



## ***Installation manual***

### ***PART 2/2***

|                                 |                                 |
|---------------------------------|---------------------------------|
| MANUFACTURER                    | Mazda                           |
| TYPE                            | (based on CX-5)                 |
| ENGINE DISPLACEMENT             | 2000cc                          |
| NUMBER OF VALVES                | 16v                             |
| ENGINE CODE / NUMBER - POWER    | 2.0 PE-VPS - 121kW              |
| FIRING ORDER                    | 1-3-4-2                         |
| VEHICLE CATEGORIES              | M                               |
| TRANSMISSION                    | AT / MT                         |
| VERSION                         | VSI-2.1 DI LPG                  |
| TYPE VSI INJECTOR               | KN9 - 73 cc                     |
| TYPE INJECTION MODULE           | Gen2 type 1                     |
| PETROL ECU MANUFACTURER / CODE  | Mitsubishi PE1T 18 881 C / PE03 |
| MODEL YEAR:                     | 2012-2016                       |
| SYSTEM APPROVAL NUMBER ( R115 ) | N.A.                            |
| LOCATION R115 SYSTEM STICKER    | right side, centre door post    |
| ENGINE SET NUMBER               | 353/121001/A                    |
| MANUAL NUMBER                   | 076/1308300                     |
| DATE                            | 2020-04-14                      |

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Revision: -



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



**Manual updates / revision**

| Rev. nr | Rev. Date  | Subject update |
|---------|------------|----------------|
| -       | 2020-04-14 | Release        |
|         |            |                |
|         |            |                |
|         |            |                |
|         |            |                |



## 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, 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 VSI computer fails, it will automatically switch over to petrol. Never disconnect the VSI computer 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 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 100 mm 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 a exterior filler into body work).
- After having completed the installation, check the whole system for gas 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 gas installation or a dangerous situation.
- For maintenance instructions and filter registration see owner 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 card completely and return it within 8 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 nr. 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 ( ø 20, 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 )



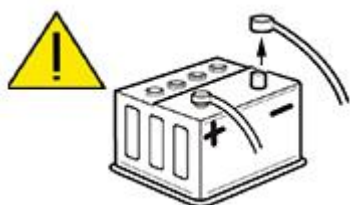
## Tightening moments

|            | Nm   | Spanner mm |
|------------|------|------------|
| M 4 x 0,7  | 3.3  | 7          |
| M 5 x 0,8  | 6.5  | 8          |
| M 6 x 1,0  | 11.3 | 10         |
| M 7 x 1,0  | 14.5 | 11         |
| M 8 x 1    | 24.5 | 13         |
| M 8 x 1,25 | 27.3 | 13         |
| M 10 x 1   | 52   | 15-16-17   |
| M 10 x 1,5 | 54   | 15-16-17   |

