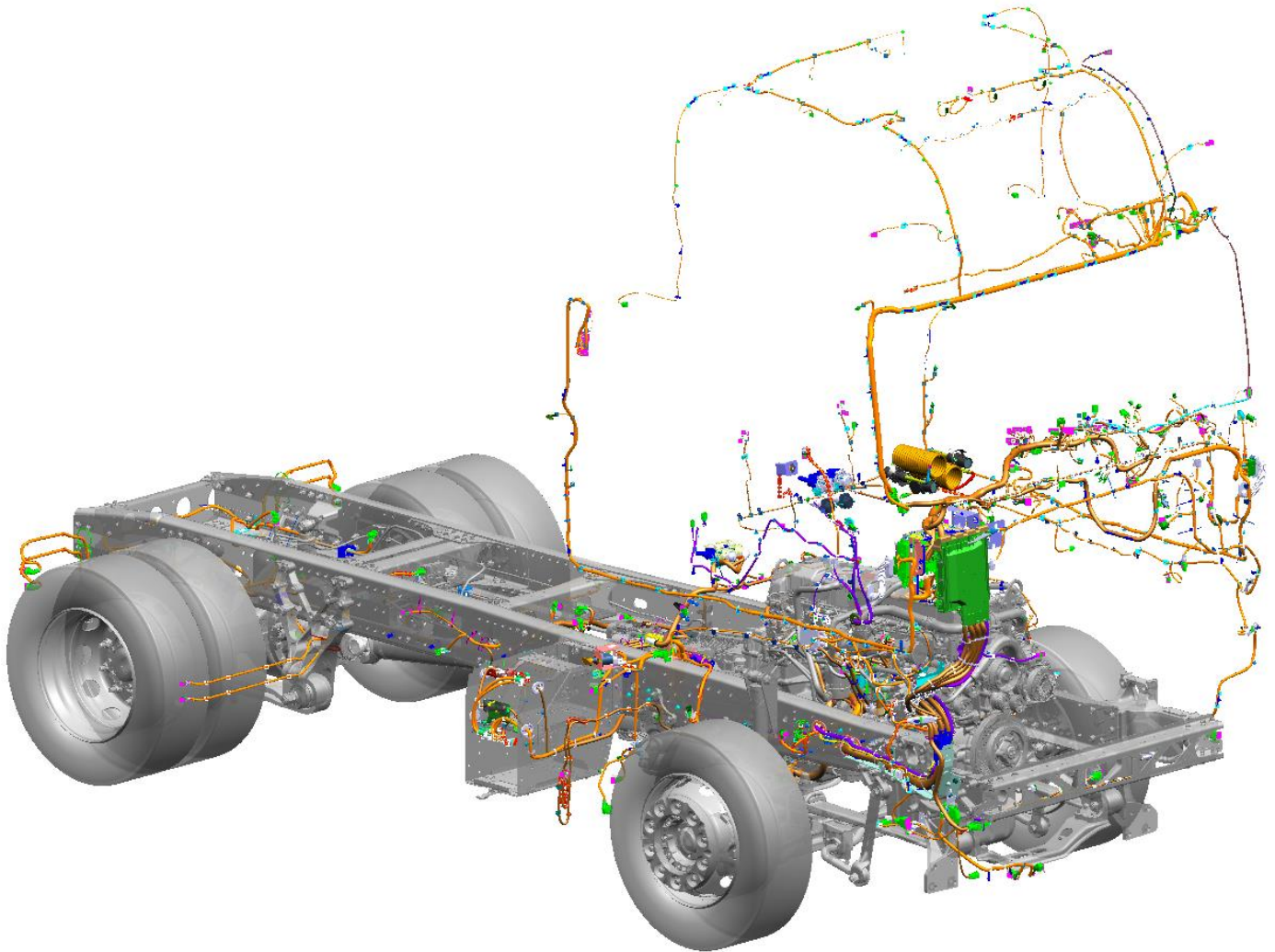


FORD TRUCKS

F-MAX Electrical Wiring Changes LP2 & GEN 1.5 Workshop Manual





TRUCKS

Ford Trucks Service Engineering

Contact:	Product Technical Service Team
E-mail:	pts@ford.com.tr
Tel. No:	02165647100

Updates:

Level	Date	Name	Revision
AA	30.01.2024	Aslıhan Akbudak Şık	First Document



PREFACE

The features which described in this document released with vehicles which started production date of 09.01.2023 and VIN Number NMOLKXTP6LPC93785.

- 1- GEN 1.5 Ecotorq Engine
 - 1.1- MD1 ECU
 - 1.2-Engine Oil Level Sensor
- 2- Dummy Switch Availability on F-MAX Vehicles.
- 3- Electro-Hydraulic Power-Assisted Steering (EHPAS)
- 4- Air Horn

Note: Please find electrical wiring diagrams (PHJC46-70002-AK & PHJC46-70002-BK) and all other additional documents related with this workshop manual by clicking below link.

<https://fordtrucks.ford.com.tr/Document/DocumentView?CategoryCode=ServiceDocFordTrucks&ParentId=35960&ViewType=List>

1. GEN 1.5 Ecotorq Engine

GEN 1.5 Ecotorq Engine launched for the FMAX vehicles which has Euro6 Emission Level. Changed features on the engine ECU MD1 described below:

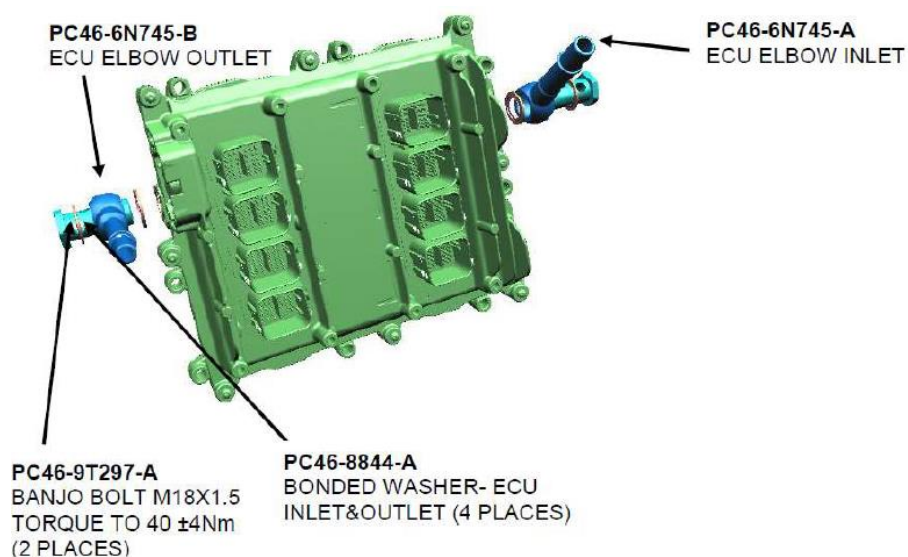
1.1 MD1 ECU

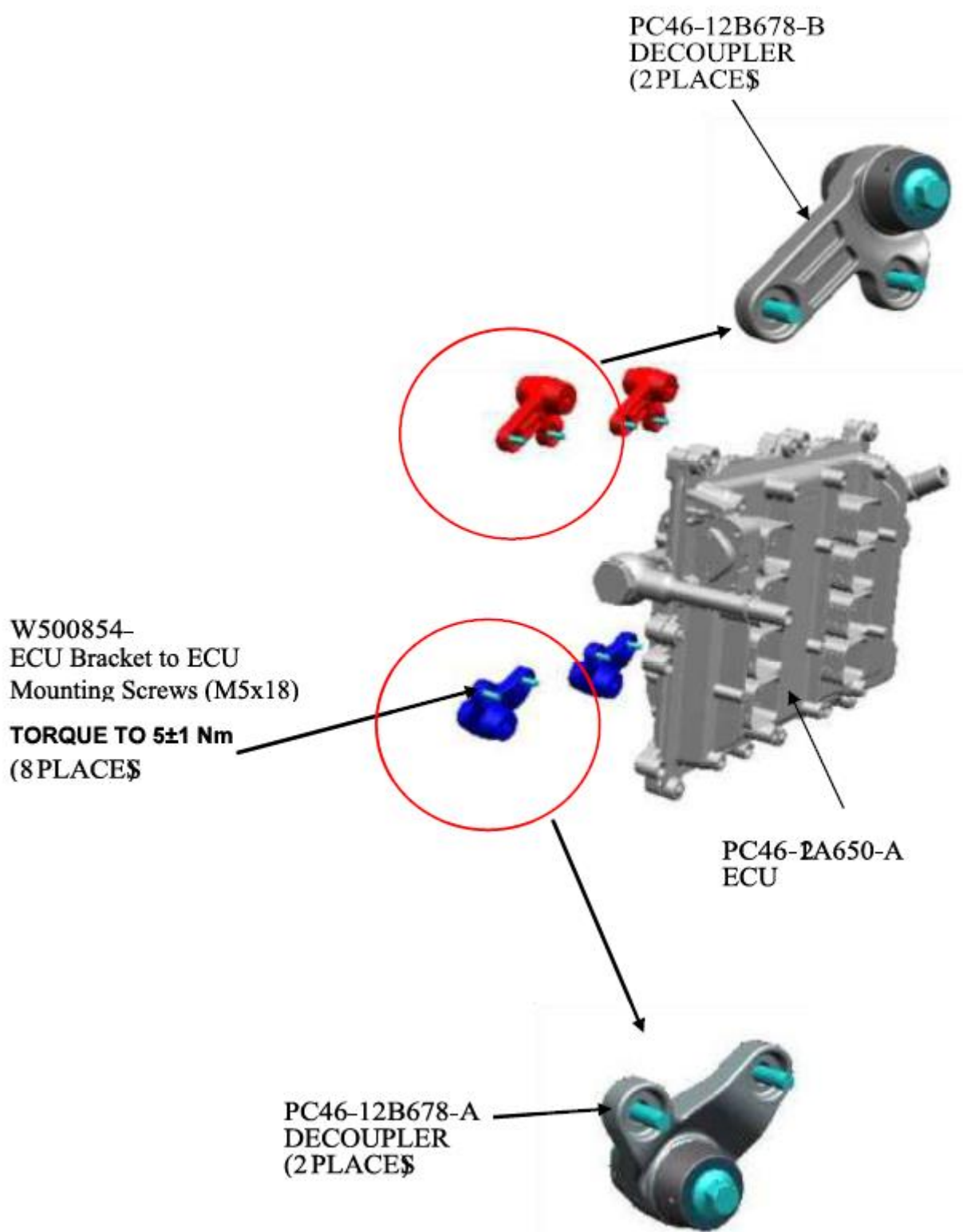
GEN1.5 Ecotorq 12.7L Engine ECU (MD1) is required to meet EU ECU Security regulation. HW Security Module (HSM) provides high access security.

