DEEP SEA ELECTRONICS

DSEM812 Installation and Operator Manual

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DSEM812 Installation and Operator Manual

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1 Introduction

This document details the Installation, Setup and Operation requirements of the DSEM812 Controller and Display, part of the DSEControl® range of products.

The manual forms part of the product and should be kept for the entire life of the product. If the product is passed or supplied to another party, ensure that this document is passed to them for reference purposes.
This is not a *controlled document.* DSE do not automatically inform on updates. Any future updates of this document are included on the DSE website at www.deepseaelectronics.com

Observe the operating instructions. Non-observance of the instructions, operation not in accordance with use as prescribed below, wrong installation or incorrect handling seriously affects the safety of the product, operators and machinery.

A robust metal case designed for chassis mounting houses the module. Connections are via locking plug and sockets.

The controller is supplied with no application program. The equipment manufacturer is responsible for creating and managing the application program and installing it in the controller. This is achieved using CODESYS V3.5 or Qt programming depending upon product variant. Contact DSE Technical Support for further details.

Variants of the device exist to provide an option with fascia mounted push buttons. All variants include a capacitive touch screen.





1.1 CLARIFICATION OF NOTATION

Clarification of notation used within this publication.

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

1.2 GLOSSARY OF TERMS

Term	Description
Application	The application is the program that allows the DSEM812 to control the machine it is connected to. The Application within the DSEM812 is designed and provided by the manufacturer of the complete machine.
Bootloader	The Bootloader is the program within the DSEM812 responsible for loading the Operating System.
CAN	Control Area Network. A high-speed data transmission system used extensively within the Automotive and Off-Highway industries.
CODESYS (Previously stylised as CoDeSys)	Integrated Development Environment for programming controller applications according to the international industrial standard IEC 61131-3. DSEM812 supports CODESYS V3.5
ECU	Electronic Control Unit. For example,the DSEM812 device.
Firmware	The Firmware of the DSEM812 is the Operating System of the DSEM812 that reads and executes the Application program.
FSD	Full Scale Deflection. For example,0 mA to 20 mA is the Full Scale Deflection of a current sink input.
I/O	Input / Output. For example,“The I/O is taken out to an external terminal strip in the user panel”.
IDE	Integrated Development Environment. For example,the CODESYS V3.5 application that runs on the host PC is an IDE.
Ixyyy	An Input, where x is the connector and yyy is the input number. For example,IC003 means Input 3 on Connector C.
PLC	Programmable Logic Controller. Industrial computer used primarily for the automation of electromechanical machinery.
PWM PWMi	A digital signal is used to represent an analogue value by using Pulse Width Modulation. The mark-space ratio of a square wave changes to represent the value. Used for many control applications including proportional valves. PWM= Voltage control. PWMi = Current control.
Off-Highway	An industrial vehicle used primarily “off road”. For example,construction and farm machinery. A wider interpretation includes on road access platforms, emergency vehicles and other industrial machinery, used either on the road, or off road.
Pin	A male or female pin connection in a housing (plug or socket).
Qxyyy	An Output, where x is the connector and yyy is the output number. For example,QC002 means Output 2 on Connector C.

1.3 RELATED INFORMATION

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 TECHNICAL INFORMATION

DSE Part	Description
055-267	DSEM812 Datasheet
057-318	DSEM812 CODESYS Manual
057-319	DSEM812 Qt Manual

1.4 SAFETY INSTRUCTIONS

1.4.1 GENERAL

- These instructions are for authorised persons according to the EMC and low-voltage directives. The device must be installed, connected and put into operation by a qualified electrician.

- It is not permissible to open the controller or to modify or repair the controller. Modification or repairs to the wiring could result in dangerous malfunctions. Repairs to the controller must be performed by DSE. Contact your original equipment supplier in the case of malfunction.

- When the device is unpowered, ensure that no connection pins are connected to a voltage source. Thus, when the supply is switched off, the supply for the electronics, the power outputs and the external sensor supply must be switched off together.

- The controller heatsink at the rear heats up beyond normal ambient temperature during operation. To avoid danger caused by high temperatures, protect against contact.

- The customer is responsible for performing risk analysis of the mobile working machine and determining the possible safety related functions. The user is responsible for the safe function of the application programs created. If necessary, they must additionally carry out an approval test by corresponding supervisory and test organisations according to the national regulations.

- All connectors must be unplugged from the electronics during electrical welding and painting operations.

1.4.2 INSTALLATION NOTES

- Follow the instructions of the connector manufacturer, specifically with respect to preventing water from entering the device. See Section entitled *Cables, Connectors, Harnesses and Spare Parts* for details of DSE Part Numbers.

- To maintain IP67 rating where connectors have unused pins, ensure the use of a suitable Blanking Insert. In the case of a completely unused connector, the plug must be inserted, fully populated with Pin Blanking Inserts. See Section entitled *Cables, Connectors, Harnesses and Spare Parts* for details.

- M12 protection plugs (supplied) must be installed in both the USB and Ethernet interfaces to ensure IP67 rating when the connectors are not in use. Tighten to 0.8 Nm (0.6 lbf ft). Where IP protection is required when the interfaces are in use, suitable O-rings must be fitted. Silicon grease to protect the O-rings is recommended.

- Ensure WiFi and GPS connectors are suitably protected if the device is not mounted within an IP67 enclosure.

- The heatsink must be wired to vehicle ground to comply with EMC guidelines. A screw connection point is provided for this purpose. A metallic screw must be used to create an electrical connection to vehicle / machine ground.

2 SPECIFICATIONS

2.1 PROCESSOR

Description	Specification
iMX6 Quad Microcontroller	ARM A9
Speed	1 GHz

2.2 MEMORY

Description	Specification
Flash	12.5 GB available for application. 16 GB total.
RAM	2 GB

2.3 DC SUPPLY

Description	Specification
Operating Voltage (Pin A7)	8 V to 32 V
Maximum Current (Full Backlight, no External Loads)	<1000 mA
Maximum Current (After Controlled Shutdown with Ignition off)	<50 mA

2.3.1 FUSING

Description		Specification
A1	ECU Supply	3 A Max
A2	Wake Up	1 A Max
A3	Ignition (15)	1 A Max
A6	Program Enable	1 A Max
B1	I/O Supply	8A or 16 A Max. See note above.
B9	I/O Supply	8 A or 16 A Max. See note above.
B10	VREF Auxiliary Supply Output	100 mA Max

2.4 ENVIRONMENTAL

NOTE: M12 protection plugs (supplied) must be installed in both the USB and Ethernet interfaces to ensure IP67 rating when the connectors are not in use. Tighten to 0.8 Nm (0.6 lbf ft). Where IP protection is required when the interfaces are in use, suitable O-rings must be fitted.

Description	Specification
Operating Temperature	-20 ºC to +70 ºC (-4 ºF to 158 ºF)
Storage Temperature	-30 ºC to +80 ºC (-22 ºF to 176 ºF)
Degrees of Protection Provided by Enclosure (With All Mating Connectors Fitted)	IP67 (NEMA 6)

2.5 USER INTERFACE



2.5.1 CONTROLS

Description	Specification
Push Buttons DSEM812-01	0
Push Buttons DSEM812-02	16

2.5.2 DISPLAY

Description	Specification
Size (Across Diagonal)	30.7 mm (12.1 ”)
Size (W x H)	1280 px X 800 px
Touchscreen	Capacitive
Aspect Ratio	16:10
Type	Optically Bonded LED
Lifetime	> 50,000 hours
Colour	24 bit
Splash Screen Image Type	Bitmap Image (BMP) 8 bit / 24 bit colour depth 1280 px X 800px

2.6 REAL TIME CLOCK

Description	Specification
Retention Type	Super Cap for up to 100 hours
Recharge Time	30 minutes

2.7 INPUTS

2.7.1 WAKE-UP

NOTE: Either Wake-Up OR Ignition initiates the start-up process. Both must be removed to allow shutdown to commence.

NOTE: Ignition removal begins the Ignition timer after which the device powers down. During this delay WakeUp functionality is disabled. Where the application requires WakeUp functionality, it is recommended to keep Ignition timer to a minimum (minimum setting is 2 seconds).

With ECU power on, a +ve signal on A2 for at least one second initiates the start-up sequence. After at least one second, the signal must be removed to prevent unintended start-ups following the next shutdown.
After application of *Wake-up* (for more than one second), DSEM812 initiates the start -up process, pausing, awaiting application of *Ignition* (pin A3). Subsequent application of *Ignition* allows for faster start-up of the application given that the device is already 'awake', awaiting application of *Ignition*.

The *Wake-up* pin is intended to be driven by an external push button or signal from an external device such as a vehicle door switch, remote control fob, schedule timer or a controlling PLC.

Description	Specification
Applicable Pin	Pin A2
Minimum Wake-Up Pin active time	1 second
Maximum Wake-Up Pin active time	Wake-Up must be removed before the shutdown process is initiated. It's recommended to make the Wake-Up pulse 1.5 seconds to ensure it exceeds the minimum requirement.

2.7.2 IGNITION(15)

NOTE: Either Wake-Up OR Ignition initiates the start-up process. Both must be removed to allow shutdown to commence.

NOTE: Application of *Wake-up* (Pin A2) wakens the device, allowing for faster application start upon *Ignition* application.

NOTE: Ignition removal begins the *Ignition Off* timer after which the device powers down. During this delay Wake Up functionality is disabled. Where the application requires Wake Up functionality, it is recommended to keep Ignition timer to a minimum (minimum setting is 2 seconds).

NOTE: *Ignition Off* timer is available within *System Pages*. For further details, see section *System Pages* | *Configuration* | *Settings* | *Ignition* elsewhere in this document.

With ECU power on, a +ve signal on A3 initiates the start-up sequence.

Removal of Ignition, for longer than the configurable timer, initiates shutdown (providing *Wake-up* is already removed).

This pin is intended to be driven by an external ignition switch or a signal from an external device such as a schedule timer or a controlling PLC.

Description	Specification
Applicable Pin	Pin A3
Time between removal and shutdown	Factory Setting 0 s. For details of timer adjustment, see section *System Pages* | *Configuration* | *Settings* | *Ignition* elsewhere in this document.

2.7.3 PROGRAM ENABLE

Program Enable is used to enter *System Menu.* See section entitled *Operation* elsewhere in this document for details.

Description	Specification
Applicable Pin	Pin A6

2.7.4 DIGITAL INPUTS

2.7.4.1 DIGITAL

Description	Specification
Applicable Pins	Pins B13, B14, B17, B18, B21, B22
Minimum Voltage for High Level.	Configurable (Factory setting 6 V)
Maximum Voltage for Low Level	Configurable (Factory setting 2 V)

2.7.4.2 FREQUENCY

Description	Specification
Applicable Pins	Pins B13, B14, B17, B18, B21, B22
Frequency Range	5 Hz to 30 kHz
Resolution	100 Hz at Maximum Frequency
Accuracy	400 Hz at Maximum Frequency
Minimum Voltage For High Level (Mark)	>2 V
Maximum Voltage For Low Level (Space)	<1.4 V

2.7.5 ANALOGUE INPUTS

2.7.5.1 VOLTAGE

Description	Specification
Applicable Pins	Pins B13, B14, B17, B18, B21, B22
Configurable Ranges	0 V to 5 V 0 V to 10 V 0 V to 32 V
Resolution	12 bits
Accuracy	± 2 % F.S.D.
Input Resistance	>=30 kΩ
Sampling Rate	2 mS

2.7.5.2 CURRENT

Description	Specification
Applicable Pins	Pins B13, B14, B17, B18, B21, B22
Configurable Ranges	0 mA to 20 mA 4 mA to 20 mA
Input Type	Current sink only
Input Sink Resistance	120 Ω ± 1%
Sampling Rate	2 mS
Resolution	12 bits
Accuracy	± 1 % F.S.D.

