



DSEControl



DEEP SEA ELECTRONICS PLC

DSEM640 Operator Manual

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Author: Anthony Manton



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

Sales Tel: +44 (0) 1723 890099
Sales Fax: +44 (0) 1723 893303

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

DSEM640 Operator Manual

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1.1	Corrected comments for pins on connectors B and C. Corrected Program Enable pin instructions. Added failure codes.

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1 INTRODUCTION

This document details the operation and setup requirements of the DSEM640 Mobile Controller, 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.deepseapl.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 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 C++ programming. Contact DSE Technical Support for further details.



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 DSEM640 to control the machine it is connected to. The Application within the DSEM640 is designed and provided by the manufacturer of the complete machine.
Bootloader	The Bootloader is the program within the DSEM640 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. DSEM640 supports CODESYS V3.5
ECU	Electronic Control Unit. For example the DSEM640 device.
Firmware	The Firmware of the DSEM640 is the Operating System of the DSEM640 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 IC005 means Input 5 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 QB022 means Output 22 on Connector B.

1.3 RELATED INFORMATION

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

1.3.1 TECHNICAL INFORMATION

DSE Part	Description
055-198	M640 Datasheet
053-186	M640 Installation Instructions

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 will heat 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.
- M12 protection plugs supplied must be installed in both the USB and Ethernet interfaces to ensure IP67 rating.
- The case must be wired to vehicle ground in order to comply with EMC guidelines. Metallic screws must be used to create an electrical connection to vehicle / machine ground.

2 SPECIFICATIONS

2.1 DC SUPPLY

Description	Specification
Operating Voltage (Connector A, Pin 4)	8 V to 32 V
Maximum Current (no external loads)	300 mA at 24 V
Maximum Current (ignition off)	5 mA at 24 V

2.1.1 FUSING

Description	Specification
DC Supply (Pin 4)	3 A
High Current Outputs supply Fuse as required by connected loads (Connector A, Pins 1, 8, 16, 23)	16 A Max for each Output Supply

2.2 ENVIRONMENTAL

Description	Specification
Operating Temperature	-40 °C to +85 °C (-40 °F to 185 °F)
Storage Temperature	-40 °C to +85 °C (-40 °F to 185 °F)
Degrees of Protection Provided by Enclosure (with all mating connectors fitted)	IP67 (NEMA 6)

2.3 INPUTS

2.3.1.1 PROGRAM ENABLE

Description	Specification
Program Enable	Connector A, Pin 6
Program Enable pin pull-down resistance	33 kΩ
Minimum voltage for active (Program Enable)	6 V
Maximum voltage for inactive	2 V

Program Enable pin has two functions as listed below.

- To configure (program) the device or activate *Debug Mode* via CODESYS V3:
 - Power down the device.
 - Disconnect Program Enable pin.
 - Apply DC power to the device.
 - Wait a few seconds.
 - Connect Program Enable pin to battery positive.
 - Program the device (ie using CODESYS V3).
- To use the Service Tool software to update firmware or download the application program to the device:
 - Power down the device.
 - Connect Program Enable pin to battery positive.
 - Apply DC power to the device.
 - Use *Service Tool* software as desired.

2.3.2 DIGITAL INPUTS

2.3.2.1 DIGITAL

Description	Specification
Applicable Inputs (Connector B and C)	Pins 6, 9, 14, 15, 16, 22, 28, 31
Minimum voltage for High Level	6 V
Maximum voltage for Low Level	2 V

2.3.2.2 FREQUENCY

Description	Specification
Applicable Inputs (Connector B and C)	Pins 6, 9, 14, 15, 16, 22, 28, 31
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)	6 V
Maximum voltage for Low Level (Space)	2 V

2.3.2.3 PHASE

Description	Specification
Applicable Inputs (Connector B and C)	Pins 6, 9, 14, 15, 16, 22, 28, 31
Frequency Range	5 Hz to 30 kHz
Resolution	1°
Accuracy	1°
Minimum voltage for High Level (Mark)	6 V
Maximum voltage for Low Level (Space)	2 V

2.3.2.4 PULSE COUNTER

Description	Specification
Applicable Inputs (Connector B and C)	Pins 6, 9, 14, 15, 16, 22, 28, 31
Frequency Range	5 Hz to 30 kHz
Counter Range	2 ²⁴ (16777215)
Direction	Up / Down
Resolution	1 count

2.3.2.5 ENCODER

Description	Specification
Applicable Inputs (Connector B and C)	Pins 6, 9, 14, 15, 16, 22, 28, 31
Frequency Range	5 Hz to 30 kHz
Counter Range	2 ²⁴ (16777215)
Direction	Up / Down
Resolution	1 count

2.3.3 ANALOGUE INPUTS

2.3.3.1 VOLTAGE

Description	Specification
Applicable Inputs (Connector B and C)	Pins 7, 8, 17, 18, 19, 20, 29, 30
Configurable Ranges	0 V to 5 V 0 V to 10 V 0 V to 32 V
Input Resistance	30 k Ω
Sampling Rate	1 kHz

Voltage Measurement resolution and accuracy

Configured Range	Resolution (12 bits)	Accuracy ($\pm 1\%$) 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

2.3.3.2 CURRENT

Description	Specification
Applicable Inputs (Connector B and C)	Pins 7, 8, 17, 18, 19, 20, 29, 30
Configurable Ranges	0 mA to 20 mA 4 mA to 20 mA
Input Type	Current sink only
Input Sink Resistance	100 Ω
Sampling Rate	1 kHz
Resolution (12 bits)	0.005 mA
Accuracy ($\pm 1\%$ Full Scale Deflection)	0.2 mA

2.3.3.3 RESISTIVE

Description	Specification
Applicable Inputs (Connector B and C)	Pins 7, 8, 17, 18, 19, 20, 29, 30
Measurement Range	0 Ω to 3400 Ω
Measurement source voltage	12 V
Measurement source current	1 mA
Sampling Rate	1 kHz
Resolution (12 bits)	0.78 Ω
Accuracy ($\pm 1\%$ Full Scale Deflection)	32 Ω

2.3.3.4 RATIOMETRIC

Description	Specification
Applicable Inputs (Connector B and C)	Pins 7, 8, 17, 18, 19, 20, 29, 30
Measurement voltage reference	Supply (Pin 4)
Measurement	Ratio of input Pin to Supply (Pin 4)
Measurement source current	1 mA
Accuracy ($\pm 1\%$ Full Scale Deflection)	0.36 V (based upon maximum supply voltage of 36 V)

2.4 OUTPUTS

2.4.1 NEGATIVE SWITCHING

Description	Specification
2 A Switching Current Applicable Inputs (Connector B and C)	Pins 1, 12, 13, 23, 24
4 A Switching Current Applicable Inputs (Connector B and C)	Pins 12, 13, 25
Maximum voltage for output ON	2 V
Maximum current for output OFF	10 mA at 24 V output supply

2.4.2 POSITIVE SWITCHING

Description	Specification
2 A Switching Current Applicable Inputs (Connector B and C)	Pins 1, 2, 3, 5, 11, 12, 13, 23, 24, 26, 32, 34, 35
4 A Switching Current Applicable Inputs (Connector B and C)	Pins 2, 4, 10, 12, 13, 23, 25, 27, 35
Minimum voltage for output ON	Output supply -2 V
Maximum current for output OFF	10 mA at 24 V output supply

2.4.3 PWM

Description	Specification
Applicable Inputs (Connector B and C)	Pins 1, 2, 3, 12, 13, 23, 24, 34, 35
Peak Current Rating (output ceases if rating is exceeded)	5 A
Frequency Range	20 Hz to 250 Hz
Frequency Resolution	0.1 Hz
Pulse Ratio Range	0 % to 100 %
Pulse Ratio Resolution	1 %
Accuracy	±1 % Full Scale Deflection
Minimum Load Impedance	3 Ω at 12 V 6 Ω at 24 V

2.4.3.1 PWMI CURRENT RESOLUTION

Configured Range	Current Resolution
0 A to 2 A	1 mA
0 A to 4 A	2 mA

2.5 COMMUNICATIONS

2.5.1 CAN

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

Description	Specification
Number of CAN interfaces	4
Supported Protocols	J1939 CAN open Raw CAN
Supported Baud Rates	50 kbit/s, 120 kbit/s, 250 kbit/s, 500 kbit/s, 800 kbit/s, 1 Mbit/s


