DEEP SEA ELECTRONICS DSE9470 MKII INTELLIGENT BATTERY CHARGER OPERATOR MANUAL

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DSE9470 MKII Intelligent Battery Charger Operator Manual

Amendments Since Last Publication

Amd. No.	Comments
1	Initial Release
2	Update to UL table

Typeface: The typeface used in this document is *Arial*. Care must 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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Section Page

1 INTRODUCTION

This document details the installation requirements of the DSE9470 MKII Intelligent Battery Charger. 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.deepseaelectronics.com.

The DSE9470 MKII Intelligent Battery Charger is intended for mounting within a customer enclosure or panel (DIN rail mounting or fastened by screws/bolts).

DSE also supply some of the battery chargers as completed units, factory mounted into enclosures for wall or floor mounting.

The DSE9470 MKII Intelligent Battery Charger fulfils the most common functions required of a charger in the generating set industry. Combining protected outputs, intelligent charging and power supply operation with a robust enclosure.

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
LED	Light Emitting Diode A semiconductor device that emits light when an electric current passes through it.
OEM	Original Equipment Manufacturer It refers to a company that produces parts and equipment that may be marketed by another manufacturer, known as a value-added reseller (VAR).
PCI	Peripheral Component Interconnect A local computer bus for attaching hardware devices in a computer and is part of the PCI Local Bus standard.
RTU	Remote Terminal Unit A microprocessor-controlled electronic device that interfaces with objects in the physical world.
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.
USB	Universal Serial Bus An industry standard that allows data exchange and delivery of power between many various types of electronics.
WEEE	Waste Electrical and Electronic Equipment A European Community Directive, numbered 2012/19/EU, concerned with electrical and electronic equipment waste.

1.3 BIBLIOGRAPHY

This document refers to and is referred by the following DSE publications which are obtained from the DSE website: www.deepseaelectronics.com or by contacting DSE technical support: support@deepseaelectronics.com.

1.3.1 INSTALLATION INSTRUCTIONS

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

DSE Part	Description
053-049	DSE9200 / DSE9400 Series Battery Charger Installation Instructions

1.3.2 MANUALS

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

DSE Part	Description
057-159	DSE9400 Series Battery Charger Configuration Suite Manual

2 SPECIFICATION

2.1 COMMON ELECTRICAL SPECIFICATIONS

NOTE: Check the DSE9470 MKII Intelligent Battery Charger's de-rating curves that can be found elsewhere in this manual for more information.

Parameter	Min	Nominal	Max
AC Input Voltage (V)	95 V	110 V-277 V	305 V
Operating Temperature	-30 °C		75 °C with de-ratings
Input Frequency (Hz)	48 Hz		64 Hz
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)		<200 ms	
Short Circuit Protection		Hiccup	
Switching Frequency (kHz) 9470-xxx-xx		67 kHz	
Efficiency % (See section entitled '*output specifications*' elsewhere in this manual)		>85%	
Temperature Sensor Input		PT1000	

2.2 REQUIREMENTS FOR UL

WARNING!: More than one live circuit exists, refer to section entitled *Typical Schematic Diagram* elsewhere in this document.

Specification	Description
Mounting	• The battery chargers shall be installed in compliance with the enclosure, mounting, spacing, casualty, and segregation requirements of the ultimate application.
Operating Temperature	• -22 °F to +158 °F (-30 °C to +70 °C)
Storage Temperature	• -22 ºF to +158 ºF (-30 ºC to +70 ºC)
Input Voltage	• 95 to 305 V AC
UL Voltage Approval Rating	• USA Only (9470-01) 100 to 305 V AC • USA & Canada (9470-A4) 110 to 150 V AC

2.3 COMMUNICATION PORTS

Description	Specification
USB Port	USB2.0 Device 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 19200 External termination required (120 Ω) Max common mode offset 70 V (on board protection transorb) Max distance 1.2 km (¾ mile)

2.4 COMMUNICATION PORT USAGE

2.4.1 USB PORT (PC CONFIGURATION)

NOTE: Refer to DSE9400 Series Battery Charger PC Software Configuration Manual for further details on configuring and monitoring.

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 the DSE9470 MKII Intelligent Battery Charger to a PC by USB, the following items are required:

- DSE9400 series battery charger

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

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

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

2.4.2 RS485

The RS485 port on the DSE9470 MKII Intelligent Battery Charger has three uses.