### EXPLANATION OF SYMBOLS :



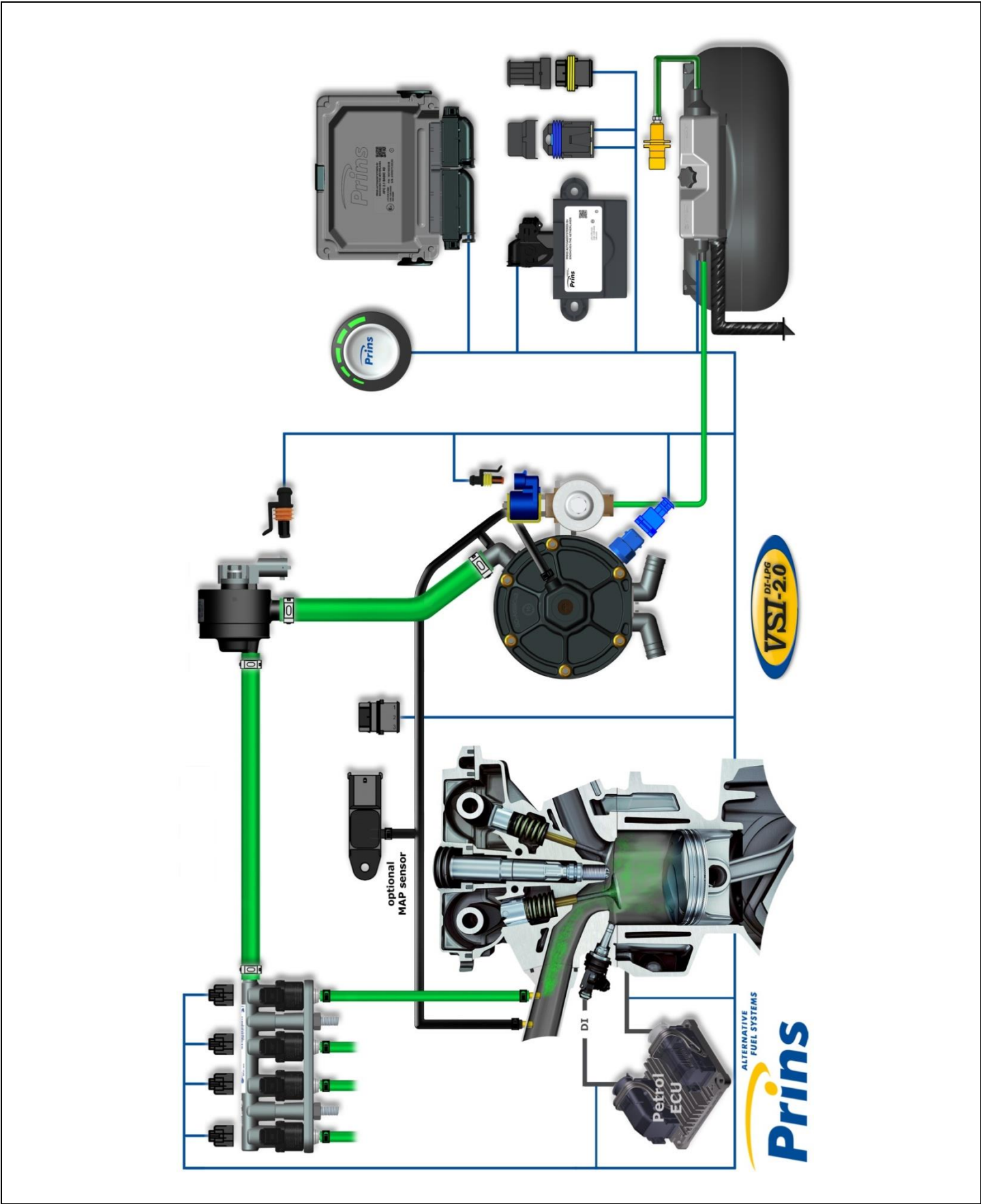
= IMPORTANT, CAUTION



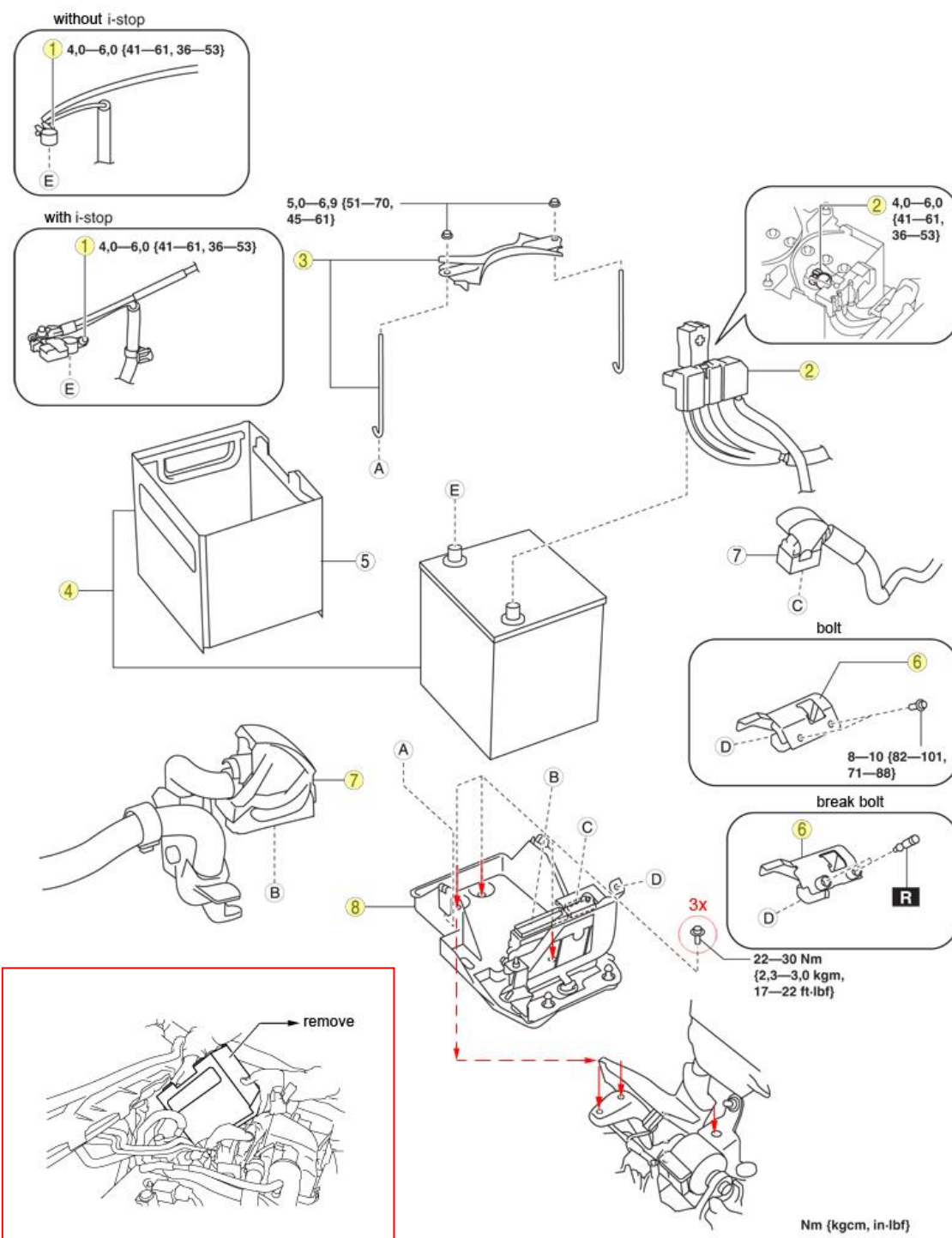
= WEAR SAFETY GOGGLES



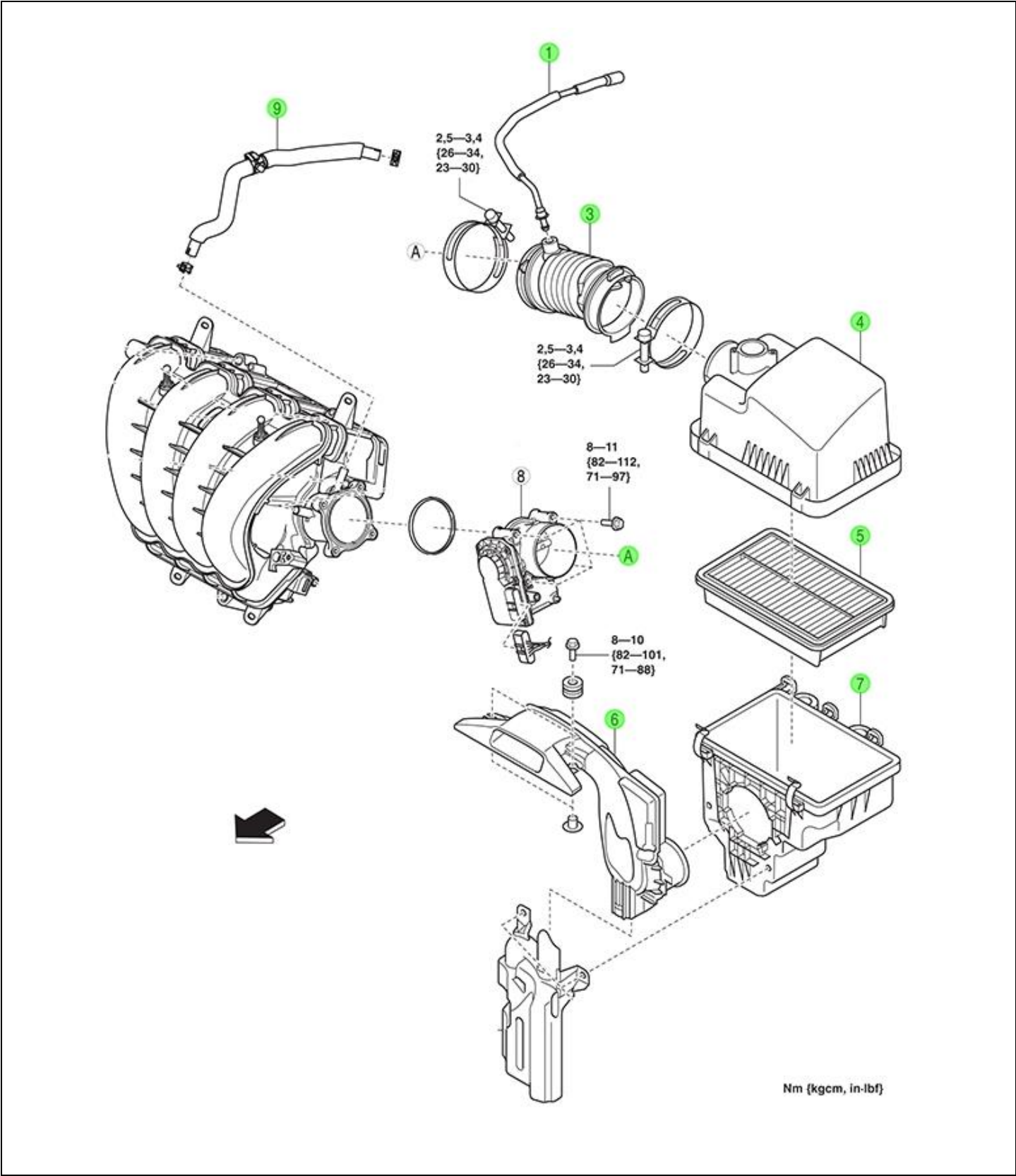
Base diagram



## Remove battery



Overview Filter removal



## VSI approval numbers

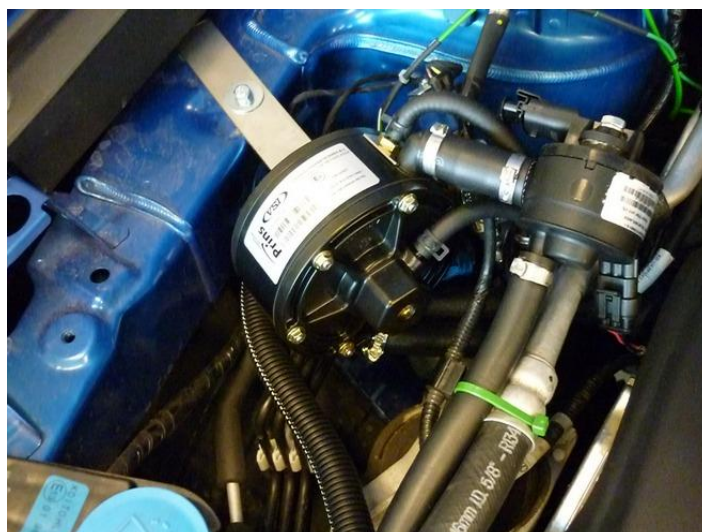
|                                                                                                                                 |                                                                                                                                                                         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

VSI component location overview  
