



# DSEM840

## PROGRAMMABLE DISPLAY FOR USE IN VEHICLES AND OFF-HIGHWAY MACHINERY



### KEY FEATURES / SUMMARY

- Robust HMI/programmable display specifically designed for mobile applications
- Optically bonded 4.3" colour screen for harsh environments
- Powerful Cortex M7 400 MHz clock speed + M4 200 MHz clock speed
- 64 MB of SDRAM / 20 MB CODESYS Application / 20 MB User Data
- 8 KB retained data
- 4 configurable inputs, digital and analogue capability
- 4 configurable digital outputs (2 x PWM)
- 2 independent CAN interfaces, J1939, CAN open and Raw CAN
- Ethernet interface for communication
- Flexible user programming via CODESYS 3.5
- IP67 protection/NEMA 6

### ADDITIONAL HARDWARE

Deutsch connector A, 18 way complete with pins  
 M840 connector harness  
 Ethernet programming cable  
 M12 to USB cable

### PRODUCT VARIANT

M840-02

### DSE PART

007-850  
 016-168  
 016-160  
 016-161

### OVERVIEW

#### DC SUPPLY

8 V DC to 32 V DC

#### CURRENT CONSUMPTION

**OPERATING CURRENT**  
 < 1000 mA at 12 V and 24 V without external loads

#### DISPLAY

480 px x 272 px  
 24 bit colour  
 Optically bonded

#### INPUTS/OUTPUTS (total)

4 inputs / 4 outputs

#### INPUTS

Configurable,  
 Digital inputs (active high / active low)  
 Analogue inputs (Voltage 0 V to 5 V, 0 V to 10 V, 0 V to 32 V, current 4 mA to 20 mA, Ratiometric, Resistive, Frequency)

#### OUTPUTS

Configurable  
 Digital Output High-Sided/Low-Sided  
 2 x PWM

#### INTERFACES

##### CAN 1.2

CAN Interfaces 2.0 A/B, ISO11898  
 50 kbits/s... 1 Mbit/s  
 CAN Open, SAE J1939 or Raw CAN

##### ETHERNET

10 Mbit/s / 100 Mbit/s, Duplex

##### USB

USB Host 2.0 (12 Mbit/s)

#### DIMENSIONS

131 mm x 208 mm x 56 mm (H x W x D)  
 5.15" x 8.2" x 2.2" (H x W x D)

#### WEIGHT

< 1 kg

#### STORAGE TEMPERATURE RANGE

-40 °C to +80 °C  
 -40 °F to +176 °F

#### OPERATING TEMPERATURE RANGE

-30 °C to +70 °C  
 -22 °F to +158 °F

#### PROTECTION RATING

IP67/NEMA 6 (with mating connectors)

#### MOUNTING

4 x M5 bolts / RAM arm

### RELATED MATERIALS

#### TITLE

M840 Installation Instructions  
 M840 Operators Manual

#### PART NO.

053-188  
 057-248

#### DEEP SEA ELECTRONICS LTD

Highfield House, Hunmanby Industrial Estate, Hunmanby YO14 0PH  
**TELEPHONE** +44 (0) 1723 890099 **FACSIMILE** +44 (0) 1723 893303  
**EMAIL** sales@deepseaelectronics.com **WEBSITE** www.deepseaelectronics.com

#### DEEP SEA ELECTRONICS INC

3230 Williams Avenue, Rockford, IL 61101-2668 USA  
**TELEPHONE** +1 (815) 316 8706 **FACSIMILE** +1 (815) 316 8708  
**EMAIL** usasales@deepseaelectronics.com **WEBSITE** www.deepseaelectronics.com



