

ALTERNATIVE  
FUEL SYSTEMS

Prins



installation manual  
Engine Kit  
part 2/2

MANUFACTURER

Mazda

TYPE

6 / CX-3 / CX-5

ENGINE DISPLACEMENT

2000cc & 2500cc

NUMBER OF VALVES

16v

ENGINE CODE / NUMBER

2.0 PE & 2.5 PY Skyactiv-G, **Euro 6D**

VEHICLE CATEGORIES

M

TRANSMISSION

MT / AT

VERSION

DLM Gen3

PETROL ECU MANUFACTURER / CODE

Mitsubishi PYFA 18 881 / Denso PYFB 18 881 / Denso PX43 18 881

HIGH PRESSURE PETROL PUMP

Denso 296100-0520

HIGH PRESSURE PETROL INJECTOR

Denso

MODEL YEAR:

2018-

SYSTEM APPROVAL NUMBER ( R115 )

E4-115R-000011 / DLM-LPG 04

LOCATION SYSTEM STICKER

right side, centre door post

ENGINE SET NUMBER

6: 353/070620003/A

MANUAL NUMBER

CX-5: 353/070520011/A

DATE

076/1308200-3

2020-07-09



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**FOR EXPLANATION AND CIRCUIT DIAGRAMS SEE: INSTALLATION MANUAL GENERAL PART 1 / 2**



**Manual updates / revision**

<b>Rev. nr</b>	<b>Rev. Date</b>	<b>Subject update</b>
-	2018	Start revision management
1	2019-06-07	Added CX-3 2.0
2	2020-04-07	Added petrol ECU code Denso PX43 18 881
3	2020-07-09	Added Mazda 6



## General instructions

- The installation of the system shall be done in accordance with the installation manual provided by Prins Autogassystemen.
- This manual is based on Dutch regulations; always install the system in accordance to the local regulations.
- For the optimal functioning of the Direct LiquiMax Gen3 system, maintain a clean and organized work environment during installation and maintenance to prevent pollution of the LPG components.
- Always download the "general manual 1/2" from our [website](#) for basic instructions and diagrams.
- When working on the car, beware of moving and rotating parts in the engine compartment (even when the engine is not running !!).
- Always disconnect the battery when installing / servicing the LPG system. Make sure the ignition key is outside the car. Be aware of central door locking, radio / telephone memory code, alarm system.
- Wear safety goggles when working on the petrol filled system / connections ( pressurized petrol )
- Do not place the main fuse into the fuse holder before having completed the installation of the system.
- The AFC has to be activated by means of the Prins diagnosis software.
- Never disconnect the AFC connector, unless you have removed the main fuse.
- When installing the wiring harness, ensure that it does not run near any of the ignition components.
- Solder and insulate all electrical connections.  
The wires in the loom are provided with numbers and text. The text on the wire explains the function of the wire.  
The wire harness is not model specific, therefore it may be necessary to adjust the length of the wires.  
Ensure maximum care is taken when connecting wiring.  
Make professional joints using solder and shrink sleeve. Do not stretch the wiring harness.
- No component of the LPG-system shall be located within 100mm of the exhaust or similar heat source, unless such components are adequately shielded against heat.
- If holes have to be drilled (wear safety glasses) for installing brackets, etc., the drilled holes must always be treated with an anti-corrosion agent, after the debris has been removed (especially when mounting an exterior filler into body work).
- After having completed the installation, check the whole system for LPG leakage; use a gas leak detection device. Also check for leak of engine coolant, petrol and air.
- Fitting and maintenance is only allowed by Prins Autogassystemen selected LPG engineers.
- Failure to follow the instructions in this manual can result in a poor or non-working LPG installation or a dangerous situation.
- For maintenance instructions see owner's manual.
- Prins Autogassystemen is not responsible for any damages to people or objects as a result of changes to Prins products.
- [Check our website regularly for diagrams, certificates, updates, info-bulletins and product information.](#)

Register the system (with warranty card) on the [Prins warranty portal](#) within 14 days after installation.

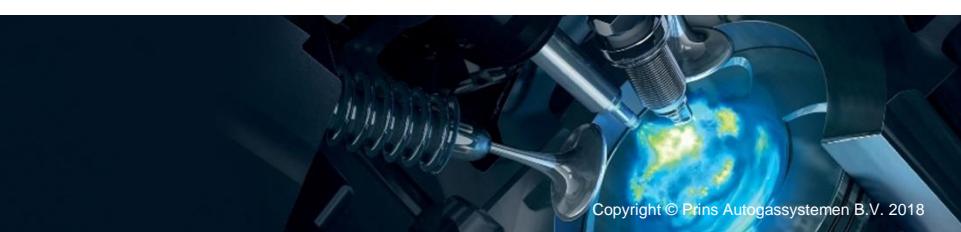


## Required equipment / tools / materials for installing a complete system

- Complete workshop toolbox (wrenches, screwdrivers, cutters, pliers, ratchet, sockets)
- Car lift
- Portable computer
- Vehicle fuel system scan tool or OBD scan tool Prins (part no. 099/99928)
- Exhaust gas analyser
- Multimeter
- Oscilloscope
- Prins diagnostic software
- Prins serial interface
- Torque wrench (5-50Nm)
- Torque wrench (200-250Nm)
- Portable light
- Assortment drill bits 4 to 12 mm
- Assortment cutters (Ø20, 30, 50, 70 mm)
- Portable drill or pneumatic drill
- Thread cutting device (male M6x1, M8x1, M10x1)
- Air gun
- Vacuum cleaner
- Safety goggles
- Hot air gun
- Soldering iron, soldering tin
- Wire-stripping pliers
- Adhesive tape
- Adhesive sealant
- Thread locking compound
- Anti-corrosion agent / black body coating
- Gas leak detection device or foam leak spray
- Shrink sleeves

## Vehicle check

- Check the vehicle drivability on petrol
- Check the fuel system for error codes (scan tool)
- Check if the catalytic converter is in good condition (exhaust gas analyzer)
- Check the condition of the ignition system (spark plugs, cables, coil)



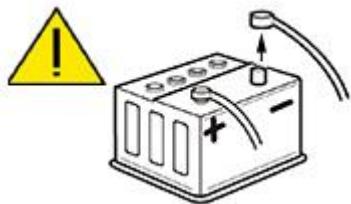
## Tightening moments

	Nm	Spanner mm
M 5 x 0,8	6.5	8
M 6 x 1,0	11.3	10
M 8 x 1,25	27.3	13
M 10 x 1,5	54	15-16-17
Banjo bolt	10	14
Supply line connection tank	15	13
Fuel module Allen bolts tank	20	7
Filler hose connection tank	50	22
Boost pump M6 mounting bolts	10	10
FMU M6 mounting bolts	10	10
High pressure petrol fuel line	24-35	17
Quick release	20	19

### EXPLANATION OF SYMBOLS:



= IMPORTANT, CAUTION

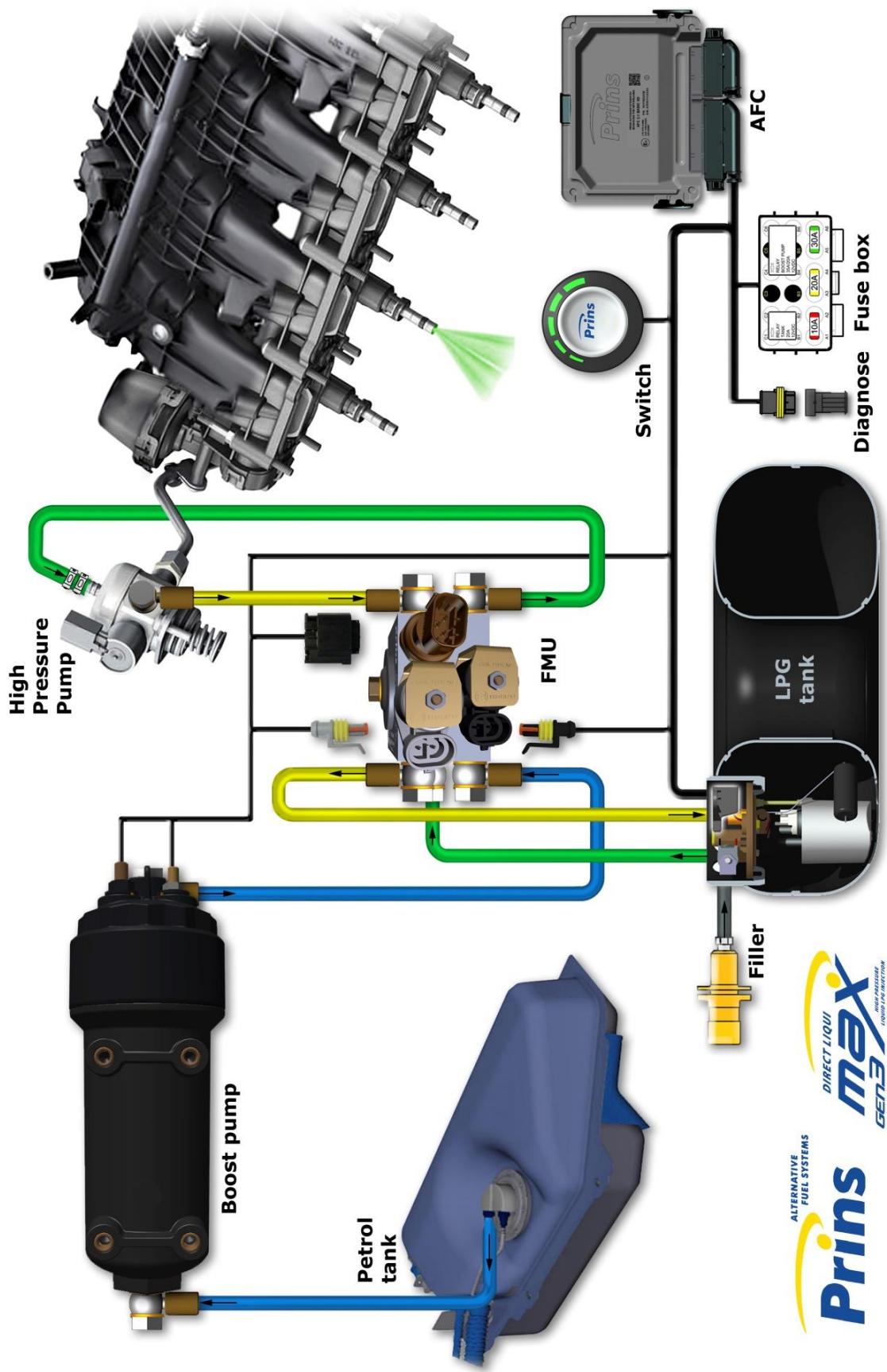


= WEAR SAFETY GOGGLES

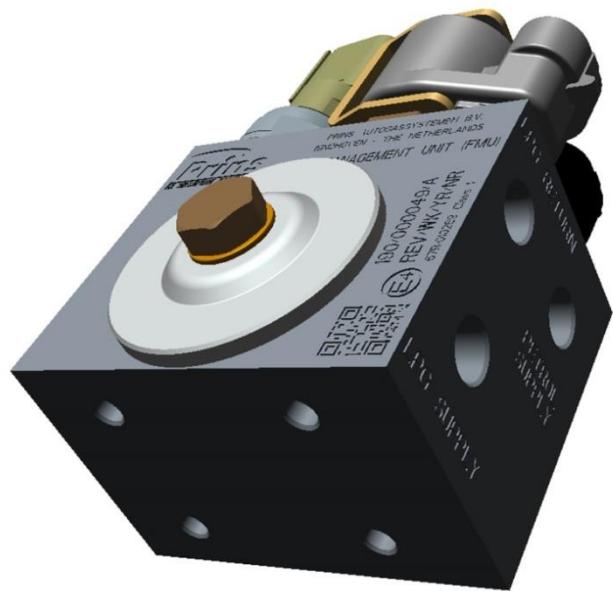
## Direct LiquiMax parts / approval numbers

	
Fuel Management Unit : E4-67R-010269	Boost pump
	
Prins AFC: E4-67R-010098 E4-10R-030507	High Pressure Pump : E4-67R-010266 High Pressure Rail : E4-67R-010267 High Pressure Injectors : E4-67R-010309
	
	Fuel lines XD-series : E4-67R-010247

## Overview DLM Direct Injection



## Fuel Management Unit connections

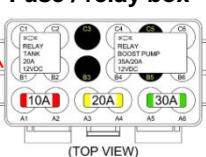


## Fuel Management Unit



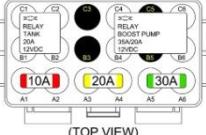
**Boost pump**

## DLM component location overview Skyactive Mazda CX-3

 <p><b>Petrol ECU</b></p>		 <p><b>AFC</b></p>
 <p><b>HPP pump</b></p>		 <p><b>FMU</b></p>
		 <p><b>Boost pump</b></p>
		 <p><b>Fuse / relay box</b></p> <p>(TOP VIEW)</p>