2.5.2 ETHERNET

Description	Specification
Number of Ethernet ports	1
Supported data rates	10 Mbits / 100 Mbits, Full Duplex
Supported Protocols	MODBUS TCP CODESYS 3.5

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

2.5.3 USB

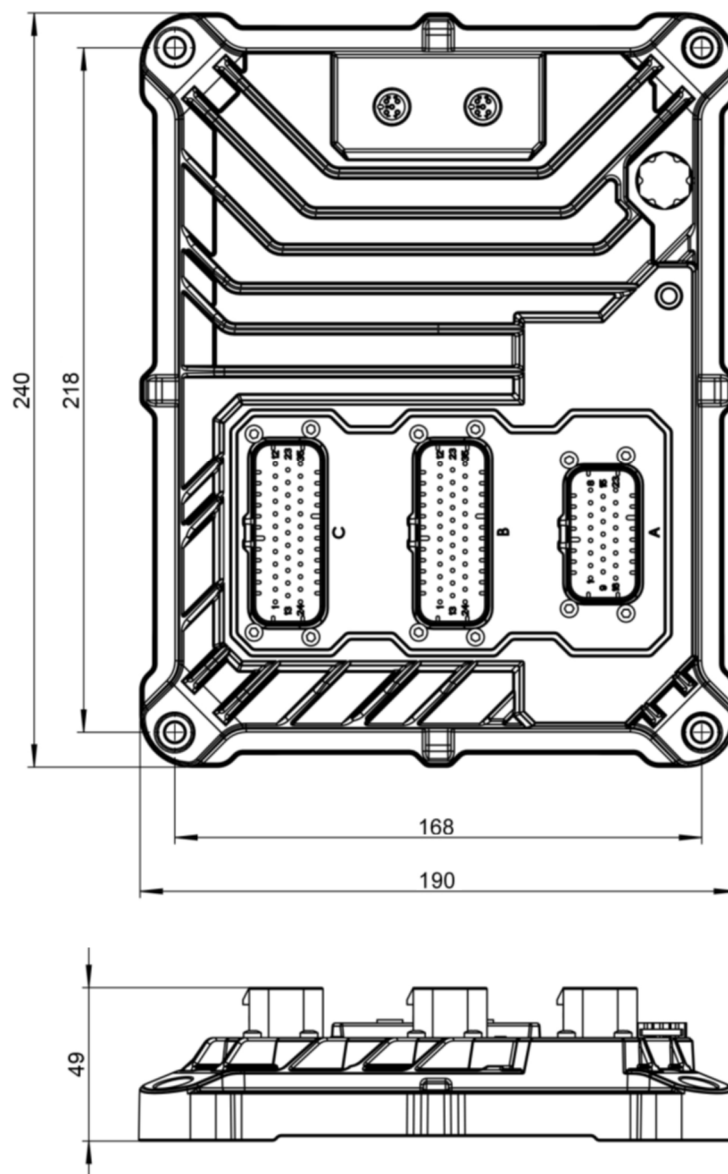
Description	Specification
Number of Ethernet Ports	1
USB Version	2
Supported Speeds	Full Speed (12 Mbit/s)
Device Class	08 (Mass Storage)
Filing System	FAT32

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

2.6 DIMENSIONS AND MOUNTING

2.6.1 DIMENSIONS

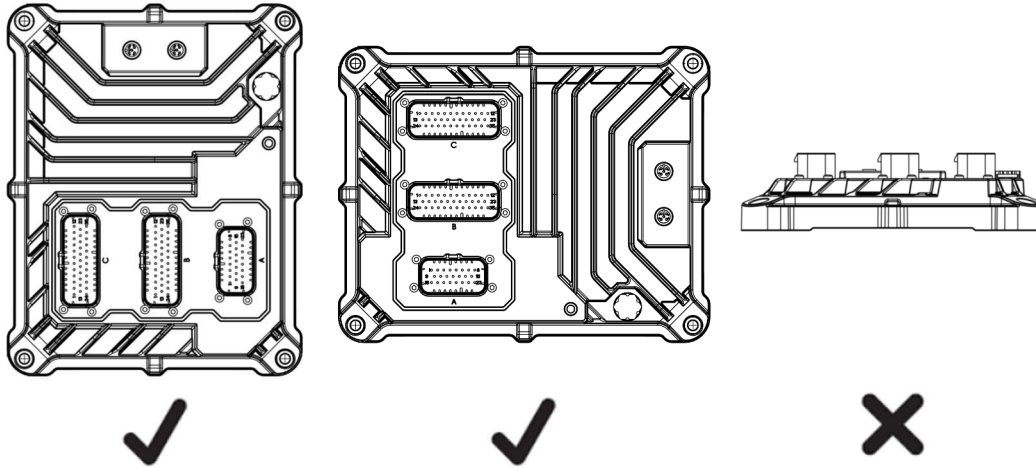
Description	Specification
Overall Dimensions (Height X Width X Depth)	240 mm X 190 mm X 49 mm (9.45 " X 7.48 " X 1.46 ")
Mounting Holes	Suitable for M6 bolts ($\frac{1}{4}$ " holes)
Mounting Hole Centres	218 mm X 169 mm (8.58 " X 6.65 ")
Mounting Bolt Material Recommendation	Steel or Stainless Steel
Mounting Bolt Tightening Torque	8 Nm \pm 2 Nm
Overall Weight	1.58 kg



2.6.2 MOUNTING

2.6.2.1 ORIENTATION

Install the controller in such a way to allow any condensation that may form to flow out.

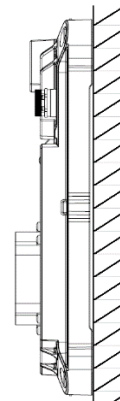


2.6.2.2 SURFACE

The controller must be mounted on a flat surface.

Use compensating elements if there is no flat mounting surface available.

For steel surfaces, ensure that it is protected against corrosion.



2.6.2.3 FIXING

4 x M6 Screws (one in each corner of the controller)

Screw material: steel or stainless steel

Tightening torque: 8 Nm \pm 2 Nm

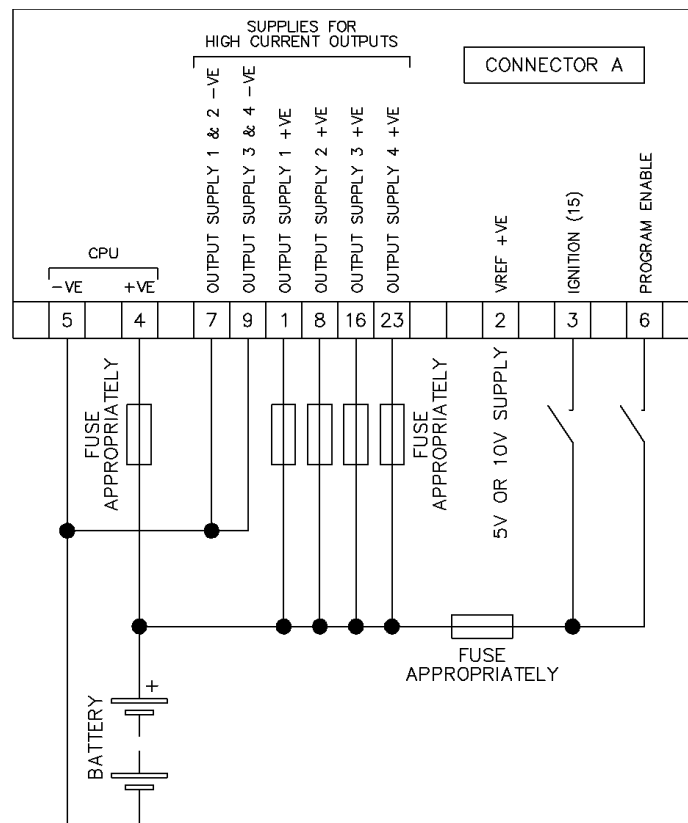
2.6.2.4 GROUNDING

To ensure the protection of the device against electrical interference and the safe function of the device, the housing must be connected to the ground of the vehicle / machine.