2.7.5.3 RESISTIVE

Description	Specification
Applicable Pins	Pins B13, B14, B17, B18, B21, B22
Measurement Range	0 Ω to 3400 Ω
Measurement Source Voltage	12 V maximum
Measurement Source Current	1 mA
Sampling Rate	2 mS
Resolution	12 bits
Accuracy	± 1 % F.S.D.

2.7.5.4 RATIOMETRIC

Description	Specification
Applicable Pins	Pins B13, B14, B17, B18, B21, B22
Measurement Voltage Reference	Supply / VREF Output
Measurement Type	Ratio of input Pin to Supply
Measurement Source Current	1 mA
Accuracy	± 1 % F.S.D.

2.8 OUTPUTS

2.8.1 VREF OUTPUT SUPPLY

Description	Specification
Applicable Pins	Pin B10
Voltage	Programmable 5 V / 10 V (±5 %)
Max Current	100 mA

2.8.2 HIGH SIDE FIXED

Description	Specification
Applicable Pins	Pins B2, B3
Maximum Current	2 A
Digital Output Active Low ‘ON’ State Maximum Voltage at Rated Current	<2 V
Digital Output Active Low ‘OFF’ State Leakage Current	<10 mA at 24 V output supply

2.8.3 LOW SIDE / HIGH SIDE CONFIGURABLE

Description	Specification
Applicable Pins	Pins B6, B7, B19, B20
Maximum Current	2 A / 4 A Configurable
Digital Output Active Low ‘ON’ State Maximum Voltage at Rated Current	<2 V
Digital Output Active Low ‘OFF’ State Leakage Current	<10 mA at 24 V output supply

2.8.4 P.W.M. HIGH SIDE

Description	Specification
Applicable Pins	Pins B2, B3
Maximum Current	2 A
Digital Output Active Low ‘ON’ State Maximum Voltage at Rated Current	<2 V
Digital Output Active Low ‘OFF’ State Leakage Current	<10 mA at 24 V output supply
PWM Frequency	20 Hz to 250 Hz
Duty Cycle Resolution	0.1 %
Duty Cycle Precision	0.1 % (<=250 Hz), 1 % (>250 Hz)

2.9 COMMUNICATIONS

2.9.1 CAN

NOTE: CAN connections are NOT internally terminated. A complete CAN network must have 120 Ω terminators at each end of the network.

NOTE: Screened 120 Ω impedance cable specified for use with CAN must be used for the CAN links.
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).

Description	Specification
Number of CAN Interfaces	3
Supported Protocols	J1939 CANopen Raw CAN
Supported Baud Rates	10 kbit/s, 20 kbit/s, 50 kbit/s, 100 kbit/s, 125 kbit/s, 250 kbit/s, 500 kbit/s, 1 Mbit/s

2.9.2 ETHERNET

NOTE: DSE supply a cable suitable for ethernet connection. For further details, see section entitled *Cables, Connectors, Harnesses and Spare P*arts elsewhere in this document.

Description	Specification
Number Of Ethernet Ports	2
Supported Data Rates	10 Mbit/s / 100 Mbit/s, Duplex
Supported Protocols	MODBUS TCP CODESYS 3.5

M12 'D' Coded – 4 Pin Female	Pin	Description
	1	Tx+
	2	RC+
	3	TX-
	4	RC-

2.9.3 WIFI

NOTE: Wifi provides a connection for other devices to join. For example, this allows a PC to connect wirelessly to M812 for programming, diagnostics etc. It cannot be used to connect to an existing network.

Description	Specification
WiFi Standards	IEEE 802.11 a/b/g/n/ac
WiFi Frequency	2.4 GHz
WiFi Antenna	External via SMA connector.

2.9.4 GPS

NOTE: DSE supply an antenna suitable for GPS reception. For further details, see section entitled *Cables, Connectors, Harnesses and Spare P*arts elsewhere in this document.

The device attains a GPS signal via an antenna. This provides stronger signal reception.
The GPS receiver allows the application program to retrieve the location of the device. Application programming is required to achieve this.

Description	Specification
GPS Antenna	External via SMA connector.
GPS Antenna connector shown on the rear of DSEM812	

2.9.5 BLUETOOTH

Bluetooth is not currently supported and is reserved for future use.

Description	Specification
Bluetooth Standard	4.1, supports BR, EDR, BLE

2.9.6 USB

NOTE: DSE supply a cable suitable for USB connection. For further details, see section entitled *Cables, Connectors, Harnesses and Spare P*arts elsewhere in this document.

Description	Specification
Number of USB Ports	1
USB Version	2
Supported Speeds	Full Speed (12 Mbit/s)
Device Class	08 (Mass Storage)
Max Size	64 Gb
Filing System	VFAT or FAT32
Filename Structure	Filenames must be alphanumeric only (A to Z, a to z, 0 to 9) and "." (used to seperate the file extension).

M12 'B' Coded – 5 Pin Female	Pin	Description
	1	5 V
	2	Data -
	3	Data +
	4	0 V
	5	Shield

2.9.7 CAMERA INPUTS

NOTE: Cameras Inputs provide facility for viewing only. Logging to file is not supported.

Description	Specification
Number of Camera Inputs	4
Applicable Pins	A4, A5 (Camera 1) A7, A8 (Camera 2) A13, A14 (Camera 3) A15, A23 (Camera 4)
Camera Type	VGA
Interface Type	Analogue (Composite) Video for PAL / NTSC
Overlay Size (when utilised)	1280 px X 800 px

2.9.8 IP CAMERAS

NOTE: IP Cameras provide facility for viewing only. Logging to file is not supported.

Description	Specification
Number of Supported IP Camera	4
Connection Method	Ethernet
Supported Protocols (RTP and RTSP)	H.264 MPEG-4

2.10 APPLICABLE STANDARDS

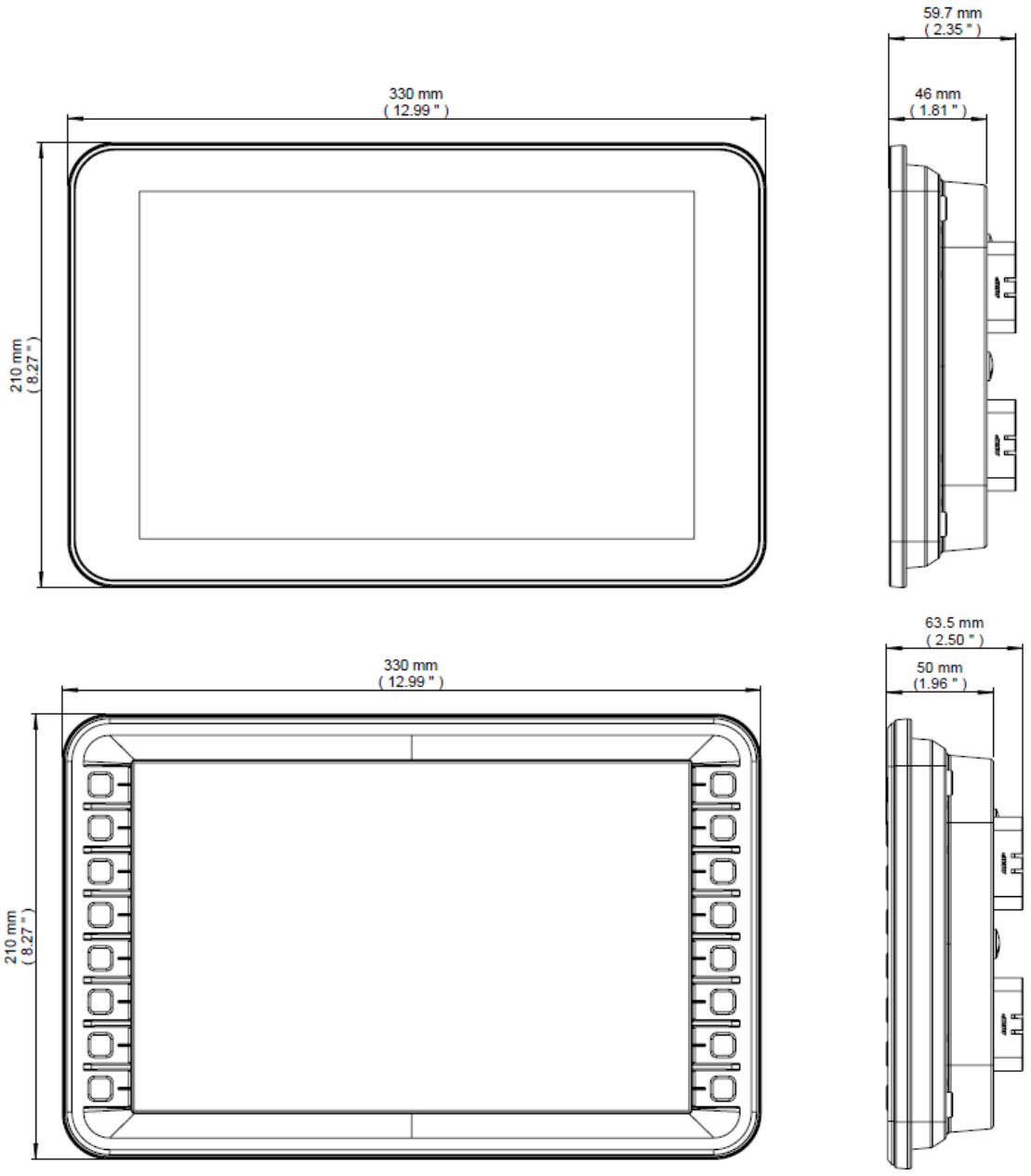
Category	Description	Standard
CE marking	Electromagnetic compatibility (EMC) noise immunity Electromagnetic compatibility (EMC) emission standard Safety of information technology equipment, general requirements	EN 61000-6-2 EN 61000-6-4 BS EN 60950-1: 2006 + A2: 2013
E11 PENDING	EMC requirements for vehicles Noise immunity with 100 V/m	UN/ECE-R10.05 ISO 11452-2
Climatic tests	Damp heat, cyclic upper temperature 55 ˚C Damp heat, steady state test temperature 40 ˚C / 93% RH Test duration: 21 days Salt spray test severity level 3 (vehicle)	EN 60068-2-30 EN 60068-2-78 EN 60068-2-52
Mechanical tests	Test VII; vibration, random mounting location: vehicle body. Vibration, sinusoidal 10...500 Hz; 0.73 mm / 10 g: 10 cycles / axis. bumps 30 g / 6 ms; 24,000 shocks	ISO 16750-3 EN 60068-2-6 ISO 16750-3
Load Dump	151 V (Ri 1 Ω) 202 V (Ri 8 Ω)	ISO 16750-2

