



# **DEEP SEA ELECTRONICS PLC**

## **DSE ENCLOSED INTELLIGENT BATTERY CHARGER OPERATOR MANUAL**

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### DSE Enclosed Intelligent Battery Charger Operator Manual

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#### Amendments since last publication

Issue No.	Comments
1	First Release
2	Added new FPE table
3	Added new FPE item to table
4	Added note to FPE table section
5	Updated to the new screen displays and charger FPE removed

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

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## 1 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
053-147	DSE9460 / DSE9461 Enclosed Intelligent Battery Charger Installation Instructions
053-154	DSE2541 Remote Battery Charger Display Installation Instructions

### 1.2 MANUALS

DSE PART	DESCRIPTION
057-159	DSE9400 Series Configuration Suite PC Software Manual

## 2 INTRODUCTION

This document details the installation requirements of the DSE range of enclosed intelligent battery chargers.


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 added to the DSE website at [www.deepseapl.com](http://www.deepseapl.com).

The enclosed intelligent battery chargers fulfill the most common functions required of a charger in the generating set industry. Combining a range of display options, protected outputs, intelligent charging and power supply operation with a robust enclosure.

### 3 SPECIFICATIONS

 **NOTE:** Chargers are factory preconfigured to suit 12V or 24V batteries. However a charger can be freely changed from 12V to 24V using DSE Configuration Suite PC Software.


 **NOTE:** Chargers are supplied configured to be suitable for Lead Acid batteries. Configuration to suit other battery types is performed using DSE Configuration Suite PC Software.

#### 3.1 PROTECTION

- High Output Voltage (DC) detection.
- High / Low Input Voltage (AC) detection.
- Current limit to charger specification (5A or 10A depending upon charger model) with High Output Current detection.
- High Ambient Temperature detection.
- High Battery Temperature detection (when enabled).
- Short circuit protection. Charger automatically restarts operation after the fault is removed.
- Reverse battery polarity protection. Charger automatically restarts operation after the fault is removed.
- Battery Charger Failure. Informs of an internal fault with the battery charger.
- Common Fault Relay output.

### 3.2 ELECTRICAL SPECIFICATIONS

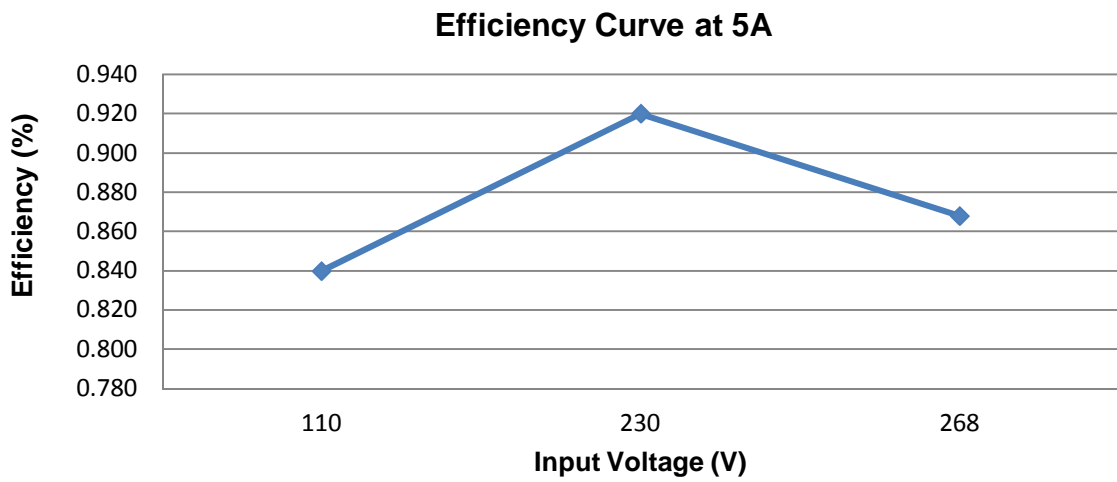
Parameter	Min	Nominal	Max
AC Input Voltage (V)	95V	110V-277V	305V
Operating Temperature	-30°C		85°C with de-ratings
Input Frequency (Hz)	48Hz		64Hz
Output Ripple and Noise		1% Vo	
Load Regulation		1% Vo	
Line Regulation		<0.01% Vo	
Output Voltage Overshoot %		<5%Vo	
Transient Response Peak Deviation (mV) (at 50% to 100% load step)		<4% Vo	
Warm Up Voltage (V)		<1% Vo	
Output Voltage Rise Time (ms)		<200ms	
Short Circuit Protection		Hiccup	
Switching Frequency (kHz)		67kHz	
Efficiency %		>85%	
Temperature Sensor Input		PT1000	

 **NOTE: Check the de-rating and efficiency curves in the following sections of this manual.**

### 3.3 OUTPUT SPECIFICATIONS

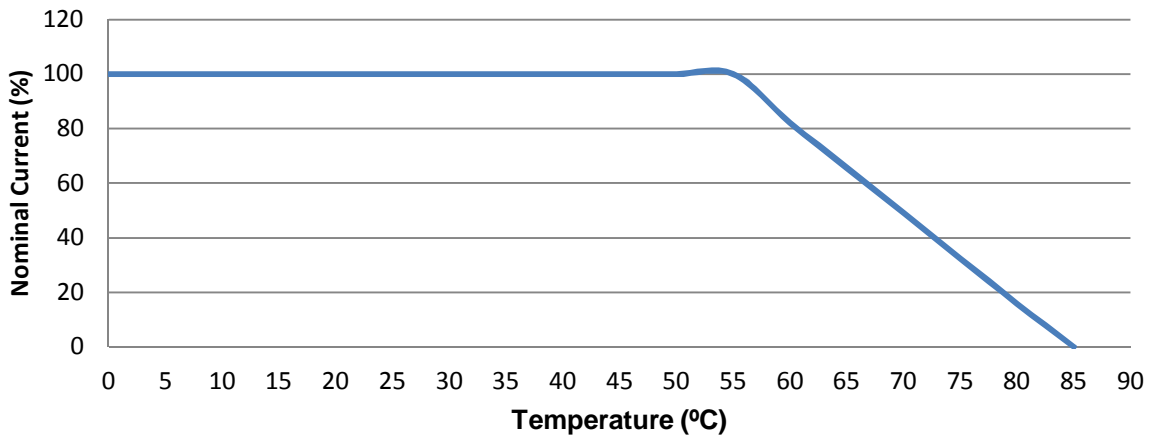
#### 3.3.1 DSE9460 24V/12V 5A

Parameter	Min	Nominal	Max	Comments
Output Voltage	9V	Configurable	29.5V	
Output Charging Current (A)	2A	5A	6A	
Current limit threshold (A)		5A	6A	
Recovery from current limit (A)	5A		6A	
Full load AC input current (A)			1.5A	At Vin=230 V, Vo=28.2 V, Io=5 Amp
Full load AC input current (A)			2.5A	At Vin=110 V, Vo=28.2 V, Io=10 Amp
AC Input Inrush (10ms) current (A)		60A		For 10ms