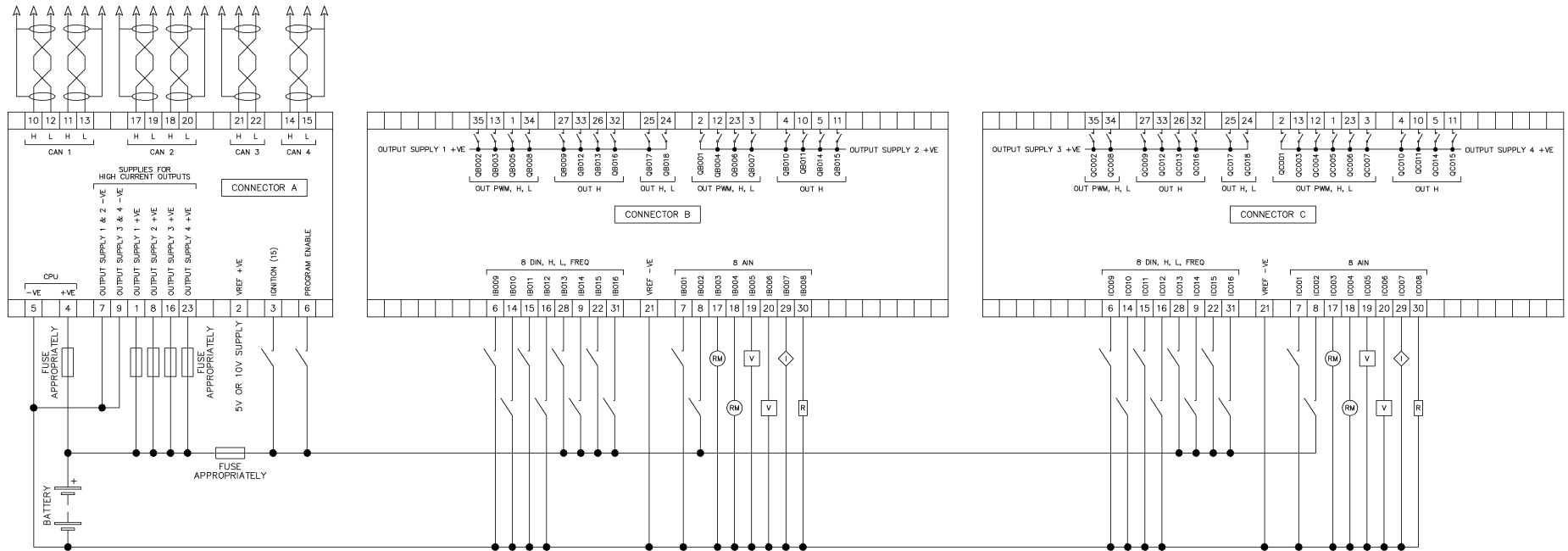
2.7 FUSING

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	Supplies Outputs	Recommended Fuse Size
1	Output Supply 1	QB02 (B35), QB03 (B13), QB05 (B1), QB08 (B34), QB09 (B27), QB12 (B33), QB13 (B26), QB16 (B32), QB17 (B25), QB18 (B24)	16 A Max
3	Ignition (15)		1 A Max
4	ECU Supply	Supplies M640 CPU	3 A Max
8	Output Supply 2	QB01 (B2), QB04 (B12), QB06 (B23), QB07 (B3), QB10 (B4), QB11 (B10), QB14 (B5), QB15 (B11)	16 A Max
16	Output Supply 3	QC02 (C35), QC08 (C34), QC09 (C27), QC12 (C33), QC13 (C26), QC16 (C32), QC17 (C25), QC18 (C24)	16 A Max
23	Output Supply 4	QC01 (C2), QC03 (C13), QC04 (C12), QC05 (C1), QC06 (C23), QC07 (C3), QC10 (C4), QC11 (C10), QC14 (C5), QC15 (C11)	16 A Max

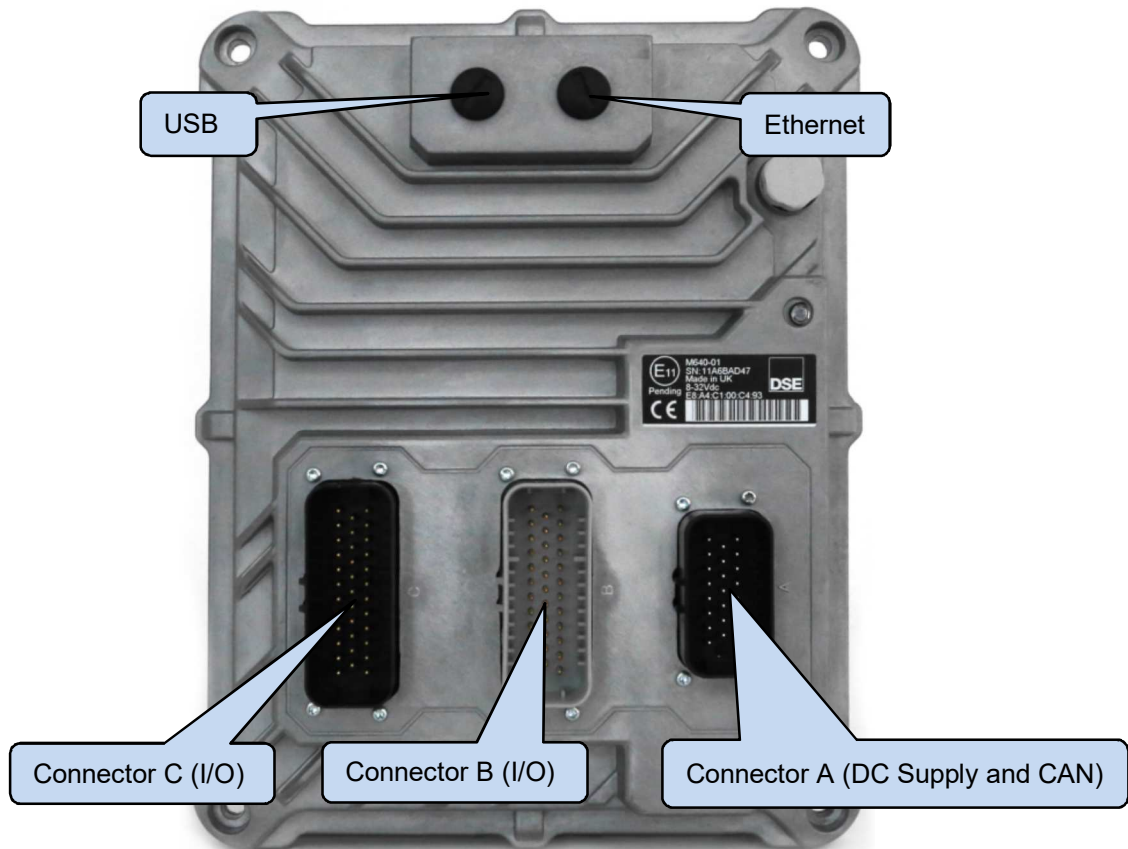


2.8 TYPICAL CONNECTION DIAGRAM



2.9 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.

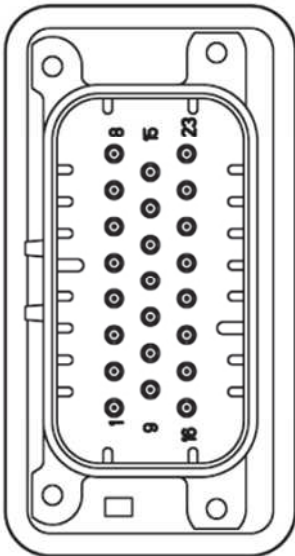


2.9.1 CONNECTOR A (DC SUPPLY AND CAN)

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

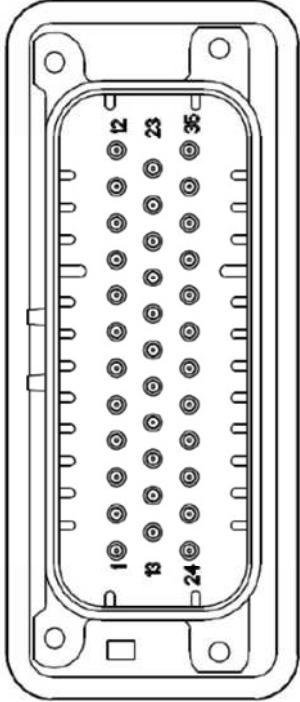
NOTE: Screened 120 Ω impedance cable specified for use with CAN must be used for the CAN links.
DSE stock and supply Belden cable 9841 which is a high quality 120 Ω impedance cable suitable for CAN use (DSE part number 016-030).