## Technical Data

## DSEM840

Supply		Connector A
Operating voltage	8 V DC to 32 V DC	Pin 7
Unit power supply maximum current consumption, full back light (no external loads)	< 1000 mA at 12 V and 24 V	
Unit power supply current consumption after controlled shut down has occurred due to the ignition being turned off	< 5 mA at 24 V	
Fusing		Connector A
Unit power supply external protection fuse rating	3 A	Pin 7
High current outputs supply input external fuse protection rating (i.e. sum of output currents from all outputs provided for by an individual supply to < external fuse rating in total)	10 A	Pin 7
Housing		
PC PBT alloy plastic resin		
Dimensions		
131 mm x 208 mm x 56 mm (H x W x D) / 5.15" x 8.2" x 2.2" (H x W x D)		
Weight		
< 1 kg		
Temperature		
Operating temperature	-30 °C to +70 °C / -22 °F to +158 °F	
Storage temperature	-40 °C to +80 °C / -40 °F to +176 °F	
Protection Rating		
	IP67 (mating connectors)	
	NEMA 6 (mating connectors)	
Display		
Resolution, pixel	480 px x 272 px	
Colour	24 bit	
Format	4.3" diagonal	
Mounting	Optically bonded	
Illumination	LED (lifetime > 50,000 hrs)	
Connectors		
Connector A	18 pin TE connectivity DT16-18SA-K004	
Ethernet	M12, D-coded 4 pole socket	
USB	M12, B-coded 5 pole socket	
Digital Inputs		Connector A
Digital inputs configured high or low		Pin 10, 11, 16, 17
High level voltage threshold	> 6 V	
Low level voltage threshold	< 2 V	
Analogue Voltage Inputs		Connector A
0 V to 5 V programmable voltage range	0 V to 5 V	Pin 10, 11, 16, 17
0 V to 10 V programmable voltage range	0 V to 10 V	
0 V to 32 V programmable voltage range	0 V to 32 V	
Voltage measurement resolution	12 bits	
Voltage measurement accuracy	± 1% FSD	
Voltage measurement input resistance	≥ 30 kΩ	
Voltage measurement sampling rate	500 Hz	
<i>FSD = Full Scale Deflection</i>		



## DSEM840

Analogue Current Inputs		Connector A
Current measurement direction	Current sink only	Pin 10, 11, 16, 17
Current measurement ranges	0 mA to 20 mA	
	4 mA to 20 mA	
Current measurement resolution	12 bits	
Current measurement accuracy	± 1% FSD	
Current measurement input sink resistance	150 Ω ± 1%	
Current measurement sampling rate	500 Hz	
<i>FSD = Full Scale Deflection</i>		
Analogue Resistive Inputs		Connector A
Resistance measurement range	0 Ω to 3200 Ω	Pin 10, 11, 16, 17
Resistance measurement source voltage	12 V maximum	
Resistance measurement current	1 mA	
Resistance measurement resolution	12 bits	
Resistance measurement accuracy	± 1% FSD	
Resistance measurement sampling rate	500 Hz	
<i>FSD = Full Scale Deflection</i>		
Analogue Ratiometric Inputs		Connector A
Voltage ratiometric measurement voltage range		Pin 10, 11, 16, 17
Voltage ratiometric measurement Vref	Supply/Vref	
Voltage ratiometric measurement	Ratio of input pin to supply voltage	
Voltage ratiometric measurement accuracy	± 1% FSD	
<i>FSD = Full Scale Deflection</i>		
Frequency Inputs		Connector A
Frequency range	5 Hz to 30 KHz	Pin 10, 11, 16, 17
Resolution	100 Hz at max. freq	
Accuracy	400 Hz at max. freq	
Maximum space voltage	< 0.9 V	
Minimum mark voltage	> 2.4 V	
Digital Outputs High Side		Connector A
Switching current	1 A	Pin 2, 3, 4, 5
Digital output active high 'ON' state internal voltage drop at rated current	< 1500 mV	
Digital output active high 'OFF' state leakage current	< 10 µA at 24 V	
Digital Outputs PWM		Connector A
Applicable pins		Pins 2, 3
Maximum current	1 A	
P.W.M. active high 'on' state maximum voltage drop at rated current	< 1500 mV	
P.W.M. active high 'off' state leakage current	< 10 µA at 24 V output supply	
P.W.M. frequency	0 Hz to 250 Hz	
P.W.M. duty cycle range	0 % to 100 % (subject to minimum pulse width)	
P.W.M. duty cycle resolution	0.1 %	
P.W.M. minimum mark (on pulse) width	200 µs	
P.W.M. minimum space (off pulse) width	200 µs	



