



DSE Genset®



DEEP SEA ELECTRONICS

DSEG8680 Operator Manual

Document Number: 057-327

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Operator Manual

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Amendments Since Last Publication

Amd. No.	Comments
1	Initial Release

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.

TABLE OF CONTENTS

Section	Page
1 INTRODUCTION.....	6
1.1 CLARIFICATION OF NOTATION.....	7
1.2 GLOSSARY OF TERMS.....	7
1.3 BIBLIOGRAPHY	9
1.3.1 INSTALLATION INSTRUCTIONS.....	9
2 MANUALS	10
2.1.1 TRAINING GUIDES	11
2.1.2 THIRD PARTY DOCUMENTS	12
3 Bus Tie Controller Application Menu	13
4 SPECIFICATION.....	14
4.1 OPERATING TEMPERATURE.....	14
4.1.1 SCREEN HEATER OPERATION (WHEN FITTED)	14
4.2 REQUIREMENTS FOR UL	14
4.3 TERMINAL SPECIFICATION	15
4.4 POWER SUPPLY REQUIREMENTS.....	15
4.4.1 MODULE SUPPLY INSTRUMENTATION DISPLAY	15
4.5 VOLTAGE & FREQUENCY SENSING.....	16
4.6 CURRENT SENSING	16
4.6.1 VA RATING OF THE CTS.....	17
4.6.2 CT POLARITY	18
4.6.3 CT PHASING.....	18
4.6.4 CT CLASS.....	18
4.7 INPUTS.....	19
4.7.1 DIGITAL INPUTS	19
4.8 OUTPUTS.....	19
4.8.1 CONFIGURABLE VOLT-FREE RELAY OUTPUTS C & D	19
4.8.2 CONFIGURABLE DC OUTPUTS E, F, G, H, I, J, K, L	19
4.9 COMMUNICATION PORTS.....	20
4.10 COMMUNICATION PORT USAGE.....	21
4.10.1 USB SLAVE PORT (PC CONFIGURATION).....	21
4.10.2 USB HOST PORT (DATA LOGGING)	21
4.10.3 RS485 PORT.....	22
4.10.3.1 RECOMMENDED PC RS485 SERIAL PORT ADD-ONS	23
4.10.4 ETHERNET PORT	24
4.10.4.1 MODBUS TCP	24
4.10.4.2 ETHERNET PORT USED FOR PLC COMMUNICATION.....	24
4.10.4.3 DIRECT PC CONNECTION.....	25
4.10.4.4 CONNECTION TO BASIC ETHERNET.....	26
4.10.4.5 CONNECTION TO COMPANY ETHERNET INFRASTRUCTURE	27
4.10.4.6 CONNECTION TO THE INTERNET.....	28
4.10.4.7 FIREWALL CONFIGURATION FOR INTERNET ACCESS	29
4.10.5 AMSC (ADVANCED MULTI-SET COMMUNICATIONS) LINK.....	30
4.10.6 REDUNDANT AMSC LINK	31
4.10.7 DSENET® (EXPANSION MODULES).....	33
4.11 SOUNDER	34
4.11.1 ADDING AN EXTERNAL SOUNDER	34
4.12 DIMENSIONS AND MOUNTING.....	35
4.12.1 DIMENSIONS.....	35
4.12.2 PANEL CUTOUT.....	35
4.12.3 WEIGHT	35
4.12.4 FIXING CLIPS	36
4.12.4.1 CABLE TIE FIXING POINTS	36
4.12.5 CARD TEXT & LOGO INSERT	37
4.12.6 SEALING GASKET	37

4.13	APPLICABLE STANDARDS	38
4.13.1	ENCLOSURE CLASSIFICATIONS	40
4.13.1.1	IP CLASSIFICATIONS.....	40
4.13.1.2	NEMA CLASSIFICATIONS.....	40
5	INSTALLATION.....	41
5.1	USER CONNECTIONS.....	41
5.2	CONNECTION DESCRIPTIONS	42
5.2.1	DC SUPPLY & DC OUTPUTS	42
5.2.2	AMSC & DSENET®	43
5.2.5	CURRENT TRANSFORMERS.....	45
5.2.5.1	BUS CURRENT TRANSFORMERS.....	45
5.2.5.2	CT CONNECTIONS.....	46
5.2.6	DIGITAL INPUTS	46
5.2.7	RS485.....	47
5.2.8	USB SLAVE (PC CONFIGURATION) CONNECTOR	48
5.2.9	USB HOST (DATA LOGGING) CONNECTOR	48
5.3	TYPICAL WIRING DIAGRAM.....	49
5.3.1	3 PHASE, 4 WIRE WITH A BUS CT	50
5.3.2	EARTH SYSTEMS	51
5.3.2.1	NEGATIVE EARTH.....	51
5.3.2.2	POSITIVE EARTH	51
5.3.2.3	FLOATING EARTH	51
5.3.3	TYPICAL ARRANGEMENT OF DSENET®.....	52
5.3.4	TYPICAL ARRANGEMENT OF AMSC LINK.....	53
5.4	ALTERNATE TOPOLOGY WIRING DIAGRAMS	54
5.4.1	SINGLE PHASE (L1 & N) WITHOUT EARTH FAULT	54
5.4.2	SINGLE PHASE (L1 & N) 2 WIRE WITHOUT EARTH FAULT	55
5.4.3	2 PHASE 3 WIRE (L1 L2) WITHOUT EARTH FAULT	56
5.4.4	2 PHASE 3 WIRE (L1 L2) WITH RESTRICTED EARTH FAULT	57
5.4.5	2 PHASE 3 WIRE (L1 L3) WITH RESTRICTED EARTH FAULT	58
5.4.6	2 PHASE (L1 L3) 3 WIRE WITH A BUS CT	59
5.4.7	3 PHASE 3 WIRE L1 L2 L3.....	60
5.4.8	3 PHASE, 4 WIRE L1 L2 L3.....	61
5.4.9	3 PHASE 4 WIRE WITH CT1- CT4.....	62
5.4.10	3 PHASE 4 WIRE WITH UNRESTRICTED EARTH FAULT	63
6	DESCRIPTION OF CONTROLS.....	64
6.1	CONTROL PUSH BUTTONS	65
6.2	DISPLAY SCREEN	66
6.3	VIEWING THE INSTRUMENT PAGES.....	66
6.3.1	STATUS	68
6.3.1.1	DISPLAY CONFIGURATION.....	68
6.3.2	LEFT BUS	70
6.3.3	RIGHT BUS.....	76
6.3.4	ALARMS.....	82
6.3.5	EVENT LOG	83
6.3.6	COMMUNICATIONS.....	84
6.3.7	MISCELLANEOUS.....	89
6.3.7.1	DATA LOGGING	89
6.3.8	ABOUT	91
7	OPERATION.....	93
7.1	BUS TIE CONFIGURATION	93
7.1.1	BUS TIE.....	93
7.1.2	LOAD SWITCHING	93
7.2	BUS TIE OPERATION	94
7.3	SEGMENT GROUPS	97
7.4	BREAKER CLOSING ON DEAD BUSSES.....	98
7.5	BREAKER CLOSING ON LIVE BUSSES	98
7.6	RAMPING ON	99

7.7	BREAKER OPENING WITH DEAD BUS	99
7.8	BREAKER OPENING WITH LIVE BUS	99
7.9	RAMPING OFF	99
7.10	QUICKSTART GUIDE	100
7.10.1	MANUAL MODE	100
7.10.2	AUTOMATIC MODE	101
7.10.3	BREAKER CONTROL BUTTONS (MANUAL MODE)	102
7.10.4	BUS TIE LED STATUS INDICATIONS	102
7.10.5	BREAKER CONTROL.....	103
7.10.6	BUS TIE CLOSE REQUEST	103
7.10.7	BUS TIE OPEN REQUEST	103
8	PROTECTIONS	104
8.1	ALARMS	104
8.2	LED INDICATORS	105
8.3	WARNING ALARMS	106
8.4	ELECTRICAL TRIP ALARMS	110
9	'RUNNING' CONFIGURATION EDITOR	114
9.1	ACCESSING THE 'RUNNING' CONFIGURATION EDITOR	114
9.2	EDITING A PARAMETER	115
9.3	EXITING THE 'RUNNING' CONFIGURATION EDITOR	115
9.4	'RUNNING' CONFIGURATION EDITOR PARAMETERS	115
9.5	ACTIVATING THE COMMISSIONING SCREENS	116
10	COMMISSIONING	117
10.1	BASIC CHECKS	117
10.2	METERING	118
10.2.1.1	CTS ON THE RIGHT PHASE	118
10.2.1.2	CTS IN THE RIGHT DIRECTION	118
10.3	COMMUNICATIONS	119
10.4	SEGMENTATION OF THE BUS	120
11	FAULT FINDING	121
11.1	STARTING	121
11.2	INSTRUMENTS	122
11.3	LOADING	122
11.4	COMMUNICATIONS	123
11.5	SYNCHRONISING & LOAD SHARING	124
11.6	MISCELLANEOUS	124
12	MAINTENANCE, SPARES, REPAIR AND SERVICING	125
12.1	PURCHASING ADDITIONAL CONNECTOR PLUGS FROM DSE	125
12.1.1	PACK OF PLUGS	125
12.1.2	INDIVIDUAL PLUGS	125
12.1.3	PURCHASING ADDITIONAL FIXING CLIPS FROM DSE	125
12.2	DSENET® EXPANSION MODULES	126
13	WARRANTY	127
14	DISPOSAL	127
14.1	WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)	127

1 INTRODUCTION

This document details the installation and operation requirements of the DSEG8680 module and is part of the DSE **GenSet**® 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*. DSE do not automatically inform on updates. Any future updates of this document are included on the DSE website at www.deepseaelectronics.com

The DSEG8680 series is designed to provide differing levels of functionality across a common platform. This allows the generator OEM greater flexibility in the choice of controller to use for a specific application.

Synchronising and Load Sharing features are included within the controller, along with the necessary protections for such a system.

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

The DSE8680 is an intelligent control module designed to control a generator bus-tie breaker. The control module features technology that automatically manages the synchronising and check-sync across the breaker using the DSE Advanced Multi-Set communications (AMSC) link when opening and closing the bus-tie breaker.

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

- *Text based LCD display*
- *True RMS Voltage*
- *Current and Power monitoring*
- *USB, RS485 and Ethernet Communications*
- *Fully configurable inputs for use as alarms or a range of different functions.*
- *Synchronising and load sharing with load demand start/stop (when operating as a loadswitch)*
- *Integral PLC to help provide customisation where required*
- *Data Logging*




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

Module access and critical operational sequences and timers for use by qualified engineers, can be protected by a security code. Selected parameters can be changed from the module's front panel using the *Running Editor*.

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

1.1 CLARIFICATION OF NOTATION

1.1.1 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
ADSL	Asymmetric Digital Subscriber Line. A technology for transmitting digital information over standard telephone lines.
AMSC	Advanced Multi-Set Communication
AVR	Automatic Voltage Regulator
BUS	BUS is a communication system that transfers data between components inside a computer, or between computers.
CAN	Controller Area Network. Vehicle standard to allow digital devices to communicate to one another.
DHCP	DHCP (Dynamic Host Configuration Protocol) is a protocol that provides quick, automatic, and central management for the distribution of IP addresses within a network.
DNS	Domain Name System is a collection of databases that translate hostnames to IP addresses.
DPF	Diesel Particulate Filter. A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas.
EMC	Electromagnetic compatibility is the ability of electrical equipment and systems to function acceptably in their electromagnetic environment
FRT	Fault Ride Through
GSM	Global System for Mobile communications. Cell phone technology used in most of the World.
HMI	Human Machine Interface. A device that provides a control and visualisation interface between a human and a process or machine.
IEEE	Institute of Electrical and Electronics Engineers
ISBN	International Standard Bibliographic Description
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MAC	Media Access Control Address. A MAC address is a hardware identification number that uniquely identifies each device on a network.
MSC	Multi-Set Communication
NAPT	Network Address and Port Translation
OEM	Original Equipment Manufacturer
PCI	Peripheral Component Interface
PIN	PIN number
PLC	Programmable Logic Controller. A programmable digital device used to create logic for a specific purpose.
RMS	Root Mean Square
ROCOF	Rate Of Change Of Frequency

Introduction

Term	Description
RTD	An RTD (Resistance Temperature Detector) is a sensor whose resistance changes as its temperature changes. The resistance increases as the temperature of the sensor increases.
SCADA	Supervisory Control And Data Acquisition. A system that operates with coded signals over communication channels to provide control and monitoring of remote equipment
SIM	Subscriber Identity Module. The small card supplied by the GSM/CDMA provider that is inserted into the cell phone, GSM modem or DSEGateway device to give GSM/GPRS connection.
SMS	Short Message Service. The text messaging service of mobile/cell phones.
SNMP	Simple Network Management Protocol. An international standard protocol for managing devices on IP networks.
TCP	TCP (Transmission Control Protocol) is a standard that defines how to establish and maintain a network conversation via which application programs can exchange data.
USB	Universal Serial Bus
WAN	Wide Area Network
WEEE	Waste Electrical and Electronic Equipment

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 obtained from the DSE website: www.deepseaelectronics.com or by contacting DSE technical support: support@deepseaelectronic.com and are intended as a 'quick start' guide only.

DSE Part	Description
053-032	DSE2548 LED Expansion Annunciator Installation Instructions
053-033	DSE2130 Input Expansion Installation Instructions
053-034	DSE2157 Output Expansion Installation Instructions
053-049	DSE9xxx Battery Charger Installation Instructions
053-125	DSE2131 Ratio-metric Input Expansion Installation Instructions
053-126	DSE2133 RTD/Thermocouple Input Expansion Installation Instructions
053-134	DSE2152 Ratio-metric Output Expansion Installation Instructions
053-147	DSE9460 & DSE9461 Battery Charger Installation Instructions
053-185	DSE9473 & DSE9483 Battery Charger Installation Instructions
053-254	DSEG8680 Installation Instructions

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
N/A	DSEGenComm (Modbus protocol for DSE controllers)
057-045	Guide to Synchronising and Load Sharing Part 1 (Usage of DSE Load Share Controllers in synchronisation / load sharing systems.)
057-046	Guide to Synchronising and Load Sharing Part 2 (Governor & AVR Interfacing)
057-047	Load Share System Design and Commissioning Guide
057-082	DSE2130 Input Expansion Operator Manual
057-083	DSE2157 Output Expansion Operator Manual
057-084	DSE2548 Annunciator Expansion Operator Manual
057-085	DSE9xxx Battery Charger Operator Manual
057-139	DSE2131 Ratio-metric Input Expansion Manual
057-140	DSE2133 RTD/Thermocouple Expansion Manual
057-141	DSE2152 Ratio-metric Output Expansion Manual
057-151	DSE Configuration Suite PC Software Installation & Operation Manual
057-176	DSE9460 & DSE9461 Battery Charger Operator Manual
057-220	Options for Communications with DSE Controllers
057-312	DSEAssistant PC Software Manual
057-314	Advanced PLC Programming Guide for DSE Controllers
057-326	DSEG8680 Configuration Suite PC Software Manual

2.1.1 TRAINING GUIDES

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


DSE Part	Description
056-001	Four Steps To Synchronising
056-005	Using CTs With DSE Products
056-006	Introduction to Comms
056-010	Over Current Protection
056-013	Load Demand Scheme
056-018	Negative Phase Sequence
056-019	Earth Fault Protection
056-020	Loss Of Excitation
056-021	Mains Decoupling
056-022	Switchgear Control
056-023	Adding New CAN Files
056-024	GSM Modem
056-026	kVA, kW, kvar and Power Factor
056-029	Smoke Limiting
056-030	Module PIN Codes
056-033	Synchronising Requirements
056-036	DSE Module Expansion
056-043	Sync Process
056-045	PLC as Load Demand Controller
056-047	Out of Sync and Failed To Close
056-051	Modbus Control
056-053	Recommended Modems
056-055	Alternate Configurations
056-057	SW1 & SW2
056-069	Firmware Update
056-072	Dead Bus Synchronising
056-075	Adding Language Files
056-076	Gencomm Alarms
056-079	Gencomm Status
056-080	MODBUS
056-081	Screen Heaters
056-082	Override Gencomm PLC Example
056-084	Synchronising & Load sharing
056-086	G59
056-091	Equipotential Earth Bonding
056-092	Best Practices for Wiring Restive Sensors
056-094	MSC Compatibility
056-095	Multi Set Controller Input Functions
056-097	USB Earth Loops and Isolation
056-099	Digital Output to Digital Input Connection
056-118	Configurable CAN
056-123	Simulation Injection Testing

2.1.2 THIRD PARTY DOCUMENTS

The following third-party documents are also referred to:

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

3 Bus Tie Controller Application Menu

 **NOTE:** The DSE module's USB port is inactive when the *Application page* is entered.

 **NOTE:** It is not possible to Firmware Update the module when the Application menu is entered.

 **NOTE:** Care must be taken when updating the module's firmware as this resets the configuration files for the Bus Tie Controller (BTC) application back to its factory defaults.

 **NOTE:** When a new software application is selected, the relevant software application's configuration file must be configured using the DSE Configuration Suite.

The DSEG8680 module contains a single Bus Tie Controller software application:

The application allows load switching and the option of load capacity requirements.

4 SPECIFICATION

4.1 OPERATING TEMPERATURE

Module	Specification
DSEG8680	-30 °C +70 °C (-22 °F +158 °F)
Display Heater Variant	-40 °C +70 °C (-40 °F +158 °F)

4.1.1 SCREEN HEATER OPERATION (WHEN FITTED)


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

4.2 REQUIREMENTS FOR UL

	WARNING! : More than one live circuit exists, refer to section 5.3 entitled <i>Typical Wiring Diagram</i> .
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Specification	Description
Screw Terminal Tightening Torque	4.5 lb-in (0.5 Nm)
Conductors	Terminals suitable for connection of conductor size 13 AWG to 20 AWG (0.5 mm ² to 2.5 mm ²). Conductor protection must be provided in accordance with NFPA 70, Article 240 Low voltage circuits (35 V or less) must be supplied from the engine starting battery or an isolated secondary circuit. The communication, sensor, and/or battery derived circuit conductors shall be separated and secured to maintain at least ¼" (6 mm) separation from the generator and mains connected circuit conductors unless all conductors are rated 600 V or greater.
Current Inputs	Must be connected through UL Listed or Recognized isolating current transformers with the secondary rating of 5 A max.
Communication Circuits	Must be connected to communication circuits of UL Listed equipment
DC Output Pilot Duty	0.5 A
Mounting	Suitable for flat surface mounting in Type 1 Enclosure Type rating with surrounding air temperature -22 °F to +122 °F (-30 °C to +50 °C) Suitable for pollution degree 3 environments when voltage sensing inputs do not exceed 300 V. When used to monitor voltages over 300 V device to be installed in an unventilated or filtered ventilation enclosure to maintain a pollution degree 2 environment.
Operating Temperature	-22 °F to +122 °F (-30 °C to +50 °C)

4.3 TERMINAL SPECIFICATION

Description	Specification	
Connection Type	Two-part connector. Male part fitted to module Female part supplied in module packing case - Screw terminal, rising clamp, no internal spring.	 <p>Example showing cable entry and screw terminals of a 10-way connector</p>
Minimum Cable Size	0.5 mm ² (AWG 24)	
Maximum Cable Size	2.5 mm ² (AWG 12)	
Tightening Torque	0.5 Nm (4.5 lb-in)	
Wire Strip Length	7 mm (9/32")	

4.4 POWER SUPPLY REQUIREMENTS

Description	Specification
Minimum Supply Voltage	5 V continuous
Cranking Dropouts	Able to survive 0 V for 100 ms providing the supply was at least greater than 5 V for 2 seconds before the dropout and recovers to 5 V afterwards.
Maximum Supply Voltage	35 V continuous (60 V protection)
Reverse Polarity Protection	-35 V continuous
Maximum Operating Current	530 mA at 12 V 280 mA at 24 V
Maximum Standby Current	320 mA at 12 V 120 mA at 24 V
Maximum Current When In Sleep Mode	140 mA at 12 V 75 mA at 24 V
Typical Power (Controller On, Heater Off)	3.8 W to 4.1 W
Typical Power (Controller On, Heater On)	6.8 W to 7.1 W

4.4.1 MODULE SUPPLY INSTRUMENTATION DISPLAY

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

4.5 VOLTAGE & FREQUENCY SENSING

Description	Specification
Measurement Type	True RMS conversion
Sample Rate	40 kHz
Harmonics	Up to 21 st or better
Input Impedance	450 k Ω phase to neutral
Phase To Neutral	15 V (minimum required for sensing frequency) to 415 V AC (absolute maximum) Suitable for 345 V AC nominal (± 20 % for under/overvoltage detection)
Phase To Phase	25 V (minimum required for sensing frequency) to 720 V AC (absolute maximum) Suitable for 600 V AC nominal (± 20 % for under/overvoltage detection)
Common Mode Offset From Earth	100 V AC (max)
Resolution	1 V AC phase to neutral 2 V AC phase to phase
Accuracy	± 1 % of full-scale phase to neutral ± 1 % of full-scale phase to phase
Minimum Frequency	3.5 Hz
Maximum Frequency	75.0 Hz
Frequency Resolution	0.1 Hz
Frequency Accuracy	± 0.05 Hz

4.6 CURRENT SENSING

Description	Specification
Measurement Type	True RMS conversion
Sample Rate	40 kHz
Harmonics	Up to 21 st or better
Nominal CT Secondary Rating	1 A and 5 A
Maximum Continuous Current	5 A
Overload Measurement	15 A
Absolute Maximum Overload	50 A for 0.2 second 30 A for 5 second
Burden	0.5 VA (0.02 Ω current shunts)
Common Mode Offset	70 V peak plant ground to CT common terminal under fault condition
Resolution	25 mA
Accuracy	± 1 % of Nominal (excluding CT error)

4.6.1 VA RATING OF THE CTS

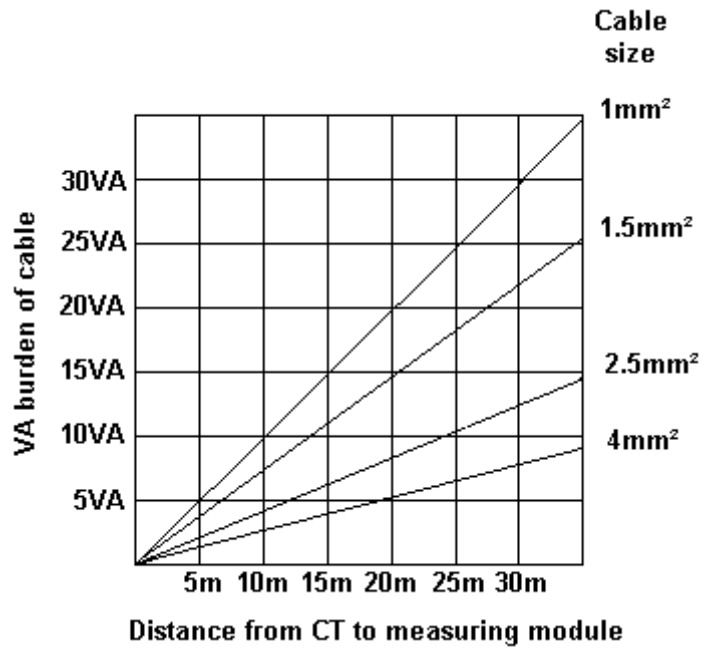
NOTE: Details for 4 mm² cables are shown for reference only. The connectors on the DSE modules are only suitable for cables up to 2.5 mm².

The VA burden of the module on the CTs is 0.5 VA. However, depending upon the type and length of cabling between the CTs and the module, CTs with a greater VA rating than the module are required.

The distance between the CTs and the measuring module should be estimated and cross-referenced against the chart opposite to find the VA burden of the cable itself.

Example:

If 1.5 mm² cable is used and the distance from the CT to the measuring module is 20 m, then the burden of the cable alone is approximately 15 VA. As the burden of the DSE controller is .5 VA, then a CT with a rating of at least 15 VA + 0.5 VA = 15.5 VA must

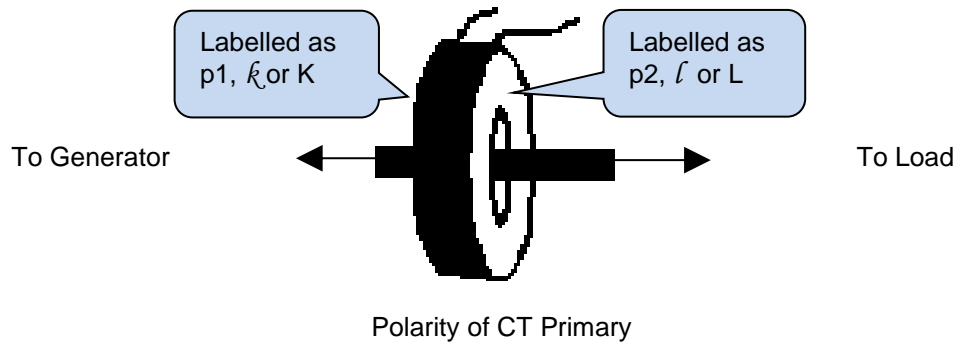


be used. 0.5 VA, then a CT with a rating of at least 15 VA + 0.5 VA = 15.5 VA must be used. If 2.5 mm² cables are used over the same distance of 20 m, then the burden of the cable on the CT is approximately 7 VA. CT's required in this instance is at least 7.5 VA (7 + 0.5).

4.6.2 CT POLARITY

NOTE: Take care to ensure correct polarity of the CT primary as shown above. If in doubt, check with the CT supplier.

Take care to ensure the correct polarity of the CTs otherwise the power flow direction across the bus tie breaker will be incorrect and will make power sharing and ramping malfunction. Take note that paper stick-on labels on CTs that show the orientation are often incorrectly placed on the CT. It is more reliable to use the labelling in the case moulding as an indicator to orientation (if available).



4.6.3 CT PHASING

Take particular care that the CTs are connected to the correct phases. For instance, ensure that the CT on phase 1 is connected to the terminal on the DSE module intended for connection to the CT for phase 1.

4.6.4 CT CLASS

Ensure the correct CT type is chosen. For instance, if the DSE module is providing over current protection, ensure the CT can measure the overload level required to protect against, and at the accuracy level required.

For instance, this may mean fitting a protection class CT to maintain high accuracy while the CT is measuring overload currents.

Conversely, if the DSE module is using the CT for instrumentation only (current protection is disabled or not fitted to the controller), then measurement class CTs can be used. Again, bear in mind the accuracy required. The DSE module is accurate to better than 1% of the full-scale current reading. To maintain this accuracy, fit a Class 0.5 or Class 1 CT.

Check with the CT manufacturer for further advice on selecting CTs.

4.7 INPUTS

4.7.1 DIGITAL INPUTS

Description	Specification
Number	12 configurable digital inputs
Arrangement	Contact between terminal and ground
Low Level Threshold	2.1 V minimum
High Level Threshold	6.6 V maximum
Maximum Input Voltage	+50 V DC with respect to plant supply negative
Minimum Input Voltage	-24 V DC with respect to plant supply negative
Contact Wetting Current	7 mA typical
Open Circuit Voltage	12 V typical

4.8 OUTPUTS

4.8.1 CONFIGURABLE VOLT-FREE RELAY OUTPUTS C & D


Description	Specification
Type	Normally used for load switching control Fully configurable volt-free relays. Output C normally closed and Output D normal open.
Rating	8 A resistive at 250 V AC

4.8.2 CONFIGURABLE DC OUTPUTS E, F, G, H, I, J, K, L

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

4.9 COMMUNICATION PORTS

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

Description	Specification
USB Slave Port	Type B USB 2.0 For connection to PC running DSE Configuration Suite Max distance 5 m (16 feet)
USB Host Port	Type A USB 2.0 Capability to add a maximum of 16 GB USB storage device for data recording only
1 x RS485 Serial Port	Isolated Data connection 2 wire + common Half Duplex Data direction control for Transmit (by s/w protocol) Max Baud Rate 115.2 kbaud subject to configuration External termination required (120 Ω) Max common mode offset 70 V (on board protection transorb) Max distance 1.2 km (¾ mile)
Ethernet	Auto detecting 10/100 Mbit Ethernet port.
AMSC (Advanced Multi Set Communication) and CAN Port	 NOTE: For additional length, the DSE124 CAN Extender is available. For more information, refer to DSE Publication: 057-116 DSE124 Operator Manual
	Standard implementation of 'Slow mode', up to 250 kbits/s Data connection 2 wire + common Isolated External termination required (120 Ω) Max common mode offset 70 V (on board protection transorb) Max distance 250 m using Belden 9841 Cable or equivalent AMSC 1, Redundant AMSC 2
DSENet® (Expansion Comms) Port	Non-isolated Data connection 2 wire + common Half Duplex Data direction control for Transmit (by s/w protocol) Baud Rate of 115 kbaud Internal termination fitted (120 Ω) Max common mode offset ±5 V Max distance 1.2 km (¾ mile)

4.10 COMMUNICATION PORT USAGE

4.10.1 USB SERVER PORT (PC CONFIGURATION)

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

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

NOTE: For further details of module configuration, refer to DSE Publication: 057-326 *DSEG8680 Configuration Suite PC Software Manual*.