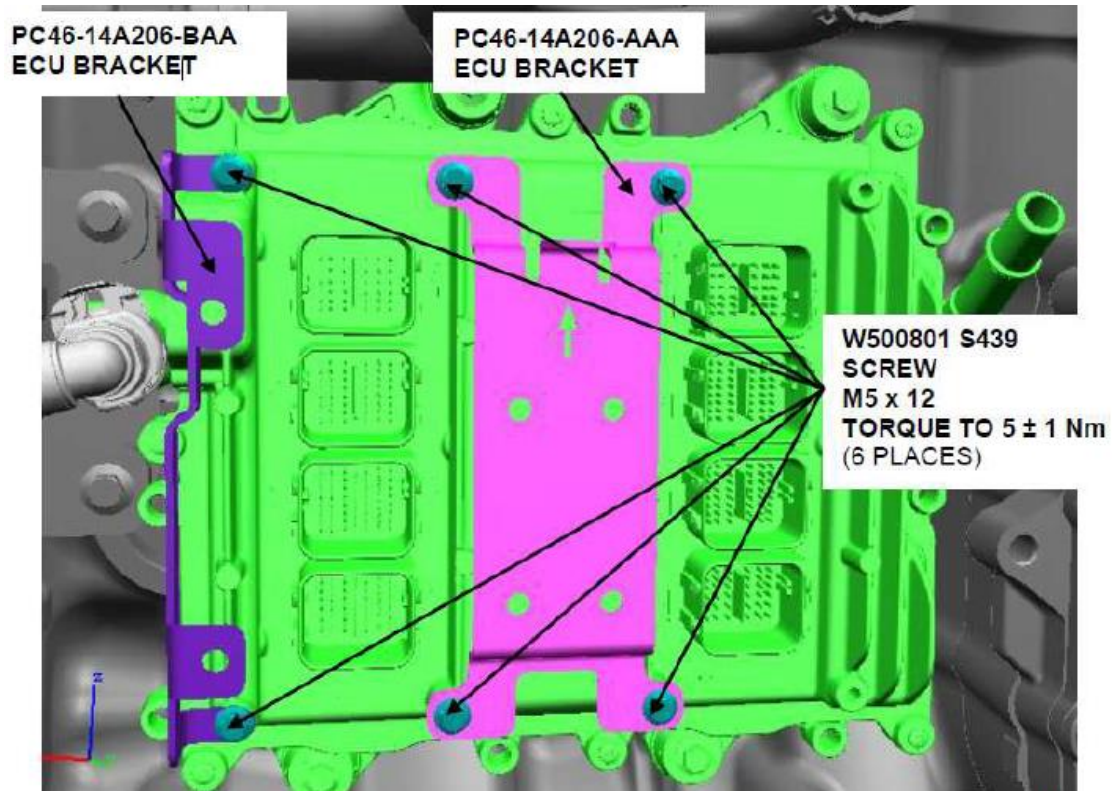
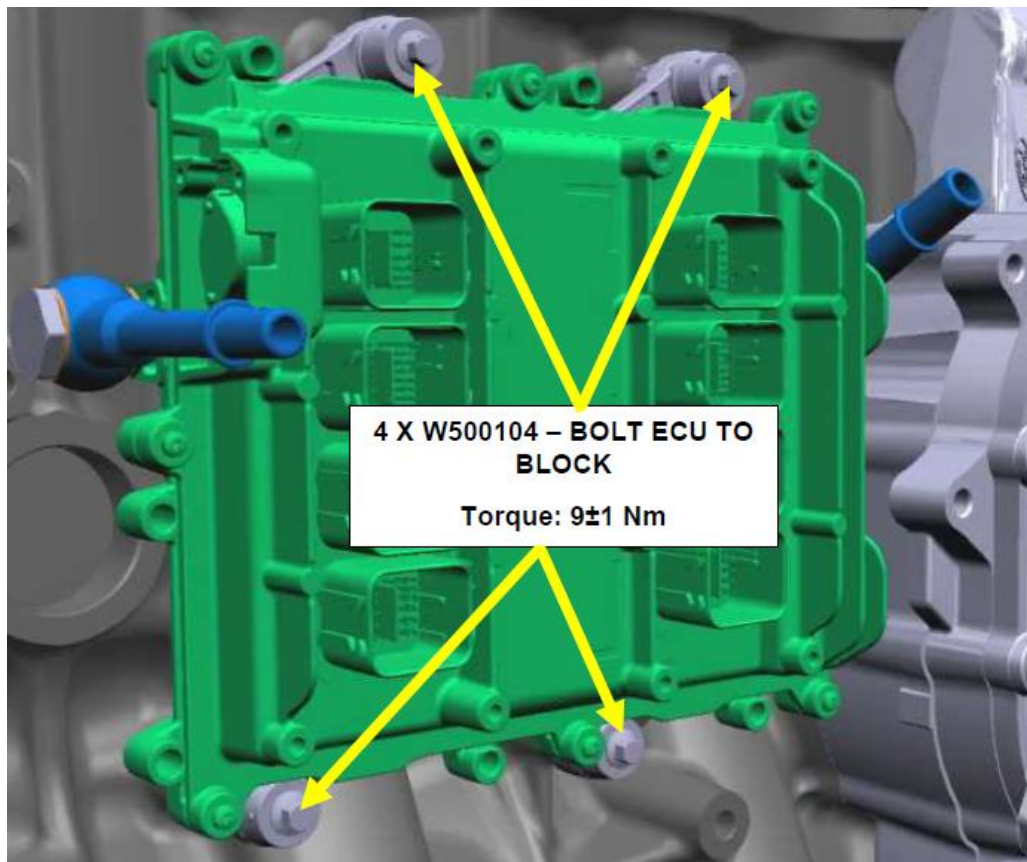
MD1 ECU provides sufficient pin & memory for future vehicle functions and CO2 technologies and supports future predictive technologies such as "predictive fan control".

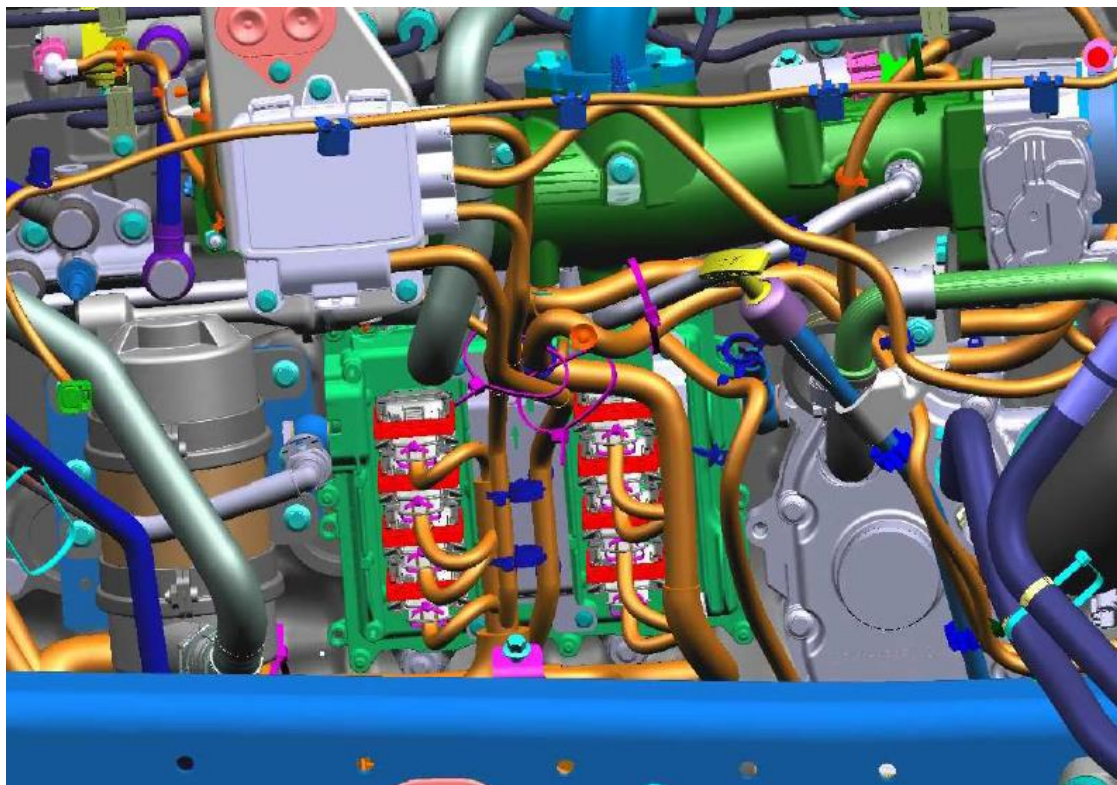


MD1 assembly steps on Engine shown below.

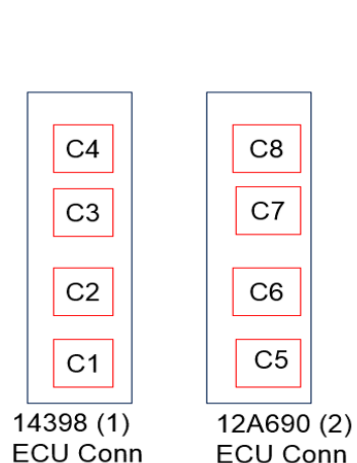








Electrical Connections for MD1 ECU



Connector Numbers:

C1E115-C1	1 928 406 091 (14398)
C1E115-C2	1 928 406 096 (14398)
C1E115-C3	1 928 406 097 (14398)
C1E115-C4	1 928 406 092 (14398)
C1E115-C5	1 928 406 093 (12A690)
C1E115-C6	1 928 406 098 (12A690)
C1E115-C7	1 928 406 099 (12A690)
C1E115-C8	1 928 406 094 (12A690)

Terminal Numbers:

Matrix1,2 Ag, 0,75 - 1,0 mm ²	1 928 498 677
Matrix1,2 Ag, 1,5 mm ²	1 928 498 678

Crimping tool:

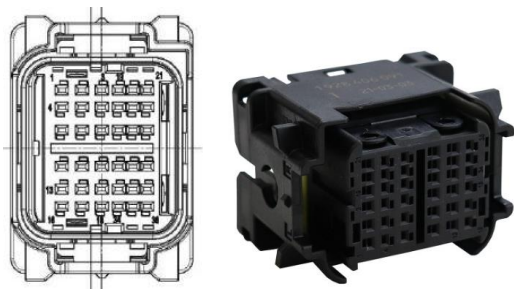
1928.498.213 for the matrix contacts 1928.498.677 (0,75-1,0 mm²)
 1928.498.214 for the matrix contacts 1928.498.678 (1,5 mm²)

Cover: 1928.406.102

TRUCKS
14398 : BCU wiring (Main Wiring)