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

Connector A	Pin	Description	Comments
	1	Output Supply 1	Used to supply QB02 (B35), QB03 (B13), QB05 (B1), QB08 (B34), QB09 (B27), QB12 (B33), QB13 (B26), QB16 (B32), QB17 (B25), QB18 (B24)
	2	Vref +ve	
	3	Ignition +ve (15)	
	4	CPU Supply +ve	DC Supply for the M640 CPU
	5	CPU Supply -ve	DC Supply for the M640 CPU
	6	Program Enable	
	7	Output Supply 1 & 2 -ve	
	8	Output Supply 2 +ve	Used to supply QB01 (B2), QB04 (B12), QB06 (B23), QB07 (B3), QB10 (B4), QB11 (B10), QB14 (B5), QB15 (B11)
	9	Output Supply 3 & 4 -ve	
	10	CAN1 H	Internally connected
	11	CAN1 H	
	12	CAN1 L	Internally connected
	13	CAN1 L	
	14	CAN4 H	
	15	CAN4 L	
	16	Output Supply 3 +ve	Used to supply QC02 (C35), QC08 (C34), QC09 (C27), QC12 (C33), QC13 (C26), QC16 (C32), QC17 (C25), QC18 (C24)
	17	CAN2 H	Internally connected
	18	CAN2 H	
	19	CAN2 L	Internally connected
	20	CAN2 L	
	21	CAN3 H	
	22	CAN3 L	
	23	Output Supply 4 +ve	Used to supply QC01 (C2), QC03 (C13), QC04 (C12), QC05 (C1), QC06 (C23), QC07 (C3), QC10 (C4), QC11 (C10), QC14 (C5), QC15 (C11)

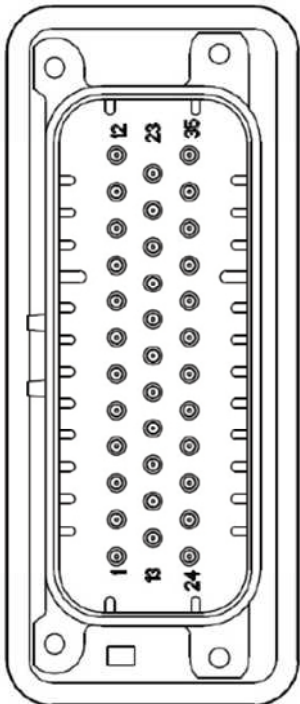
2.9.2 CONNECTOR B (I/O)

Terminology	Meaning
QBxxx	Output
IBxxx	Input
H	Output, High when active.
L	Output, Low when active.
PWM	Pulse Width Modulation (voltage or current)
DIN	Digital Input configurable to accept signals as positive digital, negative digital or frequency sensing.
AIN	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.
Supply	Designates the 'Output Supply' on Connector A, used to supply the Output

Connector B	Pin	Description	Comments	Supply
	1	QB005	OUT H, L, PWM (2 A).	1 (A1)
	2	QB001	OUT H, PWM (2 A / 4 A)	2 (A8)
	3	QB007	OUT H, PWM (2 A)	2 (A8)
	4	QB010	OUT H (4 A)	2 (A8)
	5	QB014	OUT H (2 A)	2 (A8)
	6	IB009	DIN	
	7	IB001	AIN	
	8	IB002	AIN	
	9	IB014	DIN	
	10	QB011	OUT H (4 A)	2 (A8)
	11	QB015	OUT H (2 A)	2 (A8)
	12	QB004	OUT H, L, PWM (2 A / 4 A)	2 (A8)
	13	QB003	OUT H, L, PWM (2 A / 4 A)	1 (A1)
	14	IB010	DIN	
	15	IB011	DIN	
	16	IB012	DIN	
	17	IB003	AIN	
	18	IB004	AIN	
	19	IB005	AIN	
	20	IB006	AIN	
	21	Vref -ve	Negative for Vref (A2).	
	22	IB015	DIN	
	23	QB006	OUT H, L, PWM (2A)	2 (A8)
	24	QB018	OUT H, L (2A)	1 (A1)
	25	QB017	OUT H, L (4A)	1 (A1)
	26	QB013	OUT H (2A)	1 (A1)
	27	QB009	OUT H (4A)	1 (A1)
	28	IB013	DIN	
	29	IB007	AIN	
	30	IB008	AIN	
	31	IB016	DIN	
	32	QB016	OUT H (2A)	1 (A1)
	33	QB012	OUT H (4A)	1 (A1)
	34	QB008	OUT H, PWM (2 A)	1 (A1)
	35	QB002	OUT H, PWM (2 A / 4 A)	1 (A1)

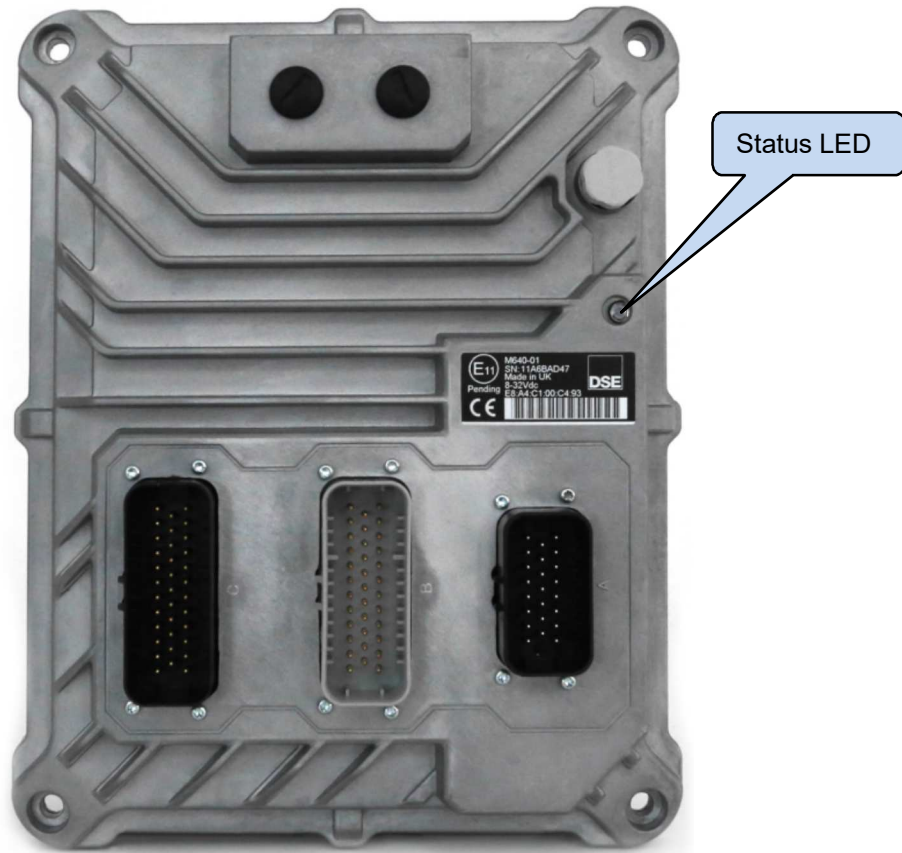
2.9.3 CONNECTOR C (I/O)

Terminology	Meaning
QCxxx	Output
ICxxx	Input
H	Output, High when active.
L	Output, Low when active.
PWM	Pulse Width Modulation (voltage or current)
DIN	Digital Input configurable to accept signals as positive digital, negative digital or frequency sensing.
AIN	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.
FREQ	Input used for Frequency Measurement
Supply	Designates the 'Output Supply' on Connector A, used to supply the Output