(example Mazda CX-5)

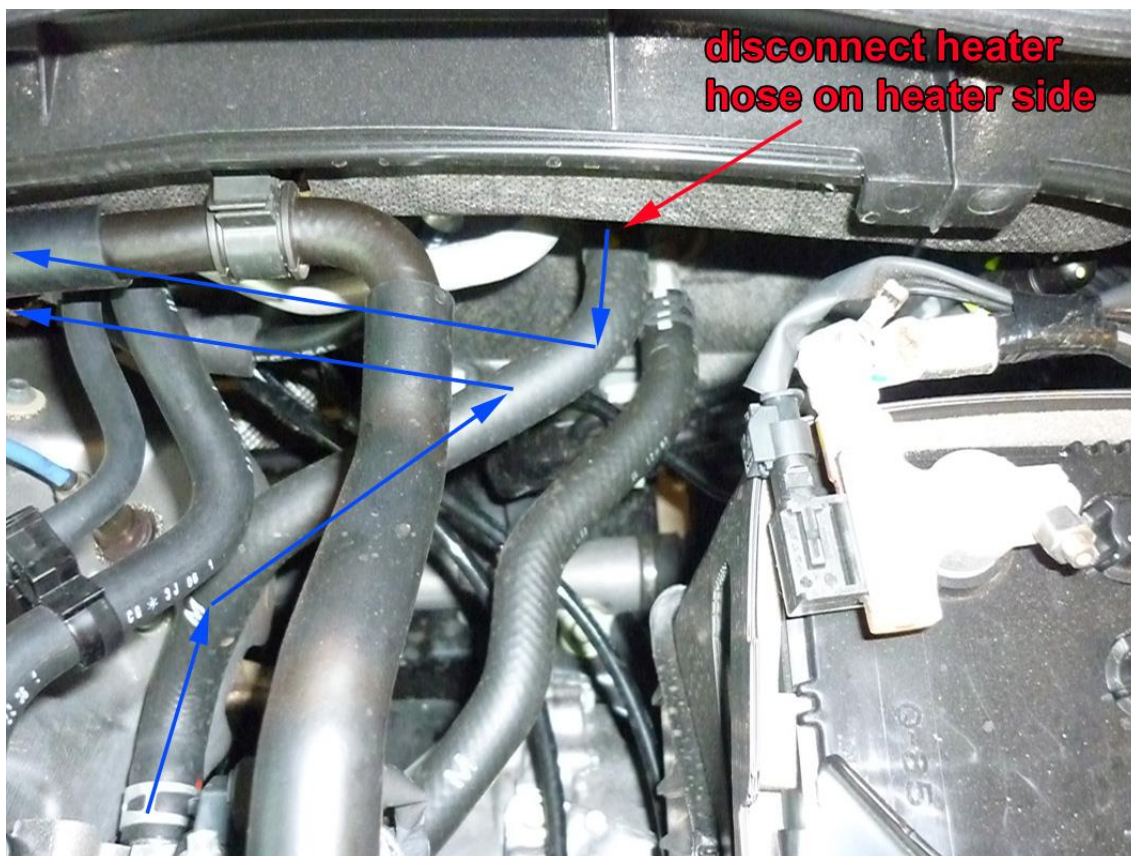
|                                                                                                         |                                                                                    |                                                                                                        |
|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <p><b>Reducer</b></p>  |  | <p><b>Petrol ECU</b></p>                                                                               |
| <p><b>Filter</b></p>   |                                                                                    | <p><b>AFC</b></p>   |
| <p><b>Rail(s)</b></p>  |                                                                                    | <p><b>Fuse</b></p>  |
|                                                                                                         |                                                                                    | <p><b>IM</b></p>                                                                                       |

|                                                                                     |                                                                |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------|
|  | <p>R115 approval sticker :<br/>Right side centre door post</p> |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------|