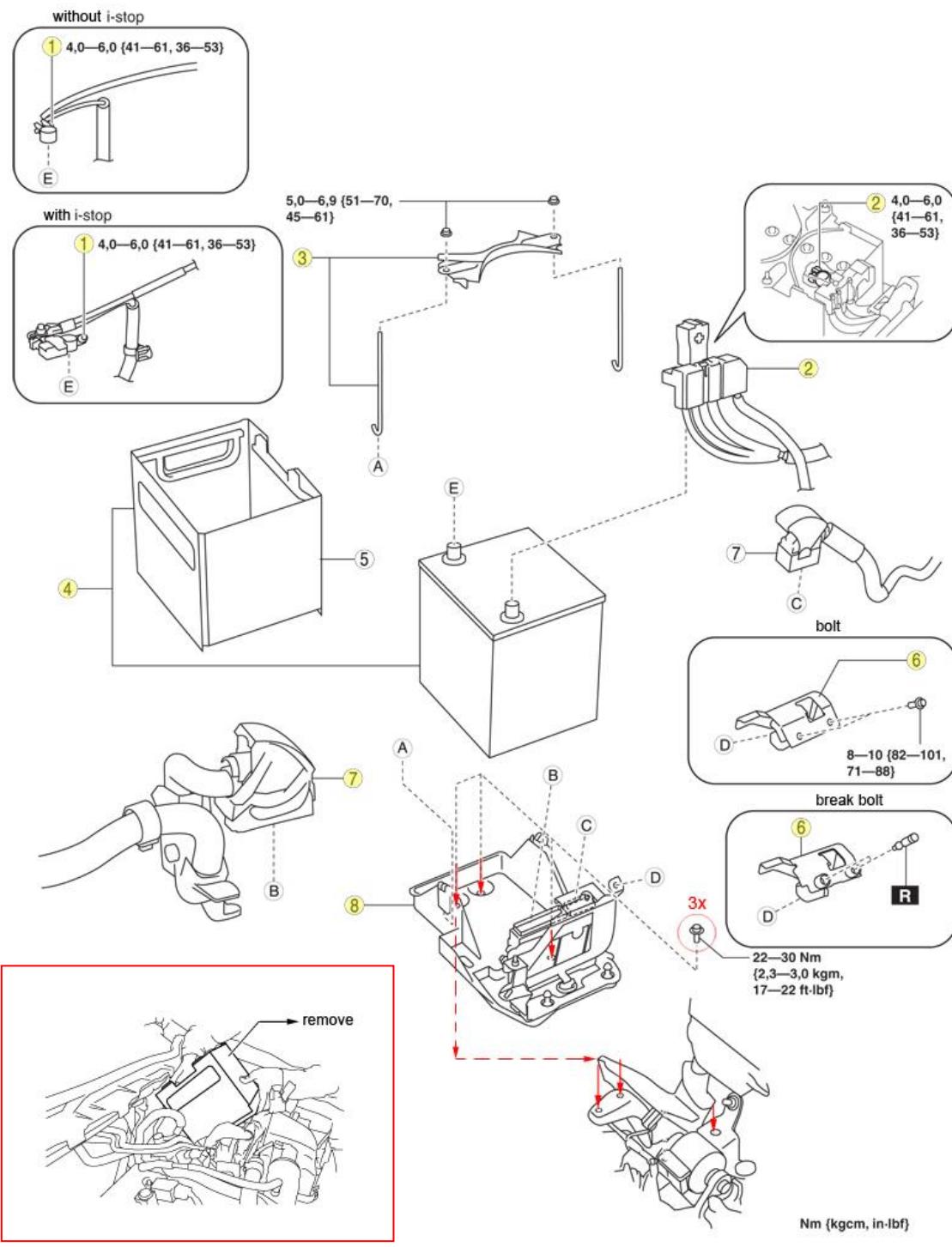
	<p>i.a. R115 approval sticker : Right side centre door post</p>
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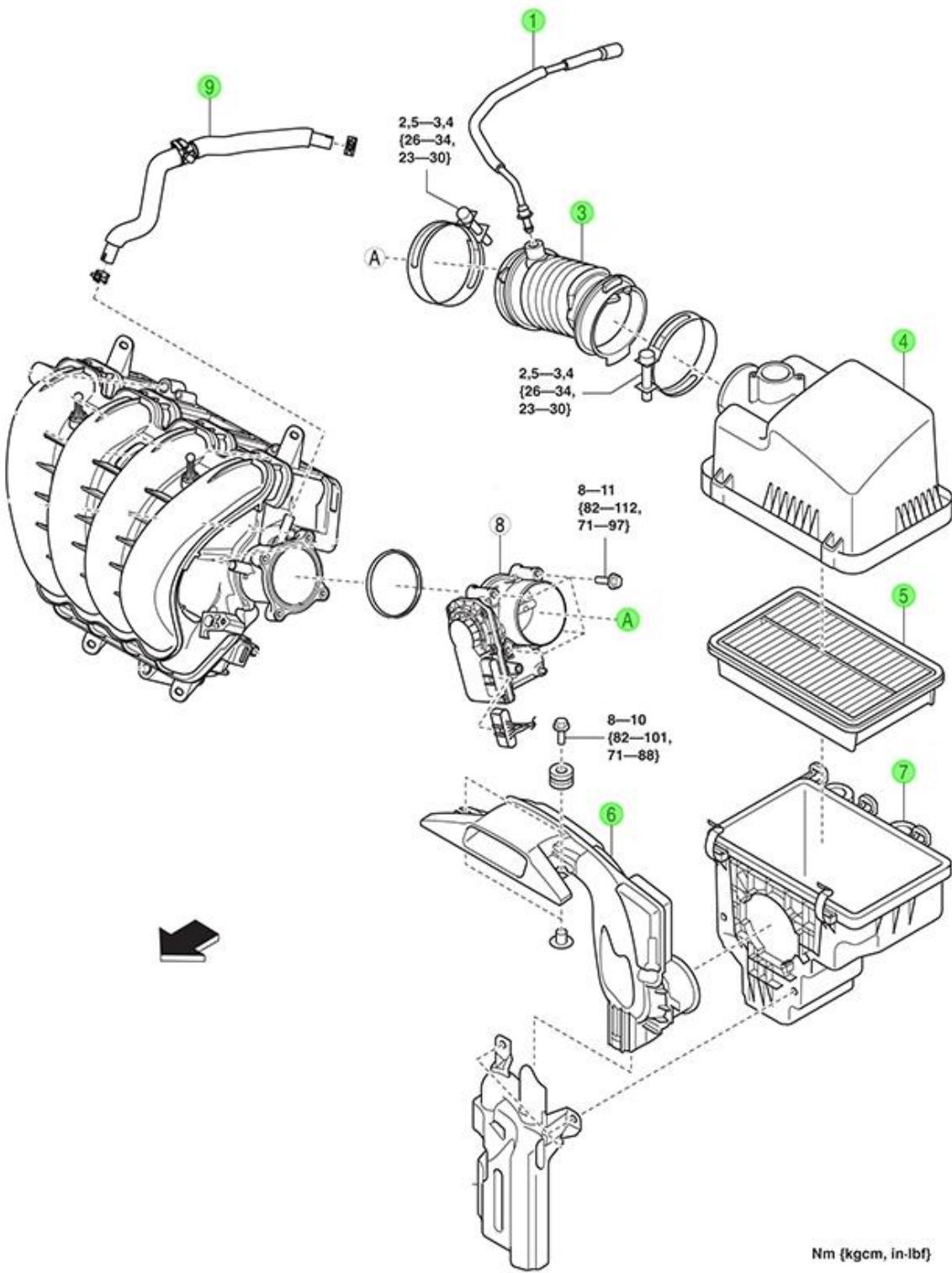
**DLM component location overview Skyactive Mazda 6 / CX-5**

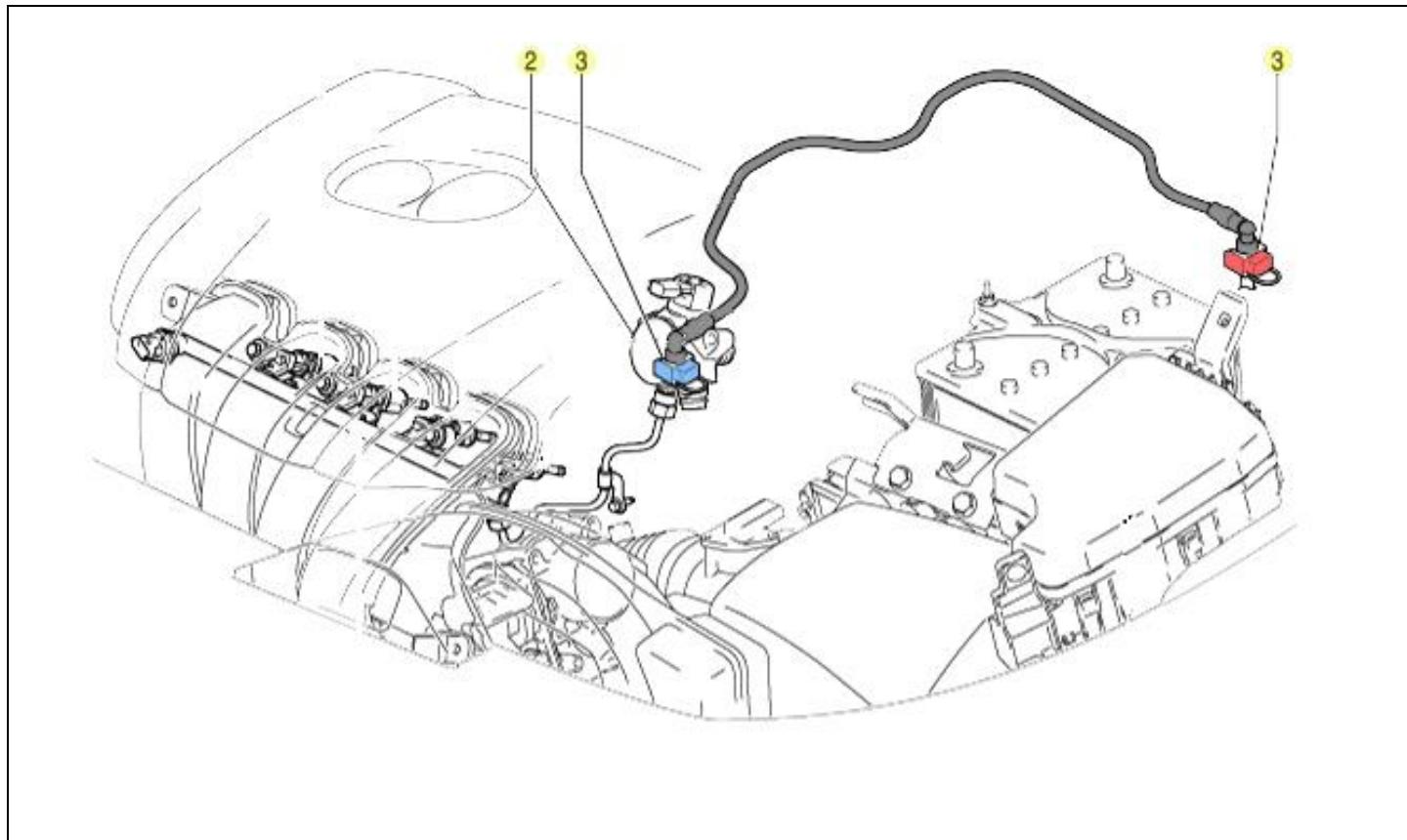
		
<b>FMU</b> 		<b>AFC</b> 
<b>Boost pump</b> 		<b>Fuse / relay box</b>  (TOP VIEW)
<b>HPP pump</b> 		<b>Petrol ECU</b> 

	If applicable: R115 approval sticker Right side centre door post
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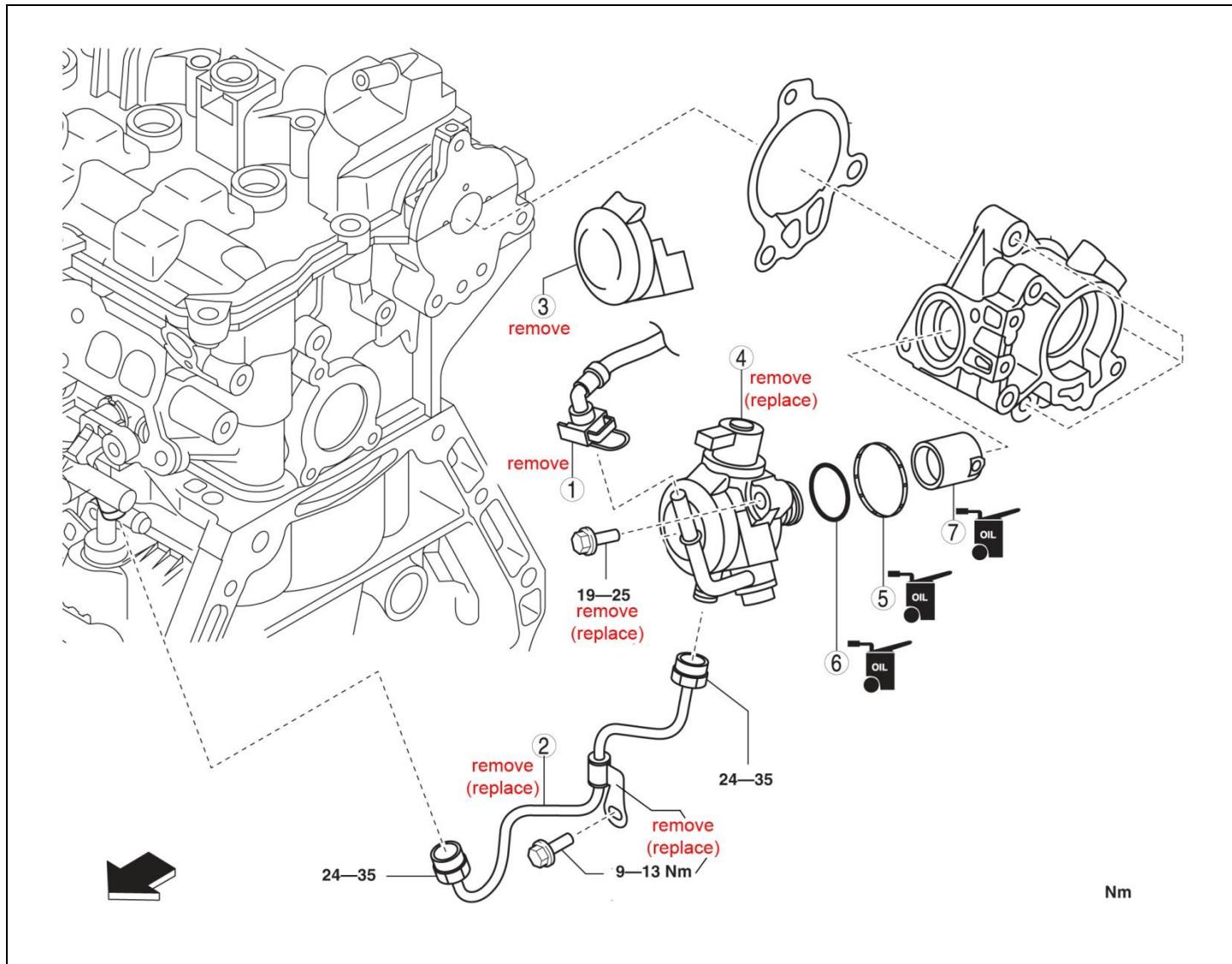
## Remove battery



**Overview Filter removal**

**Petrol hose removal**

## Overview pump removal

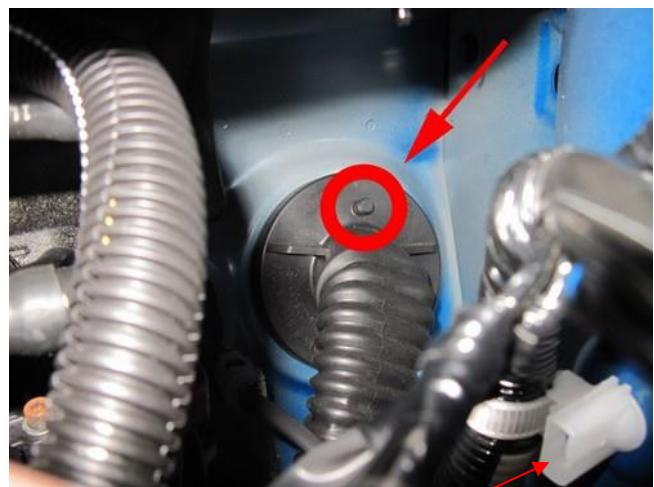


## Installation preparation

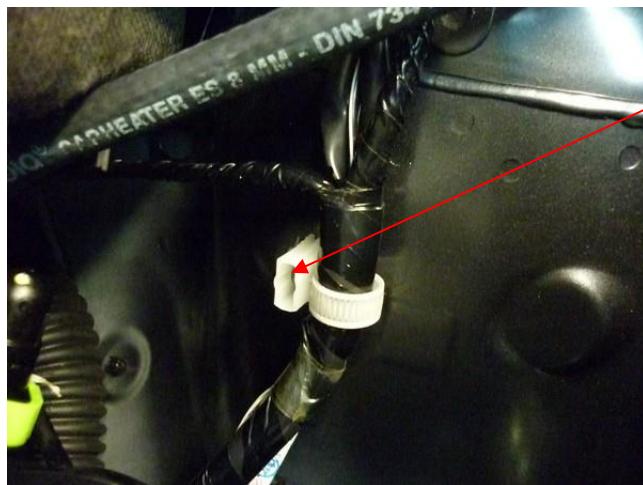
### EXTEND WIRING: Fuel Reset



22	LSS1	Purple	Extend wire from the AFC connector to the tank under back seat
4	+Batt	Red	Extend wire from the AFC connector to the tank under back seat

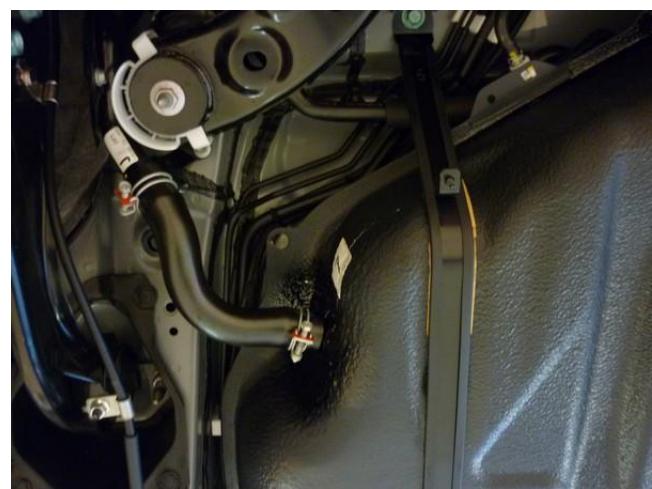
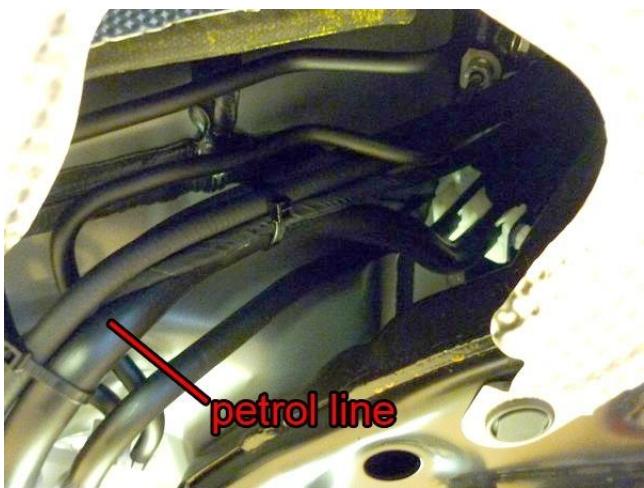


Grommet for transit the Switch,CAN wiring & Fuel reset wires, before installing the fuel unit.



