DEEP SEA ELECTRONICS
DSEM870 & DSEM871 Installation and Operation Manual

Document Number: 057-246

Author: Anthony Manton

DSE®

Deep Sea Electronics Ltd
Highfield House
Hunmanby
North Yorkshire
YO14 0PH
ENGLAND

Sales Tel: +44 (0) 1723 890099

E-mail: sales@deepseaelectronics.com
Website: www.deepseaelectronics.com

DSEM870 & DSEM871 Installation and Operation Manual

Revision History

Issue No.	Comments
1	First Release
1.1	Changed some specification items.
2.0	Changes to support DSEM870 V2 firmware.
2.1	Added Misc section.
3.0	Added features to support DSEM870 V3 firmware including Format options and new Camera Overlay support.
4.0	Added Touchscreen to cover M870-02 variant. Added WebVisu to cover M870-03 variant.
4.1	Added Tightening Torque for M10 connections. Corrected USB socket pinout Added more detail on Screen Rotation
5.0	Removed CODESYS information and moved to a separate manual. This manual is now Operation and Installation manual for M870 CODESYS and M870 Qt
6.0	Added DSEM871 CODESYS.
6.1	Added missing Standards section. Corrected typo in RAM mounting. Added "do not unplug when powered up' notes in Safety Instructions.

TABLE OF CONTENTS

1 INTRODUCTION

This document details the installation and operation and setup requirements of the DSEM870 and DSEM871 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.

2 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.**

2.1 GLOSSARY OF TERMS

Term	Description
Application	The application is the program that allows the DSEM870 to control the machine it is connected to. The Application within the DSEM870 is designed and provided by the manufacturer of the complete machine.
Bootloader	The Bootloader is the program within the DSEM870 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. DSEM870 supports CODESYS V3.5
ECU	Electronic Control Unit. For example the DSEM870 device.
Firmware	The Firmware of the DSEM870 is the Operating System of the DSEM870 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.

2.2 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.

2.2.1 TECHNICAL INFORMATION

DSE Part	Description
057-320	DSEM870 CODESYS Software Manual
057-321	DSEM870 Qt Software Manual

2.3   SAFETY INSTRUCTIONS

2.3.1   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.

- Do not insert or remove the connector when powered. Remove all sources of supply before insertion or removal.

- 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.

2.3.2   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.

- 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.

- Do not insert or remove the connector when powered. Remove all sources of supply before insertion or removal.

3 SPECIFICATIONS

3.1 PROCESSOR

Description	Specification
Technexion Freescale iMX6 SOLO Microcontroller	ARM A9
Speed	800 MHz

3.2 MEMORY

Description	Specification
Flash	2 GB available for application. 4 GB total.
RAM	512 Mb

3.3 DC SUPPLY

Description	Specification
Operating Voltage (Pin A7)	8 V to 32 V
Maximum Current (Full Backlight, no External Loads)	<1000 mA at 24 V
Maximum Current (Full Backlight & Heater, no External Loads)	<1500 mA at 24 V
Maximum Current (After Controlled Shutdown With Ignition off)	<5 mA at 24 V

3.3.1 FUSING

⚠ **NOTE: Connector C is not fitted to DSEM871.**

Description	Specification
DC Supply (Pin A7)	3 A Max
Ignition (15) (Pin A13)	1 A Max
High Current Outputs supply (Pin C1) Fuse as Required by Output Loads (Pins C2, C3, C4, C5)	10 A Max
Auxiliary Supply Output (Pin C13)	100 mA Max

3.4 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	-30 ºC to +85 ºC (-22 ºF to 185 ºF)
Storage Temperature	-40 ºC to +85 ºC (-40 ºF to 185 ºF)
Degrees of Protection Provided by Enclosure (With All Mating Connectors Fitted)	IP67 (NEMA 6)

3.5   USER INTERFACE

3.5.1   CONTROLS

Description	Specification
Push Buttons	9 (10 including Rotary Encoder Push)
Rotary Encoder	1 Rotary Encoder With Integral Push Button

3.5.2   DISPLAY

> ⚠ **NOTE: DSEM870 V1, V2, V3, V4 supports only BMP splash screen type (24 bit colour, 800 px X 480 px)**

Description	Specification
Size (Across Diagonal)	177.8 mm (7")
Size (W x H)	WVGA (800 x 480)
Touchscreen (M870-02 and DSEM870-03 only)	Capacitive
Aspect Ratio	15:9
Type	Optically Bonded LED
Lifetime	> 50,000 hours
Colour	24 bit
Splash Screen Image Type	Splash Screen Image Type: PNG, JPG, BMP, 8 bit / 24 bit colour depth, 800 px X 480 px. Alphanumeric filename only, no spaces permitted.

3.5.3   AMBIENT LIGHT LEVEL SENSOR

Description	Specification
Light Level Sensor	Measures ambient light level. This can be used to adjust display brightness based upon lighting conditions.

3.5.4 LED

> ⚠**NOTE: Application programming may also drive the LED. The application manual provided by the OEM will inform of this. Should a system error occur, the device overrides the application control of the LED to display status as shown below.**

The system LED is used to indicate operating status.

Description	Specification
LED Type	Tricolour (Red, Amber, Green) (see below)

Colour	Operation	State	Meaning
Off	N/A	Off	Device not powered
Green	Static	Application Stopped.	Unit powered up, Application program loaded but not running
	1 Hz flash	Application Running.	Unit powered up, Application program loaded and running
	5 Hz flash	No Application.	Unit powered up, but no Application program loaded
Amber	Static	Bootloader Mode	Bootloader functioning normally, firmware present
		Firmware Start-up	Firmware is at Start-up.
		Application Exception	Unit Stopped due a serious fault.
	1 Hz flash	Decrypting Image	Bootloader is decrypting the downloaded image
	5 Hz flash	Reading Image from USB	Bootloader is reading an image from the USB
Red	Static	Fatal Error	Fatal system / hardware fault – LED may be driven directly by microcontroller error pin or firmware is in fault condition state.
	1Hz flash	Faulty Application Running	Unit running with a serious fault, for example Output Supply Under Voltage.

3.6 REAL TIME CLOCK

Description	Specification
Retention Type	Super Cap for up to 800 hours

3.7 INPUTS

⚠ **NOTE: Connector C is not fitted to DSEM871. Inputs are not available on DSEM871.**

3.7.1 IGNITION

⚠ **NOTE: With legacy firmware versions, DSEM870 V1 to DSEM870 V4, ignition MUST be switched off to begin the shutdown process. After the device has safely shut down, ECU power may be removed. Removing ECU power without allowing for the safe shutdown may erase persistent values and/or device application.**

Ignition is used to energise / deenergise the device. The pin must be switched from the same supply as ECU.
Where controlled shutdown is not required, with M870 / M871 Versions 5+, ignition may be permanently connected to DC Supply.