## DSEM840

Digital Outputs Low Side		Connector A
Switching current	1 A	Pin 2, 3, 4, 5
Digital output active low 'ON' state maximum voltage at rated current	< 500 mV	
Digital output active low 'OFF' state leakage current	< 2 mA at 24 V	
Reference Voltage		Connector A
Reference voltage output	Programmable 5 V or 10 V, 100 mA accuracy $\pm 5\%$	6
		VRef GND Pin 18
Auxiliary Voltage		Connector A
8 V - 32 V ignition input	Max 150 mA	Pin 13
RTC		
Real time clock	Standard RTC, backup time ~ 5 years	
Camera		Connector A
Analogue video input (supported video standards: PAL and NTSC)	1	12,18
CAN Interfaces		Connector A
Number of CAN ports	2	Pin 8, 9, 14, 15
Supported protocols	J1939	
	CAN open	
	Raw CAN	
Supported programmable baud rates	50 kbit/s, 125 kbit/s, 250 kbit/s, 500 kbit/s, 800 Mbit/s, 1 Mbit/s	
Ethernet Interface		M12, 4 pole
Number of Ethernet ports	1	D-coded 4 pole socket
Supported data rates	10/100 Mbit/s	
Supported protocols	Modbus TCP	
	CODESYS 3.5	
USB Interface		M12, 5 pole
Number of USB host ports	1	B-coded, 5 pole socket
Supported USB version	2	
Speeds supported	Full speed (12 Mbit/s)	
Device class supported	08 (Mass Storage)	
Supported filing system	FAT32	
Processor		
STM32H745	M7 400 MHz + M4 200 MHz	
Memory		
Flash	20 MB CODESYS / 20 MB User Data / 2 MB CODESYS Log / 8 KB retained data	64 MB
RAM	64 MB	



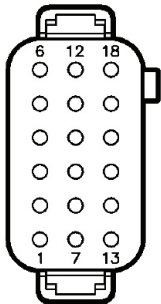
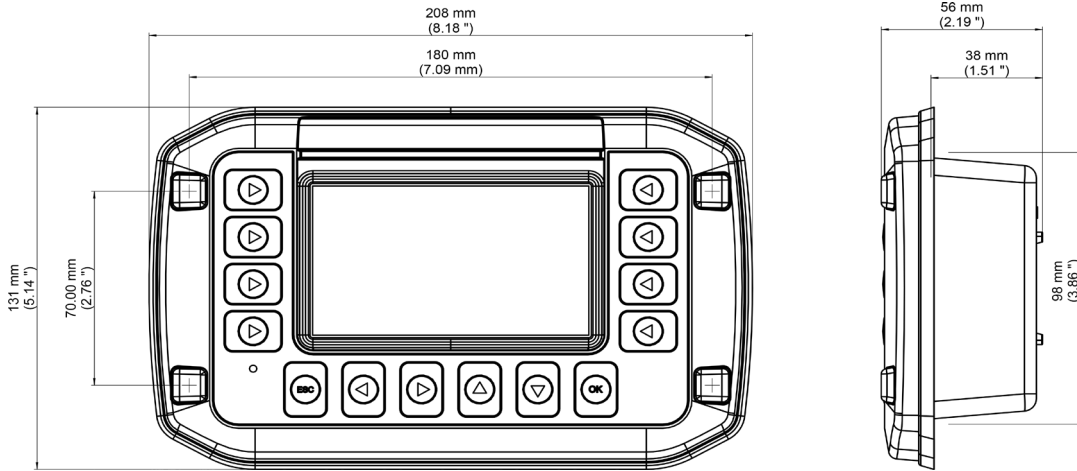
## DSEM840