Connector C	Pin	Description	Comments	Supply
	1	QC005	OUT H, L, PWM (2 A).	4 (A23)
	2	QC001	OUT H, PWM (2 A / 4 A)	4 (A23)
	3	QC007	OUT H, PWM (2 A)	4 (A23)
	4	QC010	OUT H (4 A)	4 (A23)
	5	QC014	OUT H (2 A)	4 (A23)
	6	IC009	DIN	
	7	IC001	AIN	
	8	IC002	AIN	
	9	IC014	DIN	
	10	QC011	OUT H (4 A)	4 (A23)
	11	QC015	OUT H (2 A)	4 (A23)
	12	QC004	OUT H, L, PWM (2 A / 4 A)	4 (A23)
	13	QC003	OUT H, L, PWM (2 A / 4 A)	4 (A23)
	14	IC010	DIN	
	15	IC011	DIN	
	16	IC012	DIN	
	17	IC003	AIN	
	18	IC004	AIN	
	19	IC005	AIN	
	20	IC006	AIN	
	21	Vref -ve	Negative for Vref (A2).	
	22	IC015	DIN	
	23	QC006	OUT H, L, PWM (2A)	4 (A23)
	24	QC018	OUT H, L (2A)	3 (A16)
	25	QC017	OUT H, L (4A)	3 (A16)
	26	QC013	OUT H (2A)	3 (A16)
	27	QC009	OUT H (4A)	3 (A16)
	28	IC013	DIN	
	29	IC007	AIN	
	30	IC008	AIN	
	31	IC016	DIN	
	32	QC016	OUT H (2A)	3 (A16)
	33	QC012	OUT H (4A)	3 (A16)
	34	QC008	OUT H, PWM (2 A)	3 (A16)
	35	QC002	OUT H, PWM (2 A / 4 A)	3 (A16)

3 INDICATIONS

One Multi Colour LED is provided to give indication of the device operating status.



Colour	Operation	Description	State
Off	N/A	N/A	Powered down
Green	Steady	Unit powered up Application program loaded Not running	Ignition ON
	1 Hz flash	Unit powered up Application program loaded Running	Ignition ON
	5 Hz flash	Unit powered up No application program loaded.	Ignition ON
Amber	Static	Application exception Bootloader functioning normally Firmware present Program Pin enabled	Bootloader
	1 Hz flash	Firmware update in progress Reading downloaded image.	Bootloader
	5 Hz flash	Bootloader functioning normally No firmware present	Bootloader
Red	Static	Fatal system / hardware fault	Fault Condition
	1 Hz flash	Unit running with a fault, see CODESYS error flags or <i>Service Tool</i> .	Fault Condition

4 CONNECTING TO CODESYS

DSEM640 communicates with, and is programmed by, the CODESYS V3 Integrated Development Environment (IDE).

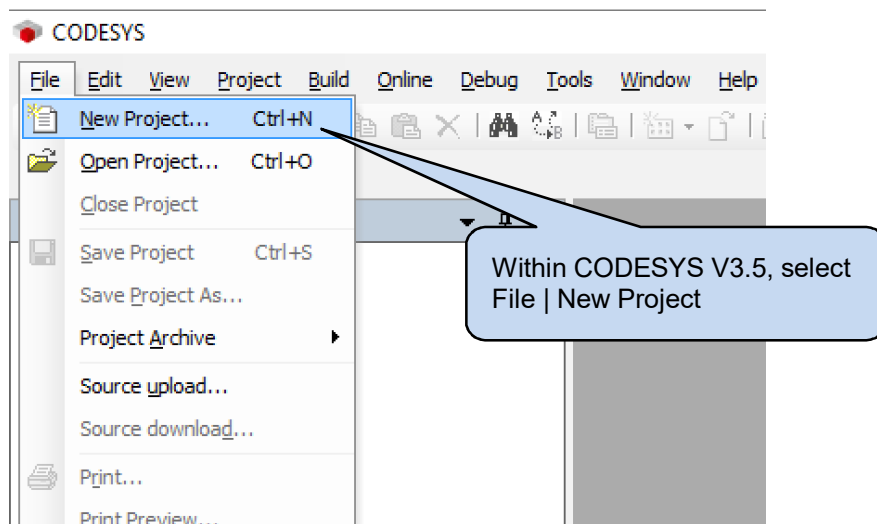
4.1 PROGRAM PIN

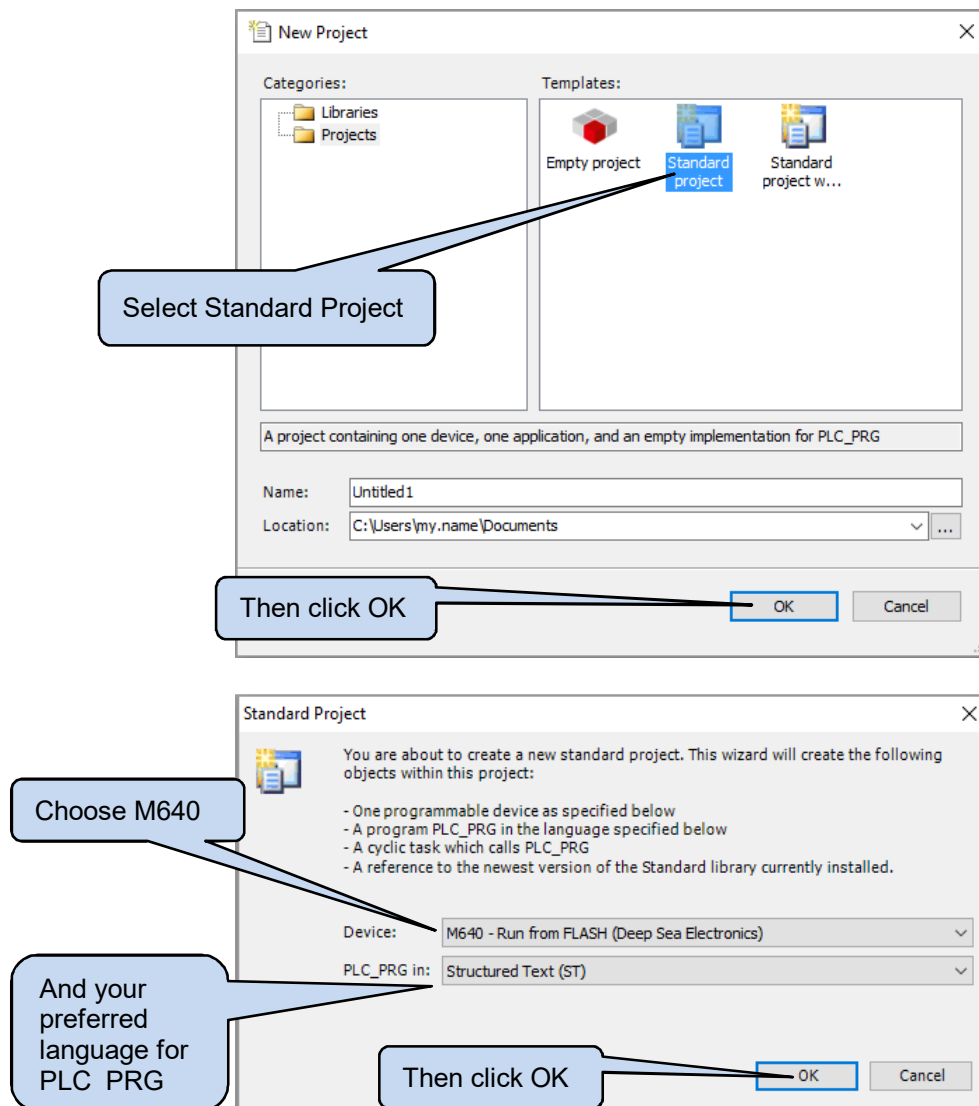
To configure (program) the device via CODESYS V3 or activate *Debug Mode*, the *Program Pin* must be enabled as follows:

- Power down the device.
- Disconnect Program Enable pin.
- Apply DC power to the device.
- Wait a few seconds.
- Connect *Program Enable* (Connector A, Pin 6) to battery positive.

4.2 START NEW PROJECT

To begin, start a new project as shown.