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

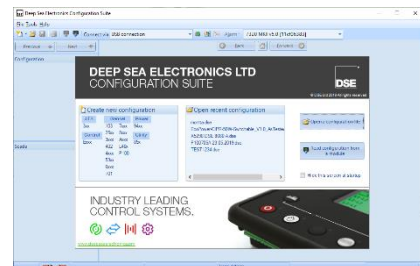
Additionally, the various operating parameters (such as coolant temperature, oil pressure, etc.) of the engine are available to be viewed or changed.

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

DSEG8680 Controller



DSE Configuration Suite PC Software
(Available from www.deepseaelectronics.com).



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

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



4.10.2 USB HOST PORT (DATA LOGGING)

USB Type A connection for an external USB storage device of maximum 16 GB for instrumentation data logging. A 16 GB external USB storage device allows for 33 weeks, 4 days and 20 minutes' worth of data, assuming 20 parameters were configured to be logged, each with a *Log Interval* of 1 second.

4.10.3 RS485 PORT

NOTE: When the *RS485 Port Usage* is configured to “*PLC Comms*”, all other modules’ *Port Usage* must be configured to “*Gencomm*”. This allows the module configured as “*PLC Comms*” to act as a master and read from the module(s) configured to “*Gencomm*”. For details on how to configure the *PLC Editor* to read via its RS485, refer to DSE Publication: *057-314 Advanced PLC Software Manual* which is found on our website: www.deepseaelectronics.com

NOTE: For a single module to PC connection and distances up to 5 m (16 feet) the USB connection method is more suitable and provides for a lower cost alternative to RS485 (which is more suited to longer distance connections).

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

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

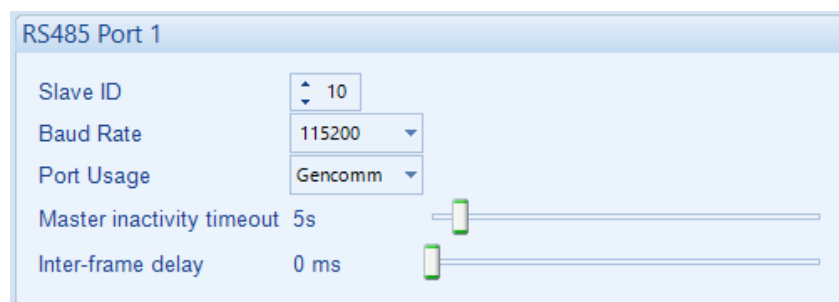
RS485 is used for point-to-point cable connection of more than one device (maximum 32 devices) and allows for connection to PCs, PLCs, and Building Management Systems (to name just a few devices).

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

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

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

The DSEG8680 has one RS485 ports which are configurable using the Configuration Suite Software. An example of configuring the RS485 connection using the DSE Configuration Suite Software is shown below:



NOTE: For further details of module configuration, refer to DSE Publication: *057-326 DSEG8680 Configuration Suite Software Manual*.

4.10.3.1 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 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

4.10.4 ETHERNET PORT

 **NOTE:** For further details of module configuration, refer to DSE Publication: *057-326 DSEG8680 Configuration Suite Software Manual*.

 **NOTE:** For a single module to PC connection and distances up to 5 m (16 feet) the USB connection method is more suitable and provides for a lower cost alternative to Ethernet (which is more suited to longer distance connections).

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

Ethernet is used for point-to-point cable connection of more than one device and allows for connection to PCs, PLCs, Building Management Systems and SNMP Managers (to name just a few devices) or to other DSE modules using the *PLC Editor*.


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

4.10.4.1 MODBUS TCP

The Ethernet port on the controller supports the Modbus TCP protocol and is for connection for up to five Modbus master devices. The various operating parameters (such as coolant temperature, oil pressure, etc.) of the remote engine are viewed or changed.

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

4.10.4.2 ETHERNET PORT USED FOR PLC COMMUNICATION

 **NOTE:** For details on how to configure the *PLC Editor* to read through the TCP/IP, refer to DSE Publication: *057-314 Advanced PLC Software Manual* which is found on our website: www.deepseaelectronics.com

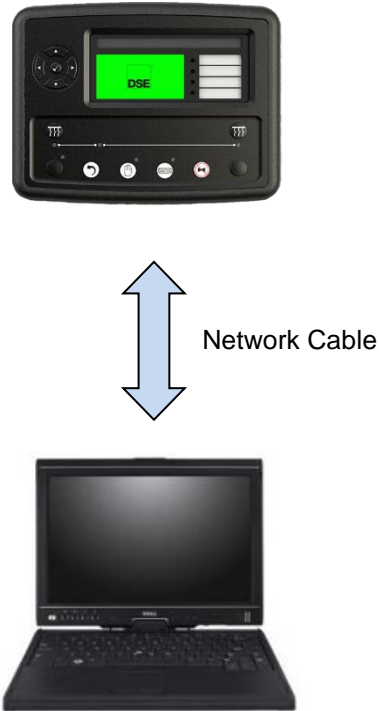
The DSE module can communicate with other DSE modules using the Ethernet Port, this is configured from the *PLC Editor* to allow it read specific GenComm registers from other modules over the TCP/IP to perform certain tasks in the PLC.

When the DSE module is configured to communicate with the other modules via the TCP/IP it becomes a Modbus TCP Master, hence care must be taken on the slave TCP modules not to exceed their total supported five Modbus TCP masters.

4.10.4.3 DIRECT PC CONNECTION

Requirements

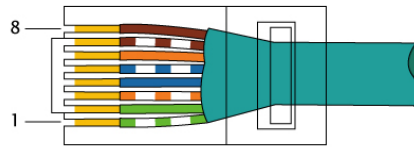
- Ethernet cable (see below)
- PC with Ethernet port



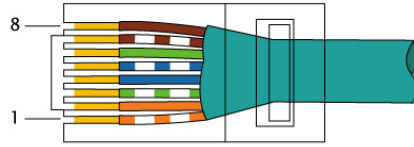
Ethernet Cable Wiring Detail

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

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



EIA/TIA-568A

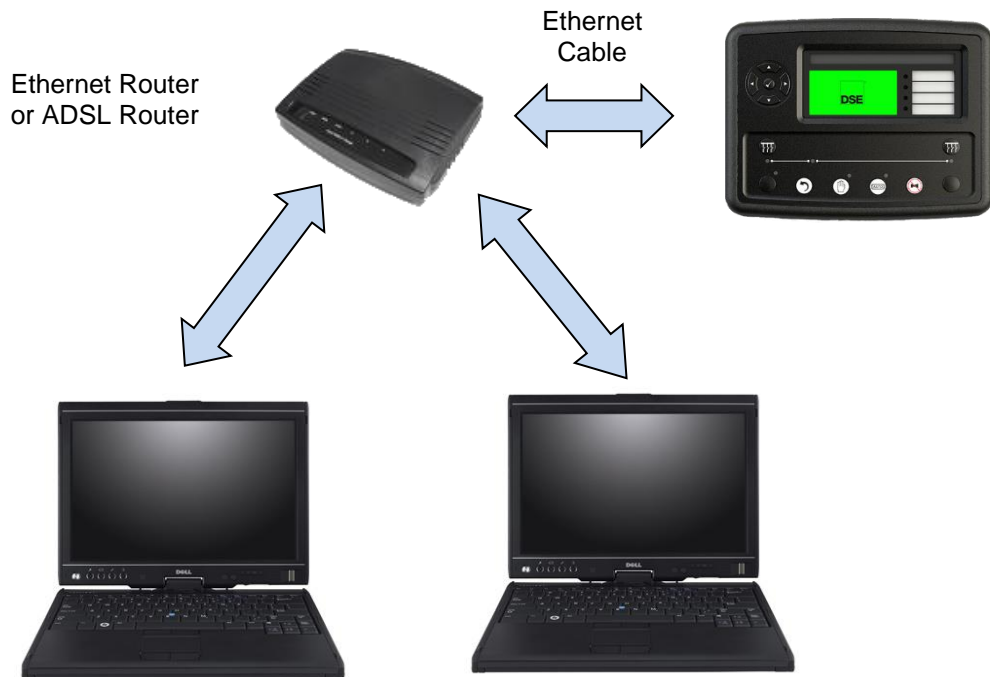


EIA/TIA-568B

4.10.4.4 CONNECTION TO BASIC ETHERNET

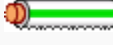
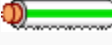














Requirements

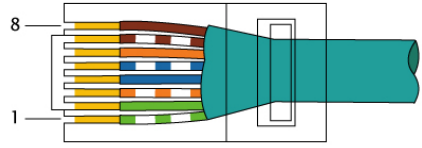
- Ethernet cable (see below)
- Working Ethernet (company or home network)
- PC with Ethernet port



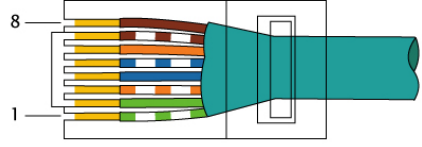
Ethernet Cable Wiring Detail

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

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



EIA/TIA-568A

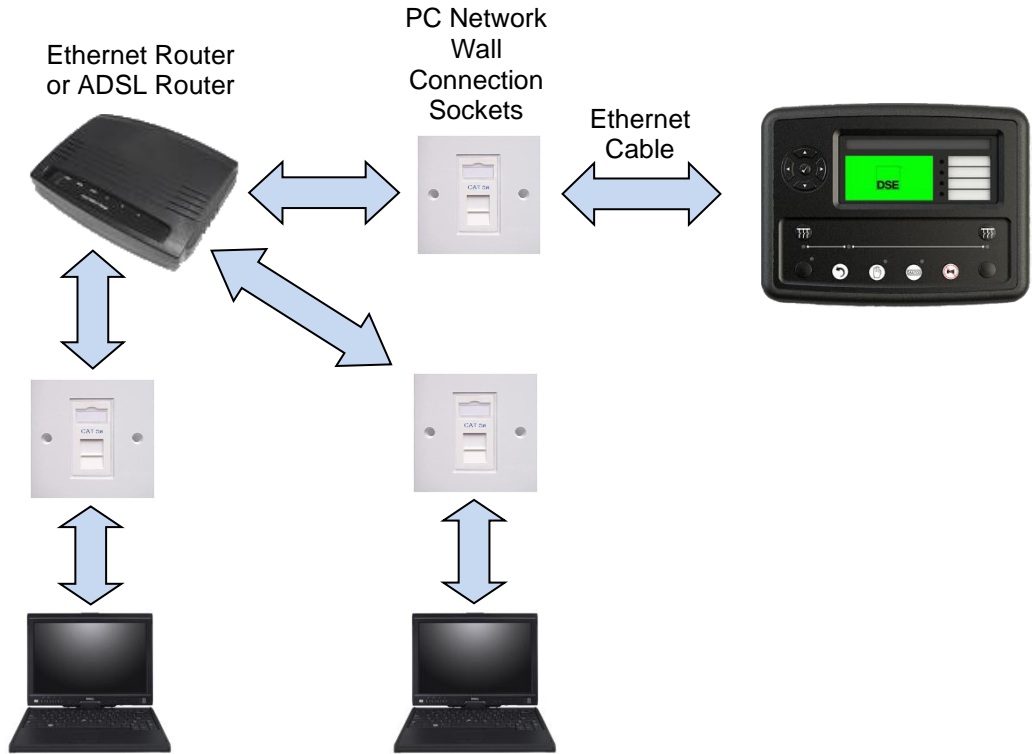


EIA/TIA-568A

4.10.4.5 CONNECTION TO COMPANY ETHERNET INFRASTRUCTURE

Requirements

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



Ethernet Cable Wiring Detail

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

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

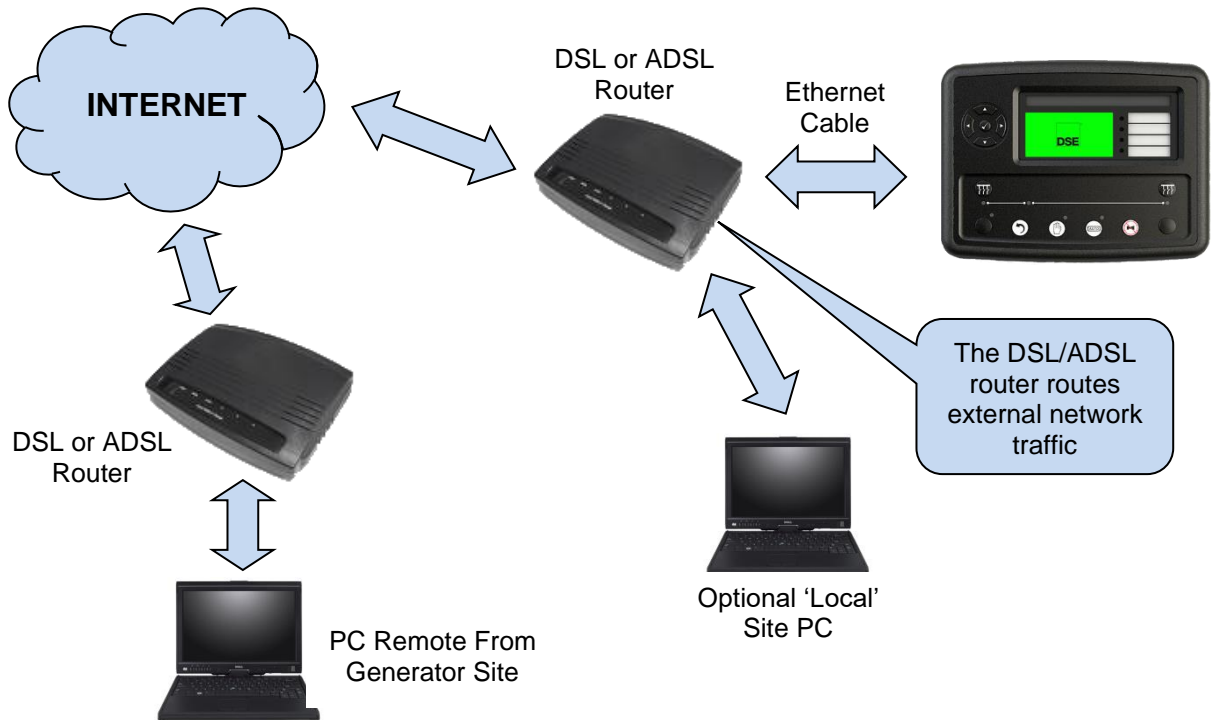
EIA/TIA-568A

EIA/TIA-568A

4.10.4.6 CONNECTION TO THE INTERNET

Requirements

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



Ethernet Cable Wiring Detail


NOTE: An Ethernet Patch Cable can use for this type of connection and can be purchased from any PC or IT store.

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

EIA/TIA-568A

EIA/TIA-568A

4.10.4.7 FIREWALL CONFIGURATION FOR INTERNET ACCESS

 **NOTE: For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite Software Manual.**

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

The module makes its data available over Modbus TCP or SNMP V2c and as such communicates over the Ethernet using a Port configured via the DSE Configuration Suite software.

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

It is also important to note that if the port assigned is already in use on the LAN, the module cannot be used, and another port must be used.

Outgoing Firewall Rule

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

Incoming Traffic (Virtual Server)

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

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

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

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

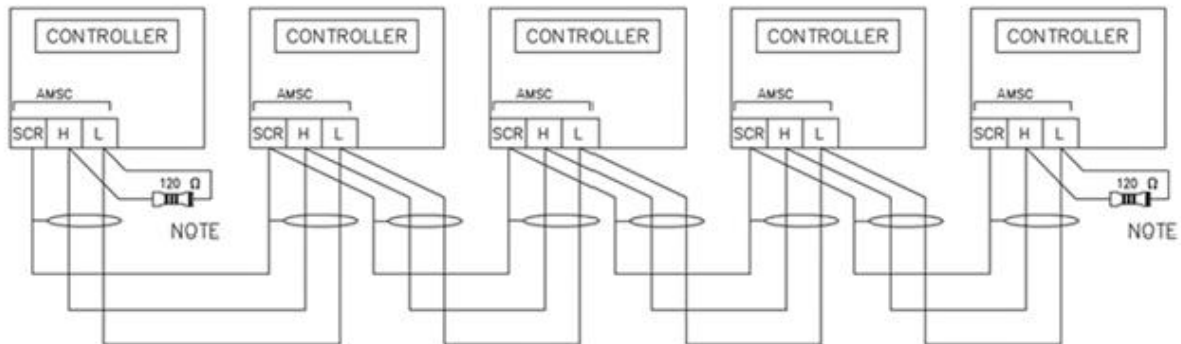
4.10.5 AMSC (ADVANCED MULTI-SET COMMUNICATIONS) LINK

NOTE: A termination resistor **MUST** be fitted to the first and last unit on the AMSC link. For connection details, refer to section 5.3.4 entitled *Typical Arrangement of AMSC Link*.

NOTE: DSE recommend Belden 9841 (or equivalent) cable for AMSC communication. This is rated to a maximum cable length of 250 m. DSE Stock Belden 9841 cable, DSE Part Number: **016-030**.

The AMSC link is the interconnection cable between all DSE synchronising controllers and must not be connected to any device other than DSE equipment designed for connection to the AMSC link.

Description	Specification
Cable Type	Two core screened and shielded twisted pair
Cable Characteristics	120 Ω, Low capacitance
Recommended Cable	Belden 9841, Belden 9271
Maximum Cable Length	<p>NOTE: For additional length, the DSE124 CAN & AMSC Extender is available. For more information, refer to DSE Publication: 057-116 DSE124 Operator Manual</p> <p>250 m (273 yards) when using Belden 9841 or direct equivalent. 125 m (136 yards) when using Belden 9271 or direct equivalent.</p>
AMSC Topology	“Daisy Chain” Bus with no stubs (spurs)
AMSC Termination	120 Ω. Must be fitted externally to the first and last module.
Maximum DSEG8680 Modules	The maximum number of DSEG8680 modules on an AMSC link is 64.



NOTE
A 120 OHM TERMINATION RESISTOR MUST BE FITTED
TO THE FIRST AND LAST UNIT ON THE AMSC LINK

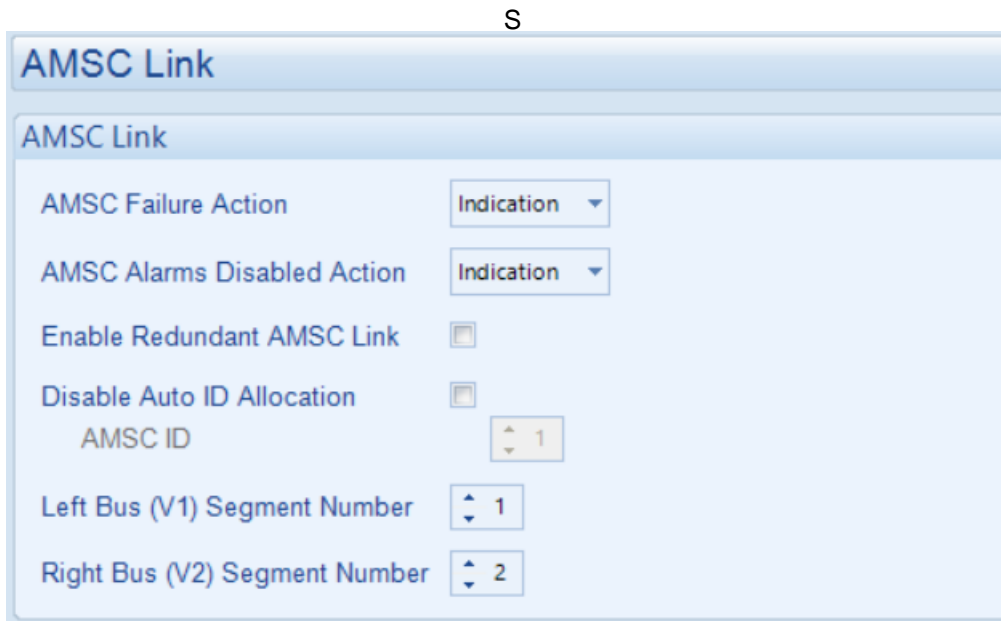
4.10.6 REDUNDANT AMSC LINK

NOTE: The redundant AMSC link connectivity is only available in DSEG8xxx modules. Contact DSE technical support: support@deepseaelectronics.com for more information.

NOTE: A termination resistor **MUST** be fitted to the first and last unit on the AMSC link. For connection details, refer to section 5.3.4 entitled *Typical Arrangement of AMSC Link*.

NOTE: DSE recommend Belden 9841 (or equivalent) cable for AMSC communication. This is rated to a maximum cable length of 250 m. DSE Stock Belden 9841 cable, DSE Part Number: 016-030.

The AMSC link is the interconnection cable between all DSE synchronising controllers and must not be connected to any device other than DSE equipment designed for connection to the AMSC link. Upon the main AMSC link failing for any reason, the user can configure the DSE8xxx MKII modules to revert the Redundant AMSC Link connection using the CAN Port connection. An example of configuring the Redundant AMSC Link connection the DSE Configuration Suite Software is shown below:

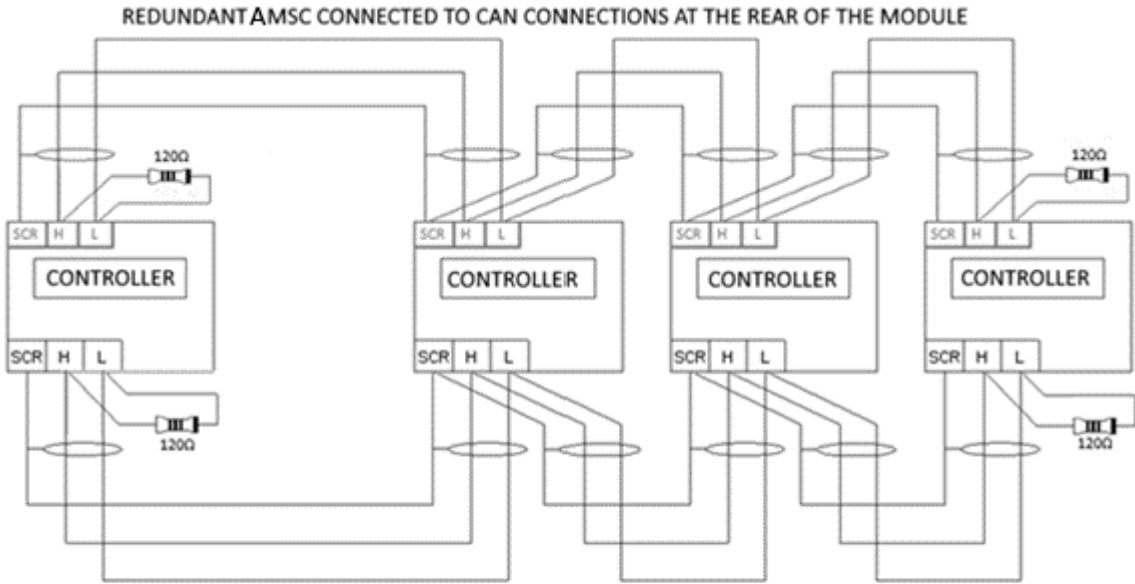


Description	Specification
Cable Type	Two core screened and shielded twisted pair
Cable Characteristics	120 Ω impedance Low capacitance
Recommended Cable	Belden 9841 Belden 9271
Maximum Cable Length	<p>NOTE: For additional length, the DSE124 CAN & AMSC Extender is available. For more information, refer to DSE Publication: <i>057-116 DSE124 Operator Manual</i></p> <p>250 m (273 yards) when using Belden 9841 or direct equivalent. 125 m (136 yards) when using Belden 9271 or direct equivalent.</p>

Continued Overleaf...

Specification

Description	Specification
Redundant AMSC Topology	"Daisy Chain" Bus with no stubs (spurs)
Redundant AMSC Termination	120 Ω. Must be fitted externally to the first and last module.
Maximum DSEG8680 Modules	<ul style="list-style-type: none"> The maximum number of DSEG8680 modules on an AMSC link is 64.



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

4.10.7 DSENET® (EXPANSION MODULES)

NOTE: For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.

NOTE: As a termination resistor is internally fitted to the controller, the controller must be the 'first' unit on the DSENet® link. A termination resistor **MUST** be fitted to the 'last' unit on the DSENet® link. For connection details, refer to section 5.3.3 entitled *Typical Arrangement of DSENet®*.

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

DSENet® is the interconnection cable between the host controller and the expansion module(s) and must not be connected to any device other than DSE equipment designed for connection to the DSENet®

Description	Specification
Cable Type	Two core screened and shielded twisted pair
Cable Characteristics	120 Ω Low capacitance
Recommended Cable	Belden 9841 Belden 9271
Maximum Cable Length	1200 m (¾ mile) when using Belden 9841 or direct equivalent. 600 m (656 yards) when using Belden 9271 or direct equivalent.
DSENet® Topology	"Daisy Chain" Bus with no stubs (spurs)
DSENet® Termination	120 Ω. Fitted internally to host controller. Must be fitted externally to the 'last' expansion module.
Maximum Expansion Modules	<p>NOTE: Only supported DSE Intelligent Battery Chargers may be connected to the DSENet®. Contact DSE Technical Support for further information.</p> <p>Total 20 devices made up of DSE2130 (up to 4), DSE2131 (up to 4), DSE2133 (up to 4), DSE2152 (up to 4), DSE2157 (up to 10), DSE2548 (up to 10) and DSE Intelligent Battery Chargers (up to 4)</p> <p>This gives the possibility of:</p> <ul style="list-style-type: none"> • Maximum 32 additional 0-10 V or 4-20 mA outputs (DSE2152) • Maximum 80 additional relay outputs (DSE2157) • Maximum 80 additional LED indicators (DSE2548) • Maximum 24 additional RTD or thermocouple inputs (DSE2133). • Maximum 32 additional inputs (Can be configured as either digital, or resistive when using DSE2130) • Maximum 40 additional flexible inputs (All can be configured as either digital, resistive, 0-10 V or 4-20 mA when using DSE2131) • Maximum 4 DSE Intelligent Battery Chargers.


4.11 SOUNDER

The module features an internal sounder to draw attention to warning, electrical trip, and shutdown alarms.

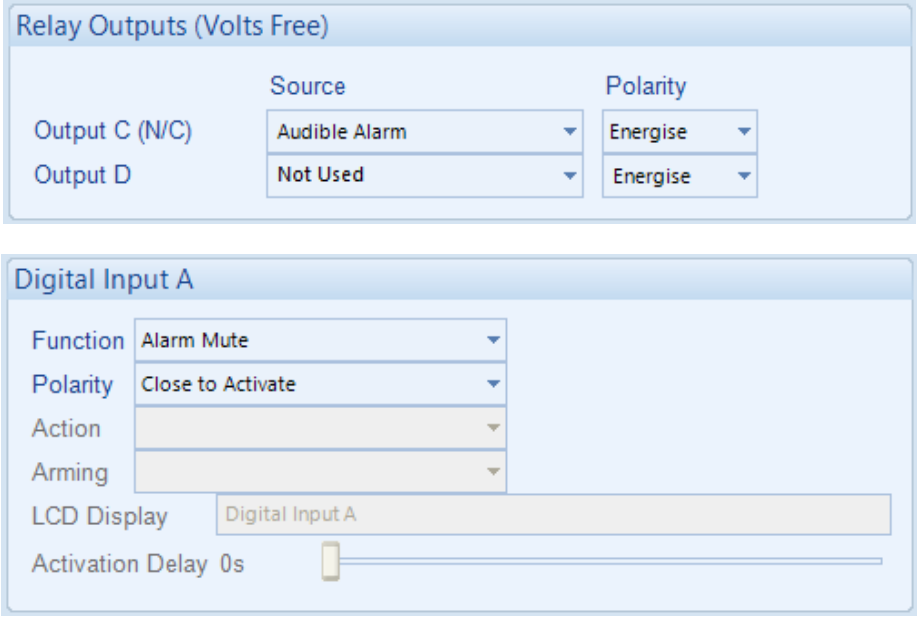
Description	Specification
Sounder Level	64 db at 1m

4.11.1 ADDING AN EXTERNAL SOUNDER

If an external alarm or indicator is required, this can be achieved by using the DSE Configuration Suite PC software to configure an auxiliary output for *Audible Alarm*, and by configuring an auxiliary input for *Alarm Mute* (if required).