Description	Specification
Ignition (15). Same supply as ECU (Connector A, Pin 7)	Connector A, Pin 13
Input Voltage for OFF	0 V
Input Voltage for ON	4 V DC to 32 V DC

3.7.2 DIGITAL INPUTS

3.7.2.1 DIGITAL

Description	Specification
Applicable Pins	Pins C14, C15, C16, C17
Minimum Voltage for High Level	>6 V
Maximum Voltage for Low Level	<2 V

3.7.2.2 FREQUENCY

Description	Specification
Applicable Pins	Pins C14, C15, C16, C17
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

3.7.3   ANALOGUE INPUTS

Description	Specification
Applicable Pins	Pins C14, C15, C16, C17
Reference Voltage Pins	C6, C18
Reference Voltage	Programmable 5 V / 10 V ±500 mV

3.7.3.1   VOLTAGE

Description	Specification
Applicable Pins	Pins C14, C15, C16, C17
Configurable Ranges	0 V to 5 V 0 V to 10 V 0 V to 32 V
Input Resistance	>=30 kΩ
Sampling Rate	500 Hz

Voltage Measurement Resolution and Accuracy

Configured Range	Resolution (12 bits)	Accuracy (±1%) FSD
0 V to 5 V	0.001 V	±0.05 V
0 V to 10 V	0.01 V	±0.1 V
0 V to 32 V	0.3 V	±0.32 V

3.7.3.2   CURRENT

Description	Specification
Applicable Pins	Pins C14, C15, C16, C17
Configurable Ranges	0 mA to 20 mA 4 mA to 20 mA
Input Type	Current sink only
Input Sink Resistance	100 Ω ± 1%
Sampling Rate	500 Hz
Resolution (12 bits)	0.005 mA
Accuracy (± 1 % Full Scale Deflection)	0.2 mA

3.7.3.3   RESISTIVE

Description	Specification
Applicable Pins	Pins C14, C15, C16, C17
Measurement Range	0 Ω to 3200 Ω
Measurement Source Voltage	12 V maximum
Measurement Source Current	1 mA
Sampling Rate	500 Hz
Resolution (12 bits)	0.78 Ω
Accuracy (± 1 % Full Scale Deflection)	32 Ω

3.7.3.4 RATIOMETRIC

Description	Specification
Applicable Pins	Pins C14, C15, C16, C17
Measurement Voltage Reference	Input/Output Supply (Pin C1, C7)
Measurement Type	Ratio of input Pin to I/O Supply
Measurement Source Current	1 mA
Accuracy	± 1 % F.S.D.

3.8 OUTPUTS

⚠️**NOTE: Connector C is not fitted to DSEM871. Outputs are not available on DSEM871.**

3.8.1 NEGATIVE SWITCHING

Description	Specification
Applicable Pins	Pins C2, C3, C4, C5
Maximum Current	2 A
Digital Output Active Low 'ON' State Maximum Voltage at Rated Current	< 100 mV
Digital Output Active Low 'OFF' State Leakage Current	<5 µA at 24 V output supply

3.8.2 POSITIVE SWITCHING

Description	Specification
Applicable Pins	Pins C2, C3, C4, C5
Maximum Current	2 A
Digital Output Active Low 'ON' State Maximum Voltage at Rated Current	<100 mV
Digital Output Active Low 'OFF' State Leakage Current	<10 µA at 24 V output supply

3.9   COMMUNICATIONS

3.9.1   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	2
Supported Protocols	J1939 CAN open 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

3.9.2   ETHERNET

Description	Specification
Number Of Ethernet Ports	1
Supported Data Rates	10 Mbit/s / 100 Mbit/s, Duplex
Supported Protocols CODESYS variant	MODBUS TCP CODESYS 3.5

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

3.9.3   USB

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

3.9.4   CAMERA INPUTS

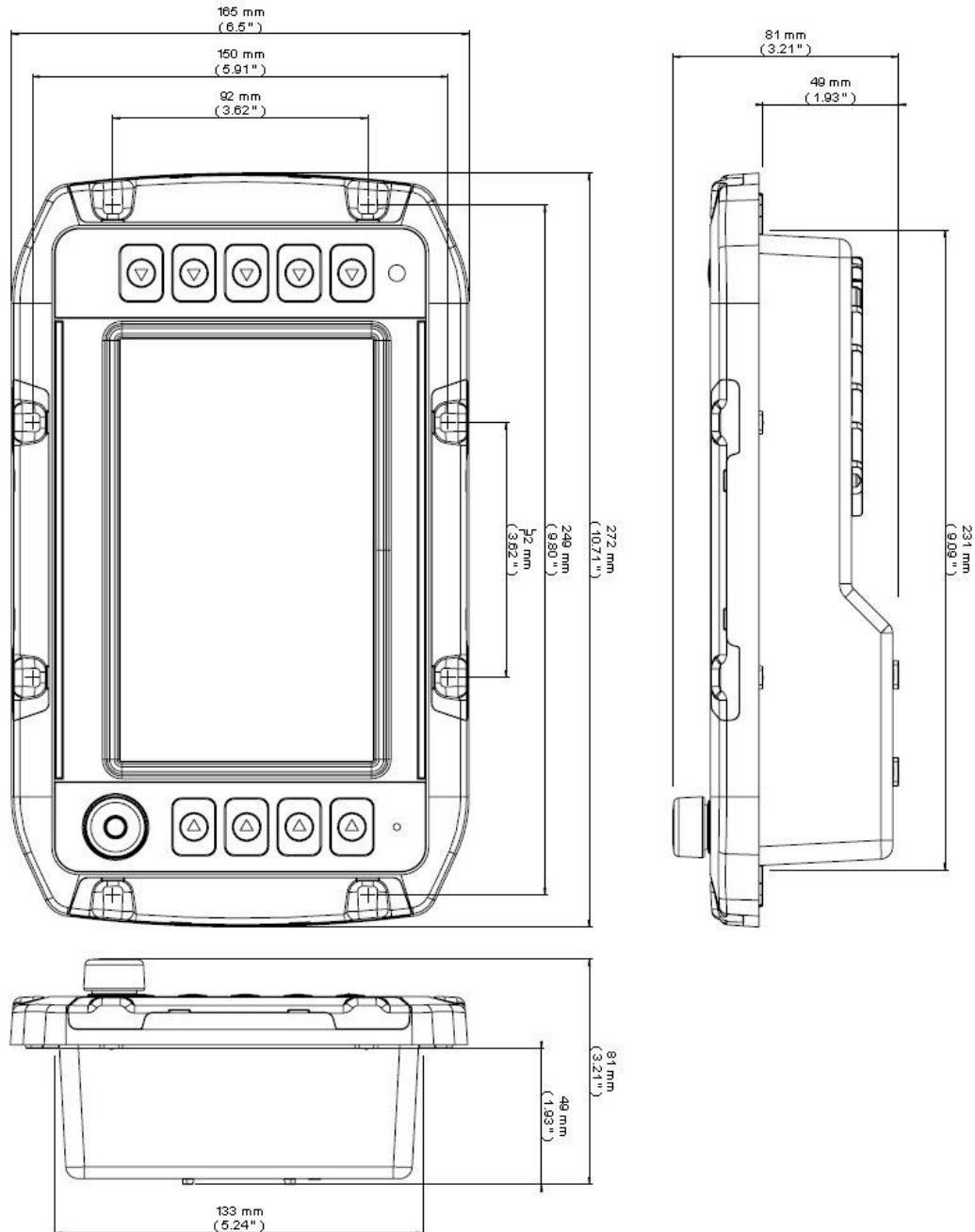| Description	Specification
Number of Camera Inputs	2
Connection Pins	A5, A11 (Camera 1) A6, A12 (Camera 2)
Camera Type	VGA
Interface Type	Analogue (Composite) Video for PAL / NTSC
Overlay Size (when utilised)	800 x 480

3.10 APPLICABLE STANDARDS

Category	Description	Standard
CE marking	Electromagnetic compatibility (EMC) noise immunity	EN 61000-6-2
	Electromagnetic compatibility (EMC) emission standard	EN 61000-6-4
	Safety of information technology equipment, general requirements	BS EN 61010:2010+A1:2019
E11 (Not Applicable to M871)	EMC requirements for vehicles	UN/ECE-R10.05
Water and Dust	IP67 (approx. NEMA 6)	IEC 60529
Mechanical tests	Vibration Resonance Search Freq range: 10 Hz to 2 kHz Acceleration: 5 g	EN 60068-2-6
	Vibration Random Freq range: 10 Hz to 350 Hz	EN 60068-2-64
	Test VII; vibration random mounting location: vehicle body	ISO 16750-3
	Mechanical Shock Operational Shock Pulse Shape: Half Sine Amplitude: 50 g Duration: 11 ms Number of Shocks: 3 in each direction of each axis (9 in total of each duration)	EN 60068-2-27
	Mechanical Shock Amplitude: 50 g Duration: 6 ms	EN 60068-2-27
	Bumps Amplitude: 30 g Duration: 6 ms; 24,000 shocks	ISO 16750-3
Load Dump	151 V (Ri 1 Ω) 202 V (Ri 8 Ω)	ISO 7637-2