Connector Code: C1E115-C1

Bosch Part Number: 1 928 406 091



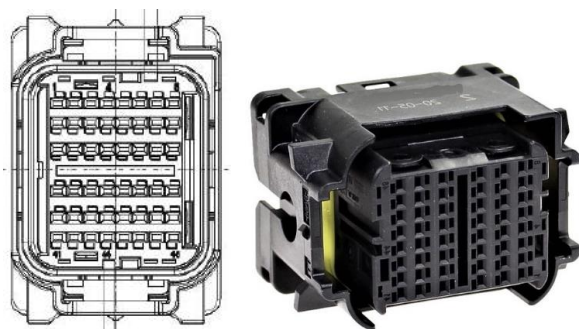
Pin No	Cable Code	Cable Section	Cable Color	Function
1	RCL17A	0.75 mm ²	WH/OG	SCR Tank Heating Valve
2	VE354A	0.75 mm ²	GN/BU	SCR Pump Motor Control
3	RE354C	0.75 mm ²	GN/BU	Hose Heater Relay LS
4	RE355A	0.75 mm ²	GN	SCR Reverting Valve Purging Pump LS
5	CE375B	0.75 mm ²	BN/WH	SCR Reverting Valve Purging Pump HS
6	CE354M	0.75 mm ²	BN/BU	Hose Heater Relay HS
7	CE352B	0.75 mm ²	YE/GY	SCR Dosing Valve LS
8	CE354A	1.5 mm ²	BN/BU	SCR Motor Pump Control HS
9	LE423G	0.75 mm ²	GN/VT	SCR Tank Heating Valve HS
10	CE506B	0.75 mm ²	GN	SCR Dosing Valve HS
11	VE351A	0.75 mm ²	VT/OG	HCI Metering Valve HS
12				
13	LE357A	0.75 mm ²	WH	HCI Shut-Off Valve HS
14	VE350A	0.75 mm ²	GY	HCI Metering Valve LS
15	VE352A	1.0 mm ²	BN	SCR Pressure Hose Heater 1 LS
16	RE357A	0.75 mm ²	VT/WH	HCI Shut-Off Valve LS
17	RE356A	1.0 mm ²	VT	SCR Pressure Hose Heater 2 LS
18	CH304A	1.5 mm ²	YE/GY	SCR Supply Module Heater LS
19	VDB25AP PUR	0.75 mm ²	GN/OG	B_D_CANH4
20	VDB26AP PUR	0.75 mm ²	GY/BU	B_D_CANL4
21				
22	RE354A	0.75 mm ²	WH/BU	SCR Pump Motor GND
23	VE353B	0.75 mm ²	GY/BU	SCR Pressure Sensor Supply
24				
25	VE719B	0.75 mm ²	GY/VT	Exhaust Gas Temperature Sensor 1 Ground
26	RE723B	0.75 mm ²	WH/BU	Exhaust Gas Temperature Sensor 2 Ground
27	RE771A	0.75 mm ²	GY/OG	Exhaust Gas Temperature Sensor 3 Ground
28	VE722B	0.75 mm ²	BN	Exhaust Gas Temperature Sensor 1
29	VE723B	0.75 mm ²	GN/VT	Exhaust gas temperature sensor 2
30	VE771B	0.75 mm ²	BN/VT	Exhaust gas temperature sensor 3
31	RE353B	0.75 mm ²	GN/VT	SCR pressure sensor ground

TRUCKS

32	VE708A	0.75 mm ²	GN/BN	SCR pressure sensor
33				
34	RE838B	0.75 mm ²	BU/OG	SCR tank temperature sensor ground
35	VE762A	0.75 mm ²	BU/GY	SCR tank temperature sensor
36	VE834A	0.75 mm ²	GN	SCR tank level sensor

Connector Code: C1E115-C2

Bosch Part Number: 1 928 406 096



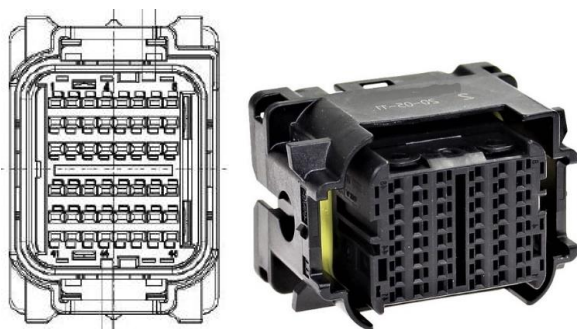
Pin No	Cable Code	Cable Section	Cable Color	Function
1	ZA202A	0.75 mm ²	OG/YE	HCl temperature sensor & HCl pressure sensor 1 upstream ground
2				
3				
4	RE823A	0.75 mm ²	GY/YE	Water in fuel sensor ground
5				
6	CH302B	0.75 mm ²	WH/BN	AC Pressure sensor (pressure transducer) sensor supply
7	CEC01D	0.75 mm ²	WH/BU	DPF differential pressure sensor supply
8				
9				
10				
11	RE769A	0.75 mm ²	BU/GY	HCl pressure sensor 2 downstream ground
12				
13	VE803A	0.75 mm ²	BU/GN	HCl pressure sensor 1 downstream
14				
15				
16	VE823A	0.75 mm ²	BU/BN	Water in fuel sensor supply
17				
18				
19				
20				
21	VE804B	0.75 mm ²	GN/BN	HCl temperature sensor & HCl pressure 1 sensor upstream supply
22	ZA191B	0.75 mm ²	OG/GN	HCl pressure sensor 2 downstream supply
23				
24				
25				

TRUCKS

26	CH423B	0.75 mm ²	YE	AC Pressure sensor (pressure transducer) signal
27				
28				
29				
30				
31				
32				
33	CDC55A	0.75 mm ²	BN/VT	Starter relay LS
34	RH433B	0.75 mm ²	BU/GY	AC Pressure sensor (pressure transducer) ground
35				
36	RE803A	0.75 mm ²	BN/GN	HCI temperature sensor
37				
38	RE405F	0.75 mm ²	GN/WH	DPF differential pressure sensor ground
39	VE770A	0.75 mm ²	GY/BN	HCI pressure sensor 2 upstream
40				
41	CE353B	0.75 mm ²	YE/OG	DPF differential pressure sensor
42	VE831A	0.75 mm ²	GY/BN	Water in fuel sensor / switch
43				
44				
45				
46	CDC25A	0.75 mm ²	BN/GN	Starter relay HS
47				
48				

Connector Code: C1E115-C3

Bosch Part Number: 1 928 406 097



Pin No	Cable Code	Cable Section	Cable Color	Function
1	RE136C	0.75 mm ²	VT/GN	Accelerator pedal position sensor 1 ground
2	VE701C	0.75 mm ²	YE/OG	Accelerator pedal position sensor 2 ground
3				
4				
5				
6				



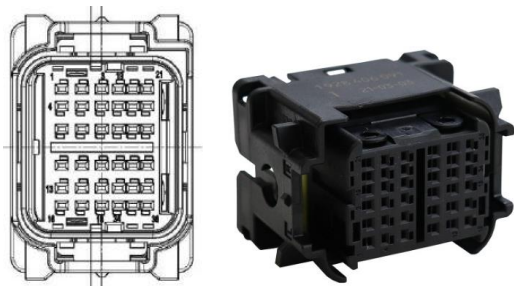
TRUCKS

7	CPK45A	0.75 mm ²	YE/VT	Engine compartment start switch
8				
9	LE136C	0.75 mm ²	GN/OG	Accelerator pedal position sensor 1
10	CE901C	0.75 mm ²	YE/BU	Accelerator pedal position sensor 2
11				
12				
13				
14				
15	CDC15D	0.75 mm ²	VT	Alternator driver HS-PWM
16				
17	VE702C	0.75 mm ²	BU/WH	Accelerator pedal 1 sensor supply
18	CEC01C	0.75 mm ²	WH/BU	Accelerator pedal 2 sensor supply
19				
20				
21				
22				
23				
24				
25				
26				
27				
28	CE937A	0.75 mm ²	VT/GY	Engine compartment stop switch
29	CCB10B	0.75 mm ²	YE/GN	Engine brake demand switch
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46	ZA201B	0.75 mm ²	OG	Cabin & dashboard supply 2
47				
48	CMC14B	0.75 mm ²		Oil Pressure Warning LED 2

TRUCKS

Connector Code: C1E115-C4

Bosch Part Number: 1 928 406 092



Pin No	Cable Code	Cable Section	Cable Color	Function
1	SBB13C	1.5 mm ²	GY/RD	Terminal 30 (Battery plus)
2	CEC11A	0.75 mm ²	VT/WH	Fan 1 LS
3	CEC14A	0.75 mm ²	GY/OG	Fan 1 HS
4	SBB13D	1.5 mm ²	GY/RD	Terminal 30 (Battery plus)
5	SBB13E	1.5 mm ²	GY/RD	Terminal 30 (Battery plus)
6	GD414B	1.5 mm ²	BK/WH	Terminal 31 (Battery minus)
7	SBB13F	1.5 mm ²	GY/RD	Terminal 30 (Battery plus)
8	SBB13G	1.5 mm ²	GY/RD	Terminal 30 (Battery plus)
9	GD414C	1.5 mm ²	BK/WH	Terminal 31 (Battery minus)
10	GD414D	1.5 mm ²	BK/WH	Terminal 31 (Battery minus)
11	GD414E	1.5 mm ²	BK/WH	Terminal 31 (Battery minus)
12	GD414F	1.5 mm ²	BK/WH	Terminal 31 (Battery minus)
13	GD414G	1.5 mm ²	BK/WH	Terminal 31 (Battery minus)
14				
15				
16	GD414H	1.5 mm ²	BK/WH	Terminal 31 (Battery minus)
17				
18				
19	LE458C	0.75 mm ²	BU/WH	OBD lamp supply
20	CE317B	0.75 mm ²	GY	OBD Lamp LS
21				
22				
23				
24				
25				
26				
27	VEC03A	0.75 mm ²	WH/BU	Fan speed sensor 1
28	VDB12F	0.75 mm ²	BN/BU	CAN low signal 1 / FLASH CAN L
29	VDB11F	0.75 mm ²	BN/GN	CAN high signal 1 / FLASH CAN H
30	CEC02A	0.75 mm ²	GN/BU	Fan speed sensor 1 ground
31	CDC35B	0.75 mm ²	BU/WH	Terminal 50 signal // Ignition switch
32				
33	CEC05A	0.75 mm ²	VT/GY	Fan speed sensor (Hall) supply