The audible alarm output activates and de-activates at the same time as the module's internal sounder. The Alarm mute input and internal **Lamp Test / Alarm Mute**  button activate 'in parallel' with each other. Either signal mutes both the internal sounder and audible alarm output.

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



The screenshot displays two configuration panels from the DSE Configuration Suite software. The top panel, titled "Relay Outputs (Volts Free)", shows two outputs: "Output C (N/C)" and "Output D". For "Output C (N/C)", the "Source" is set to "Audible Alarm" and the "Polarity" is set to "Energise". For "Output D", the "Source" is set to "Not Used" and the "Polarity" is set to "Energise". The bottom panel, titled "Digital Input A", shows the "Function" set to "Alarm Mute", "Polarity" set to "Close to Activate", and "Action" and "Arming" set to empty dropdown menus. Below these settings, the "LCD Display" is set to "Digital Input A" and the "Activation Delay" is set to "0s".

4.12 DIMENSIONS AND MOUNTING

4.12.1 DIMENSIONS

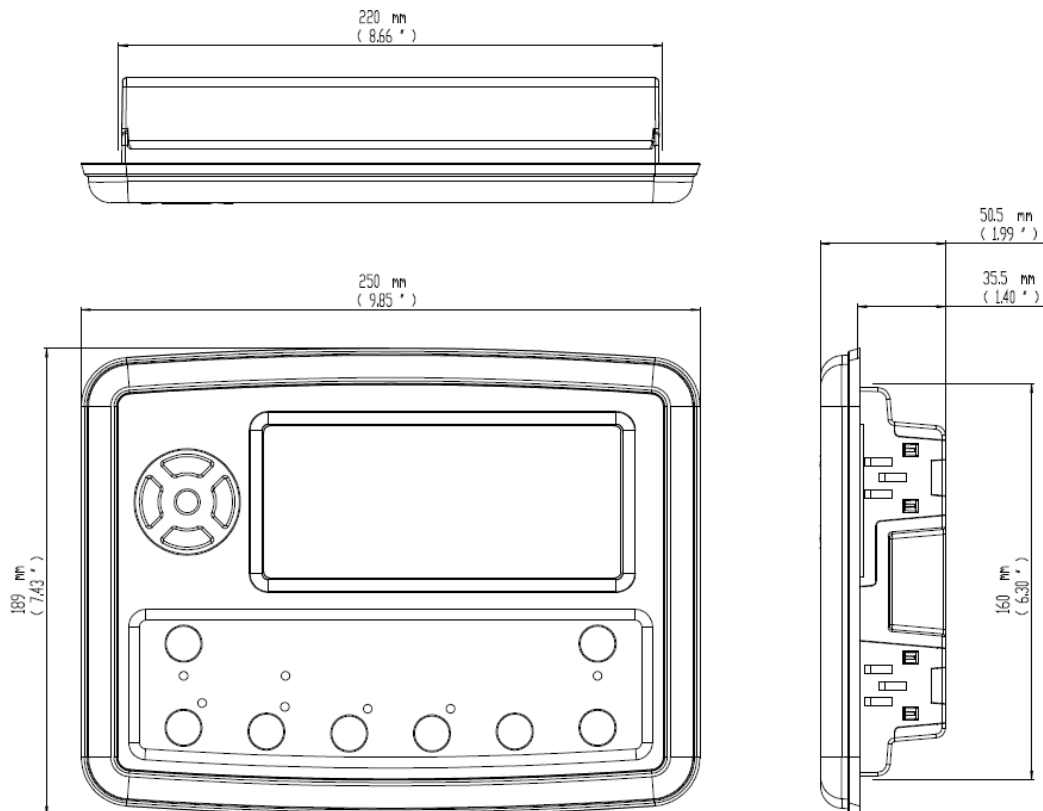
250 mm x 189 mm x 50.5 mm
(9.85" x 7.43" x 1.99")

4.12.2 PANEL CUTOUT

220 mm x 160 mm
(8.66" x 6.30")

4.12.3 WEIGHT

0.76 kg
(1.67 lb)

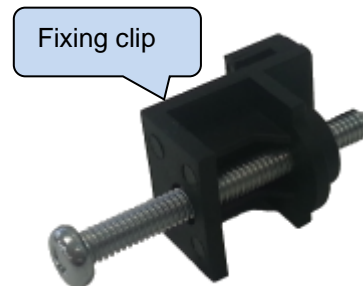
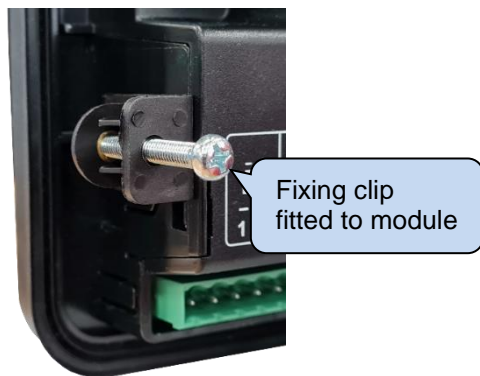


4.12.4 FIXING CLIPS

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

The module is held into the panel fascia using the supplied fixing clips:

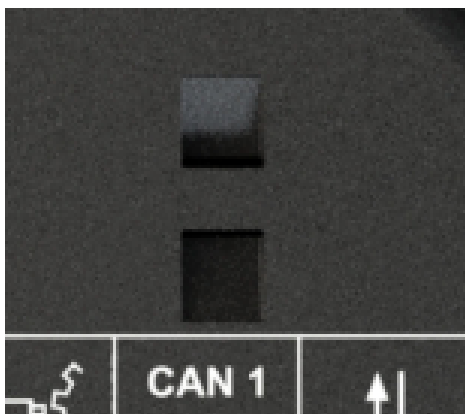
- Withdraw the fixing clip screw (turn anticlockwise) until only the pointed end is protruding from the clip.
- Insert the three 'prongs' of the fixing clip into the slots in the side of the module case.
- Pull the fixing clip backwards (towards the back of the module) ensuring all three prongs of the clip are inside their allotted slots.
- Turn the fixing clip screws clockwise until they contact the panel fascia.
- Turn the screw a quarter of a turn to secure the module into the panel fascia. Care must be taken not to over tighten the fixing clip screws.



4.12.4.1 CABLE TIE FIXING POINTS

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

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



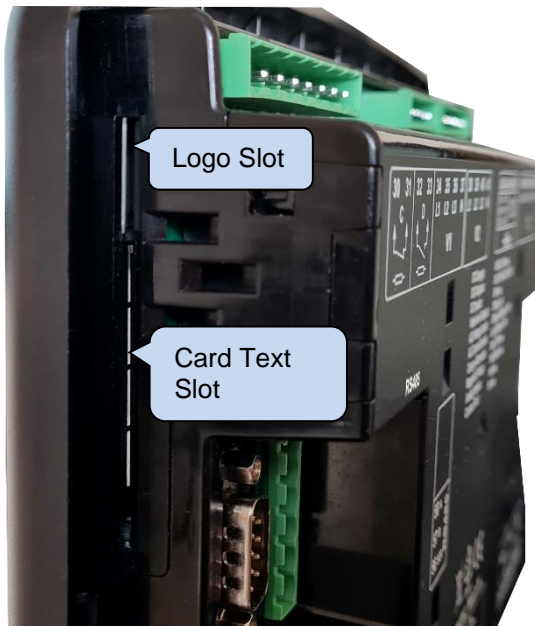
Cable Tie Fixing Point



With Cable And Tie In Place

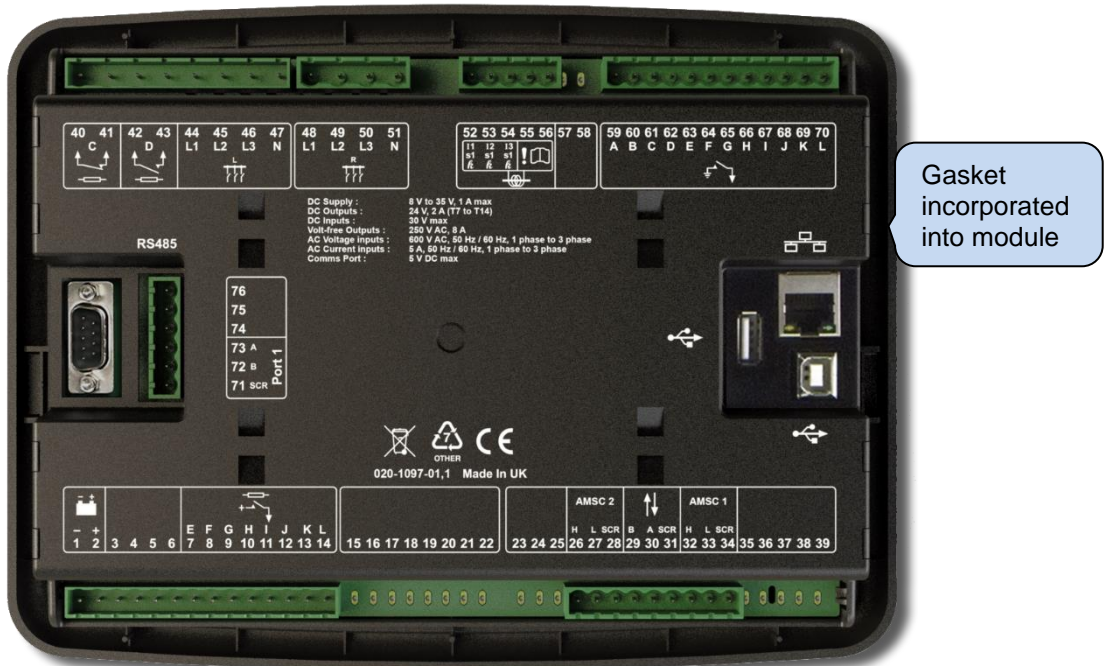
4.12.5 CARD TEXT & LOGO INSERT

The module has two slots available for Logo Designs and Card Text for use with the LED indicators.



4.12.6 SEALING GASKET

The gasket provides improved sealing between module and the panel fascia. The gasket is incorporated into the module as shown below. Ensure correct fitment to the panel fascia to maintain the integrity of the seal.



4.13 APPLICABLE STANDARDS

Standard	Description
BS EN 60068-2-1 (Minimum temperature)	-30 °C (-22 °F)
BS EN 60068-2-2 (Maximum temperature)	+70 °C (158 °F)
BS EN 60068-2-6 (Vibration)	Ten sweeps in each of three major axes 5 Hz to 8 Hz at ± 7.5 mm 8 Hz to 500 Hz at 2 gn
BS EN 60068-2-27 (Shock)	Three shocks in each of three major axes 15 gn in 11 ms
BS EN 60068-2-30 (Damp heat cyclic)	20°C to 55 °C at 95% relative humidity for 48 hours
BS EN 60068-2-78 (Damp heat static)	40 °C at 95% relative humidity for 48 hours
BS EN 60950 (Electrical safety)	Safety of information technology equipment, including electrical business equipment
BS EN 61000-6-2 (Electro-magnetic Compatibility)	EMC Generic Immunity Standard (Industrial)
BS EN 61000-6-4 (Electro-magnetic Compatibility)	EMC Generic Emission Standard (Industrial)
BS EN 60529 (Degrees of protection provided by enclosures)	IP65 (front of module when installed into the control panel with the optional sealing gasket) IP42 (front of module when installed into the control panel WITHOUT being sealed to the panel)
UL508 NEMA rating (Approximate)	12 (Front of module when installed into the control panel with the optional sealing gasket). 2 (Front of module when installed into the control panel WITHOUT being sealed to the panel)
IEEE C37.2 (Standard Electrical Power System Device Function Numbers and Contact Designations)	Under the scope of IEEE 37.2, function numbers can also be used to represent functions in microprocessor devices and software programs. The controller is device number 11L-8000 (Multifunction device protecting Line (generator) –module). As the module is configurable by the generator OEM, the functions covered by the module vary. Depending on module configuration, the device numbers included within the module could be: 2 – Time delay starting or closing relay 3 – Checking or interlocking relay 5 – Stopping device 6 – Starting circuit controller 8 – Control power disconnecting device 10 – Unit sequence switch 11 – Multifunction device 15 – Speed or frequency matching device. 25 – Synchronising or synchronism check relay

Continued over the page...

Specification

Standard	Description
IEEE C37.2 (Standard Electrical Power System Device Function Numbers and Contact Designations)	Continued... 26 – Apparatus thermal device 27AC – AC undervoltage relay 27DC – DC undervoltage relay 29 – Isolating contactor or switch 30 – Annunciator relay 37 – Undercurrent or underpower relay (USING INTERNAL PLC EDITOR) 42 – Running circuit controller 44 – Unit sequence relay 46 – Reverse-phase or phase-balance current relay 48 – Incomplete sequence relay 50 – Instantaneous overcurrent relay 51 – AC time overcurrent relay 52 – AC circuit controller 55 – Power factor relay (USING INTERNAL PLC EDITOR) 59AC – AC overvoltage relay 59DC – DC overvoltage relay 62 – Time delay stopping or opening relay 71 – Level switch 74 – Alarm relay 78 – Phase-angle measuring relay 79 – Reclosing relay (USING INTERNAL PLC EDITOR) 81 – Frequency relay 83 – Automatic selective control or transfer relay 86 – Lockout relay

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

Specification


4.13.1 ENCLOSURE CLASSIFICATIONS

4.13.1.1 IP CLASSIFICATIONS

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

IP65 (Front of module when module is installed into the control panel).	
First Digit	Second Digit
Protection against contact and ingress of solid objects	Protection against ingress of water
0 No protection	0 No protection
1 Protected against ingress solid objects with a diameter of more than 50 mm. No protection against deliberate access, e.g., with a hand, but large surfaces of the body are prevented from approach.	1 Protection against dripping water falling vertically. No harmful effect must be produced (vertically falling drops).
2 Protected against penetration by solid objects with a diameter of more than 12 mm. Fingers or similar objects prevented from approach.	2 Protection against dripping water falling vertically. There must be no harmful effect when the equipment (enclosure) is tilted at an angle up to 15° from its normal position (drops falling at an angle).
3 Protected against ingress of solid objects with a diameter of more than 2.5 mm. Tools, wires etc. with a thickness of more than 2.5 mm are prevented from approach.	3 Protection against water falling at any angle up to 60° from the vertical. There must be no harmful effect (spray water).
4 Protected against ingress of solid objects with a diameter of more than 1 mm. Tools, wires etc. with a thickness of more than 1 mm are prevented from approach.	4 Protection against water splashed against the equipment (enclosure) from any direction. There must be no harmful effect (splashing water).
5 Protected against harmful dust deposits. Ingress of dust is not totally prevented but the dust must not enter in sufficient quantity to interface with satisfactory operation of the equipment. Complete protection against contact.	5 Protection against water projected from a nozzle against the equipment (enclosure) from any direction. There must be no harmful effect (water jet).
6 Protection against ingress of dust (dust tight). Complete protection against contact.	6 Protection against heavy seas or powerful water jets. Water must not enter the equipment (enclosure) in harmful quantities (splashing over).

4.13.1.2 NEMA CLASSIFICATIONS

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

12 (Front of module when module is installed into the control panel).	
1	Provides a degree of protection against contact with the enclosure equipment and against a limited amount of falling dirt.
IP30	
2	Provides a degree of protection against limited amounts of falling water and dirt.
IP31	
3	Provides a degree of protection against windblown dust, rain, and sleet; undamaged by the formation of ice on the enclosure.
IP64	
3R	Provides a degree of protection against rain and sleet; undamaged by the formation of ice on the enclosure.
IP32	
4 (X)	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).
IP66	
12/12K	Provides a degree of protection against dust, falling dirt and dripping noncorrosive liquids.
IP65	
13	Provides a degree of protection against dust and spraying of water, oil, and noncorrosive coolants.
IP65	

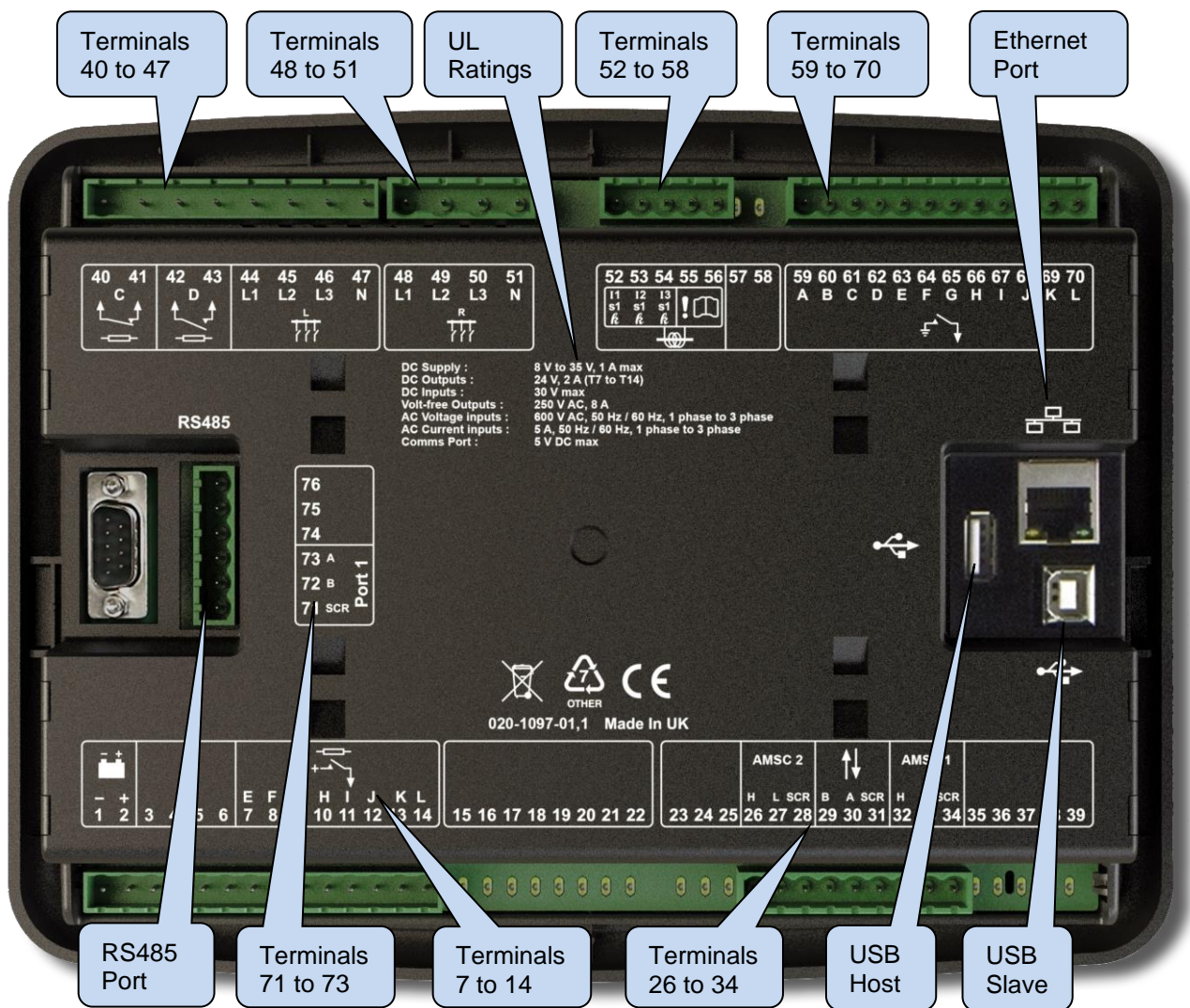
5 INSTALLATION

The module is designed to be mounted on the panel fascia. For dimension and mounting details, see the section 4.12 entitled *Dimension and Mounting*.

5.1 USER CONNECTIONS


NOTE: Availability of some terminals depends upon module version. Full details are given in the section 4.3 entitled *Terminal Specification*.

To aid user connection, icons are used on the rear of the module to help identify terminal functions. An example of this is shown below.





5.2 CONNECTION DESCRIPTIONS

5.2.1 DC SUPPLY & DC OUTPUTS

 **NOTE:** When the module is configured for operation with an electronic engine, *Fuel* and *Start* output requirements may be different. For further details on connection to electronic engines, refer to DSE Publication: *057-004 Electronic Engines And DSE Wiring*

 **NOTE:** For further details of module configuration, refer to DSE Publication: *057-326 DSEG8680 Configuration Suite PC Software Manual.*

	Pin No	Description	Cable Size	Notes
	1	DC Plant Supply Input (Negative)	2.5 mm ² AWG 13	Connect to ground where applicable.
	2	DC Plant Supply Input (Positive)	2.5 mm ² AWG 13	Supplies the module and DC Outputs E, F, G, H, I & J
	3	Not Connected		
	4	Not Connected		
	5	Not Connected		
	6	Not Connected		
	7	DC Output E	1.0 mm ² AWG 18	Plant Supply Positive from terminal 2. 2 A DC rated.
	8	DC Output F	1.0 mm ² AWG 18	Plant Supply Positive from terminal 2. 2 A DC rated.
	9	DC Output G	1.0 mm ² AWG 18	Plant Supply Positive from terminal 2. 2 A DC rated.
	10	DC Output H	1.0 mm ² AWG 18	Plant Supply Positive from terminal 2. 2 A DC rated.
	11	DC Output I	1.0 mm ² AWG 18	Plant Supply Positive from terminal 2. 2 A DC rated.
	12	DC Output J	1.0 mm ² AWG 18	Plant Supply Positive from terminal 2. 2 A DC rated.
	13	DC Output K	1.0 mm ² AWG 18	Plant Supply Positive from terminal 2. 2 A DC rated.
	14	DC Output L	1.0 mm ² AWG 18	Plant Supply Positive from terminal 2. 2 A DC rated.
	15	Not Connected		
	16	Not Connected		
	17	Not Connected		
	18	Not Connected		
	19	Not Connected		
	20	Not Connected		
	21	Not Connected		
	22	Not Connected		

5.2.2 AMSC & DSENET®

NOTE: For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.




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

NOTE: As a termination resistor is internally fitted to the controller, the controller must be the 'first' unit on the DSENet® link. A termination resistor **MUST** be fitted to the 'last' unit on the DSENet® link. For connection details, refer to section 5.3.3 entitled *Typical Arrangement of DSENet®*.

	Pin No	Description	Cable Size	Notes
	23	Not Connected		
	24	Not Connected		
	25	Not Connected		
Redundant AMSC 2	26	CAN Port H	0.5 mm ² AWG 20	Use only 120 Ω CAN or RS485 approved cable
	27	CAN Port L	0.5 mm ² AWG 20	Use only 120 Ω CAN or RS485 approved cable
	28	CAN Port Screen	Shield	Use only 120 Ω CAN or RS485 approved cable
↑↓	29	DSENet® Expansion B	0.5 mm ² AWG 20	Use only 120 Ω CAN or RS485 approved cable
	30	DSENet® Expansion A	0.5 mm ² AWG 20	Use only 120 Ω CAN or RS485 approved cable
	31	DSENet® Expansion Screen	Shield	Use only 120 Ω CAN or RS485 approved cable
AMSC 1	32	CAN Port H	0.5 mm ² AWG 20	Use only 120 Ω CAN or RS485 approved cable
	33	CAN Port L	0.5 mm ² AWG 20	Use only 120 Ω CAN or RS485 approved cable
	34	CAN Port Screen	Shield	Use only 120 Ω CAN or RS485 approved cable
	35	Not Connected		
	36	Not Connected		
	37	Not Connected		
	38	Not Connected		
	39	Not Connected		


5.2.3 LOAD SWITCHING AND BUS 1 SENSING (L)

NOTE: The below table describes connections to a three phase, four wire supply. For alternative wiring topologies, see the section 5.4 entitled *Alternate Topology Wiring Diagrams*.


	Pin No	Description	Cable Size	Notes
	40	Normally Closed Volt-Free Relay Output C	1.0mm ² AWG 18	Normally configured to control load switching device
	41		1.0mm ² AWG 18	
	42	Normally Open Volt-Free Relay Output D	1.0mm ² AWG 18	Normally configured to control load switching device
	43		1.0mm ² AWG 18	
	44	Bus L1 (R) Voltage Sensing	1.0 mm ² AWG 18	Connect to Bus L1 (U) output (AC) (Recommend 2 A fuse)
	45	Bus L2 (S) Voltage Sensing	1.0 mm ² AWG 18	Connect to Bus L2 (V) output (AC) (Recommend 2 A fuse)
	46	Bus L3 (T) Voltage Sensing	1.0 mm ² AWG 18	Connect to Bus L3 (W) output (AC) (Recommend 2 A fuse)
	47	Bus Neutral (N) Input	1.0 mm ² AWG 18	Connect to Bus Neutral terminal (AC)


5.2.4 BUS 2 SENSING (R)

NOTE: The below table describes connections to a three phase, four wire Bus supply. For alternative wiring topologies, see the section 5.4 entitled *Alternate Topology Wiring Diagrams*.

	Pin No	Description	Cable Size	Notes
	48	Bus L1 (U) Voltage Sensing	1.0 mm ² AWG 18	Connect to Bus L1 (U) output (AC) (Recommend 2 A fuse)
	49	Bus L2 (V) Voltage Sensing	1.0 mm ² AWG 18	Connect to Bus L2 (V) output (AC) (Recommend 2 A fuse)
	50	Bus L3 (W) Voltage Sensing	1.0 mm ² AWG 18	Connect to Bus L3 (W) output (AC) (Recommend 2 A fuse)
	51	Bus Neutral (N) Input	1.0 mm ² AWG 18	Connect to Bus Neutral terminal (AC)


5.2.5 CURRENT TRANSFORMERS

 **WARNING!** Do not disconnect this plug when the CTs are carrying current. Disconnection will open circuit the secondary of the C.T.'s and dangerous voltages may then develop. Always ensure the CTs are not carrying current and the CTs are short circuit connected before making or breaking connections to the module.

 **NOTE:** The module has a burden of 0.5 VA on the CT. Ensure the CT is rated for the burden of the controller, the cable length being used and any other equipment sharing the CT. If in doubt, consult your CT supplier.

 **NOTE:** Take care to ensure correct polarity of the CT primary as shown below. If in doubt, check with the CT supplier.

5.2.5.1 BUS CURRENT TRANSFORMERS

	Pin No	Description	Cable Size	Notes
	52	CT Secondary for Bus1 or Bus 2 L1	2.5 mm ² AWG 13	Connect to s1 secondary of L1 monitoring CT
	53	CT Secondary for Bus 1 or Bus L2	2.5 mm ² AWG 13	Connect to s1 secondary of L2 monitoring CT
	54	CT Secondary for Bus1 or Bus 2 L3	2.5 mm ² AWG 13	Connect to s1 secondary of L3 monitoring CT
	55	Connected as required	2.5 mm ² AWG 13	
	56	Common for CTs connected to L1, L2, L3 (s2)	2.5 mm ² AWG 13	Connect to s2 secondary of L1, L2, L3 monitoring CTs
	57	Not Connected		
	58	Not Connected		

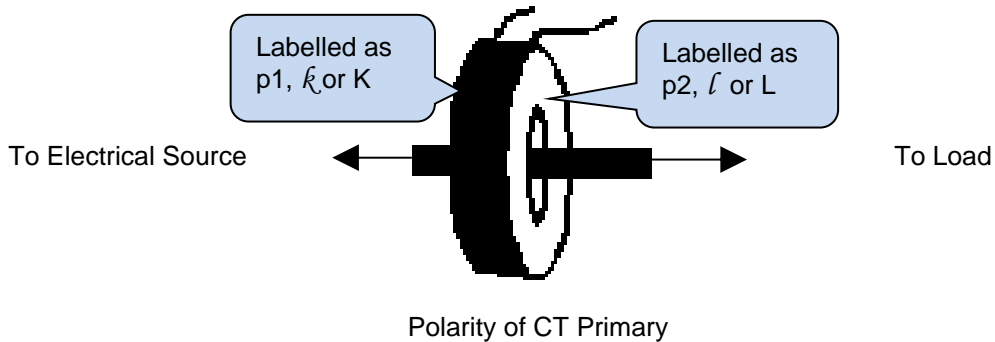
5.2.5.2 CT CONNECTIONS

p1, κ or K is the primary of the CT that 'points' towards the Generator

p2, l or L is the primary of the CT that 'points' towards the Load


s1 is the secondary of the CT that connects to the DSE Module's input for the CT measuring

s2 is the secondary of the CT that is connected with the s2 connections of all the other CTs and connected to the CT common terminal of the module.



