Installation manual

PART 2/2

MANUFACTURER	Ford
TYPE	(Based on Focus 2017 & Transit Connect 2019)
ENGINE DISPLACEMENT	2000cc
NUMBER OF VALVES	16
ENGINE CODE / NUMBER - OUTPUT	MGDA – 113/125 kW
FIRING ORDER	1-3-4-2
VEHICLE CATEGORIES	M
TRANSMISSION	MT
VERSION	AFC-2.1 DI-LPG
TYPE VSI INJECTOR	KN9 - 73cc
TYPE INJECTION MODULE	Gen2 - Type 1
PETROL ECU MANUFACTURER / CODE	FoMoCo Bosch 0 261 S21 993 (810) – 113kW
PETROL ECU MANUFACTURER / CODE	FoMoCo Bosch 0 261 S12 874 (864) – 125Kw
MODEL YEAR:	2017-2019
SYSTEM APPROVAL NUMBER (R115)	N.A.
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	347/121007/A
MANUAL NUMBER	076/0708700-1
DATE	2019-08-26

TABLE OF CONTENTS

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

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.
- Always download the “general manual 1/2“ from our website for basic instructions and diagrams.
- Always disconnect the battery when installing the LPG system. Make sure the ignition key is outside the car. Be aware of central door locking, radio / telephone memory code and alarm system.
- Do not place the main fuse into the fuse holder before having completed the installation of the VSI system.
- The VSI computer has to be activated by means of the diagnosis software.
- In the unlikely event the AFC fails, it will automatically switch over to petrol.
  Never disconnect the AFC connector, unless you have removed the main fuse.
- When installing the VSI 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 the 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.
- Remove any internal burrs after having shortened the LPG pipe.
  (This guarantees the maximum flow through the pipe without pollution.)
- 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 chips have been removed (especially when mounting an exterior filler into the body work).
- After having completed the installation, check the whole system for gas leakage; use a gas leak detection device. Also check for any 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 and filter registration 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.

Please fill in the warranty portal completely within 14 days after installation.
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Manual updates / revision

Rev. nr	Rev. Date	Subject update
-	2019-04-08	Release
1	2019-08-26	Update with other petrol ECM & connections

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 Diagnostic Tool
- Torque wrench (5-50Nm)
- Torque wrench (200-250Nm)
- Portable light
- Assortment drill bits Ø4 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 analyser)
- Check the condition of the ignition system (spark plugs, cables, coil)

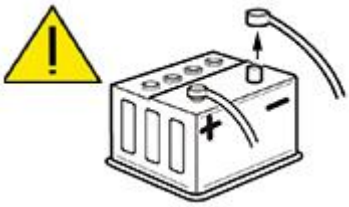
Tightening moments

		Nm	Spanner mm
M5 x 0,8		6.5	8
M6 x 1,0		11.3	10
M8 x 1,25		27.3	13
M10 x 1		52	15-16-17
M10 x 1,5		54	15-16-17

LPG manifold nipple		1	3.5 Allen
Reducer nut - bracket		10	13
Lock-off nut		15	16
Fuel line nut – lock-off		20	13
Fuel line tank – lock-off		20	16
Filling hose connections		50	22

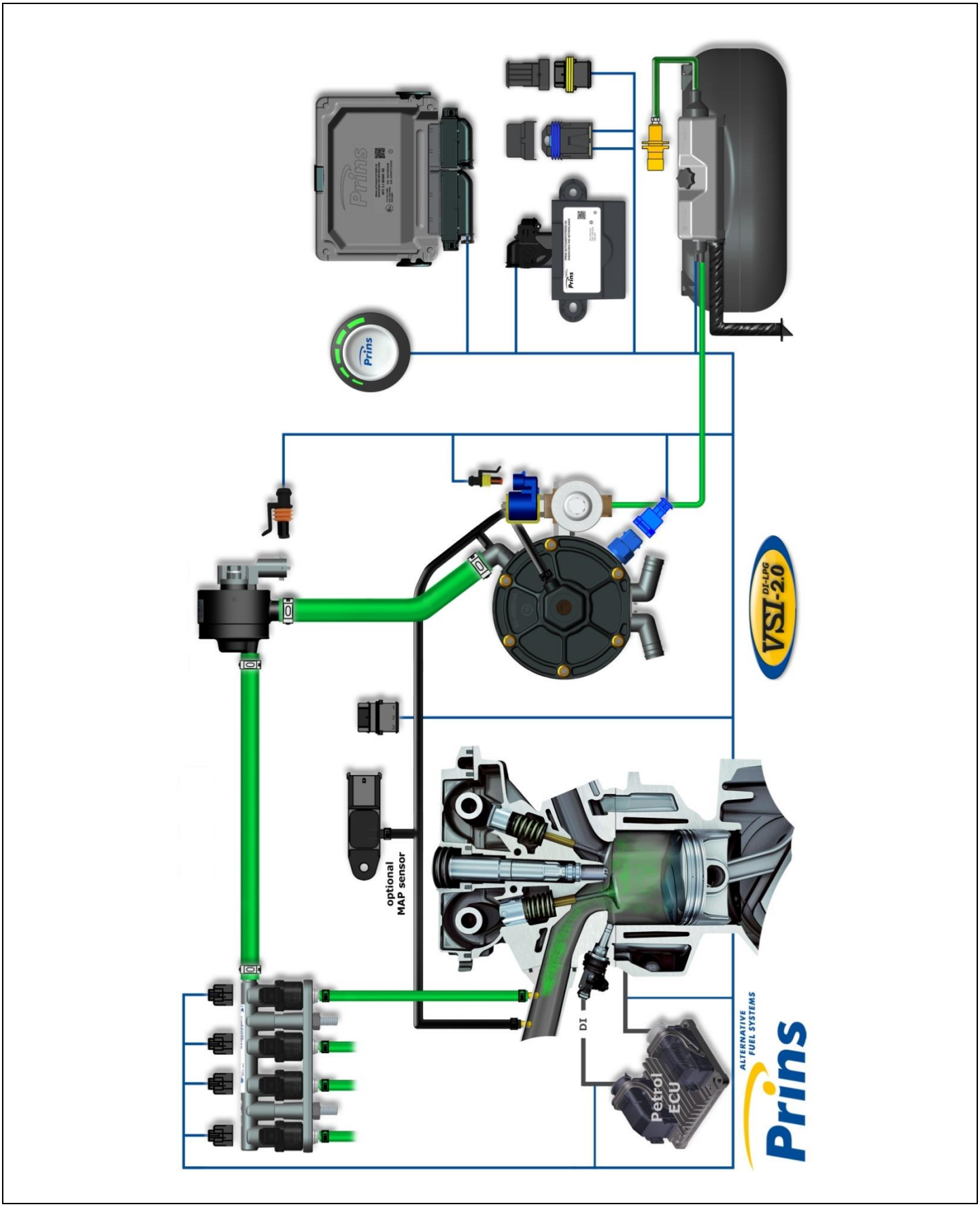
EXPLANATION OF SYMBOLS:

= IMPORTANT, CAUTION



= WEAR SAFETY GOGGLES

Base diagram



VSI approval numbers

	
Reducer VSI LPG Prins : E4-67R-010054 Lock-off valve OMB : E8-67R-014327 Lock-off valve Valtek : E4-67R-010041	Injector rail Prins : LPG E4-67R-010093 CNG E4-110R-000021
	
Filter unit T1 / T2 Prins : LPG E4-67R-010096 CNG E4-110R-000028 Filter unit Keihin: LPG E4-67R-010177 CNG E4-110R-000091	Injector Keihin KN8 : LPG E4-67R-010092 CNG E4-110R-000020 Injector Keihin KN9 : LPG E4-67R-010310 CNG E4-110R-000295
	
Prins AFC : E4-67R-010098 E4-10R-030507	Tubithor : LPG E13-67R-010145 CNG E13-110R-000017 Rubia : LPG E4-67R-010068 CNG E4-110R-000003 WinLas : LPG E37-67R-010140 CNG E37-110R-000012 Thunderflex LPG E24-67R-010018 CNG E24-110R-000040

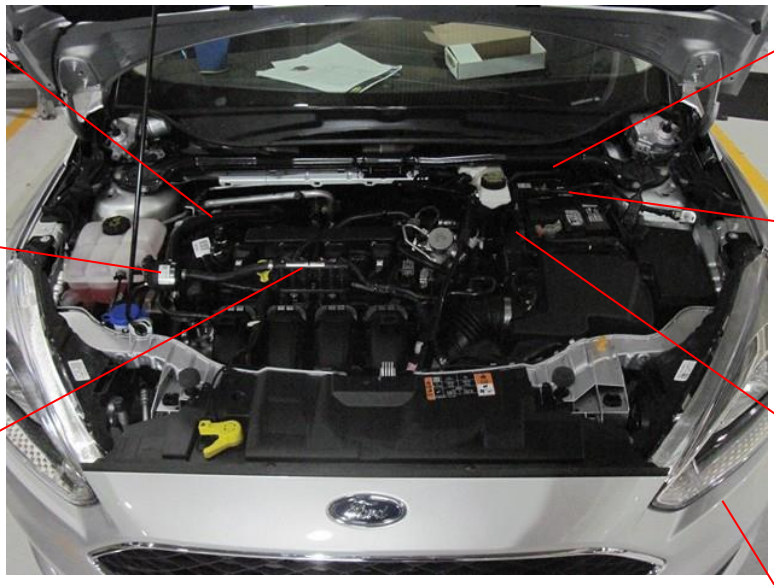
VSI component location overview

(example Ford Focus 2017)

Reducer

Filter

Rail



AFC

Fuse

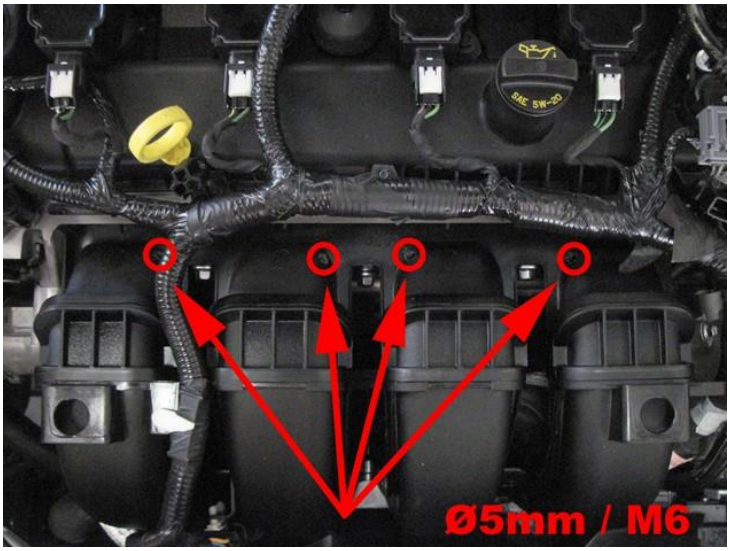
IM

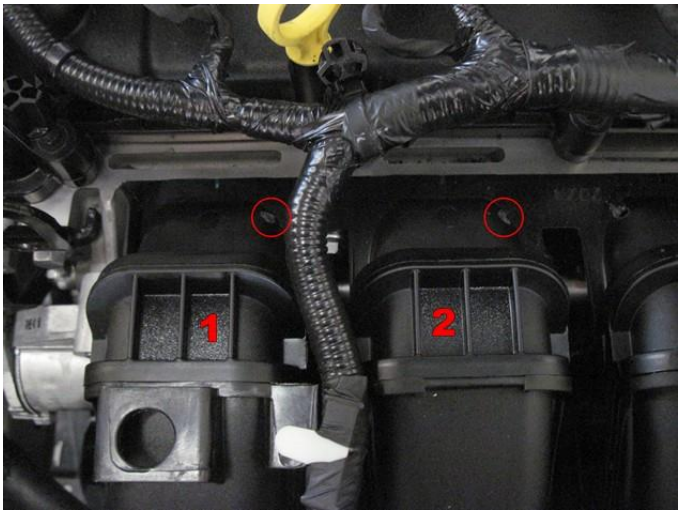
Petrol ECU

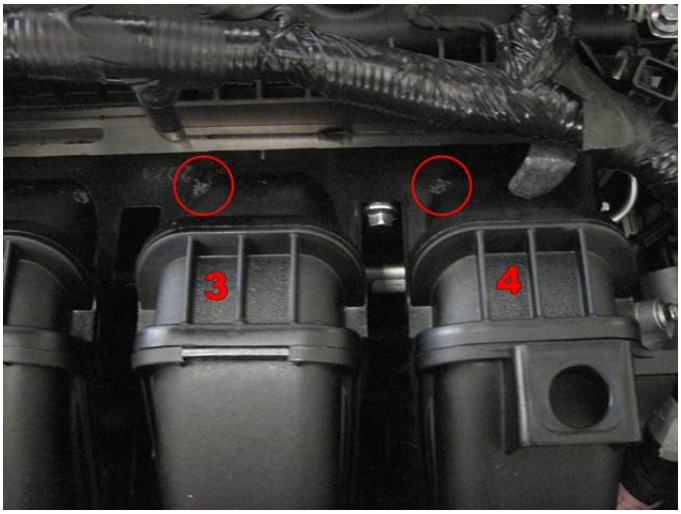
If applicable:
R115 approval sticker on the right (side) centre door post

Mounting the inlet manifold couplings

Remove the manifold when drilling.