## Mounting the reducer



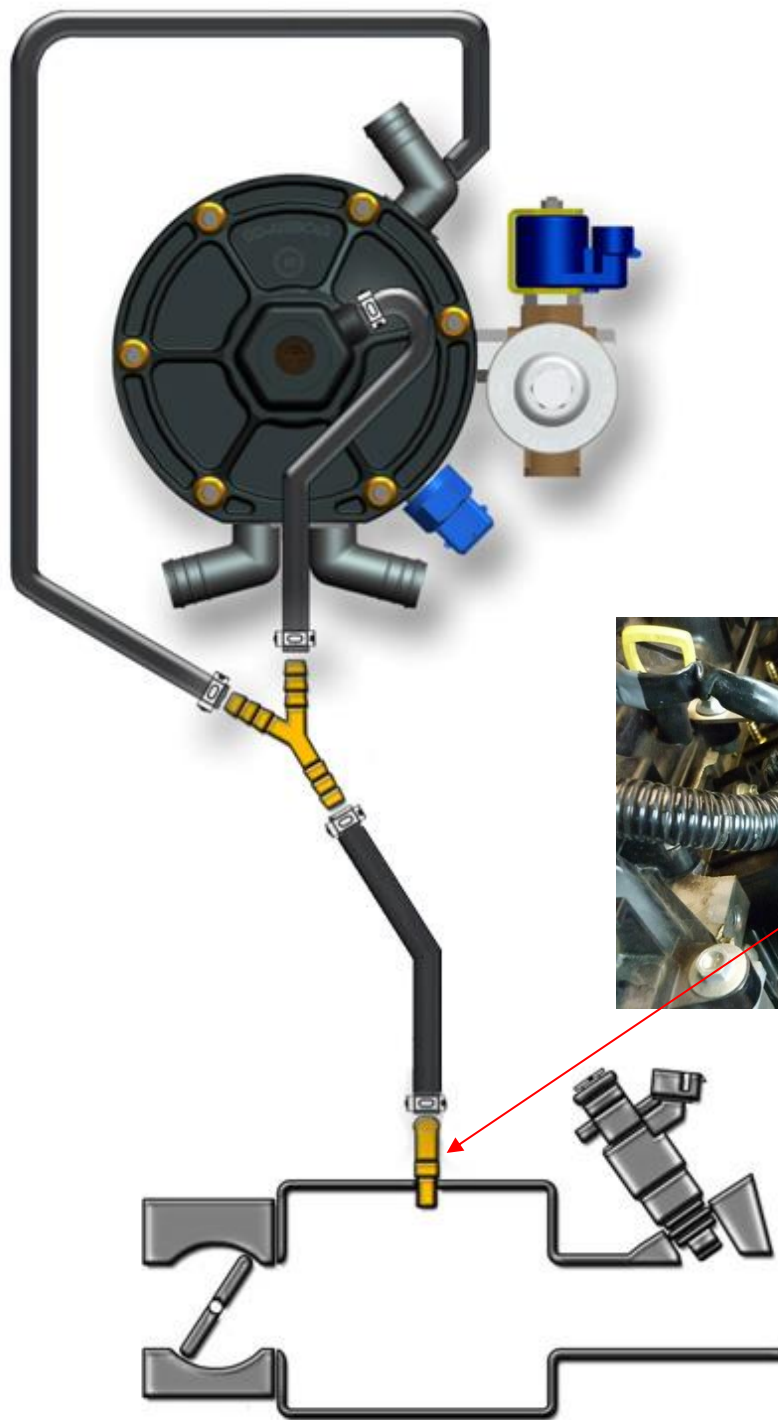
## Water connections



Serial connections

**Overpressure / MAP connection**

Drill Ø5mm, cut M6x1 thread



Ø5mm lpg hose: 3 x 30cm

## Mounting the inlet manifold couplings

Remove the inlet manifold.

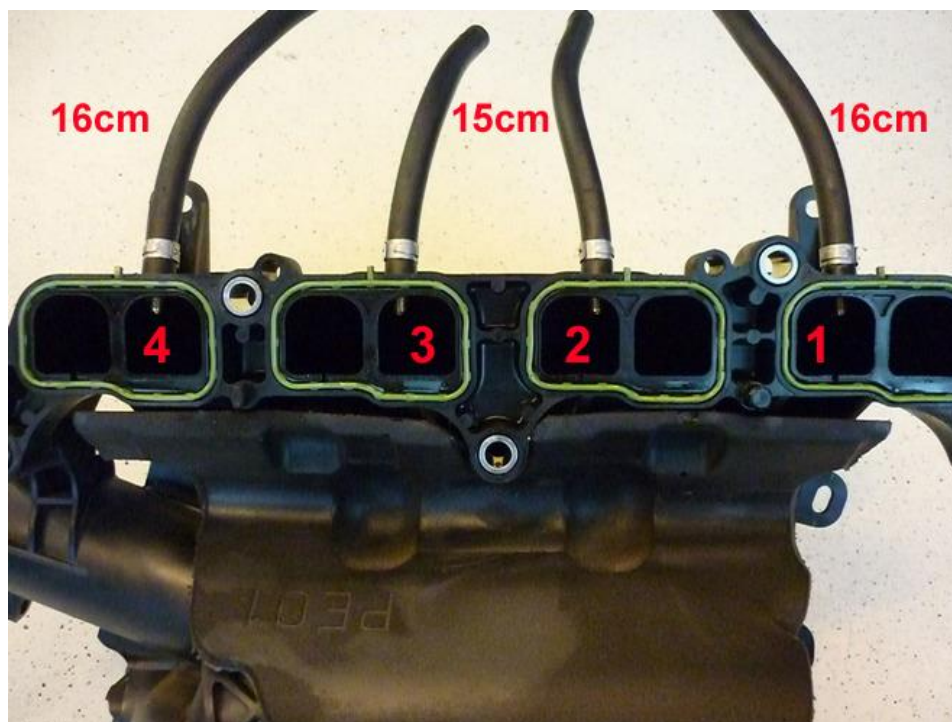
Drill 4 holes of 5 mm in the inlet manifold, one in each runner.