5.2.6 DIGITAL INPUTS

NOTE: For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.

Pin No	Description	Cable Size	Notes	
	59	Configurable Digital Input A	0.5 mm ² AWG 20	Switch To Negative
	60	Configurable Digital Input B	0.5 mm ² AWG 20	Switch To Negative
	61	Configurable Digital Input C	0.5 mm ² AWG 20	Switch To Negative
	62	Configurable Digital Input D	0.5 mm ² AWG 20	Switch To Negative
	63	Configurable Digital Input E	0.5 mm ² AWG 20	Switch To Negative
	64	Configurable Digital Input F	0.5 mm ² AWG 20	Switch To Negative
	65	Configurable Digital Input G	0.5 mm ² AWG 20	Switch To Negative
	66	Configurable Digital Input H	0.5 mm ² AWG 20	Switch To Negative
	67	Configurable Digital Input I	0.5 mm ² AWG 20	Switch To Negative
	68	Configurable Digital Input J	0.5 mm ² AWG 20	Switch To Negative
	69	Configurable Digital Input K	0.5 mm ² AWG 20	Switch To Negative
	70	Configurable Digital Input L	0.5 mm ² AWG 20	Switch To Negative

5.2.7 RS485

NOTE: For further details of module configuration, refer to DSE Publication: 057-326 *DSEG8680 Configuration Suite PC Software Manual*.

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

NOTE: Screened 120 Ω impedance cable specified for use with RS485 must be used for the RS485 link.
DSE stock and supply Belden cable 9841 which is a high quality 120 Ω impedance cable suitable for CAN use (DSE part number 016-030)




	Pin No	Description	Cable Size	Notes
RS485 1	71	RS485 Port Screen	Shield	Use only 120 Ω CAN or RS485 approved cable
	72	RS485 Port B (+)	0.5 mm ² AWG 20	Connect to RXD+ and TXD+ Use only 120 Ω CAN or RS485 approved cable
	73	RS485 Port A (-)	0.5 mm ² AWG 20	Connect to RXD- and TXD- Use only 120 Ω CAN or RS485 approved cable
	74	Not Connected		
	75	Not Connected		
	76	Not Connected		

5.2.8 USB SERVER [JR3][IR4](PC CONFIGURATION) CONNECTOR

NOTE: The USB connection cable between the PC and the module must not be extended beyond 5 m (16 feet). For distances over 5 m, it is possible to use a third-party USB extender. Typically, they extend USB up to 50 m. The supply and support of this type of equipment is outside the scope of Deep Sea Electronics.

CAUTION! Care must be taken not to overload the PC's USB system by connecting more than the recommended number of USB devices to the PC. For further information, consult your PC supplier.



NOTE: For further details of module configuration, refer to DSE Publication: 057-326 *DSEG8680 Configuration Suite PC Software Manual*.

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

5.2.9 USB HOST (DATA LOGGING) CONNECTOR

NOTE: For further details on how to add and remove a USB storage device, refer to section 6.3.7.1 entitled *Data Logging*.

NOTE: For further details of module configuration, refer to DSE Publication: 057-326 *DSEG8680 Configuration Software Manual*.

	Description	Storage Size	Notes
 	Socket for connection to USB storage device for data logging	Maximum 16 GB	USB storage device must be formatted as FAT32.

5.3 TYPICAL WIRING DIAGRAM

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

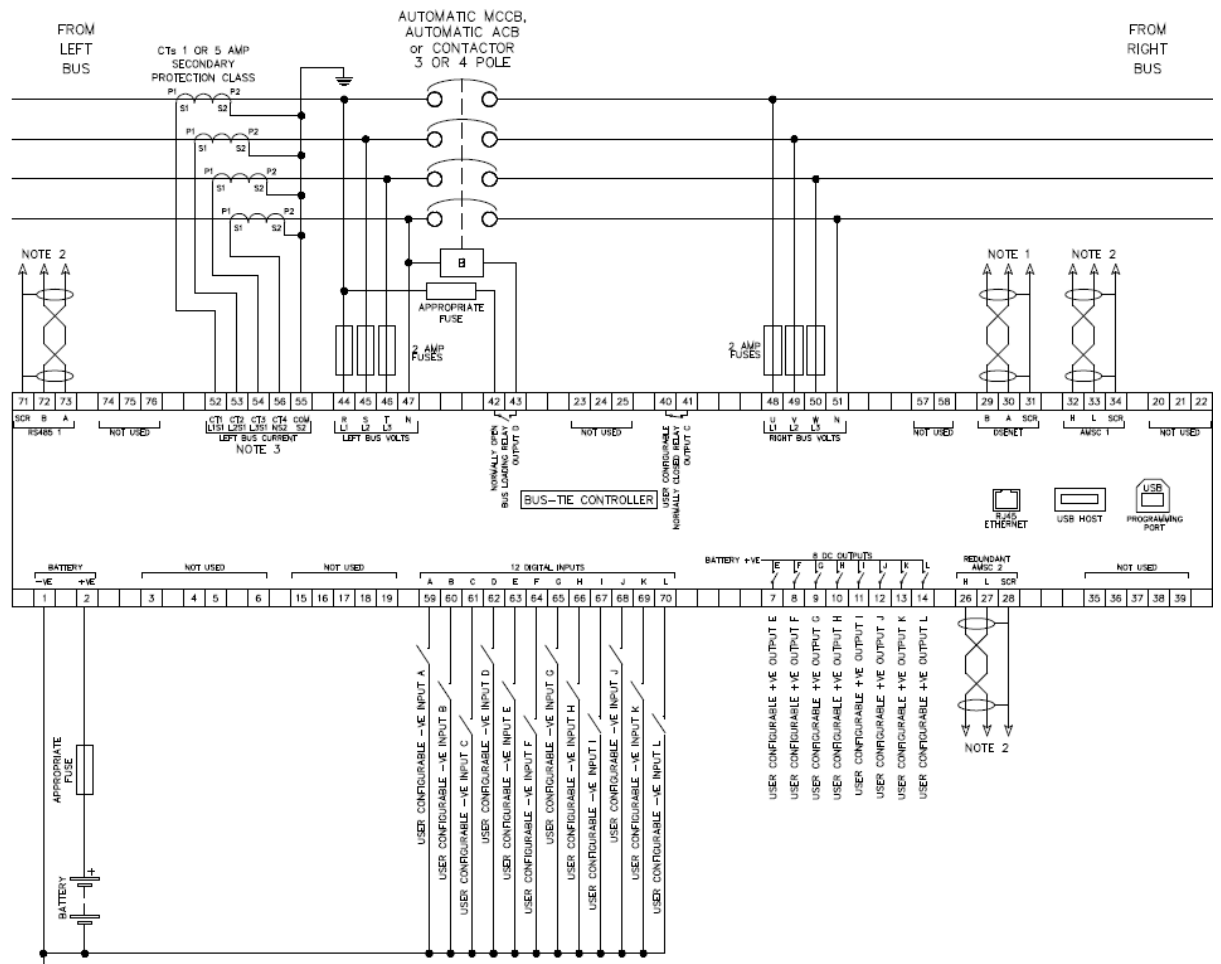
Genset manufacturers and panel builders may use these diagrams as a starting point; however always refer to the completed system diagram provided by the system manufacturer for complete wiring detail.

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

DSE Part	Description
056-022	Controller Control (Training guide)
056-005	Using CTs With DSE Products
056-022	Controller Control
056-091	Equipotential Earth Bonding
056-092	Best Practices for Wiring Resistive Sensors

5.3.1 3 PHASE 4 WIRE WITH A BUS CT

NOTE: The below diagram is applicable for the following AC topologies: 3 Phase 4 Wire Star, 3 Phase 4 Wire Delta L1-N-L2, 3 Phase 4 Wire Delta L1-N-L3 and 3 Phase 4 Wire Delta L2-N-L3. For further details of module configuration to suit these different topologies, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite Software Manual.



BATTERY NEGATIVE MUST BE GROUNDED

NOTE 1. MUST BE FITTED AS FIRST OR LAST UNIT ON DSENET WITH NO TERMINATION RESISTOR. THE SUBSEQUENT FIRST OR LAST UNIT ON DSENET MUST BE FITTED WITH A 120 OHM TERMINATION RESISTOR TERMINALS A AND B.

NOTE 2. IF THE MODULE IS FIRST OR LAST UNIT ON THE LINK, IT MUST BE FITTED WITH A 120 OHM TERMINATION RESISTOR ACROSS TERMINALS H AND L.

NOTE 3. WHEN THE 4TH CT IS PLACED ON THE NEUTRAL, TERMINAL 55 IS THE CT COMMON. WHEN THE 4TH IS NOT IN USE OR PLACED ON THE EARTH CONNECTION, TERMINAL 56 IS THE CT COMMON

5.3.2 EARTH SYSTEMS

5.3.2.1 NEGATIVE EARTH

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

5.3.2.2 POSITIVE EARTH

When using a DSE module with a Positive Earth System (the battery positive connects to Earth), the following points must be followed:

Follow the typical wiring diagram as normal for all sections **except** the earth points. All points shown as Earth on the typical wiring diagram are connected to **battery negative** (not earth).

5.3.2.3 FLOATING EARTH

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

Follow the typical wiring diagram as normal for all sections **except** the earth points. All points shown as Earth on the typical wiring diagram are connected to **battery negative** (not earth).

5.3.3 TYPICAL ARRANGEMENT OF DSENET®

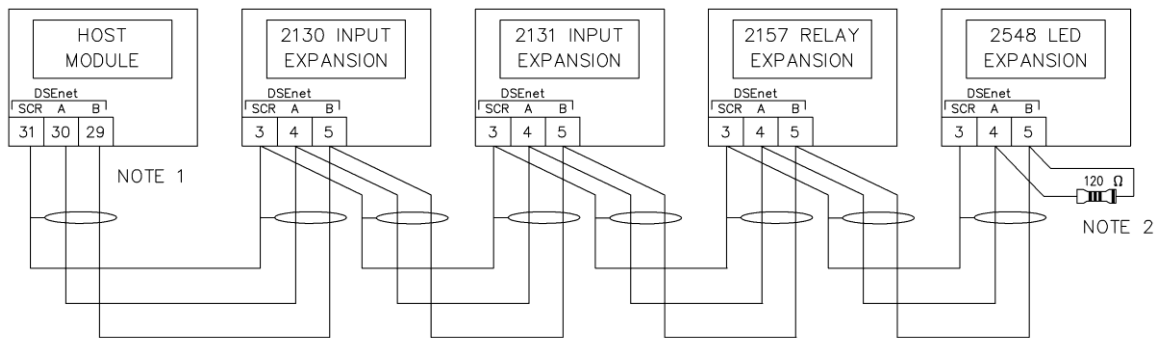
NOTE: For further details of module configuration, refer to DSE Publication: 057-326 *DSEG8680 Configuration Suite Software Manual*.

NOTE: Screened 120 Ω impedance cable specified for use with CAN must be used for the DSENet® (RS485) connection.

DSE stock and supply Belden cable 9841 which is a high quality 120Ω impedance cable suitable for DSENet® use (DSE part number 016-030)

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

Device	Maximum Number Supported
DSE2130 Input Expansion	4
DSE2131 Input Expansion	4
DSE2133 Input Expansion	4
DSE2152 Relay Output Expansion	4
DSE2157 Relay Output Expansion	10
DSE2548 LED Expansion	10
DSE Intelligent Battery Chargers	4



NOTE 1
AS A TERMINATING RESISTOR IS INTERNALLY FITTED TO THE HOST CONTROLLER, THE HOST CONTROLLER MUST BE THE FIRST UNIT ON THE DSEnet

NOTE 2
A 120 OHM TERMINATION RESISTOR MUST BE FITTED TO THE LAST UNIT ON THE DSEnet

5.3.4 TYPICAL ARRANGEMENT OF AMSC LINK

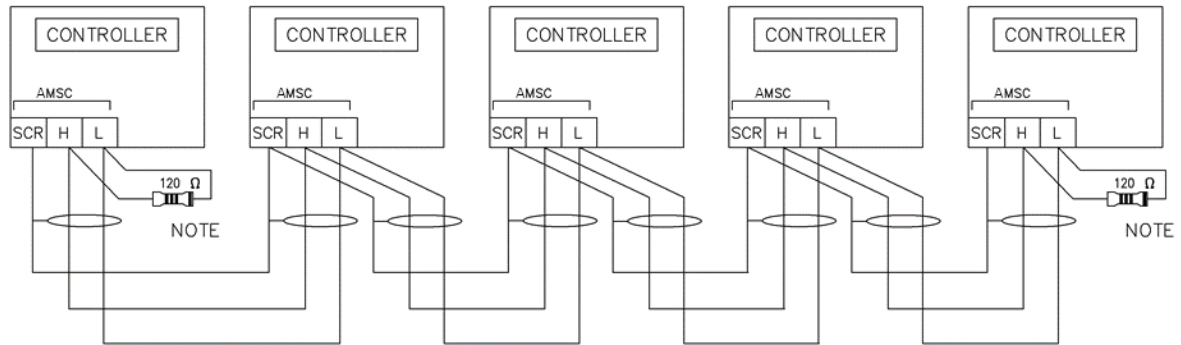
NOTE: For further information on the maximum number of modules that can be connected to the AMSC link and Redundant AMSC link, refer to sections 4.10.5 & 4.10.6 entitled *AMSC (Multi-Set Communications) Link* and *CAN Port (Redundant AMSC)*.

NOTE: For further details of module configuration, refer to DSE Publication: 057-326 *DSEG8680 Configuration Suite Software Manual*.

NOTE: Screened 120 Ω impedance cable specified for use with CAN must be used for the AMSC link connection.

DSE stock and supply Belden cable 9841 which is a high quality 120 Ω impedance cable suitable for AMSC link (DSE part number 016-030)

NOTE: A termination resistor **MUST** be fitted to the first and last unit on the AMSC link.



NOTE
A 120 OHM TERMINATION RESISTOR MUST BE FITTED
TO THE FIRST AND LAST UNIT ON THE AMSC LINK

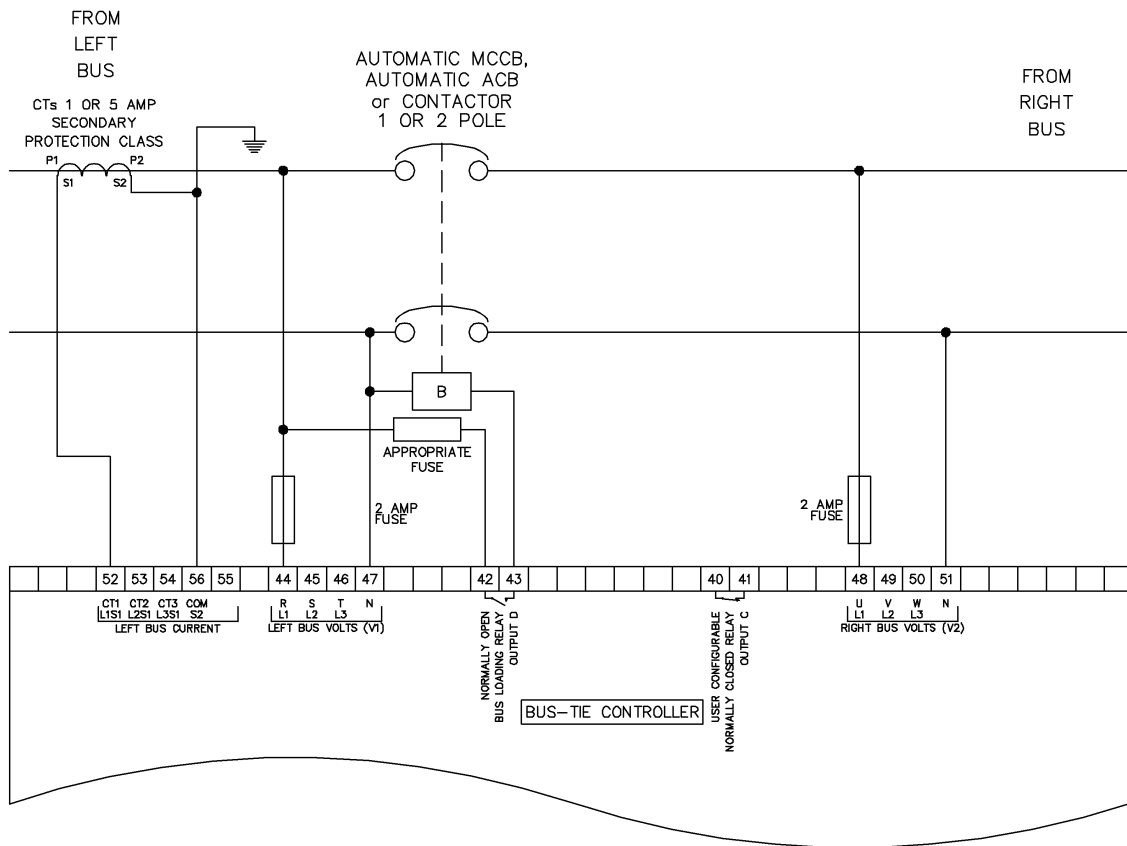
5.4 ALTERNATE TOPOLOGY WIRING DIAGRAMS

NOTE: For further details of module configuration, refer to DSE Publication: *057-326 DSEG8680 Configuration Software Manual*.

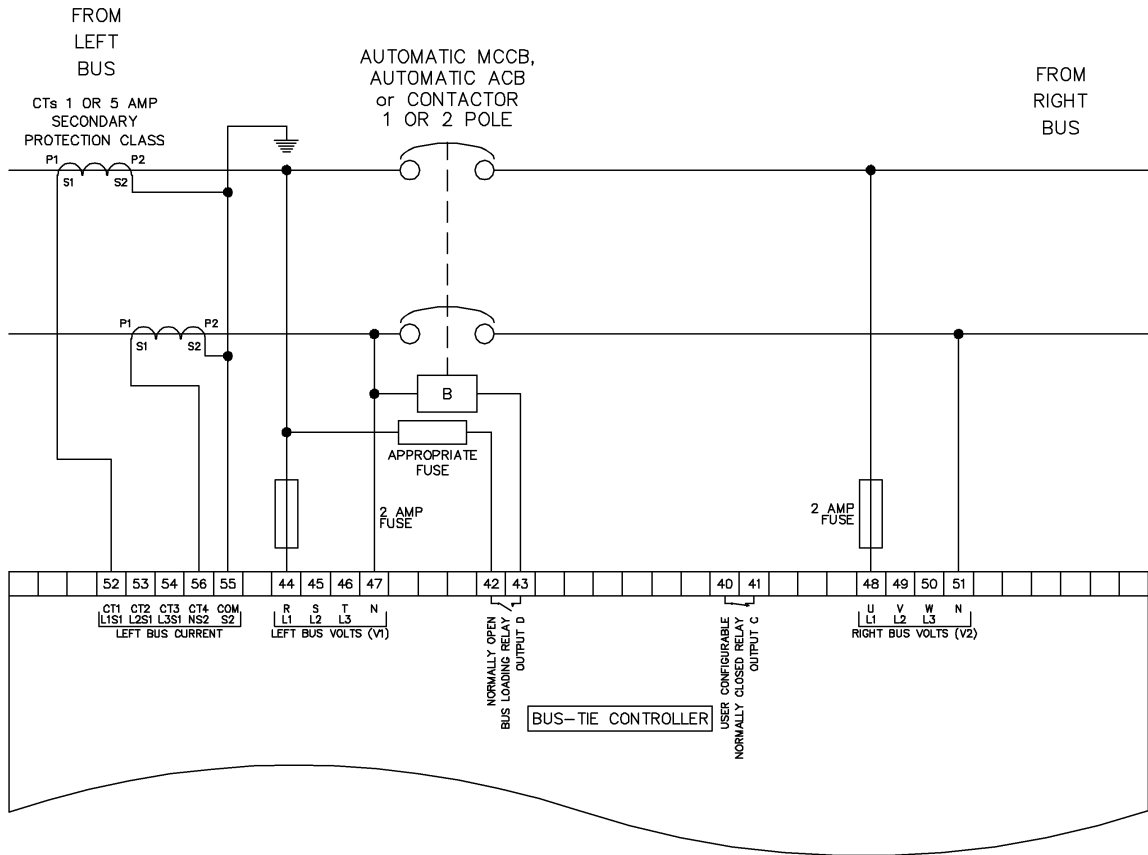
NOTE: The Bus/Load CT is **NOT REQUIRED** in a system including only one DSEG8680 controller. For further information regarding the advantages of a Bus/Load CT, refer to section Error! Reference source not found. entitled *Bus/Load Current Transformer*, or refer to DSE Publication: *056-007 Advantages of Bus/Load CT*.

The controller is factory configured to connect to a 3 Phase, 4 Wire Star connected system. This section details connections for alternative AC topologies. Ensure to configure the controller to suit the required topology.

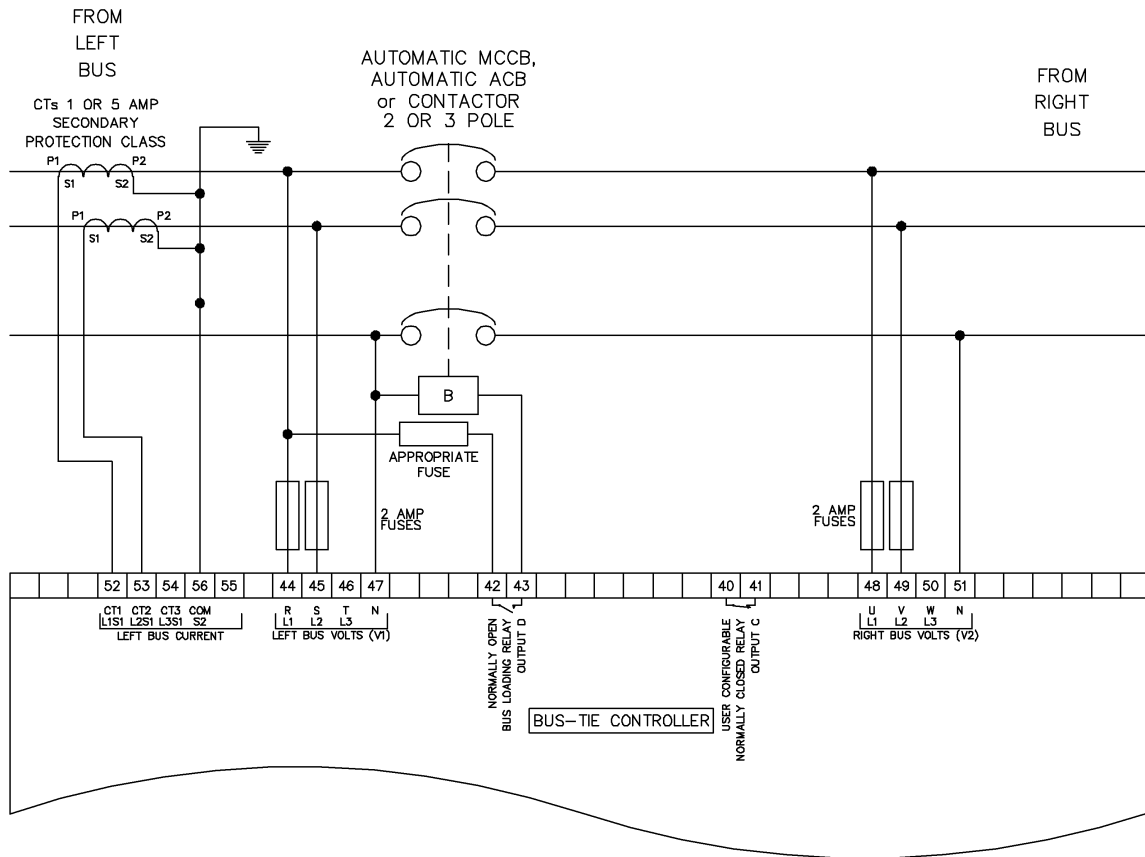
5.4.1 SINGLE PHASE (L1 & N) WITHOUT EARTH FAULT



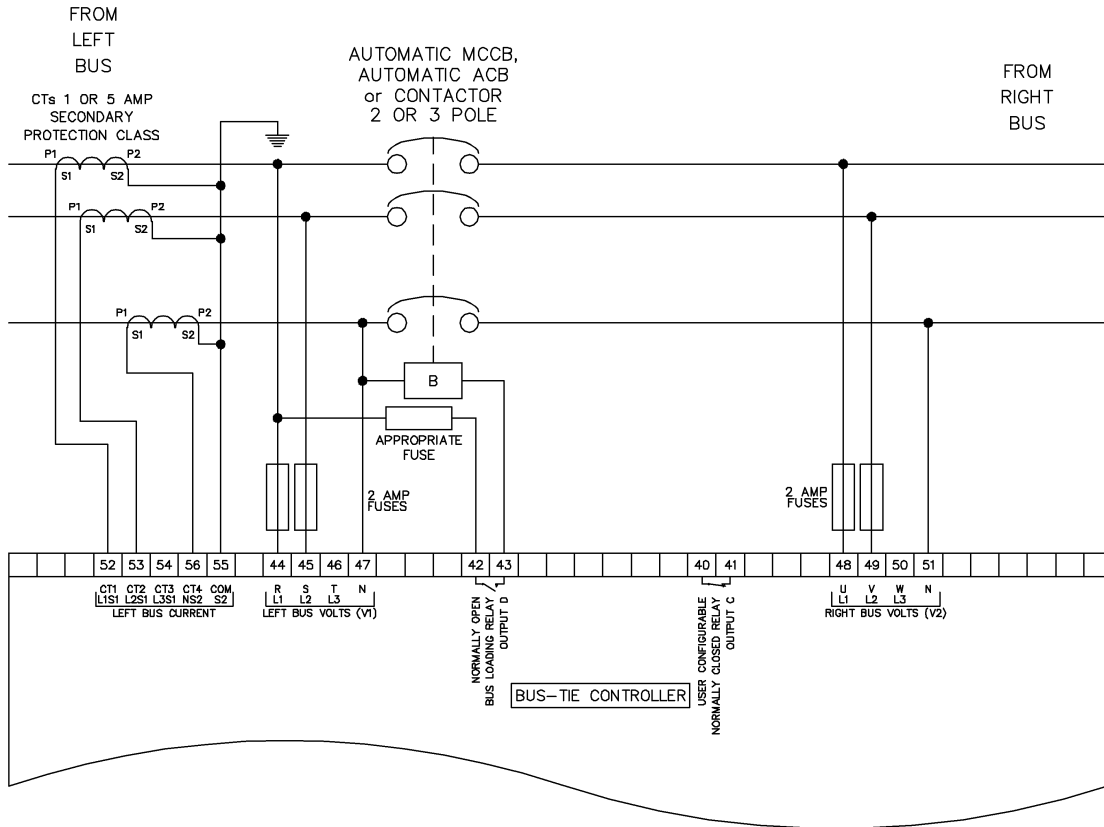
5.4.2 SINGLE PHASE (L1 & N) 2 WIRE WITH EARTH FAULT JR5 IR6



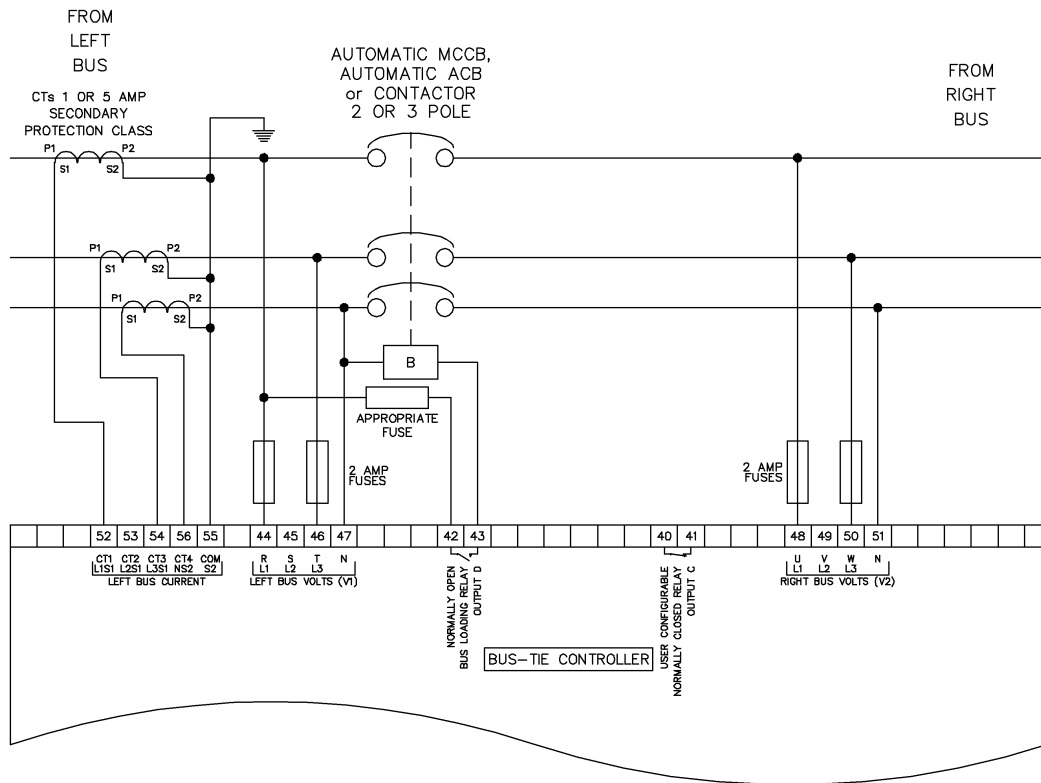
5.4.3 2 PHASE 3 WIRE (L1 L2) WITHOUT EARTH FAULT