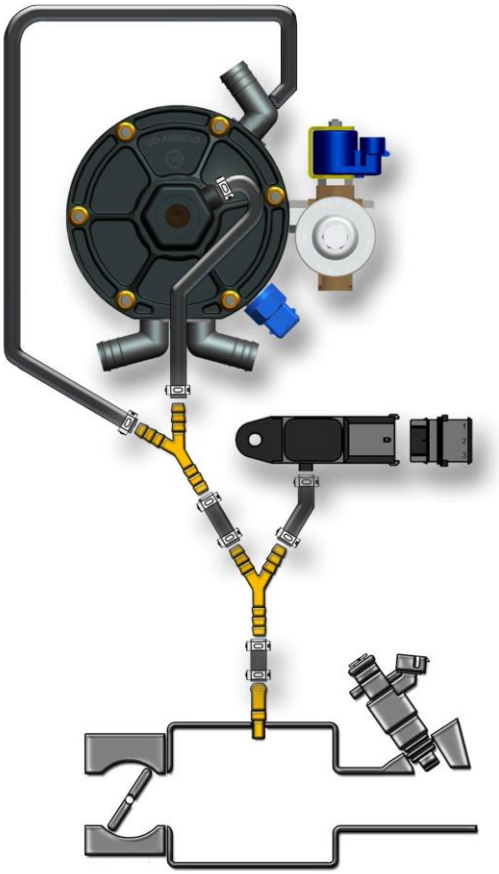


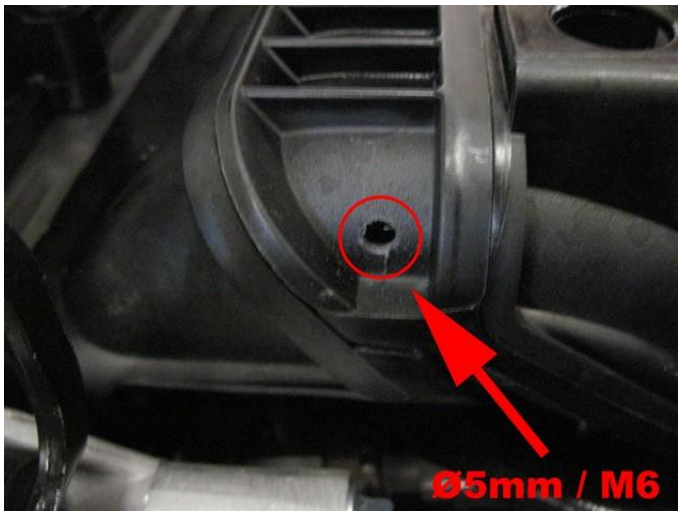


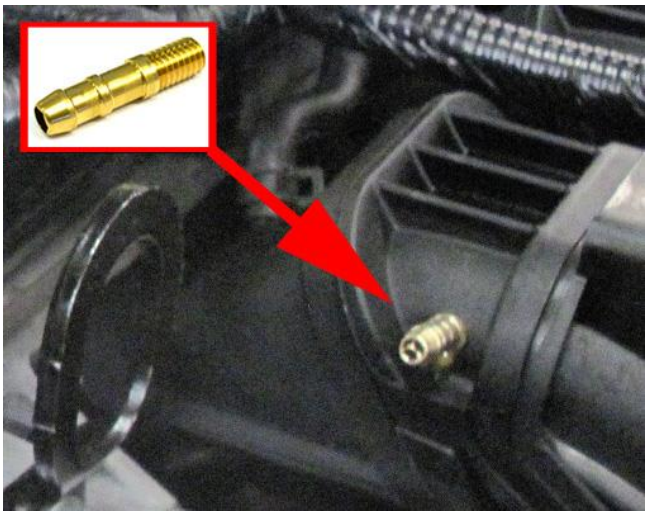
Drill the holes Ø5mm and cut thread M6 as shown.

Mount the VSI-couplings with a locking compound to the just drilled holes.

Overpressure / MAP connection







Drill a hole of **5mm** in the inlet manifold. Cut **M6x1** thread.
Place the VSI coupling with a lock compound in the inlet manifold.
Connect the hoses to the reducer and the MAP sensor.

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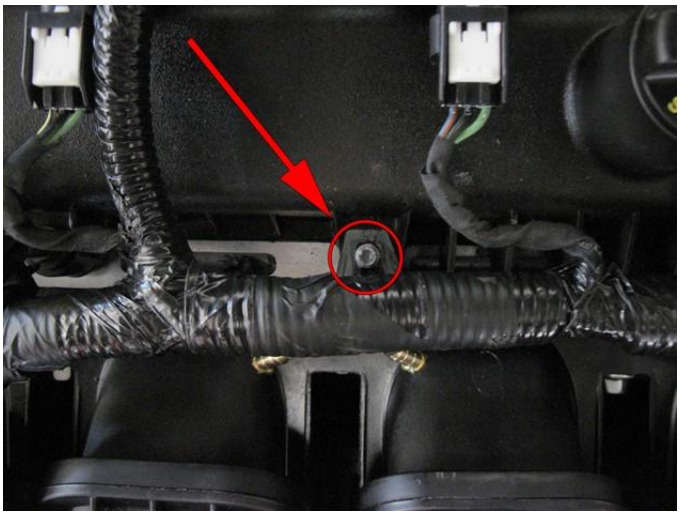
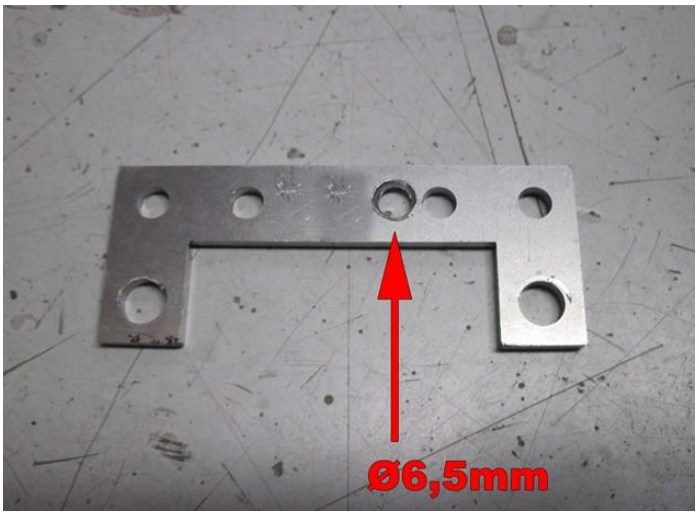
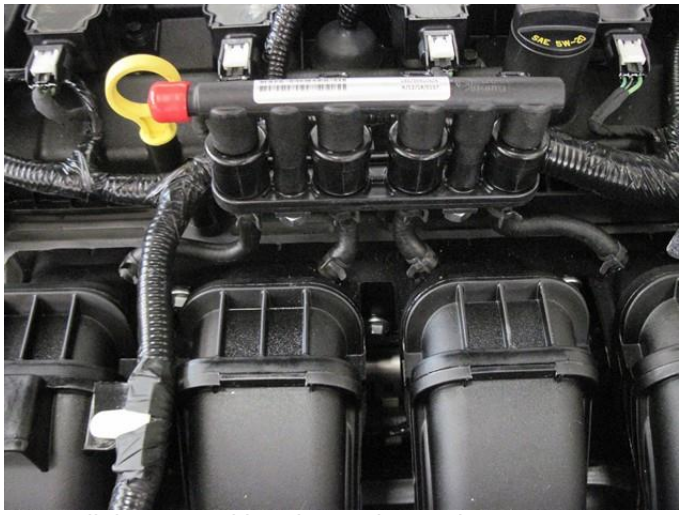
Mounting the VSI injector rail



Use the original bolt to mount the injectorrail & bracket.