Drill 1 hole of 5 mm in the inlet manifold runner cylinder 1: vacuum / overpressure coupling ( see previous page )

Cut M6x1 thread in these holes.

Place the VSI couplings with a lock compound in the inlet manifold.

Watch out that the lock compound doesn't come inside the VSI couplings and place the inlet manifold back on the engine.



## Mounting the VSI injector rail (example, this bracket not included)

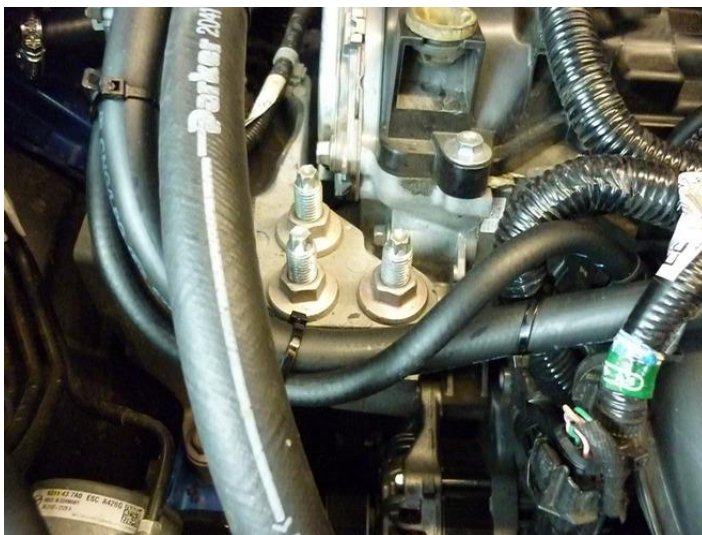


## Mounting the Prins filter unit

Ø 16mm LPG hose : 6 cm



Ø 11mm LPG hose : 50 cm :



**LPG hoses**

| <b>Hose<br/>(Ø..mm)</b> | <b>From component</b>  | <b>To component</b>                | <b>Hose length<br/>(cm)</b> |
|-------------------------|------------------------|------------------------------------|-----------------------------|
| 16                      | Reducer                | Prins filter unit                  | 6                           |
|                         |                        |                                    |                             |
| 11                      | Prins filter unit      | VSI injector rail                  | 50                          |
|                         |                        |                                    |                             |
| 5                       | Reducer overpressure   | Y-piece                            | 30                          |
| 5                       | Reducer MAP connection | Y-piece                            | 30                          |
| 5                       | Y-piece                | Inlet manifold coupling ( vacuum ) | 30                          |
|                         |                        |                                    |                             |
| 5                       | VSI injector 1         | Inlet manifold coupling cyl.1      | 16                          |
| 5                       | VSI injector 2         | Inlet manifold coupling cyl.2      | 15                          |
| 5                       | VSI injector 3         | Inlet manifold coupling cyl.3      | 15                          |
| 5                       | VSI injector 4         | Inlet manifold coupling cyl.4      | 16                          |

General info.

Cut the LPG hoses on length.

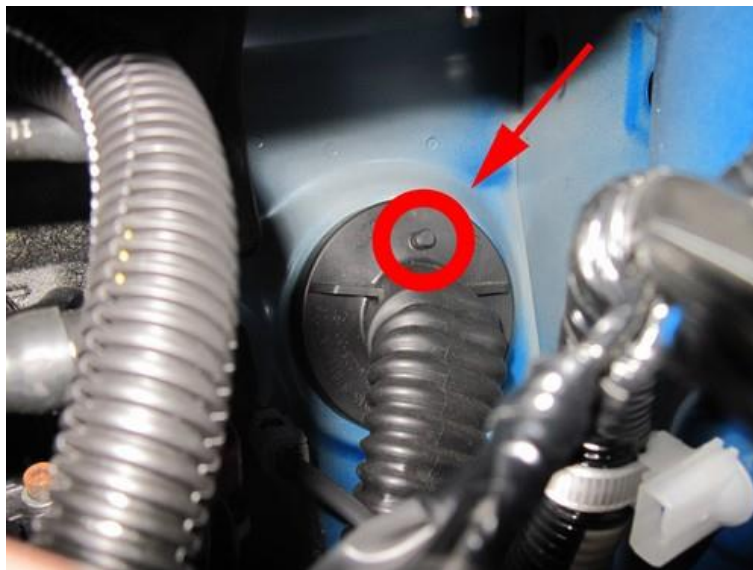
Please observe that there is no damage or fouling to the hoses.