4 INSTALLATION

4.1 DIMENSIONS AND MOUNTING

4.1.1 DIMENSIONS

| Description	Specification
Overall Dimensions (Height x Width x Depth)	272 mm x 165 mm x 81 mm (10.7 " x 6.5 " x 3.2 ")
Mounting Type	8 x mounting bolts or RAM mount.
Overall Weight	<1 kg (2.2 lb)

Overall dimensions without fascia mounting gasket

4.1.2   FASCIA MOUNTING

| Description	Specification
Fascia Mounting Holes	Suitable for M5 bolts (3/16 ")
Fascia Mounting Hole Centres	See Diagram Below
Panel Cut-Out	231 mm x 133 mm (9.09 " x 5.24 ")
Fascia Mounting Bolt Material Recommendation	Steel or Stainless Steel bolts fitted with M5 bonded seal washers (also known as Dowty washers).
Fascia Mounting Bolt Tightening Torque to prevent distortion of the sealing gasket and subsequent seal failure / mechanical damage to the controller.	1.2 Nm Maximum (0.89 lbf ft Maximum)
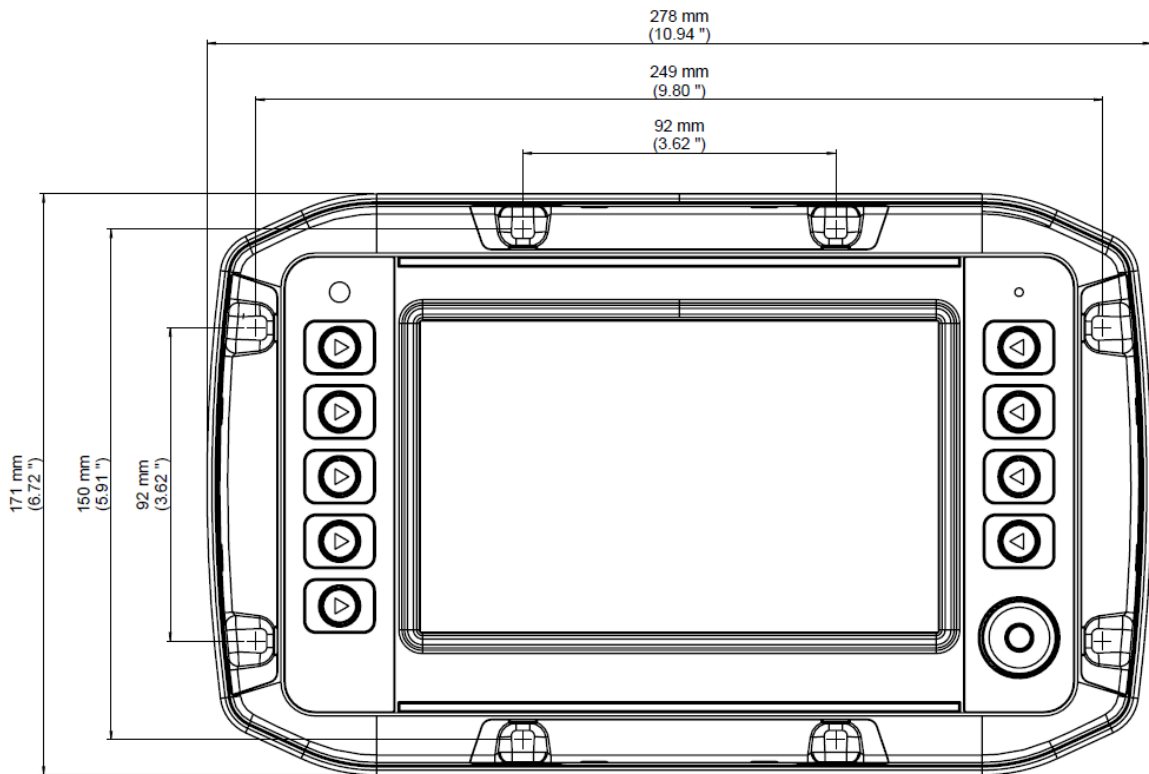
Overall dimension including fascia mount gasket.

4.1.3   RAM MOUNTING

DSE870 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.

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)
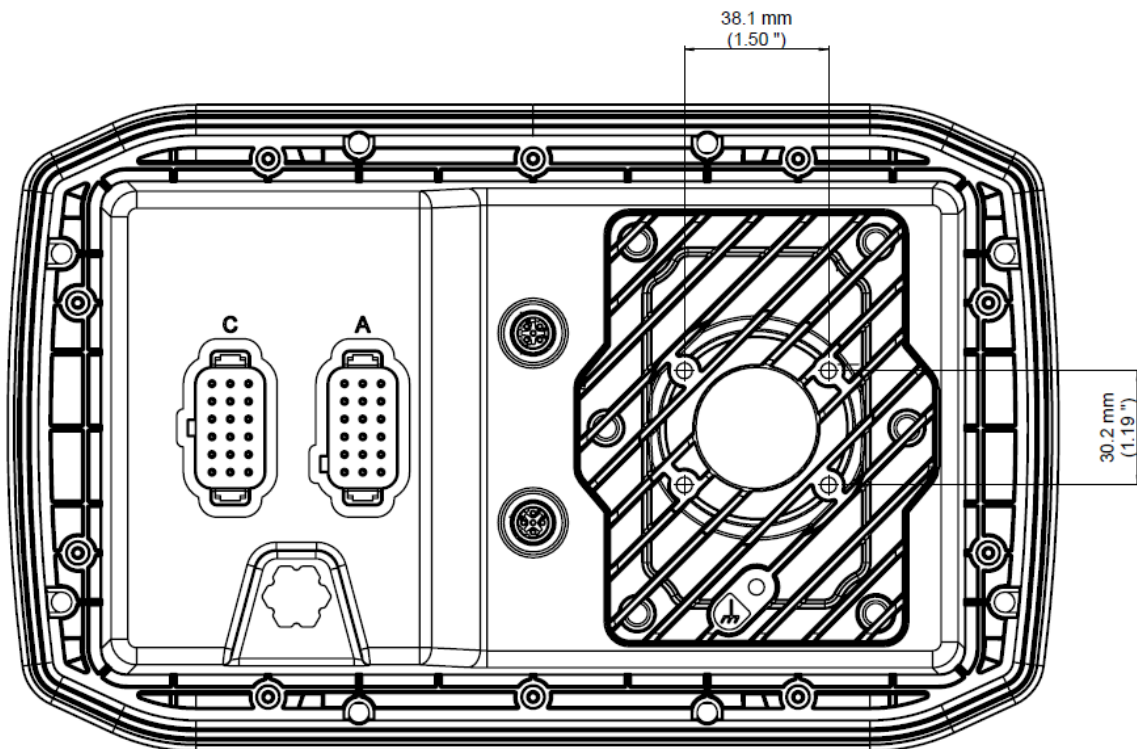
4.2 GROUNDING

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.