1) Supporting the DSE2541 remote battery charger display module (MKII only)
2) Support the Modbus RTU protocol for connection to a Modbus RTU Master device.
3) Supporting the DSENet® connection with the supported modules.

2.4.2.1 DSE2541 REMOTE BATTERY CHARGER DISPLAY MODULE

DSE2541 remote battery charger display modules connects to the DSE9470 MKII Intelligent Battery Charger RS485 terminals.
This provides battery charger operating status, alarm indication, instrumentation and control over the DSE9470 MKII Intelligent Battery Charger.

For further information please contact sales@deepseaplc.com.

2.4.2.2 MODBUS RTU

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

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).

Using the DSE Configuration Suite PC Software, Configurable Gencomm is used to map instrumentation to modbus registers.

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 DSE9470 MKII Intelligent Battery Charger and a PC running the DSE Configuration Suite software. The operator is then able to view the various operating parameters.

2.4.2.3 DSENET

The DSE9470 MKII Intelligent Battery Charger's RS485 port can be configured as DSENet® using the DSE Configuration Suite PC Software to allow the DSE Intelligent Battery Chargers' information (Instruments and Status) to be viewed on the Genset controller's display.

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

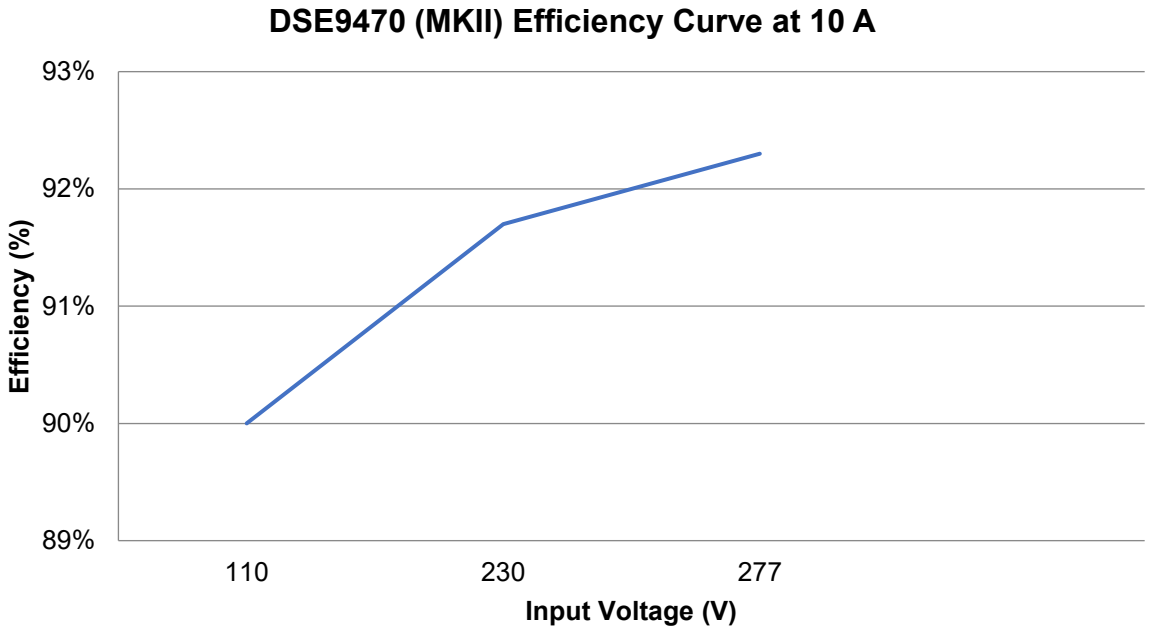
Brainboxes PX-324 PCI Express 1 Port RS422/485 (for desktop PCs)