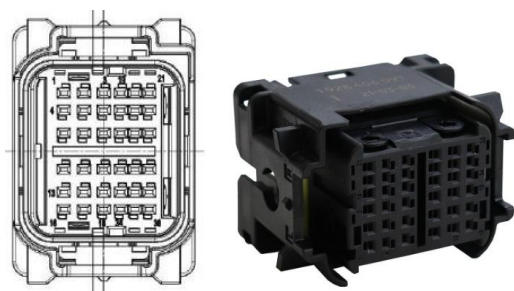
TRUCKS

34				
35				
36	CBB75B	0.75 mm ²	YE/GY	Terminal 15 signal // Ignition switch

12A690 : Sensor on Engine wiring

Connector Code: C1E115-C5

Bosch Part Number: 1 928 406 093



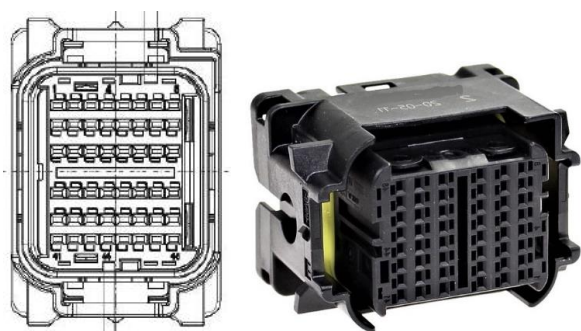
Pin No	Cable Code	Cable Section	Cable Color	Function
1	VE819A	1.0 mm ²	GN/VT	Throttle flap actuator pos (+)
2				
3				
4	VE818A	1.0 mm ²	BN	Throttle flap actuator neg (-)
5				
6				
7				
8				
9	CE174A	1.0 mm ²	YE/GY	MCT-Pump HS (+)
10				
11				
12	CE628A	0.75 mm ²	GY	MCT-Pump LS (-)
13				
14	LE428A	0.75 mm ²	BU/WH	Throttle flap sensor power supply
15				
16				
17				
18				
19	VE720A	0.75 mm ²	VT	Throttle flap sensor ground
20	VE820A	0.75 mm ²	GY	Throttle flap sensor signal
21				
22	RE238A	0.75 mm ²	BU/BN	Single rail pressure sensor ground
23	VE727A	0.75 mm ²	BU/BN	Single rail pressure sensor
24				
25	ZA152A	0.75 mm ²	OG/GN	Fuel temperature sensor ground
26	RE232A	0.75 mm ²	VT/WH	Fuel temperature sensor signal
27				
28				
29				

TRUCKS

30	LE437A	0.75 mm ²	YE	Turbine wheel / VGT Speed sensor signal
31				
32				
33	RE437A	0.75 mm ²	GY	Turbine wheel / VGT Speed Sensor ground
34	LE238A	0.75 mm ²	GY	Single rail pressure sensor supply
35				
36				

Connector Code: C1E115-C6

Bosch Part Number: 1 928 406 098



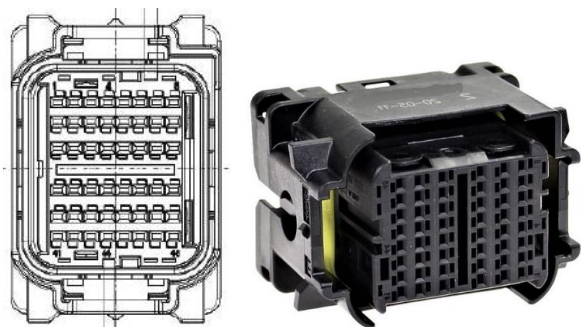
Pin No	Cable Code	Cable Section	Cable Color	Function
1	CE613A	0.75 mm ²	WH/VT	Turbo, EGR, Urea Level and NOX Sensors, Quantity sensor etc. LS
2	VE716A	0.75 mm ²	YE	Coolant temp sensor 1
3				
4				
5				
6	VE824A	0.75 mm ²	YE/GN	Boost air temperature sensor 1
7				
8				
9				
10	RE141A	0.75 mm ²	BN/GN	Coolant temp sensor 1 ground
11				
12	CE604A	0.75 mm ²	YE/VT	Grid heater relay 1 LS GND
13				
14	ZA190A	0.75 mm ²	OG/YE	Oil temperature sensor
15				
16				
17	VE711A	0.75 mm ²	YE/VT	Crankshaft speed sensor Negative // Crankshaft speed sensor - inductive
18	ZA159A	0.75 mm ²	OG/BU	Crankshaft speed sensor Positive // Crankshaft speed sensor - inductive
19	ZA142B	0.75 mm ²	OG/YE	Crankshaft speed sensor - Hall ground
20				
21	LE150A	0.75 mm ²	BU/WH	Boost air temperature 1 & boost pressure 1 sensor supply

TRUCKS

22	RE150A	0.75 mm ²	GN/BU	Boost air temperature sensor 1 & Boost pressure sensor 1 ground
23	RE774A	0.75 mm ²	GN/OG	Oil temperature & pressure sensor ground
24	ZA188A	0.75 mm ²	OG/GN	Oil level sensor
25				
26				
27				
28				
29	VE774A	0.75 mm ²	YE/GN	Oil temperature & pressure sensor supply
30				
31	CMC24A	0.75 mm ²	GY	Oil pressure sensor
32	ZA174A	0.75 mm ²	OG/YE	Boost pressure sensor 1
33	CE612A	1.0 mm ²	GY/VT	Turbo, EGR, Urea Level and NOX Sensors, Quantity sensor etc. HS
34	CE606A	0.75 mm ²	GN/OG	Grid heater relay 1 HS power
35				
36				
37				
38				
39	VE706A	0.75 mm ²	BN/BU	Camshaft speed sensor Positive // Camshaft speed sensor - Inductive
40	VE707A	0.75 mm ²	GN/VT	Camshaft speed sensor Negative /// Camshaft speed sensor - Inductive
41				
42				
43	ZA189A	0.75 mm ²	OG	Oil level sensor ground
44				
45				
46	VDB30A PUR	0.75 mm ²	WH/GN	B_D_CANL3
47	VBB29A PUR	0.75 mm ²	GN/BU	B_D_CANH3
48				

Connector Code: C1E115-C7

Bosch Part Number: 1 928 406 099





TRUCKS

Pin No	Cable Code	Cable Section	Cable Color	Function
1				
2				
3				
4				
5				
6				
7	ZA178A	0.75 mm ²	OG/WH	Unit Fuel Pump Metering PWR
8	ZA179A	0.75 mm ²	OG/BK	Unit Fuel Pump Metering GND
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20	VE807A	0.75 mm ²	YE/VT	Intake Air Temperature Signal
21				
22				
23				
24				
25	CH422A	0.75 mm ²	VT	EGR temperature sensor ground
26	VE765A	0.75 mm ²	GY/BU	EGR temperature sensor
27				
28				
29				
30				
31	ZA156A	0.75 mm ²	OG/BK	MAF mass & temperature sensor supply
32				
33				
34				
35	CE623A	0.75 mm ²	BN/BU	Fuel filter clogging switch ground
36	CE163A	0.75 mm ²	VT/GY	Fuel filter clogging switch signal
37				
38	VE809A	0.75 mm ²	GN/OG	Intake Air Temperature Signal Ground
39				
40				
41				
42				
43				
44				
45	RE320A	0.75 mm ²	BU	MAF mass & temperature sensor_Frequency

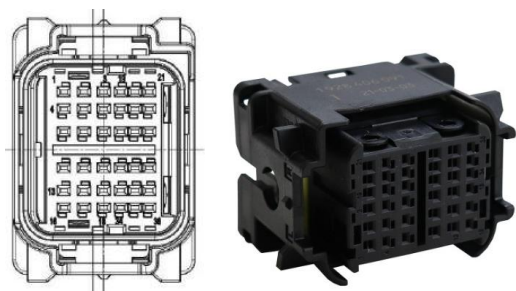


TRUCKS

46				
47				
48				

Connector Code: C1E115-C8

Bosch Part Number: 1 928 406 094



Pin No	Cable Code	Cable Section	Cable Color	Function
1	RE208B	1.5 mm ²	BU	Injector 1 "low" Bank 1
2	CE208B	1.5 mm ²	YE/OG	Injector 1 "high" Bank 1
3	ZA181A	0.75 mm ²	OG	VALVE – RAIL PRESSURE CONTROL GND
4	RE210B	1.5 mm ²	BN/VT	Injector 2 "low" Bank 1
5	CE210B	1.5 mm ²	GN/WH	Injector 2 "high" Bank 1
6	CE257A	0.75 mm ²	GY/BN	VALVE – RAIL PRESSURE CONTROL PWR
7	RE209B	1.5 mm ²	WH/GN	Injector 3 "low" Bank 1
8	CE209B	1.5 mm ²	BN	Injector 3 "high" Bank 1
9				
10	RE207B	1.5 mm ²	GN/VT	Injector 3 "low" Bank 2
11	CE207B	1.5 mm ²	VT/GY	Injector 3 "high" Bank 2
12				
13	RE206B	1.5 mm ²	BU/OG	Injector 2 "low" Bank 2
14	CE206B	1.5 mm ²	GY/YE	Injector 2 "high" Bank 2
15				
16	RE205B	1.5 mm ²	YE/BU	Injector 1 "low" Bank 2
17	CE205B	1.5 mm ²	GN/BU	Injector 1 "high" Bank 2
18				
19				
20				
21				
22				
23				
24				
25	CCB13A	0.75 mm ²	GY	Solenoid Engine Brake 1 LS GND
26				
27				
28	CCB14A	0.75 mm ²	VT	Solenoid Engine Brake 1 HS PWR
29				

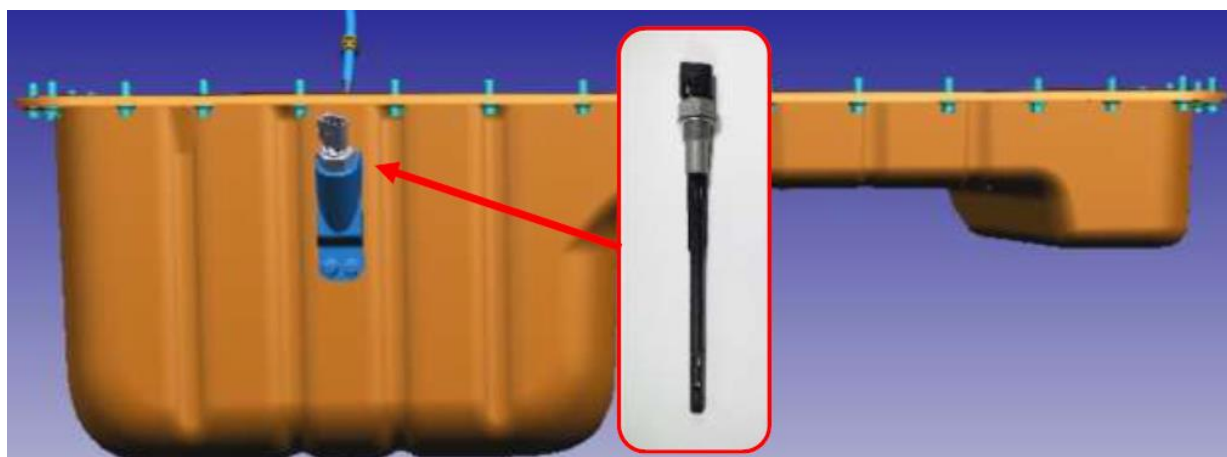
TRUCKS

30				
31	CCB04A	0.75 mm ²	WH	Solenoid Engine Brake 2 HS PWR
32				
33				
34	CCB05A	0.75 mm ²	GY/BU	Solenoid Engine Brake 2 LS GND
35				
36				