Replace white cable clamp, wiring loom moves to front.

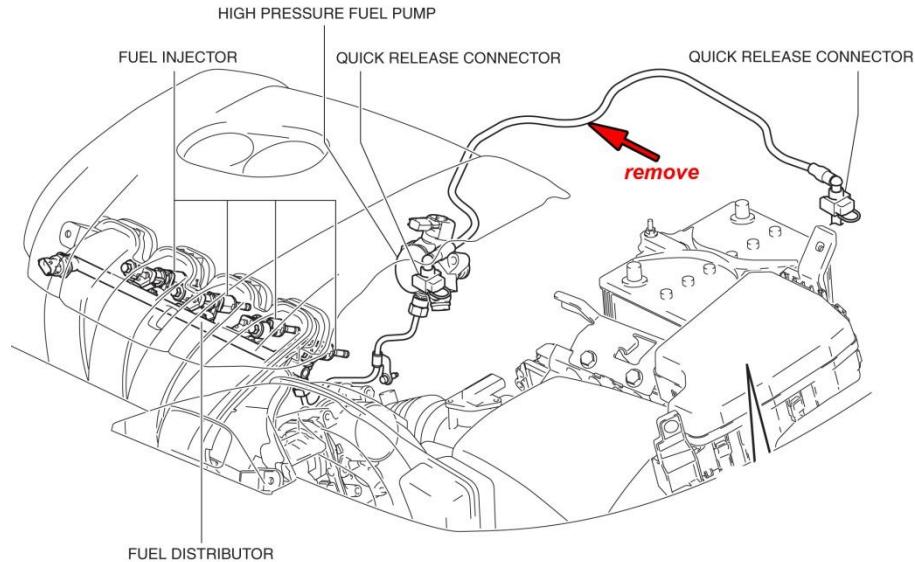
## Hose routing



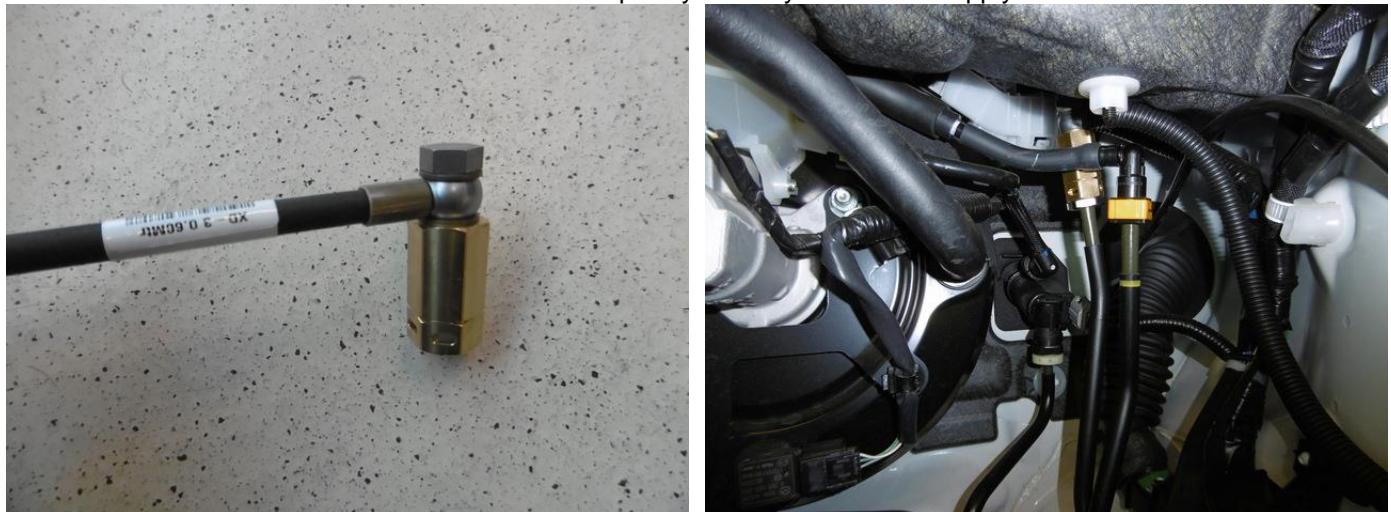
**Mount the DLM Lines with tie-raps & only to the petrol fuel line!  
DLM Lines with clamps and screws → chassis beam / floor.**

## Connection of the fuel hose to the boost pump CX-3

Remove the original petrol supply line.



Remove the petrol fuel line (not used anymore).  
Remove EVAP hose temporary for easy installation supply line.



Connect the petrol supply quick connector to the fuel pipe.



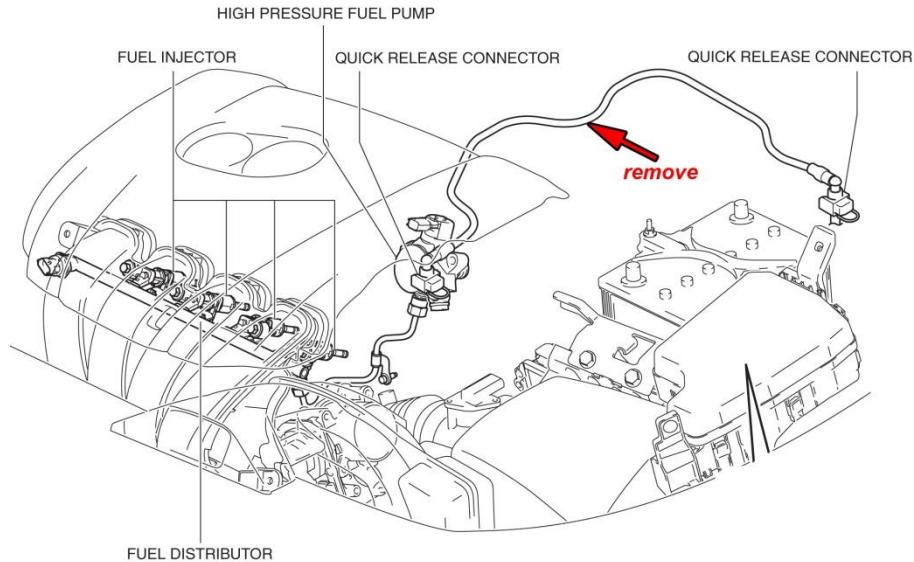
New type quick connector: Tighten with 20Nm.



Wiring transit.

## Connection of the fuel hose to the boost pump 6 / CX-5

Remove the original petrol supply line.

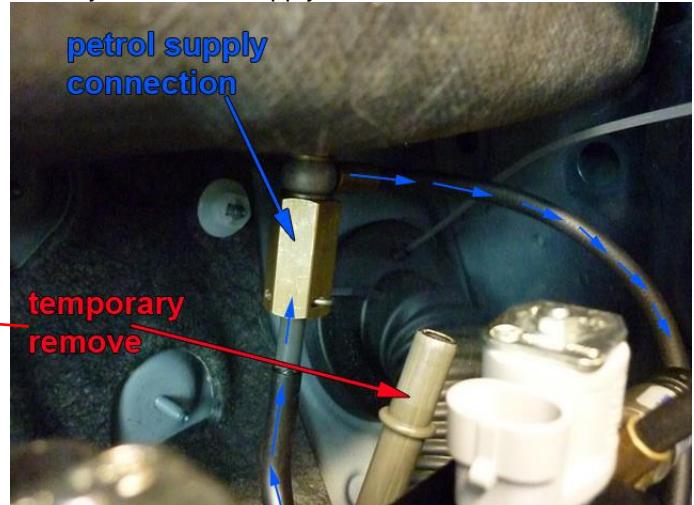


Remove the petrol fuel line (not used anymore).

Remove EVAP hose temporary for easy installation supply line.



LHD



RHD

Connect the petrol supply quick connector to the fuel pipe.



Quick connector: Tighten with 20Nm.

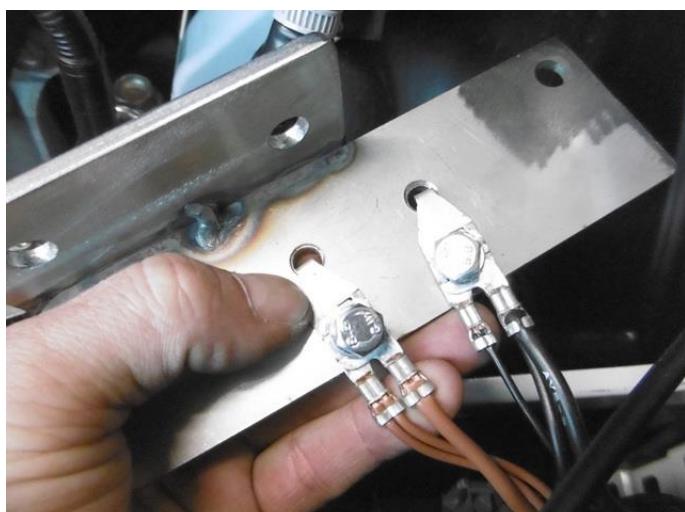
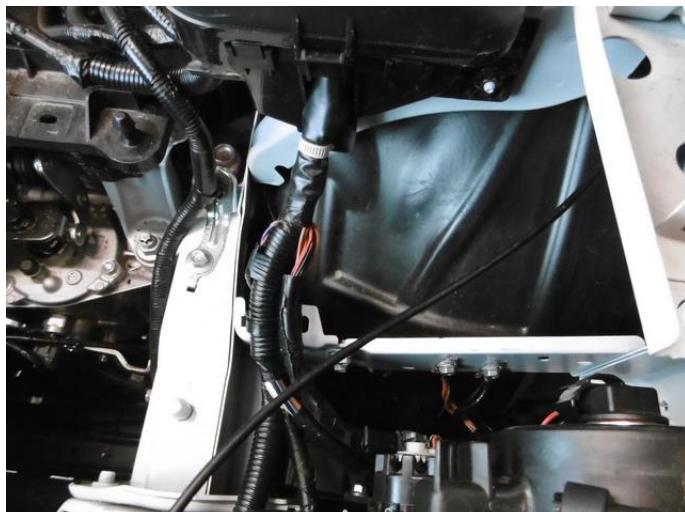


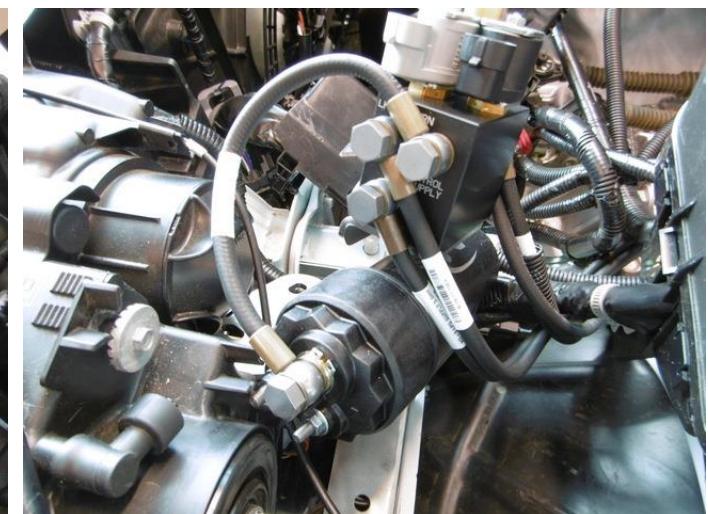
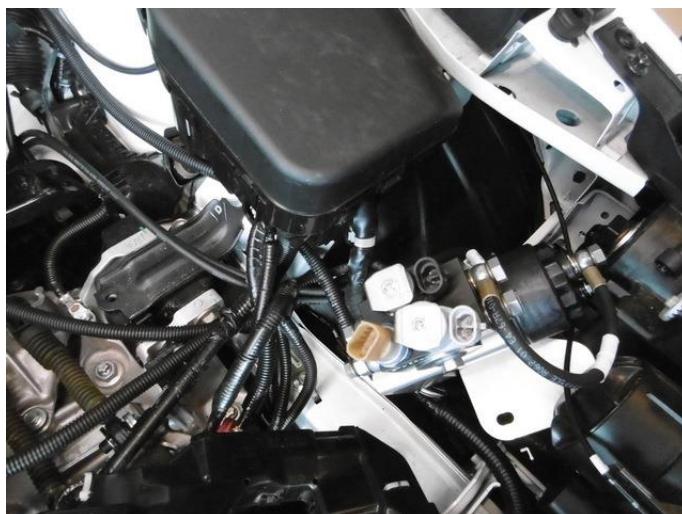
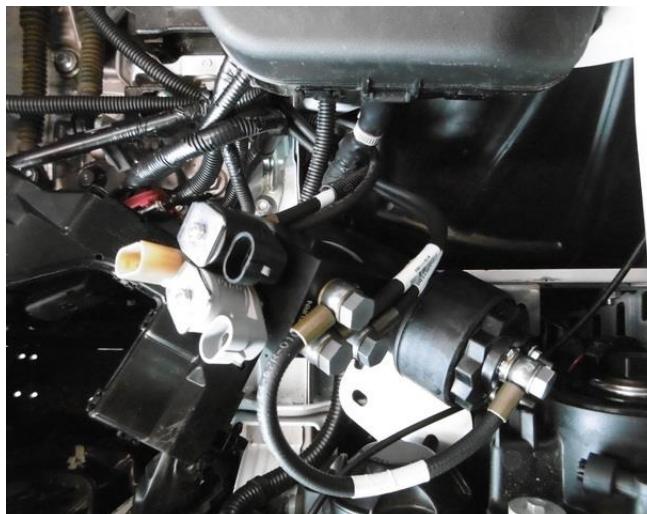
Wiring transit.