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

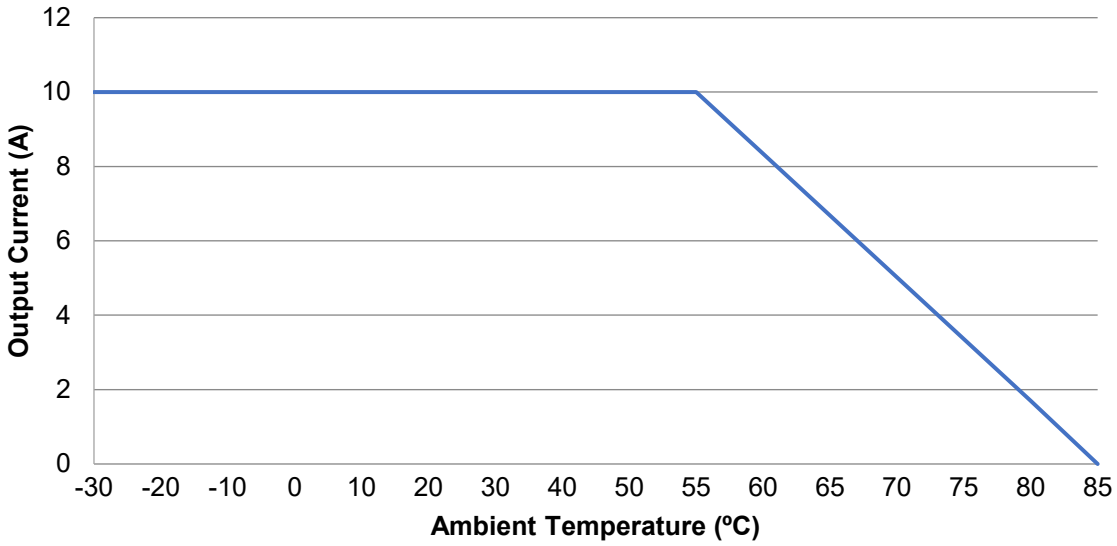
2.5 OUTPUT SPECIFICATIONS

NOTE: DSE9470 MKII is factory configured to 24 V 10 A. If required, voltage and current levels can be user configured via DSE Configuration Suite PC Software.
Part number 9470-001-00 is fixed at 24 V 10 A.

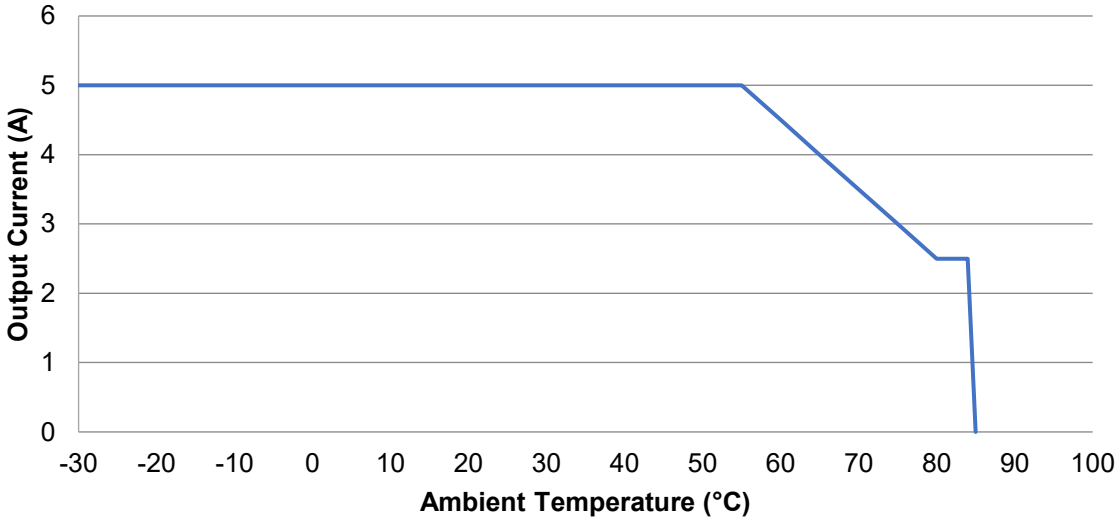
Parameter	Min	Nominal	Max	Comments
Output Voltage (24 V DC Battery)	26.7 V	27 V	29 V	
Output Charging Current (A)	2 A	10 A	11 A	
Current limit threshold (A)		10 A	11 A	
Recovery from current limit (A)	10 A		11 A	
Full load AC input current (A)			2.3 A	At Vin=230 V, Vo=28.8 V, Io=10 A
Full load AC input current (A)			4 A	At Vin=110 V, Vo=28.8 V, Io=10 A
AC Input Inrush current (A)		60 A		For 10 ms