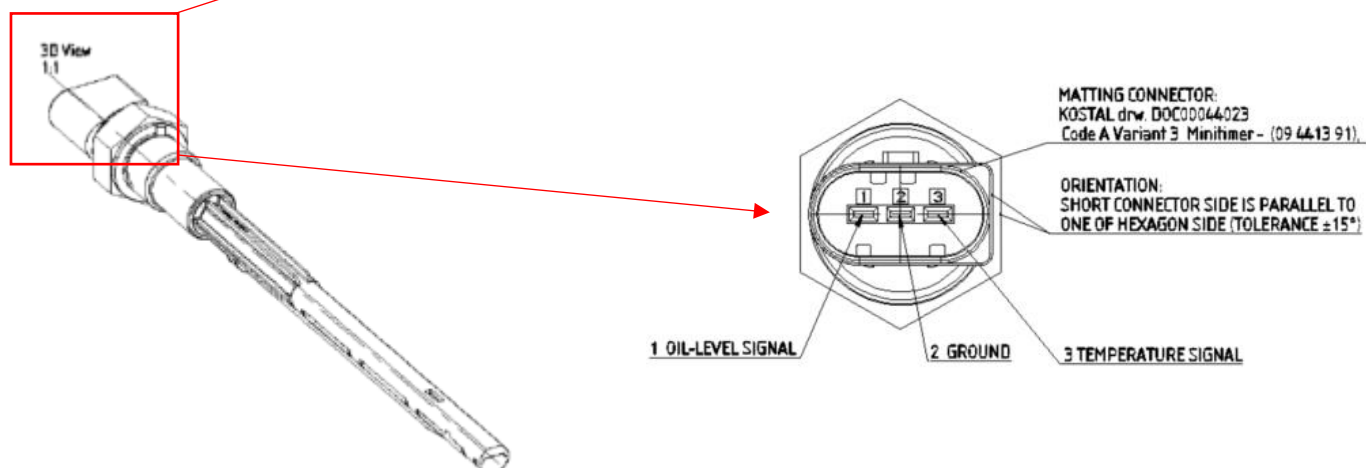
1.2 Engine Oil Level Sensor

Oil Level Sensor details for GEN1.5 Engines shown below:

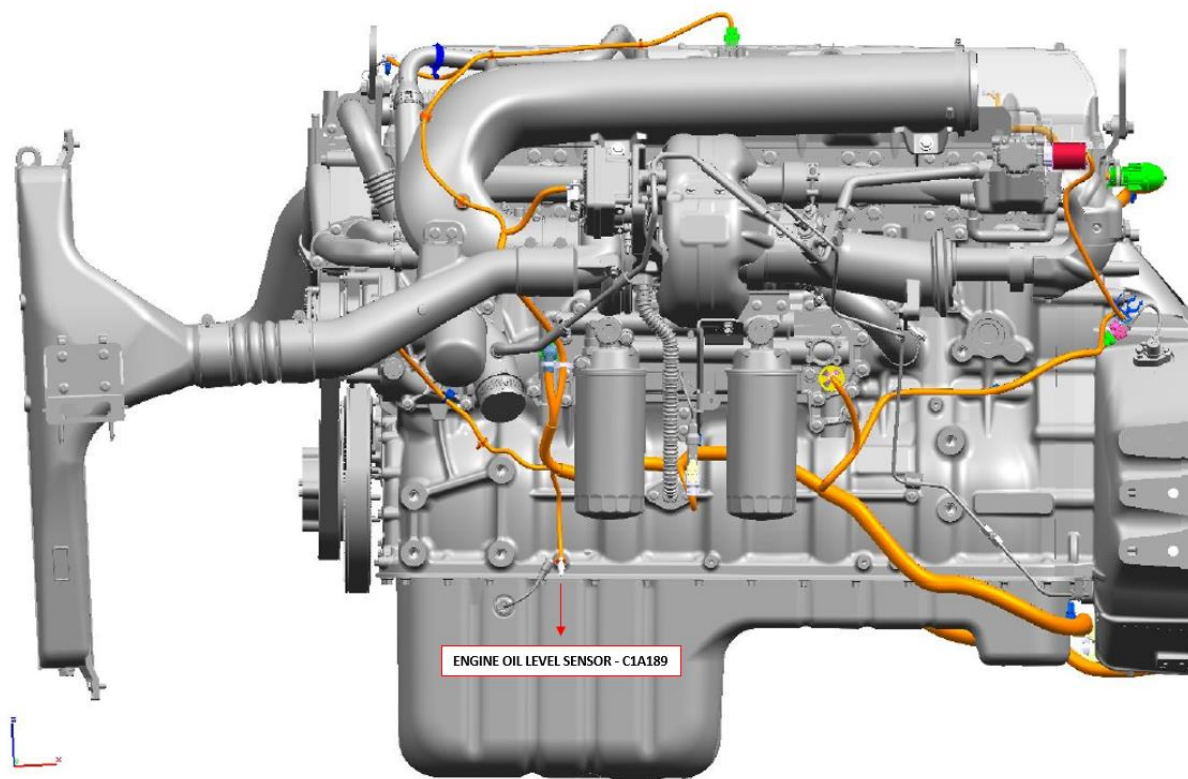
Engine oil level sensor continuously informs the user via instrument cluster about the remaining oil level in the engine oil pan. It gives a warning when there is an oil leak due to a crack on the oil pan and indicates how much oil shall be added for filling up oil.



Connector of Engine Oil Level Sensor:



12A690 : Sensor on Engine wiring



Connector Code: C1A189

KOSTAL Part Number: 09441391



Pin No	Cable Code	Cable Section	Cable Color	Target Unit	Function
1	ZA188A	0.75 mm ²	OG/GN	C1E115-C6 / 24 (ECU)	Oil level signal
2	ZA189A	0.75 mm ²	OG	C1E115-C6 / 43 (ECU)	Ground
3	ZA190A	0.75 mm ²	OG/YE	C1E115-C6 / 14 (ECU)	Temperature signal

TRUCKS

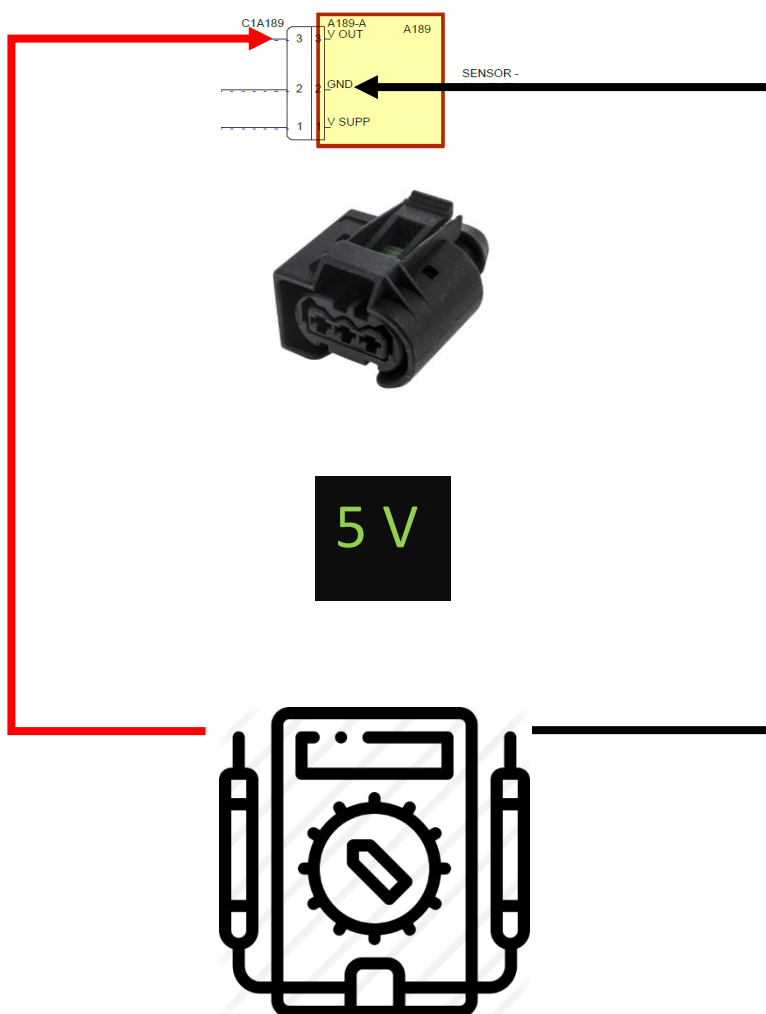
Sensor Control Method:

For measurement with piezo resistive type sensors, making the measurement to verify that sensor works correctly shall provide correct results.

Pin Number	Nominal Current	Nominal Voltage	Maximum Steady State Operating Current (A)	Maximum Steady State Operating Voltage (V)
1	0,2	5	0,133	8,24
2	0,202	5	0,202	0
3	0,002	5	0,002	5

Measure the voltage between pin 2 and pin 3 of C1A189 connector (when ignition is ON).

- If the voltage value between the connected pins is measured as 5V, it means that the engine oil level sensor is in good condition.
- If the voltage value between the connected pins is measured different from 5V, check wiring between pin 2 of C1A189 and pin 43 of C1E115-C6 and check wiring between pin 3 of C1A189 and pin 14 of C1E115-C6.
- If problem still exists, change sensor (6C624).



2. Dummy Switch Availability on F-MAX Vehicles.

Two dummy switches have been added to the front console for new features that can be added in line with customer demands in F-MAX vehicles. Dummy Switch I-II which is supplied as a standard ex-factory, control the applications requested by the customer.

The additional switch required for the activation of Dummy1 and Dummy2 can be obtained from the Spare Parts with the following codes and is defined for Dummy1 and Dummy2 application.

- Dummy1 Switch: NC46-13D734-AA
- Dummy2 Switch: NC46-13D734-BA

Service Application:

No action will be taken on switches. Switches are properly connected to the vehicle's electrical installation. Outputs will be taken from the relevant pins to drive the desired function or superstructure feature. Switch picture and its location is as seen in below.

It is in the lower left row of the 10-switch package on the right side of the steering.

