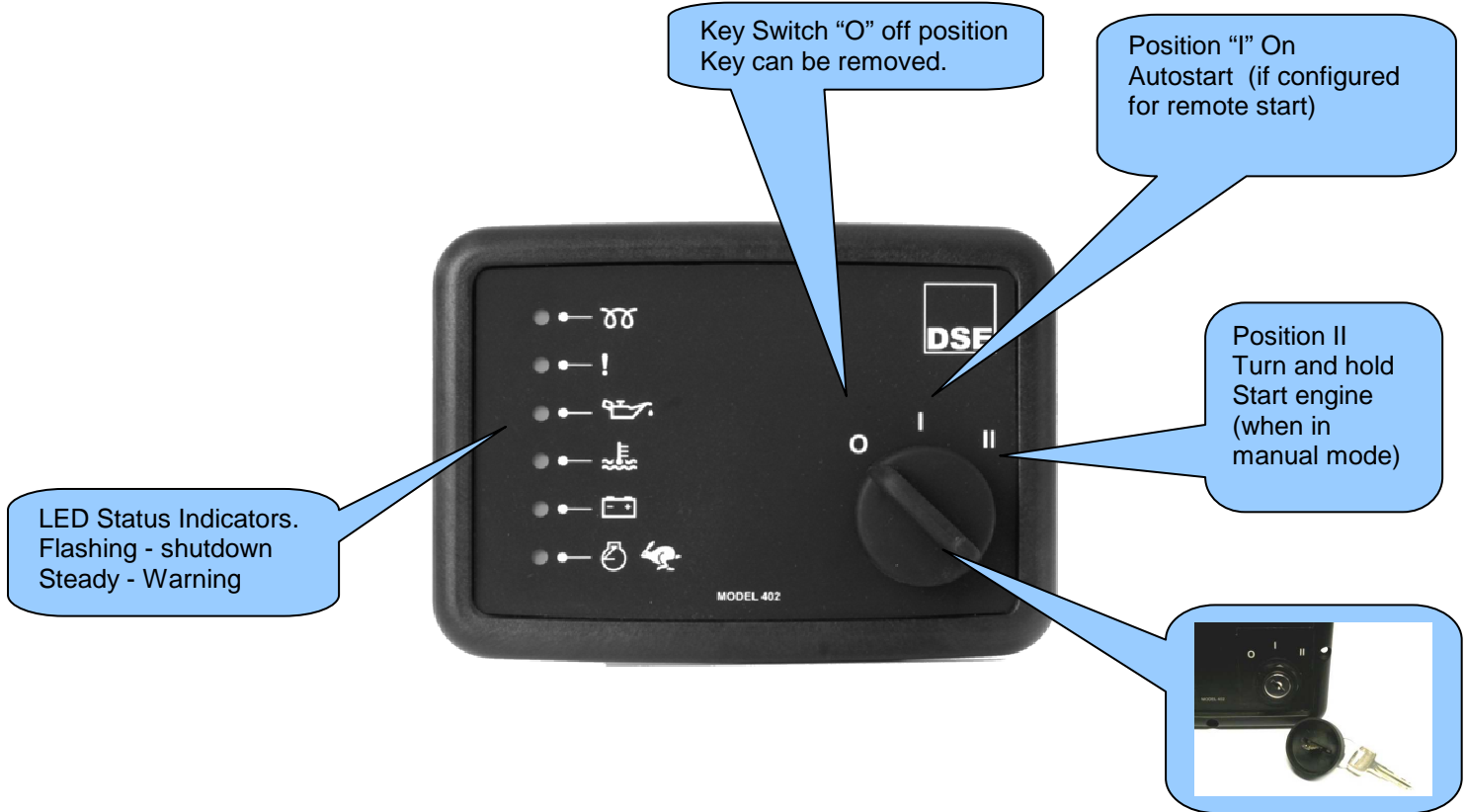
- Follow the typical wiring diagram as normal for all sections EXCEPT the earth points
- All points shown as Earth on the typical wiring diagram should connect to BATTERY NEGATIVE (not earth).