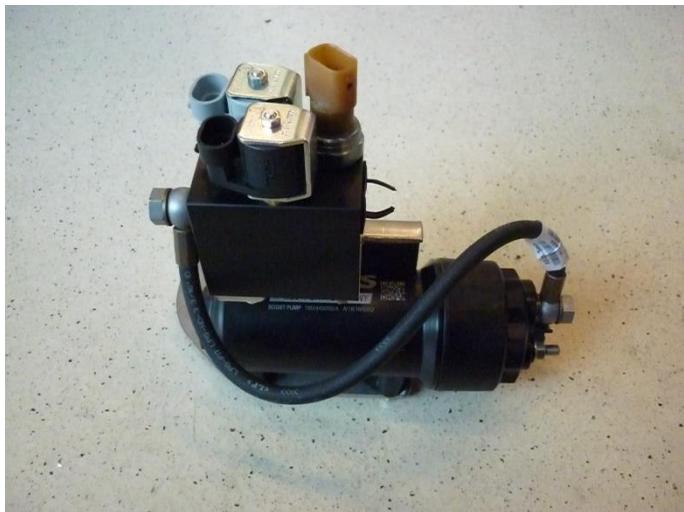
## Install the unit CX-3



### Install the support bracket CX-3



**Install unit bracket onto the support bracket CX-3**

**Boost pump and FMU Assembly 6 / CX-5**

Connect hoses to the boost pump and FMU.



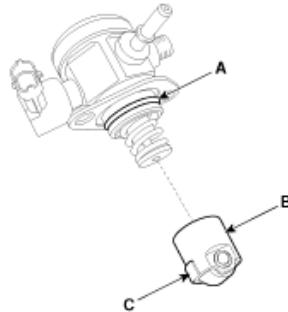
## Installation of a High Pressure Petrol Pump

### **-INSTALLATION-**

Before installing the high pressure fuel pump, position the roller tappet (**B&C** in picture) in the lowest position by rotating the crankshaft. Otherwise the installation bolts may be broken because of tension of the pump spring.

Apply engine oil to the O-ring (**A**) of the high pressure fuel pump, the roller tappet (**B**), and the protrusion (**C**). (roller tappet, only if removed from cylinder head).

Also apply engine oil to the groove on the location where the protrusion (**C**) is installed.



#### **Installation bolts:**

When tightening the installation bolts of the high pressure fuel pump, tighten and turn the bolts in small step (0.5 turns) after tightening them with hand-screwed torque.

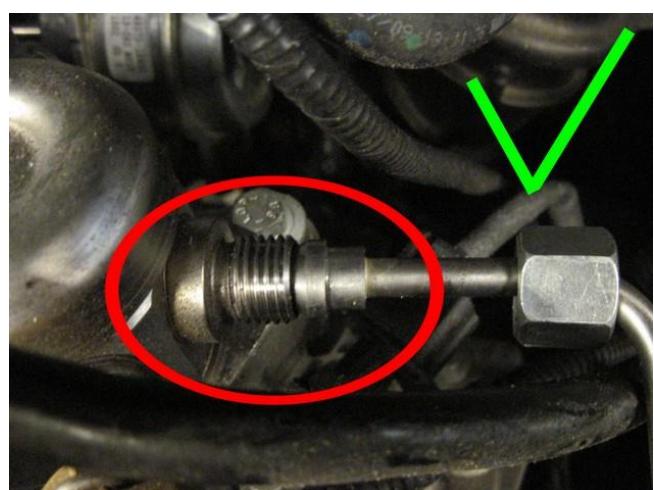
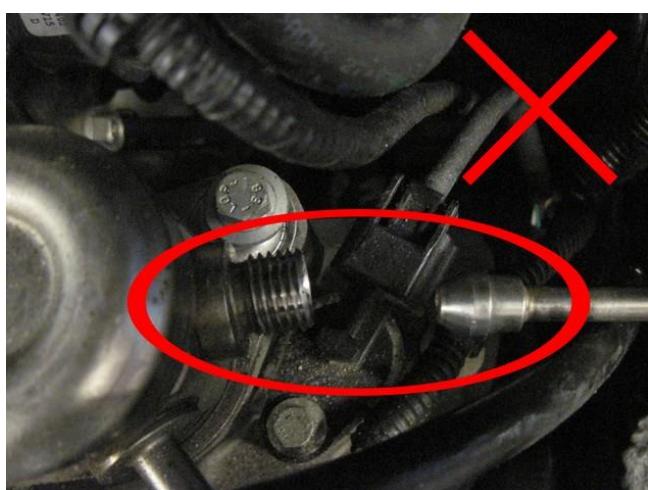
**High pressure petrol pump installation bolt:** 12.8 ~ 14.7 N.m.

#### **Petrol pipe:**

First hand-tighten the nut(s) fully until they are not fastened any more in order to have them inserted in place and then completely tighten to the specified torque using a torque wrench.

If not tightening the bolts or nuts in a straight line with the mating bolt holes or fittings, it may cause a fuel leak due to broken threads.

**High pressure petrol pipe installation nut:** 26.5 ~ 32.4 N.m.



***Mount the new fuel line free of tension. If the fuel line does not fit correctly, adapt the fuel line.***

Installation is reverse of removal.

## High pressure pump removal



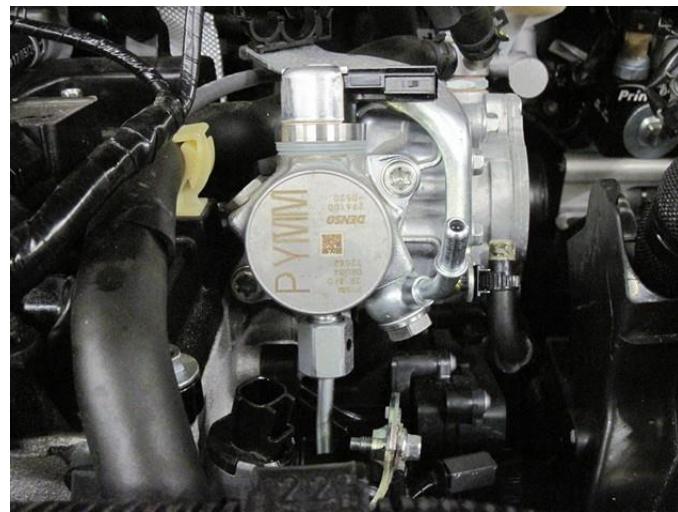
Replace the high pressure pump for the adapted high pressure pump.  
(Follow the workshop manual of the car)



Remove hose from air filter to throttle body. Remove throttle body & brackets/hoses next to the HP pump.



Remove high pressure fuel line

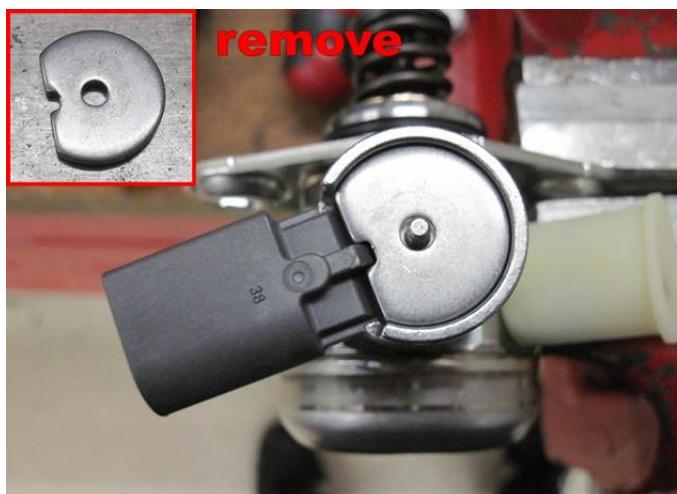


Remove the original high pressure pump

## New high pressure pump coil adaption



Remove spring washer carefully.

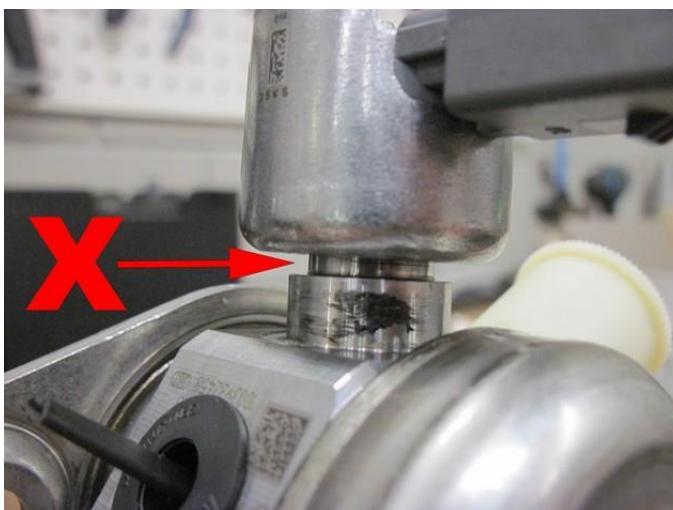


Remove shim. **Carefully!** loosen the coil with a screwdriver left& right of the coil.

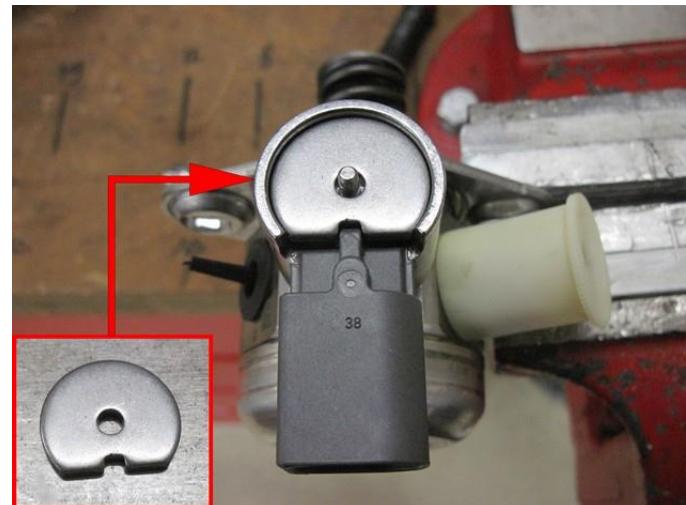
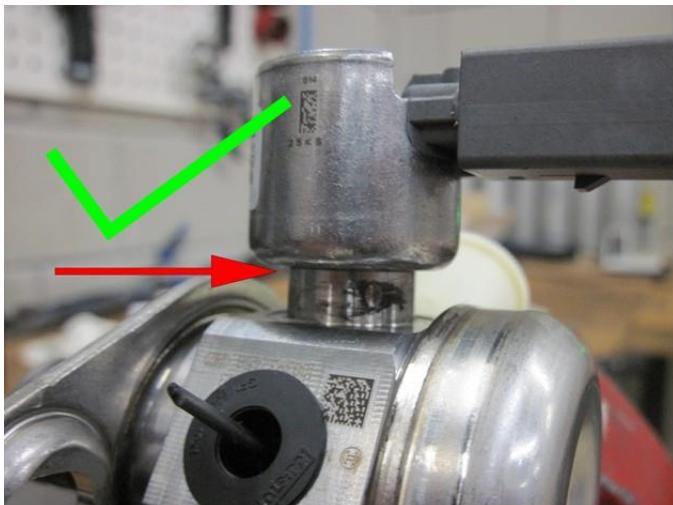


Lift the coil and turn the coil as shown on the picture above.

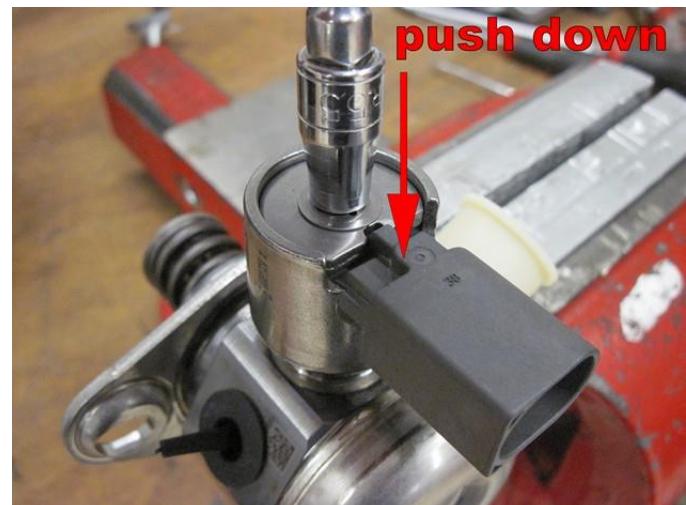
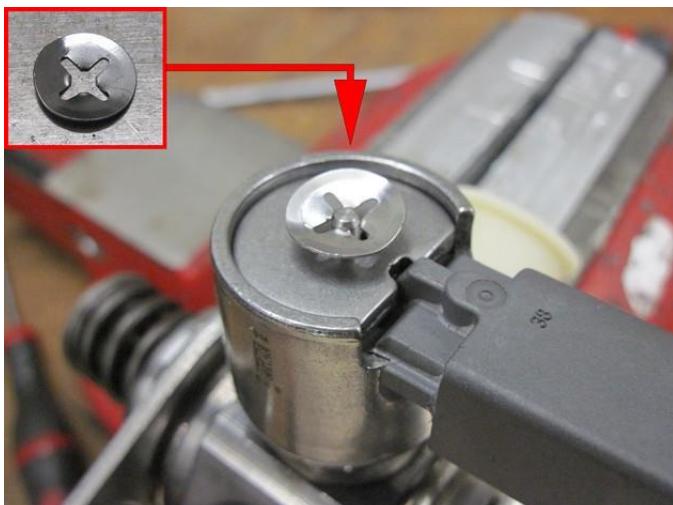
## New high pressure pump coil adaption



Be sure the coil is mounted correctly without a gap in the pin. **Carefully** use a plastic hammer if necessary.



Mount the shim.

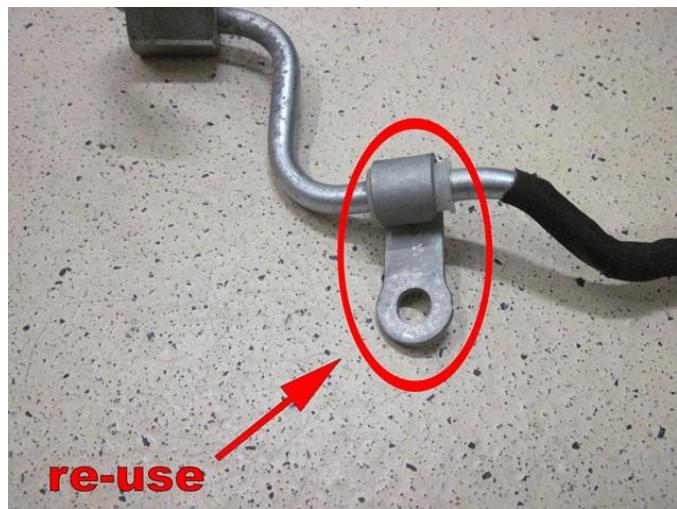
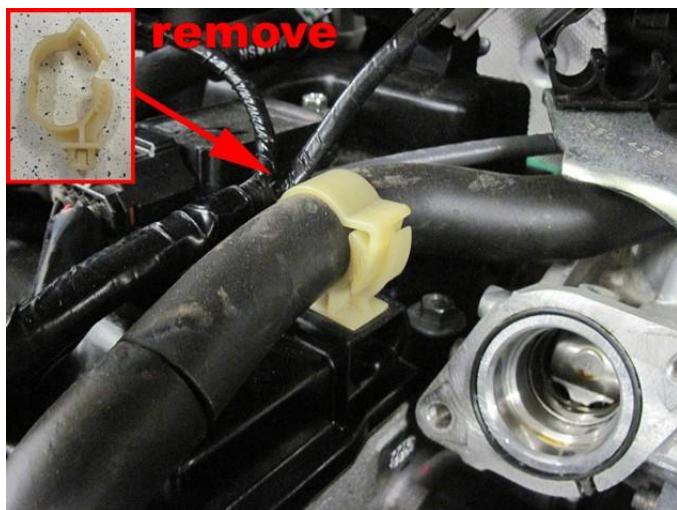


Mount the spring washer back on the pump/coil. Push down with a socket screwdriver or similar.