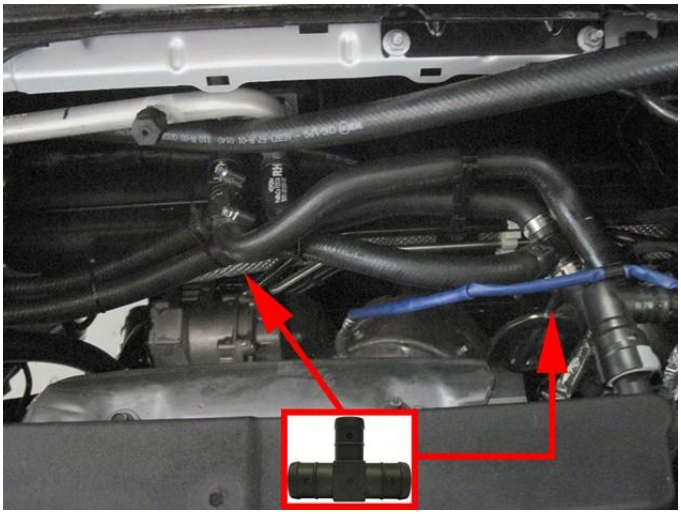
Drill a hole Ø6.5mm as shown. Mount the injector rail, hoses and bracket to the engine.

Mounting Examples Prins Parts

(Based on Ford Focus 2017)

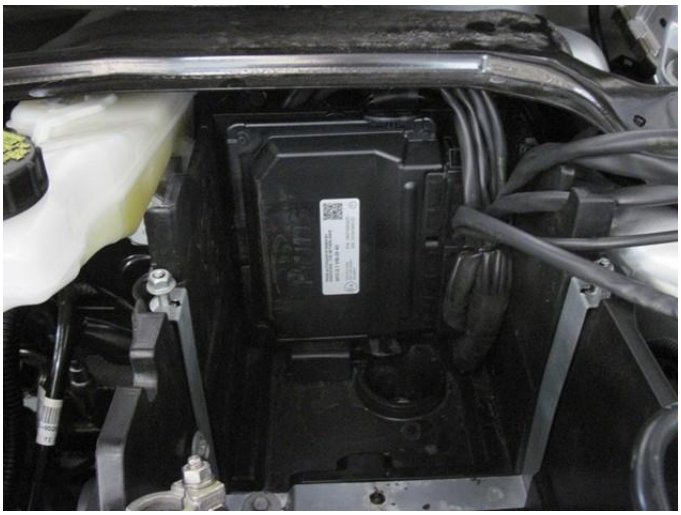
Reducer

Filter

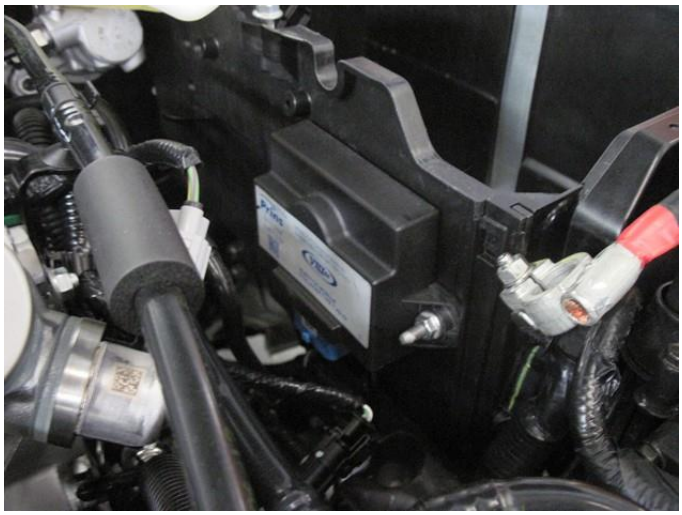


T-pieces (20x16x20)

MAP sensor



AFC



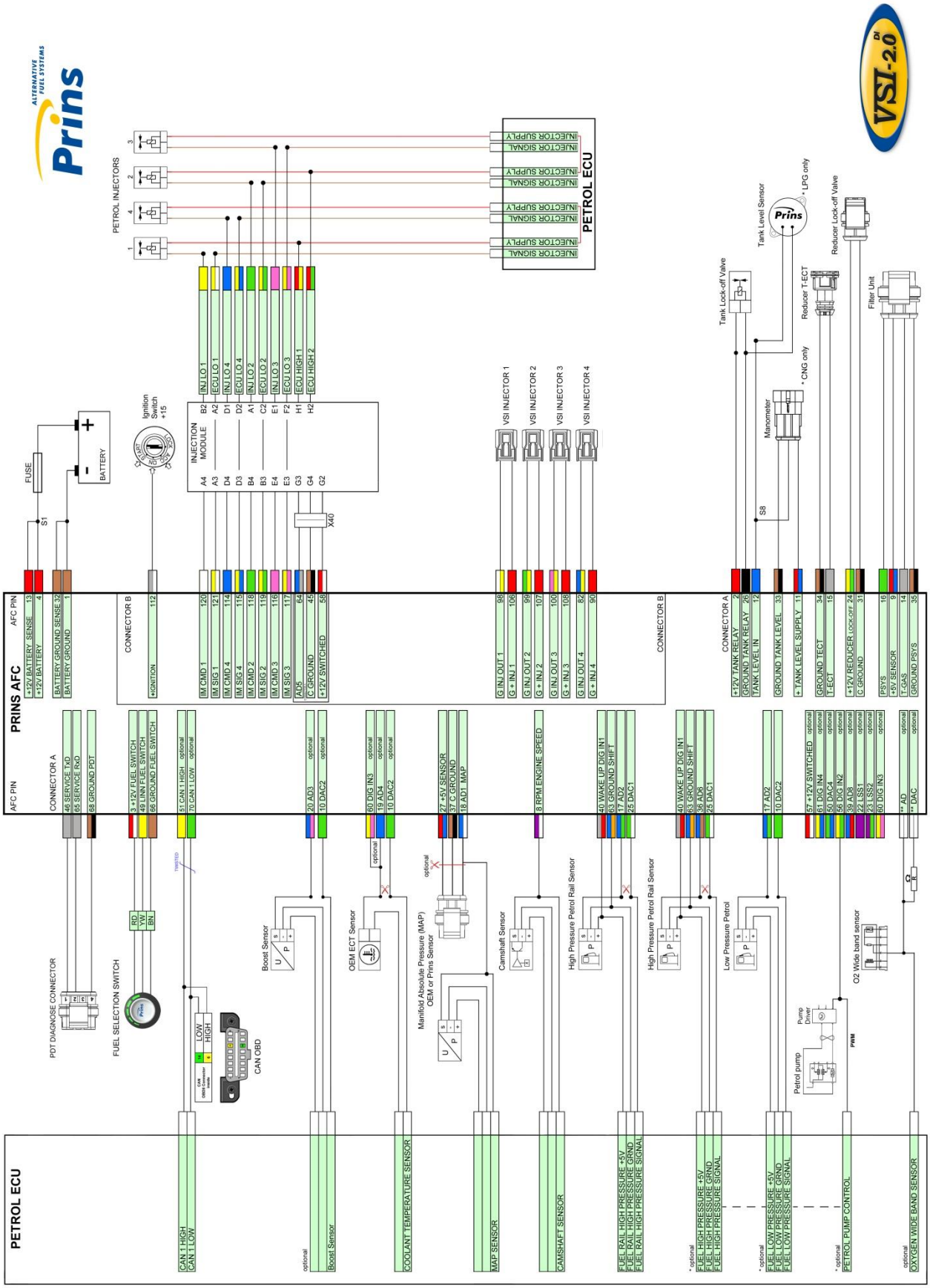
IM

Mounting the fuel selection switch

When mounting the switch, only push on its sides.
Pushing the switch hard in the centre may result in damage to the switch.