Location of dummy switches in the vehicle:



TRUCKS

When the dummy switches are pressed, the aftermarket pins below are energized through FS072 from R18 relay 5. pin for dummy1 and FS086 from R22 relay 5. pin for dummy 2. The inputs of the functions that the switches will control can be connected the pins as follows:

Connector – Aftermarket Cabin (20 Pin)

14401 : cab internal console wiring

Connector Code: C2AH02

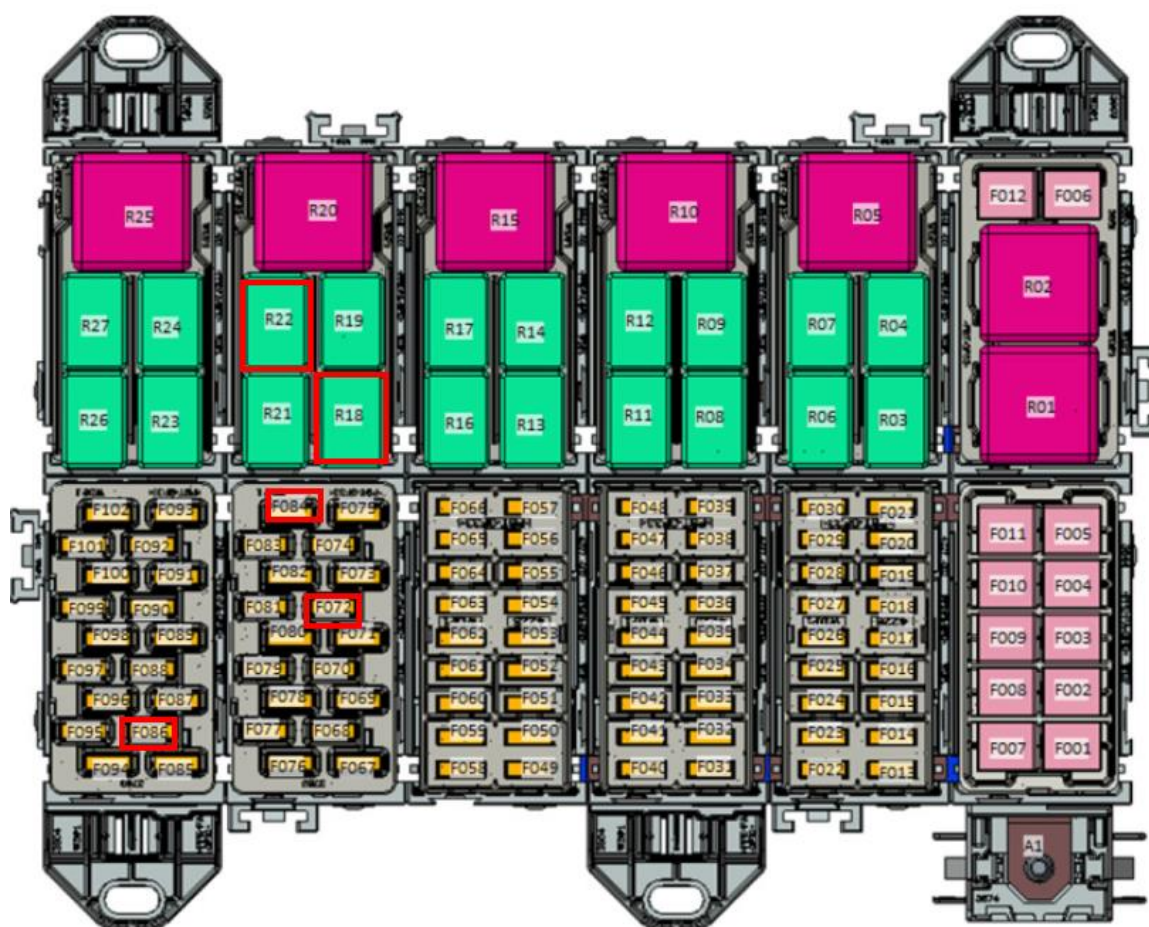
Pin No	Cable Code	Cable Section	Cable Color	Target Unit
20	CBB72C	0,75 mm ²	GN/VT	Dummy 1 Switch
11	CBB86C	0,75 mm ²	WH/BU	Dummy 2 Switch

Connector – Aftermarket Chassis (18 Pin)

14398 : BCU Wiring

Connector Code: C1AH03

Pin No	Cable Code	Cable Section	Cable Color	Target Unit
17	CBB72E	0,75 mm ²	GN/VT	Dummy 1 Switch
18	CBB86E	0,75 mm ²	WH/BU	Dummy 2 Switch



TRUCKS

FS084	Mini Fuse	5A	Dummy 1, Dummy 2
FS072	Mini Fuse	10A	Dummy 1
FS086	Mini Fuse	10A	Dummy 2
R18	Micro Relay	24V, 20A	Dummy 1
R22	Micro Relay	24V, 20A	Dummy 2

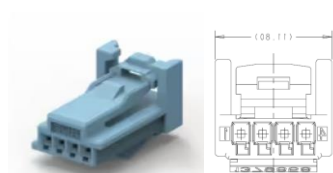
14A320 = Cab internal console wiring attachment 1

Dummy-1 Switch:

Connector Code: C2XD01

Tyco Part Nr: 1379658-3

Ford Part Nr: JU5T-14489-AUA



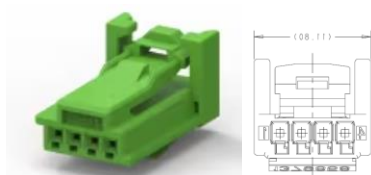
Pin No	Cable Code	Cable Section	Cable Color	Target Unit
1	CBB84AE	0,35 mm ²	VT	FS084 KL15
2	ZA145A	0,35 mm ²	OG/GY	R18/1 24V 20A Relay

Dummy-2 Switch:

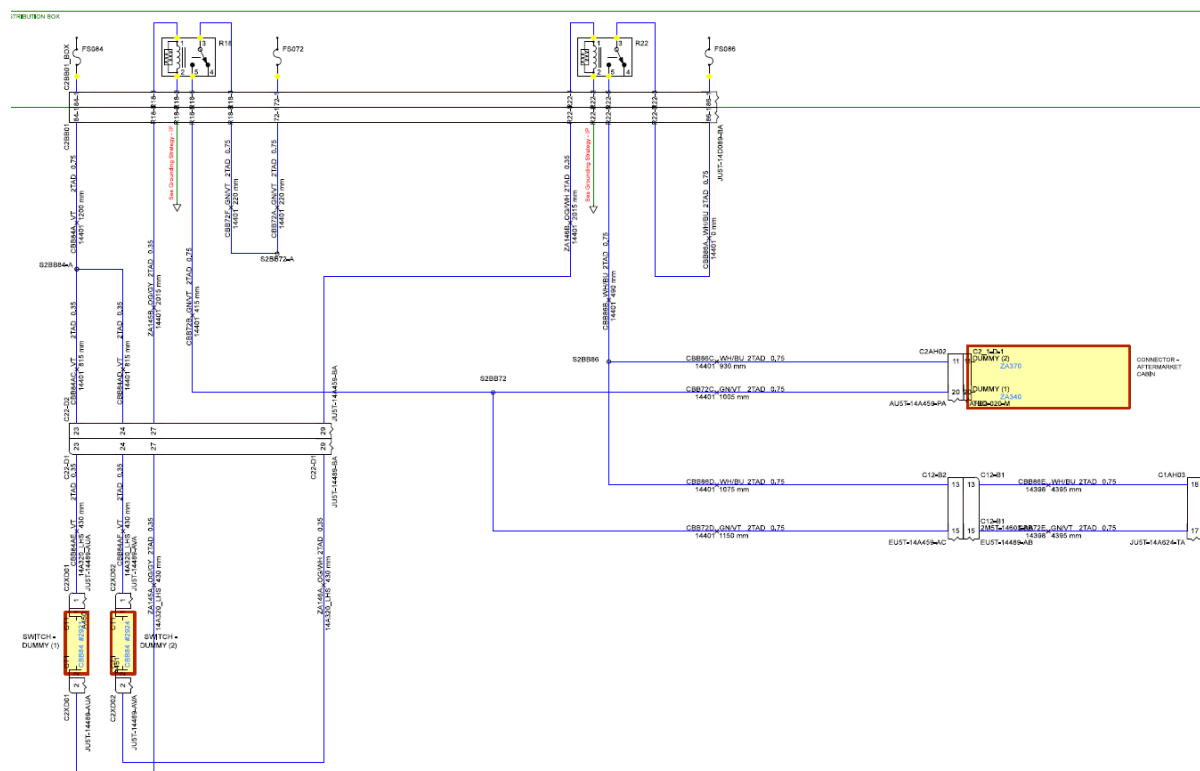
Connector Code: C2XD02

Tyco Part Nr: 1379658-4

Ford Part Nr: JU5T-14489-AVA



Pin No	Cable Code	Cable Section	Cable Color	Target Unit
1	CBB84AF	0,35 mm ²	VT	FS084 KL15
2	ZA146A	0,35 mm ²	OG/WH	R22/1 24V 20A Relay

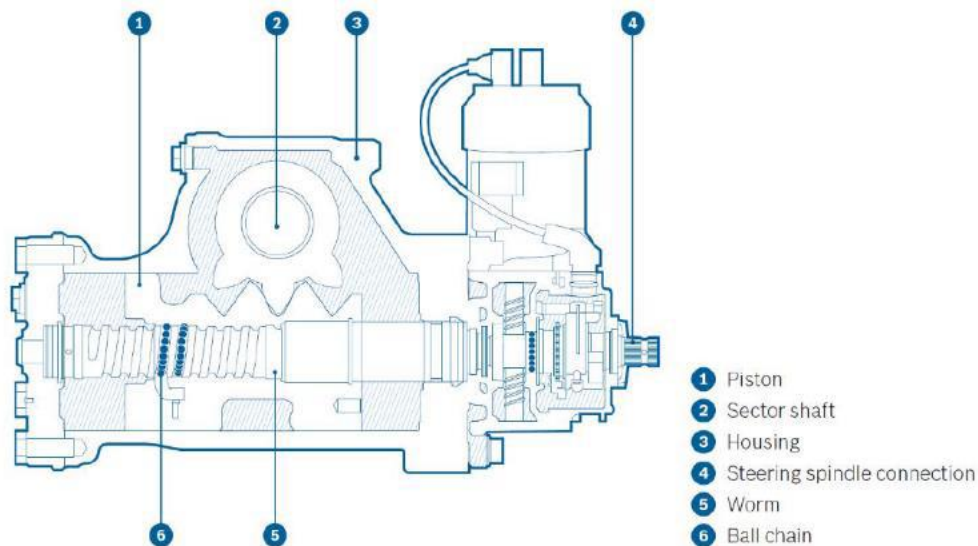


CAUTION:

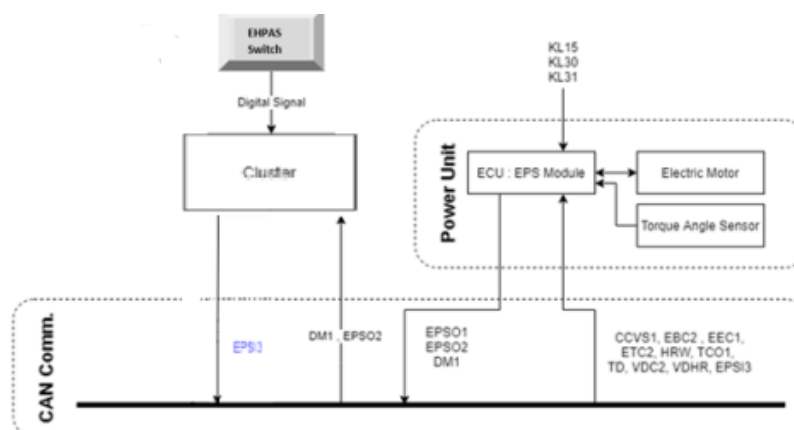
The current value should not exceed 10 A. The current and voltage requirements of the superstructure feature to be applied should be carefully controlled and applied. When the superstructure function is requested to be activated by the customer, it becomes active and the orange light turns on.