## High pressure pump / High pressure fuel line installation



Before mounting the pump, install the return hose. Hose facing forward as shown. Use the small head banjo. Mount the supplied HP pump with the new Allen bolts & (spring) washers with 25Nm.

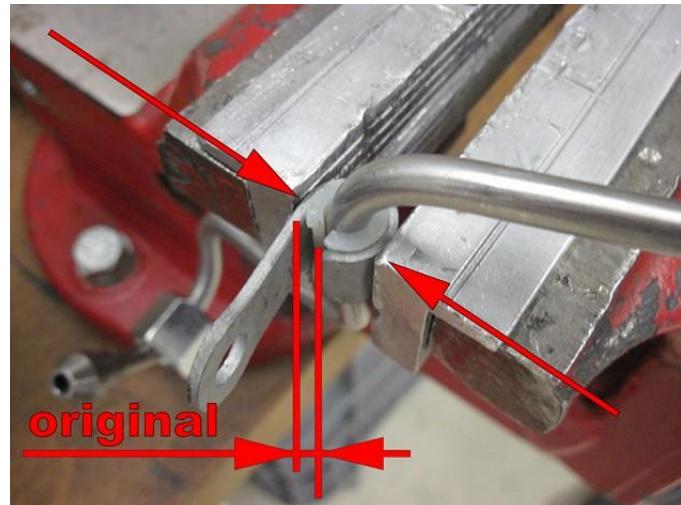


You need to re-use the clamp & bushing from the original fuel line.

## High pressure fuel line installation



Mount the bushing on the new fuel line and mount the clamp as shown (the other way around compared to the original)



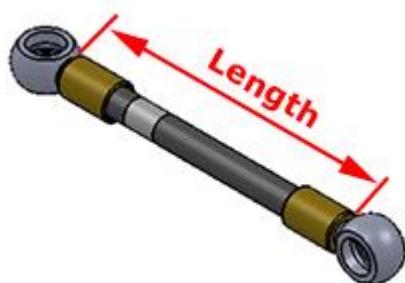
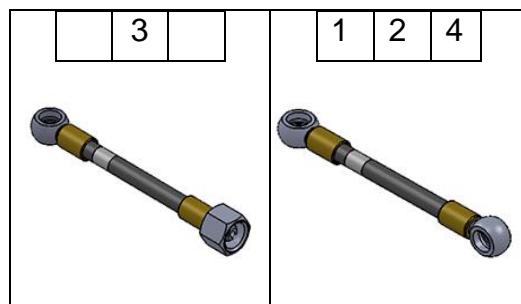
Carefully pinch the clamp together with a vice or strong plier.



**Mount the new fuel line free of tension. If the fuel line does not fit correctly, adapt the fuel line.**

### LPG / petrol fuel lines CX-3

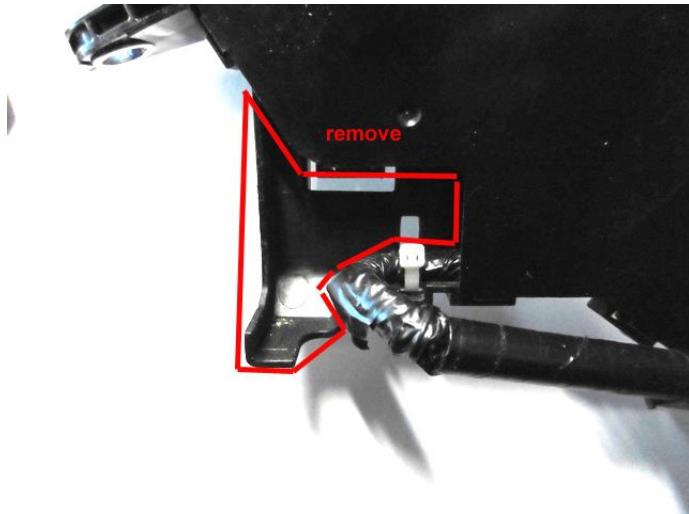
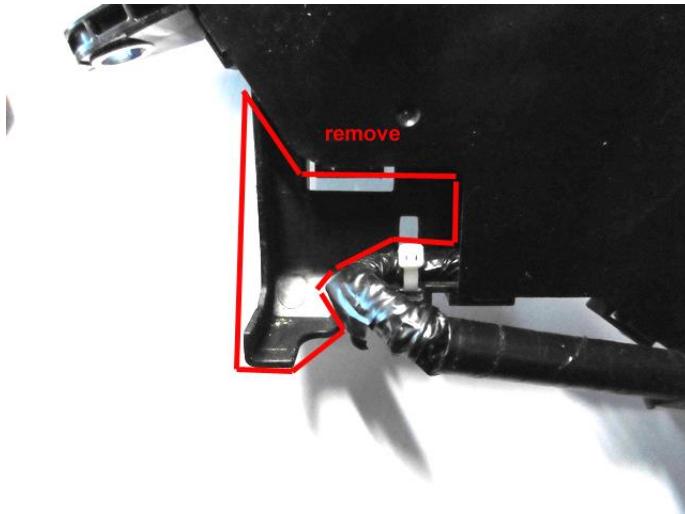
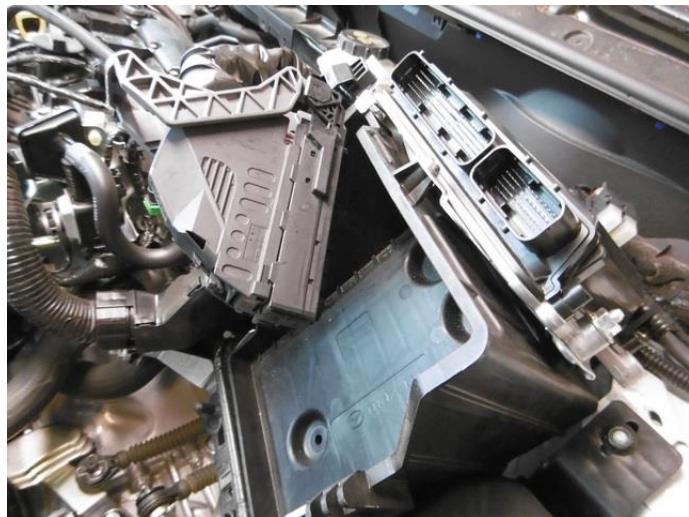
Hose	from	to	Length ( cm )
1 XD-3	Adapter original petrol hose	Boost pump in	60
2 XD-3	Boost pump out	FMU petrol supply	20
3 XD-4	FMU HPP supply	High pressure pump	100
4 XD-3	High pressure pump	FMU HPP return	70
5 XD fuel supply line	FMU LPG supply	Tank	
6 XD fuel return line	FMU LPG return	Tank	



Install the fuel line using two bonded seal washers and banjo bolt;

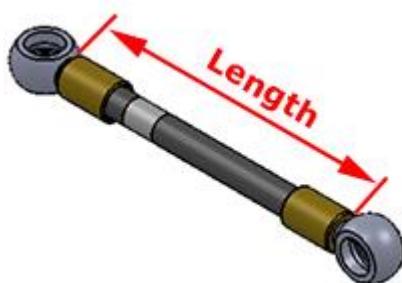
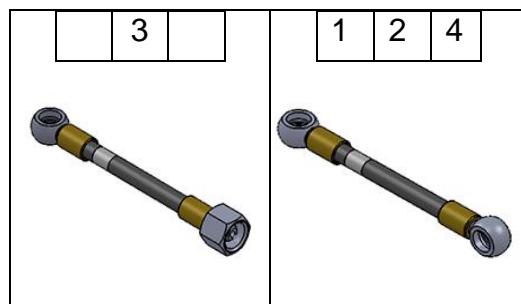


## LPG/petrol fuel lines from/to FMU CX-3



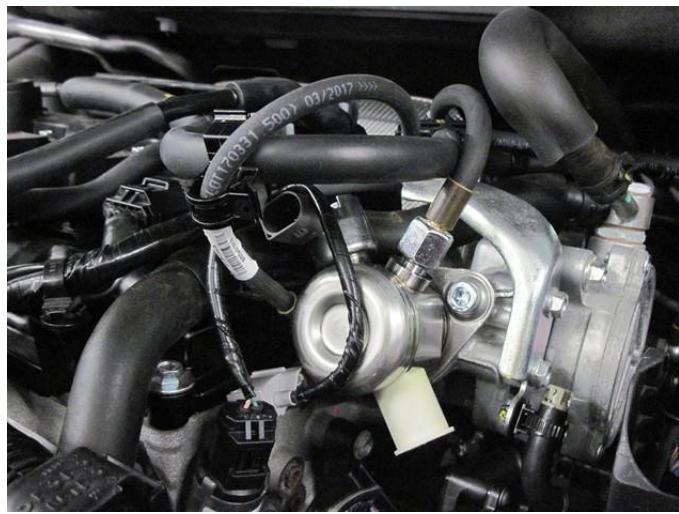
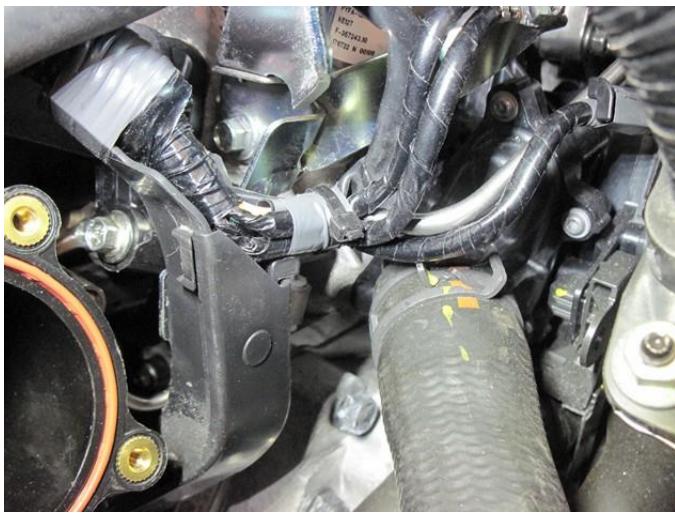
## LPG / petrol fuel lines 6 / CX-5

Hose	from	to	Length ( cm )
1 XD-3	Adapter original petrol hose	Boost pump in	40
2 XD-3	Boost pump out	FMU petrol supply	30
3 XD-4	FMU HPP supply	High pressure pump	50
4 XD-3	High pressure pump	FMU HPP return	85
5 XD fuel supply line	FMU LPG supply	Tank	
6 XD fuel return line	FMU LPG return	Tank	



Install the fuel line using two bonded seal washers and banjo bolt;



**LPG/petrol fuel lines from/to FMU 6 / CX-5**

Mount the hoses between the high pressure fuel pump and the FMU.

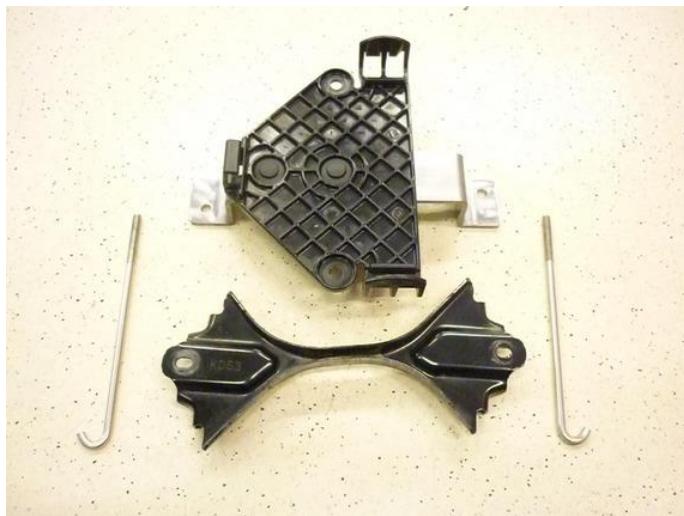


Routing hoses.

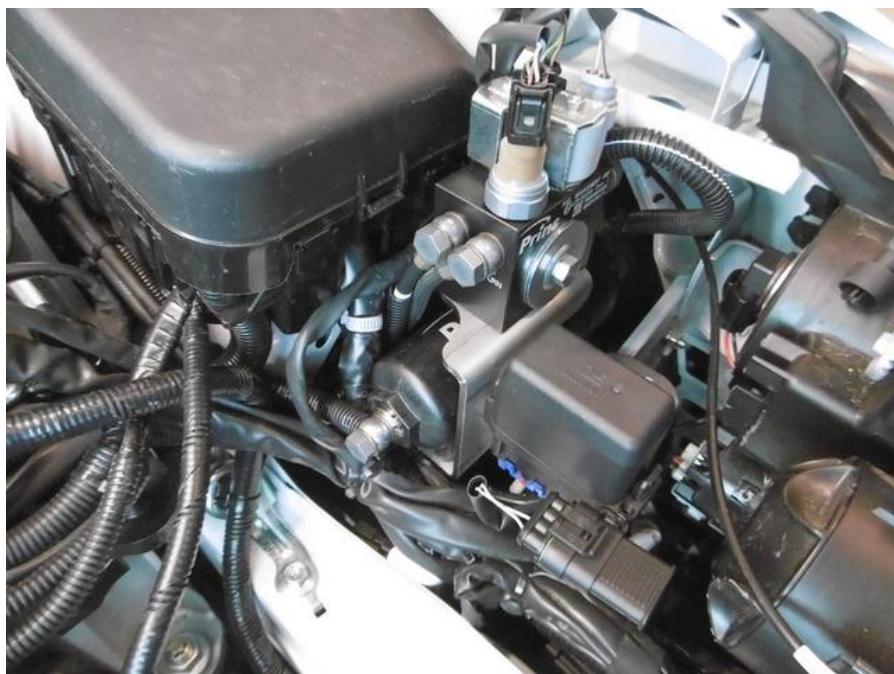
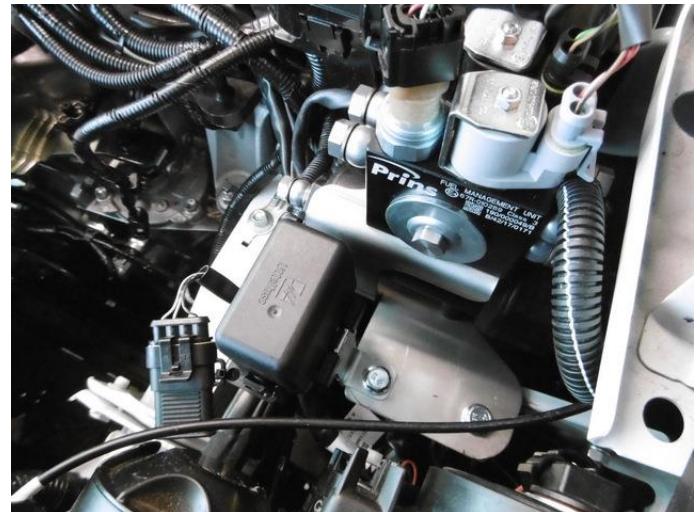
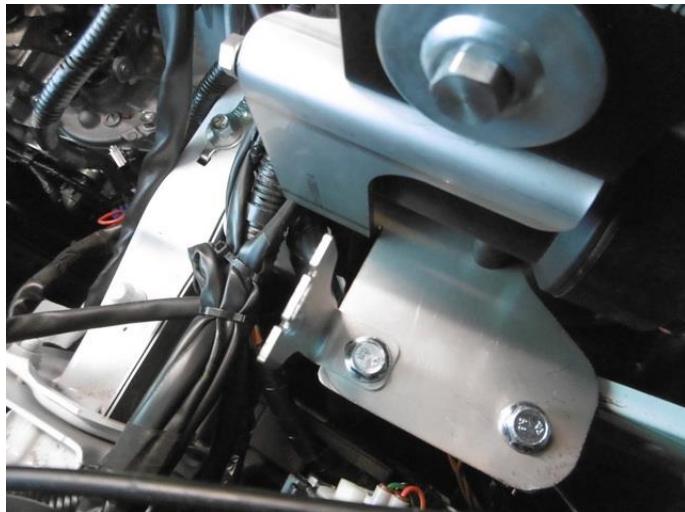


Routing hoses. Mount the extension cable.