Ground (Earth) Point
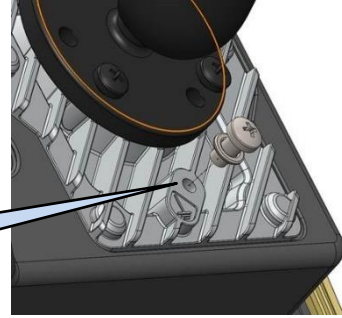
4.3 FUSING
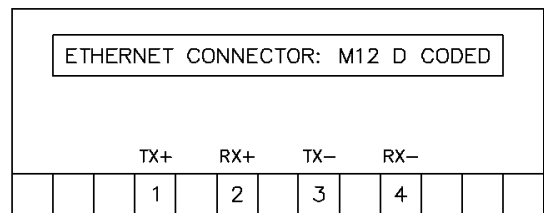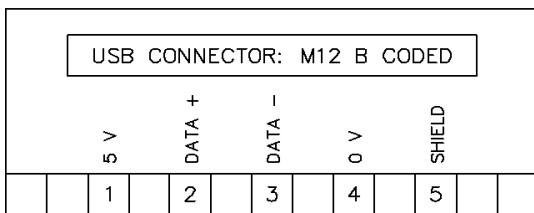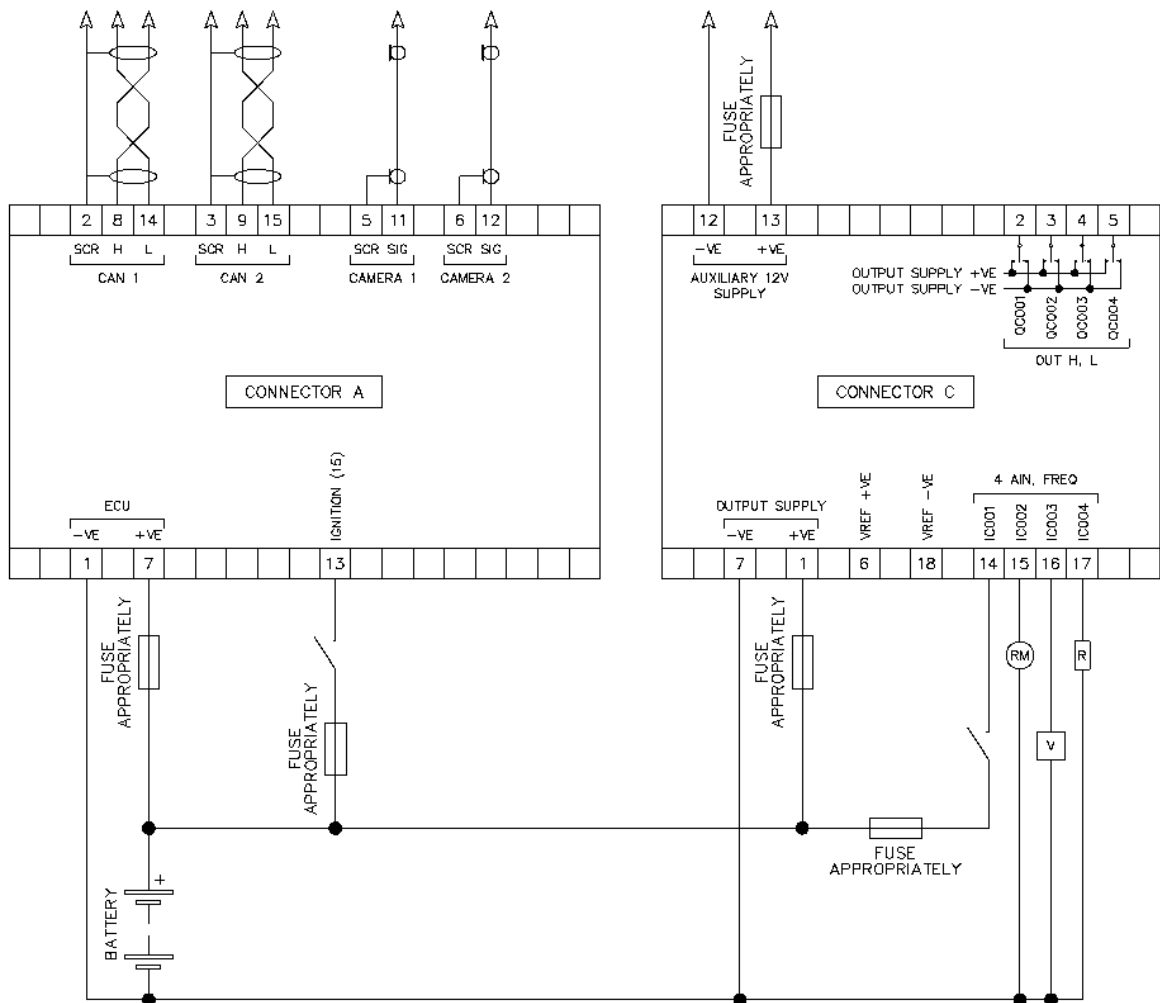
⚠ **NOTE: Connector C is not fitted to DSEM871.**

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

Pin	Description	Comments	Recommended Fuse Size
A7	ECU Supply	Supplies M870 CPU	3 A Max
A13	Ignition (15)		1 A Max
C1	Output Supply	Supplies Outputs QC001 (Pin C2) QC002 (Pin C3) QC003 (Pin C4) QC004 (Pin C5).	10 A Max
C13	Auxiliary Supply Output (100 mA)	Used to Supply External Devices Internally Protected From Overcurrent.	100 mA Max

4.4 TYPICAL CONNECTION DIAGRAM

⚠️**NOTE: Connector C is not fitted to DSEM871.**

| Terminology	Meaning
QCxxx	Output
Ix	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.

4.5   USER CONNECTIONS

⚠️**NOTE: Connector C is not fitted to DSEM871.**

⚠️**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.**
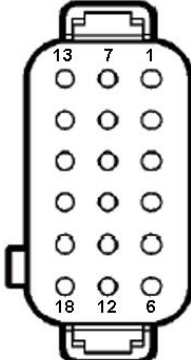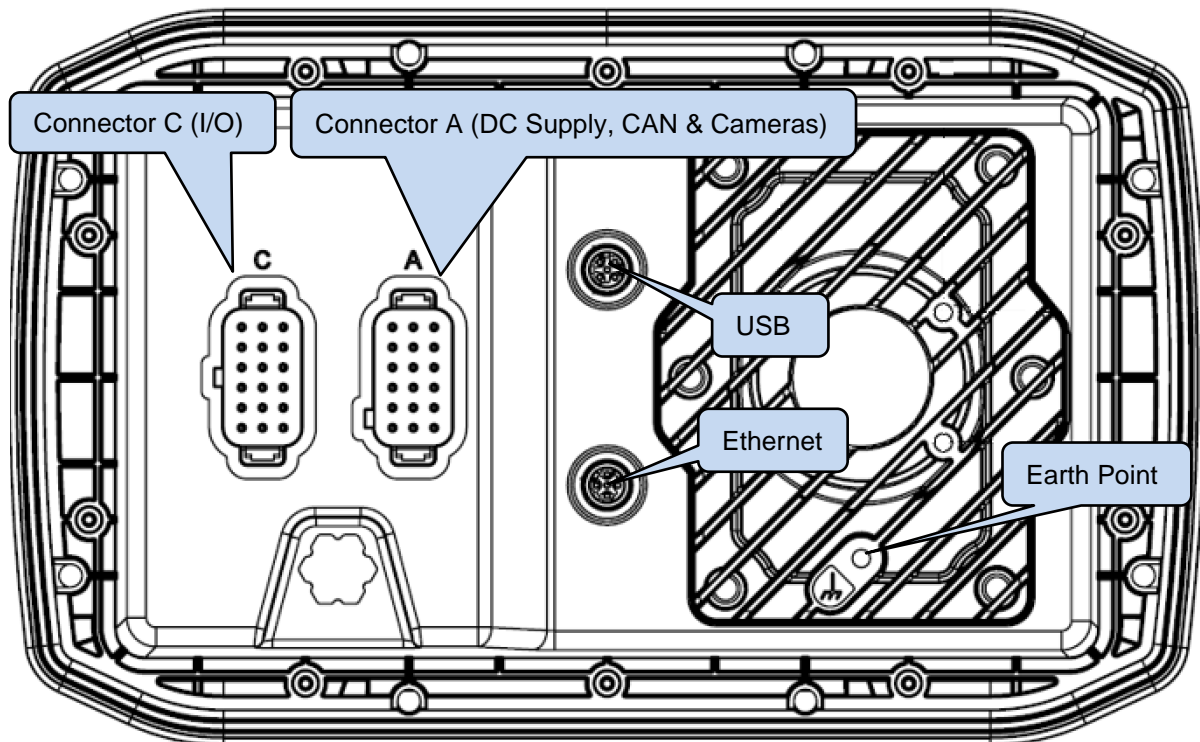
4.5.1 CONNECTOR A (DC SUPPLY, CAN AND CAMERA)