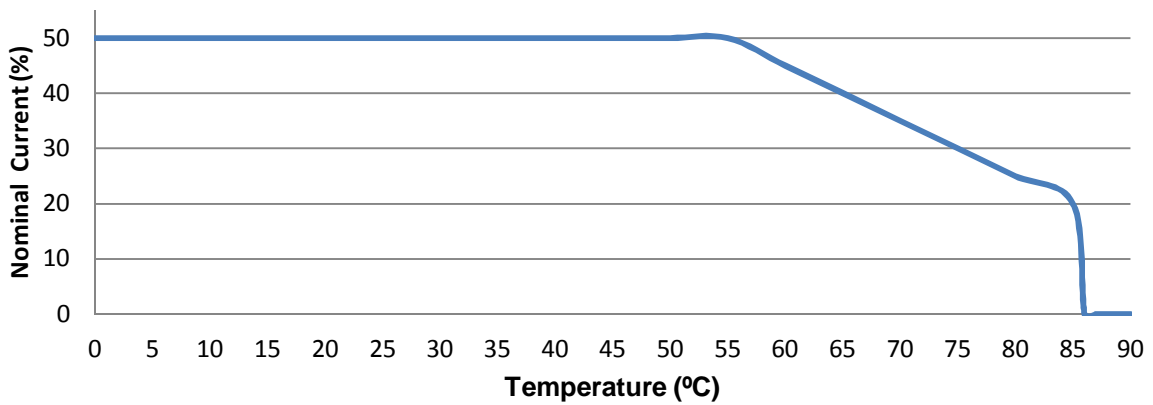




**De-rating Curve**  
**110V < Vin < 305V Charger De-rating Curve**



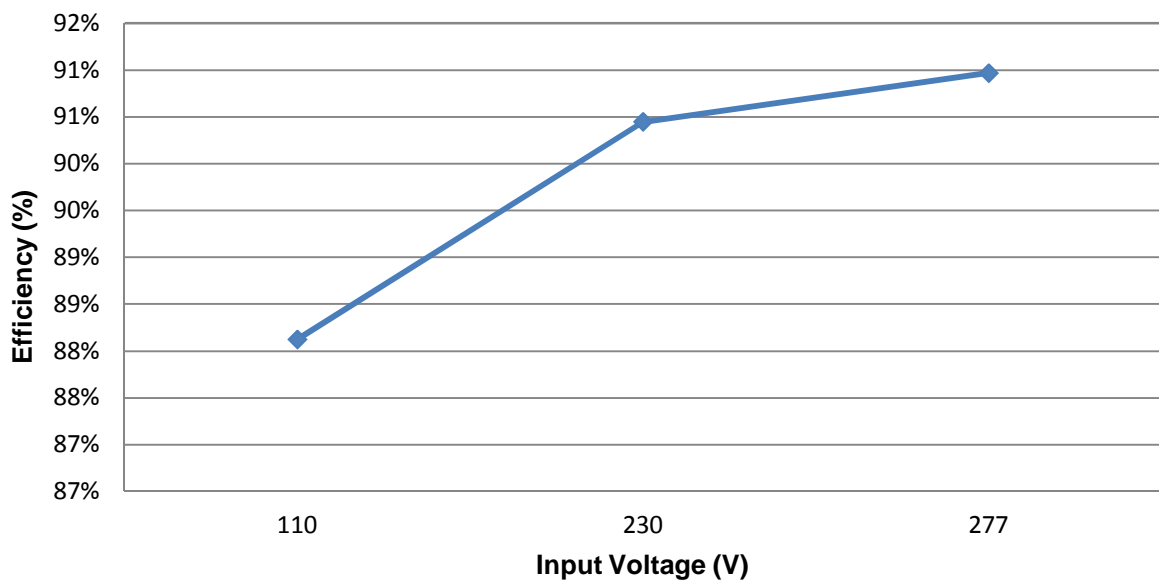
**De-rating Curve**  
**90V < Vin < 110V Charger De-rating Curve**



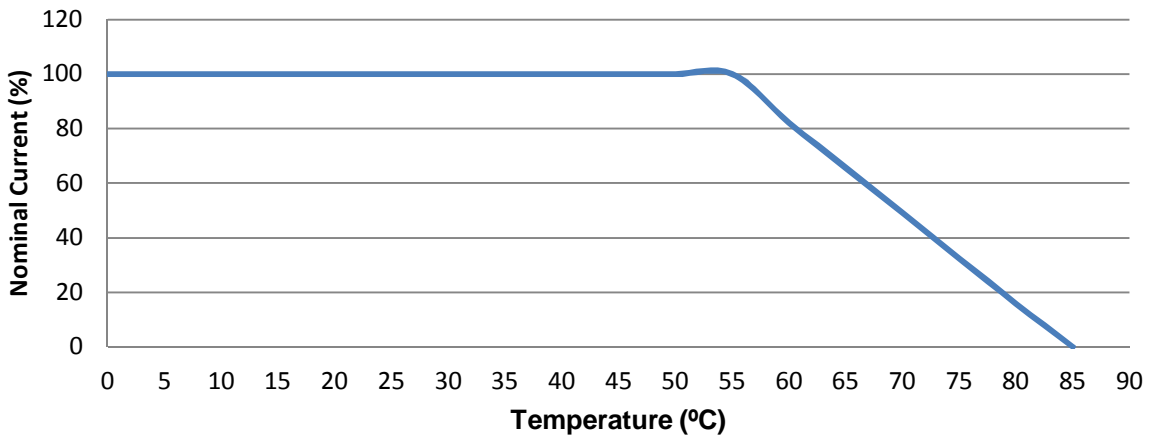
**3.3.2 DSE9461 24V/12V 10A**

Parameter	Min	Nominal	Max	Comments
Output Voltage	9V	Configurable	30.5V	
Output Charging Current (A)	2A	10A	11A	
Current limit threshold (A)		10A	11A	
Recovery from current limit (A)	10A		11A	
Full load AC input current (A)			1.2A	At Vin=230V, Vo=14.4V, Io=10Amp
Full load AC input current (A)			2.2A	At Vin=110V, Vo=14.4V, Io=10Amp
AC Input Inrush (10ms) current (A)		60A		For 10ms

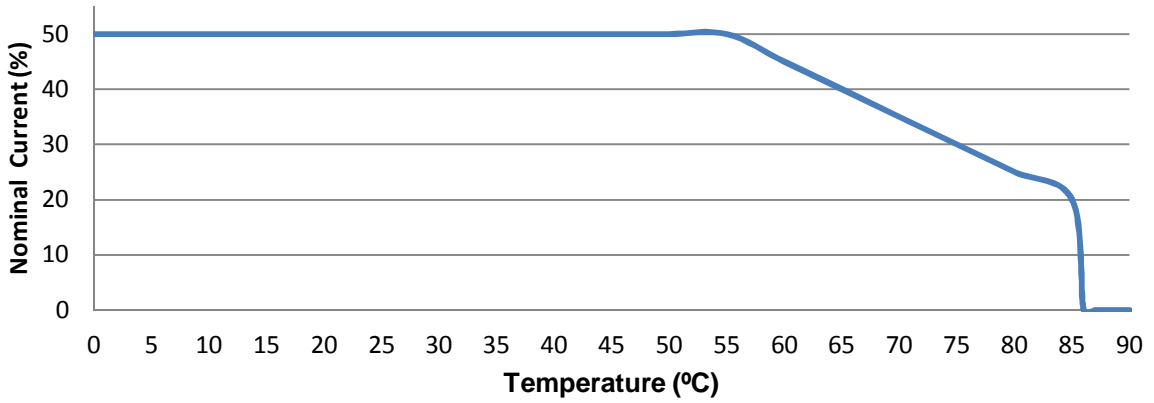
**Efficiency Curve at 10A**



**De-rating Curve**  
**110V < Vin < 305V Charger De-rating Curve**



**De-rating Curve**  
**90V < Vin < 110V Charger De-rating Curve**



### 3.4 COMMUNICATION PORTS

Communication	Specification
<b>USB Port</b>	USB2.0 Device for connection to PC running DSE Configuration Suite Max distance 6m (20 feet)
<b>RS485 Serial Port</b>	Isolated Data connection 2 wire + common Half Duplex Data direction control for Transmit (by s/w protocol) Max Baud Rate 19200 External termination required (120Ω) Max common mode offset 70V (on board protection transorb) Max distance 1.2km (¾ mile)
<b>Display Communication Port</b>	Reserved for connection to fascia mounted LCD display module.

#### 3.4.1 USB CONNECTION

The USB port is provided to give a simple means of connection between a PC and the DSE9400 series battery charger. Using the DSE Configuration Suite Software, the operator is then configure and monitor the state of the battery charger.

To connect a DSE9400 series battery charger to a PC by USB, the following items are required:

- DSE Enclosed Intelligent Battery Charger.
- DSE Configuration Suite Software  
(Supplied on configuration suite software CD or available from [www.deepseapl.com](http://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)



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

**NOTE:** Refer to Enclosed Intelligent Battery Charger PC Software Configuration Manual for further details on configuring and monitoring.

### 3.4.2 RS485

The RS485 port on the battery charger supports the Modbus RTU protocol.

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 (1.2km) when using Belden 9841 (or equivalent) cable. This allows for a large distance between the battery charger and a PC running the DSE Configuration Suite software. The operator is then able to view the various operating parameters.

**▲ NOTE: For distances up to 6m (8yds) the USB connection method is more suitable and provides for a lower cost alternative to RS485 (which is more suited to longer distance connections).**

Cable Type	Two core screened twisted pair
Cable Characteristic Impedance	120Ω
Recommended Cable	Belden 9841 Belden 9271
Maximum Cable Length	1200m (¾ mile) when using Belden 9841 or direct equivalent. 600m (666 yds) when using Belden 9271 or direct equivalent.
RS485 Topology	“Daisy Chain” Bus with no stubs (spurs)
RS485 Termination	120Ω. Termination resistor must be fitted externally to the ‘first’ and ‘last’ expansion module by the customer as required by the RS485 specification.