## Mounting the AFC

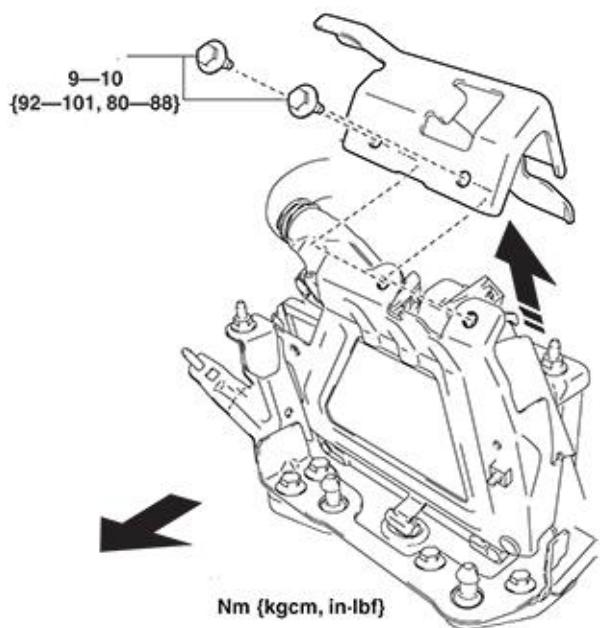
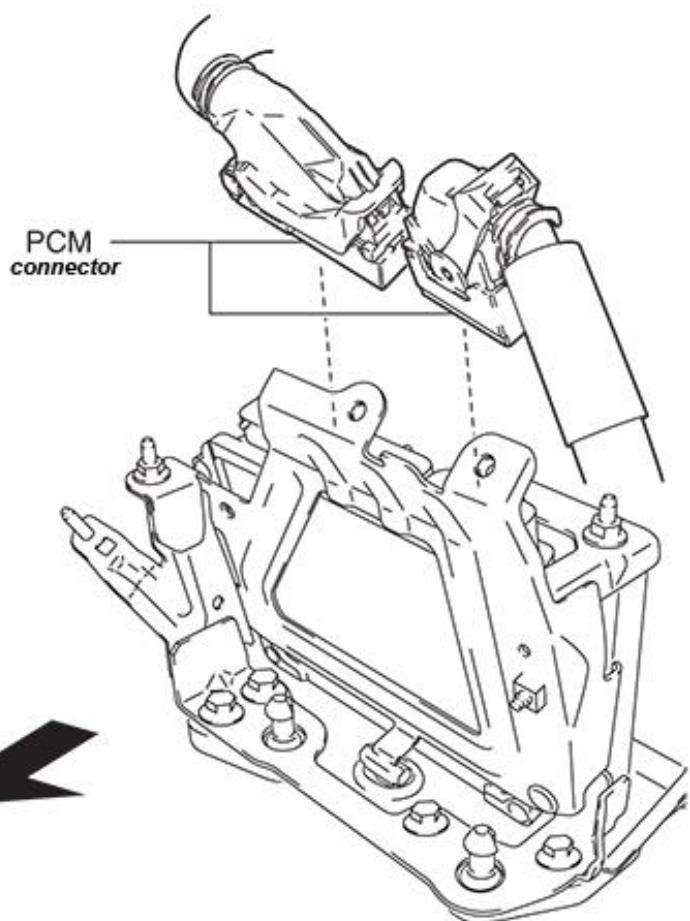


***Connect battery ground only when completely finished the installation!***

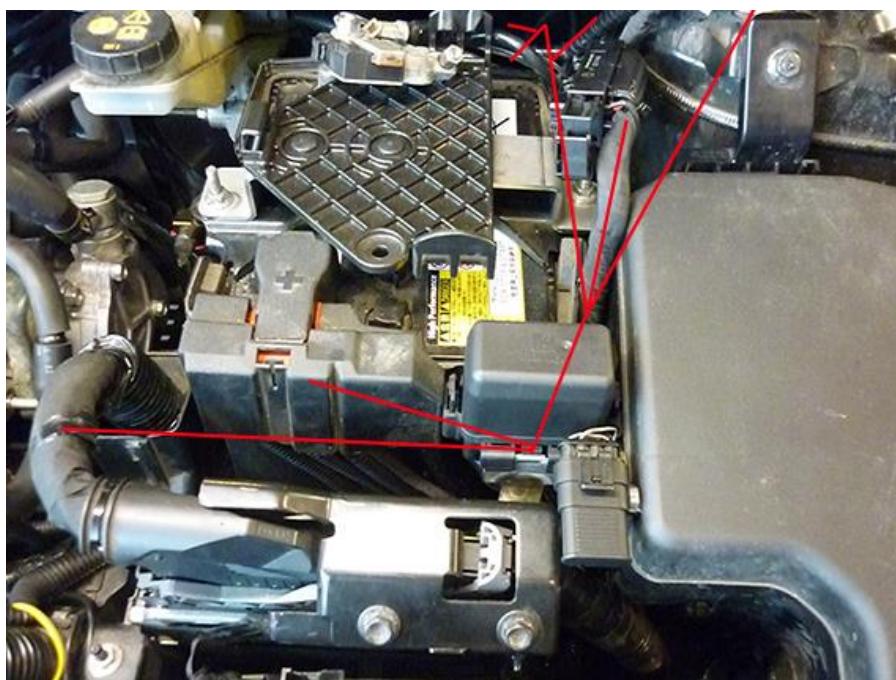
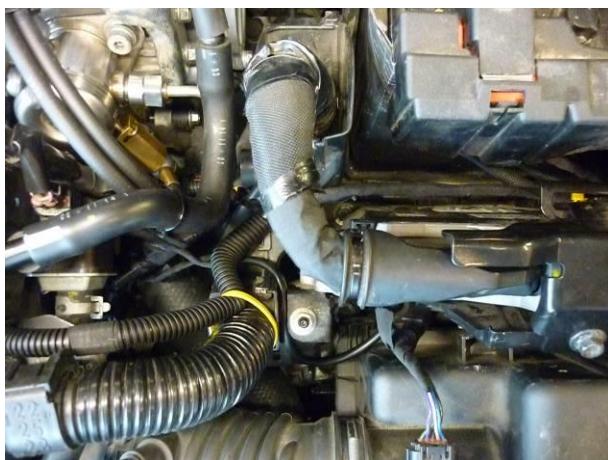
**Fuse / relay box location CX-3**

## Wiring CX-3



**Fuse / relay box location 6 / CX-5**

## Wiring routing 6 / CX-5



## Mounting the fuel selection switch Mazda CX-3 (2 options)



Mount the switch



Option 1



Option 2, beware of the circuit board behind this switches!

## Mounting the fuel selection switch 6 / CX-5



Mount the switch.

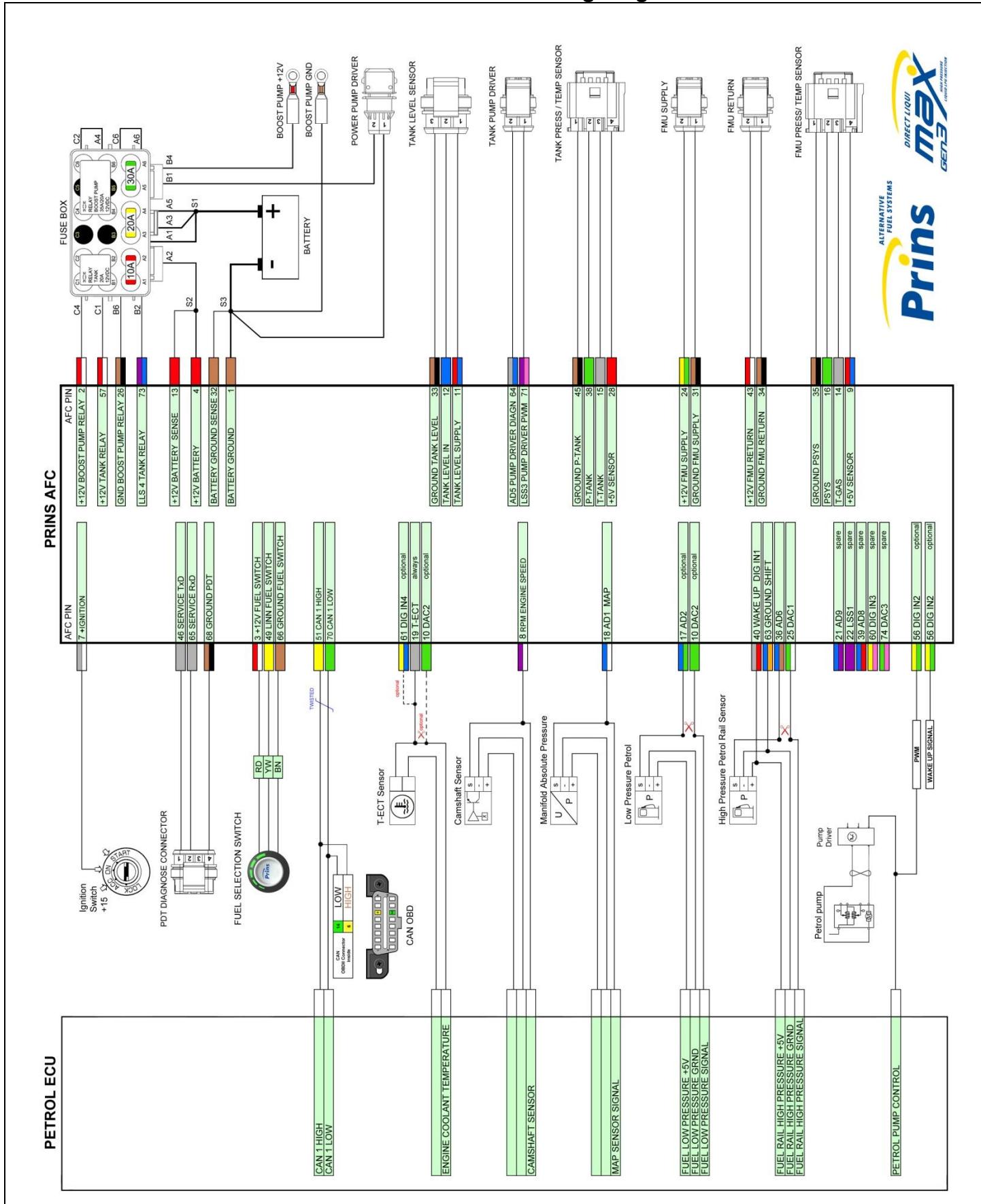


Mazda 6, 2 options



Mazda CX-5

## Basic DLM Gen3 Wiring Diagram



## Main Connector AFC



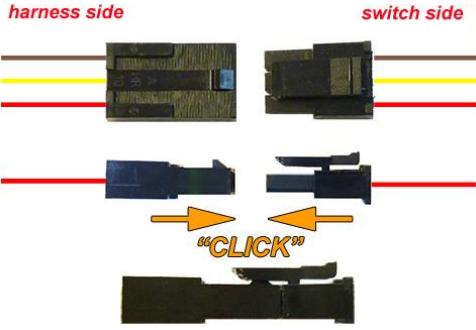
**Prins**  
A WESTPORT COMPANY

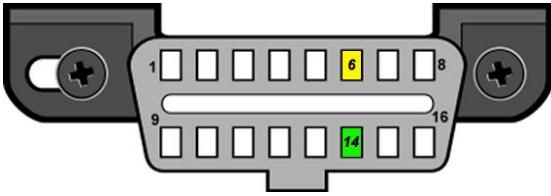


## Electrical connections driver room

Check and measure the wiring in case of changes in the cars wiring colours.  
Insulate not used wires.

### Driver room

Wire number / code	Wire colour	Connection
3-pole micro connector 66 Ground fuel switch 3 +12V fuel switch 49 LIN fuel switch	Brown-black Red-white Yellow	Connect the 3-pole connector to the Prins fuel selection switch.
		

51 CAN-High		Yellow	EOBD connector pin 6
70 CAN-Low		Green	EOBD connector pin 14
			

### Fuel Reset - Driver room

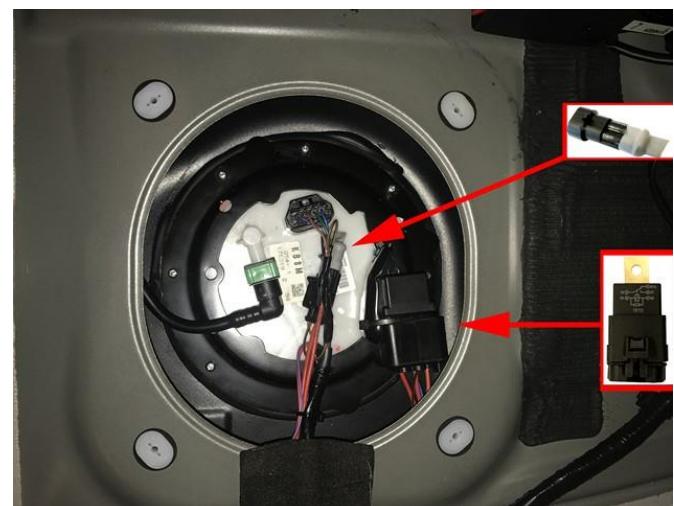
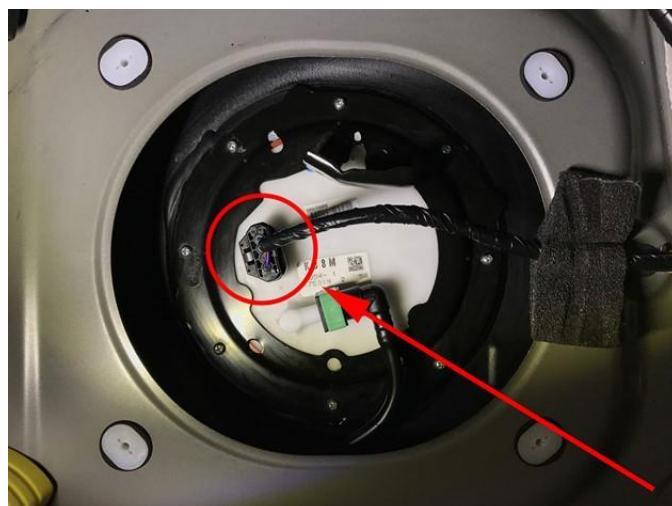
22 LSS1		Purple	Extend wire from the AFC connector to the tank under back seat
4 +Batt		Red	Extend wire from the AFC connector to the tank under back seat



## Fuel Reset

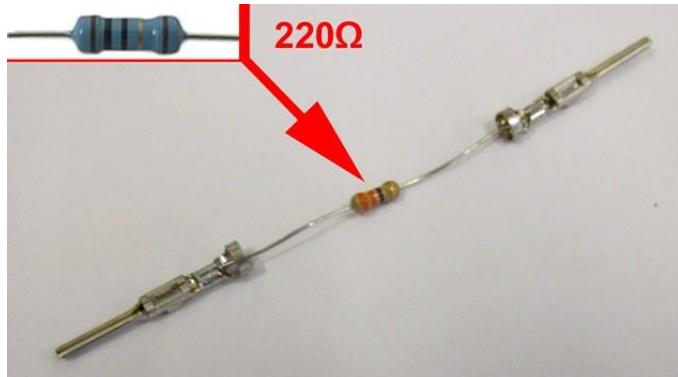


Connect & extend LSS1 (22) & +Batt (4) to/from the AFC connector with the supplied wiring to the tank fuel level gauge underneath the back seat.