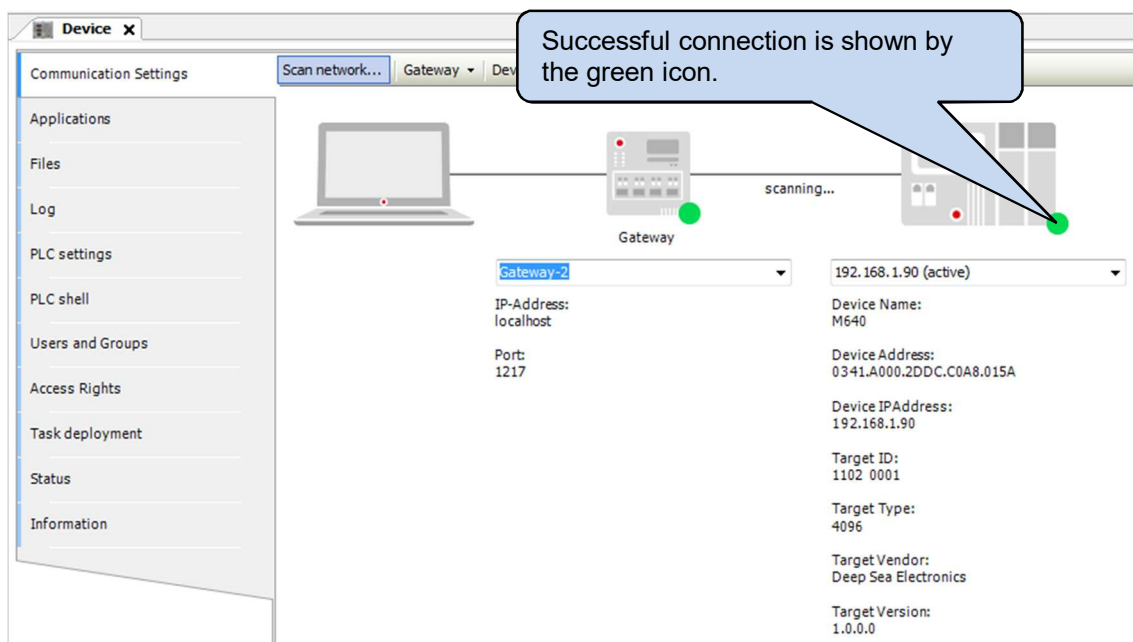
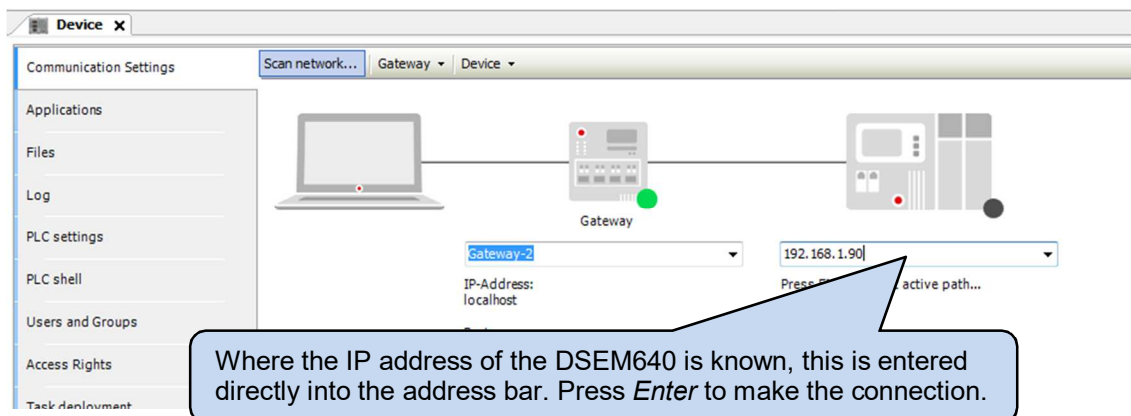
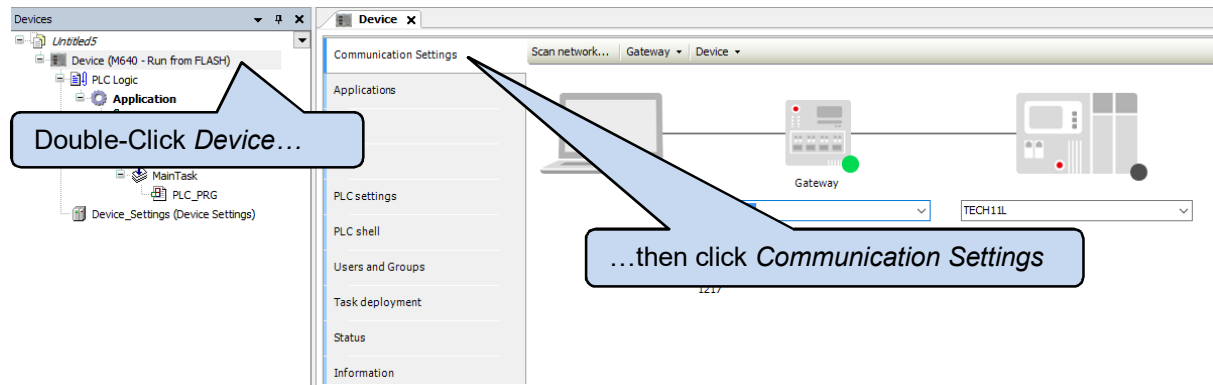




4.3 ETHERNET TCP

NOTE: If the IP address of the device is not known, see the section entitled *Ethernet UDP* elsewhere in this document.

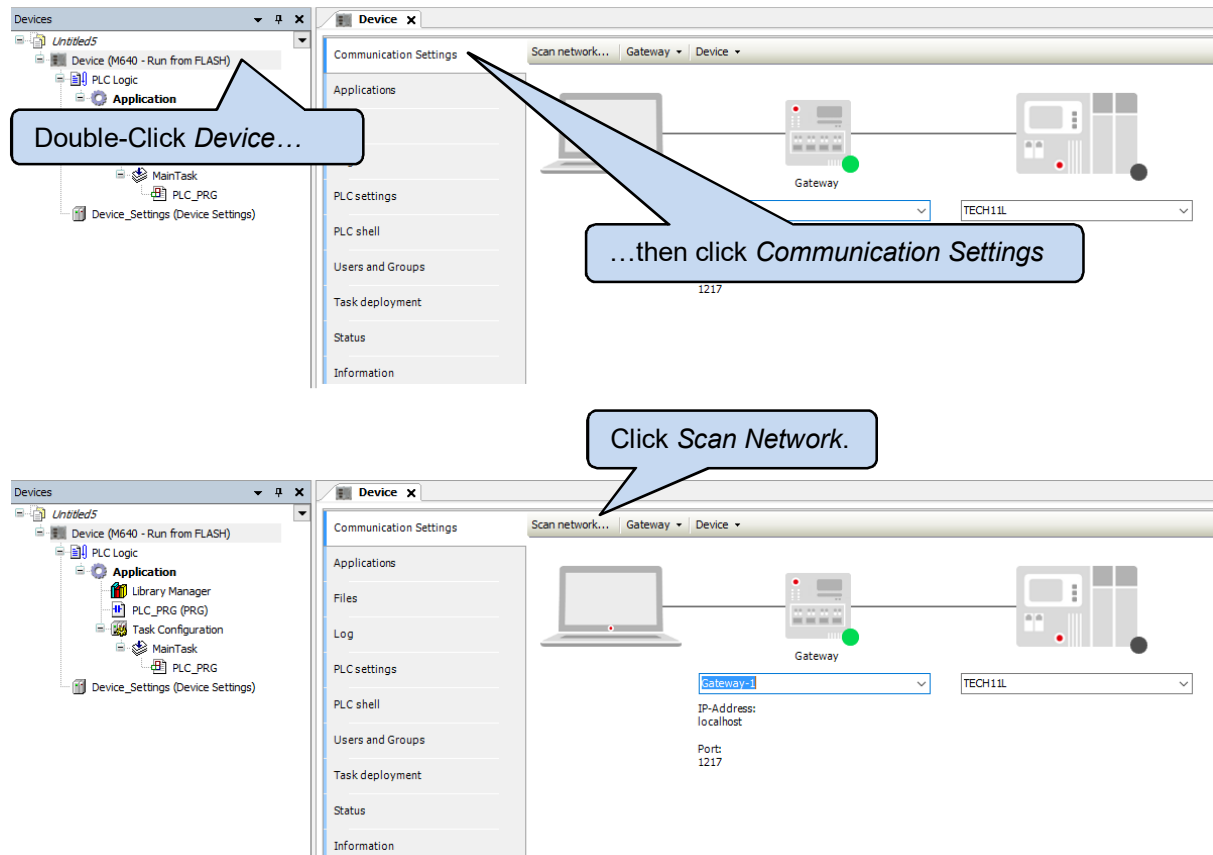
With the DSEM640 connected to the same Ethernet network as the PC, Select *Device | Communication Settings* in the CODESYS V3 IDE.