DSE9470 (MKII) Temperature Derate Curve
110 V < Vin < 305 V



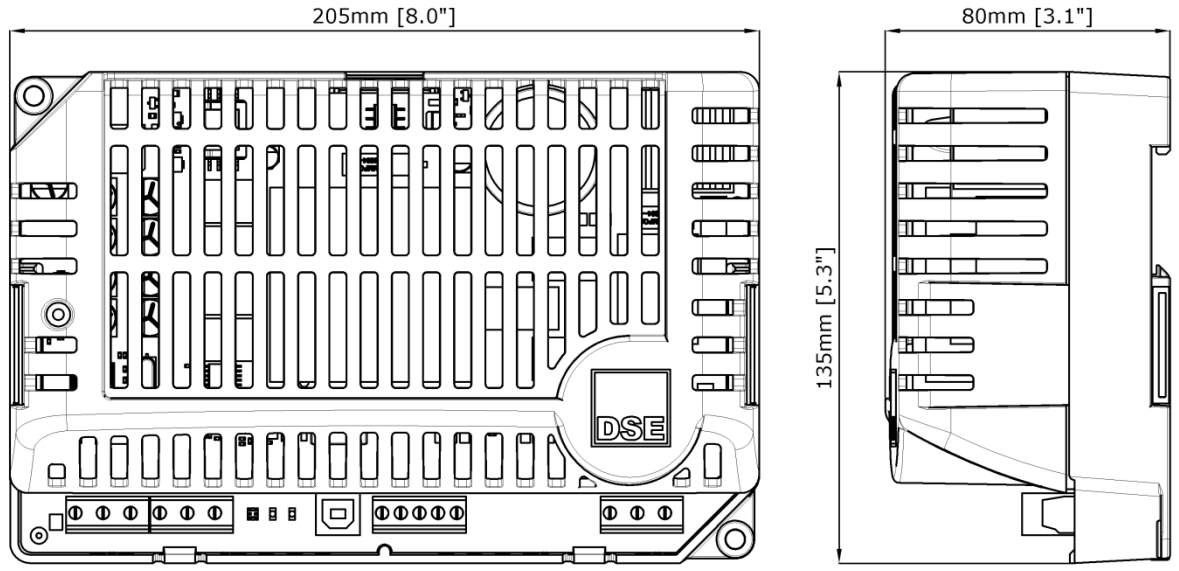
DSE9470 (MKII) Temperature Derate Curve
95 V < Vin < 110 V



2.6 DIMENSIONS AND MOUNTING

NOTE: This battery charger is designed to be mounted with the base to a vertical surface with the terminal strips at the bottom.

Parameter	Specification
Overall size(mm)	205 mm x 135 mm x 80 mm (8.0 ” x 5.3 ” x 3.1 ”)
Weight	0.78 kg
Mounting type	DIN rail or chassis mounting
Din rail type	EN 50022 35 mm type only
Mounting holes	Suitable for M4
Mounting hole centres	190 mm x 120 mm (7.5 ” x 4.7 ”)
Input voltage (nominal)	110 V to 277 V
Input voltage (absolute range)	95 V to 305 V
Charge failure relay rating	3 A DC resistive 30 V maximum
Operating Temperature	-30 °C to 85 °C with de rating (-22 °F to 185 °F with de rating)



2.7 APPLICABLE STANDARDS

Standard	Description
BS EN 60529 (Degrees of protection provided by enclosures)	IP65 (front of module when installed into the control panel with the sealing gasket) IP42 (front of module when installed into the control panel WITHOUT being sealed to the panel)
UL508 NEMA rating (Approximate)	12 (Front of module when installed into the control panel with the sealing gasket). 2 (Front of module when installed into the control panel WITHOUT being sealed to the panel)

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

3 INSTALLATION

NOTE: The DSE9470 MKII Intelligent Battery Charger should only be used to charge one battery bank at a time. It is not recommended to parallel batteries as the tolerance of the batteries leads to imbalance in their charging.

The DSE9470 MKII Intelligent Battery Charger is designed to be mounted within a control panel, on the panel DIN rail utilising the integral mounts or on a chassis utilising the mounting holes. For dimension and mounting details, see the section entitled Specification, Dimensions elsewhere in this document.

The DSE9470 MKII Intelligent 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) or when the generator is running (even when a DC charging alternator is fitted).

3.1 BATTERY SUITABILITY

The standard charger is factory set by DSE to suit Lead Acid batteries but can be adjusted at the time of ordering to suit other battery types. Care should be taken to ensure the batteries connected to the charger are of the correct 'technology' to suit the setting of the charger.
For details of other supported battery types and float voltages see the section entitled Specifications, Part Numbering elsewhere in this document.

3.2 USER CONNECTIONS

NOTE: Where the current rating has been user configured below the rated maximum current, an appropriate fuse size must be selected to match the lower maximum output current.