### 3.4.2.1 RECOMMENDED RS485 EXPANSION FOR DESKTOP AND LAPTOP PC'S

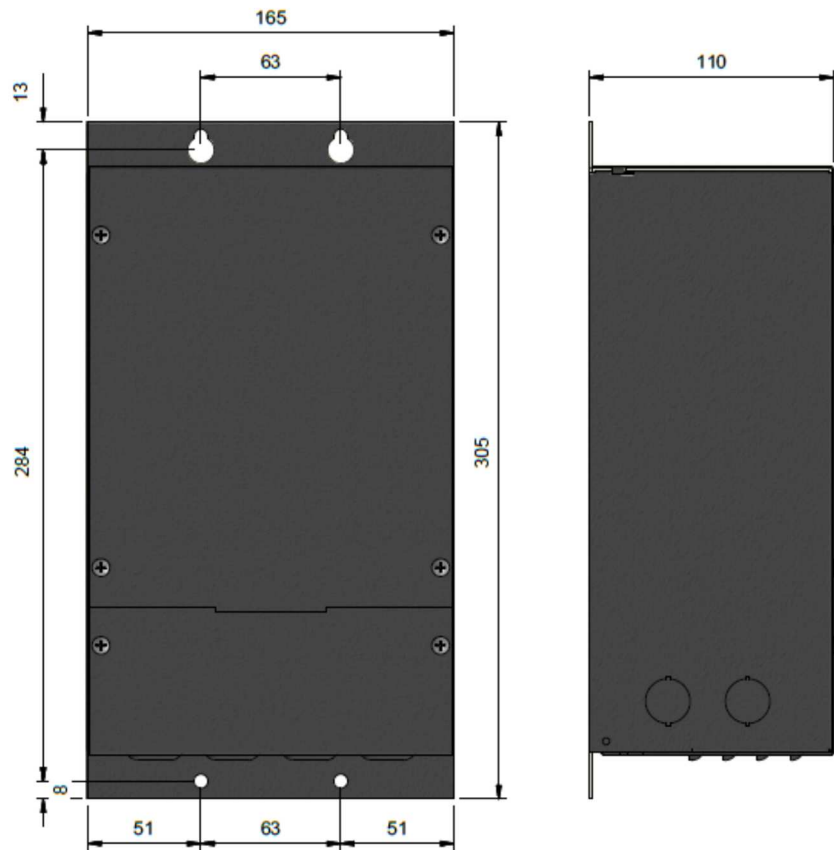
- Brainboxes PM154 PCMCIA RS485 card (for laptops PCs)  
Set to 'Half Duplex, Autogating" with 'CTS True' set to 'enabled'
- Brainboxes VX-023 ExpressCard 1 Port RS422/485 (for laptops and nettop PCs)
- Brainboxes UC320 PCI Velocity RS485 card (for desktop PCs)  
Set to 'Half Duplex, Autogating" with '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](mailto:sales@brainboxes.com)

### 3.6 DIMENSIONS AND MOUNTING

Parameter	Comment
Cabinet type	Custom cabinet for indoor use only
Overall size (see below for diagram)	165 mm x 305 mm x 110 mm (6.5" x 12" x 4.3")
Material:	Sheet steel enclosure of all-round solid construction
Surface finish:	Powder-coated black
Protection category:	IP20 NEMA 1
Weight	2.3 kg (5 lb 1 oz)
Mounting type	Wall mounting
Mounting holes	Diameter 6 mm (0.2") 63 mm x 284 mm (3.4" x 11.2") centres
Operating Temperature	-30 °C to +85 °C with deratings (-22 °F to +185 °F with deratings)



Measurements in mm

### 3.7 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)	+85°C (185°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)	IP20 Protected against penetration by solid objects with a diameter of more than 12 mm. Fingers or similar objects prevented from approach.  No protection against water
<b>UL508</b> <b>NEMA rating</b>	Enclosure type 1  Provides a degree of protection against contact with the enclosure equipment and against a limited amount of falling dirt
<b>UK WEEE REGULATIONS</b>	Producer Registration Number WEE/BE0052TQ

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




## 4 INSTALLATION

The DSE battery charger is *fit-and-forget*. It can be permanently connected to the supply and the load, with no requirement to disable the charger during times of heavy load (such as engine cranking).

### 4.1 BATTERY SUITABILITY

The charger is factory set by DSE to suit Lead Acid batteries but can be adjusted to suit other battery types using the Configuration Suite PC Software.


Care should be taken to ensure the batteries connected to the charger are of the correct 'technology' to suit the setting of the charger.

 **NOTE: Ensure any Standing Load (loads connected to the battery charger other than the battery) are less 75% of the battery charger configured rating. This helps to ensure the charger correctly detects the battery charge state.**

## 4.2 USER CONNECTIONS

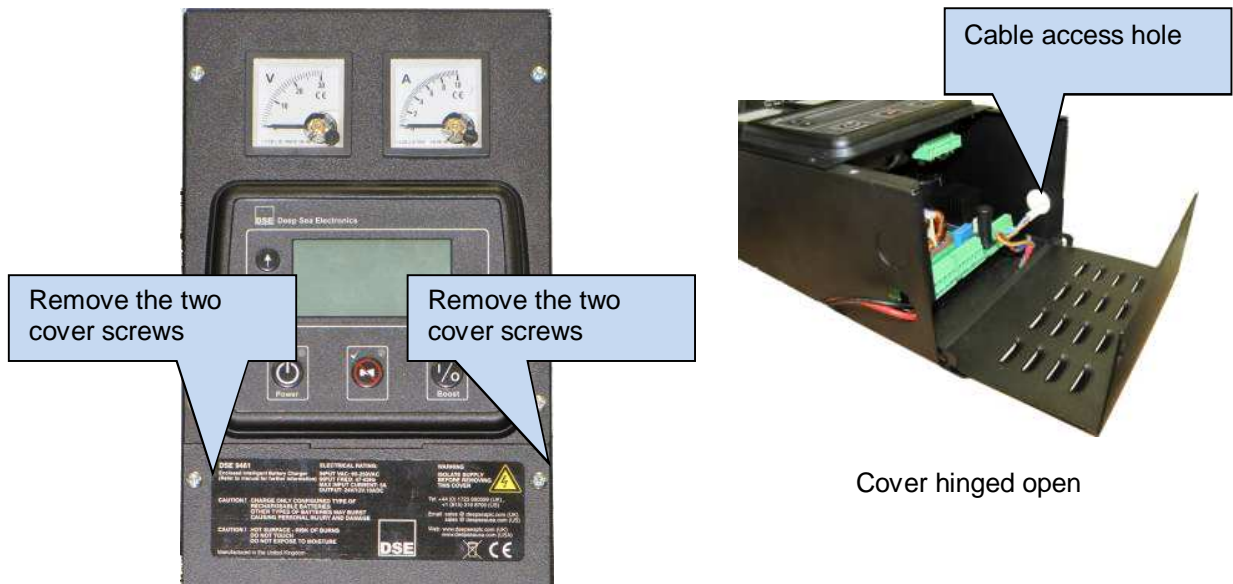
Parameter	Comment	
Connection type	Screw terminal, rising clamp, no internal spring	
Min cable size	0.5mm <sup>2</sup> (AWG 20)	
Max cable size	2.5mm <sup>2</sup> (AWG 14)	
<b>Recommended AC fuse</b>	<b>230V AC Input</b>	<b>110V AC Input</b>
DSE9461 24V/12V 10A charger	3.5A anti-surge	6.3A anti-surge
DSE9460 24V/12V 5A charger	2.0A antisurge	3.5A anti-surge

### 4.2.1 BATTERY CHARGER

 **DANGER OF DEATH: LIVE PARTS exist within the enclosure. The enclosure cover must not be removed when connected to an AC supply.**

Battery Charger connections are available by removing the screws identified below and hinging the cover down.

'Push Outs' are available on the side of the charger case to enable the installer to fit rubber grommets to facilitate cable entry.