## 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.

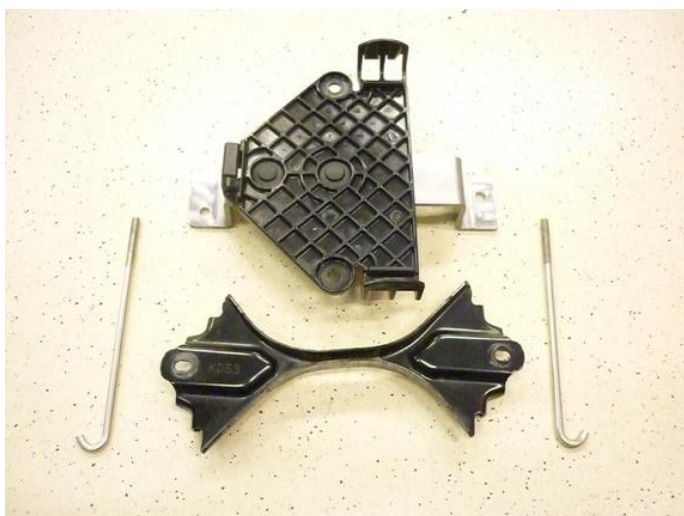


Grommet behind battery



Drill Ø8.2mm

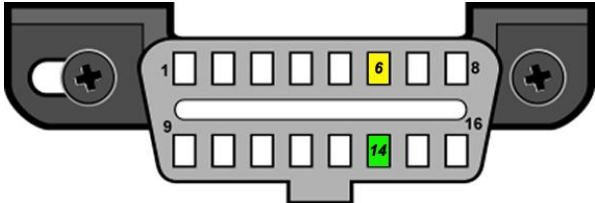
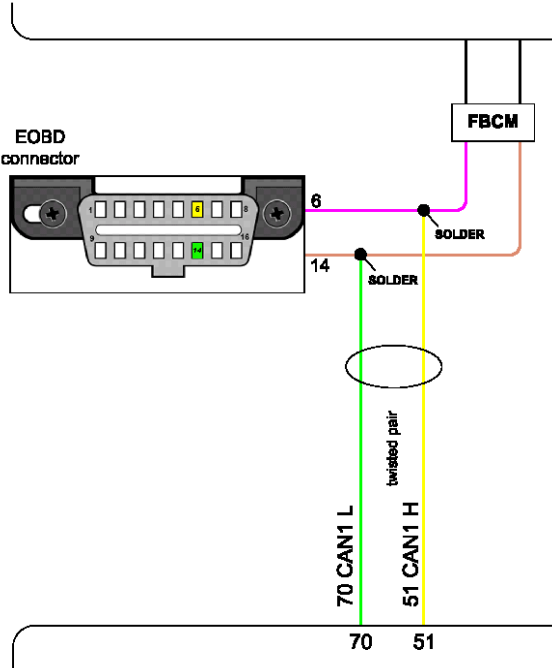
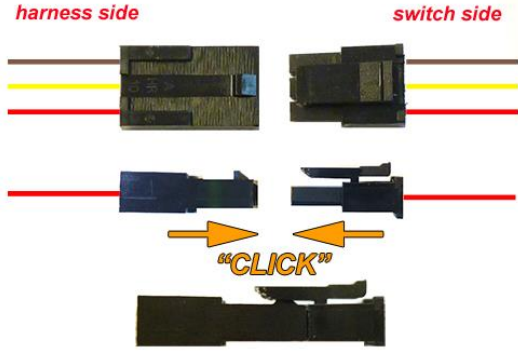
## Mounting the AFC