### 5.3 DESCRIPTION OF CONTROLS

The following section details the function and meaning of the various controls on the controller.

### 5.4 DSE 402 MKII AUTOSTART CONTROL CONTROLLER



ICON	DESCRIPTION	
	<b>Pre Heat</b>	The Pre heat output The auxiliary charge alternator voltage is low as measured from the W/L terminal.
	<b>Auxiliary Alarm</b>	An external alarm condition has occurred. Example Emergency Stop
	<b>LOW OIL PRESSURE</b>	The controller detects that the engine oil pressure has fallen below the low oil pressure pre-alarm setting level after the <i>Safety On</i> timer has expired.
	<b>ENGINE HIGH TEMPERATURE</b>	The controller detects that the engine coolant temperature has exceeded the high engine temperature pre-alarm setting level after the <i>Safety On</i> timer has expired.
	<b>BATTERY UNDER VOLTAGE / BATTERY OVER VOLTAGE</b>	The DC supply has fallen below or risen above the low/high volts setting level.
	<b>OVERSPEED</b>	The engine speed has risen above the over speed pre alarm setting

## 5.5 QUICKSTART GUIDE




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



Insert Key and turn to position I

Turn and hold to position II, crank and start .

## 5.1 CONTROLS

<p><b>Stop / Reset</b> Turning the keyswitch to this position places the controller into its <b>Stop/Reset</b> mode. This will clear any alarm conditions unless the alarm condition is still present.</p>	
<p><b>Run.</b> <i>Moving the Keyswitch into this position. Controller in manual or auto mode (auto mode if remote start configured). Preheat timer commences and gives pre-heat output.</i></p>	
<p><b>Turn and hold</b> In this position will send the Fuel and crank signals to start the engine, The preheat will continue if the timer has not expired this is indicated by the preheat led.</p>	

## 6 SETTINGS AND ADJUSTMENTS

The setting of nominal speed and adjustment of trip points can be set using the following method.

### 6.1.1.1 SETTING OF NOMINAL SPEED

- With the DSE402 MKII connected, run the engine at nominal speed. Connect the 'Set Nominal Speed' input to battery negative to set the nominal speed.

### 6.1.1.2 ADJUSTMENT OF TRIP POINTS

- Turn the pre-set potentiometers to set the trip point. The factory setting for the Trip is 90% to 140% . The range is adjusted from 0% to 400% of nominal engine speed via the DSE Configuration Suite Lite PC Software.
- Turn the pre-set potentiometers clockwise to increase the trip point, turn it anti-clockwise to decrease the trip point.
- The 'Engine Overspeed LED' will illuminate when the trip has been achieved.

## 6.2 SHUTDOWNS / WARNINGS

Shutdowns are latching alarms and stop the Generator. Clear the alarm and remove the fault then switch the Keyswitch to "O" to reset the controller.

A flashing LED indicates a shutdown condition

A steady LED indicates a warning.

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

Display	Reason
LOW OIL PRESSURE	The engine oil pressure has fallen below the low oil pressure trip setting level after the <i>Safety On</i> timer has expired.
ENGINE HIGH TEMPERATURE	The engine coolant temperature has exceeded the high engine temperature trip setting level after the <i>Safety On</i> timer has expired.
OVERSPEED	The engine speed has exceeded the pre-set trip
UNDERSPEED	The engine speed has fallen below the pre-set trip after the <i>Safety On</i> timer has expired.