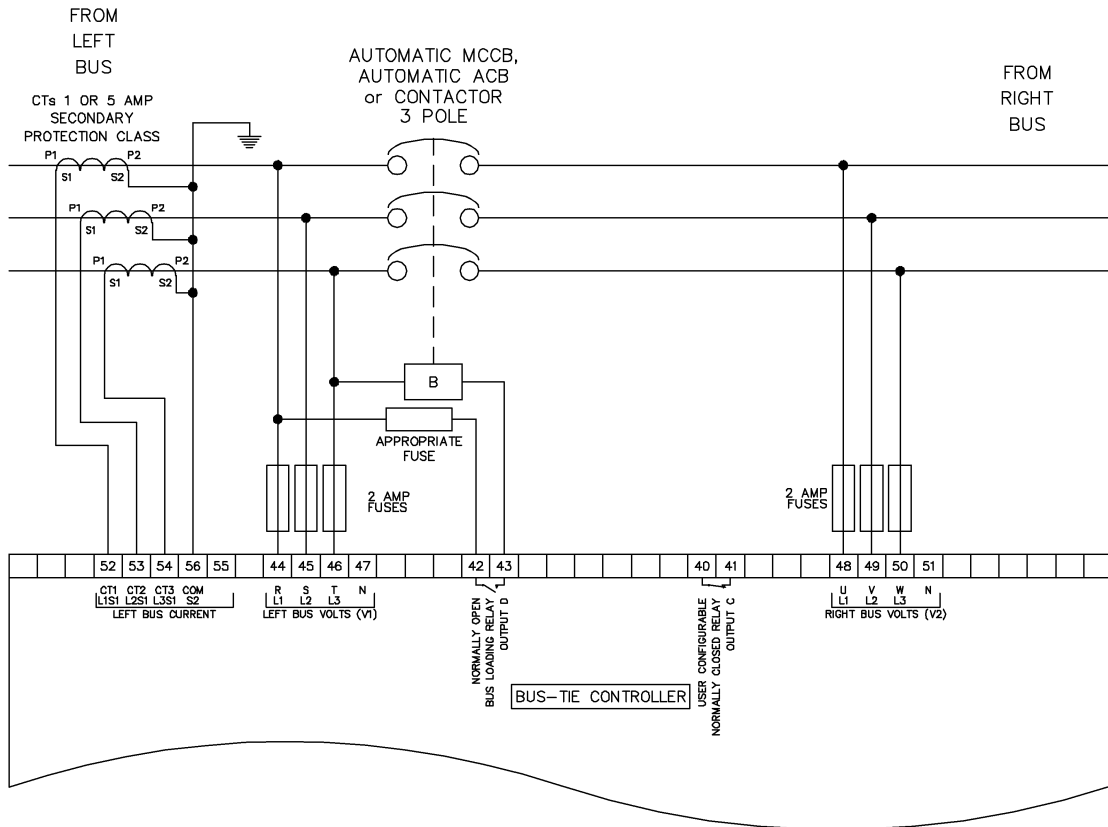
5.4.4 2 PHASE 3 WIRE (L1 L2) WITH RESTRICTED EARTH FAULT



5.4.5 2 PHASE 3 WIRE (L1 L3) WITH RESTRICTED EARTH FAULT

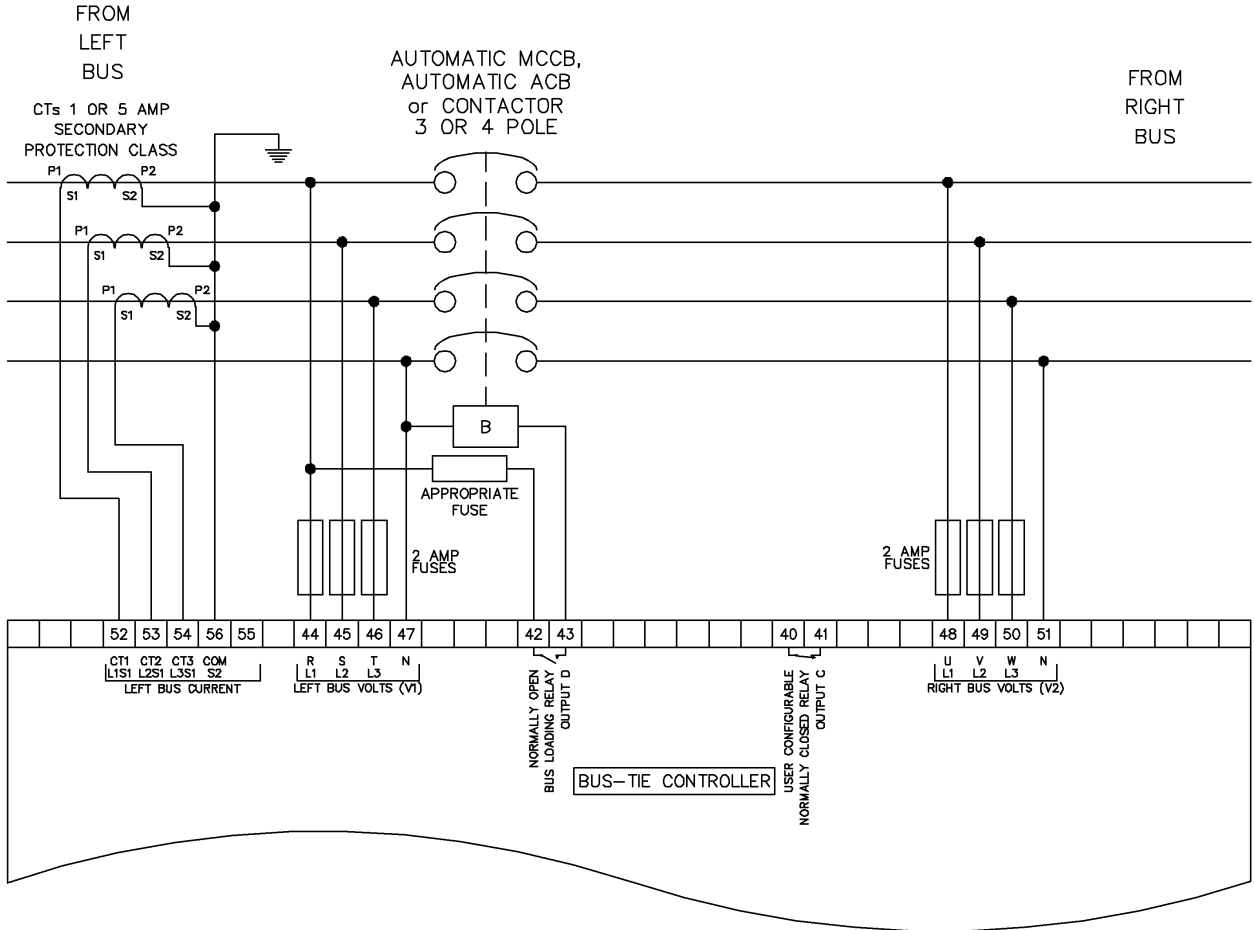


5.4.7 3 PHASE 3 WIRE L1 L2 L3

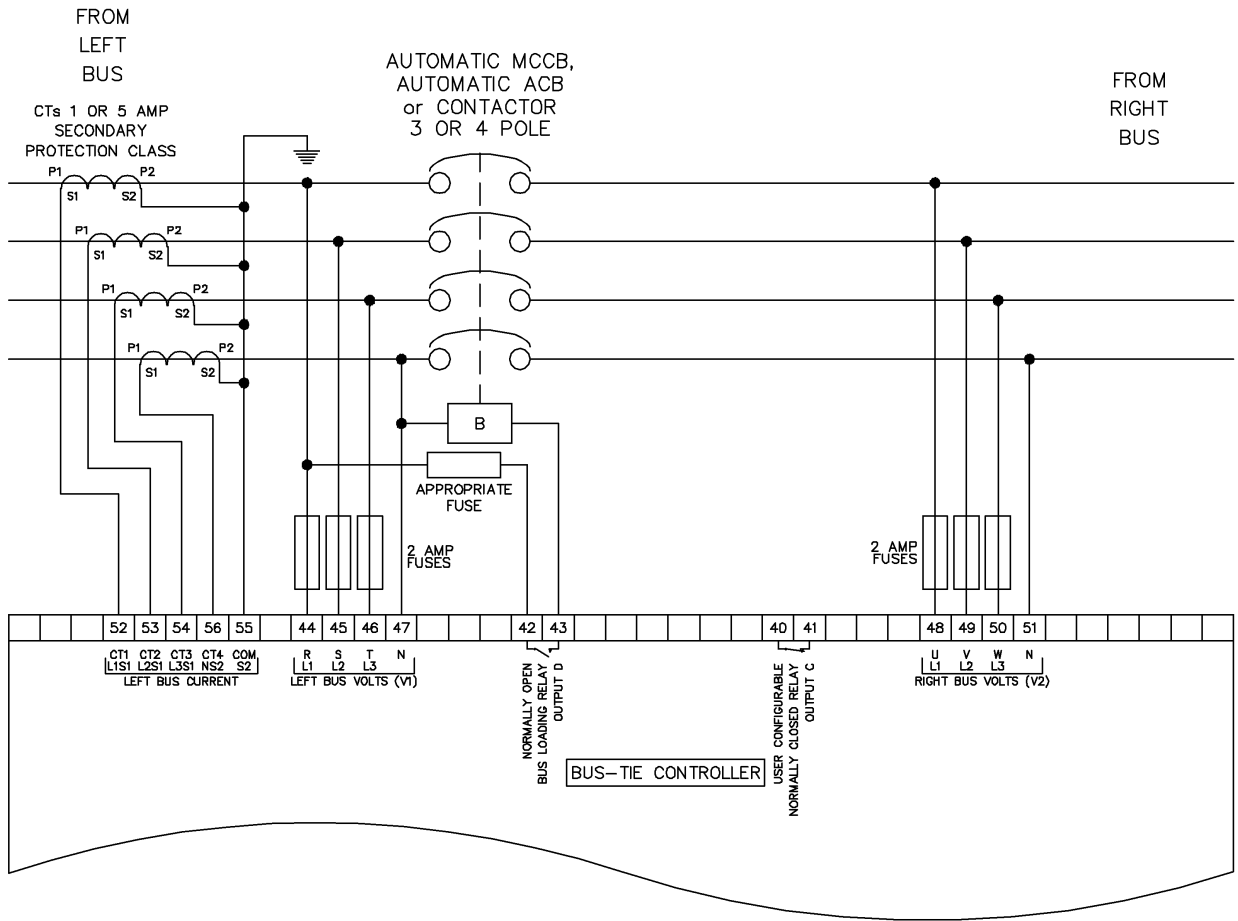


5.4.8 3 PHASE, 4 WIRE L1 L2 L3

NOTE: The below diagram is applicable for the following AC topologies: 3 Phase 4 Wire Star, 3 Phase 4 Wire Delta L1-N-L2, 3 Phase 4 Wire Delta L1-N-L3 and 3 Phase 4 Wire Delta L2-N-L3. For further details of module configuration to suit these different topologies, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite Software Manual.



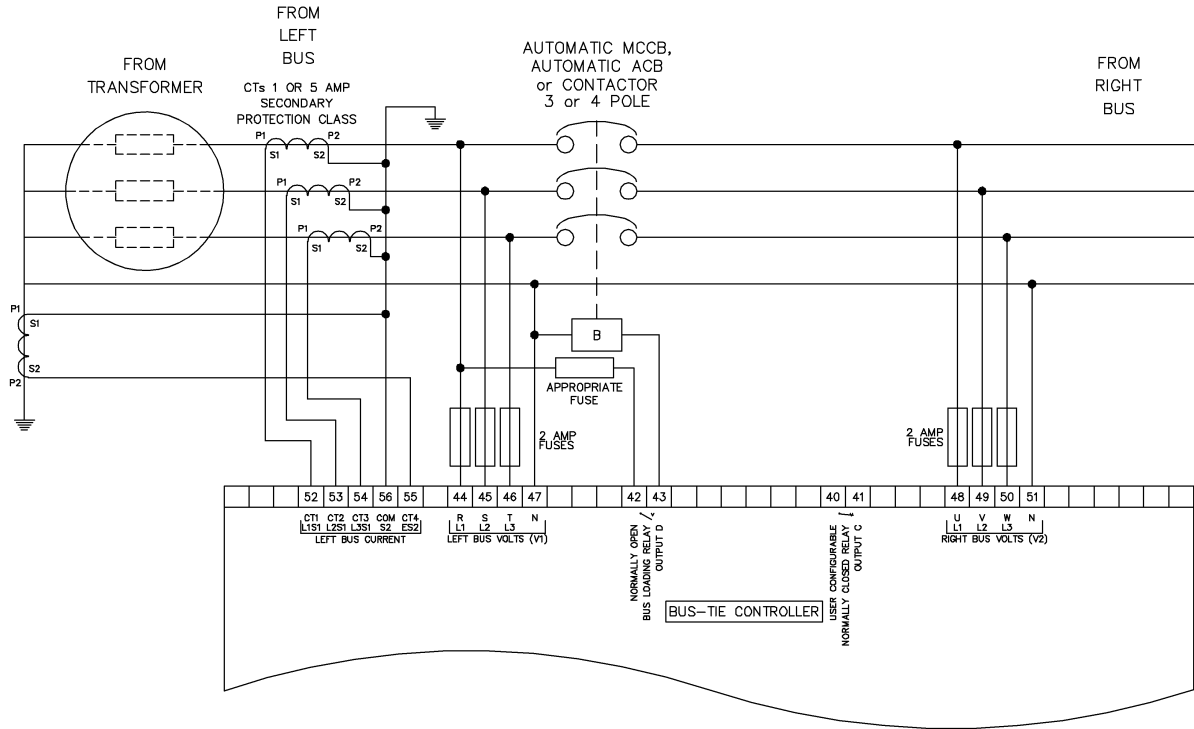
5.4.9 3 PHASE 4 WIRE WITH CT1- CT4



5.4.10 3 PHASE 4 WIRE WITH UNRESTRICTED EARTH FAULT

NOTE: The below diagram is applicable for the following AC topologies: 3 Phase 4 Wire Star, 3 Phase 4 Wire Delta L1-N-L2, 3 Phase 4 Wire Delta L1-N-L3 and 3 Phase 4 Wire Delta L2-N-L3. For further details of module configuration to suit these different topologies, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite Software Manual.

This example shows the Bus/Load CT in the common load feed for a three phase four wire system, but the same philosophy is applicable to the other topologies



6 DESCRIPTION OF CONTROLS

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

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

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

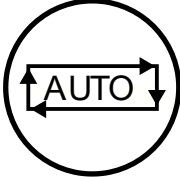


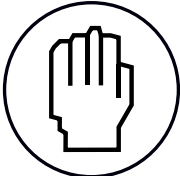


Auto Mode (AUTO), **Alarm Mute/Lamp Test** (Mute), **Open/Close Bus** (Bus), **Manual** (Hand), functions and **Reset** (Reset).

For normal operation, these are the only controls which need to be operated. Details of their operation are provided later in this document.



6.1 CONTROL PUSH BUTTONS

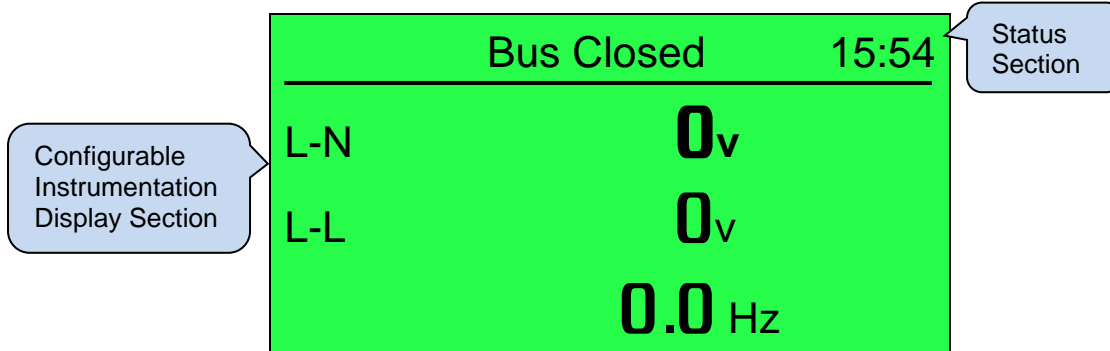
 **NOTE:** For further details, see section 7 entitled *Operation*.

Icon	Description
	<p>Auto Button</p> <p>In the G8680 the auto button is used to select Auto Mode.</p>
	<p>Alarm Mute / Lamp Test</p> <p>This button silences the audible alarm in the controller, de-activates the <i>Audible Alarm</i> output (if configured) and illuminates all the LEDs on the module's fascia as a lamp test function.</p>
	<p>Open Close Bus Breaker</p> <p>There are two controller buttons (left and right) which provide various control options for the breaker:</p> <p>This button opens and closes the breaker.</p>
	<p>Manual</p> <p>This mode allows manual control of the functions. Once in Manual mode the module will respond to the breaker button , toggling the bus breaker.</p>
	<p>Reset</p> <p>Resets any alarms that have been detected by the controller.</p>
	<p>Menu Navigation</p> <p>Used for navigating the instrumentation, event log and configuration screens.</p>

6.2 DISPLAY SCREEN

When an event or user interaction happens, this may be represented on the display graphically. The Status page is the default screen shown once the module has been powered up.

Status Page



6.3 VIEWING THE INSTRUMENT PAGES

NOTE: Depending upon the module's configuration, some display screens may be disabled. For further details of module configuration, refer to DSE Publication: 057-326 *DSEG8680 Configuration Suite PC Software Manual*.

Selecting Pages

To navigate to different pages or sub-pages the following sequence must be observed.



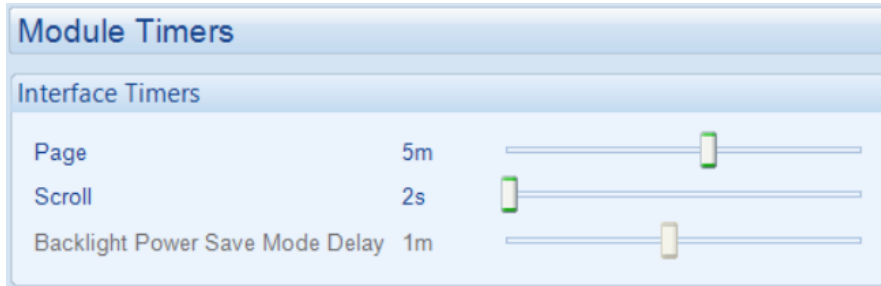
Once selected, the page remains on the LCD display until the user selects a different page, or after an extended period of inactivity (*LCD Page Timer*), the module reverts to the home display.

NOTE: The display screen will cycle through each instrument parameter unless the scroll buttons are pressed.

NOTE: The screens in the following examples may not be representative of the current model but are used for a guide for functionality only.

Configuring Timers


The *LCD Page* timers are configurable using the DSE Configuration Suite Software.




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

If an alarm becomes active while viewing the status page, the display shows the Alarms page to draw the operator's attention to the alarm condition. The complete order and contents of each information page are given in the following sections.

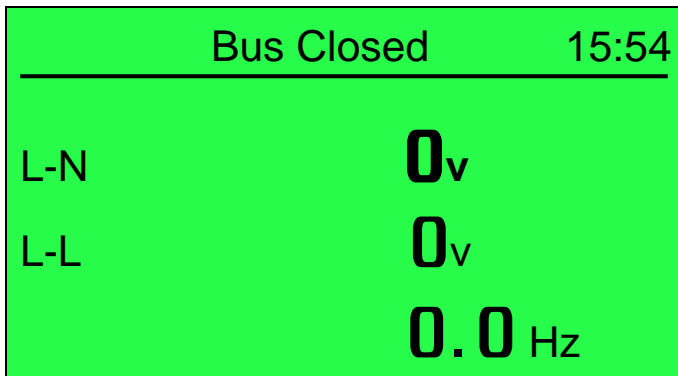
6.3.1 STATUS



NOTE: Press the *Scroll*  buttons on the *Home Page* to view other Configurable Status Screens if configured. For further details of module configuration, refer to DSE Publication: 057-151 *DSEG8680 Configuration Suite PC Software Manual*.

This is the 'Status' page, the page that is displayed when no other page has been selected, and the page that is automatically displayed after a period of inactivity (*LCD Page Timer*) of the module control buttons.

This page changes for example when an alarm has tripped:



6.3.1.1 DISPLAY CONFIGURATION

The screen content may vary depending upon configuration. Below is an example of the Displayed Pages being changed to show Battery related information.

Display Configuration

Displayed Pages

Page 1	Battery Voltage
Page 2	Synchroscope
Page 3	Bus Current
Page 4	Left Bus - Bus Tie Controllers Connected
Page 5	Left Bus - Mains Controllers Connected

Example of Battery Voltage being selected to be the default Home Page.

Other pages can be configured to be shown, automatically scrolling when the set is running.

Description of Controls

The Displayed Pages section allows a maximum of 10 pages to be displayed. The pages available are shown in the list below:

- Battery Voltage
- Bus Current
- Bus Power
- Left AMSC Power
- Left Bus- Bus Tie Controllers Connected
- Left Bus- Mains Controllers Connected
- Left Bus Frequency
- Left Bus Phase Rotation
- Left Bus Sets On AMSC Bus
- Left Bus Sets On Load
- Left Bus Voltage L-L
- Left Bus Voltage L-N
- Right AMSC Power
- Right Bus- Bus Tie Controllers Connected
- Right Bus- Mains Controllers Connected
- Right Bus Frequency
- Right Bus Phase Rotation
- Right Bus Sets On AMSC Bus
- Right Bus Sets On Load
- Right Bus Voltage L-L
- Right Bus Voltage L-N
- Synchroscope

6.3.2 LEFT BUS

Contains electrical values of the Bus, measured, or derived from the module's voltage and current inputs.



Press the *Scroll* buttons scroll through the *Left Bus* parameters.

Left Bus Voltage	
L1- N	0 _v
L2- N	0 _v
L3- N	0 _v

AC Voltages on Left Bus

Left Bus Voltage	
L1- L2	0 _v
L2- L3	0 _v
L3- L1	0 _v

AC Voltages on Left Bus

Left Bus Frequency
0.00 _{Hz}

Left Bus Frequency

Bus Current	
L1	0 A
L2	0 A
L3	0 A

Left Bus Current

Bus Earth Current	
0 A	

Left Bus Earth Current

Left Bus Load	
L1	0 kW
L2	0 kW
L3	0 kW

Left Bus Load

Left Bus Load	
L1	0 kVA
L2	0 kVA
L3	0 kVA

Left Bus Load

Left Bus Load	
L1	0 kVr
L2	0 kVr
L3	0 kVr

Left Bus Load

Left Bus Load	
L1	0 kW
L2	0 kVA
L3	0 kVAr

Left Bus Load

Left Bus Power Factor	
L1	0.00
L2	0.00
L3	0.00

Left Bus Load

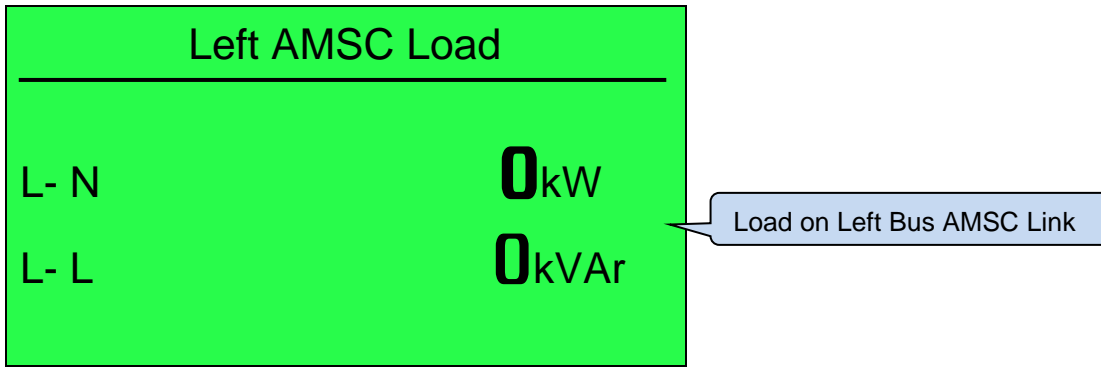
Left Bus Power Factor	
Average	1.00

Left Bus Load

Left AMSC Load

L- N	0 kW
L- L	0 kVAr

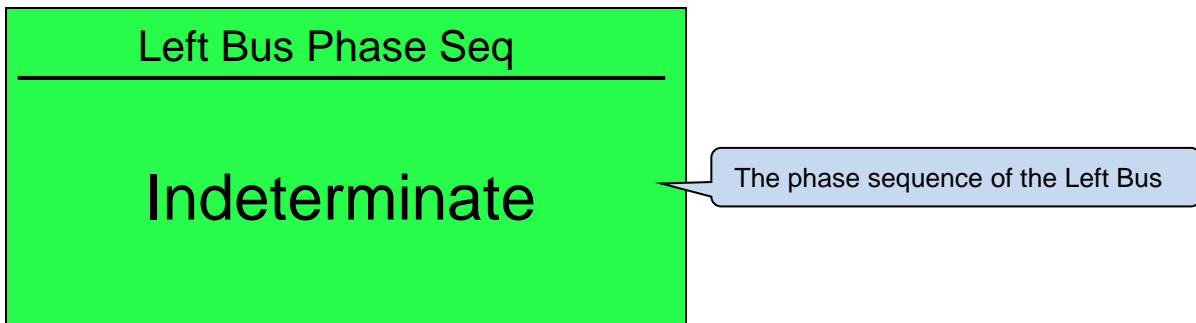
Load on Left Bus AMSC Link



Left Bus Phase Seq

Indeterminate

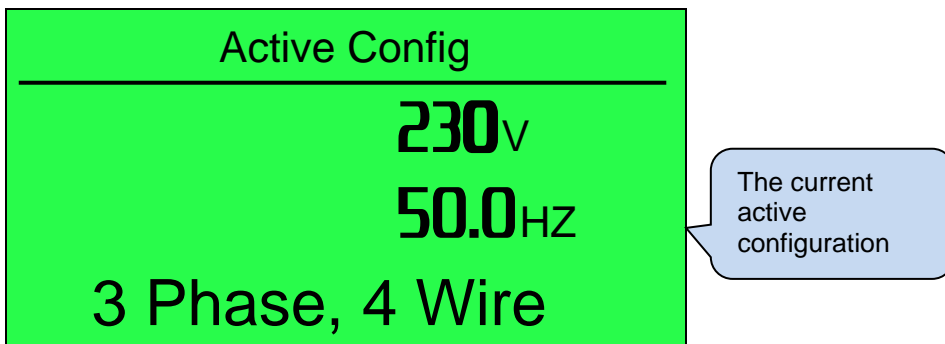
The phase sequence of the Left Bus



Active Config

230v
50.0HZ
3 Phase, 4 Wire

The current active configuration



Active Config

Default Config

The default active configuration



AMSC Left Token	
Token Requested	No
Token Received	No
Holding Token	Inactive

Left Token information

AMSC Right Token	
Token Requested	No
Token Received	No
Holding Token	Inactive


Right Token information

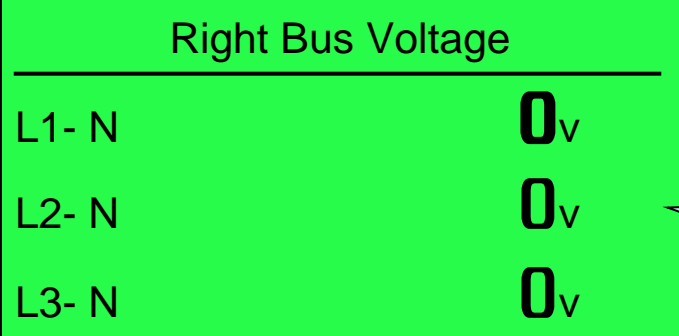
AMSC1 connected	
64	
	0000 0000 0000 0000
	0000 0000 0000 0000
	0000 0000 0000 0000
	0000 0000 0000 0000
	1

AMSC map of G8660 modules

6.3.3 RIGHT BUS

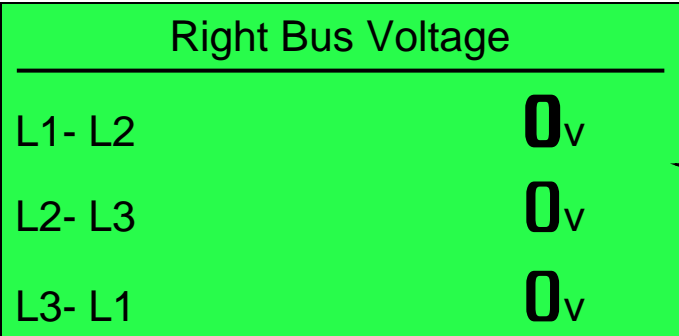
Contains electrical values of the Bus, measured, or derived from the module's voltage and current inputs.