NOTE: For obsolete parts 9470-001-00 contact DSE Technical Support for connection details.

Parameter	Comment	
Connection type	Screw terminal, rising clamp, no internal spring	
Min cable size	0.5 mm² (AWG 20)	
Max cable size	2.5 mm² (AWG 10)	
Recommended AC fuse DSE9470 24 V / 12 V 10 A charger	**230 V AC Input** 3.5 A anti-surge	**110 V AC Input** 6.3 A anti-surge

Connector A

Terminal	Function	Recommended size	Comments
-OP	Load negative	2.5 mm² (AWG 10)	Battery negative terminal
+OP	Load Positive	2.5 mm² (AWG 10)	Battery positive terminal

Connector B

Terminal	Function	Recommended size	Comments
LK1	Configurable Input	1 mm² (AWG 16)	Connect the terminals together to activate the input. *The Factory Setting for the digital input provides a selection of 12 V / 24 V operation. Customer configurable using DSE Configuration Suite PC Software.
LK1	Configurable Input (0V)	1 mm² (AWG 16)	**NOTE: Digital Input Not Fitted to 9470-001-00**
NC	Normally Closed Contact of the Charge failure relay	0.5 mm² (AWG 22)	De-energises Under Charge Fail Conditions
COM	Charge failure relay Contact Common	0.5 mm² (AWG 22)	
NO	Normally Open Contact of the Charge failure relay	0.5 mm² (AWG 22)	

NOTE: For further details of PC Configuration, you are referred to DSE Publication: 057-159 DSE9400 Series Battery Charger Configuration Suite Manual.

NOTE: For further details on the Charge Failure Relay, refer to the section entitled Protection elsewhere in this manual.

Connector C

Terminal	Function	Recommended size	Comments
SCR	RS485 screen	0.5 mm² (AWG20)	Use only 120 Ω RS485 approved cable
A	RS485 -ve	0.5 mm² (AWG20)	Use only 120 Ω RS485 approved cable
B	RS485 +ve	0.5 mm² (AWG20)	Use only 120 Ω RS485 approved cable
NTC	PT1000 connection terminals	0.5 mm² (AWG20)	Use only PT1000
NTC		0.5 mm² (AWG20)	

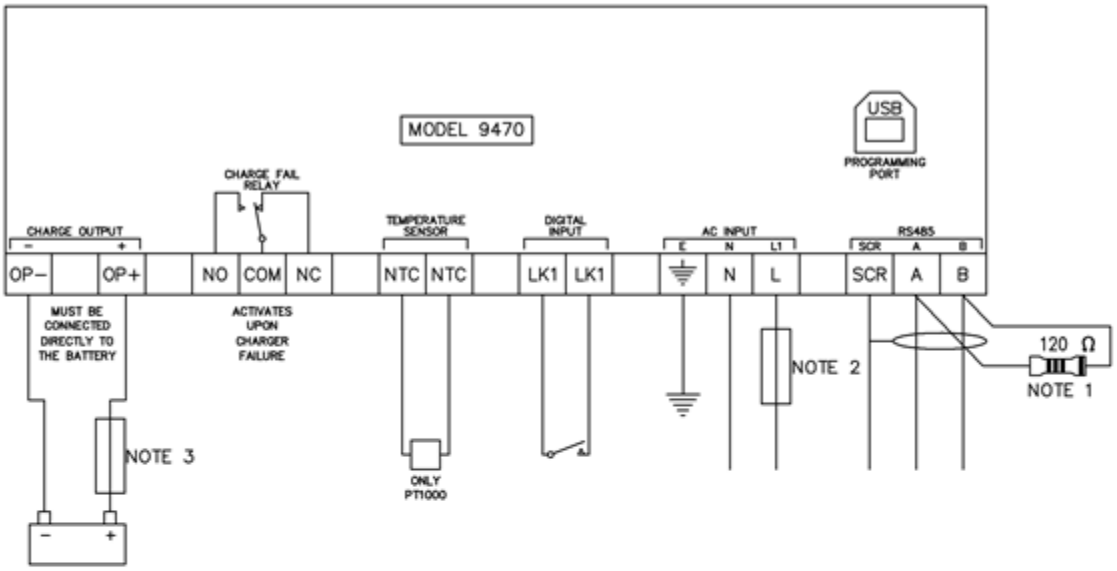
Connector D

NOTE: 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

Terminal	Function	Recommended Size
⏚	Earth	1 mm² (AWG 16)
N	AC Neutral	1 mm² (AWG 16)
L	AC Live	1 mm² (AWG 16)

3.3 TYPICAL SCHEMATIC DIAGRAM

NOTE: For obsolete part 9470-001-00 contact DSE Technical Support for connection details.