3 INSTALLATION

3.1 DIMENSIONS AND MOUNTING

3.1.1 DIMENSIONS

Description	Specification
Overall Dimensions (Height x Width x Depth) M870 Without Buttons	330 mm X 210 mm X 59.7 mm (12.99 ” X 8.27 ” X 2.35 ”)
Overall Dimensions (Height x Width x Depth) M870 With Buttons	330 mm X 210 mm X 63.5 mm (12.99 ” X 8.27 ” X 2. 5 ”)
Mounting Type	8 x mounting bolts or RAM mount.
Overall Weight	2.12 kg (4.66 lb)



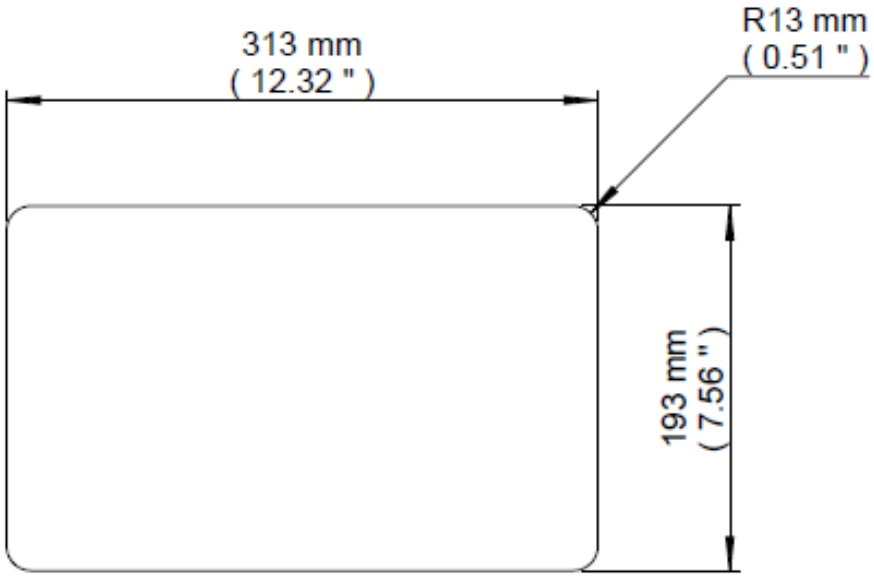
3.1.2 FASCIA MOUNTING

NOTE: DSE supply a kit for fascia (panel) mounting. For further details, see section entitled *Cables, Connectors, Harnesses and Spare P*arts elsewhere in this document.

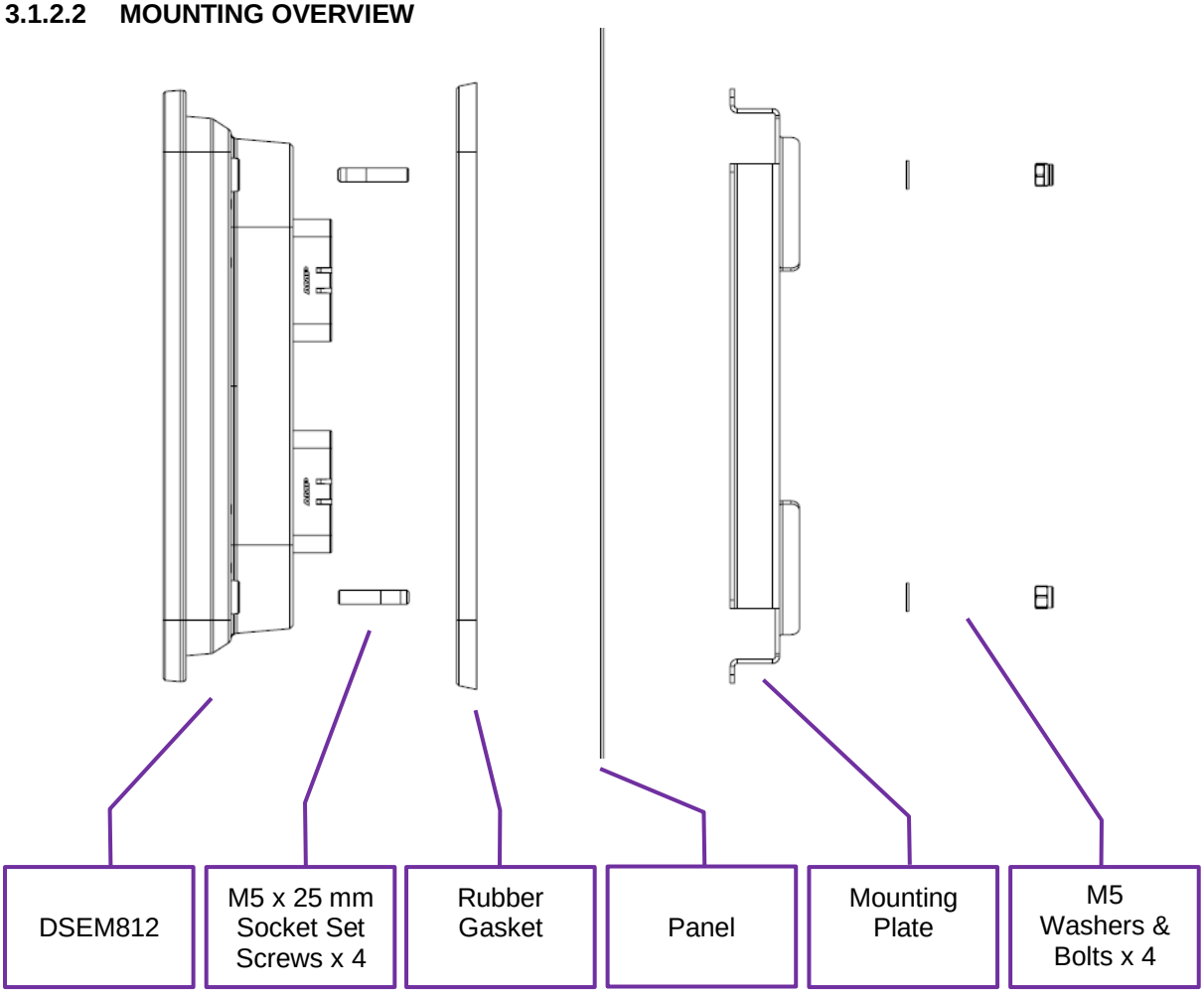


Description	Specification
Panel Cut-Out	313 mm X 193 mm (R 13 mm) (12.32 “ X 7.56 “ (R 0.51 “))
Panel Thickness	1 mm to 6 mm (0.04 “ to 0.23 “)
Fascia Mounting Bolt Tightening Torque to prevent distortion of the sealing gasket and subsequent seal failure / mechanical damage to the controller.	3.0 Nm Maximum (2.21 lbf ft Maximum)

3.1.2.1 PANEL CUTOUT

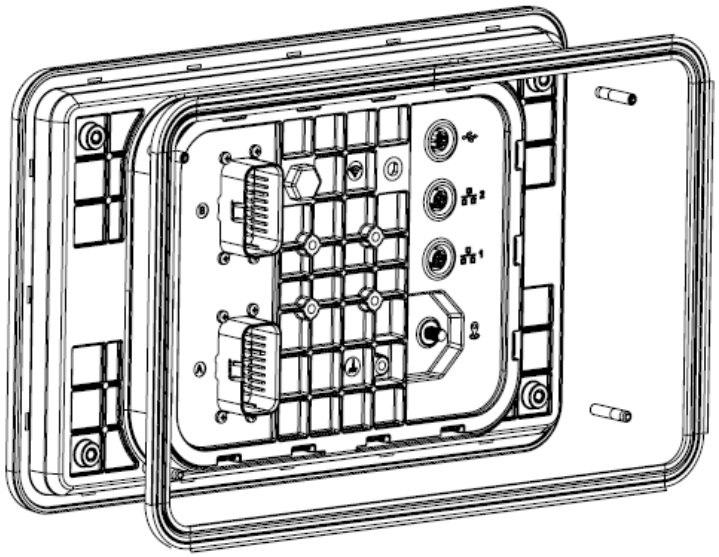


3.1.2.2 MOUNTING OVERVIEW

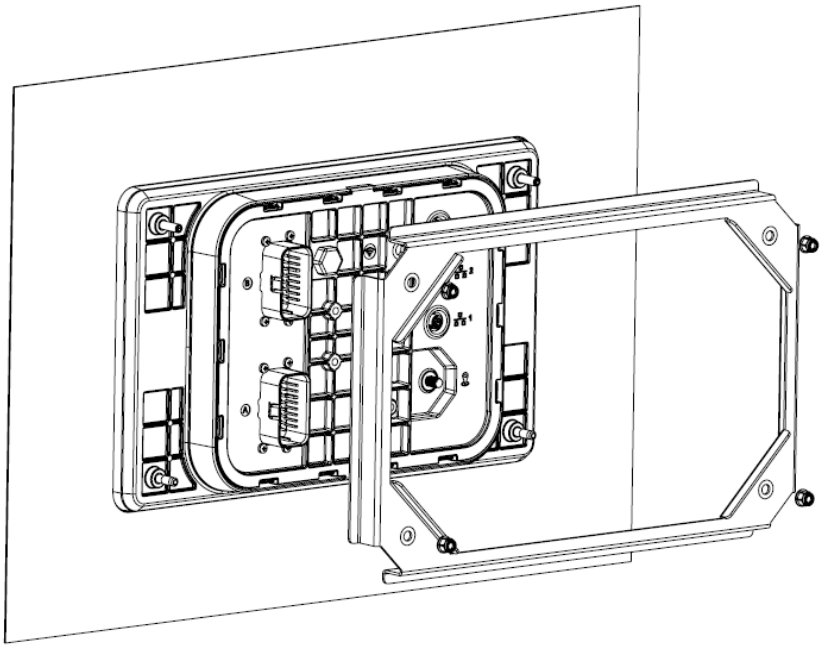


See Overleaf for Mounting Instructions

3.1.2.3 MOUNTING INSTRUCTIONS



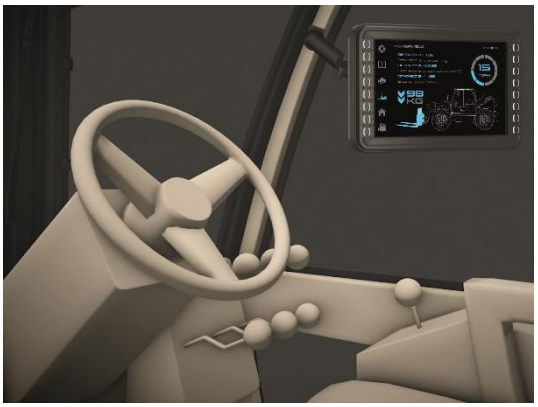
Insert the Socket Set Screws into the rear of DSEM812 and carefully install the gasket.