Press the  *Scroll* buttons scroll through the *Left Bus* parameters.



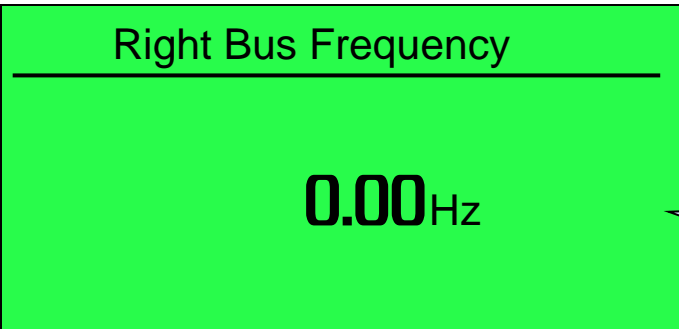
Right Bus Voltage	
L1- N	0 _v
L2- N	0 _v
L3- N	0 _v

AC Voltages on Right Bus



Right Bus Voltage	
L1- L2	0 _v
L2- L3	0 _v
L3- L1	0 _v

AC Voltages on Right Bus



Right Bus Frequency
0.00Hz

Right Bus Frequency

Bus Current	
L1	0 A
L2	0 A
L3	0 A

Right Bus Current

Bus Earth Current	
0 A	

Right Bus Earth Current

Right Bus Load	
L1	0 kW
L2	0 kW
L3	0 kW

Right Bus Load

Right Bus Load	
L1	0 kVA
L2	0 kVA
L3	0 kVA

Right Bus Load

Right Bus Load	
L1	0 kVr
L2	0 kVr
L3	0 kVr

Right Bus Load

Right Bus Load	
L1	0 kW
L2	0 kVA
L3	0 kVAr

Right Bus Load

Right Bus Power Factor	
L1	0.00
L2	0.00
L3	0.00

Right Bus Load

Right Bus Power Factor	
Average	1.00

Right Bus Load

Right AMSC Load

L- N	0 kW
L- L	0 kVAr

Load on Right Bus AMSC

Right Bus Phase Seq

Indeterminate

The phase sequence of the Right

Active Config

230v
50.0HZ
3 Phase, 4 Wire

The current active configuration

Active Config

Default Config

The default active configuration

AMSC Left Token	
Token Requested	No
Token Received	No
Holding Token	Inactive

Left Token information

AMSC Right Token	
Token Requested	No
Token Received	No
Holding Token	Inactive


Right Token information

AMSC1 connected	
64	
	0000 0000 0000 0000
	0000 0000 0000 0000
	0000 0000 0000 0000
	0000 0000 0000 0000
	1

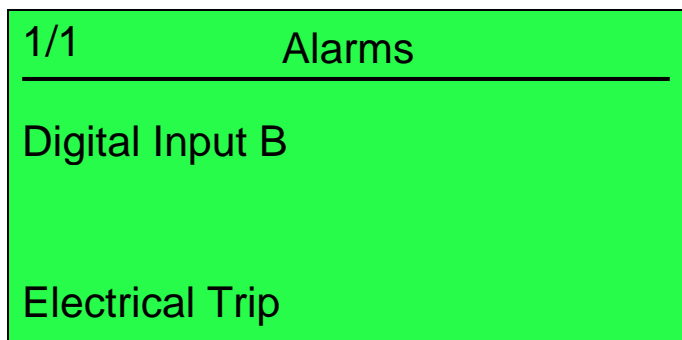
AMSC map of G8660 modules

6.3.4 ALARMS

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

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

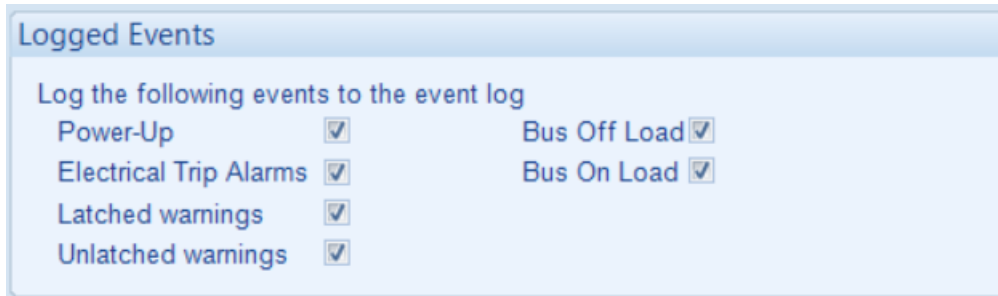
The LCD display jumps from the 'Information page' to display the Alarm Page



6.3.5 EVENT LOG

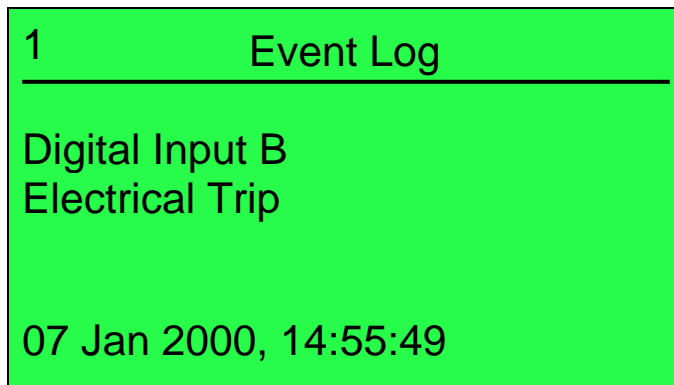
The module maintains a log of past alarms and/or selected status changes. At the time of writing, the modules log can store the last 250 log entries.


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




When the event log is full, any subsequent event overwrites the oldest entry. Hence, the event log always contains the most recent events. The module logs the event type, along with the date and time. If the module is configured and connected to a modem, an SMS message is sent on any logged event.

To view the event log, repeatedly press the **Next or Previous Page**  buttons until the LCD screen displays the *Event Log* page.



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

To exit the event log and return to viewing the instruments, press the **Next or Previous Page**  buttons to select the next instrumentation page.

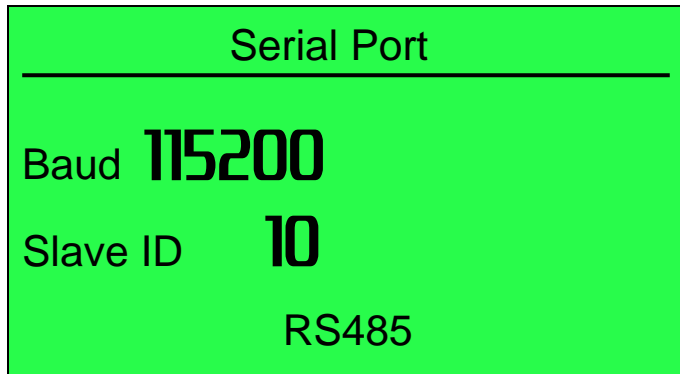
6.3.6 COMMUNICATIONS



Press the Scroll buttons scroll through the network parameters.

Connected to an RS485 Modbus Master

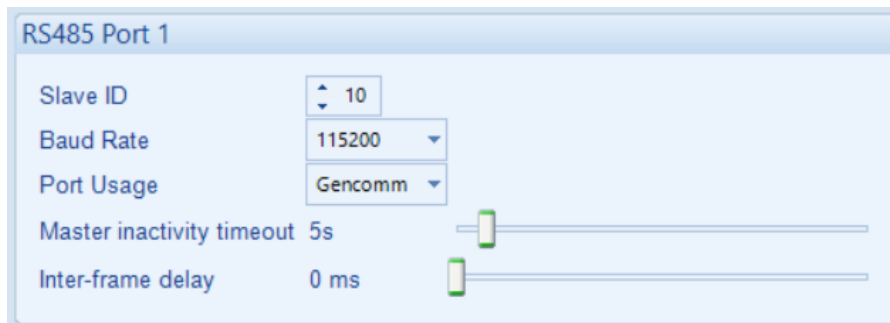
NOTE: The Modbus Master can be another DSE module communicating through its PLC. For further details see section 4.10.3 entitled *RS485 Ports* in this document.



The modules operate as a Modbus RTU slave device. In a Modbus system, there is only one Master, typically a PLC, HMI system, PC SCADA system, or another DSE module using its PLC Comms.

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

The factory settings are for the module to communicate at 115200 baud, Modbus slave address 10.



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

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

RS485 MODBUS RTU Diagnostics



RS485 Modbus RTU diagnostic screens are included; press the **Scroll Down** button when viewing the *RS485 Serial Port* instruments to cycle to the available screens. If experiencing RS485 Modbus RTU communication problems, this information aids troubleshooting.

RS485 Port 1	
Link Quality	0%
Rx Rate	0%
Lost Rate	0%

Shows the state of the RS485 communication lines. These can help diagnose connection problems.

Link Quality: The quality of the RS485 connection
RX Rate: The number of received message during the packet timeout
Lost Rate: The number of messages that are discarded (invalid messages)

Typical Requests (Using Pseudo Code)

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

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

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

ElectricalTrip=(ReadRegister(10,0306,1) >> 10) & 1): reads (hex) 0306 and looks at bit 11 (Electrical Trip alarm present)

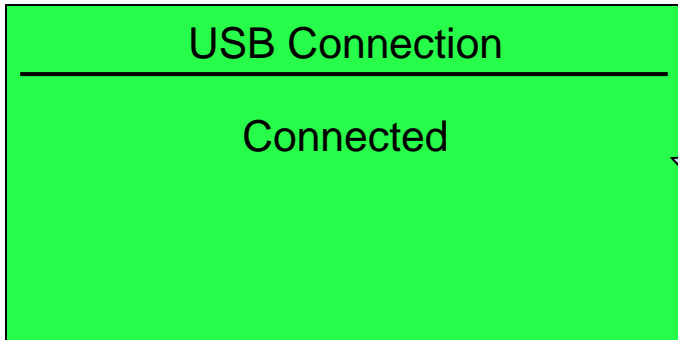
ControlMode=ReadRegister(10,0304,2): reads (hex) register 0304 (control mode).

USB/ Network Settings

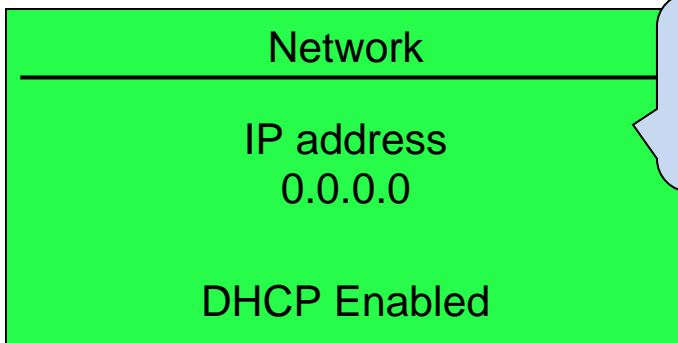


Whilst in the *Communication* section, press the **Scroll Down** button to access more information about the USB Slave Connection status.

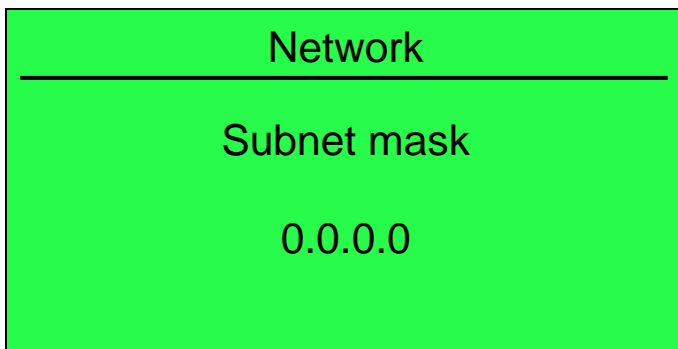
Network settings are configured using DSE Configuration Suite PC Software. The module must be rebooted for the changes to take effect.



Connected/Inactive: Indicates the connection status of the USB Slave Connection which is normally used for module configuration.



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



Subnet Mask: The configured network subnet mask of the module.

Network

Gateway address

0.0.0.0

Gateway Address: The configured network gateway address of the module.

Network

DNS address

0.0.0.0

DNS Address: The configured network DNS address of the module.

Network

MAC address

00:22:C7:FF:DE:A1

MAC Address: The MAC address of the module, this cannot be changed and is

DHCP

Host
Domain
Vendor

DHCP: The DHCP settings of module if configured. unique to every Ethernet device.

MODBUS over IP

TCP Port 502
Pref IP 0.0.0.0

TCP Port: The MODBUS TCP communication port number.
Pref IP: The preferred connection IP address. The module can support up to 5 MODBUS TCP masters. If the preferred IP address is configured, one of those five connections is reserved for the device with the preferred IP.

Ethernet Connection

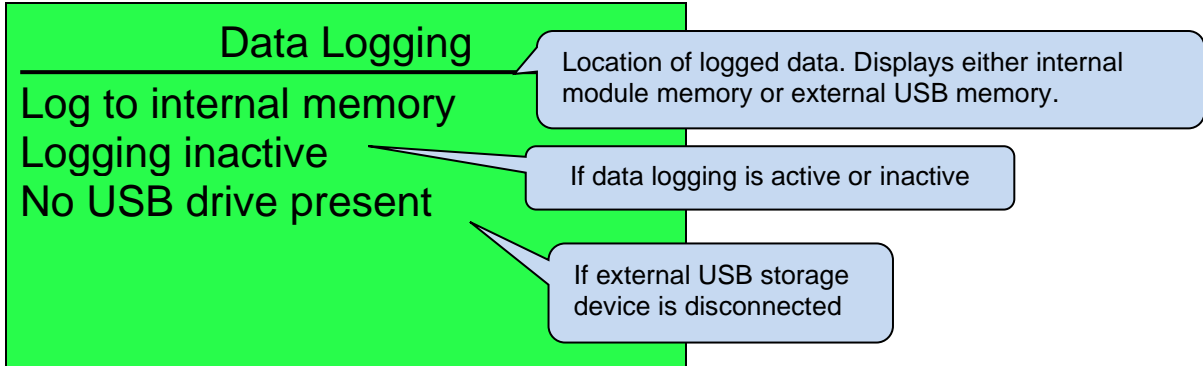
Inactive

Ethernet Connection #: State of the 5 individual Ethernet connections
IP Address: IP address of the device connected via Ethernet.
Connected/Inactive: State of the port connection unique to every Ethernet device.

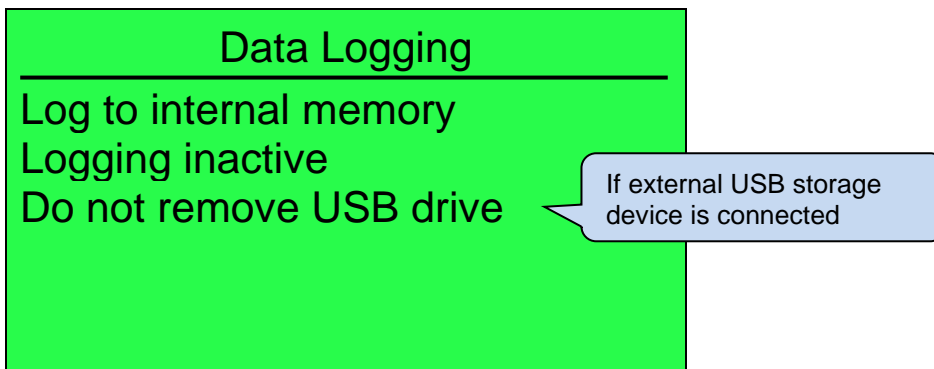
6.3.7 MISCELLANEOUS

6.3.7.1 DATA LOGGING

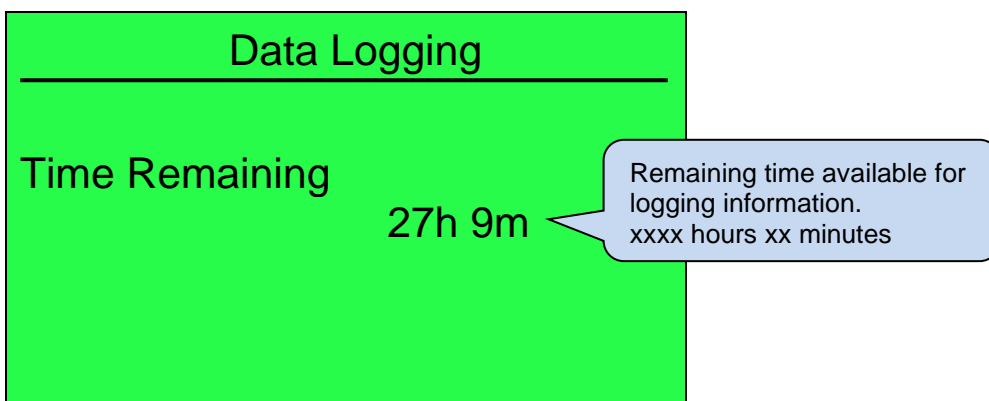
Whilst in the *Miscellaneous* section, press **Scroll Down**  button to access more information about the data logging settings.

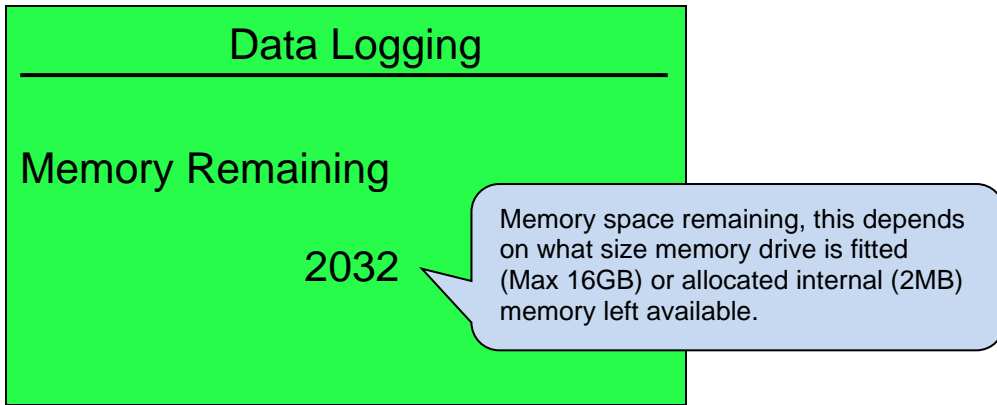


Inserting a USB storage device to the USB host connector on the rear of the module displays the following change to the page.



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





6.3.8 ABOUT

Contains important information about the module and the firmware versions. This information may be asked for when contacting DSE Technical Support Department for advice.



Use the **Scroll** buttons to access more information about the module.

About	
Variant	G8680
Model	Bus Tie
USB ID	1BAD1DEA

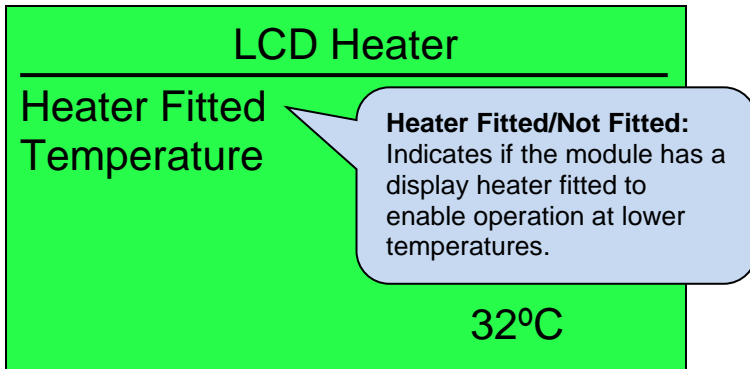
Variant: DSEG8680
Model: the module type.
USB ID: Unique identifier for PC USB connection

About	
Application	V.1.0.6
Analogue	V1.3.2
Auxiliary	V2.0.29

Application: The version of the module's main firmware file (Updatable using the Firmware Update Wizard in the DSE Configuration Suite Software).
Analogue: Analogue measurements software version
Auxiliary: The version of the module's auxiliary micro firmware file.

About	
Bootstrap	V3.1.3
Bootloader	V3.1.1.

Bootstrap: Bootstrap software version
Bootloader: Firmware Update bootloader software version



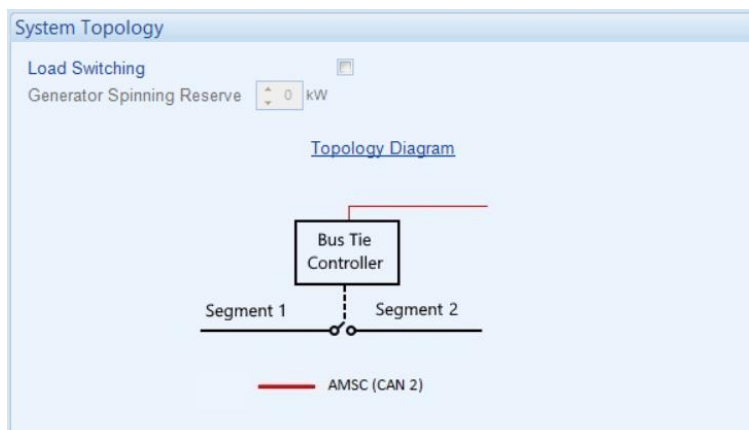
7 OPERATION

7.1 BUS TIE CONFIGURATION

There are two possible configurations for the Bus tie controller which can be enabled on the *Application* page in the Configuration Software.

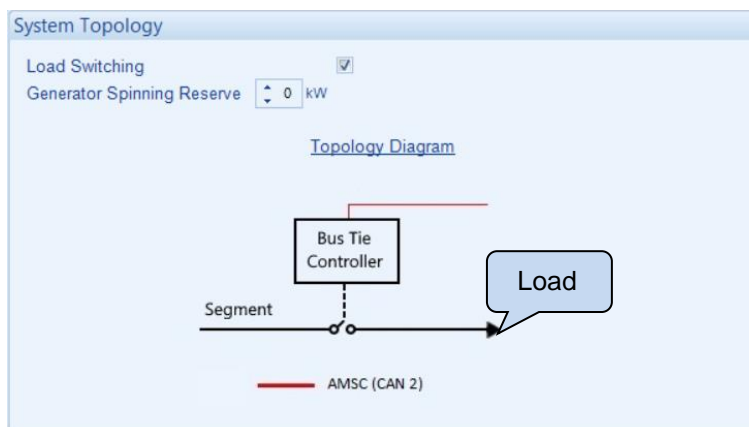
7.1.1 BUS TIE

The Bus Tie Configuration enables control of two bus segments on the left (Segment 1) and right side (Segment 2).



7.1.2 LOAD SWITCHING

The Bus Tie controller can be used for load switching by selecting Load Switching in the Configuration Suite.

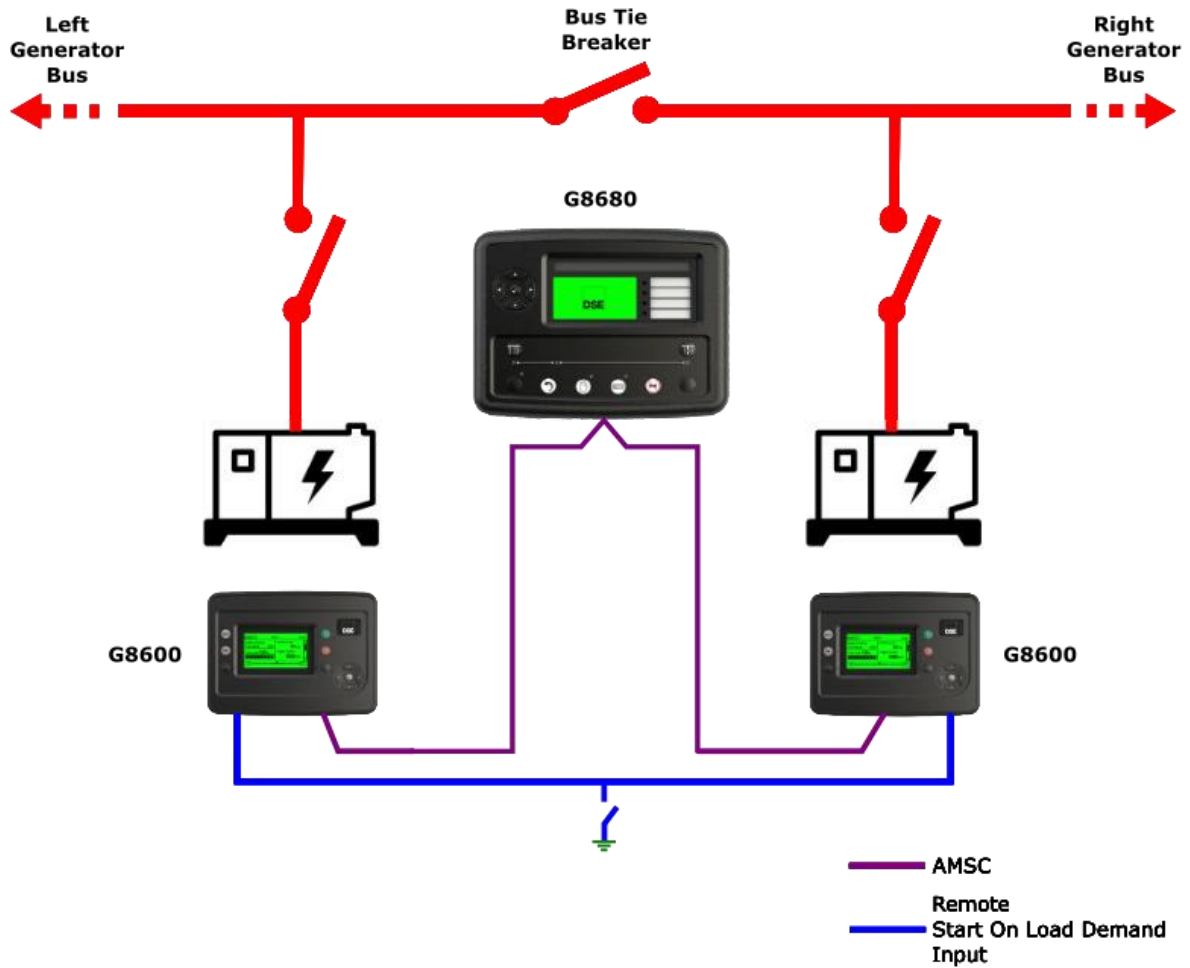


The load must be on Right side as shown above.

7.2 BUS TIE OPERATION

The DSEG8680 has two AMSC Ports, one for each side of the bus. The DSEG8680 only closes the generator bus-tie when it is told to via button presses, digital input (*Close Bus Tie*) or on receipt of command over Modbus.

When the DSEG8680 bus tie breaker is open, the left-hand bus does not communicate to the right-hand bus, and they are seen as two separate systems.