> ⚠ **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.**

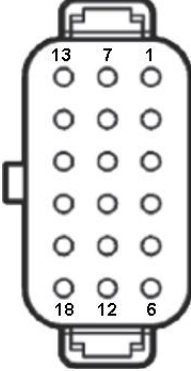> ⚠ **NOTE: Connect Camera1 and Camera2 using a single core conductor with screen (shield).**

Connector A	Pin	Description	Comments
(A Coded)	1	ECU Supply -ve	DC Supply for the M870
	2	CAN1 SCR	Screen (shield) for CAN1
	3	CAN2 SCR	Screen (shield) for CAN2
	4	No Connection	
	5	Camera 1 SCR	Screen (shield) for Camera 1
	6	Camera 2 SCR	Screen (shield) for Camera 2
	7	ECU Supply +ve	DC Supply for the M870
	8	CAN1 H	
	9	CAN2 H	
	10	No Connection	
	11	Camera 1 Signal	Analogue (Composite) video
	12	Camera 2 Signal	Analogue (Composite) video
	13	Ignition +ve (15)	Energises the ECU.
	14	CAN1 L	
	15	CAN2 L	
	16	No Connection	
	17	No Connection	
	18	No Connection	

4.5.2   CONNECTOR C (I/O)

⚠️**NOTE: Connector C is not fitted to DSEM871.**

Terminology	Meaning
QC00x	Output
IC00x	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

Connector C	Pin	Description	Comments
(C Coded)	1	Input/Output Supply +ve	Supplies Outputs 1 to 4 and *Ratiometric* inputs.
	2	QC001	OUT H, L. Supplied by C1.
	3	QC002	OUT H, L. Supplied by C1.
	4	QC003	OUT H, L. Supplied by C1.
	5	QC004	OUT H, L. Supplied by C1.
	6	Vref +	+ve Reference Output for AIN.
	7	Output Supply GND	-ve Connection for Output Supply (C1)
	8	No Connection	
	9	No Connection	
	10	No Connection	
	11	No Connection	
	12	Aux 12V -ve Output	Used to Supply External Devices
	13	Aux 12V +ve Output (Max 100 mA)	Used to Supply External Devices
	14	IC001	AIN, FREQ
	15	IC002	AIN, FREQ
	16	IC003	AIN, FREQ
	17	IC004	AIN, FREQ
	18	Vref GND	-ve Reference Output for AIN

5 OPERATION

5.1 SYSTEM PAGES

The System Information and System Settings pages are accessed by pressing and holding any two of the fascia buttons during the power up (application of DC power) of the DSEM870. Wait until *Entering Setup…* is displayed before releasing the buttons.

5.1.1 NAVIGATION

Within the System Pages, the following icons appear adjacent to the buttons to indicate their function.

Icon	Function	Description
◁	Return	Press the adjacent button to return to a previous page.
↻	Encoder	Rotate to cycle through the available options. Press to select (OK) the displayed option.

Press ◄ to return to a previous page.

Navigation is by rotary encoder (rotate and click).

5.1.2 PAGE SELECTION

Use the rotary encoder to move through the pages. Press the rotary encoder to select the page.

Device Settings   **Device Actions**   **Device Information**

#### 5.1.2.1 OPTION SELECTION AND EDITING

While viewing the selected page, use the rotary encoder to move through the options, Press the rotary encoder to select the option for editing.

While editing the selected parameter, use the rotary encoder to change the value, Press the rotary encoder to save the change.
Press ◄ to exit the editor.

5.1.3   DEVICE SETTINGS

This section allows access to the *Device Settings.*
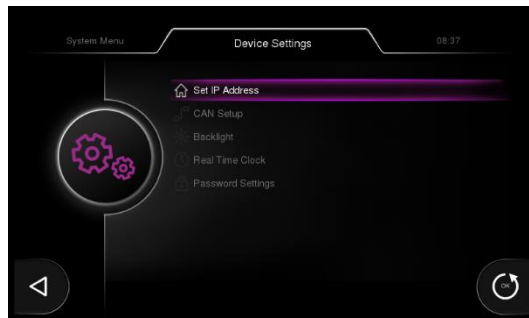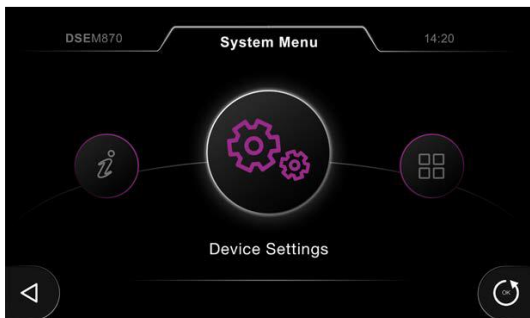
5.1.3.1   SET IP ADDRESS

This section allows selection of DHCP or Static
IP address.
When connecting the device to a third party
network, these settings must be made after
consulation with the network manager.

Turn the rotary encoder to select the item to
change and press it to enter the editor.

Use the rotary encoder to select the digit.
Press to accept the change and/or move to the
next digit.

5.1.3.2   CAN

This section allows configuration of the CAN
interface parameters.

Turn the rotary encoder to select the item to
change and press it to enter the editor.

Selecting *Interface* and pressing the encoder
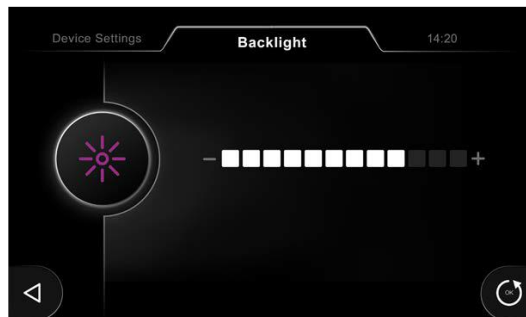cycles between the two CAN ports (0 & 1).
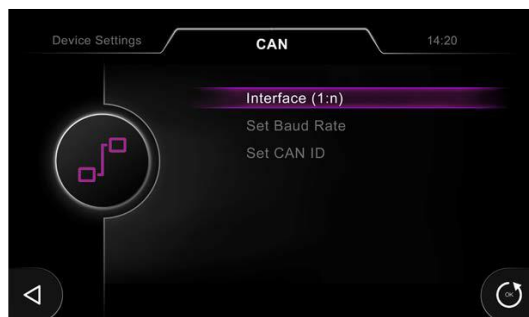
5.1.3.3 BACKLIGHT

⚠️**NOTE: Application programming may also set the Backlight, overriding the *Device Setting* after system boot up completes and the application code executes.**

This section allows adjustment of the LCD backlight brightness.

Use the rotary encoder to adjust the level. Press to accept the change.

5.1.3.4 REAL TIME CLOCK

⚠️**NOTE: Installation of CODESYS Package Files (.pkg) requires the date/time to be correctly set. For example, Firmware files cannot be applied if the date is set prior to the creation date of the firmware file.**

Allows the setting of the Real Time Clock and Calendar.

Use the rotary encoder to select the digit. Press to accept the change and/or move to the next digit.