Offer up DSEM812 into the fascia cut-out. Ensure gasket is seated evenly between DSEM812 and panel. Fit the mount and secure to the screws with supplied mounting bolts and washers.

3.1.3 RAM MOUNTING

DSEM812 has four holes on the rear face, suitable for fitting of a RAM type mount with the *AMPS hole pattern.* The spacing for the mounting holes is detailed in the image below.

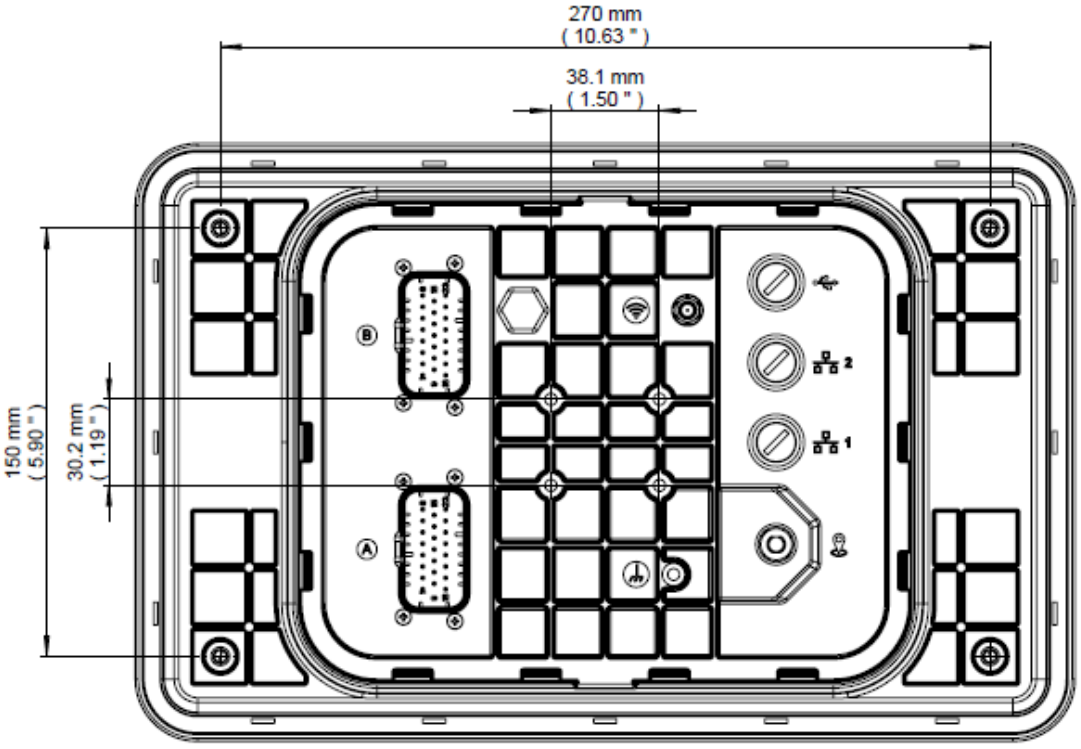


For RAM mount components, visit:

https://www.ram-mount.co.uk/

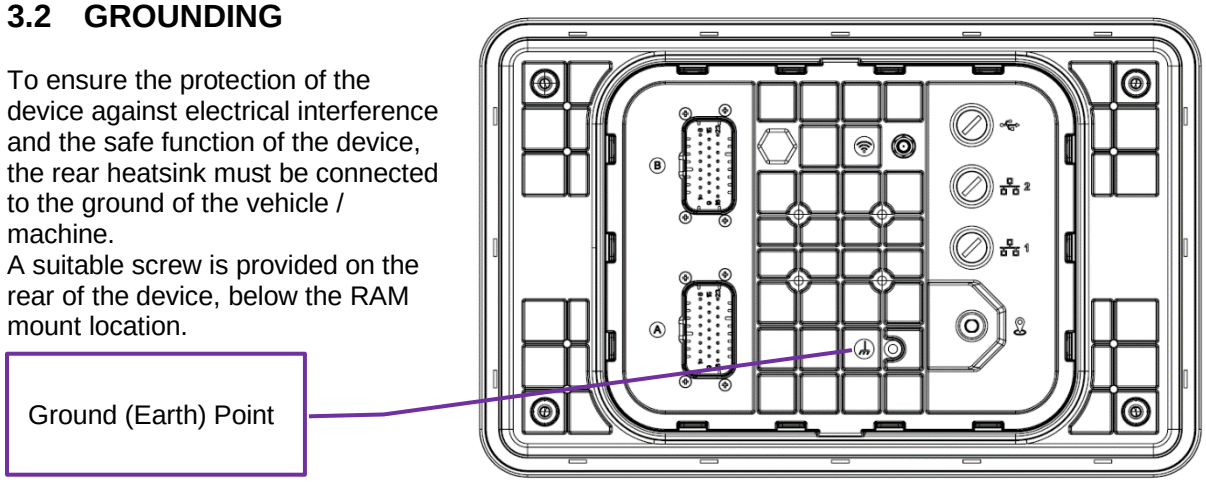


Description	Specification
RAM Mounting Holes	Suitable for M5 bolts (0.3 “ holes)
RAM Mounting Hole Centres	38.1 mm X 30.2 mm (1.50 “ X 1.19 “)
RAM Mounting Bolt Material Recommendation	Steel or Stainless Steel
RAM Mounting Bolt Tightening Torque	4 Nm Maximum (2.95 ft. lb Maximum)



3.2 GROUNDING

To ensure the protection of the device against electrical interference and the safe function of the device, the rear heatsink must be connected to the ground of the vehicle / machine.
A suitable screw is provided on the rear of the device, below the RAM mount location.



3.3 FUSING

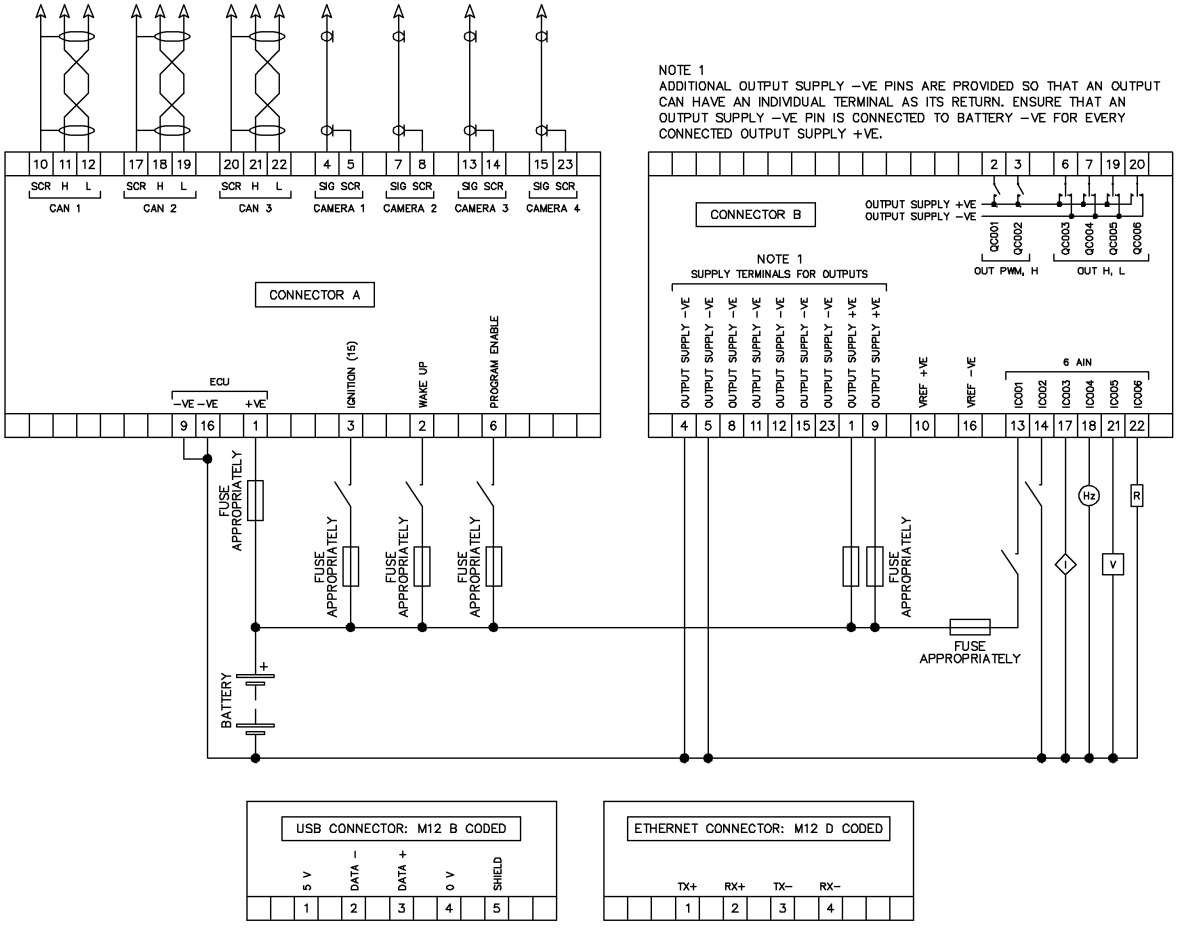
NOTE: When using connector pins part no. 770854-1 (8 A rated) pins, utilise multiple supply pins where the application requires more than 8 A. Connector pins part no. 770854-3 are 16 A rated.
Ensure one ground pin is used for each supply pin used. This ensures the ground return path has the correct current carrying capacity.

The individual electric circuits must be fused in order to protect the whole system. Select appropriate fuses to protect the outputs being supplied.

Pin	Description	Recommended Fuse Size
A1	ECU Supply	3 A Max
A2	Wake Up	1 A Max
A3	Ignition (15)	1 A Max
A6	Program Enable	1 A Max
B1	I/O Supply	8A or 16 A Max. See note above.
B9	I/O Supply	8 A or 16 A Max. See note above.

3.4 TYPICAL CONNECTION DIAGRAM

Terminology	Meaning
QCxxx	Output
ICxxx	Input
H	Output, High when active
L	Output, Low when active
AIN, FREQ	Input configurable to accept signals as positive digital, negative digital, 0 V to 5 V, 0 V to 10 V, 0 V to 32 V, 0 mA to 20 mA, 4 mA to 20 mA, ratiometric or resistive and frequency measuring.