4.2.1.1 CONNECTOR A

**NOTE:** Connection from battery charge must be directly connected to the battery.

Terminal	Function	Recommended size	Comments
⊖	Load negative	1mm <sup>2</sup> (AWG 16)	Battery negative terminal
⊕	Load Positive	1mm <sup>2</sup> (AWG 16)	Battery positive terminal

4.2.1.2 CONNECTOR B / C


**NOTE:** Screened 120Ω 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 120Ω impedance cable suitable for RS485 use (DSE part number 016-030)

Terminal	Function	Recommended size	Comments
0V	Supply for a remote (locally fitted) DSE2541 display	1mm <sup>2</sup> (AWG 16)	<b>Do not connect to these terminals on chargers having LCD displays</b>
12V		1mm <sup>2</sup> (AWG 16)	
SCR	RS485 screen	N/A	Use only 120Ω RS485 approved cable
B	RS485 +ve	0.5mm <sup>2</sup> (AWG20)	
A	RS485 -ve	0.5mm <sup>2</sup> (AWG20)	
LK	Connect together to activate Digital Input	0.5mm <sup>2</sup> (AWG20)	
LK		0.5mm <sup>2</sup> (AWG20)	
NTC	PT1000 connection terminals	0.5mm <sup>2</sup> (AWG20)	Use only PT1000
NTC		0.5mm <sup>2</sup> (AWG20)	
N/C	Fault relay Normally Closed terminal	0.5 mm <sup>2</sup> (AWG 22)	De-energises under Fault Conditions
Common	Fault relay Common Terminal	0.5 mm <sup>2</sup> (AWG 22)	
N/O	Fault relay Normally Open terminal	0.5 mm <sup>2</sup> (AWG 22)	

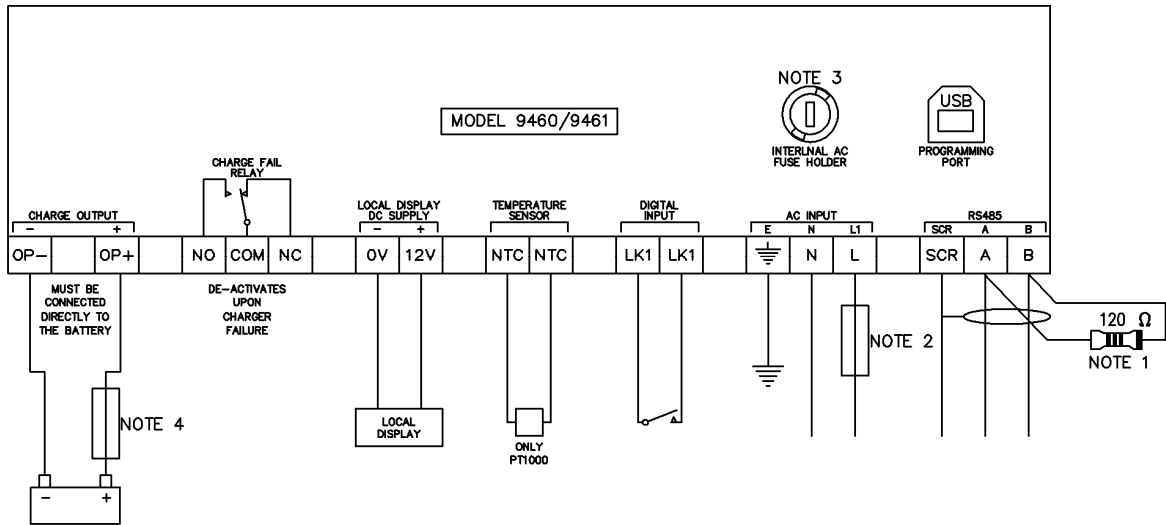
4.2.1.3 CONNECTOR D

**CAUTION:** Ensure Earth Terminal is connected to Battery negative (for negative earth systems) or Battery positive (for positive earth systems)  
Where no system earth exists, Earth Terminal must be connected to battery negative

Parameter	Comment	
Recommended AC fuse	230V AC Input	110V AC Input
DSE9461 24V/12V 10A charger	3.5A anti-surge	6.3A anti-surge
DSE9460 24V/12V 5A charger	2.0A antisurge	3.5A anti-surge

Terminal	Function	Recommended Size
L	AC Live	1mm <sup>2</sup> (AWG 16)
N	AC Neutral	1mm <sup>2</sup> (AWG 16)
	Earth	1mm <sup>2</sup> (AWG 16)

### 4.2.2 TYPICAL CONNECTION DIAGRAM



TERMINALS SUITABLE FOR 22-16 AWG (0.6mm<sup>2</sup> - 1.3mm<sup>2</sup>) FIELD WIRING  
 TIGHTENING TORQUE = 0.5Nm (4.5lb-in)

NOTE 1  
 A 120 OHM TERMINATION RESISTOR MUST BE FITTED IF IT IS THE FIRST OR LAST DEVICE ON AN RS485 LINK

NOTE 2

AC INPUT	ANTI-SURGE FUSE RATING
110V	6.3A
230V	3.5A


FUSE APPROPRIATELY WHEN CURRENT LIMIT IS CONFIGURED BELOW 10A AND AS CLOSE TO THE BATTERY CHARGER AS POSSIBLE TO PROTECT THE CABLES

NOTE 3  
 FACTORY FITTED WITH 6.3A ANTI-SURGE FUSE, FUSE APPROPRIATELY

NOTE 4  
 FUSE APPROPRIATELY AND AS CLOSE TO THE BATTERY AS POSSIBLE TO PROTECT THE CABLES AND BATTERY


### 4.3 DSE2541 ENCLOSURE MOUNTED DISPLAY MODULE

 **NOTE:** LCD display is fitted to specific models only.

 **NOTE:** Where factory fitted to the enclosure, the DSE2541-01 must not be removed. Should an external, remote display be required, use DSE Part Number 2541-02 suitable for remote location up to 1.2km from the host battery charger.

 **NOTE:** These connections are made by the DSE factory and are included for information only.

Terminal	Function	Recommended Size	Comments
1	Plant Supply Negative	1mm <sup>2</sup> (AWG16)	
2	Plant Supply Positive	1mm <sup>2</sup> (AWG16)	
3	RS485 (Screen)	N/A	Use only 120Ω RS485 approved cable
4	RS485 (B)	0.5mm <sup>2</sup> (AWG20)	
5	RS485 (A)	0.5mm <sup>2</sup> (AWG20)	

 **NOTE:** Screened 120Ω 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 120Ω impedance cable suitable for RS485 use (DSE part number 016-030)