LED Status			
Colour	Description	Operation	State
None	Device not powered	N/A	Off
Green	Unit powered up, application program loaded but not running	Static	Application stopped
	Unit powered up, application program loaded and running	1 Hz flash	Application running
	Unit powered up, but no application program loaded	5 Hz flash	No application
Amber	Bootloader functioning normally, firmware present	Static	Bootloader mode
	Firmware is at start-up	Static	Firmware start-up
	Unit stopped due to a serious fault	Static	Application exception
	Bootloader is decrypting the downloaded image	1 Hz flash	Decrypting image
	Bootloader is reading an image from the USB	5 Hz flash	Reading image from USB
Red	Fatal system/hardware fault - LED may be driven directly by microcontroller error pin or firmware is in a fault condition	Static	Fatal error
	Unit running with a fault, see CODESYS error flags or web tool.	1 Hz flash	Faulty application running
Environmental and Testing			
CE marking	Electromagnetic compatibility (EMC) noise immunity Electromagnetic compatibility (EMC) emission standard		BS EN ISO 13766-1:2018
E11 marking	Emission standard noise immunity with 100 V/m		UN/ECE-R10
Electrical tests	Pulse 1, severity level: IV; function state C Pulse 2a, severity level: IV; function state B Pulse 2b, severity level: IV; function state C Pulse 3a, severity level: IV; function state A Pulse 3b, severity level: IV; function state A Pulse 4, severity level: IV; function state B Pulse 5a, severity level: III; function state C		ISO 7637-2
Climatic tests	Damp heat, cyclic upper temperature 55°C, number		EN 60068-2-30
	Damp heat, steady state test temperature 40 °C / 93% RH Test duration: 21 days Salt spray test severity level 3 (vehicle)		EN 60068-2-78 EN 60068-2-53
Mechanical tests	Test VII; vibration, random mounting location: vehicle body		ISO 16750-3
	Vibration, sinusoidal 2000 Hz: 0.73 mm / 10g: 10 cycles/axis Bumps 30 g / 6 ms; 24,000 shocks		EN 60068-2-6 ISO 16750-3



# DSEM840

## PROGRAMMABLE DISPLAY FOR USE IN VEHICLES AND OFF-HIGHWAY MACHINERY



### Connector A

PIN	DESCRIPTION	REF
1	ECU Supply GND	
2	OUT H, L, PWM	QA002
3	OUT H, L, PWM	QA001
4	OUT H, L	QA004
5	OUT H, L	QA003
6	VREF OUT	
7	Battery	
8	CAN1 H	
9	CAN 2 H	
10	AIN	IA001
11	AIN	IA002
12	Camera 1	
13	Ignition	
14	CAN1 L	
15	CAN2 L	
16	AIN	IA003
17	AIN	IA004
18	Camera 1 GND	

### Ethernet

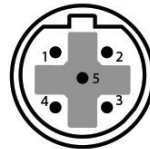
M12 "D" coded - 4 pin female



Pin - 01	TX+
Pin - 02	RC+
Pin - 03	TX-
Pin - 04	RC-

### USB Host

M12 'B' coded - 5 pin female



Pin -01	5 V
Pin - 02	Data -
Pin - 03	Data +
Pin - 04	0 V
Pin - 05	Shield

Abbreviations  
 OUT H, L  
 PWM  
 AIN  
 A GND

Output can be configured as digital high-side or digital low-side  
 Output can be configured as high-side PWM  
 Input can be configured to accept signals from positive digital, negative digital, 0 V to 10 V, 4mA to 20 mA, ratiometric, resistive or frequency  
 Ground connection for the analogue input channels