5.1.3.5   PASSWORD SETTINGS

⚠️**NOTE: Ensure the Password (if enabled) is not lost or forgotten!**

Allows the password to be enabled and changed.

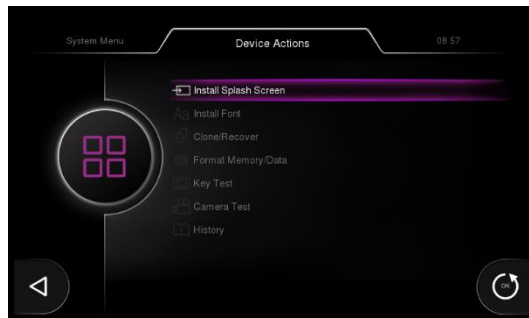Turn the rotary encoder to select the item to change and press it to enter the editor.
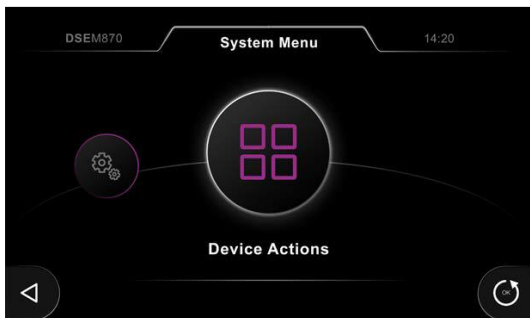
Use the rotary encoder to select the digit. Press to accept the change and move to the next digit.

Use the rotary encoder to select the digit. Press to accept the change and move to the next digit.
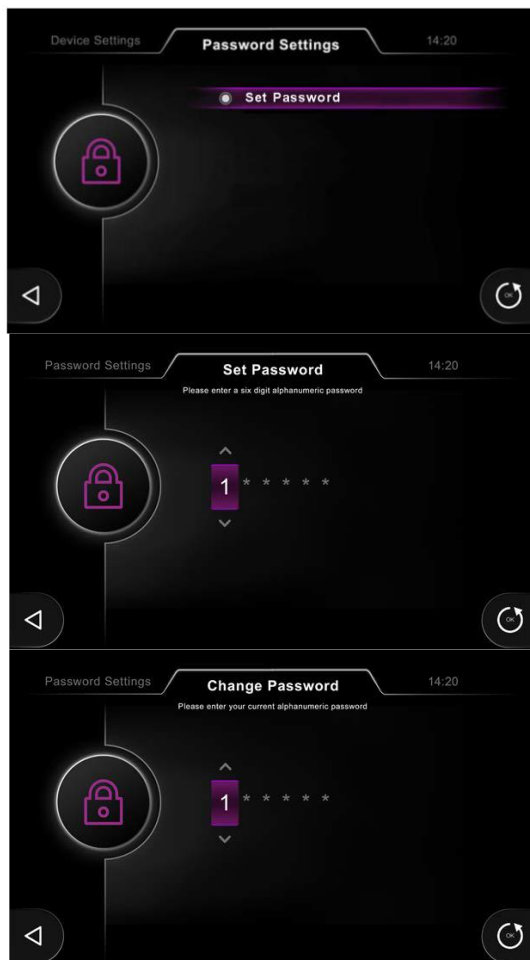
5.1.4   DEVICE ACTIONS

Allows selection of device actions.

5.1.4.1   INSTALL SPLASH SCREEN

> ⚠️**NOTE: DSEM870 V1, V2, V3, V4 supports only BMP splash screen type (24 bit colour, 800 px X 480 px)**

DSEM870 supports the display of a *Splash Screen* at power up and shutdown of the device. This is typically used to display the OEM logo image.

The device Password is required (when enabled) to allow Splash Screen installation.

Splash Screen Image Type:
PNG, JPG, BMP,
8 bit / 24 bit colour depth,
800 px X 480 px.

Filenames must be alphanumeric only (A to Z, a to z, 0 to 9) and "." (used to seperate the file extension). Spaces are not permitted in the filename.

Turn the rotary encoder to choose *Startup or* Shutdown image and then to select the required image file. Press the encoder to install the file..
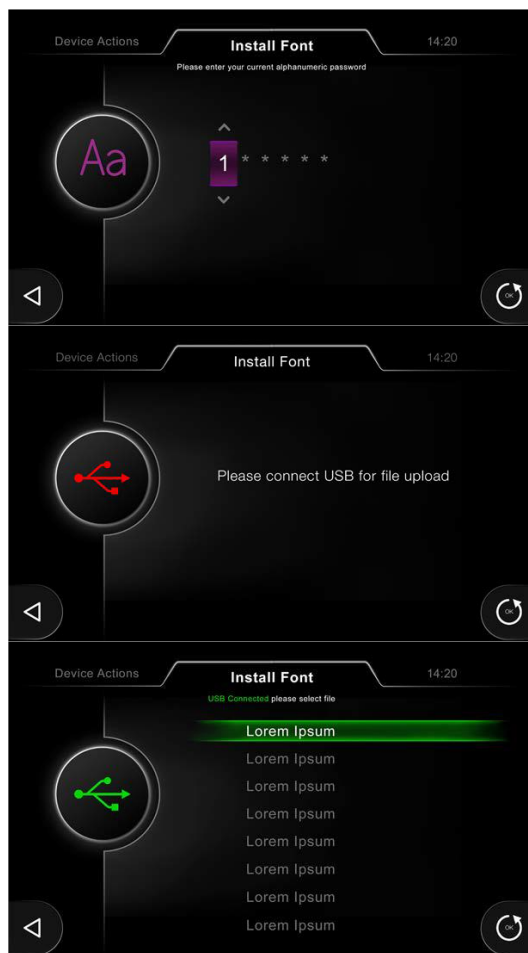
5.1.4.2   INSTALL FONT

The device Password is required (when enabled) to allow font installation.

Ensure the USB device containing the font(s) is connected to the controller.

Filenames must be alphanumeric only (A to Z, a to z, 0 to 9) and "." (used to seperate the file extension).

Turn the rotary encoder to choose the required font and press it to select.

5.1.4.3   CLONE / RECOVER SELECTION

⚠️**NOTE: The name of the clone file is important and must be named as "m870-app_backup-xxxxxx.dse" where xxxxxx may be used to identify the file with alphanumeric characters. The part before xxxxxx must not be changed. Upon creation of the clone file, the name includes the current device date in place of xxxxxx in the above example.**

The device Password is required (when enabled) to allow Clone or Recover operations.

CLONE

This section is used to create a backup file of the device, selecting the elements to backup. This file may then be used to recover the device, or create *Clones*, sending the file to other devices.

Turn the rotary encoder to choose the function and press it to access the *Clone* selector.
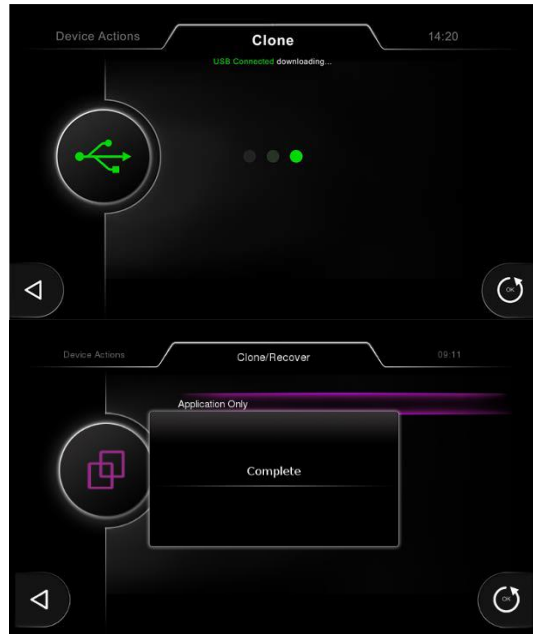

Turn the rotary encoder to choose the function and press it to select.