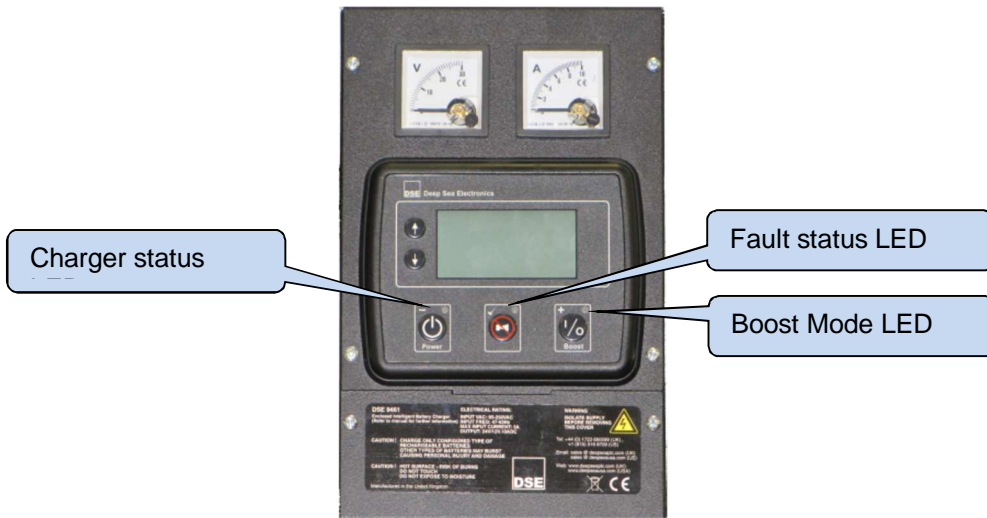
## 5 INDICATIONS

### 5.1 LCD DISPLAY

**NOTE:** LCD display is fitted to specific models only.

**NOTE:** For details of controls and LCD indication, see the section entitled *Operation* elsewhere in this document.

**NOTE:** When the lamp test on the Enclosed Battery Charger is active, all three LEDs on the display illuminate.



#### 5.1.1 CHARGER STATUS

Condition	LED State
Charger off	OFF
Charger on	Constant Red

#### 5.1.2 FAULT STATUS

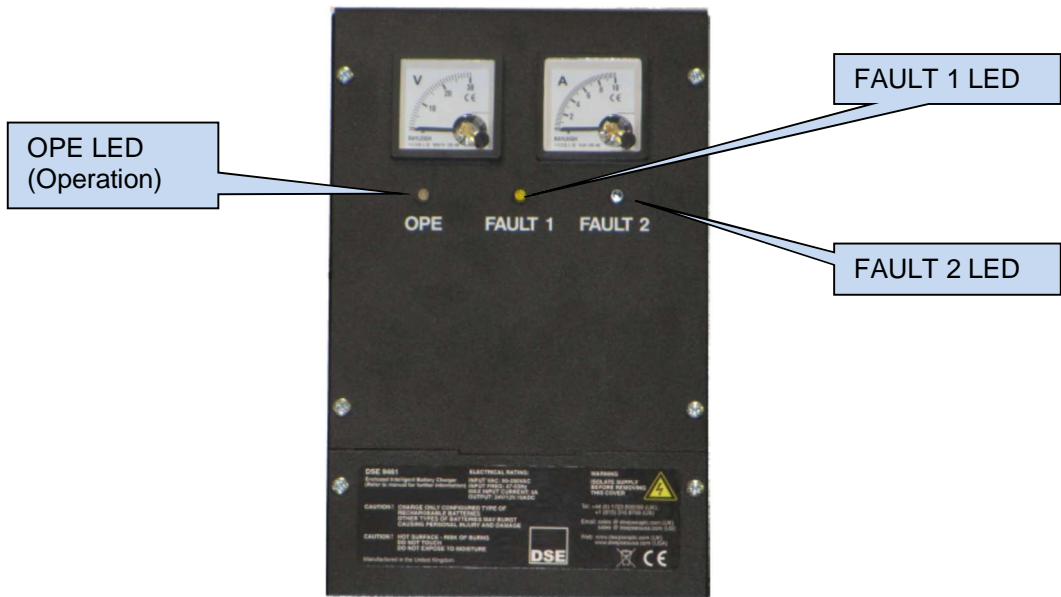
Condition	LED State
No Fault	OFF
Warning Fault	Constant Red
Shutdown Fault	Flashing Red

#### 5.1.3 BOOST MODE

Condition	LED State
No Boost	OFF
In Boost Mode	Constant Red

## 5.2 ENCLOSURE MOUNTED LEDS

**NOTE:** Enclosure mounted LED indicators are fitted to specific models only.



### 5.2.1 STATUS

Condition	LED DESIGNATION		
	OPE Yellow/Green	FAULT 1 Yellow	FAULT 2 Red
Charger Off	Off	Off	Off
Battery not Detected (Battery Detection Mode)	Green Flashing	Yellow Flashing	Red Flashing
Battery Connected (Battery Detection Mode)	Green Constant	Yellow Constant	Red Constant
Not Charging (Charger is operating correctly but the output has been disconnected from the battery)	Off	Yellow Constant	Red Constant

### 5.2.2 CHARGE MODE

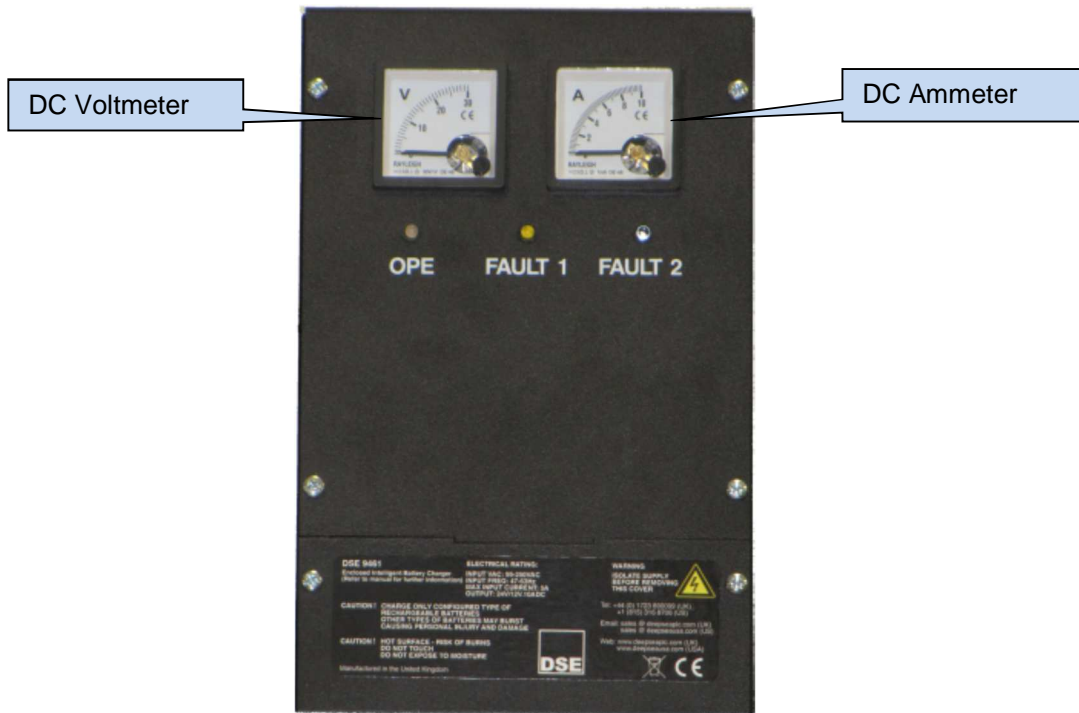
Mode	LED DESIGNATION
	OPE
Bulk Charge in progress	Yellow Constant
Absorption Charge in progress	Yellow Flashing
Float Charge in Progress	Green Constant
Storage Charge in Progress	Green Flashing

### 5.2.3 FAULT CONDITIONS

Condition	LED DESIGNATION	
	FAULT 1	FAULT 2
High Output Voltage (DC)	Red Constant	Off
High / Low Input Voltage (AC) or High Output Current (DC)	Red Flashing	Off
High Ambient / Charger Temperature, High Battery Temperature (if enabled)	Off	Red Constant
Short Circuit/ Reverse Polarity (DC Output Connection)	Off	Red Flashing

### 5.3 ENCLOSURE MOUNTED ANALOGUE METERS

**NOTE:** Enclosure mounted analogue meters are fitted to specific models only.





## 6 OPERATION

The DSE battery charger can be used as a battery charger, DC power supply, or both at the same time. For instance, the unit can be used to power the generator control panels and charge the panel batteries or starter batteries at the same time.

With no AC input to the charger, the *Charge fail* relay is de-energised. This can be used to provide indication of charger failure which operates upon mains supply AC supply failure or battery charging failure.

When a suitable AC supply is connected, operation of the unit will depend upon the load connected to the unit's output terminals :

Battery connected – The charging operation will begin (Charge mode)

No Battery connected – The output voltage will be enabled. (PSU mode)

Reverse connected battery – The charger will remain in charge fail mode.

Short circuit – The charger will remain in charge fail mode.

AC under/over voltage – The charger will remain in charge fail mode.

DC over current/voltage – The charger will remain in charge fail mode.

Over temperature - The charger will remain in charge fail mode.

Battery Charger Failure - The charger will remain in charge fail mode.

Depending upon the model variant, the battery charger can be operated using either the remote or enclosure mounted DSE2541.

Operation of the LCD display module is covered later in this section.

### 6.1 OPERATING MODES

#### 6.1.1 PSU MODE

If no battery is connected to the output terminals, the DSE battery charger will operate as a DC power supply only, current limit is factory set. See the section entitled *Specification* elsewhere in this manual for output specifications.

#### 6.1.2 CHARGE MODE

 **NOTE: Ensure any Standing Load (loads connected to the battery charger other than the battery) are less 75% of the battery charger configured rating. This helps to ensure the charger correctly detects the battery charge state.**

##### Constant Voltage

The DSE battery charger operates in *Constant voltage current limited* mode.

The charger output voltage is maintained at a constant level to allow the battery to charge while the load does not exceed the maximum rating of the charger.

Once the battery is fully charged, the battery charger switches to *ECO-POWER* mode. This is a low power use *standby* mode.

##### Current Limit

If the load on the battery charger (*battery charge demand+standing load*) exceeds the maximum current rating of the charger, the charging current is limited to the maximum rating of the charger and the voltage is reduced.

The voltage will rise to the rated voltage again once the load drops below the maximum rating of the charger.

### Charging time

Charge time is often of little consequence when the battery is used in a *standby* operation. An example of this is when the battery is used to supply the starting system of a diesel generator. During normal operation, the battery is at full capacity and the battery charger is used to maintain the float voltage of the battery. The battery is only drained when the generator is called to start. As the generator has a DC charging alternator fitted, the battery is quickly recharged when the generator is running. Should the generator stop before the battery is fully recharged, the battery charger continues to recharge the battery until it is fully charged.

Typically a battery will charge from flat to 80% capacity in 16hrs when when charged at C/10. For example charging a 50Ah battery for 16hrs at 5A will charge the battery to 80% of its full capacity. Remember to take into account any other standing load such as control panel requirements when calculating how much power is 'left' to charge the battery.

### 6.1.3 BOOST MODE

Boost mode is operated automatically or by activation of the digital input (if configured to perform this function). This raises the battery charger voltage to the *boost* voltage setting. It will stay in boost mode until the current drawn from the charger drops below 75% of the rated output, it will then go into a timed run-on charge.