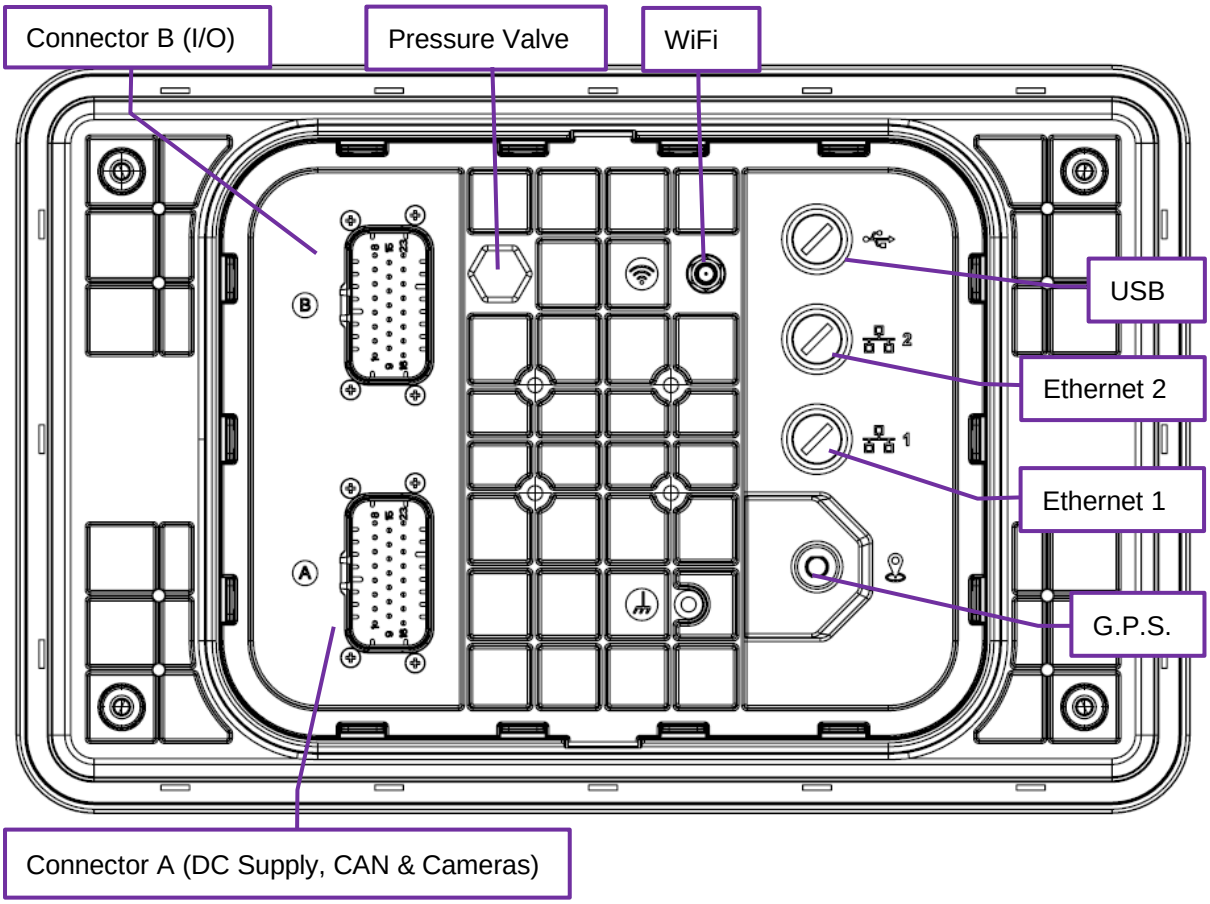
ABBREVIATIONS	
OUT PWM, H	OUTPUT CAN BE CONFIGURED AS A PWM OR DIGITAL HIGH−SIDED
OUT H, L	OUTPUT CAN BE CONFIGURED AS DIGITAL HIGH−SIDED OR LOW−SIDED
AIN	ANALOGUE INPUT CAN BE CONFIGURED AS A POSITIVE DIGITAL, NEGATIVE DIGITAL, FREQUENCY INPUT, VOLTAGE, CURRENT OR RESISTIVE SIGNAL
VREF +VE	5V OR 10V SUPPLY, E.G. FOR EXTERNAL ANALOGUE SENSORS
VREF −VE	NEGATIVE REFERENCE FOR THE ANALOGUE INPUT CHANNELS

3.5 USER CONNECTIONS

NOTE: If a prewired connection cable is used, remove the cores with unused signal inputs and outputs. Unused cores, in particular core loops, lead to interference coupling that can influence the connected controller.

NOTE: Connectors A and C are coded differently. Do not try to force a connector into the wrong socket.

NOTE: USB and Ethernet connectors are coded differently. Do not try to force a connector into the wrong socket.



3.5.1 CONNECTOR A (DC SUPPLY, CAN AND CAMERA)

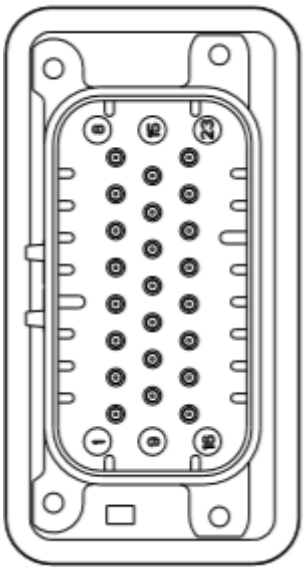
NOTE: For details of fuse requirements, refer to section entitled *Fusing* elsewhere in this document.

NOTE: Screened 120 Ω impedance cable specified for use with CAN must be used for the CAN links.
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: CAN connections are NOT internally terminated. A complete CAN network must have 120 Ω terminators at each end of the network.

NOTE: Connect Cameras using a single core conductor suitable for Composite Video. Connect screen (shield) to the respective Camera Signal -ve terminal.

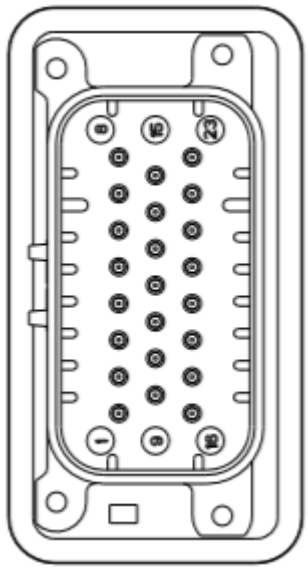
NOTE: Pin A9 and Pin A16 are internally connect. Connect both to battery negative for applications requiring more than 6 A DC supply.

Connector A	Pin	Description	Comments
	1	ECU Supply +ve	DC Supply -ve for the M812
	2	Wake Up	
	3	Ignition +ve (15)	Energises the ECU
	4	Camera 1 Signal +ve	Analogue (Composite) video
	5	Camera 1 Signal -ve	Analogue (Composite) video
	6	Program Enable	Switch to +ve to activate
	7	Camera 2 Signal +ve	Analogue (Composite) video
	8	Camera 2 Signal -ve	Analogue (Composite) video
	9	ECU Supply -ve	DC Supply -ve for the M812
	10	CAN1 SCR	
	11	CAN1 H	
	12	CAN1 L	Analogue (Composite) video
	13	Camera 3 Signal +ve	Analogue (Composite) video
	14	Camera 3 Signal -ve	Analogue (Composite) video
	15	Camera 4 Signal +ve	Analogue (Composite) video
	16	ECU Supply -ve	DC Supply -ve for the M812
	17	CAN2 SCR	
	18	CAN2 H	
	19	CAN2 L	
	20	CAN3 SCR	
	21	CAN3 H	
	22	CAN3 L	
	23	Camera 4 Signal -ve	Analogue (Composite) video

3.5.2 CONNECTOR B (I/O)

Terminology	Meaning
QC00x	Output
IC00x	Input
H	Output, High when active.
L	Output, Low when active.
PWM	PWM, High during 'Mark'.
AIN, FREQ	Input configurable to accept signals as positive digital, negative digital, 0 V to 5 V, 0 V to 10 V, 0 V to 32 V, 0 mA to 20 mA, 4 mA to 20 mA, ratiometric or resistive and frequency measuring

NOTE: GND Pins are internally connected. Multiple connections are provided to give a separate return for each output if required. Ensure to connect at least one GND terminal for each I/O Supply +ve that is used.

Connector B	Pin	Description	Comments
	1	I/O Supply +ve	Internally connected to B9
	2	QB001	OUT H, PWM
	3	QB002	OUT H, PWM
	4	GND	Return for Outputs
	5	GND	Return for Outputs
	6	QB003	OUT H, L
	7	QB004	OUT H, L
	8	GND	Return for Outputs
	9	I/O Supply +ve	Internally connected to B1
	10	VREF OUT +	Used to Supply External Devices (Max 100 mA)
	11	GND	Return for Outputs
	12	GND	Return for Outputs
	13	IB001	AIN, FREQ
	14	IB002	AIN, FREQ
	15	GND	Return for Outputs
	16	DGND	Analogue / Sensor Ground
	17	IB003	AIN, FREQ
	18	IB004	AIN, FREQ
	19	QB005	OUT H, L
	20	QB006	OUT H, L
	21	IB005	AIN, FREQ
	22	IB006	AIN, FREQ
	23	GND	Return for Outputs

4 OPERATION

NOTE: Ensure the *System Pages* are closed (exited) before attempting to send the application to the device.

4.1 NAVIGATION AND SELECTION

Simply touch the icon on the screen to select the options.

Within the System Pages, the following icon appears in the display bottom left when available,

Icon	Description
	Press to save changes on this page and return to the previous page.
	Press to return to a previous page, any changes that have been made are NOT saved.
	The adjacent option is selected. Touch the icon to toggle the selection.
	The adjacent option is NOT selected. Touch the icon to toggle the selection.

4.2 SYSTEM PAGES

NOTE: Failure to select between *Recovery* and *Configuration* within 30 seconds results in *Recovery* being selected.

NOTE: With DSEM812 with Buttons, *Recovery* is accessible directly by pressing and holding any THREE fascia buttons at device power-up.

The System Information and System Settings pages are accessed as follows:

DSEM812 With Buttons



- Power off the device.
- Press and hold any two buttons to access the setup menu. (Press and hold any three buttons to access *Recovery* directly, bypassing the setup menu).
- Power on the device. Keep the buttons held until the menu is displayed.

Alternatively, you may use the Program Enable Pin as detailed below for the variant without buttons.

DSEM812 Without Buttons



- Power off the device.
- Enable the Program Enable pin (A6)
- Power on the device.
- After a short while the Start-up Menu appears.

Select between the following options:



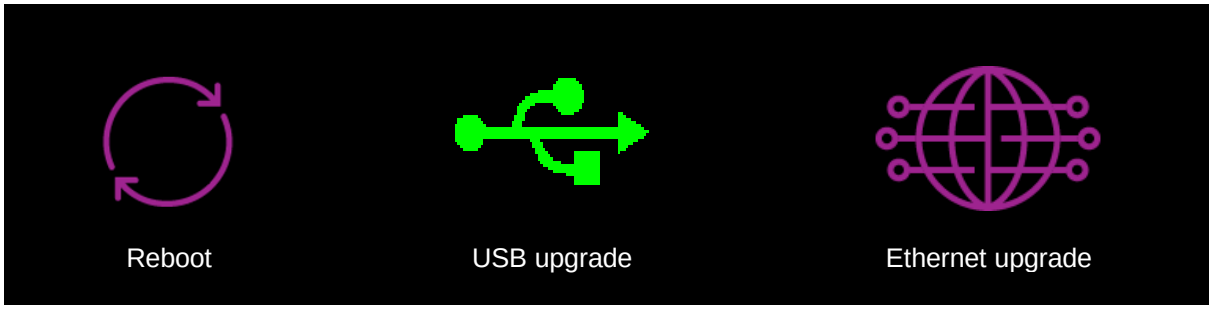
Selection	Description
Recovery	Allows files (firmware, applications etc) to be installed to the device.
Configuration	Allows viewing and configuration of the device settings including (but not limited to) Network settings, password, Real Time Clock, firmware version information). For further details, see section entitled *Configuration* elsewhere in this document.