Example Ford Focus 2017:

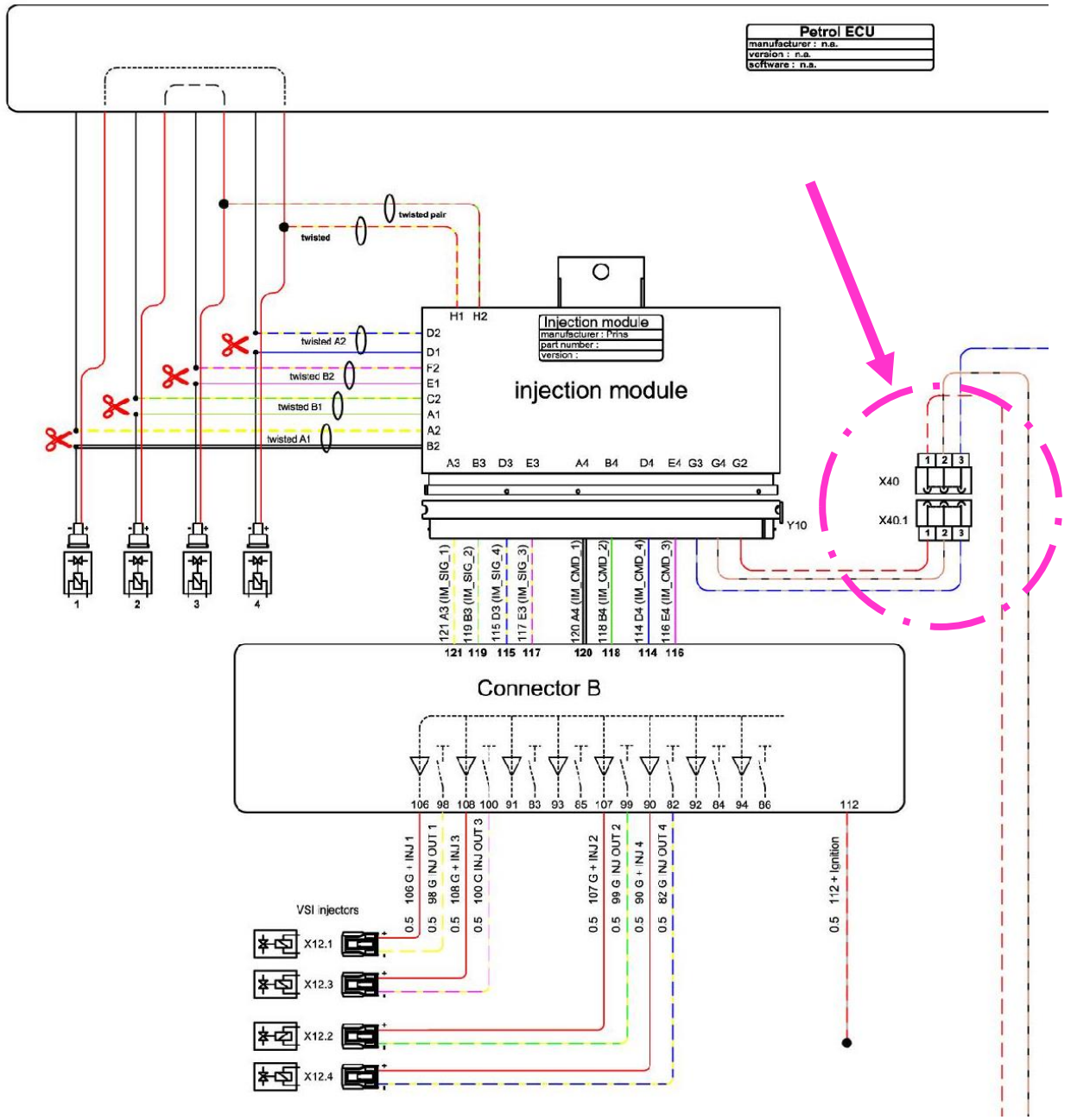
Basic Wiring Diagram



Electrical connections

Check and measure the wiring in case of changes in the cars wiring colours.