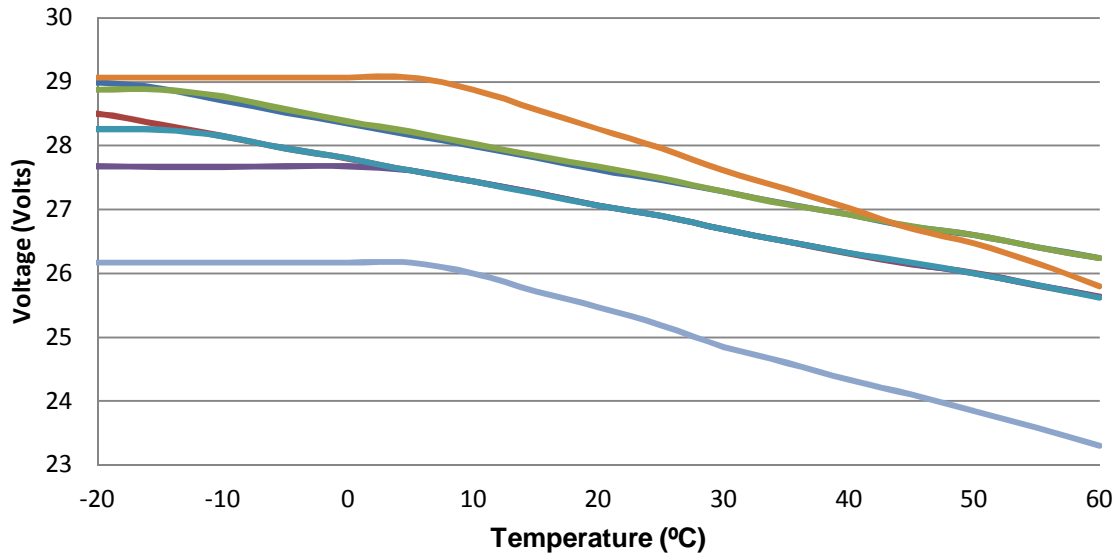
The battery charger will go back into boost mode, if the charge voltage is detected to drop below 1.8V per battery cell.

### 6.1.4 TEMPERATURE COMPENSATION

If temperature compensation is enabled through configuration, and remote temperature sensor is connected, the output voltage automatically varies by a configured mV per cell per 1°C deviation from 20°C, within the range of -20°C to 60°C. Increasing temperature give decreasing outputs and decreasing temperatures give increasing outputs.

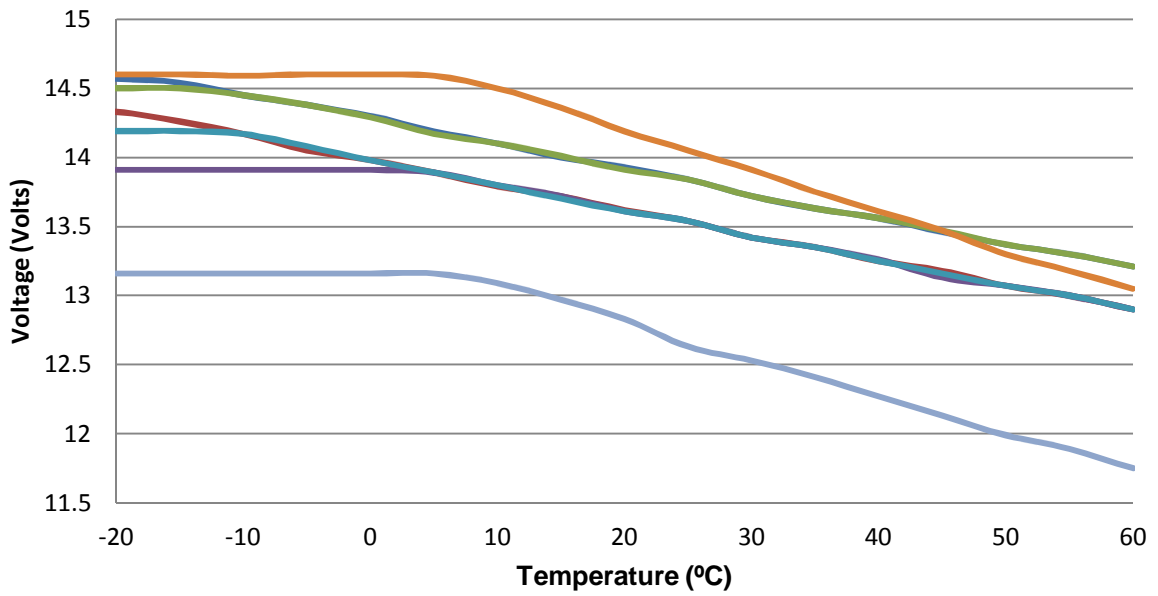
The battery temperature will be measured by a temperature sensor (2 wire PT1000 sensor) which will be placed on the battery

### Battery Temperature Compensation (Configured to 24V)



- Calcium
- Lead Acid Antimony
- VRLA-AGM
- VRLA-AGM
- Wet (Vented) Lead Acid
- NiCd 10/20 Cell
- NiCd-9/18 Cell

### Battery Temperature Compensation (Configured to 12V)



- Calcium
- VRLA-GEL
- NiCd 9/18
- Lead Acid Antimony
- Wet (Vented) Lead Acid
- VRLA-AGM
- NiCd 10/20

## 6.2 OPERATION OF LCD DISPLAY

**NOTE:** LCD display is fitted to specific models only.

**NOTE:** An external remotely connected LCD display can be added to models without the enclosure mounted display. DSE Part Number 2541-02.

### 6.2.1 BACKLIGHT

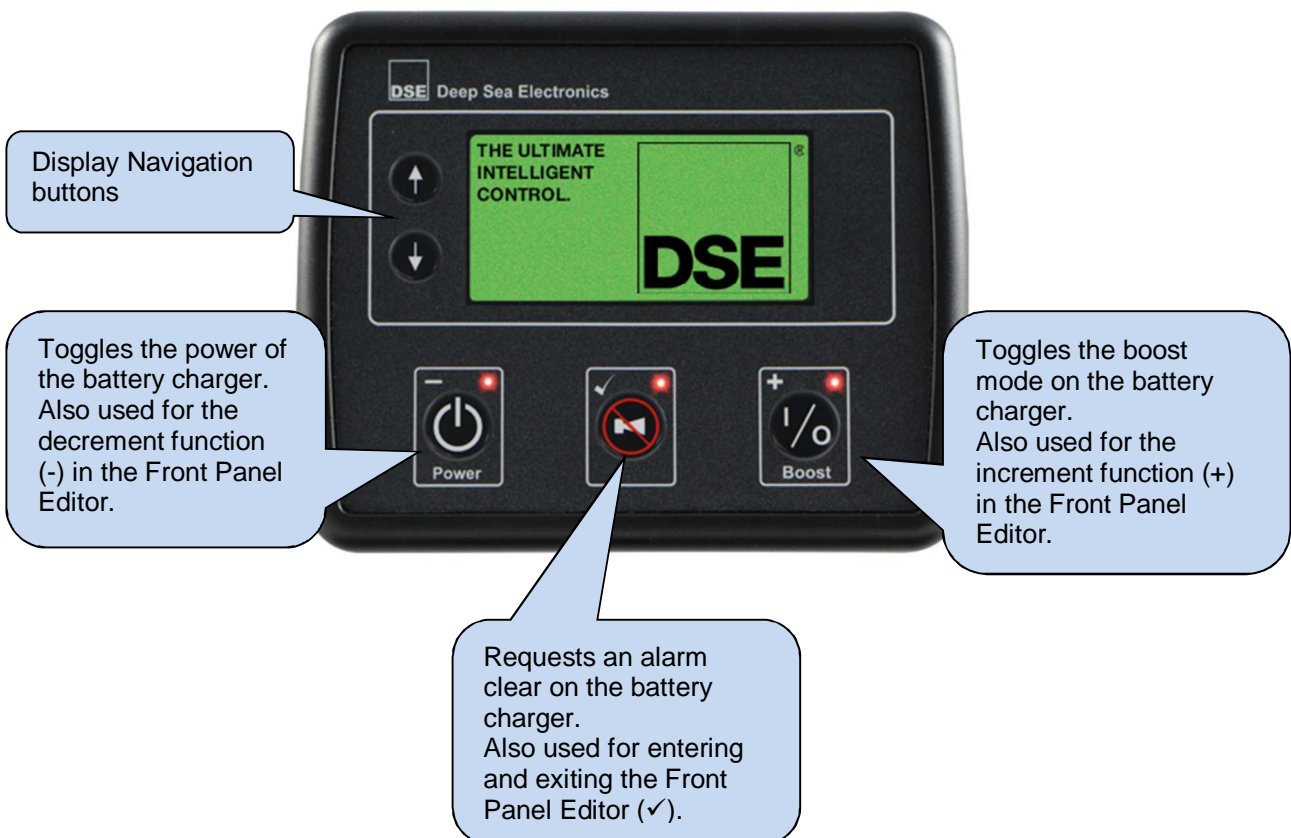
The LCD backlight is ON while the module is powered and flashes up detection of an alarm condition.