Connect the relay with the resistor to the wiring from the tank fuel level gauge (see next pages).

## Fuel Reset - Resistor

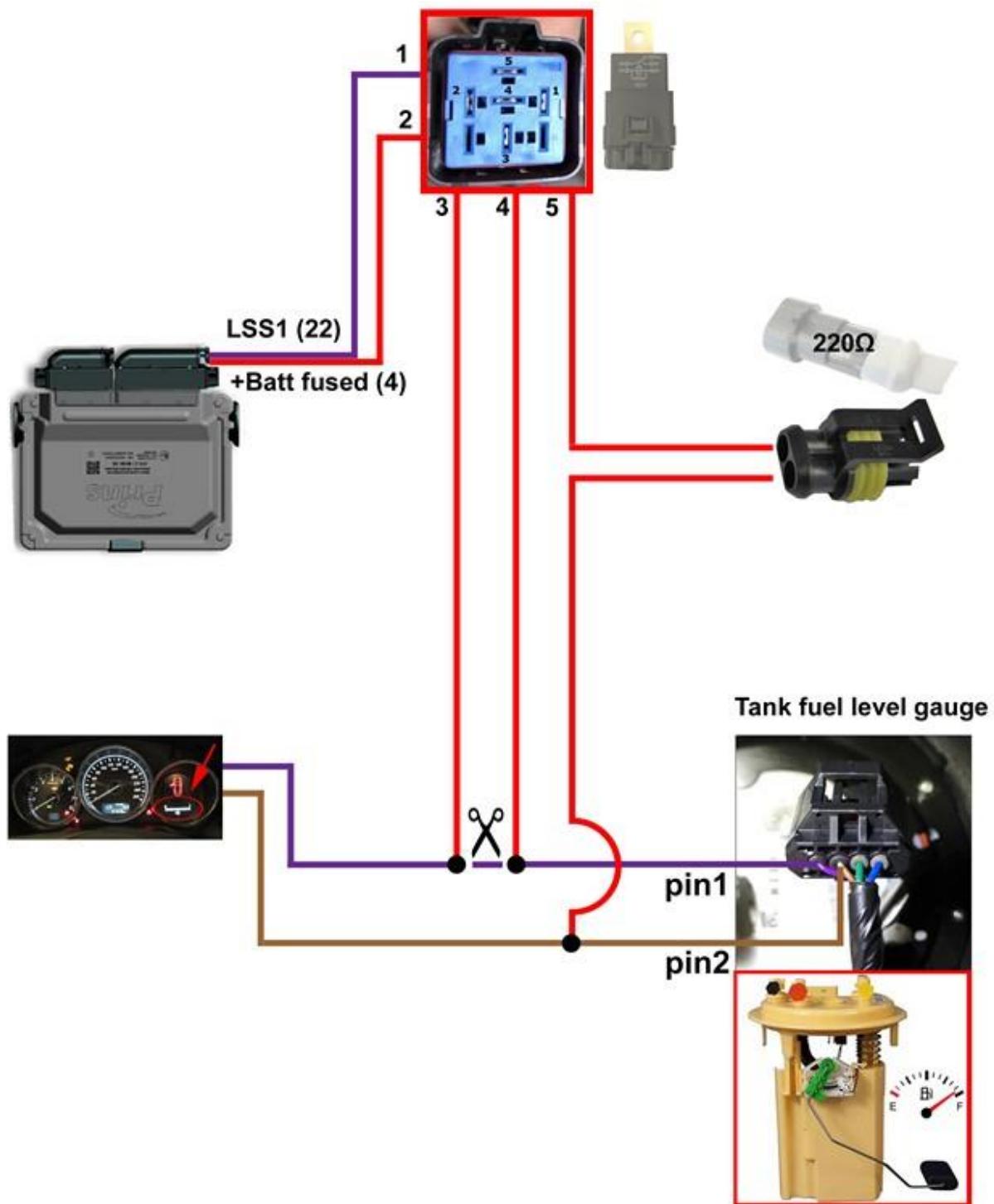


Mount (& solder) the resistor to the terminals & mount to the connector.



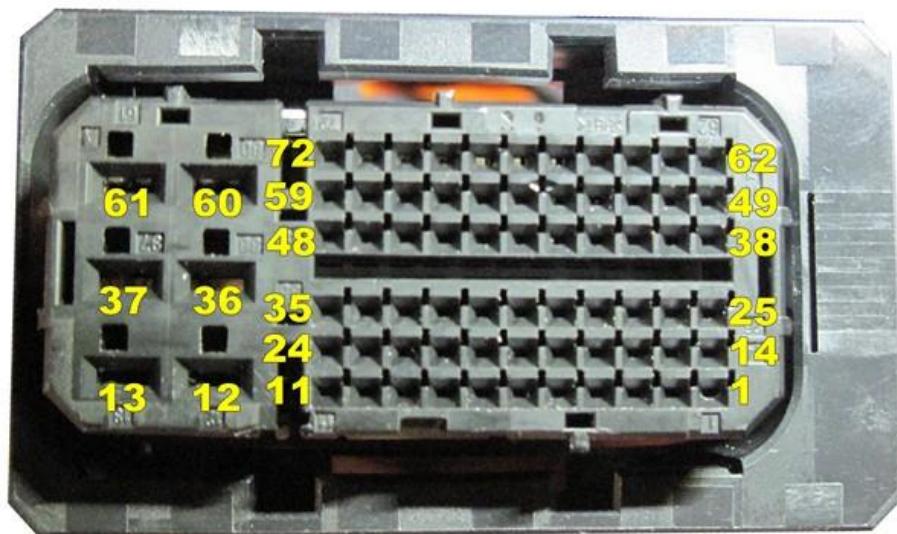
Mount the resistor to the connector. Use shrink sleeve with glue to protect the connector against weather influences.

## Fuel Reset

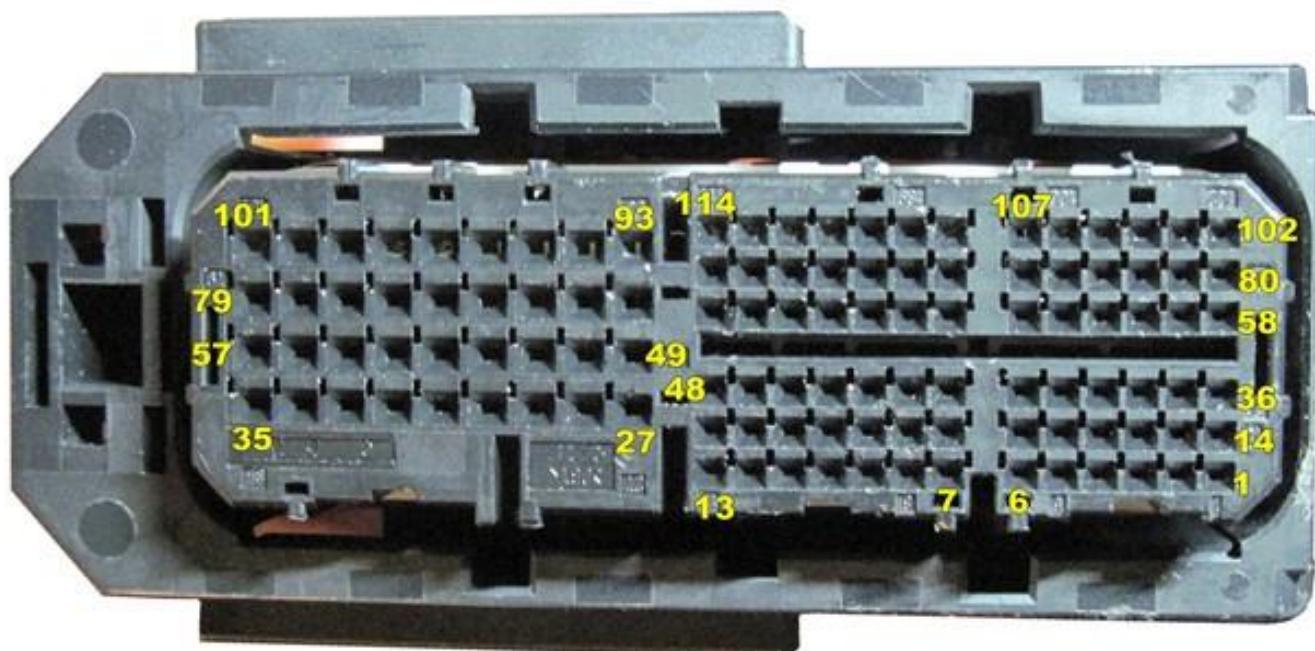


Relay pin 1	Brown-black	Connect to <b>LSS1 (22)</b> from AFC (extended wire)
Relay pin 2	Blue	Connect to <b>+BATT (4)</b> from AFC (extended wire)
Relay pin 3	Red	Cut wire from the <b>tank level</b> fuel gauge <b>pin 1</b> and connect to the front
Relay pin 4	Red	Cut wire from the <b>tank level</b> fuel gauge <b>pin 1</b> and connect to the sensor
Relay pin 5	Red	Connect to <b>pin 2</b> from the <b>tank level</b> fuel gauge <b>via</b> the resistor connector

### Petrol ECU connector overview



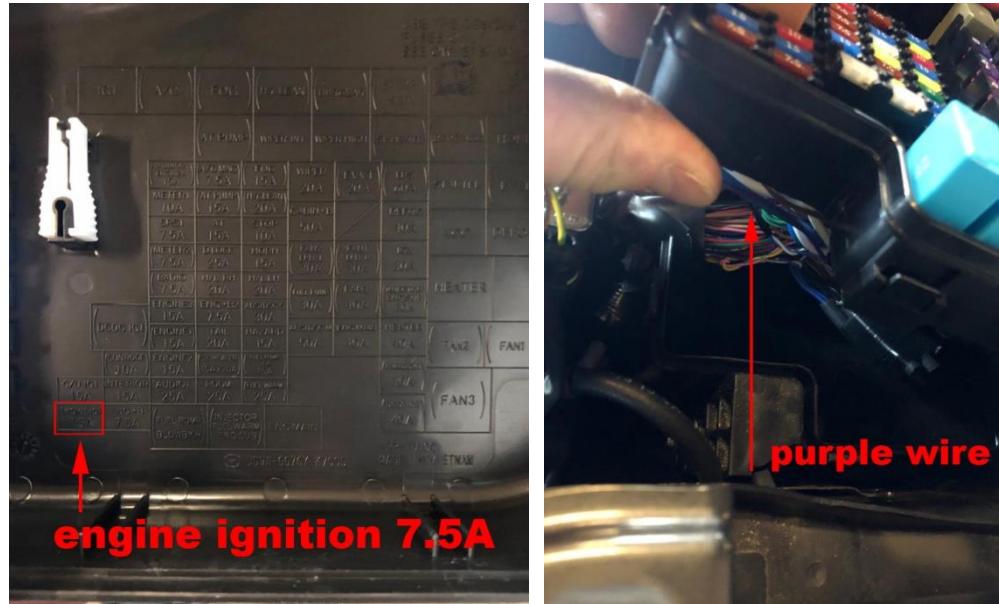
Small connector



Big connector

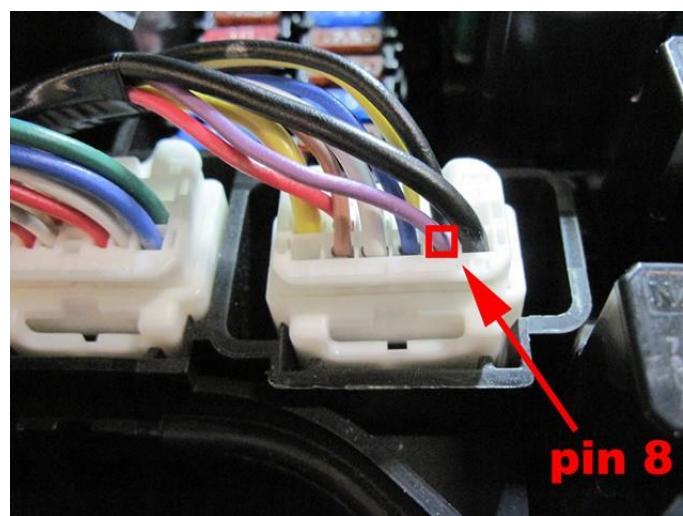
### Electrical connections - Wake-up CX-3

Wire number / code	Wire color	Connection
		Car wake-up. Wire color: <b>Purple</b> Wire location: <b>Under Relay box</b> under fuse <b>ENG IGN 7.5A</b>
40 Wake-up	Grey-red	



### Electrical connections - Wake-up 6 / CX-5

Wire number / code	Wire color	Connection
		Car wake-up. Wire color: <b>Purple</b> Wire location: <b>Relay box</b> , white connector <b>pin 8</b>
40 Wake-up	Grey-red	