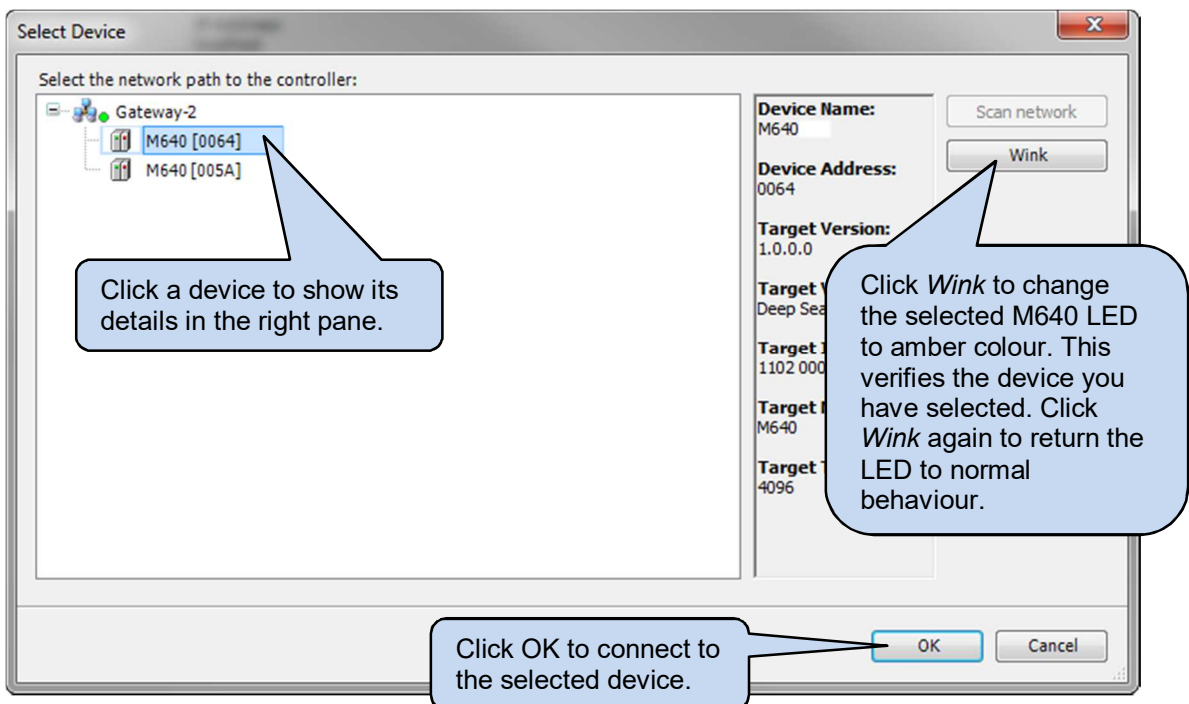
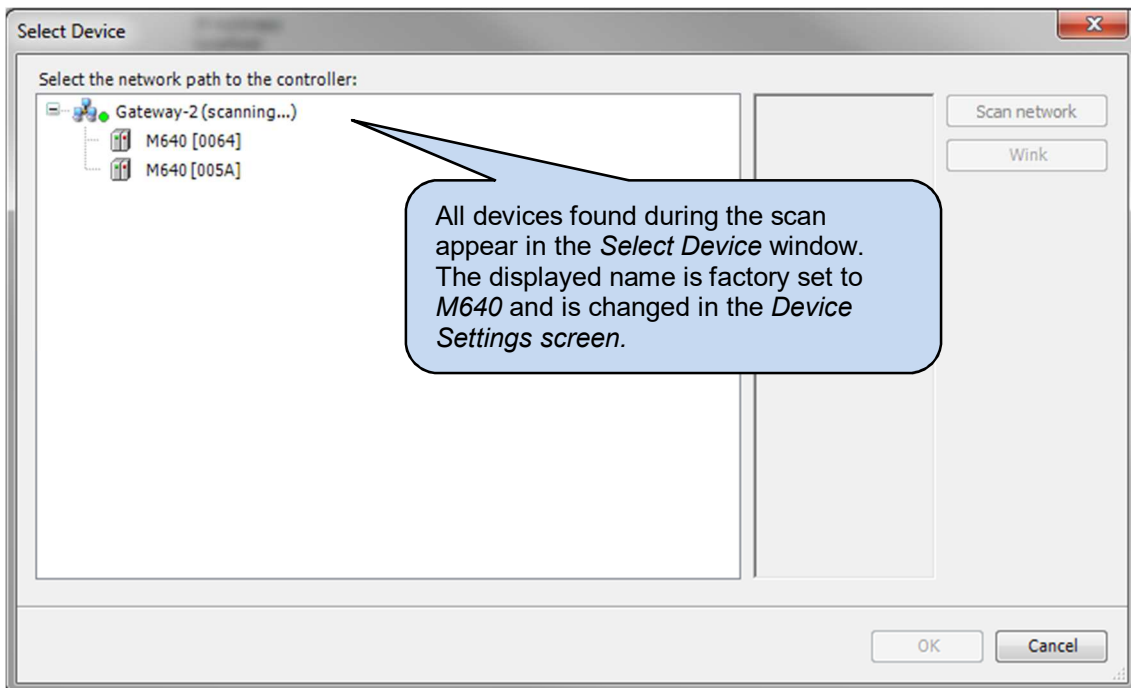
4.4 ETHERNET UDP

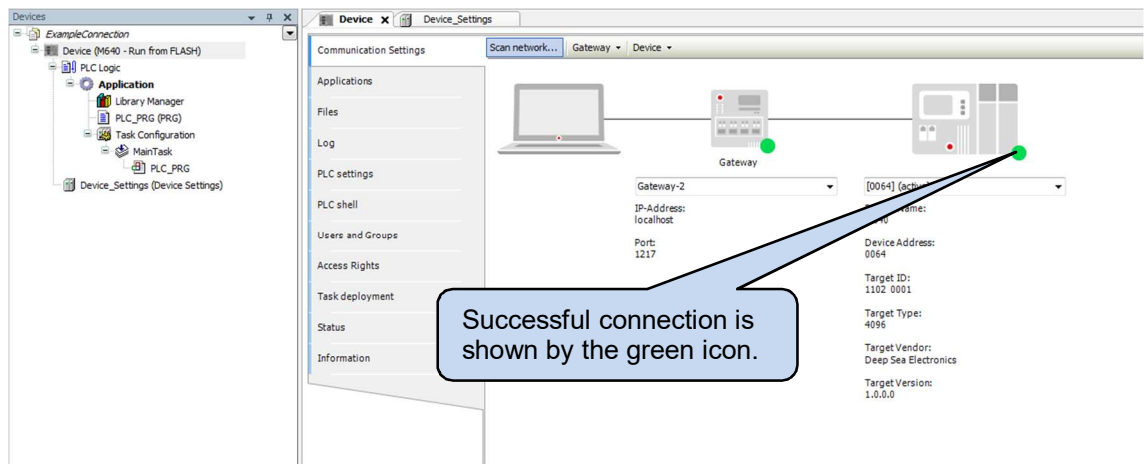
NOTE: If the IP address of the device is known, connection may also be achieved manually as detailed in the section entitled *Ethernet TCP* elsewhere in this document.

With the DSEM640 connected to the same Ethernet network as the PC, Select *Device | Communication Settings* in the CODESYS V3 IDE.



NOTE: A device in *Bootloader* mode is not discoverable by the Scan.





4.5 CONFIGURE ETHERNET SETTINGS

To configure the Ethernet Settings, first select *Device...*

...and then select *Device Settings...*

...and then select *Device Settings Parameters...*

...and then expand *Ethernet Parameters* by clicking the + symbol.