### 6.2.2 LED

The Display Module has three integral LEDs to show operation status and fault conditions. Full details are contained in the section entitled *Indications* elsewhere in this document.

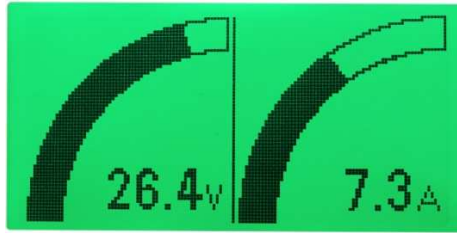
### 6.2.3 CONTROL BUTTONS

The LCD display has five control buttons :



### 6.2.4 HOME SCREEN

The home screen shows the visual representation dials of the charger output voltage and current, relative to their maximum outputs.



### 6.2.5 LINK ICON

The link icon indicates a successful link to the battery charger over the RS485 link. If there is no link active the icon is not shown.

Alarm Condition	Icon
RS485 Active	

### 6.2.6 BATTERY ICON

The battery icon indicates the current state of charging.

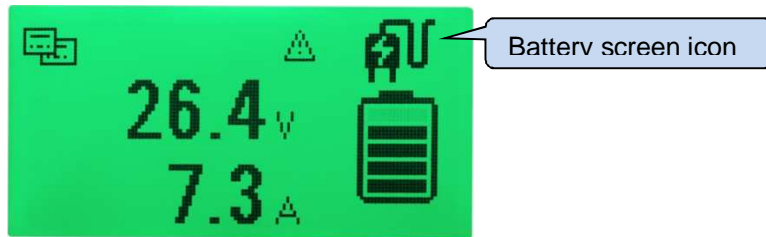
Battery State	Icon graphic
Not Charging	
Bulk/boost	
Absorption	
Float	
Storage	
Fault	

### 6.2.7 VIEWING THE INSTRUMENTATION

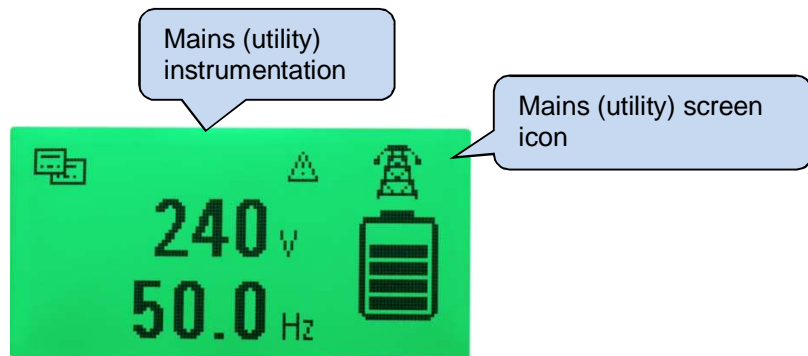
Press the navigation buttons  (up) and  (down) to cycle through the available instrumentation screens.

An icon is used to show the meaning of the currently visible screen as shown in the following sections.

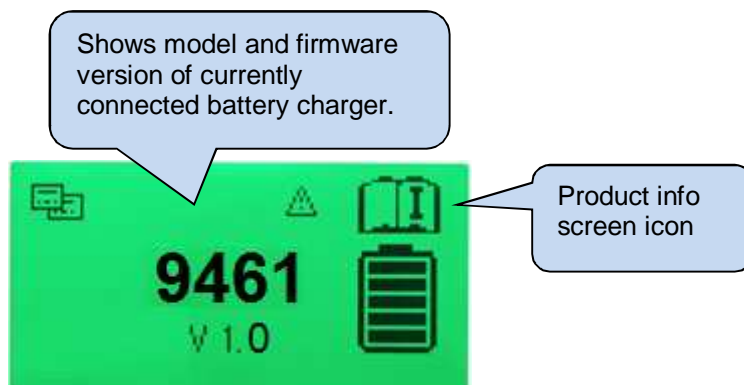
#### 6.2.7.1 BATTERY



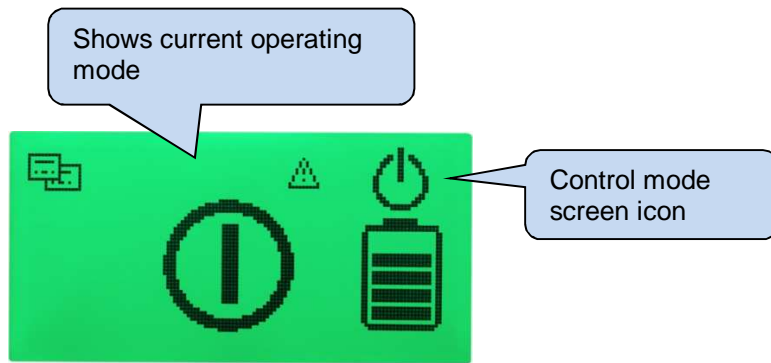
#### 6.2.7.2 MAINS



#### 6.2.7.3 PRODUCT INFO



### 6.2.7.4 CONTROL MODE

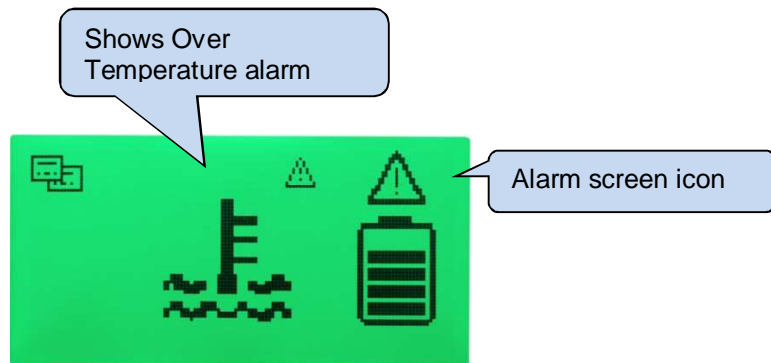


Control State	Icon displayed
On	
Off	
Boost	

### 6.2.7.5 ALARMS

When a new alarm is detected, the LCD displays the alarm screen and the LCD backlight flashes.

Press the (✓) button to accept the alarm, exit the alarm screen and return to the summary screen.



Alarm condition	Icon displayed
DC Over Volts	
DC Over Current	
AC Under or Over Volts	
Over Temperature	
Short Circuit or Reverse polarity	
Battery open circuit	
Battery Charger Failure	



6.2.7.6 ENGINEERING PAGE 1

```

OPV 26.4V  OPC 7.3A
OPVL 31.0V  OPCL 12.0A
OPPW 197W  BSV 26.4V
BTMP 25°C  MTMP 30°C
    
```

Item	String	Units
Output voltage	OPV	V
Output current	OPC	A
Output Voltage Limit (if available)	OPVL	V
Output current Limit	OPCL	A
Charger output power	OPPW	W
Remote battery sense voltage	BSV	V
Battery Temperature	BTMP	°F or °C (depends on config)
Module Temperature	MTMP	°F or °C (depends on config)

6.2.7.7 ENGINEERING PAGE 2


```

ACSV 240V  ACSF 50.0 Hz
ACSC 0.0A
FSP1 0rpm  FSP2 0rpm
    
```

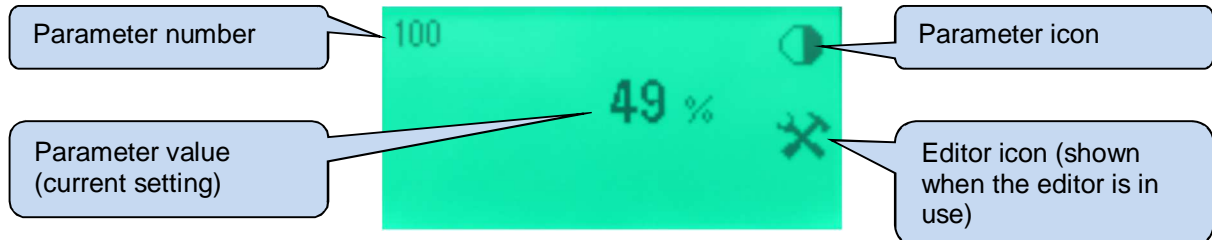
Item	String	Units
AC supply voltage	ACSV	V
AV Supply frequency	ACSF	Hz
AC supply current	ACSC	A
Fan 1 Speed	FSP1	rpm
Fan 2 Speed	FSP2	rpm

## 6.3 FRONT PANEL EDITOR





### 6.3.1 ACCESSING THE FRONT PANEL EDITOR

The front panel editor (FPE) is accessed by pressing and holding the  (✓) button.