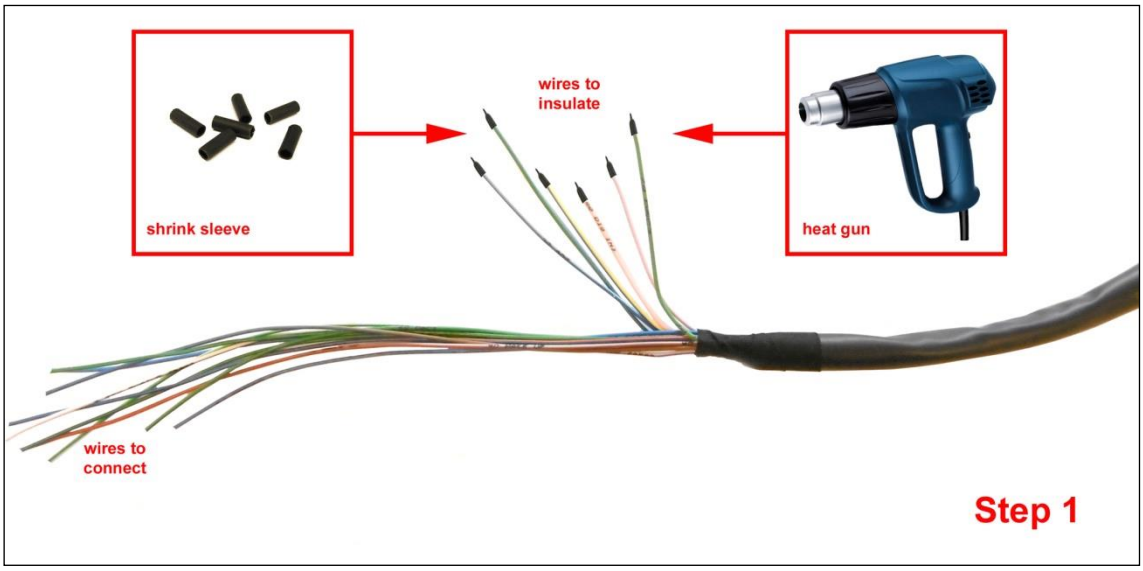
Connector Injection Module

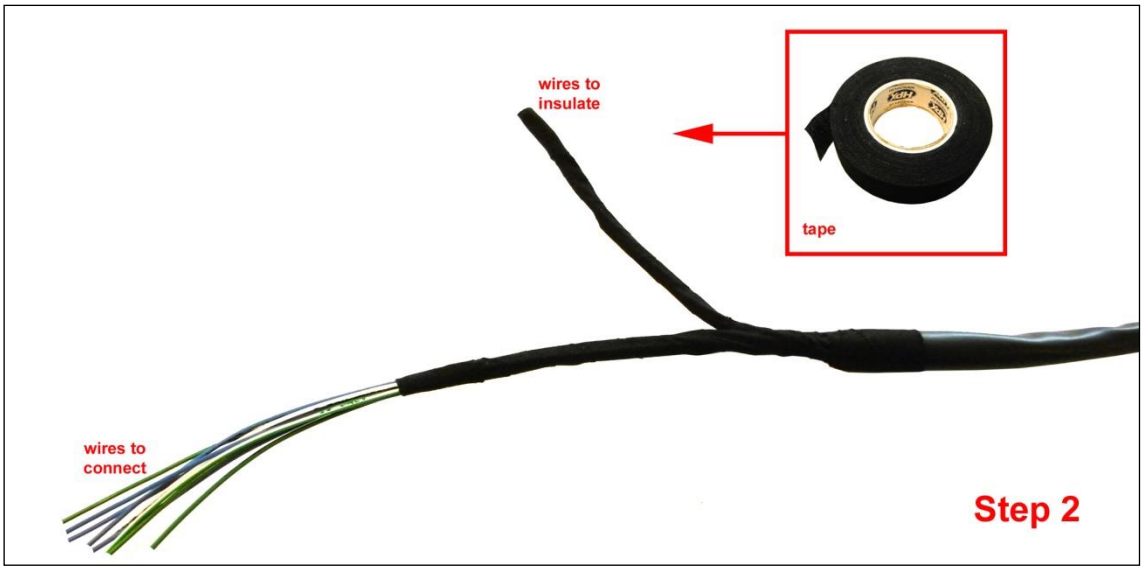


Electrical connections – Insulate

19	AD4		Blue	
20	AD3		Blue-pink	
22	LSS1		Purple	
23	LSS2		Purple-green	
38	AD7		Blue-light Blue	
39	AD8		Blue-red	
43	+12 Valve 2		Red-white	
50	DAC4		Green-blue	
60	DIG IN3		Yellow-pink	
61	DIG IN4		Yellow-blue	
62	C Ground		Brown-black	
74	DAC3		Green-pink	
Insulate additional loose wires				

Electrical connections – How to insulate not used wires





Electrical connections

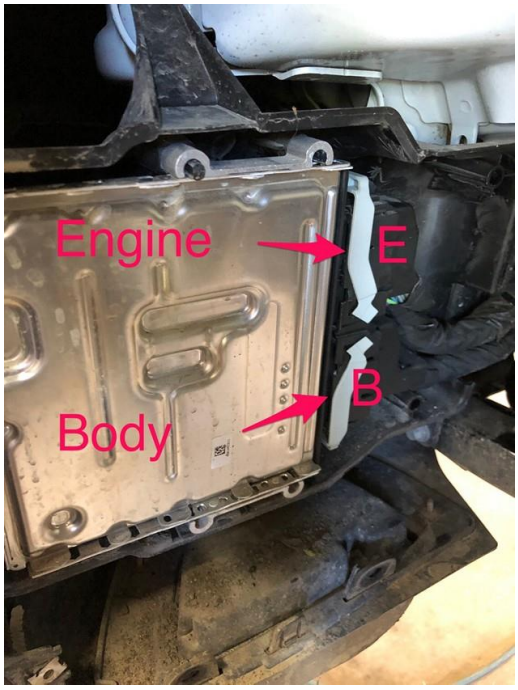
Check and measure the wiring in case of changes in the cars wiring colours.

Wire number / code	Wire colour	Connection
32 Ground sense 1 Ground battery	Brown Brown	*Connect to the '–' of the battery; use a ring terminal :*
4 +12V Battery	Red	*Do not place the fuse in the holder before having completed the installation of the LPG system.* *Connect to the '+' of the battery; use a ring terminal :*

Electrical connections – Petrol ECM

Check and measure the wiring in case of changes in the cars wiring colours.

1 connector is the Engine wiring loom (E) and the other connector is the Body wiring loom (B)



Transit Connect

Focus

To access the wiring, use the original wiring routing of the vehicle into the ECU box.

Electrical connections

Transit Connect - FoMoCo Bosch 0 261 S21 993 (810) – 113kW

Check and measure the wiring in case of changes in the cars wiring colours.

⚠ For measuring the petrol injectors :
Interrupt each petrol injector control wire (injector min)
Each VSI wire has a petrol injector / cylinder number printed on the wire, connect this wire to the corresponding petrol injector / cylinder.
Connect the **bicoloured** VSI measuring wire to the **ecu side** (wire code: ecu-lo).
Connect the **corresponding full coloured** VSI wire to the **petrol injector side** (wire code: inj-lo).
See diagrams: Installation manual general part 1 / 2.
Attention:
Each bicoloured measuring wire corresponds to a specific LPG injector and petrol injector / cylinder number.
Do not interchange the wires.

Petrol injector **cyl. 1**			
INJ LO 1		White	Injector side
ECU LO 1		**White-yellow**	ECU side
IM pos. B2 / A2			Colour: **Yellow-blue** Location: petrol ecu connector **E** pin **78**

Petrol injector **cyl. 4**			
INJ LO 4		Blue	Injector side
ECU LO 4		**Blue-yellow**	ECU side
IM pos. D1 / D2			Colour: **Blue** Location: petrol ecu connector **E** pin **89**

(cyl. 1-4)			
ECU HIGH **A**		**Red-white**	Injector side
IM pos. H1			Colour: **Green-blue** Location: petrol ecu connector **E** pin **83**

Petrol injector **cyl. 2**			
INJ LO 2		Green	Injector side
ECU LO 2		**Green-yellow**	ECU side
IM pos. A1 / C2			Colour: **Blue-orange** Location: petrol ecu connector **E** pin **77**

Petrol injector **cyl. 3**			
INJ LO 3		Pink	Injector side
ECU LO 3		**Pink-yellow**	ECU side
IM pos. E1 / F2			Colour: **Green-violet** Location: petrol ecu connector **E** pin **88**

(cyl. 2-3)			
ECU HIGH **B**		**Red-green**	Injector side
IM pos. H2			Colour: **Violet-grey** Location: petrol ecu connector **E** pin **87**

Electrical connections

Transit Connect - FoMoCo Bosch 0 261 S21 993 (810) – 113kW

Check and measure the wiring in case of changes in the cars wiring colours.