### Electrical connections - MAF sensor

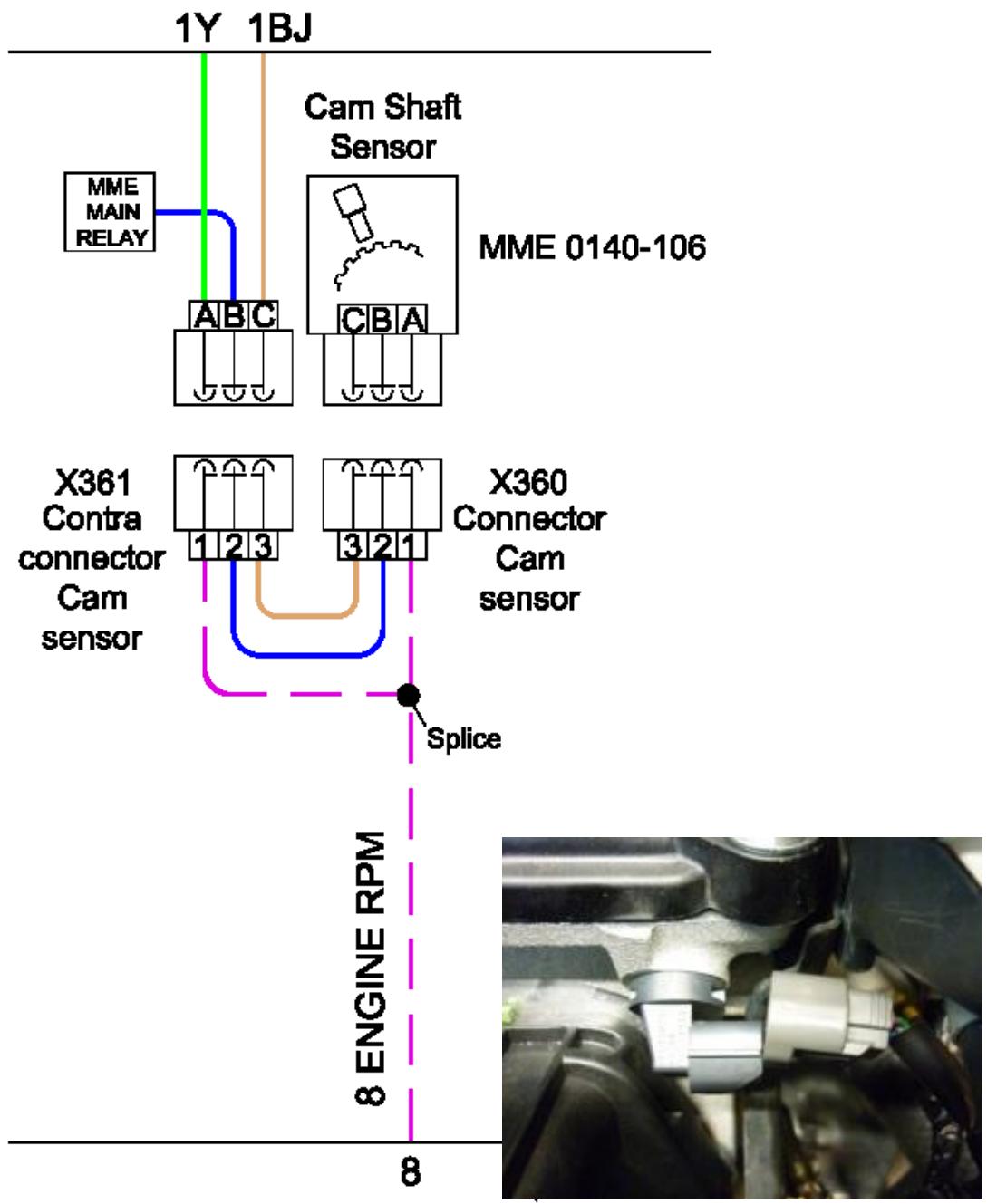
Wire number / code	Wire color	Connection
		<i>For measuring the Air Flow signal. Wire color: Purple Wire location: petrol ECU, small connector, pin 34 (or Air box, 3-pole sensor connector, pin 2)</i>
60 DI 3	Yellow-Pink	

Airflow sensor



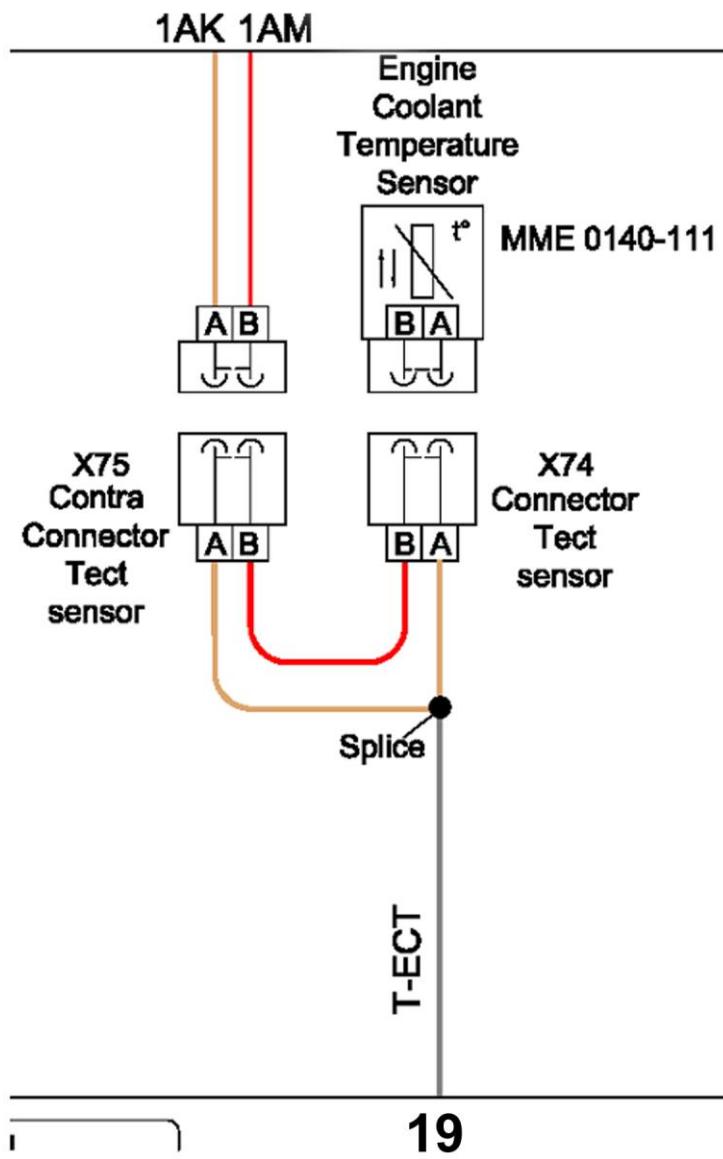
### Electrical connections - Camshaft Sensor

Wire number / code	Wire color	Connection
8 RPM engine speed		For measuring the engine speed signal. Wire color: <b>Green</b> Wire location: Petrol ECU, <b>big connector</b> , <b>pin 113</b> (or left front side cylinder head, pin A)
8 RPM	Purple-white	



## Electrical connections - Engine Coolant Sensor

Wire number / code	Wire color	Connection
19 Tect		<p>For measuring the engine coolant temperature.          Wire color: <b>Tan</b>          Wire location: Petrol ECU, <b>big</b> connector, pin <b>63</b>          (or left rear side engine, connector pin 1)</p>
19 T-ect		Grey



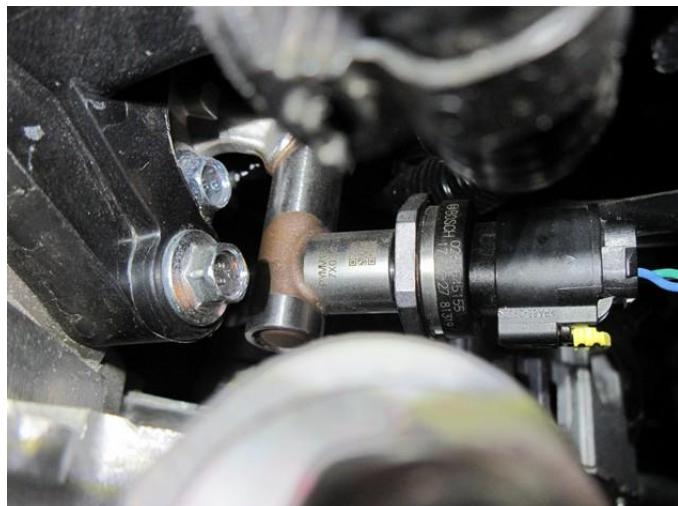
## Electrical connections - High Pressure Petrol Sensor

36 & 25			<i>High pressure petrol sensor signal interruption.</i> Wire color: <b>Green</b> Wire location: Petrol ECU, <b>big</b> connector, pin <b>83</b> (or right front side engine on rail, pin 4)
36 AD 6			Sensor side
25 DAC 1			Petrol ECU side

63 Ground Shift			<i>High pressure petrol sensor ground shift.</i> Wire color : <b>Blue</b> Wire location: Petrol ECU, <b>big</b> connector, pin <b>111</b> (or right front side engine on rail, pin 3)
63	Ground Shift		Blue-orange

7 + IGNITION			<i>+IGNITION / High pressure petrol sensor +.</i> Wire color: <b>Pink</b> Wire location: Petrol ECU, <b>big</b> connector, pin <b>81</b> (or right front side engine on rail, pin 5)
7	+IGNITION		Grey-white

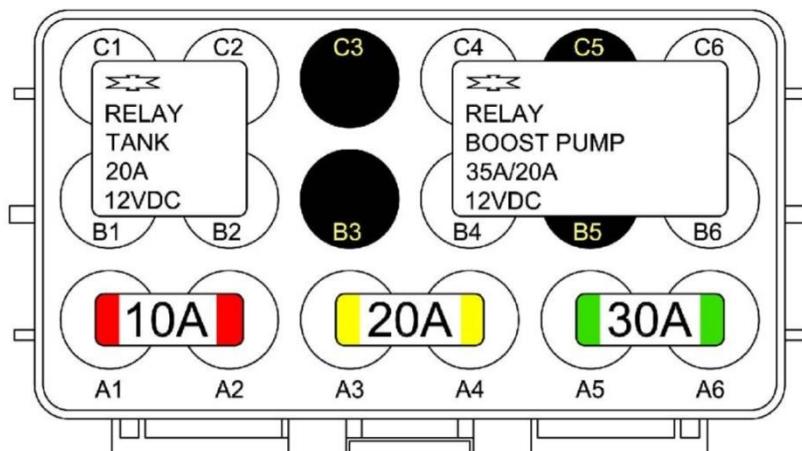
High pressure sensor on high pressure rail



## Electrical connections

Wire text	clr	Wire colour	Connection
1 BATTERY GROUND			<p>Connect to the '-' of the battery (-31); Use a ring terminal.</p> 
1 BATTERY GROUND		Brown	

4 +12V BATTERY			<p>Connect to the '+' of the battery ( +30 ); use a ring terminal.</p> <p><b>Do not place the fuses</b> before having completed the installation of the LPG system.</p> 
4 +12V BATTERY		Red	

**Fuse Box**

(TOP VIEW)

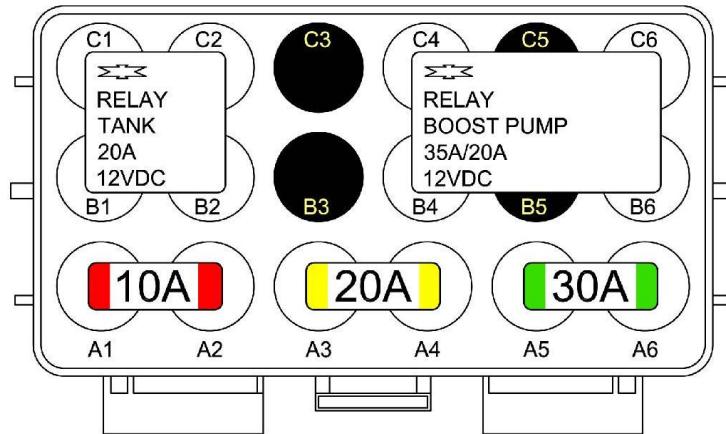


## Electrical connections

**Check and measure the wiring in case of changes in the cars wiring color's.  
Insulate not used wires.**

### **Engine room**

<b>Wire number / code</b>	<b>Wire color</b>	<b>Connection</b>
<i>4-pole FMU P/T sensor</i> 1. 35 Ground P-Sys 2. 16 P-Sys 3. 14 T-Sys 4. 9 +5V sensor	Brown-black Green Grey Red-blue	Connect the 4-pole connector to the P/T sensor.
<i>2-pole black connector FMU</i> 24 +12V FMU supply 31 Ground FMU supply	Yellow-green Brown-black	Connect the 2-pole connector to the black lock-off valve of the Fuel Management Unit
<i>2-pole grey connector FMU</i> 43 +12V FMU return 34 Ground FMU return	Red-white Brown-black	Connect the 2-pole connector to the grey lock-off valve of the Fuel Management Unit
<i>4-pole diagnose connector</i> 46 Service TxD 65 Service RxD 68 Ground PDT	Grey Grey Brown-black	<i>Diagnose connector for service / diagnosis.</i> Connector pin 1 Connector pin 2 Connector pin 4
<i>Boost pump relay</i> 2 +12V boost pump relay 26 Ground BP relay +12V fused BATT +12V Boost pump	Red-white Brown-black Red Red	Pin 86 of the boost pump relay C4 Pin 85 of the boost pump relay B6 Pin 30 of the boost pump relay C6-A5 Pin 87 of the boost pump relay B4
<i>Wiring tank pump driver relay</i> 57 +12V tank relay 73 LSS 4 tank relay +12V BATT fused +12V driver	Red-white Purple-blue Red Red	Pin 86 of the driver relay C1 Pin 85 of the driver relay B2 Pin 30 of the driver relay C2-A4 Pin 87 of the driver relay B1



(TOP VIEW)

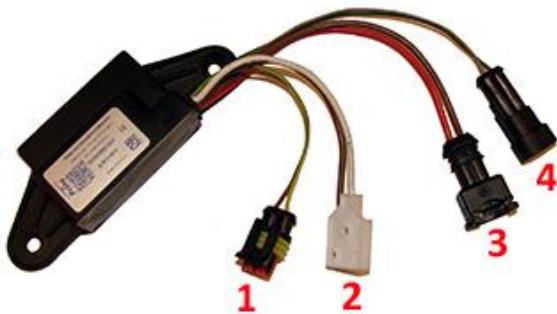
## Electrical connections

**Check and measure the wiring in case of changes in the cars wiring color's.  
Insulate not used wires.**

### **LPG tank housing**

<b>Wire number / code</b>	<b>Wire color</b>	<b>Connection</b>
<b>3-pole tank level connector</b> 1. 33 Ground tank level 2. 12 Tank level in 3. 11 + tank level supply	Brown-white Blue Red-blue	Connect the 3-pole connector to the tank level sensor.
<b>4-pole Tank P/T sensor</b> 1. 45 Ground P-Tank 2. 38 P-Tank 3. 15 T-Tank 4. 28 +5V sensor	Brown-black Green Grey Red	Connect the 4-pole connector to the P/T sensor.
<b>2-pole Steering Diagnose connector</b> 1. Ground pump driver 2. +12V pump driver	Brown Red	Connect the 2-pole connector to the driver, connector 3.
<b>2-pole Steering Diagnose connector</b> 1. 71 LSS3 Pump driver PWM 2. 64 Pump driver diagnose	Purple-pink Blue-grey	Connect the 2-pole connector to the driver, connector 4.

<b>Pump Driver</b>			
<b>1.</b> 2-pole connector tank lock-off	Green-yellow Brown	From tank pump driver From tank pump driver	
<b>2.</b> 3-pole connector tank pump	Red Brown	From tank pump driver From tank pump driver	
<b>3.</b> 2-pole connector driver	Brown Red	From main ground From tank pump relay	Ground pump driver +12V pump driver
<b>4.</b> 2-pole connector driver	Green Grey	From AFC pin 71 From AFC pin 64	LSS3 Pump driver PWM Pump driver diagnose



## Prins safety stickers



Apply the sticker on an eye catching location.

## Checklist after installation

1. Install the system fuses.  
Turn on ignition.  
Connect the Prins Diagnostic Tool and run the Prins Diagnostic program.  
When working on the car, beware of moving and rotating parts in the engine compartment.  
(even when the engine is not running !!).
2. When commissioning the LPG system, you must activate the AFC with the diagnosis software.
3. Check whether the program in the AFC matches with the car (dedicated engine set):  
See "Identification" in the diagnosis program.
4. Check all components and connections for any LPG leakage, use a gas leak detector device or  
a fluid detection like soap. Also check for petrol leakage.  
Check all made connections and XD-hose crimps for petrol / LPG leakage.  
Make sure the solenoid valves are in open position.  
No evidence of leakage is permitted.  
Caution for moving and rotating parts in the engine compartment!
5. Use the diagnosis software to check again all input and output signals.
6. Check the system for error codes and solve these if required.  
Check the petrol ECU for EOBD error codes.  
Place the protection connector back on the diagnose connector.
7. Make a test drive and check the cars drivability on LPG and petrol.