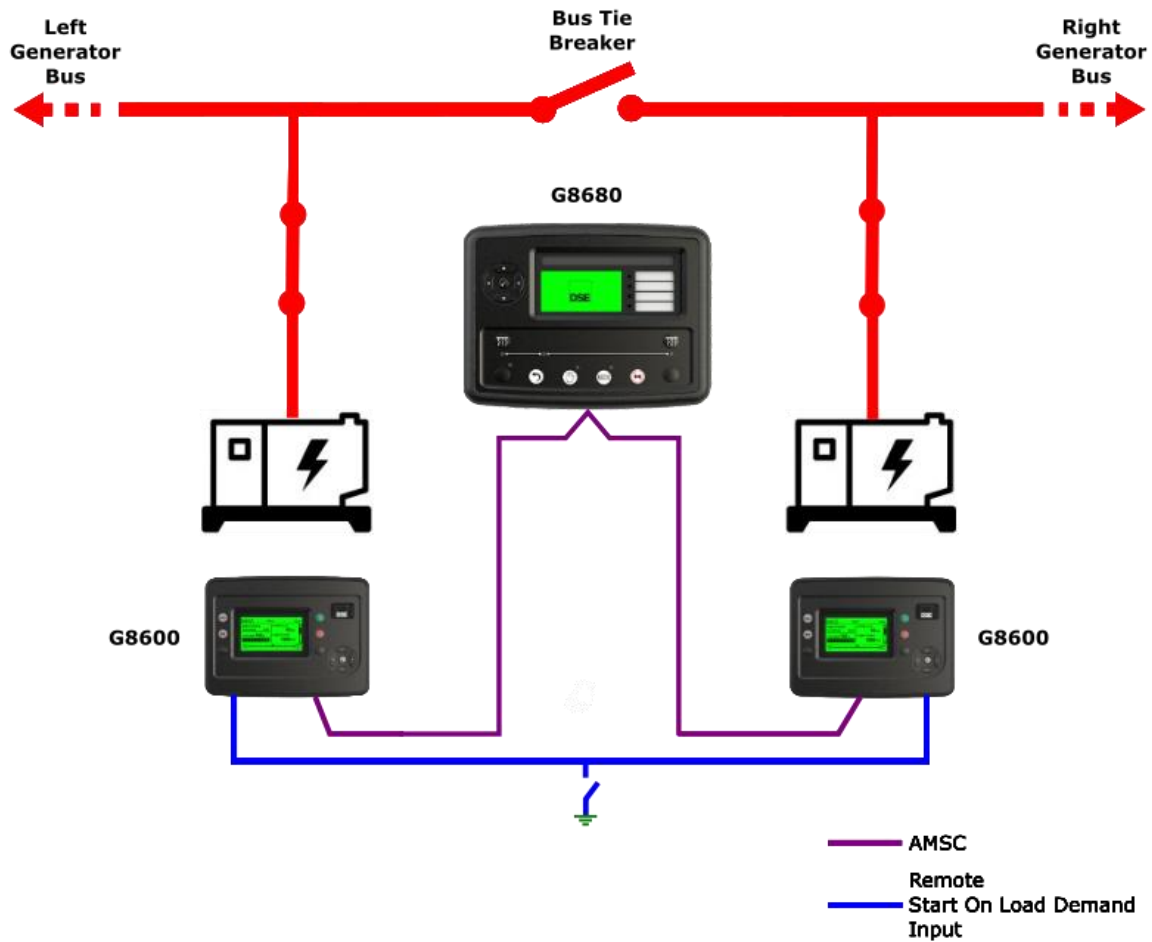


Operation

All generators are started using the Remote Start input and when the generators become available, they close onto a dead bus.

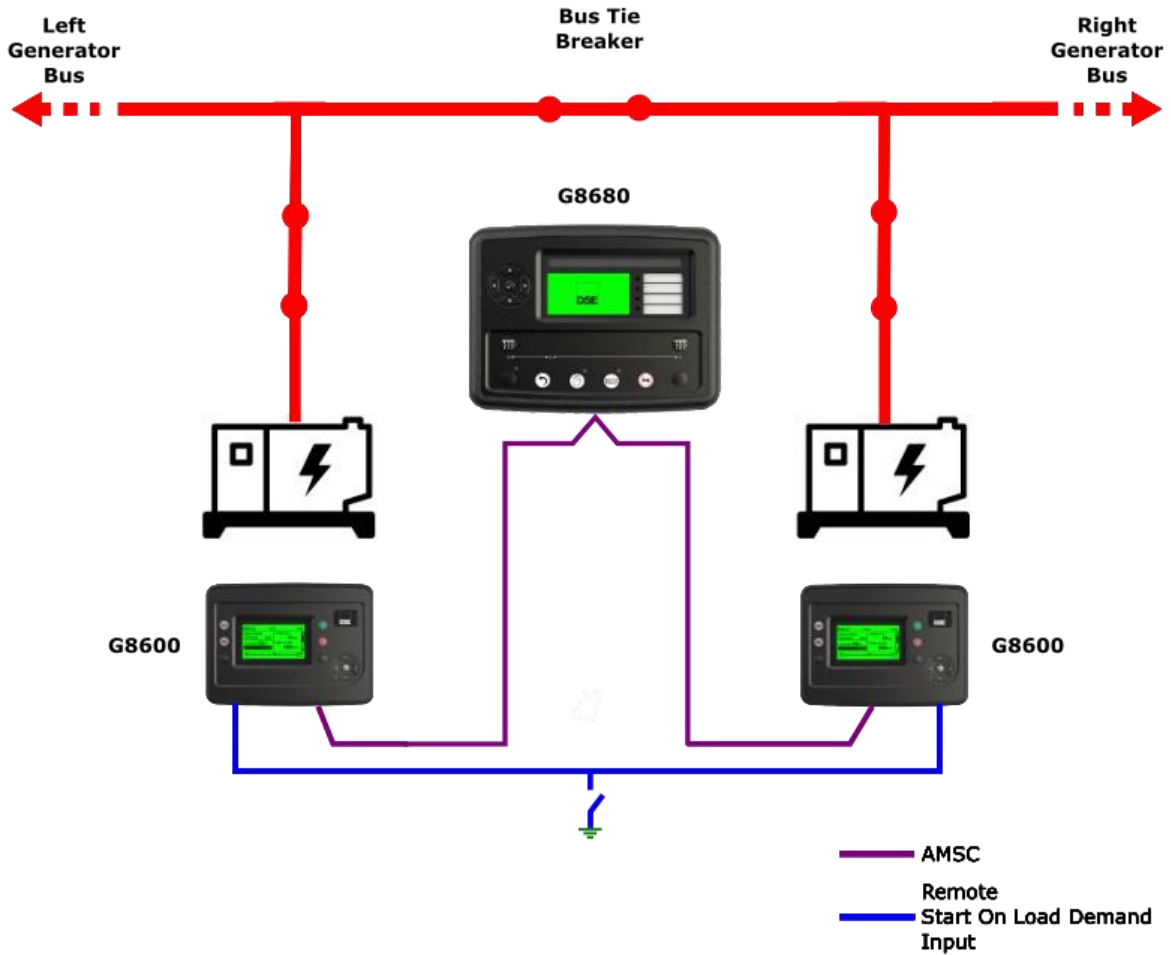
As the DSEG8680 breaker is open, the two sides are separate systems. This means a DSE8600 on either side attains their own token to know it is safe to close onto the dead bus. Both sides of the bus-tie are working independently with the load demand scheme.

[JR7][IR8]



Operation

Before the DSEG8680 is requested to close its breaker it must attain a token that is different to the tokens of the DSEG8600s. Once it has this token it will gain control of one side of the generator bus (depending on configuration) and synchronizes it to the other. Once in sync the DSEG8680 closes its breaker and releases its token and then both sides of the bus are considered as one. If the *Close Bus Input* is removed, the DSEG8680 opens its bus breaker without requiring a token. Once the breaker is open, both sides become independent again and each attain their own token.

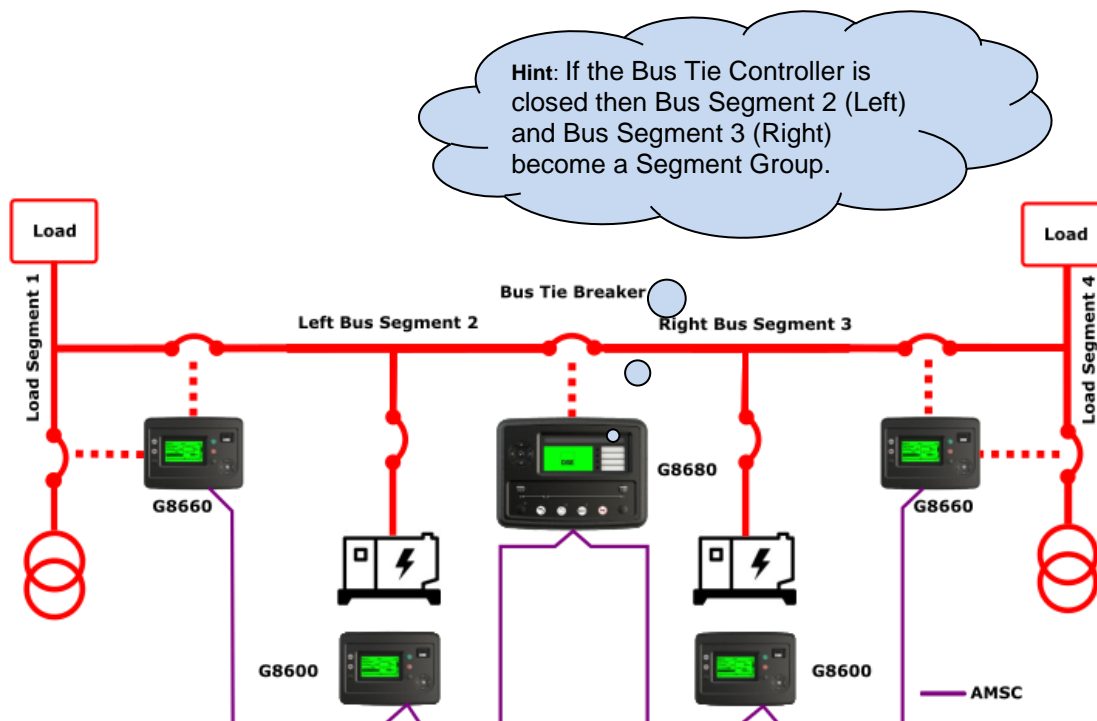


7.3 SEGMENT GROUPS

1. When two or more segments are connected by the closure of one or more breakers, they form a Segment Group.

The Left Segment and Right Segment numbers are used to identify Bus segments. This is illustrated in the example below.

Example



2. Segment Groups are dynamic, being created, destroyed, and altered as the system operates.
3. A Load Share Scheme operates within a single Segment Group.
4. A Load Demand Scheme operates within a single Segment Group.
5. A Segment Group can have one and only one Master Token, though it may have none if no module requires one.
6. A Master Token controls one and only one Segment Group.
7. A module is considered to be in a Segment Group that contains a segment that the module is directly connected to, i.e., it is broadcasting that segment number in its Configuration Broadcast message.
8. All modules must continually perform the task of building a map of the segment groups. This is done using the segment numbers in the Configuration Broadcast message from each module and the state of the bus breakers in the Bus Tie and Mains Controllers. A closed breaker in these modules joins two segment groups to form one larger one.



WARNING! The Left Bus Segment number and Right Bus Segment number cannot be the same! This is critical for safe control!

7.4 BREAKER CLOSING ON DEAD BUSESSES

If one or both sides of the breaker are dead (depending on configuration), and a request to close is active, then the bus tie will attempt to close the breaker without synchronising or ramping.

The controller will first request a control token and once received the bus tie will close the breaker. If the “Bus Closed” auxiliary input fails to indicate that the breaker is closed, the bus tie will open the breaker again and raise an alarm.

The configuration options to allow the bus breaker to close onto a dead bus are:

Disabled: Breaker closing is only enabled if both busses are live.

- Left Bus to Right Bus: Breaker closing is only enabled if the left bus is live (with the right bus dead or live).
- Right Bus to Left Bus: Breaker closing is only enabled if the right bus is live (with the left bus dead or live).
- Either: Breaker closing is only enabled if one or both busses are live.
- Always: Breaker closing is always enabled.

7.5 BREAKER CLOSING ON LIVE BUSESSES

If both sides of the breaker are live, the module will decide on the bus to control as described below.

- If module is in manual mode, then the breaker button that is pressed determines which bus is controlled. If the left button is pressed then generation on the left bus will be controlled to synchronise the busses. Similarly, if the right button is pressed then generation on the right bus is controlled.
- If the breaker is being closed by a GenComm simulated button press message then the decision is the same as above based on whether the left or right breaker button is being simulated.
- If the breaker is being closed by a GenComm control key then the message determines which bus is controlled: Close Left or Close Right.
- If the module is in auto mode and there is a digital input for “Close Bus Tie” and there is another digital input for “Control Right Side of Bus Tie” then this second signal determines which side of the bus tie is controlled when the close signal becomes active; if it is inactive then the left side is controlled, and if its active the right side is controlled.
- If the module is in auto mode and there is a digital input for “Close Bus Tie” and there is no digital input for “Control Right Side of Bus Tie” then a setting in the config determines which side of the bus tie is controlled.

If a suitable bus to control can be determined, the bus tie will negotiate on that bus for the master token, to allow it exclusive generator control.

If the controller fails to get the token in a configured time, an “Unable to Obtain Master Token” alarm is raised.

Two output sources are available to indicate when the master token has been obtained for each side of the breaker. These can be used to drive the user-defined LEDs in order to indicate when a bus is being controlled for ramping or synchronising.

Once the master token is obtained, the tie will synchronise the busses and close the breaker. If the bus tie cannot control a suitable bus for synchronisation, a check-sync will be performed instead to determine if the breaker can be closed.

If a “Bus Closed” auxiliary input fails to indicate that the breaker is closed, the bus tie will open the breaker again and raise an alarm.

Failure to synchronise/check-sync in a configurable time will result in a “failed to Sync” alarm.

7.6 RAMPING ON

At the end of the synchronisation phase, the G8680 will close the bus tie. If there is generation on the busses on both sides of the breaker then the generators will almost certainly be no longer sharing power equally. The bus tie must now equalise the power sharing if it can.

Before closing the breaker, the bus tie will record the overall power levels from the two bus segments, information which is available from the AMSC. Once the bus tie breaker is closed the bus tie will switch the generators on both sides to constant power mode. It will then set new power levels (via the AMSC) for the generators for them to share the load equally (as a percentage of their capability). Once this sharing has been achieved, the bus tie will signal the SEGMENTS_COMBINED flag to indicate that the two power segments are now a single group and will release the master control token. This will allow another module to take control of the combined segment to apply the configured power scheme.

Load Share Ramp			
Ramp Up Rate	<input type="text" value="3.0"/>	%	<input type="range" value="3.0"/> %/s
Ramp Down Rate	<input type="text" value="3.0"/>	%	<input type="range" value="3.0"/> %/s
Maximum Time to Ramp On	<input type="text" value="20s"/>		<input type="range" value="20s"/>
Maximum Time to Ramp Off	<input type="text" value="20s"/>		<input type="range" value="20s"/>

7.7 BREAKER OPENING WITH DEAD BUS

If the bus is dead when a breaker open request is received, the bus tie will attempt to open the breaker

If a "Bus Closed" auxiliary input fails to indicate that the breaker is open, the bus tie will close the breaker again and raise an alarm.

Failure to open the breaker in a configurable time will result in a "Bus Failed to Open" alarm.

Once the breaker is confirmed to be open, the "SEGMENTS_COMBINED" flag will be cleared to signal to the rest of the AMSC network that the busses have now been separated into two segments.

7.8 BREAKER OPENING WITH LIVE BUS

If the bus is live when a breaker open request is received, the bus tie will attempt to ramp one of the busses to reduce the current flow across the breaker to a minimal amount, which can be configured. As described above the bus tie will determine which bus to control based on the configured options and optionally the "Control Right Bus" input.

If a suitable bus to control can be determined, the bus tie will negotiate on that bus for the master token, to allow it exclusive generator control.

If the controller fails to get the token in a configured time, an "Unable to Obtain Master Token" alarm is raised.

7.9 RAMPING OFF

Once the master control token is obtained, the bus tie can attempt to ramp off. This process differs depending on whether the breaker is fitted with a CT.

- If a CT is fitted, the bus tie will ramp the bus being controlled to minimise the measured power through the breaker. Once this minimum is reached (as determined by a minimum power level available through SCADA) the bus tie can open the breaker. It will then separate the two segments (via the AMSC) and release the master control token.
- If there are no CTs fitted that can measure the power through the breaker, the bus tie relies on a configurable power level provided by the user. The bus tie will ramp the bus that it is controlling until the AMSC reports that the power level of the controlled bus matches the pre-set value. At this point the bus tie will open the breaker.


7.10 QUICKSTART GUIDE

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

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


7.10.1 MANUAL MODE



Activate Manual mode by pressing the  pushbutton. An LED indicator beside the button confirms this action. Manual mode allows the operator to open and close the left and right breakers by manually toggling the left and right breaker buttons. The open/close breaker digital input has no effect in MANUAL mode.

7.10.2 AUTOMATIC MODE



Activate auto mode by pressing the  pushbutton. An LED indicator beside the button confirms this action.
Auto mode will allow the DSE8680 to monitor the *open/close breaker* input and control the tie breaker accordingly.
The fascia mounted breaker control button has no effect in AUTO mode.

7.10.3 BREAKER CONTROL BUTTONS (MANUAL MODE)



There are two breaker control buttons, designated the left and right bus buttons. They are only active when the module is operating in manual mode. Their function differs depending on the state of the two busses and the state of the bus tie breaker itself.

- If the bus tie is closed, pressing either breaker button causes an open request to be made.
- If the bus tie is open, and one or more busses are dead, then a close request is made, and the breaker will be closed based on the configuration options in effect (which may prevent closure under various combinations of live and dead busses).
- If the bus tie is open, and both busses are live, then an attempt will be made to synchronise the busses before closing the bus tie. If the left button was pressed, then the left bus will be controlled, and synchronised with the right. If this is not possible (for example if there is a mains supply connected to the left bus or there are no controllable generators on that bus) then an alarm will be raised, and the breaker will not close. Similarly, if the right button is pressed, the right bus will be controlled, and synchronised with the left. The breaker control buttons can also be simulated via GenComm. In that case the button operation is the same.

7.10.4 BUS TIE LED STATUS INDICATIONS

The bus and breaker states are indicated on the front of the module by three green LEDs as follows:

- Left Bus LED: This is illuminated to show that the bus is available.
- Right Bus LED: This is illuminated to show that the bus is available.
- Breaker LED: This shows the state of the breaker auxiliary input.

Note that a bus is available if it has voltage and frequency within the minimum and maximum bus availability settings and can thus be synchronised. If the LED is extinguished, it is outside these ranges.

NOTE: If a bus available LED is extinguished this does not indicate a dead bus.

7.10.5 BREAKER CONTROL

When the breaker is closed using the breaker button (or simulated buttons) the synchronisation direction (left to right or right to left) is determined by which button is pressed. However, when using a digital input or GenComm control key to close the breaker, the direction is not specified. Instead, two user-configurable options and 1 digital input are used to determine the bus to control when synchronising.

- Synchronise left bus to right bus option.
- Synchronise right bus to left bus option.
- “Control Right Bus” digital input.

When “Control Right Bus” digital input is configured, the other options become unavailable, and the controlled bus is determined by whether the signal is active (control right bus) or inactive (control left bus). If that bus cannot be controlled, then an alarm will be raised, and the synchronisation aborted. When “Control Right bus” digital input is not configured, the bus to be controlled is selected by the user options to select left bus or right bus.

The image shows a software interface for checking synchronization. It has a blue header with the text 'Check Sync'. Below the header is a section titled 'Bus To Control'. Underneath this section, there is a label 'Bus To Control' and a dropdown menu. The dropdown menu is currently set to 'Left(V1)' and has a small downward arrow on the right side.

7.10.6 BUS TIE CLOSE REQUEST

A bus tie close request can occur in one of four cases:

- Breaker is open and a front panel breaker control button is pressed, “Bus Close Inhibit” digital input is not active, and module is in manual mode.
- GenComm Control Key “Close Bus” is received and “Bus Close Inhibit” digital input is not active.
- “Close Bus” digital input becomes active, “Bus Close Inhibit” digital input is not active, and module is in auto mode.
- “Bus Close Inhibit” digital input becomes inactive and “Close bus” digital input is active.

7.10.7 BUS TIE OPEN REQUEST

A bus tie open request can occur in one of four cases:

- Breaker is closed and a front panel breaker control button is pressed, and module is in manual mode.
- GenComm Control Key “Open Bus” is received.
- “Close Bus” digital input becomes inactive, and the module is in auto mode.
- “Bus Close Inhibit” digital input becomes active. This will cause the breaker to open immediately without ramping off

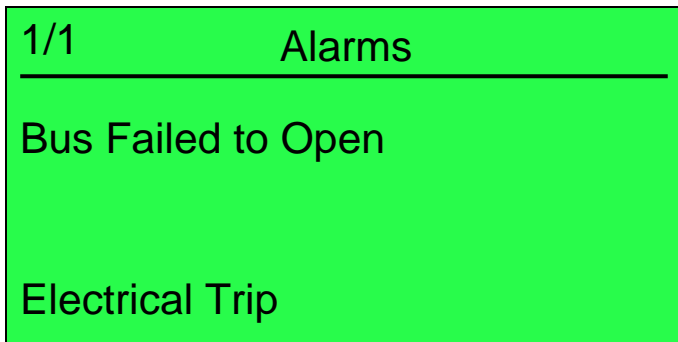
8 PROTECTIONS


8.1 ALARMS

 **NOTE:** For further details of module configuration and available alarms, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.

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

Example



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

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

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

8.2 LED INDICATORS

The LED indicators display non-critical and often status conditions. They do not appear on the LCD display of the module as a text message in the *Status*, *Event Log* or *Alarms* pages. However, an output or LED indicator can be configured to draw the operator's attention to an event.

Example:

- Input configured for indication.
- The LCD text does not appear on the module display but can be added in the configuration to remind the system designer what the input is used for.
- As the input is configured to *Indication* there is no alarm generated.
- LED Indicator 1 illuminates when Digital Input A is active.
- The Insert Card Text allows the system designer to print an insert card detailing the LED function.
- Example showing operation of the LED.

Digital Input A

Function: User Configured

Polarity: Open to Activate

Action: Indication

Arming: Always

LCD Display: Panel Door Open

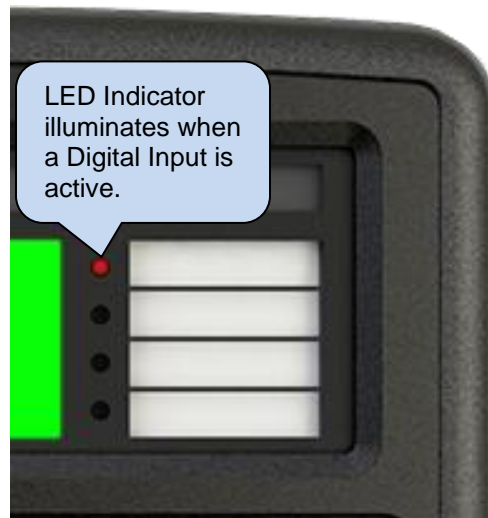
Activation Delay: 0s

LED Indicators

1	Digital Input A	Lit	Panel Door Open
2	Not Used	Lit	
3	Not Used	Lit	
4	Not Used	Lit	

Text Insert

Logo Insert







8.3 WARNING ALARMS

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

Example:

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

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


Fault	Description
2130 ID 1 to 4 Analogue Input E to H High	<div style="border: 1px solid black; padding: 2px;">  NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual. </div> <p>The module detected that an analogue input value of a DSE2130 had risen above the <i>Flexible Sensor High Pre-Alarm Trip</i> level.</p>
2130 ID 1 to 4 Analogue Input E to H Low	<div style="border: 1px solid black; padding: 2px;">  NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual. </div> <p>The module detected that an analogue input value of a DSE2130 had fallen below the <i>Flexible Sensor Low Pre-Alarm Trip</i> level.</p>
2130 ID1 to 4 Digital Input A to H	<div style="border: 1px solid black; padding: 2px;">  NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual. </div> <p>The module detected that a digital input configured to create a fault condition on a DSE2130 expansion module became active and the appropriate LCD message displayed.</p>
2131 ID 1 to 4 Analogue Input A to J High	<div style="border: 1px solid black; padding: 2px;">  NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual. </div> <p>The module detected that an analogue input value of a DSE2131 had risen above the <i>Flexible Sensor High Pre-Alarm Trip</i> level.</p>

Continued over page...

Fault	Description
2131 ID 1 to 4 Analogue Input A to J Low	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that an analogue input value of a DSE2131 had fallen below the <i>Flexible Sensor Low Pre-Alarm Trip</i> level.</p>
2131 ID 1 to 4 Analogue Input A to J	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that a digital input configured to create a fault condition on a DSE2131 expansion module became active and the appropriate LCD message displayed.</p>
2133 ID 1 to 4 Analogue Input A to H High	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that an analogue input value of a DSE2133 had risen above the <i>Flexible Sensor High Pre-Alarm Trip</i> level.</p>
2133 ID 1 to 4 Analogue Input A to H Low	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that an analogue input value of a DSE2133 had fallen below the <i>Flexible Sensor Low Pre-Alarm Trip</i> level.</p>
Battery Detect Failure	The module detected that a battery charger connected by DSENet® had issued a <i>Battery Detect Failure</i> alarm.
Battery Failure Detection Output 1	The module detected that a battery charger connected by DSENet® had issued a <i>Battery Failure Detection</i> alarm on its Output 1.
Battery Failure Detection Output 2	The module detected that a battery charger connected by DSENet® had issued a <i>Battery Failure Detection</i> alarm on its Output 2.
Battery High Current Output 1	The module detected that a battery charger connected by DSENet® had issued a <i>Battery High Current</i> alarm on its Output 1.
Battery High Current Output 2	The module detected that a battery charger connected by DSENet® had issued a <i>Battery High Current</i> alarm on its Output 2.
Battery High Temperature Output 1	The module detected that a battery charger connected by DSENet® had issued a <i>Battery High Temperature</i> alarm on its Output 1.
Battery High Temperature Output 2	The module detected that a battery charger connected by DSENet® had issued a <i>Battery High Temperature</i> alarm on its Output 2.
Battery High Voltage IEEE 37.2 – 59 DC Overvoltage Relay	The module detected that its DC supply voltage had risen above the <i>Plant Battery Overvolts Warning Trip</i> level for the configured delay timer.

Continued over page...

Protections

Fault	Description
Battery High Voltage Output 1	The module detected that a battery charger connected by DSENet® had issued a <i>Battery High Voltage</i> alarm on its Output 1.
Battery High Voltage Output 2	The module detected that a battery charger connected by DSENet® had issued a <i>Battery High Voltage</i> alarm on its Output 2.
Battery Low Voltage IEEE 37.2 – 27 DC Undervoltage Relay	The module detected that its DC supply voltage had fallen below the <i>Plant Battery Undervolts Warning Trip</i> level for the configured delay timer.
Battery Low Voltage Output 1	The module detected that a battery charger connected by DSENet® had issued a <i>Battery Low Voltage</i> alarm on its Output 1.
Battery Low Voltage Output 2	The module detected that a battery charger connected by DSENet® had issued a <i>Battery Low Voltage</i> alarm on its Output 2.
Battery Temperature Sensor Fail Output 1	The module detected that a battery charger connected by DSENet® had issued a <i>Battery Temperature Fail</i> alarm on its Output 1.
Battery Temperature Sensor Fail Output 2	The module detected that a battery charger connected by DSENet® had issued a <i>Battery Temperature Fail</i> alarm on its Output 2.
Bus Asymmetry High	The module detected the bus voltage asymmetry had risen above the configurable <i>Trip</i> level for the configured delay timer.
Bus Over Negative Sequence	The module detected the bus voltage negative sequence had risen above the configurable <i>Trip</i> level for the configured delay timer.
Bus Over Zero Sequence	The module detected the bus voltage zero sequence had risen above the configurable <i>Trip</i> level for the configured delay timer.
Bus Under Positive Sequence	The module detected the bus voltage positive sequence had fallen below the configurable <i>Trip</i> level for the configured delay timer.
Calibration Fault	The module detected that its internal calibration has failed. The unit must be sent back to DSE to be investigated and repaired. Contact DSE Technical Support for more details.
Charger Fan Locked	The module detected that a battery charger connected by DSENet® had a <i>Charger Failure</i> alarm.
Charger High Temperature	The module detected that a battery charger connected by DSENet® had a High Temperature alarm.
Charger Mains High Current	The module detected that a battery charger connected by DSENet® had a <i>Mains High Current</i> alarm.
Charger ID 0 to 3 Common Warning	 NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite Software Manual.
	The module detected that a battery charger connected by DSENet® had issued a <i>Common Warning Alarm</i> .
Charger Mains High Voltage	The module detected that a battery charger connected by DSENet® had a <i>Mains High Voltage</i> alarm.
Charger Mains Low Voltage	The module detected that a battery charger connected by DSENet® had a <i>Mains Low Voltage</i> alarm.
Charger Voltage Drop Charging Cable Output 1	The module detected that a battery charger connected by DSENet® had issued a <i>Voltage Drop Charging Cable</i> alarm on its Output 1.
Charger Voltage Drop Charging Cable Output 2	The module detected that a battery charger connected by DSENet® had issued a <i>Voltage Drop Charging Cable</i> alarm on its Output 2.