3-pole connector 27 +5V Sensor 37 C ground 18 AD1		Red-blue Brown-black Blue-white	*For measuring the inlet manifold pressure (MAP).* Connect to the MAP sensor
18 AD 1		Blue-white	

36 & 25			*High pressure petrol sensor signal interruption.* Wire colour : **blue-brown** Location: petrol ecu connector **E** pin **55**
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side

			Sensor supply 5V. Wire colour: **Grey** Location: petrol ecu connector **E** pin **25**
40 Wake-up		Grey-red	

			Sensor ground. Wire colour: **Grey-violet** Location: petrol ecu connector **E** pin **41**
63 Ground Shift		Blue-orange	

17 & 10			*Low pressure petrol sensor signal interruption.* Wire colour: **Brown-blue** Location: petrol ecu connector **E** pin **73**
17 AD 2		Blue-green	Sensor side
10 DAC 2		Green	Petrol ecu side

			For measuring the engine speed signal. Wire colour: **Blue-brown** Location: petrol ecu connector **E** pin **28**
8 RPM		Purple-white	

			PWM signal. Wire colour: **Yellow-orange** Location: petrol ecu connector **B** pin **58**
56 DI2		Yellow-green	

112			*Connect to +ignition / contact+ (+15).* *Do not place the fuses in the holder before having completed the installation of the LPG system.* Wire colour: **Green** Location: petrol ecu connector **B** pin **64**
112 + Ignition		Red-grey	

Electrical connections

Focus - FoMoCo Bosch 0 261 S12 874 (864) – 125kW

Check and measure the wiring in case of changes in the cars wiring colours.

⚠ For measuring the petrol injectors :
Interrupt each petrol injector control wire (injector min)
Each VSI wire has a petrol injector / cylinder number printed on the wire, connect this wire to the corresponding petrol injector / cylinder.
Connect the **bicoloured** VSI measuring wire to the **ecu side** (wire code: ecu-lo).
Connect the **corresponding full coloured** VSI wire to the **petrol injector side** (wire code: inj-lo).
See diagrams: Installation manual general part 1 / 2.
Attention:
Each bicoloured measuring wire corresponds to a specific LPG injector and petrol injector / cylinder number.
Do not interchange the wires.

Petrol injector **cyl. 1**			
INJ LO 1		White	Injector side
ECU LO 1		**White-yellow**	ECU side
IM pos. B2 / A2			Colour: **Yellow-blue** Location: petrol ecu connector **E** pin **3**

Petrol injector **cyl. 4**			
INJ LO 4		Blue	Injector side
ECU LO 4		**Blue-yellow**	ECU side
IM pos. D1 / D2			Colour: **Blue** Location: petrol ecu connector **E** pin **27**

(cyl. 1-4)			
ECU HIGH **A**		**Red-white**	Injector side
IM pos. H1			Colour: **Green-blue** Location: petrol ecu connector **E** pin **77**

Petrol injector **cyl. 2**			
INJ LO 2		Green	Injector side
ECU LO 2		**Green-yellow**	ECU side
IM pos. A1 / C2			Colour: **Blue-orange** Location: petrol ecu connector **E** pin **25**

Petrol injector **cyl. 3**			
INJ LO 3		Pink	Injector side
ECU LO 3		**Pink-yellow**	ECU side
IM pos. E1 / F2			Colour: **Green-violet** Location: petrol ecu connector **E** pin **26**

(cyl. 2-3)			
ECU HIGH **B**		**Red-green**	Injector side
IM pos. H2			Colour: **Violet-grey** Location: petrol ecu connector **E** pin **52**

Electrical connections

Focus - FoMoCo Bosch 0 261 S12 874 (864) – 125kW

Check and measure the wiring in case of changes in the cars wiring colours.

3-pole connector 27 +5V Sensor 37 C ground 18 AD1		Red-blue Brown-black Blue-white	*For measuring the inlet manifold pressure (MAP).* Connect to the MAP sensor
18 AD 1		Blue-white	

36 & 25			*High pressure petrol sensor signal interruption.* Wire colour : **blue-brown** Location: petrol ecu connector **E** pin **9**
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side

			Sensor supply 5V. Wire colour: **Grey** Location: petrol ecu connector **E** pin **40**
40 Wake-up		Grey-red	

			Sensor ground. Wire colour: **Green-violet** Location: petrol ecu connector **E** pin **34**
63 Ground Shift		Blue-orange	

17 & 10			*Low pressure petrol sensor signal interruption.* Wire colour: **Yellow-green** Location: petrol ecu connector **E** pin **7**
17 AD 2		Blue-green	Sensor side
10 DAC 2		Green	Petrol ecu side

			For measuring the engine speed signal. Wire colour: **Violet** Location: petrol ecu connector **E** pin **80**
8 RPM		Purple-white	

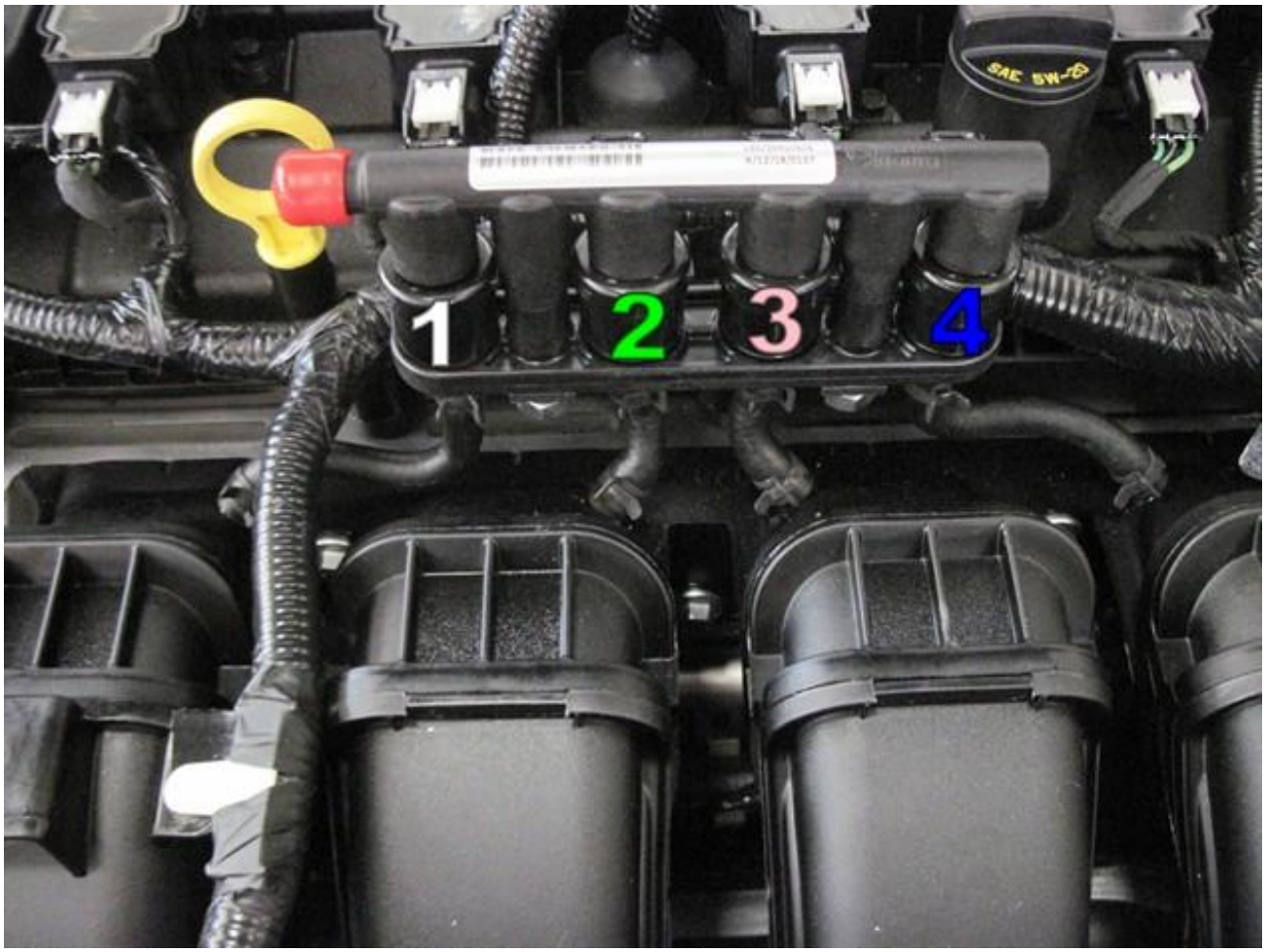
			PWM signal. Wire colour: **White** Location: petrol ecu connector **B** pin **45**
56 DI2		Yellow-green	