3. Electro-Hydraulic Power-Assisted Steering (EHPAS)

The EHPAS extends the hydraulic steering gear with a worm gear, an electric motor with ECU and a torsion bar with torque sensor and a steering angle sensor. Using the electric motor and the worm gear, an additional steering torque can be applied in parallel to the steering torque of the driver. The driver torque and the additional steering torque are the input to the hydraulic steering gear. Thus it is possible to modify the steering torque of the driver depending on the driving situation. The mechanical connection from the steering wheel to the steering linkage still remains. In case of failure of the electronic system, the hydraulic assistance remains. The other way round, in case of a failure of the hydraulic system, the electric motor continues to assist the steering motion (especially important for 8x4 vehicles).



The EHPAS system requires hardwired inputs (HW Inputs), CAN communication and interaction with Cluster systems as described.



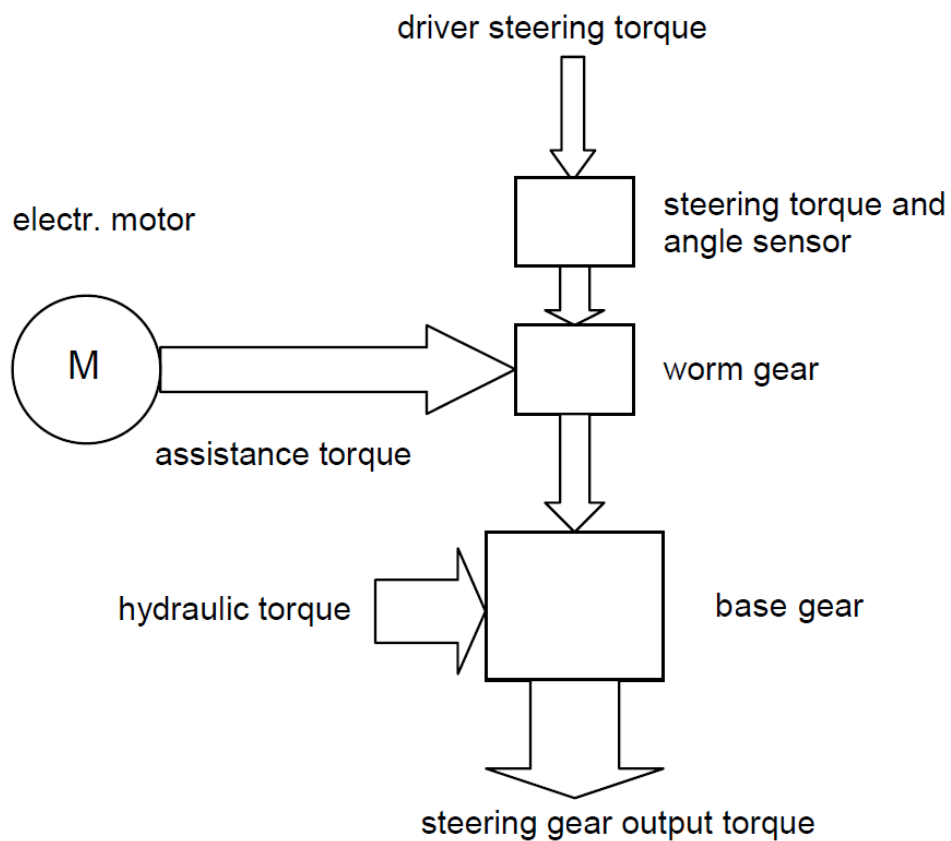
Interaction between CAN Line, Cluster, and EPS

TRUCKS

Components of the EHPAS is feature is composed of the following parts:

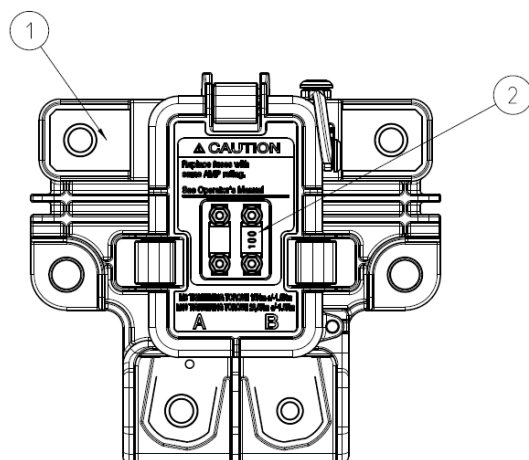
1. Electric Motor
2. Steering Torque and Angle Sensor
3. Worm Gear
4. Base Gear

Working principle of EHPAS system is shown.



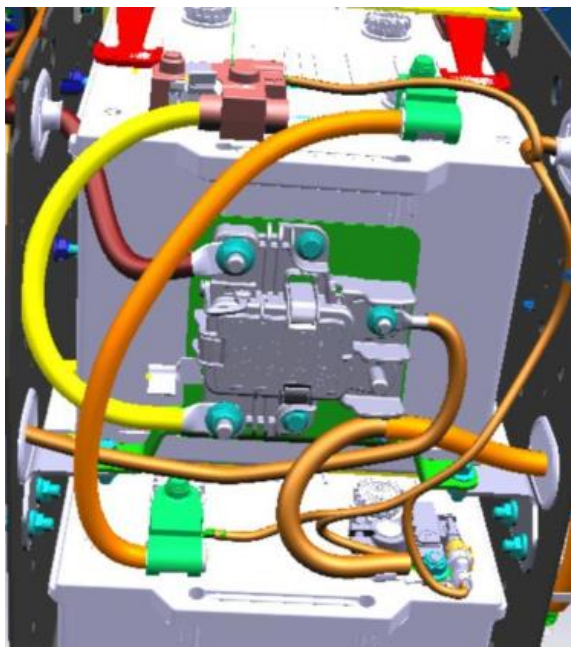
TRUCKS

EHPAS 100A Fuse Box;



NOTE : 100A Megafuse will be placed slot B

	PART NUMBER	PART DESCRIPTION	QTY
1	MC46-14A094-AA	MTA 0301887 FUSE BOX	1
2	MTA 0701100	100 A FUSE	1

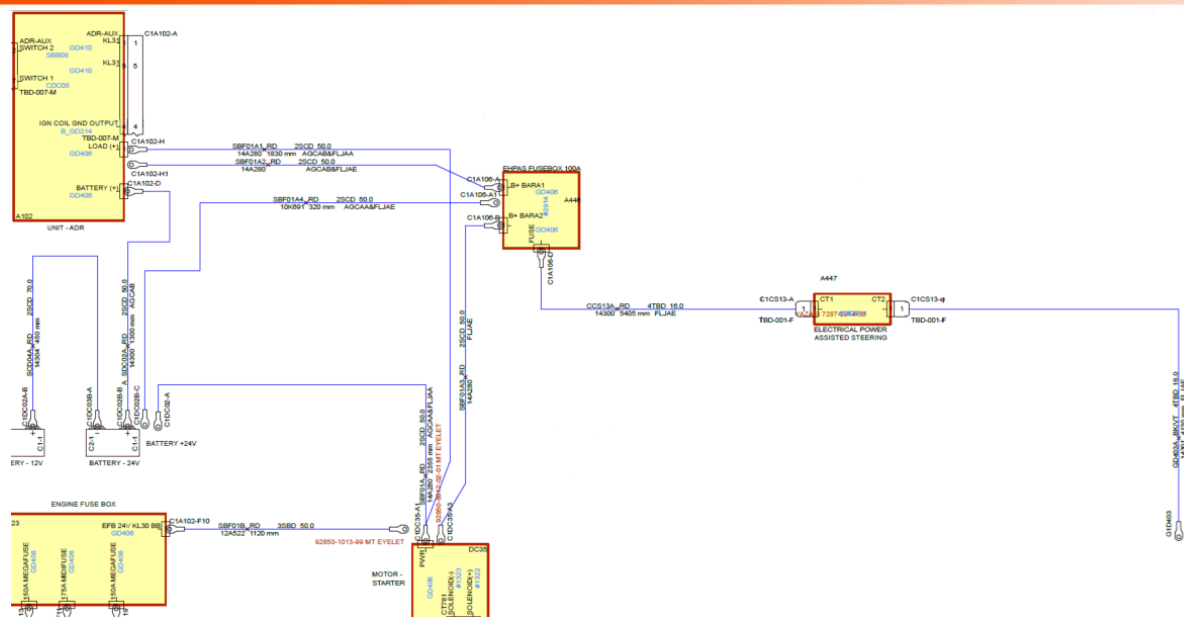


C1A106-A1 50 mm² Red cable (or C1A106-A 50 mm² Red cable if the vehicle is with ADR) and C1CS13-B 50 mm² Red cables are the eyelets that connect to the EHPAS fuse box. EHPAS fuse box is located on the battery plate area on the right side of the vehicle.

Fuse Box Connections:

Cable Code	Color	Cable Section	From	To
C1A106-A1 (W/ADR)	RD	50 mm ²	EHPAS Fuse Box	Unit ADR
C1A106-A	RD	50 mm ²	EHPAS Fuse Box	Battery +24V
C1A106-B	RD	50 mm ²	EHPAS Fuse Box	Motor - STARTER
C1A106-D	RD	16 mm ²	EHPAS Fuse Box	C1CS13-A / 1
C1CS13-B	BK/VT	16 mm ²	C1CS13-B / 1	GND G1D403

TRUCKS



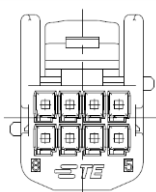
EHPAS Switch Connector:

14A320 = Cab internal console wiring attachment 1

Connector Code: C2CS13

Tyco Part Nr: 1379659-6

Ford Part Nr: JU5T-14489-BBA



Pin No	Cable Code	Color	Cable Section	Target Unit
1	CCS09B	GN	0.35 mm ²	INSTRUMENT CLUSTER
2	A_GD214BE	BK/BU	0.35 mm ²	GND
3	A_GD214BF	BK/BU	0.35 mm ²	GND
4	CLN04BG	BU/BN	0.35 mm ²	INTERIOR LIGHT DIMMING

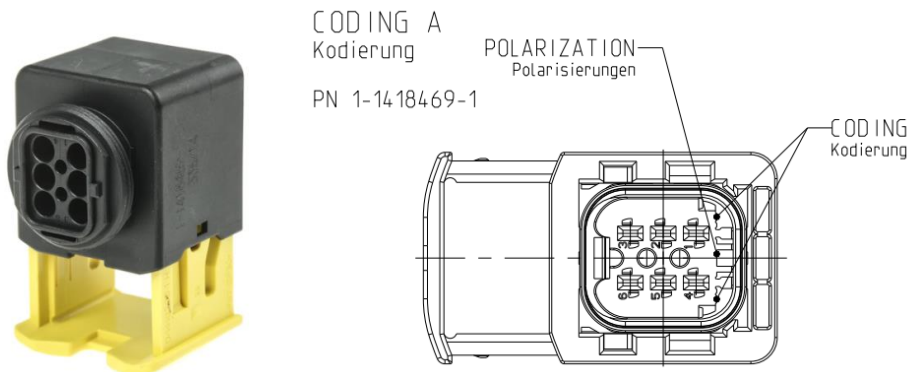
TRUCKS

Module EHPAS Connector:

14398 = BCU wiring (Main wiring)

Connector Code: C1CS13-C

Tyco Part Nr: 1-1418469-1



Pin No	Cable Code	Color	Cable Section	Target Unit
1	GD464N	BK/VT	1.5 mm ²	GND GD464N
2	VDB25BM_PUR	GN/OG	0.75 mm ²	VCANHigh
3	VDB26BM_PUR	GY/BU	0.75 mm ²	VCANLow
4	CBB80M	YE/GN	1.5 mm ²	FS080 15A KL15 24V

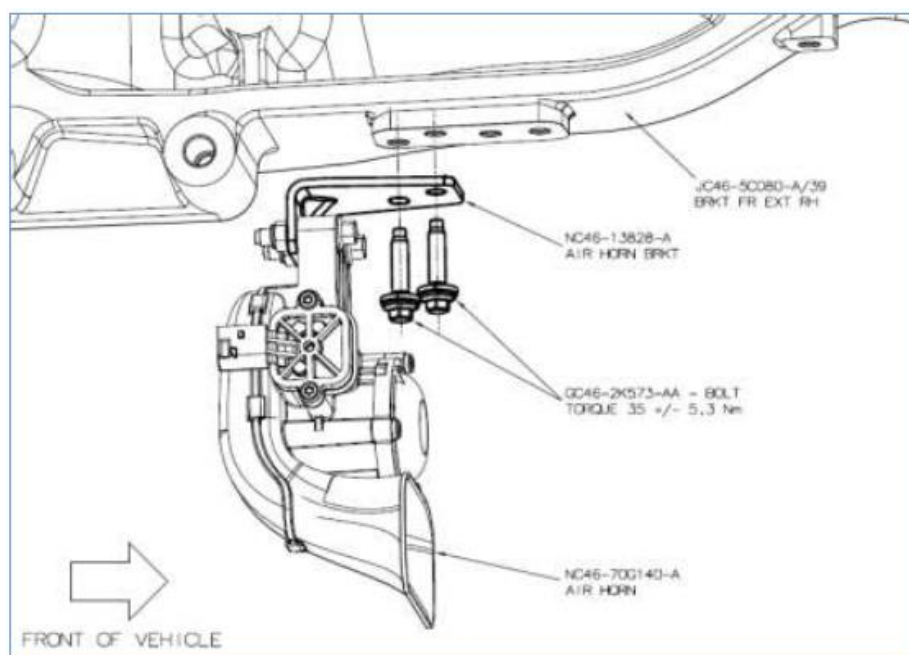
TRUCKS

4. Air Horn

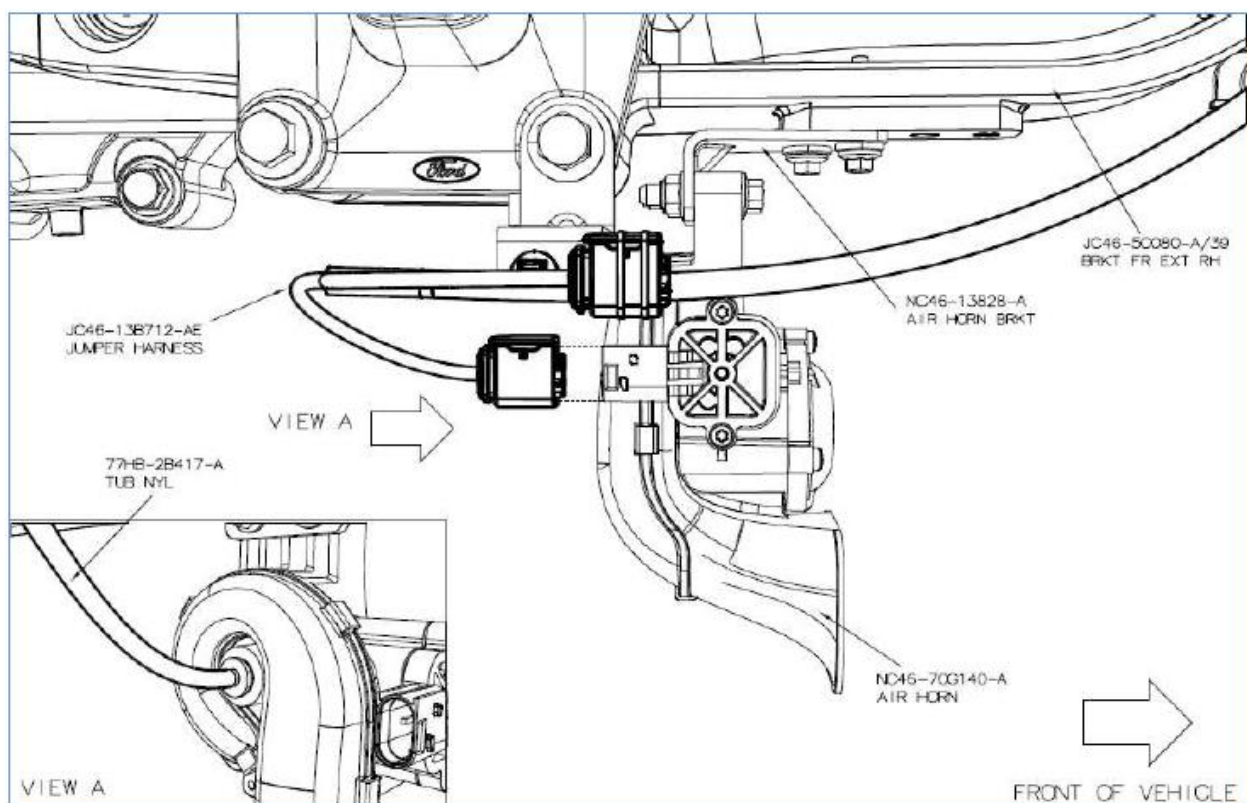
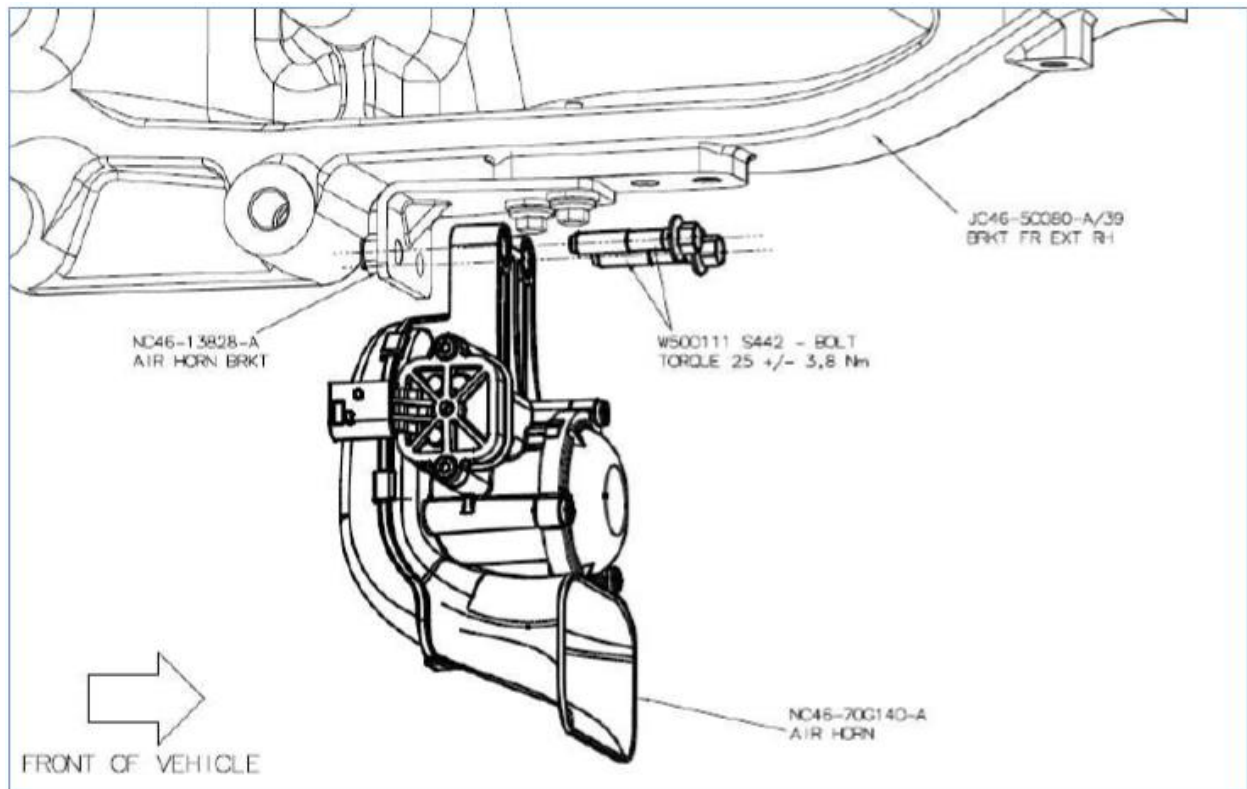
Air Horn Option is available for the F-MAX vehicles which produced after 09 Jan 2023.
Please follow the procedure which described below when you need to replace the air horn part.

Part Number	Part Name	Quantity
NC46-13828-A*	Bracket	1
GC46-2K573-A*	Bolt	2
NC46-70G140-A*	Air Horn	1
W500111	Bolt	2

- The connection bracket (part number NC46-13828-A*) must be mounted to the chassis part (JC46-5C080-A*) with defined bolts (GC46-2K573-A*)
- The air horn (NC46-70G140-A*) must be mounted to the bracket NC46-13828-A* with W500111 bolts.
- The electrical wiring with part number JC46-13B712-AE* must be attached to the air horn.
- Air line which has part number 77HB-2B417-A* must be attached to the air horn.



TRUCKS



TRUCKS

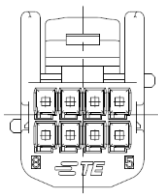
Air Horn Switch

14A320 = Cab internal console wiring attachment 1

Connector Code: C2RH03

Tyco Part Nr: 1379659-4

Ford Part Nr: JU5T-14489-BAA



Pin No	Cable Code	Color	Cable Section	Target Unit
1	CRH02J	BU/WH	0.5 mm ²	FS051 - 5A Mini Fuse KL30
2	ZA102A	OG/YE	0.5 mm ²	R16/1 Air Horn Relay 24V 20A
3	A_GD214C	BK/BU	0.35 mm ²	GND A_G2D214
4	CLN04Z	BU/BN	0.35 mm ²	Interior Light Dimming