The first parameter is displayed.



### 6.3.2 SELECTING A PARAMETER


- Press  (+) or  (-) to change between parameter pages (listed overleaf).
- Press  (up) or  (down) to cycle through the available parameters (listed overleaf).

#### 6.3.2.1 EDITING A PARAMETER

- Press  (✓) to edit a parameter when it is being viewed on the screen. The value flashes to show edit mode is in progress.
- Press  (+) or  (-) to change the parameter to the required value.
- Press  (✓) to save the currently selected value. The value ceases flashing to show editing is complete.

Other parameters can now be selected and edited in the same manner.

#### 6.3.2.2 EXITING THE EDITOR

- Press and hold  (✓) to exit the editor.
- The *File Transfer* screen shown progress as the configuration is uploaded from the display module to the battery charger.

### 6.3.3 FRONT PANEL EDITOR PARAMETERS

**NOTE:** On previous versions of the DSE2541 some charger configuration parameters are available. All charger parameters must be configured using the DSE Configuration Suite PC Software., refer to DSE Publication 057-159 *DSE94xx Battery Charger Series Configuration Suite PC Software Manual*.

#### 6.3.3.1 PAGE 1 – MISCELLANEOUS

Index	Configuration item	Icon
100	Contrast	
101	Temperature Units	
102	Slave ID	
103	Baud Rate	
104	Enable Alarm Splash Screen	
105	Page Timeout Screen	
106	Page Timeout	
107	Sleep Mode Timeout	
108	Enable Engineering Page	

*Parameter 105 – Page Timeout Screen* selects the ‘main’ display screen. This is the screen that is displayed after a period of inactivity (no buttons are pressed for the duration of *Page Timeout* (parameter 106). It has the following possible selections :

Value	Function
0	Analogue Meters
1	Output Voltage And Current
2	Output Power And Battery Charger Temperature
3	Battery Sensed Voltage And Battery Temperature
4	Mains AC Voltage And Frequency
5	Battery Charger Model And Charger Software Version
6	Control Page
7	Alarms Page
8	Engineering Page 1
9	Engineering Page 2

Operation

Parameter 108 – Digital Input Function has the following possible selections :

Value	Function
0	Lamp Test
1	Charger Off
2	Enable Battery Detection
3	Manual Boost
4	Switch Voltage Mode (12V / 24V)

## 7 MODBUS

The DSE Battery Charger supports the modbus RTU protocol over half-duplex RS485 communications.

RS485 parameter	Setting
Start Bits	1
Data Bits	8
Parity	None
Stop Bits	2
Baud Rate	Configurable using DSE Configuration Suite PC Software (1200, 2400/ 4800, 9600, 19200, 28800, 38400, 57600, 115200) Factory setting : 9600
Modbus Slave ID	Configurable using DSE Configuration Suite PC Software (1-247) Factory Setting : 10

### 7.1 READING VALUES

Values must be read using Modbus *Function Code 3 – Read Multiple Registers*.

Using the DSE Configuration Suite PC Software, modbus registers are defined by the system designer in modbus Page 166.

An example of customer configuration is shown below, the screen image is taken from the SE Configuration Suite PC Software.

Register	Value	Register	Value	Register	Value	Register	Value
0-1	Charge Output Off	64-65	<Not Used>	128-129	<Not Used>	192-193	<Not Used>
2-3	Fault LED	66-67	<Not Used>	130-131	<Not Used>	194-195	<Not Used>
4-5	Fault LED 2	68-69	<Not Used>	132-133	<Not Used>	196-197	<Not Used>
6-7	OPE Green LED	70-71	<Not Used>	134-135	<Not Used>	198-199	<Not Used>
8-9	OPE Yellow LED	72-73	<Not Used>	136-137	<Not Used>	200-201	<Not Used>
10-11	Relay Healthy	74-75	<Not Used>	138-139	<Not Used>	202-203	<Not Used>
12-13	Battery Temperature	76-77	<Not Used>	140-141	<Not Used>	204-205	<Not Used>
14-15	Active current limit	78-79	<Not Used>	142-143	<Not Used>	206-207	<Not Used>
16-17	<Not Used>	80-81	<Not Used>	144-145	<Not Used>	208-209	<Not Used>
18-19	<Not Used>	82-83	<Not Used>	146-147	<Not Used>	210-211	<Not Used>
20-21	<Not Used>	84-85	<Not Used>	148-149	<Not Used>	212-213	<Not Used>
22-23	<Not Used>	86-87	<Not Used>	150-151	<Not Used>	214-215	<Not Used>
24-25	<Not Used>	88-89	<Not Used>	152-153	<Not Used>	216-217	<Not Used>
26-27	<Not Used>	90-91	<Not Used>	154-155	<Not Used>	218-219	<Not Used>
28-29	<Not Used>	92-93	<Not Used>	156-157	<Not Used>	220-221	<Not Used>
30-31	<Not Used>	94-95	<Not Used>	158-159	<Not Used>	222-223	<Not Used>
32-33	<Not Used>	96-97	<Not Used>	160-161	<Not Used>	224-225	<Not Used>
34-35	<Not Used>	98-99	<Not Used>	162-163	<Not Used>	226-227	<Not Used>
36-37	<Not Used>	100-101	<Not Used>	164-165	<Not Used>	228-229	<Not Used>
38-39	<Not Used>	102-103	<Not Used>	166-167	<Not Used>	230-231	<Not Used>
40-41	<Not Used>	104-105	<Not Used>	168-169	<Not Used>	232-233	<Not Used>
42-43	<Not Used>	106-107	<Not Used>	170-171	<Not Used>	234-235	<Not Used>
44-45	<Not Used>	108-109	<Not Used>	172-173	<Not Used>	236-237	<Not Used>

Modbus parameter	Value
Modbus Register Start	Address Page 166 Absolute HexaDecimal Address A600 Absolute Decimal Address 42496 (166 x 256).  <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <b>NOTE: Some Legacy Modbus Master devices may require a suffix of 40,000 to the address, making the base address 82496.</b> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <b>NOTE: Some Modbus Master devices may require '1' to be added to the address.</b> </div>
Modbus Register Size / Sign	32 bit, signed
Modbus Register Type	Holding Registers (modbus function code 3 supported)

## 7.2 WRITING VALUES

Writing values to the battery charger is used to perform functions below. Two values must be written using the same write function.

Using Modbus *Function Code 16 – Write Multiple Registers*, write the required Control Key and One's Compliment of the Control key to the specified registers:

### 7.2.1 TOGGLE BOOST MODE

Writing this control key enables or disables boost mode. When in boost mode, the battery is charged at the configured *boost voltage*.

Single Modbus Write using Modbus *Function Code 16 – Write Multiple Registers*

Address to write to	Control Key	One's Compliment of Control Key
Decimal Address 4104 & 4105 (Hexadecimal 1008 & 1008)	35772	27963

### 7.2.2 TOGGLE CHARGER ON/OFF

Writing this control key enables or disables the charger's DC output.

Single Modbus Write using Modbus *Function Code 16 – Write Multiple Registers*.

Address to write to	Control Key	One's Compliment of Control Key
Decimal Address 4104 & 4105 (Hexadecimal 1008 & 1008)	35773	29762

## 8 FAULT DIAGNOSIS

Nature of problem	Suggestion
The charger is not operating	<p>Check that the incoming AC supply is correctly connected and within limits and check the integrity of any external fuse that may be fitted.</p> <p>Ensure the charger is not being operated above the maximum temperature specification.</p>
Charge fail relay continuously operated	Check the connected load of the charger is not reverse connected or short circuit.
Batteries fail to charge	Check the batteries using the battery manufacturers recommendations.
Charge time is too long	<p>Typically a battery will charge from flat to 80% capacity in 16hrs when when charged at C/10.</p> <p>For example charging a 50Ah battery for 16hrs at 5A will charge the battery to 80% of its full capacity.</p> <p>Remember to take into account any other standing load such as control panel requirements when calculating how much power is 'left' to charge the battery.</p>

## **9 MAINTENANCE, SPARES, REPAIR AND SERVICING**

The DSE battery chargers are designed to be *Fit and Forget*. As such, there are no user serviceable parts. In the case of malfunction you should contact your original equipment supplier (OEM).

## **10 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).

## **11 DISPOSAL**

### **11.1 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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