TERMINALS SUITABLE FOR 22−16 AWG (0.6mm^2 − 1.3mm^2) 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

WHEN CURRENT LIMIT IS CONFIGURED BELOW 10A, FUSE APPROPRIATELY

NOTE 3
FUSE APPROPRIATELY AND AS CLOSE TO THE BATTERY AS POSSIBLE TO PROTECT THE CABLES AND BATTERY

Recommended AC fuse	230 V AC Input	110 V AC Input
DSE9470 MKII 24 V / 12V 10 A charger	3.5 A anti-surge	6.3 A anti-surge

4 INDICATIONS

DANGER OF DEATH : LIVE PARTS exist within the DSE9470 MKII enclosure. The enclosure cover must not be removed when connected to an AC supply.

NOTE: For obsolete part 9470-001-00 contact DSE Technical Support for LED descriptions.

4.1 STATUS

LCondition	LED Designation		
	OPE	FAULT1	FAULT2
Charger Off	Off	Off	Off
Battery not Detected (Battery Detection Mode)	Green Flashing	Red Flashing	Red Flashing
Battery Connected (Battery Detection Mode)	Green Constant	Red Constant	Red Constant
Not Charging (Charger is operating correctly but the ouput has been disconnected from the battery)	Off	Red Constant	Red Constant

4.2 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

4.3 FAULT CONDITIONS

Condition	LED Designation	
	FAULT1	FAULT2
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 OPERATION

NOTE: For details of Battery Charger Configuration, you are referred to DSE Publication: 057-159 DSE9400 Series Battery Charger Configuration Suite Manual.

The DSE9470 MKII Intelligent 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 Fault relay is in it's inactive state. This volts-free change over relay can be used to provide indication of alarms as detailed in the Protection section below.
When a suitable AC supply is connected, operation of the unit will depend upon the load connected to the unit's output terminals:

5.1 PROTECTION

NOTE: The Fail Relay is de-energised when a Shutdown Alarm or User Configurable alarm is active on the charger.
The Fail Relay is energised when the charger is powered and there is no active alarm.

Alarms fall into two categories :
- Shutdown Alarms, non-adjustable alarms.
- User Configurable Alarms, adjustable by DSE Configuration Suite PC Software.

5.1.1 SHUTDOWN ALARMS

NOTE: The Shutdown alarm are factory set and cannot be changed.

NOTE: When the AC supply source falls outside the hardware voltage limits, the DSE charger is instantly switched off for safety reasons, and the alarm is activated (Fault Relay De-energises).

Under the following conditions, the Fault Relay de-energises to the normally closed state and charging is stopped (DC output is disabled) :

- AC Power removed
- AC Power outside the hardware limits (Minimum & Maximum AC input voltage and frequency as detailed in the *Common Electrical Specifications* table for each specific charger)
- Battery temperature > 60 ºC (if temperature compensation is enabled)
- Battery Charger ambient temperature> 85 ºC
- DC output voltage > 110% of Boost Voltage
- Short circuit / reverse polarity of the DC output.

5.1.2 USER CONFIGURABLE ALARMS

NOTE: For details of Battery Charger Configuration, you are referred to DSE Publication: 057-159 DSE9400 Series Battery Charger Configuration Suite Manual.

NOTE: When a *Shutdown Alarm* is active at the same time as a *User Configurable Alarm,* the *Shutdown Alarm* takes priority and switches the charger off.

The following alarms are user configurable using DSE Configuration Suite PC Software. In each case, the Fault relay de-energises.

- DC Overcurrent alarm
- DC Overvoltage alarm
- Battery Temperature alarm. Activation of this alarm places the charger into Float mode.
- Mains Over Voltage alarm. Activation of this alarm places the charger into Float mode.
- Mains Under Voltage alarm. Activation of this alarm places the charger into Float mode.

5.2 DIGTAL INPUT

The DSE9470 MKII Intelligent Battery Charger is fitted with a configurable digital input. Configuration is made using the DSE Configuration Suite PC Software.

The Factory Setting for the digital input provides a 12 V / 24 V selection function.