## 7 COMMISSIONING

### 7.1.1 PRE-COMMISSIONING

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

- 10.1. The unit is adequately cooled and all the wiring to the controller 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.
- 10.2. The unit **DC** supply is fused and connected to the battery and that it is of the correct polarity.
- 10.3. Make all checks on the engine and alternator as detailed by their respective manufacturer documentation.
- 10.4. Check all other parts in the system according to the manufacturer documentation.
- 10.5. Thoroughly review the configuration of the DSE controller and check that all parameters meet the requirements of your system.
- 10.6. +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. Put the Keyswitch into the "I" position and then "II", the unit start sequence will commence.
- 10.7. The starter will engage and operate for the pre-set crank period. After the starter motor has attempted to start the engine the explanation mark will illuminate.
- 10.8. Restore the engine to operational status (reconnect the fuel solenoid). Turn the Keyswitch to the off position and then to the "I" then "II". This time the engine will start and the starter motor will disengage automatically. If not then check the engine is fully operational (fuel available, etc.) and the fuel solenoid is operating. The engine will now run up to operating speed. If not, and an alarm is present, check the alarm condition for validity, and check input wiring. The engine will continue to run for an indefinite period.
- 10.9. Fully commission the engine/alternator and any other parts in the system as detailed in the respective manufacturer documentation. This could include load bank testing, load acceptance, breaker control and more.
- 10.10. If despite repeated checking of the connections between the **DSE402 MKII** controller and the customer's system, satisfactory operation cannot be achieved, then the customer is requested to contact the factory for further advice on:-

**INTERNATIONAL TEL: +44 (0) 1723 890099**

**INTERNATIONAL FAX: +44 (0) 1723 893303**

**E-mail: [Support@Deepseapl.com](mailto:Support@Deepseapl.com)**

**Website : [www.deepseapl.com](http://www.deepseapl.com)**

## FAULT FINDING


SYMPTOM	POSSIBLE REMEDY
Unit is inoperative Read/Write configuration does not operate	Check the battery and wiring to the unit. Check the DC supply. Check the DC fuse.
Unit shuts down	Check DC supply voltage is not above 35 Volts or below 9 Volts Check the operating temperature is not above 70°C. Check the DC fuse.
Intermittent Magnetic Pick-up sensor fault	Ensure that Magnetic pick-up screen only connects to earth at one end, if connected at both ends, this enables the screen to act as an aerial and will pick up random voltages. Check pickup is correct distance from the flywheel teeth.
Low oil Pressure fault operates after engine has fired	Check engine oil pressure. Check oil pressure switch and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed)
High engine temperature fault operates after engine has fired.	Check engine temperature. Check switch and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed) .
common fault operates	Check relevant switch and wiring of fault indicated by LED. Check configuration of input.
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 controller. Check the speed-sensing signal is present on the controller's inputs. Refer to engine manual.
Continuous starting of generator when in <b>AUTO</b>	Check that there is no signal present on the "Remote Start" input. Check configured polarity is correct.
Generator fails to start on receipt of Remote Start signal.	Check Start Delay timer has timed out.  Check signal is on "Remote Start" input. Confirm correct configuration of input  Check that the oil pressure switch is indicating low oil pressure to the controller. Depending upon configuration, then set will 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 controller. 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 controller. Ensure that the Emergency Stop input is at Positive. Ensure oil pressure switch or sensor is indicating the "low oil pressure" state to the controller.
Controller appears to 'revert' to an earlier configuration	When editing a configuration using the PC software it is vital that the configuration is first 'read' from the controller before editing it. This edited configuration must then be "written" back to the controller for the changes to take effect.

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

## 8 MAINTENANCE, SPARES, REPAIR AND SERVICING

The DSE402 MKII 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).

### 8.1 PURCHASING ADDITIONAL SEALING GASKET FROM DSE

Item	Description	Part No.
	DSE402 MKII silicon sealing gasket	020-016

## 9 WARRANTY

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

## 10 DISPOSAL

### 10.1 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)

Directive 2002/96/EC

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



### 10.2 ROHS (RESTRICTION OF HAZARDOUS SUBSTANCES)

Directive 2002/95/EC: 2006

To remove specified hazardous substances (Lead, Mercury, Hexavalent Chromium, Cadmium, PBB & PBDE's)

Exemption Note: Category 9. (Monitoring & Control Instruments) as defined in Annex 1B of the WEEE directive will be exempt from the RoHS legislation. This was confirmed in the August 2005 UK's Department of Trade and Industry RoHS REGULATIONS Guide (Para 11).

Despite this exemption, DSE has been carefully removing all non RoHS compliant components from our supply chain and products.

When this is completed, a Lead Free & RoHS compatible manufacturing process will be phased into DSE production.

This process is almost complete and is being phased through different product groups.

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