Ensure the USB device used to store the Clone file(s) is connected to the controller.
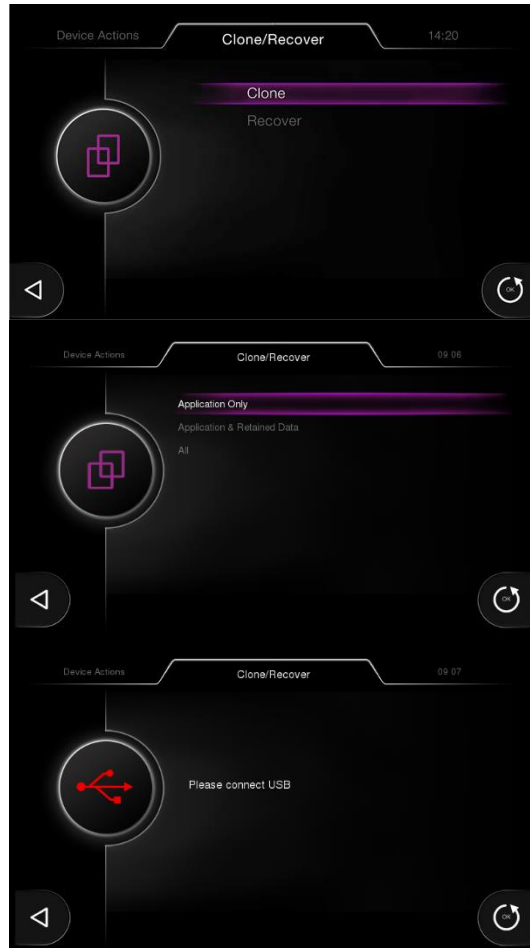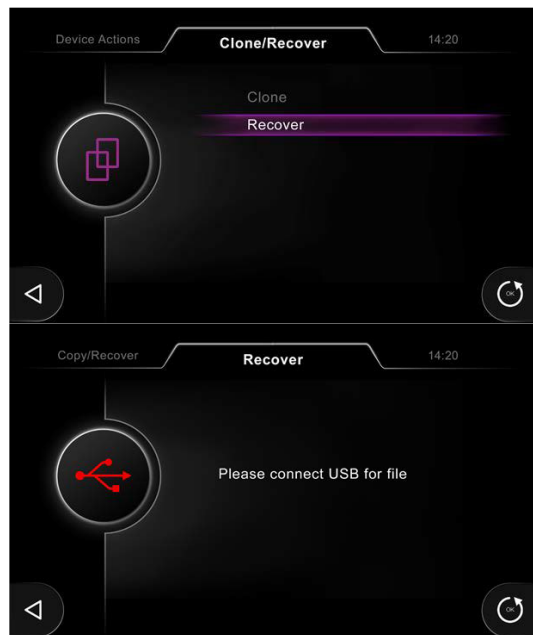
Wait while the process completes....

RECOVER

⚠NOTE: The *Recover* process replaces files on the target device and may change the Application of the device.

⚠NOTE: Installing a *package* file such as a Firmware Update requires that the date/time of the device is correctly set as detailed in the section entitled *Configuration | Settings* elsewhere in this document.

This section is used to recover the device from a previously stored Clone (backup) file, or create copies of the device, sending the file to other devices.

Ensure the USB device containing the file(s) to Recover is connected to the controller.

Filenames must be alphanumeric only (A to Z, a to z, 0 to 9) and "." (used to seperate the file extension).
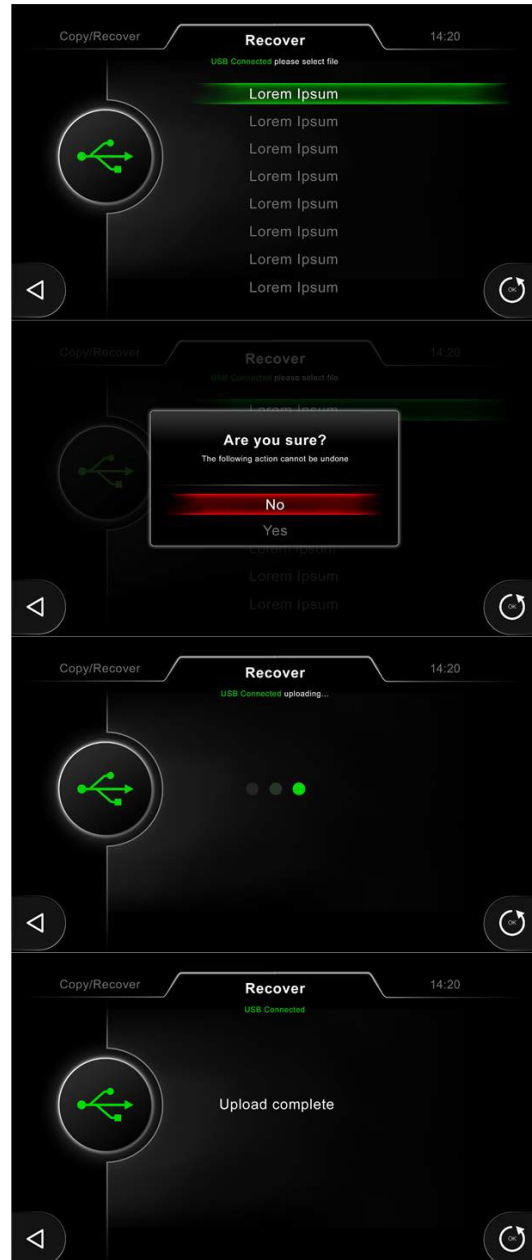
Turn the rotary encoder to choose the file to restore, and press it (*click*) to select.

Confirm that you wish to proceed with this process.

Turn the rotary encoder to choose the option, and press it to select.
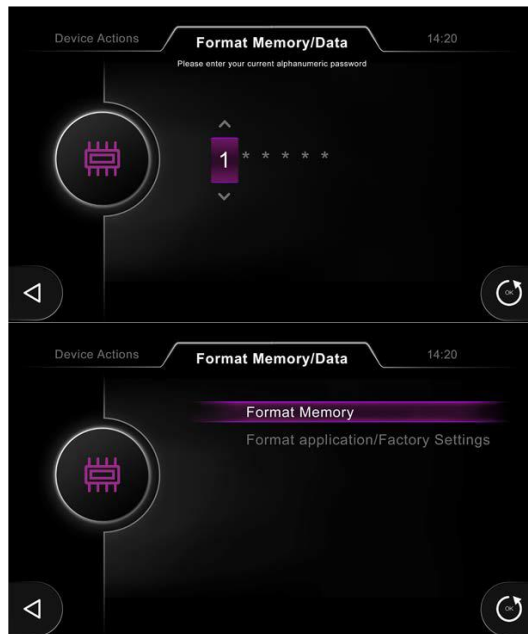
Wait while the process completes….

5.1.4.4   FORMAT MEMORY / DATA

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

Enter the Password if one has been set.

Select which memory area to Format.
Turn the rotary encoder to choose the function, and press it to select.

Format Memory : Remove Application only.
Format Application/Factory Settings:
Removes Application and all other files including system settings. May be considered as a 'Factory Reset'.

5.1.4.5   KEY TEST

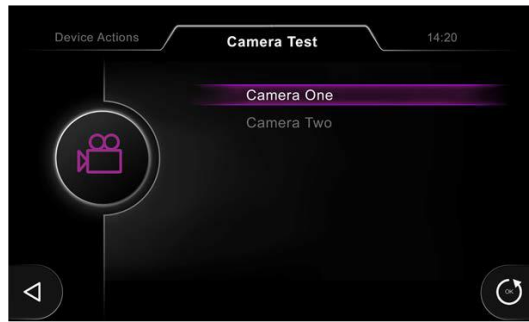This section allows the device fascia buttons and rotary encoder to be tested.