4.3 RECOVERY

NOTE: With DSEM812 with Buttons, *Recovery* is accessible directly by pressing and holding any THREE fascia buttons at device power-up.

Upon selection of *Recovery*, the device restarts, displays 'Entering Flash/Recovery' and displays the *Recovery* menu.

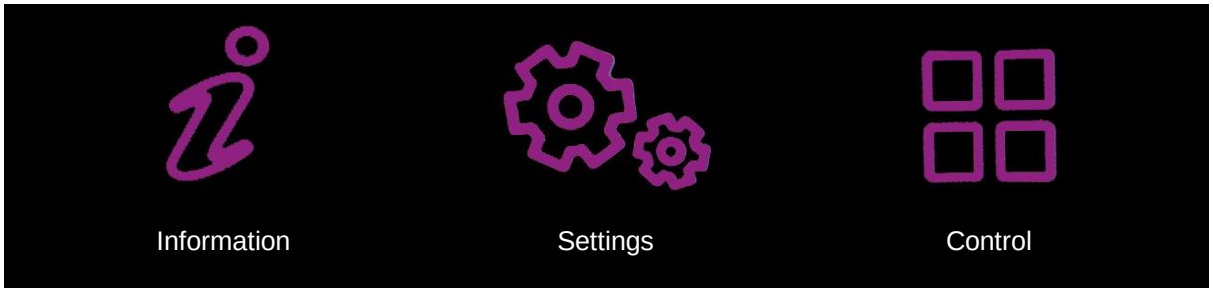
Failure to select within 30 seconds results in *Reboot* being selected.



Selection	Description
Reboot	Reboots the device. Ensure to remove *Program Enable* pin connection unless you wish to re-enter the *System Pages* menu again.
USB Upgrade	Allows the user to browse the connected USB memory storage device for a file to install.
Ethernet Upgrade	Allows a file to be installed to the device over ethernet connection using DSEServicetool PC Software.

4.4 CONFIGURATION

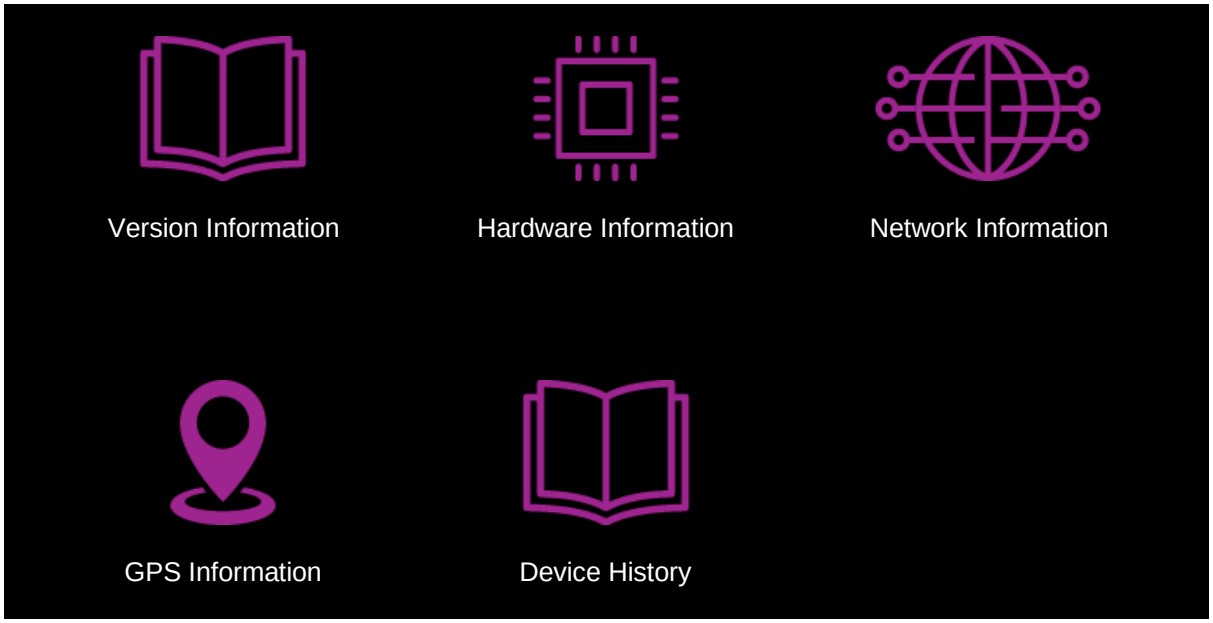
Configuration is further separated into three submenus:



Selection	Description
Information	Gives version information about the device.
Settings	Allows settings to be changed.
Control	Allows Test, Install, Clone, Recover and Format operations to be made to the device.

4.4.1 DEVICE INFORMATION

Device Information is further separated into submenus:



4.4.1.1 VERSION INFORMATION

Provides the version information for various subsystems within the device. This information may be requested by DSE Technical Support during a technical enquiry.
This section is also used to verify the device version number after a firmware update.

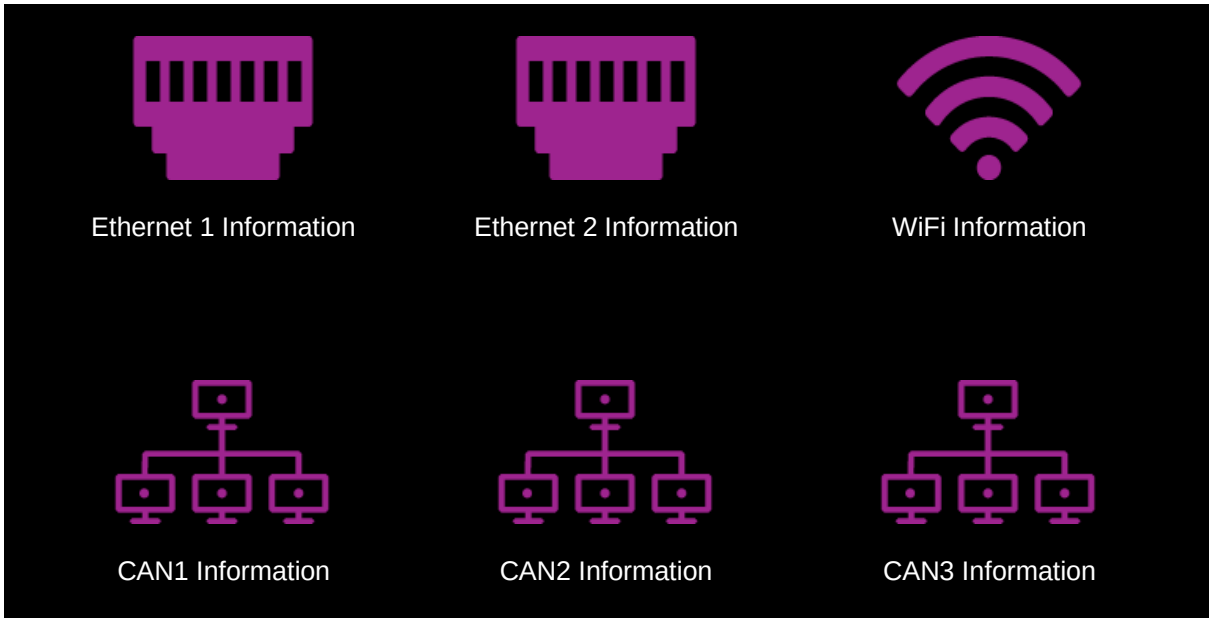
4.4.1.2 HARDWARE INFORMATION

Provides useful information regarding the device hardware.

Parameter	Description
CPU Temperature	Internal temperature of the main CPU within the device.
PCB Temperature	Temperature within the device, taken from a sensor mounted on the device circuit board.
Battery Voltage	Measurement of the *ECU Supply* of the device.
I/O Voltage	Measurement of the *I/O Supply* of the device.
RAM Usage	Shows internal RAM memory usage.
Storage Usage	Shows device storage usage.
Unique ID	A unique ID given to the device. Used for example,in USB communications.

4.4.1.3 NETWORK INFORMATION

Network Information is further separated into submenus:



Ethernet 1 & 2 Information

Parameter	Description
Cable Connected	***No:***No active ethernet is detected. ***Yes:*** Active ethernet cable is detected on the network interface.
MAC Address	Hardware address of this network interface.
DHCP	***No:*** Dynamic Host Configuration Protocol is not enabled for this port. Static network settings are in use. ***Yes:*** Dynamic Host Configuration Protocol is enabled. Ensure a DHCP server is active on this network interface.

Continued overleaf…

Parameter	Description
IP Address	The IP address currently in use for this network interface.
Subnet Mask	The Subnet Mask currently in use for this network interface.
Speed	The current operating speed of this network interface.
Tx Packets	A count of transmitted network packets. Useful for network diagnostics.
Rx Packets	A count of received network packets. Useful for network diagnostics.

WiFi Information

Parameter	Description
SSID	The name of the WiFi network being served by the device.
MAC Address	Hardware address of the WiFi adaptor.
IP Address	The IP address currently in use for this network interface.
Subnet Mask	The Subnet Mask currently in use for this network interface.
DHCP Server	***No:*** The device Dynamic Host Configuration Protocol is not active. Devices connecting to this WiFi server must have static IP addresses defined. ***Yes:*** The device Dynamic Host Configuration Protocol is active Devices connecting to this WiFi server must have static IP addresses are configured automatically providing they have DHCP enabled within their WiFi configuration.
Tx Packets	A count of transmitted network packets. Useful for network diagnostics.
Rx Packets	A count of received network packets. Useful for network diagnostics.
Connected Devices	Shows a list of devices that are currently connected to the WiFi server.

CAN 1 & 2 Information

Parameter	Description
Status	***Up:*** No error is detected on the CAN network. ***Down:*** The network is detected as being in a fault state.
Bitrate	Shows the bitrate (baud rate) setting of the CAN network.
Tx Errors	A count of transmitted packet errors. Useful for CAN network diagnostics.
Rx Errors	A count of received packet errors. Useful for CAN network diagnostics.
Tx Packets	A count of transmitted network packets. Useful for CAN network diagnostics.
Rx Packets	A count of received network packets. Useful for CAN network diagnostics.

4.4.1.4 GPS INFORMATION

NOTE: DSE supply an antenna suitable for GPS reception. For further details, see section entitled *Cables, Connectors, Harnesses and Spare P*arts elsewhere in this document.

NOTE: Ensure the antenna has a clear view of the sky, not obscured by buildings or trees. A position fix may take a few minutes depending upon visibility of satellites.

Displays the current position of the device.