Parameter	Type	Unit	Description
Device Mode	Enumeration of USINT		
Ethernet Parameters			
Voltage Reference	Enumeration of USINT		Voltage Reference Configuration
Battery Voltage	Enumeration of USINT		Battery Voltage
Wirebreak Condition	DINT	mA	Output must draw minimum this current when active, otherwise will flag an error
Output Overcurrent Alarm Delay	UINT	ms	Delay (in steps of 100ms) of the Output Over Current Alarm Trip (MAX 5000 ms)

Example of how set the IP Address to 192.168.1.100

Parameter	Type	Value	Default Value	Unit	Description
Debug Mode	Enumeration of USINT	Keep Current	Keep Current		
Ethernet Parameters					
Save Config	Enumeration of USINT	No	No		Save Config
IP Mode	Enumeration of USINT	DHCP	DHCP		
WebConfig Port	UDINT	8080	8080		
IP Address					Static IP Address
[0]	USINT	192	192		
[1]	USINT	168	168		
[2]	USINT	1	1		
[3]	USINT	100	100		
Subnet Mask					Subnet Mask for Static Mode
[0]	USINT	255	255		
[1]	USINT	255	255		
[2]	USINT	255	255		
[3]	USINT	0	0		
Gateway Address					Gateway Address for Static Mode
[0]	USINT	192	192		
[1]	USINT	168	168		
[2]	USINT	1	1		
[3]	USINT	1	1		
DNS Address					DNS for Static Mode
[0]	USINT	192	192		
[1]	USINT	168	168		
[2]	USINT	1	1		
[3]	USINT	1	1		
Hostname	STRING	'M640'	'M640'		
Voltage Reference	Enumeration of USINT	Disabled	Disabled		Voltage Reference Configuration
Battery Voltage	Enumeration of USINT	12V	12V		Battery Voltage
Wirebreak Condition	DINT	50	50	mA	Output must draw minimum this current when active, otherwise will flag an error
Output Overcurrent Alarm Delay	UINT	200	200	ms	Delay (in steps of 100ms) of the Output Over Current Alarm Trip (MAX 5000...

After making changes, choose Yes in the Save Config section to save the changes made.

Parameter	Type	Value	Default Value	Unit	Description
Debug Mode	Enumeration of USINT	Keep Current	Keep Current		
Ethernet Parameters					
Save Config	Enumeration of USINT	No			
IP Mode	Enumeration of USINT	No			
WebConfig Port	UDINT	Yes			
IP Address					
[0]	USINT	192			
[1]	USINT	168	168		
[2]	USINT	1	1		
[3]	USINT	100	100		

4.6 DEBUG MODE SETTING

Debug Mode is switchable by activating the *Program Enable* pin when the device is powered. However, keeping the pin active during a power cycle places the device into *Bootloader* mode. During debugging of a project, repeated enabling and disabling of the *Program Enable* pin can become tiresome. An alternative is to use the *Device Settings* to enable and disable *Debug Mode*.

Selecting *Keep Current* allows the existing operation of *Debug Mode* to be kept. i.e. if it's already active, it remains active when the Config is saved.

Parameter	Type	Value	Default Value	Unit	Description
Debug Mode	Enumeration of USINT	Keep Current	Keep Current		
Ethernet Parameters					
Save Config	Enumeration of USINT	No	No		
IP Mode	Enumeration of USINT	DHCP	DHCP		
WebConfig Port	UDINT	8080	8080		

5 M640 CODESYS ERROR CODES

DSEM640 returns error codes to CODESYS when appropriate. The returned status is zero for success. Individual bits are set within the returned value to indicate one or more error conditions.

For example:

A Device error value of 7 (00000111 in binary) indicates *Error*, *Over Temperature* and *Under Voltage Supply*.

5.1 DEVICE

MSB 8	7	6	5	4	3	2	LSB 1
Output Reference Outside Limits	Under Voltage Output Supply 4	Under Voltage Output Supply 3	Under Voltage Output Supply 2	Under Voltage Output Supply 1	Under Voltage Supply	Over Temperature	Error

5.2 ANALOGUE INPUTS

Input Configuration	MSB 8	7	6	5	4	3	2	LSB 1
Digital	Invalid Parameter			Invalid Threshold				Error
Voltage	Invalid Parameter					Over Range	Inverted Input (<10 mV)	Error
Current	Invalid Parameter					Over Range	Wire Break (<4 mA)	Error
Resistance	Invalid Parameter					Over Range		Error
Ratiometric	Invalid Parameter		Invalid Reference			Over Range		Error

5.3 DIGITAL INPUTS

Input Configuration	MSB 8	7	6	5	4	3	2	LSB 1
Digital	Invalid Parameter							Error
Frequency	Invalid Parameter					Freq Over Range		Error
Phase	Invalid Parameter		Invalid Phase Reference			Freq Over Range		Error
Counter	Invalid Parameter			Invalid Direction		Over Range		Error
Encoder	Invalid Parameter		Invalid Phase Reference					Error

5.4 DIGITAL OUTPUTS

Output Configuration	Bit							
	MSB 8	7	6	5	4	3	2	LSB 1
Digital	Invalid Parameter					Over Current	Wire Break (Config)	Error
PWM	Invalid Parameter			Invalid Duty Cycle	Invalid Frequency	Over Current	Wire Break (Config)	Error
PWMi	Invalid Parameter		Invalid Current		Invalid Frequency	Over Current	Wire Break (Config)	Error

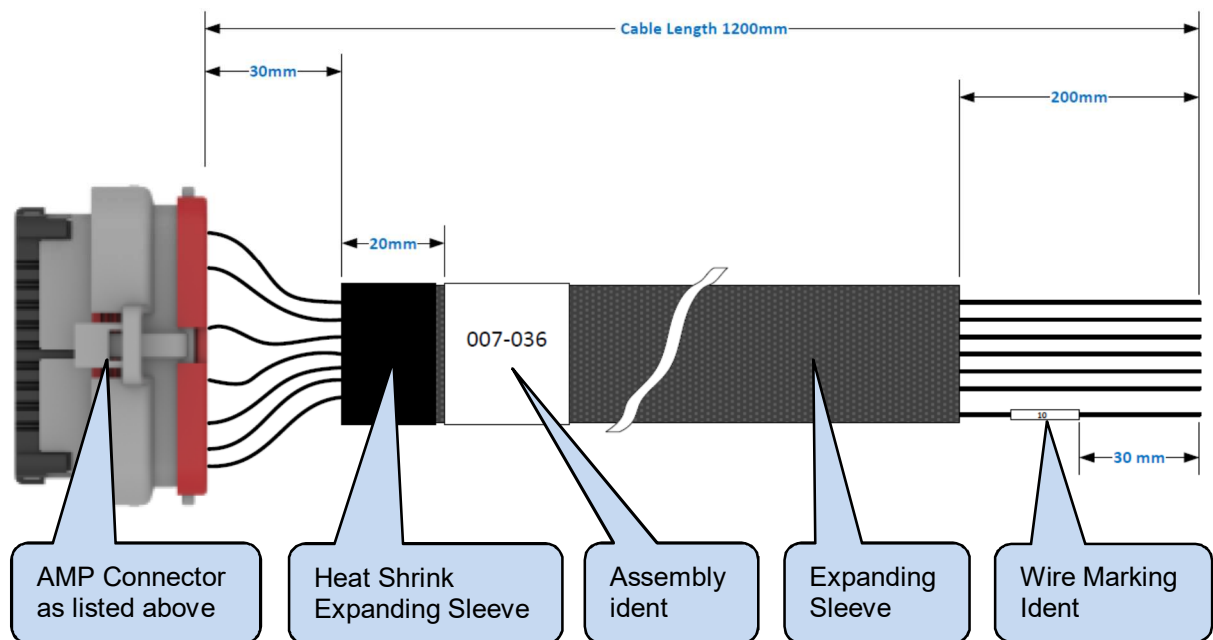
6 CABLES, CONNECTORS, HARNESSES AND SPARE PARTS

Description	DSE Part	Manufacturer Part	Manufacturer
M640 Connector Kit (Set of 3)	007-035	1-776228-1 1-776231-4 1-776231-1	TE
Connector Pin Crimp	N/A	770854-1	TE
M640 Connector Harness Kit (Set of 3)	007-036	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	016-030	9841	Belden

6.1 M640 CONNECTOR HARNESS KIT (007-036)

DSE Part 007-036 consists of three 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	Connector C
Assembly Ident	007-036 (a)	007-036 (b)	007-036 (c)
AMP Connector	1-776228-1	1-776231-4	1-776231-1
No of Connections	23	35	35
Wire size	0.5 mm ² (AWG 20)	0.5 mm ² (AWG 20)	0.5 mm ² (AWG 20)
Wire Colour	Black	Black	Black
Wire Idents	1 to 23	1 to 35	1 to 35
Pin Crimp Part No	770854-1	770854-1	770854-1



7 MAINTENANCE AND WARRANTY

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

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



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