5.3 VOLTAGE ADJUSTMENT POTENTIOMETER

A manually operated potentiometer is provided to make small adjustments to the *Boost Voltage* without the requirement for the DSE Configuration Suite PC Software.
This is primarily intended to increase charger output to cater for voltage drop in long connection cables.

The potentiometer adjusts the *boost voltage* by up to ±1.7 V. This is subject to an absolute maximum of 29.5 V.

The table below shows the effect of the potentiometer on the *boost voltage* in the various charging modes.

Charge Mode	Effect on *boost voltage*
Bulk	100% of potentiometer setting
Absorption	50% of potentiometer setting
Float	Potentiometer has no effect on *Float Voltage*
Storage	Potentiometer has no effect on *Storage Voltage*

5.4 PSU MODE

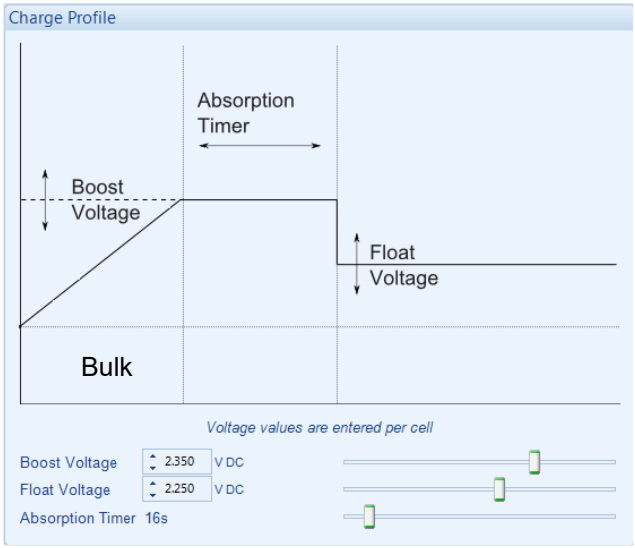
If no battery is connected to the output terminals, the battery charger will operate as a DC power supply only, current limit is factory set to 10 A and is adjustable (down to 2 A) using the DSE Configuration Suite PC Software. See the section entitled *Specification* elsewhere in this manual for further output specifications.

5.5 CHARGE MODE

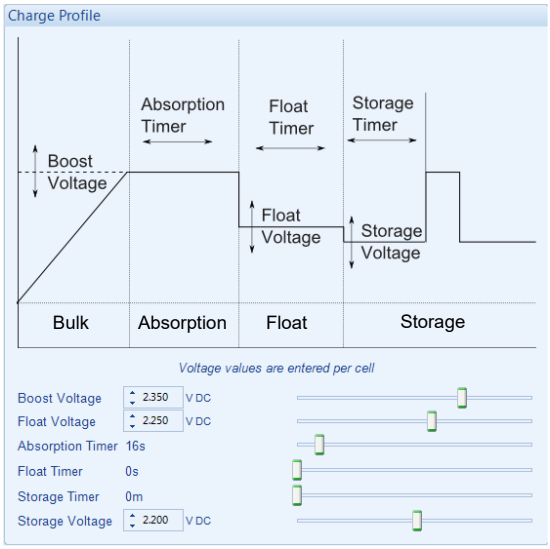
NOTE: For details of Battery Charger Configuration, you are referred to DSE Publication: 057-159 DSE9400 Series Battery Charger Configuration Suite Manual.

NOTE: Should a 2-Stage charging profile be required, select a 3-Stage profile and configure Boost Voltage and Float Voltage to the same value.

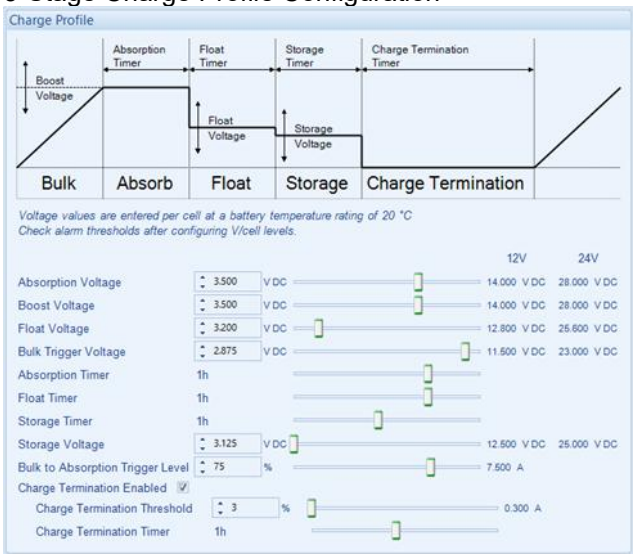
Using DSE Configuration Suite PC Software, the battery charger is configured to use a 3-Stage Charge, or 4-Stage Charge, or 5-Stage Charge profile as shown below. The description of each charge mode is given in the following sections.