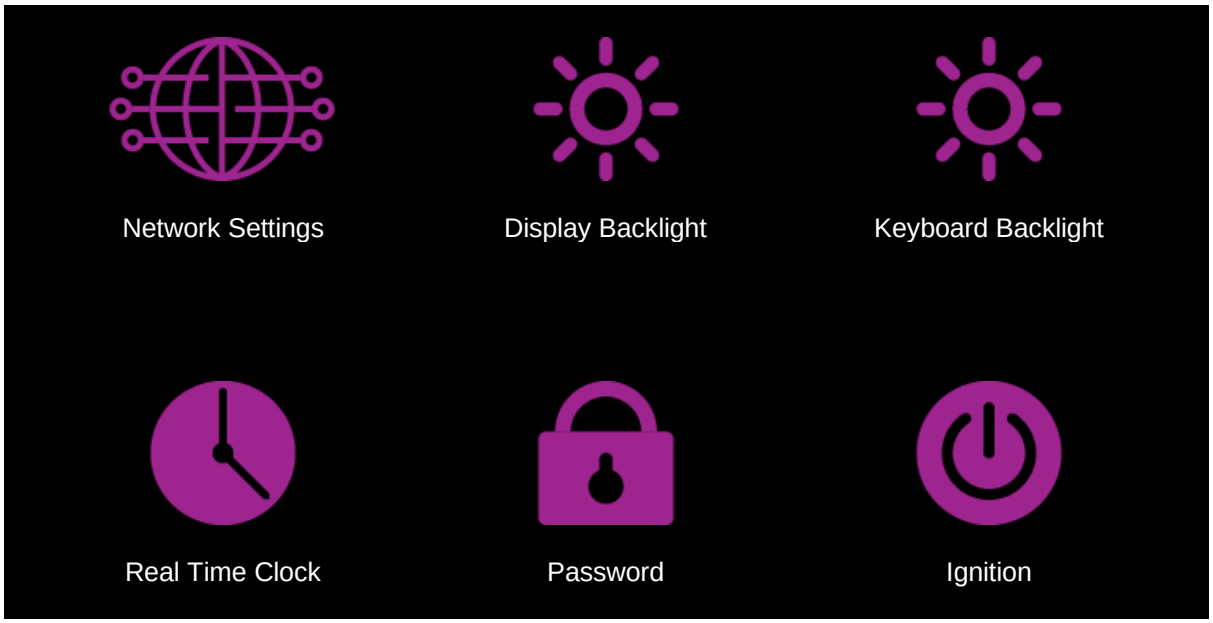
GPS Timestamp	2020-08-18 08:55:23
Latitude	54.12345 °
Longitude	-0.23456 °
Altitude	35.8 m
Speed	22.3 m/s
Direction	22.89 °

4.4.1.5 DEVICE HISTORY

Displays a log of important device events such as firmware update history,

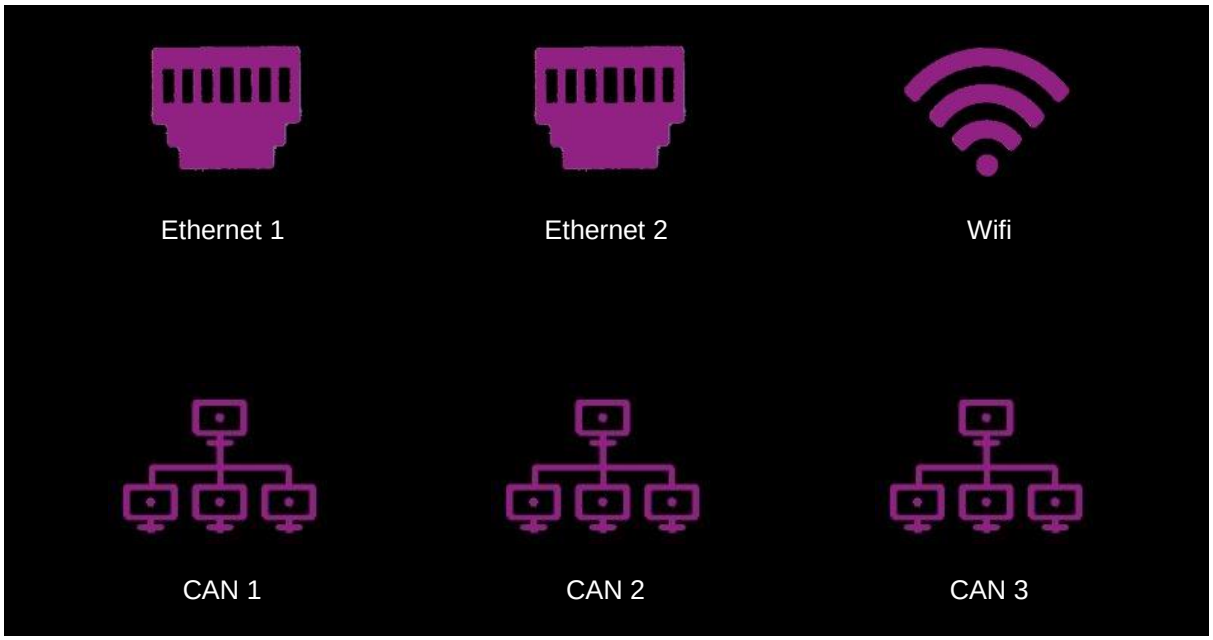
Date & Time	Description
2020-03-31	Successfully updated to V1.0.119

4.4.2 SETTINGS



4.4.2.1 NETWORK SETTINGS

Network Settings is further divided into submenus.



4.4.2.2 DISPLAY BACKLIGHT

Allows the default display backlight to be adjusted.
The application may also adjust the display backlight after the power up sequence and application start-up has completed.

4.4.2.3 KEYBOARD BACKLIGHT

NOTE: Applicable only to DSEM812 Fascia Button variant.

Adjusts the default setting for the backlight of the fascia buttons.
The application may also adjust the button backlight after the power up sequence and application start-up has completed.

4.4.2.4 REAL TIME CLOCK

Allows setting of the device Real Time Clock / Calendar.

4.4.2.5 PASSWORD

Allows password protection to be placed on the device. This prevents operations such as *Format*, *Clone*, and *Recover* unless the password is known.

4.4.2.6 IGNITION

NOTE: Shutdown is not possible if the *Wakeup* pin is active.

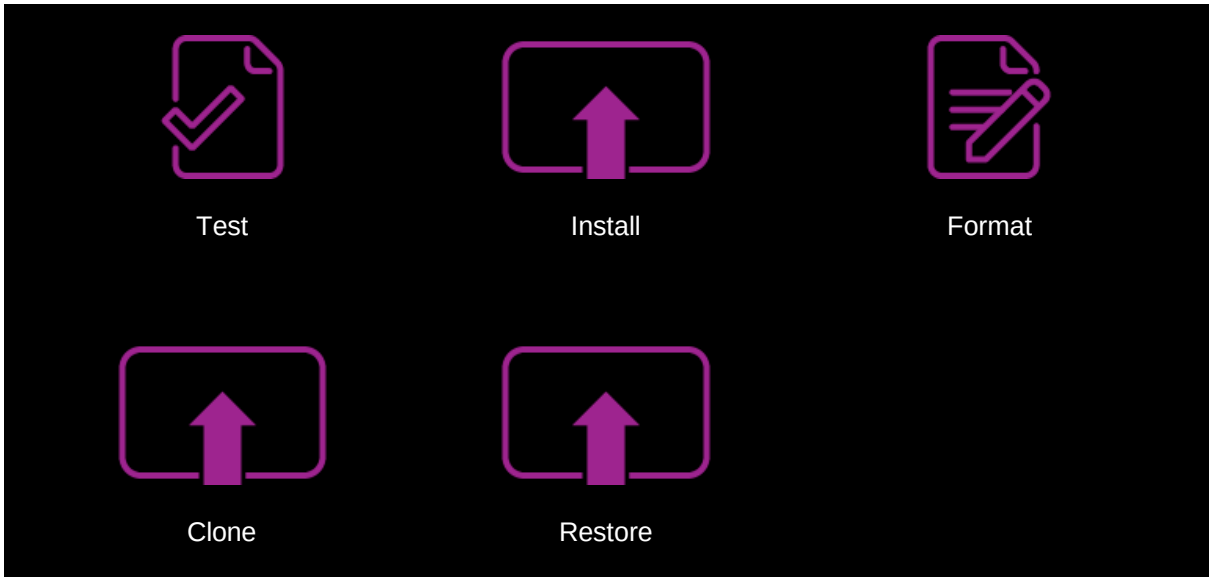
Allows setting of the Ignition Pin timer.

Setting	Description
Enable Timeout	 : The timer is disabled (Off)  : The timer is enabled (On).
Timer	**NOTE: Ignition removal begins the timer after which the device powers down. During this delay WakeUp functionality is disabled. Where the application requires WakeUp functionality, it is recommended to keep this timer to a minimum (minimum setting is 2 seconds).** The timer begins upon removal of the Ignition pin. Shutdown sequence begins upon timer expiry.

4.4.3 CONTROL

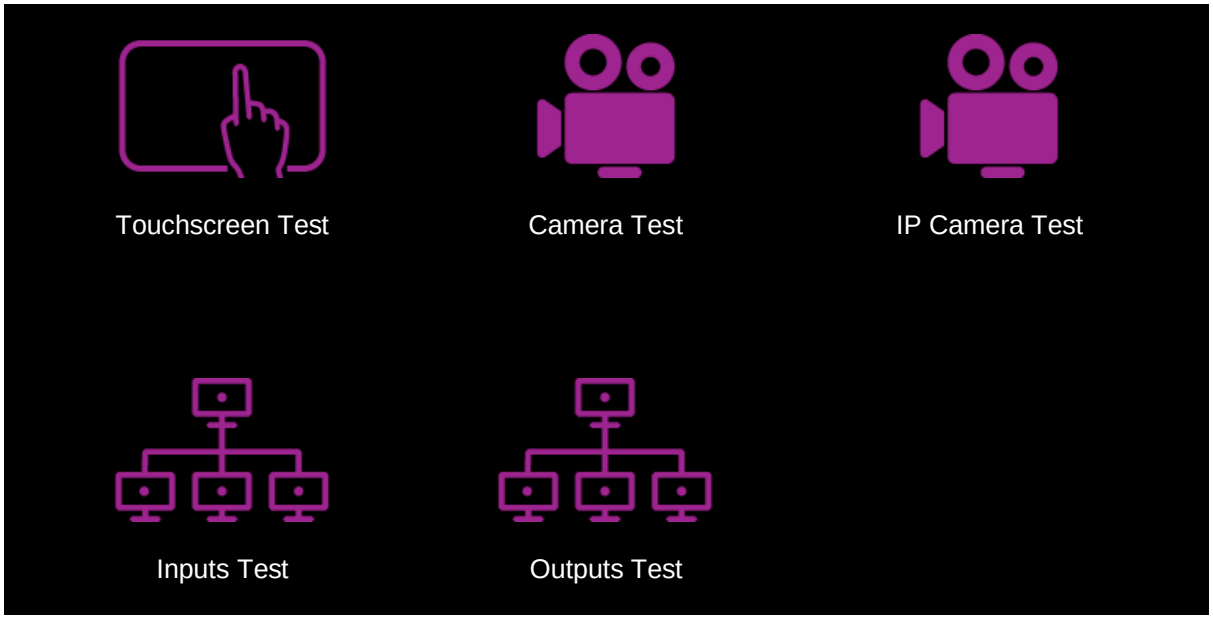
NOTE: *Clone* and *Restore* are applicable to DSEM812 CODESYS variant only.