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Fault	Description
Digital Input A to L	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that a digital input configured to create a fault condition became active and the appropriate LCD message is displayed.</p>
Exp. Unit Failure	The module detected communications to one of the DSENet® expansion modules had been lost.
Fail To Sync	If the module cannot synchronise within the time allowed by the Synchronising timer a warning is initiated. The LCD indicates <i>Failed To Sync</i> .
FRT event	The module activated the <i>Fault Ride Through</i> event
Insufficient Capacity	If the generator bus reaches full load when they are in parallel with the mains. The LCD indicates <i>Insufficient Capacity</i> .
AMSC Alarms Inhibited	The module detected that an input configured for <i>AMSC Alarms Inhibit</i> had become active disabling all the AMSC alarms.
AMSC 1 and 2 Failure	That module detected that the AMSC and Redundant AMSC communication failed, most likely caused by it being disconnected.
AMSC 1 Data Error	The module detected that data on the AMSC link had become corrupt, possibly caused by incorrect wiring or faulty cabling.
AMSC 1 Link Failure	That module detected that the AMSC communication failed, most likely caused by it being disconnected.
AMSC 1 Too Few Sets	That module detected that the number of modules on the AMSC was less then the configured <i>Minimum Modules on AMSC Link</i> setting.
AMSC 2 Data Error	The module detected that data on the Redundant AMSC link had become corrupt, possibly caused by incorrect wiring or faulty cabling.
AMSC 2 Link Failure	That module detected that the Redundant AMSC communication failed, most likely caused by it being disconnected.
AMSC 2 Too Few Sets	That module detected that the number of modules on the Redundant AMSC was less then the configured <i>Minimum Modules on AMSC Link</i> setting.

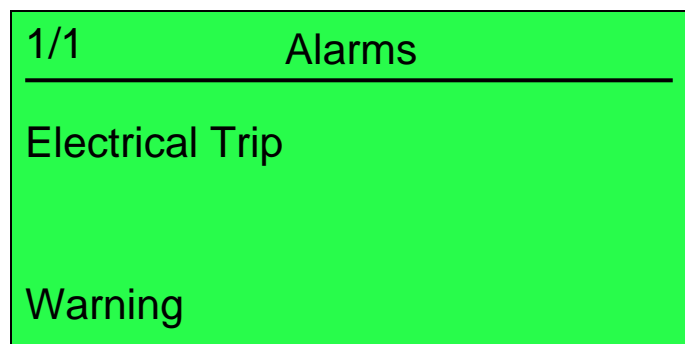
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8.4 ELECTRICAL TRIP ALARMS

▲ NOTE: The fault condition must be resolved before the alarm can be reset. If the fault condition remains, it is not possible to reset the alarm.

Electrical Trip Alarms are latching and stop the Bus Tie but in a controlled manner.. To restart the Bus Tie controller the fault must be cleared, and the alarm reset.

Example:



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

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

Fault	Description
2130 ID 1 to 4 Analogue Input E to H High	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that an analogue input value of a DSE2130 had risen above the <i>Flexible Sensor High Alarm Trip</i> level.</p>
2130 ID 1 to 4 Analogue Input E to H Low	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that an analogue input value of a DSE2130 had fallen below the <i>Flexible Sensor Low Alarm Trip</i> level.</p>
2130 ID1 to 4 Digital Input A to H	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that a digital input configured to create a fault condition on a DSE2130 expansion module became active and the appropriate LCD message displayed.</p>

Continued over page...


Fault	Description
2131 ID 1 to 4 Analogue Input A to J High	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that an analogue input value of a DSE2131 had risen above the <i>Flexible Sensor High Alarm Trip</i> level.</p>
2131 ID 1 to 4 Analogue Input A to J Low	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that an analogue input value of a DSE2131 had fallen below the <i>Flexible Sensor Low Alarm Trip</i> level.</p>
2131 ID1 to 4 Digital Input A to J	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that a digital input configured to create a fault condition on a DSE2131 expansion module became active and the appropriate LCD message displayed.</p>
2133 ID 1 to 4 Analogue Input A to H High	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that an analogue input value of a DSE2133 had risen above the <i>Flexible Sensor High Alarm Trip</i> level.</p>
2133 ID 1 to 4 Analogue Input A to H Low	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite PC Software Manual.</p> <p>The module detected that an analogue input value of a DSE2133 had fallen below the <i>Flexible Sensor Low Alarm Trip</i> level.</p>
Bus Asymmetry High	The module detected the bus voltage asymmetry had risen above the configurable <i>Trip</i> level for the configured delay timer.
Bus Failed To Close	If the bus controller fails to close, the LCD indicates <i>Bus Failed To Close</i> .
Bus Failed To Open	If the bus controller fails to open, the LCD indicates <i>Bus Failed To Open</i> .
Bus Over Negative Sequence	The module detected the bus voltage negative sequence had risen above the configurable <i>Trip</i> level for the configured delay timer.
Bus Over Zero Sequence	The module detected the bus voltage zero sequence had risen above the configurable <i>Trip</i> level for the configured delay timer.
Bus Phase Sequence	The module detected a bus phase rotation error, an electrical trip is initiated. The LCD indicates <i>Bus Phase Seq Wrong</i> .

Continued over page...

Fault	Description
Bus Under Positive Sequence	The module detected the bus voltage positive sequence had fallen below the configurable <i>Trip</i> level for the configured delay timer.
Calibration Fault	The module detected that its internal calibration has failed. The unit must be sent back to DSE to be investigated and repaired. Contact DSE Technical Support for more details.
Charger ID 0 to 3 Common Electrical Trip	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite Software Manual.</p>
	The module detected that a battery charger connected by DSENet® had issued a <i>Common Electrical Trip Alarm</i> .
Charger Failure	The module detected that a battery charger connected by DSENet® had a <i>Charger Failure</i> alarm.
Charger Fan Locked	The module detected that a battery charger connected by DSENet® had a <i>Charger Failure</i> alarm.
Charger High Temperature	The module detected that a battery charger connected by DSENet® had a <i>High Temperature</i> alarm.
Charger Input Fuse Fail	The module detected that a battery charger connected by DSENet® had an <i>Input Fuse Fail</i> alarm.
Charger Mains High Current	The module detected that a battery charger connected by DSENet® had a <i>Mains High Current</i> alarm.
Charger Mains High Voltage	The module detected that a battery charger connected by DSENet® had a <i>Mains High Voltage</i> alarm.
Charger Mains Low Voltage	The module detected that a battery charger connected by DSENet® had a <i>Mains Low Voltage</i> alarm.
Charger Reverse Polarity	The module detected that a battery charger connected by DSENet® had a <i>Reverse Polarity</i> alarm.
Charger Short Circuit	The module detected that a battery charger connected by DSENet® had a <i>Short Circuit</i> alarm.
Charger Short Circuit / Reverse Polarity	The module detected that a battery charger connected by DSENet® had a combined <i>Short Circuit</i> and <i>Reverse Polarity</i> alarm.
Combined Mains Decoupling	The module detected that the mains supply failed when the generator was in parallel with it.
Digital Input A to L	<p>▲ NOTE: Due to module configuration the alarm message that appears on the display may be different. For further details of module configuration, refer to DSE Publication: 057-326 DSEG8680 Configuration Suite Software Manual.</p>
	The module detected that a digital input configured to create a fault condition became active and the appropriate LCD message is displayed.
Exp. Unit Failure	The module detected communications to one of the DSENet® expansion modules had been lost.
Fail to Synchronise	The module failed to synchronise the generator before the <i>Fail to Sync Delay</i> timer had expired.

Continued over page...

Protections

Fault	Description
AMSC ID Error	The module detected that another module on the AMSC link had the same <i>GenSet AMSC ID</i> configured.
AMSC Old Version Unit	The module detected that another module on the AMSC link was incompatible. Check all the module firmware version numbers (under <i>About Application Number</i> on the modules' displays) and ensure all are the latest version firmware. Use the DSE Configuration Suite Software to upgrade the firmware (<i>Tools Update Firmware</i>) of the older modules.
AMSC 1 and 2 Failure	That module detected that the AMSC and Redundant AMSC communication failed, most likely caused by it being disconnected.
AMSC 1 Link Failure	That module detected that the AMSC communication failed, most likely caused by it being disconnected.
AMSC 1 Too Few Sets	That module detected that the number of modules on the AMSC was less then the configured <i>Minimum Modules on AMSC Link</i> setting.
AMSC 2 Link Failure	That module detected that the Redundant AMSC communication failed, most likely caused by it being disconnected.
AMSC 2 Too Few Sets	That module detected that the number of modules on the Redundant AMSC was less then the configured <i>Minimum Modules on AMSC Link</i> setting.
Out Of Sync Bus	 NOTE: For further details, refer to DSE Publication: 056-047 Out of Sync and Failed to Close Training Document.
	If the module detects that the generator bus supply is not in sync when the controller is closed. The LCD indicates <i>Out Of Sync Bus</i> .
Priority Selection Error	If the module detects that another DSEG8680 or DSE8680 shares the same priority number, an electrical trip is initiated. The LCD indicates <i>Priority Selection Error</i> .

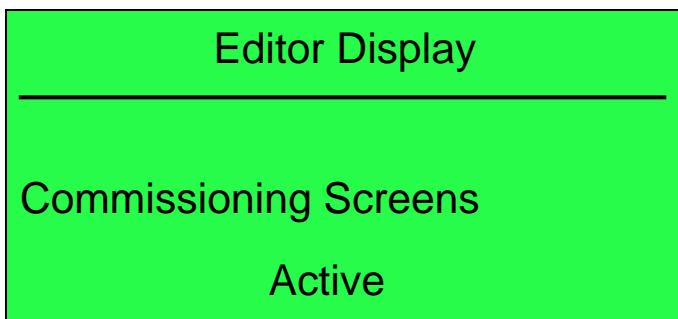
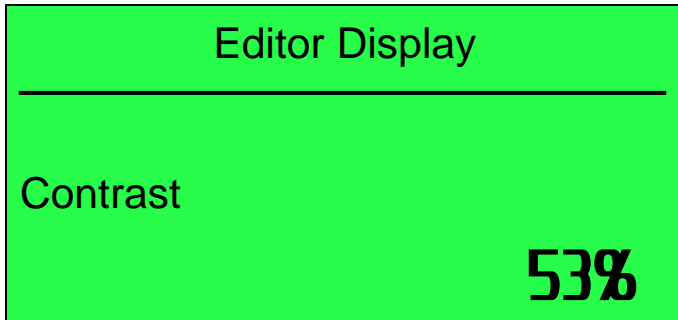
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9 'RUNNING' CONFIGURATION EDITOR

9.1 ACCESSING THE 'RUNNING' CONFIGURATION EDITOR






NOTE: Depending upon module configuration, some parameters in the 'Running' Editor may not be available. For more information refer to DSE publication *057-151 DSEG8680 Configuration Suite PC Software Manual* available from www.deepseaelectronics.com

- The 'Running' Configuration Editor is accessible without stopping the engine. All protections remain active whilst using the 'Running' Configuration Editor.




9.2 EDITING A PARAMETER

NOTE: Pressing and holding the *Menu Navigation* buttons provides the auto-repeat functionality. Values can be changed quickly by holding the navigation buttons for a prolonged period.

- Press and hold the **Tick**  button for 5 seconds to access the editor.
- Press the **.Scroll**  buttons to select parameter.
- Press the **Tick**  button to adjust the value (flashing) using the **.Scroll**  buttons
- Press the **Tick**  button save the changes.

9.3 EXITING THE ‘RUNNING’ CONFIGURATION EDITOR

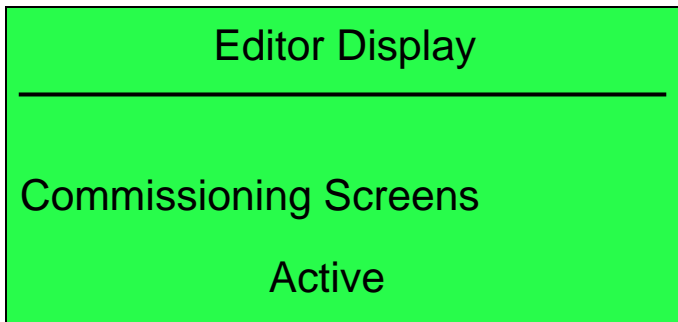
NOTE: The editor automatically exits after 5 minutes of inactivity to ensure security.





- Press and hold the **Tick**  button for 5 seconds to exit the editor and save the changes.

9.4 ‘RUNNING’ CONFIGURATION EDITOR PARAMETERS

Section	Parameter As Shown On Display	Values
Display Settings	Contrast	75 %
	Language	English, Other

9.5 ACTIVATING THE COMMISSIONING SCREENS



- Press the **Scroll**  buttons to select Commissioning Screens parameter.
- Press the **Tick**  button to adjust the value (flashing) using the **Scroll**  buttons
- Press the **Tick**  button save the changes

10 COMMISSIONING

10.1 BASIC CHECKS

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

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

Check all mechanical parts are fitted correctly and that all electrical connections (including earths) are good. The unit **DC** supply is fused and connected to the battery and that it is of the correct polarity.

Check the operation of the AMSC Link. Use the DSE Configuration Suite to check this in the *SCADA | BUS | AMSC Link* page. Verify the number of *Set On The Bus* is equal to that of the number of DSEG86xx modules.


Set the modules internal clock/calendar to ensure correct operation of the scheduler and event logging functions. For details of this procedure, see section entitled *Front Panel Configuration*

If, despite repeated checking of the connections between the controller and the customer's system, satisfactory operation cannot be achieved, then the customer is requested to the DSE Technical Support Department

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

10.2 METERING

 **CAUTION!** Failure to perform the Metering steps results in incorrect power factor and kW calculations leading to problems with kW and kvar load sharing if not corrected.


 **WARNING!** Steps must be taken to ensure that when a CT is open circuit, the system/generator is in a safe state to work around.

10.2.1.1 CTS ON THE RIGHT PHASE

Check to ensure that the CTs on L1, L2 & L3 are connected to their respective connection on the DSE module.

This is tested by loading the bus with a purely resistive load (around 10% of the main's size) across the three phases. If the CTs are wired correctly to the DSE module, it displays unity power factor (1.0 pf) across all three phases. If unity power factor is not displayed the CTs have been wired to the wrong phases on the DSE module.

10.2.1.2 CTS IN THE RIGHT DIRECTION

 **NOTE:** Checking that the CTs are on the right phase **MUST** be completed prior to checking if the CTs are in the correct direction. CTs on the wrong phase also cause negative kW.

Check to ensure that the CTs on L1, L2 & L3 have been mounted for the correct orientation for current flow and that the S1 and S2 have not been swapped over.

This is tested by loading the bus with a purely resistive load (around 10% of the main's size) across the three phases. If the CTs' S1 and S2 are wired to correctly to the DSE module, it displays positive kW. If negative kW is displayed the CTs' S1 and S2 have been swapped around.

10.3 COMMUNICATIONS

⚠ CAUTION! Failure to perform the Communications steps results in the controllers being unable to communicate to the other DSE controllers leading to problems during load sharing.

🔍 NOTE: For further details of module configuration, refer to DSE Publication: *057-326 DSEG8680 Configuration Suite Software Manual*.

Check to ensure that all the modules are connected are communicating correctly on the AMSC link and Redundant AMSC (if used).

This is tested by connecting the DSE module to a PC with the DSE Configuration Suite PC Software installed and going to the *SCADA | Bus | AMSC Link* section. The information shown in this section changes dynamically depending on whether the AMSC Link or Redundant AMSC Link is in use. The number of *Sets On The Bus* must be the same as the number of DSEG8600 (Multi Set)s on the link. The number of *Mains Controllers On The Bus* must be the same as the combined number of DSEG8660s in Mains Controller mode.

Left Bus		Right Bus	
Sets On The Bus	0	Sets On The Bus	0
Mains Controllers On The Bus	0	Mains Controllers On The Bus	0
Bus Tie Controllers On The Bus	1	Bus Tie Controllers On The Bus	1
Group Controllers On The Bus	0	Group Controllers On The Bus	0
Segment Number	1	Segment Number	2

If these numbers do not match up there is a fault on the active link. To find the module with the fault, connect into each module individually until the *Sets On The Bus* or *Mains Controllers On The Bus* reports 1.

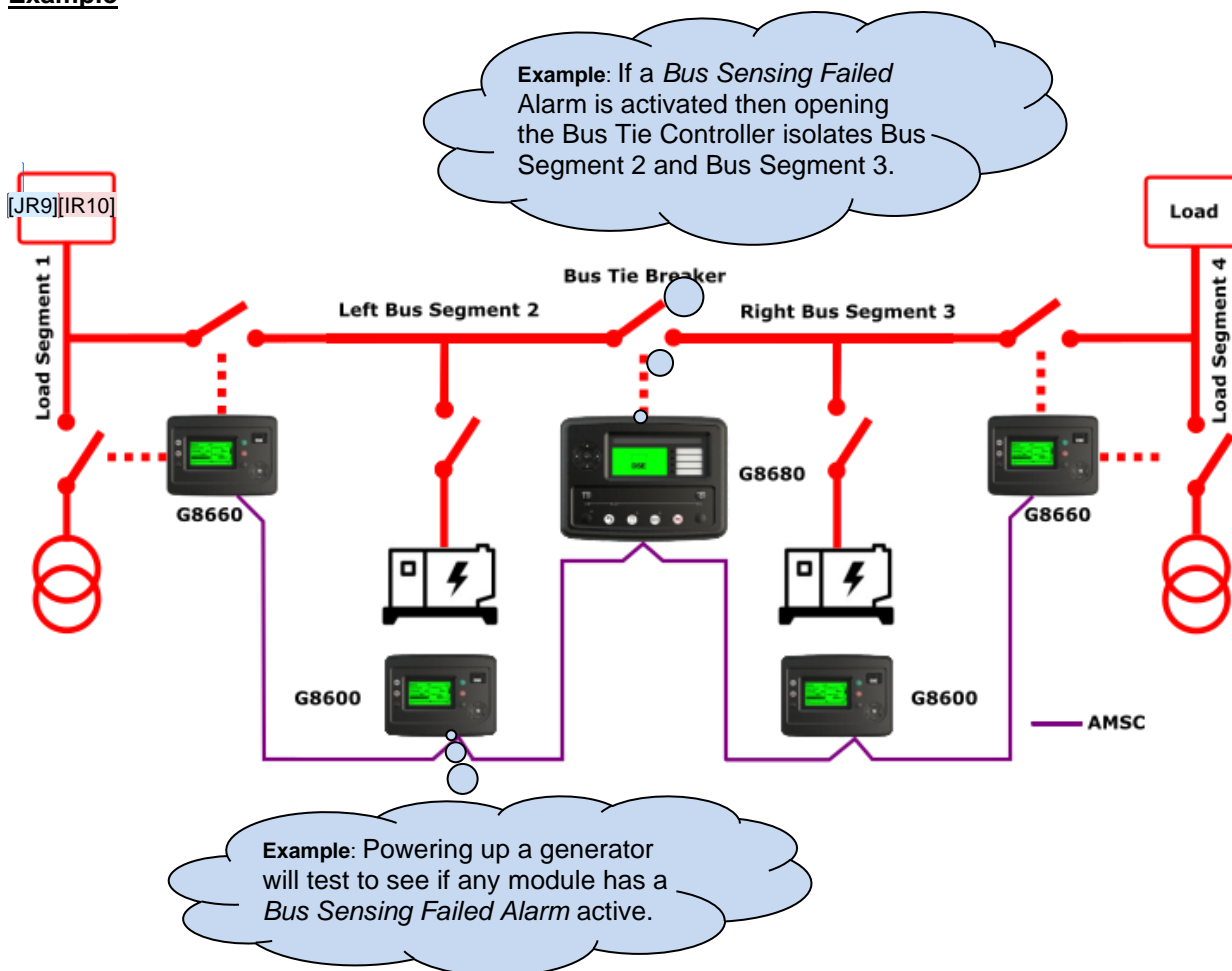
If these numbers do match up, then the link which is currently in use is working correctly. To test the other link, remove the active link connection from any module. All the modules should then alarm with the same number link failure (*AMSC 1 Link Failure* or *AMSC 2 Link Failure*). If all the modules do not have the same number link failure, then at some point the AMSC and CAN connections have been crossed. If all the modules do have the same number link failure, the communication is automatically transferred onto the other link. Check the numbers in SCADA again to ensure the other link is operating correctly.

10.4 SEGMENTATION OF THE BUS

The G Series allows the system to act locally and allows each isolated section to work either independently or as part of combined system. For this to be safe it is vitally important that the segmentation is set up correctly.

When a Bus Sensing Failed alarm is activated, it is important that each segment is isolated and that breakers (G8660 bus breakers and G8680 ties) are opened.

Example




To check each segment is live, a generator needs to be powered up to ensure that there are no modules with the Bus Sensing Failed alarm that are active. This ensures that there are no modules on a different segment that have this segment ID. See section 3.8.5.2 in document 057-324 entitled DSEG8660 Configuration Suite PC Software Manual for further information.

The user must then disconnect each module's bus sensing on this segment and check that the alarm occurs, this confirms that the modules on this segment are correctly configured.



**WARNING!: The Bus Segment number and Load Segment number cannot be the same!
This is critical for safe control!**

11 FAULT FINDING

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

11.1 STARTING

Symptom	Possible Remedy
Unit is inoperative Read/Write configuration does not operate	Check: <ul style="list-style-type: none"> • The battery and wiring to the unit. • The DC supply. • The DC fuse.
Unit shuts down	Check: <ul style="list-style-type: none"> • DC supply voltage is not above 35 V or below 8 V • The operating temperature is not above 70 °C. • The DC fuse.

11.2 INSTRUMENTS

Symptom	Possible Remedy
Inaccurate measurements on controller display	<p>Check:</p> <ul style="list-style-type: none"> • That the CT primary, CT secondary and VT ratio settings are correct for the application. • That the CTs are wired correctly with regards to the direction of current flow (p1,p2 and s1,s2) and additionally ensure that CTs are connected to the correct phase (errors occur if CT1 is connected to phase 2). • Remember to consider the power factor: (kW = kV A x Power Factor) • The DSE8xxx MKII modules are true RMS measuring so gives more accurate display when compared with an 'averaging' meter such as an analogue panel meter or some lower specified digital multimeter. • Accuracy of the controller is better than 1% of full scale. Voltage full scale is 415 V AC ph-N so accuracy is ± 4.15 V (1% of 415 V).

11.3 LOADING

Symptom	Possible Remedy
Bus does not take load	<p>Check:</p> <ul style="list-style-type: none"> • The generator bus available LED is lit • That the output configuration is correct to drive the generator bus switch and that all connections are correct.
Inaccurate measurements on controller display	<p>Check:</p> <ul style="list-style-type: none"> • That the CT primary, CT secondary and VT ratio settings are correct for the application. • That the CTs are wired correctly with regards to the direction of current flow (p1,p2 and s1,s2) and additionally ensure that CTs are connected to the correct phase (errors occur if CT1 is connected to phase 2). • Remember to consider the power factor: (kW = kV A x Power Factor) • The DSE8xxx MII modules are true RMS measuring so gives more accurate display when compared with an 'averaging' meter such as an analogue panel meter or some lower specified digital multimeter. • Accuracy of the controller is better than 1% of full scale. Voltage full scale is 415 V AC ph-N so accuracy is ± 4.15 V (1% of 415 V).


11.4 COMMUNICATIONS

Symptom	Possible Remedy
RS485 inoperative	Check: <ul style="list-style-type: none"> • Connection cable – Belden 9841 or equivalent • 120 Ω termination resistors are correctly fitted • Baud rate of controller and of master device are the same • Slave ID of the controller is the same as configured in the master device
DSENet inoperative	Check: <ul style="list-style-type: none"> • Connection cable – Belden 9841 or equivalent • 120 Ω termination resistors are correctly fitted to the last expansion module only. • Slave ID of the expansion module is the same as configured in the module's configuration.
Ethernet comms direct to PC inoperative	Check: <ul style="list-style-type: none"> • Ethernet rated cable is used • Check the IP address of the DSE controller is correct • Check the PC is not set to obtain IP address automatically • Check PC firewall allows traffic on the configured port.
Ethernet connected to a router.	Check: <ul style="list-style-type: none"> • Ethernet rated cable is used • Check the IP address of the DSE controller is correct • Check all firewalls and routers allow traffic on the configured port. • Test the controller connected directly to a PC for test purposes to eliminate router problems.

11.5 SYNCHRONISING & LOAD SHARING

Symptom	Possible Remedy
Synchronising not available	Check Synchronising is enabled in the configuration suite software Generator, Synchronising section
Generator does not loadshare correctly	Ensure that all the DSE Four Steps to Synchronising have been completed. Check kW Share & kvar Share are enabled, check generator rating is correctly configured in the DSE configuration suite PC Software and check the AMSC link is connected correctly.
Synchronising or load sharing is not operating satisfactorily	Follow the DSE "4 Steps To Synchronising" as detailed in the following section.

11.6 MISCELLANEOUS

Symptom	Possible Remedy
Module appears to 'revert' to an earlier configuration	<p>When editing a configuration using the PC software it is vital that the configuration is first 'read' from the controller before editing it. This edited configuration must then be "written" back to the controller for the changes to take effect.</p> <p>When editing a configuration using the fascia editor, be sure to exit the editor by pressing Tick  button to save changes</p>

12 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, contact your original equipment manufacturer (OEM).








12.1 PURCHASING ADDITIONAL CONNECTOR PLUGS FROM DSE

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


12.1.1 PACK OF PLUGS

Module Type	Plug Pack Part Number
DSEG8680	007-1075

12.1.2 INDIVIDUAL PLUGS

Module Terminal Designation	Plug Description	Part No.
1 to 14  D+W/L	14-way 5.08 mm	007-428
26 to 34  AMSC1 AMSC2	9-way 5.08 mm	007-167
40 to 47  L	8-way 7.62 mm	007-454
48 to 51  R	4-way 7.62 mm	007-171
52 to 58 	5-way 5.08 mm	007-445
59 to 70 	12-way 5.08 mm	007-109
71 to 76 RS485 Port 1	6-way 5.08 mm	007-446
	PC Configuration interface lead (USB type A – USB type B)	016-125








12.1.3 PURCHASING ADDITIONAL FIXING CLIPS FROM DSE

Item	Description	Part No.
	Module Fixing Clips (Packet of 4)	020-294

12.2 DSENET® EXPANSION MODULES

NOTE: A maximum of twenty (20) expansion modules can be connected to the DSEG8680 DSENet® Port

NOTE: DSENet® utilises an RS485 connection. Using Belden 9841 (or equivalent) cable allows for the expansion cable to be extended to a maximum of 1.2 km. DSE Stock and supply Belden 9841 cable. DSE Part Number 016-030.

Item	Max No. Supported	Description	DSE Part Numbers		
			Model Order Number	Operator Manual	Installation Instructions
	4	Model DSE2130 input module provides additional analogue and digital inputs for use with the controller.	2130-00	055-060	057-082
	4	Model DSE2131 Ratio-metric input expansion module provides additional restive, digital, 0-10V and 4-20ma inputs for use with the controller.	2131-00	055-115	057-139
	4	Model DSE2133 RTD/Thermocouple input expansion module provides additional RTD and thermocouple inputs for use with the controller.	2133-00	055-114	057-140
	4	Model DSE2152 Ratio-metric output expansion module provides additional 0-10V and 4-20ma outputs for use with the controller.	2152-00	055-112	057-141
	10	Model DSE2157 expansion relay module provides eight additional voltage free relays for use with the controller	2157-00	055-061	057-083
	10	Model DSE2548 expansion LED module provides additional LED indications, internal sounder, and remote lamp test/alarm mute for use with the controller.	2548-00	057-084	053-032
	4	DSE Intelligent Battery Charger monitored by the controller	Various DSE Intelligent Battery Chargers are supported, contact DSE Technical Support; support@deepseaelectronics.com for further details.		

13 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)

14 DISPOSAL

14.1 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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