112			*Connect to +ignition / contact+ (+15).* *Do not place the fuses in the holder before having completed the installation of the LPG system.* Wire colour: **Green** Location: petrol ecu connector **B** pin **15**
112 + Ignition		Red-grey	

Electrical connections

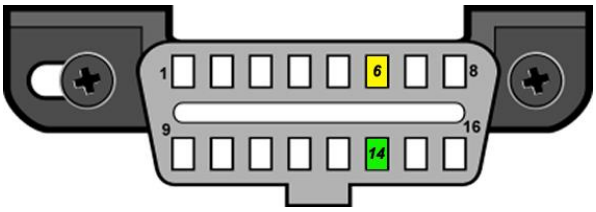
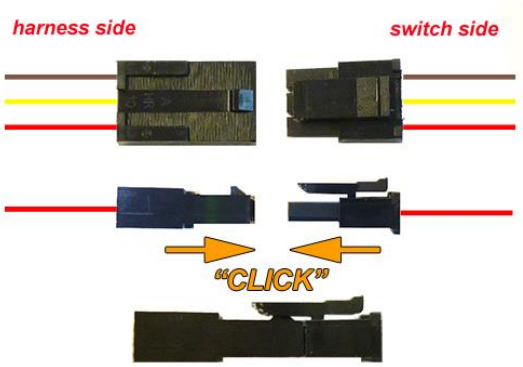
Check and measure the wiring in case of changes in the cars wiring colours.

98 98 G INJ OUT **1** 106 106 G + INJ 1	**White-yellow** red	Connector VSI-injector to cylinder **1**. Timing belt side
99 99 G INJ OUT **2** 107 107 G + INJ 2	**Green-yellow** red	Connector VSI-injector to cylinder **2**.
100 100 G INJ OUT **3** 108 108 G + INJ 3	**Pink-yellow** red	Connector VSI-injector to cylinder **3**.
82 82 G INJ OUT **4** 90 90 G + INJ 4	**Blue-yellow** red	Connector VSI-injector to cylinder **4**.



Electrical connections

Driver room

51 CAN1 High 70 CAN1 Low	Yellow Green	*Connect to EOBD diagnose connector.* Pin : 6 Pin : 14
		
3-pole micro connector 66 Ground fuel switch 3 +12V fuel switch 49 LIN fuel switch	Brown-black Red-white Yellow	*Connect to switch.* Connect the 3-pole connector to the Prins fuel selection switch
		

Electrical connections

Connectors in wiring loom

3-pole connector *27 +5V Sensor* *37 C ground* *18 AD1*	 Red-blue Brown-black Blue-white	*For measuring the inlet manifold pressure (MAP).* *Connect to the MAP sensor*
2-pole blue connector 15 T-ECT 34 Ground T-ECT	 Grey Brown-black	*For measuring the engine coolant temperature (Tect).* Connect the connector to the reducer temperature sensor.
4-pole connector 35 Ground Psys 14 T-Gas 9 +5 Volt sensor 16 Psys	 Brown-black Grey Red-blue Green	*For measuring gas pressure and temperature.* Connect the connector to the filter unit sensor.
2-pole connector 24 +12V reducer lock-off 31 C Ground	 Yellow-green Brown-black	Connect the connector to the reducer lock-off valve.
4-pole connector 46 Service TxD 65 Service RxD 68 Ground PDT	 Grey Grey Brown-black	Diagnose connector.
Tank wiring loom 2 +12V Tank relay 12 Tank level IN 26 Ground tank relay	 red blue black	 Connect to the tank lock-off. Connect the tank level gauge. Connect to the tank lock-off.
Wiring loom link 45 C ground 58 +12V switched 64 AD5	 Brown–black Red–white Blue-grey	 Connection from AFC connector A to connector B.

Optional:

3-pole connector 11 + manometer 12 tank level in 33 ground manometer	 red blue brown	***Cut off connector and insulate wires***

Checklist after installation

1. Connect the Prins Diagnostic Tool and run the VSI diagnostic program.
   Install the VSI fuse, turn the ignition key in the accessory position.
   When working on the car, beware of moving and rotating parts in the engine compartment.

2. When commissioning the LPG system, you must activate the AFC with the diagnostic software.
   When the AFC has not been activated, the switch will keep blinking.
   To activate the AFC, select function *activate ECM* in the diagnostic software.

3. Check whether the program in the AFC matches with the car (dedicated engine set):
   Refer the car description in the diagnostic software (Basic → Identification) and compare these with the set number.

4. The system will switch over to LPG as soon as the temperature of the coolant becomes higher than parameter 70 - Switch over ECT.

5. Check all components and connections for any gas leakage (use a LPG leak detector device or a fluid detection like soap). Caution for moving and rotating parts in the engine compartment!

6. Let the engine run warm on petrol >80°C.
   Check if the reducer heats up.
   Check the engine signals, petrol injection time, RPM, ECT, lambda, MAP signal and petrol pressure signal.
   Let the engine run idle on LPG.
   Adjust the reducer pressure.
   Refer to *Basic → System* in the diagnostic software for the idle level value set.
   Adjust the reducer pressure in such a way that the pressure measured (P-sys) equals the idle level value.
   Turn the socket-head screw at the front of the reducer to adjust the pressure.
   An error code will be generated whenever the pressure variation is too high.

7. Use the diagnostic software to check again all input and output signals.

8. Check the system for error codes and solve these, if required.
   Check the petrol ECM for EOBD error codes.
   Place the protection connector on the VSI communication connector.

9. Take a test drive and check the drivability on LPG and petrol.

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Prins