Control is further separated into submenus:



4.4.3.1 TEST

Test is further separated into submenus:



Touchscreen Test

Touch the screen with one or more fingers to see the device detect the press and illuminate the screen where the finger(s) touch.

Camera Test

Shows the signal detected on the four Analogue Camera (composite video) inputs.

IP Camera Test

NOTE: While Camera Test application allows for testing of two IP cameras, DSEM812 supports up to four (4) IP Cameras within the application.

Parameter	Description
URL	Touch and enter the URL of IP Camera 1 or IP Camera 2
Play	Press *Play* to connect to and display the selected IP Camera.

Inputs Test

Select the input to view by touching it on the screen, then select the configuration for the selected input.

Parameter	Description
Voltage	Select the voltage range of the input: ***5V:*** Input is configured to be 0 V to 5 V dc. ***10V:*** Input is configured to be 0 V to 10 V dc. ***32V:*** Input is configured to be 0 V to 32 V dc.
Current	Input is configured to be 0 mA to 20 mA.
Resistive	Input is configured to be 0 Ω to 3400 Ω.
Frequency	Input is configured to be Digital and used to measured the frequency of the input signal.

For testing purposes, a moving graph of the input value is shown below the input measurement.

Outputs Test

Select the output to view by touching it on the screen, then select the configuration for the selected output (High Side or Low Side).

Parameter	Description
Enable	 : The output is enabled (On).  : The output is disabled (Off)

4.4.3.2 INSTALL

Allows installation of files to the device. Connect the USB memory device containing the file to install, then select the relevant option.

Parameter	Description
Install Boot Splashscreen	Installs a *Boot* display to be shown during the startup sequence. For example,this could be the OEM logo and/or product name. ***Size***: 1280 px X 800 px ***Image Type:*** Bitmap (bmp), 24-bit colour. ***Filename:*** Filenames must be alphanumeric only (A to Z, a to z, 0 to 9) and "." (used to separate the file extension). No spaces allowed.
Install Shutdown Splashscreen.	Installs a *Shutdown* display to be shown during the shutdown sequence. For example,this could be the OEM logo and/or product name along with a "Shutting Down" message. ***Size***: 1280 px X 800 px ***Image Type:*** Bitmap (bmp), 24-bit colour. ***Filename:*** Filenames must be alphanumeric only (A to Z, a to z, 0 to 9) and "." (used to separate the file extension). No spaces allowed.
Install Font	Installs a *TrueType* font (extension '.ttf) to the device for use on the Visualisation screens. ***Font Type:*** TrueType (ttf). ***Filename:*** Filenames must be alphanumeric only (A to Z, a to z, 0 to 9) and "." (used to separate the file extension). No spaces allowed.

4.4.3.3 FORMAT

NOTE: If configured, the device Password is required to access this section.

NOTE: The *Format* process deletes files on the target device and may change the operation of the device.

Parameter	Description
Configuration	**NOTE: All settings are returned to default. The device may no longer be accessible on the connected network.** Returns all configuration items to factory settings.
Application	**NOTE: All files are removed from the device. It must be reprogrammed before use.** Removes the application and all files from the device.
All	**NOTE: All files are removed from the device and all settings returned to default. The device may no longer be accessible on the connected network and the device must be reprogrammed before use.** Removes the application and all files from the device and returns all configuration items to factory settings.

4.4.3.4 CLONE

NOTE: *Clone* is applicable to DSEM812 CODESYS variant only.

NOTE: If configured, the device Password is required to access this section.

NOTE: When obtaining the *Clone* file from an existing device, ALL files on the device are copied. For this reason, ensure the device was previously *Formatted* before the application was installed. This ensures that the device contains only the required application and that other (previously installed) files have been removed. For details on erasing a device, see section entitled *Format* elsewhere in this document.

Where an existing device has the application already installed. *Clone* may be used to copy the entire device contents.

This file may then be used to recover the device, or create *Clones*, sending the file to other devices.

Parameter	Description
Select a Clone Method	Touch the screen to select the required option and press ✓ to continue. ***Application Only:*** Only the application itself is copied. ***Application & Retained Data:*** Only the Application and Persistent/Retained Data is copied. ***All:*** The Application, Persistent/Retained Data and all other files present on the device are copied.
	If the USB device is not connected or not detected, a red USB icon is shown. Connect USB memory stick to store the *Clone* file on.
	A green USB icon shows that the USB device is detected. Navigate the file system to select the directory to save into. ***usbhd-sda1:*** The name of DSEM812 USB port. Press it to select the USB device and view the contents. If required, select a subdirectory. Press **..** (two dots) to go back up one subdirectory level. Press ✓ to continue.
	Circle animation is displayed during the process followed by a confirmation message. Press **OK** to complete and return to the USB directory listing. Another *Clone* file can be made if required, alternatively, press « to return to the *Device Control* menu.

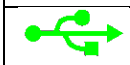
4.4.3.5 RESTORE

NOTE: *Restore* is applicable to DSEM812 CODESYS variant only.

NOTE: If configured, the device Password is required to access this section.

NOTE: Recovering a file to the device overwrites the existing application. Depending upon the type of clone file, Persistent/Retained data may also be overwritten.

This section is used to restore the device from a previously stored Clone (backup) file.

Parameter	Description
	If the USB device is not connected or not detected, a red USB icon is shown. Connect USB memory stick containing the Clone file and select the file to Restore from.
	**NOTE: Recovering a file to the device overwrites the existing application. Depending upon the type of clone file, Persistent/Retained data may also be overwritten.** A green USB icon shows that the USB device is detected. Navigate the file system to select the file to *Restore* from. ***usbhd-sda1:*** The name of DSEM812 USB port. Press it to select the USB device and view the contents. If required, select a subdirectory. Press **..** (two dots) to go back up one subdirectory level. Select the required file. Check carefully the file name when asked to confirm. Press **YES** to confirm and install this file or **NO** to cancel the process and select again.
	Circle animation is displayed during the process. Press « to return to the *Device Control* menu.

5 CABLES, CONNECTORS, HARNESSES AND SPARE PARTS

Description	DSE Part	Manufacturer Part	Manufacturer
Connector Pin Crimp	N/A	770854-1 (8 A rated) 770854-3 (16 A rated)	TE
M812 Connector Kit with 8 A Pins (Set of 2 Connectors and Pins)	007-1073	1 X 770680-1 1 X 770680-4 46 X 770854-1 (8 A rated)	TE
M812 Connector Harness Kit (Set of 2)	016-185	N/A	DSE
Pin Blank Inserts (Seals unused connector pins)	N/A	114017	TE
M12 to Ethernet Cable	016-160	VS-M12MS-IP20-93R-L1/2	Phoenix
M12 to USB Cable	016-161	N/A	DSE
Belden 9841 (CAN Cable)	016-030	9841	Belden
2.4 Ghz WiFi / Bluetooth Antenna	020-1080	N/A	AMC
GPS Antenna (3m cable)	020-1079	N/A	AMC
Panel Mount Complete Kit for M812 with Buttons	1	100-411-01	DSE
Panel Mount Complete Kit for M812 without Buttons	1	100-411-02	DSE

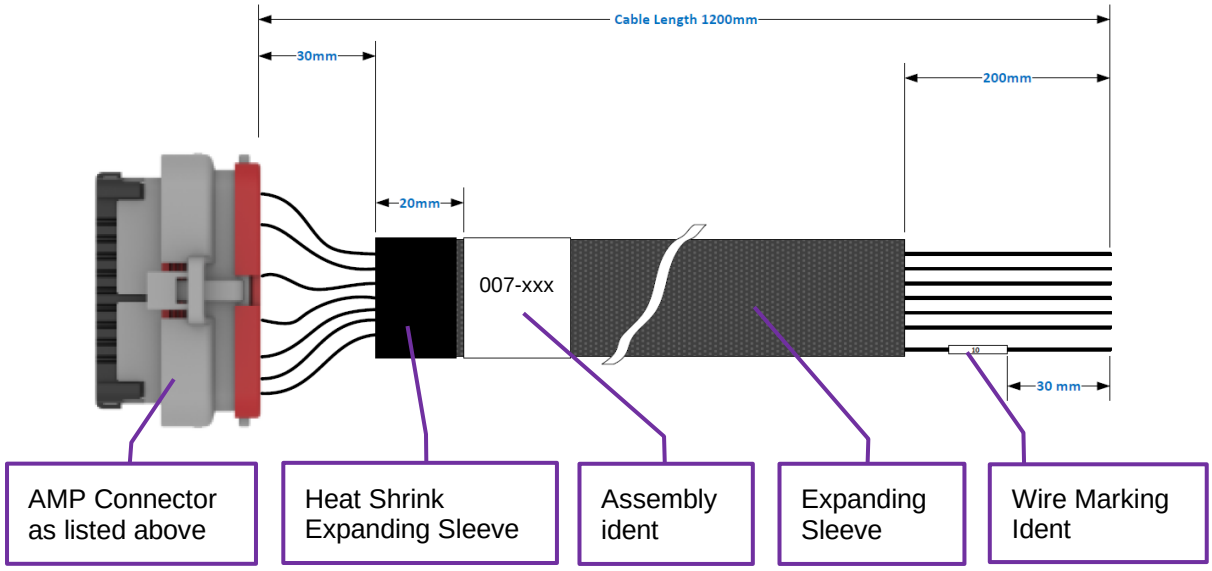
5.1 M812 CONNECTOR HARNESS KIT (016-185)

NOTE: Note the use of 8 A rated contacts in the connectors. Ensure correct fusing of supply pins. Utilise multiple supply pins where the application requires more than 8 A. Ensure one ground pin for each supply pin.

NOTE: If required, loose 16 A rated pins are available as detailed in the section entitled *Cables and Connectors* elsewhere in this document.

DSE Part 016-185 consists of two cables as listed below. Connectors are fitted at one end, with cable marking to identify the wires at the other end.

	Connector A	Connector B
Assembly Ident	016-185(A)	016-185(B)
AMP Connector	770680-4	770680-4
No of Connections	23	23
Wire size	0.75 mm^2 (AWG 18), Belden 9841 or AV Cable	0.75 mm^2 (AWG 18)
Wire Colour	Black	Various (Red, Orange, Black, Yellow)
Wire Idents	1 to 23	1 to 23
Connector Pin Crimp	770854-1 (8 A rated)	770854-1 (8 A rated)



6 MAINTENANCE AND WARRANTY

The device is *Fit and Forget*. As such, there are no user serviceable parts within the controller. In the case of malfunction, you should contact your original equipment manufacturer (OEM).

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).

7 DISPOSAL

7.1 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

8 MISCELLANEOUS

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