3-Stage Charge Profile Configuration



4-Stage Charge Profile Configuration



5-Stage Charge Profile Configuration

5.5.1 BULK CHARGE

The battery charger operates in *Constant voltage current limited* mode.
The charger output voltage is maintained at a constant level (*boost voltage)* to allow the battery to charge while the load does not exceed the maximum rating of the charger.
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. This may occur naturally as the battery charges.
As the battery charges and the charge current drops below the *Bulk to Absorption Trigger Level* percentage, *Absorption* mode is entered. The default *Bulk to Absorption Trigger Level* is 75%, configurable using the DSE Configuration Suite PC Software.

5.5.2 ABSORBTION

This mode is active for the duration of the *Absorption Timer*. This is adjustable using the DSE Configuration Suite PC Software.
Absorption mode is used to complete the charging process, bringing the battery to 100% charged status.
After the *Absorption timer*, *float charge* mode is entered.

5.5.3 FLOAT CHARGE

The battery charger DC voltage is lowered to the configured float voltage.
Float Charge is used to provide a small amount of current to the battery, to overcome internal losses and keep the battery at it’s 100% charged state. The battery can be left in this mode indefinitely.

5.5.4 STORAGE

When configured to use a four stage charging profile, a time limited storage charge is periodically entered (storage timer) to maintain the battery charge at optimum levels. This occurs at the level of the storage voltage. This is adjustable using the DSE Configuration Suite PC Software.
When the storage timer expires, the charger re-enters the Absorption mode.

5.5.5 CHARGE TERMINATION

When Charge Termination is enabled, the charger terminates the charging when the output current level decreases below the Charge Termination Threshold % level, and the charger remains off for the Charge Termination Timer time before exiting this stage. The Charge Termination Threshold and the Charge Termination Timer are configured using the DSE Configuration Suite PC Software.
The charger transfers back to the Bulk Stage when the Charge Termination Timer expires, or the output voltage drops below the Bulk Trigger Voltage level.

5.5.6 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 DSE9400 MKII Series battery charger will continue to recharge the battery until it is fully charged.

Typically a battery will charge from flat to 80% capacity in 16 hrs when charged at C/10.
For example charging a 50 Ah battery for 16 hrs at 5 A 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.

5.5.7 MANUAL BOOST

NOTE: The Digital Input must be configured to Manual Boost to provide this function. For further details, you are referred to DSE Publication: 057-159 DSE9400 Series Battery Charger Configuration Suite Manual.

Manual boost will place the charger into *Bulk* Charge mode, charging at the level of the *boost voltage*. A typical use of manual boost is with Lead Acid type batteries. When the battery is fully charged, placing the charger into boost mode will raise the output voltage. This has the effect of *gassing* the battery, helping to remove sulfation from the battery plates and helping the cells to *equalise* in voltage.

5.5.8 TEMPERATURE COMPENSATION

NOTE: For details of Battery Charger Configuration, you are referred to DSE Publication: 057-159 DSE9400 Series Battery Charger Configuration Suite Manual.

If temperature compensation is enabled through configuration, and remote temperature sensor is connected, the output voltage automatically varies by a configurable voltage per cell for each 1 °C deviation from 20 °C, within the range of -20 °C to 60 °C. Increasing temperature gives decreasing output voltage and decreasing temperatures gives increasing output voltage..
The battery temperature is measured by a 2 wire PT1000 sensor placed on the battery itself.

6 FAULT FINDING

Symptom	Possible Remedy
The charger is not operating	Check that the incoming AC supply is correctly connected and within limits and check the integrity of any external fuse that may be fitted. Ensure the charger is not being operated above the maximum temperature specification. Check the LED indications against the LED descriptions listed elsewhere in this document.
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	Typically a battery will charge from flat to 80% capacity in 16 hrs when charged at C/10. For example charging a 50 Ah battery for 16 hrs at 5 A will charge the battery to 80% of its full capacity. Remember to consider any other standing load such as control panel requirements when calculating how much power is 'left' to charge the battery.

7 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).

8 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)

9 DISPOSAL

9.1 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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