Press the keys and rotate the encoder to receive feedback of their operation.

To exit the Keytest, release all buttons for five seconds.
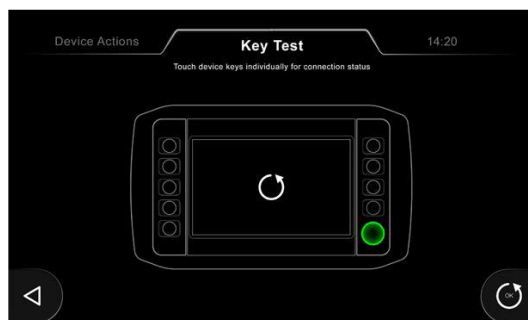
5.1.4.6   CAMERA TEST

Select the camera using the rotary encoder and press the encoder to view the selected camera.
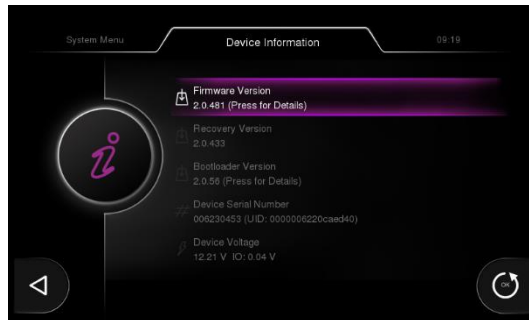

5.1.4.7   HISTORY

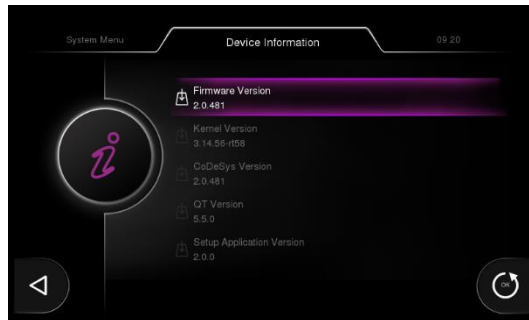Used to display a log of the date of certain actions.

5.1.5   DEVICE INFORMATION

This section shows the *Device Information*.

5.1.5.1   FIRMWARE VERSION

Shows all details of the device versions.

5.2   FIRMWARE UPDATE

⚠**NOTE: Installing a *package* file such as a Firmware Update requires that the date/time of the device is correctly set as detailed in the section entitled *Configuration | Settings* elsewhere in this document.**

⚠**NOTE: BE PATIENT while the update process completes. Removing power from the device partway through the process could render the device inoperable requiring return to DSE.**

The Firmware Update is performed as follows:

- Remove DC Supply from the DSEM870.
- Press and hold any three buttons. Reapply DC power until the DSEM870 indicates that it is *Entering Flash / Recovery.* Now release the buttons.
- When prompted, connect the USB memory stick containing the firmware update file(s). You must do this within 60 seconds. Failure to do so results in the DSEM870 restarting into normal operation mode.
- Update occurs automatically when the memory stick is inserted.
- During the process, *Detecting Components* may be shown on the display for a few minutes. Be patient while this completes.
- During the process the display may 'blank' a number of times. Again, be patient while the process completes.
- During the process it may appear to 'pause', including the display of *Firmware Done* or *Recovery Done.* At these points, the process is not complete. Again, be patient while the process completes.
- The process is complete when the following message is displayed:

```
                 DSE M870 Update
                     Done…

 \        Press any key to reboot…
```

        Press any key when prompted to restart the device and apply the new firmware.
- Wait for the **DSEControl**® logo to appear.
- Wait for the System LED to illuminate, Green, Flashing.
- It is now safe to power off the device.

6   CABLES, CONNECTORS, HARNESSES AND SPARE PARTS

Description	DSE Part	Manufacturer Part	Manufacturer
M870 Connector Kit (Set of 2)	007-850	DT16-18SA-K004 DT16-18SC-K004	TE / Deutsch
Connector Pin Crimp (0.5 mm^2 to 1.0 mm^2)	N/A	0462-201-16	TE
Connector Pin Crimp (2 mm^2)		0462-209-16	TE
M870 Connector Harness Kit (Set of 2)	016-167	N/A	DSE
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
Panel Mounting Sealing Gasket	020-579	N/A	DSE
Pin Blank Inserts (Seals unused connector pins)	N/A	114017	TE

6.1   M870 CONNECTOR HARNESS KIT (016-167)

DSE Part 016-167 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	007-850	007-851
AMP Connector	DT16-18SA-K004	DT16-18SC-K004
No of Connections	18	18
Wire size	0.5 mm^2 (AWG 20)	0.5 mm^2 (AWG 20)
Wire Colour	Black	Black
Wire Idents	1 to 18	1 to 18
Connector Pin Crimp (0.5 mm^2 to 1.0 mm^2)	0462-201-16	0462-201-16
Connector Pin Crimp (2 mm^2)	0462-209-16	0462-209-16
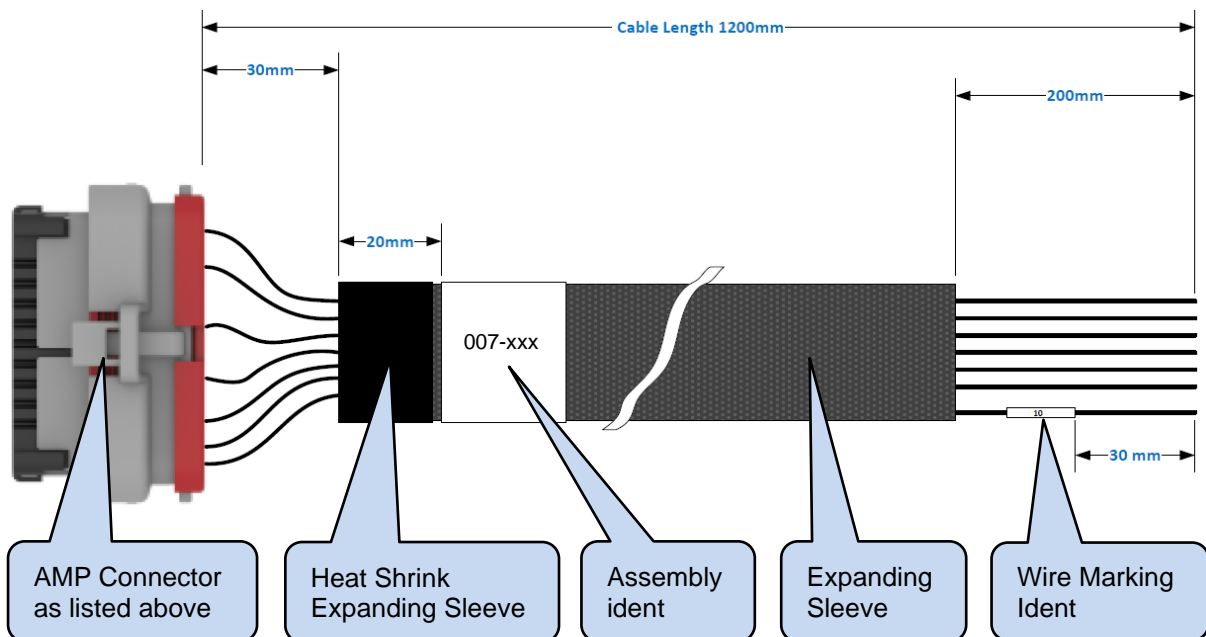
7 MAINTENANCE AND WARRANTY

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).

8 DISPOSAL

8.1 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

9 MISCELLANEOUS

This product includes copyrighted third-party software licensed under the terms of the GNU General Public License. A copy of the corresponding source code for all included third-party software is available on request, please contact DSE Technical Support for additional information.

This Page is Intentionally Blank