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

Electrical connections

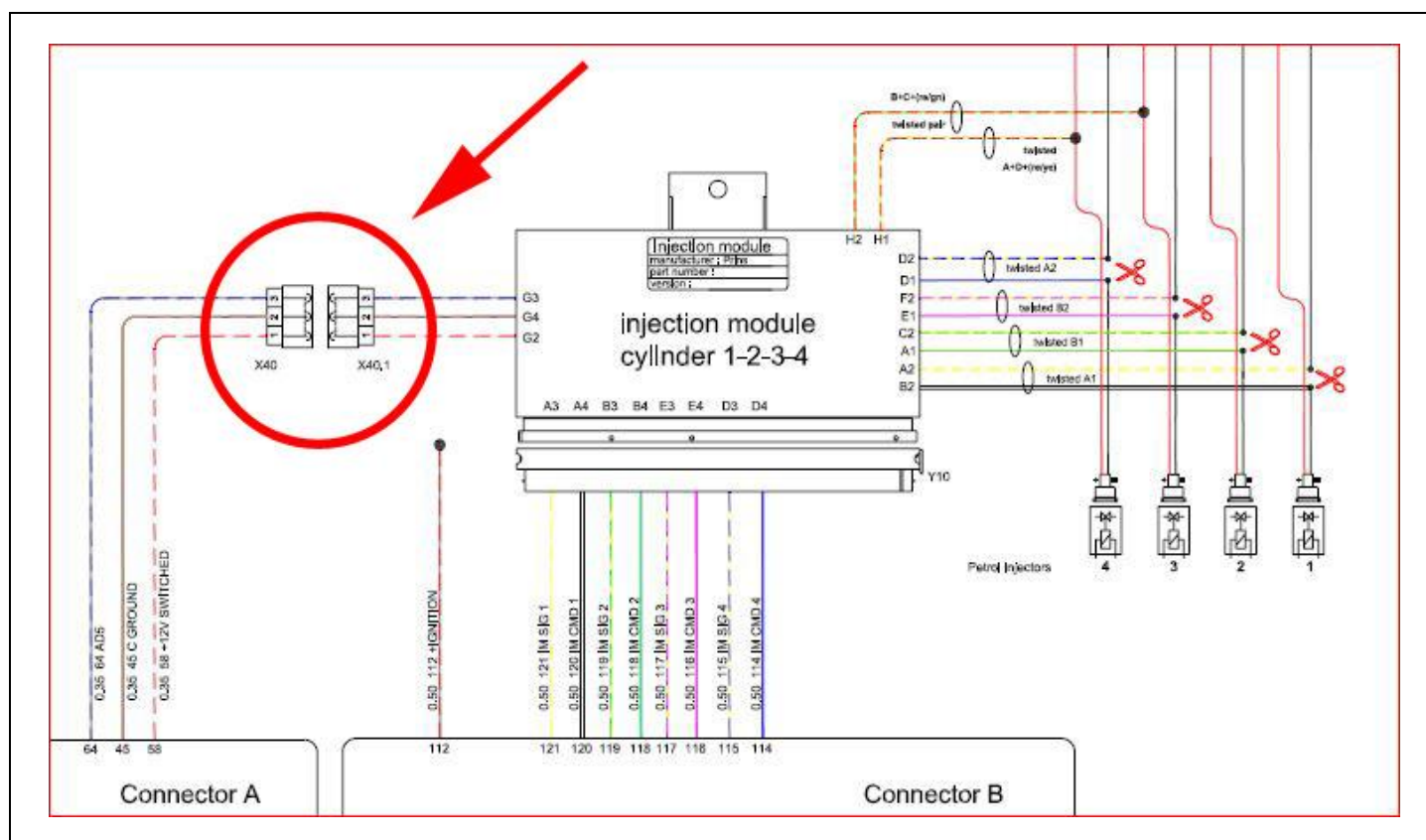
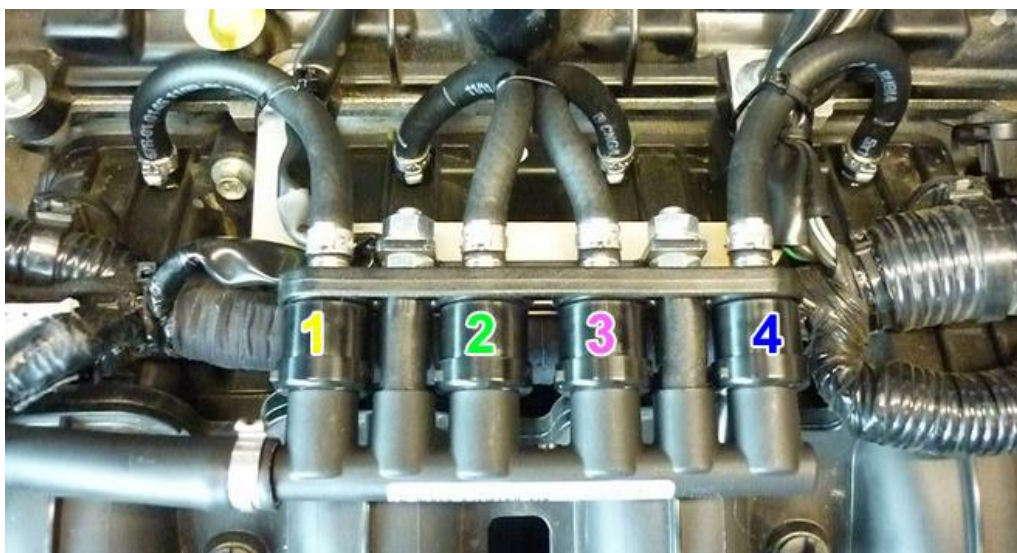
Driver room

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

## Electrical connections

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

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

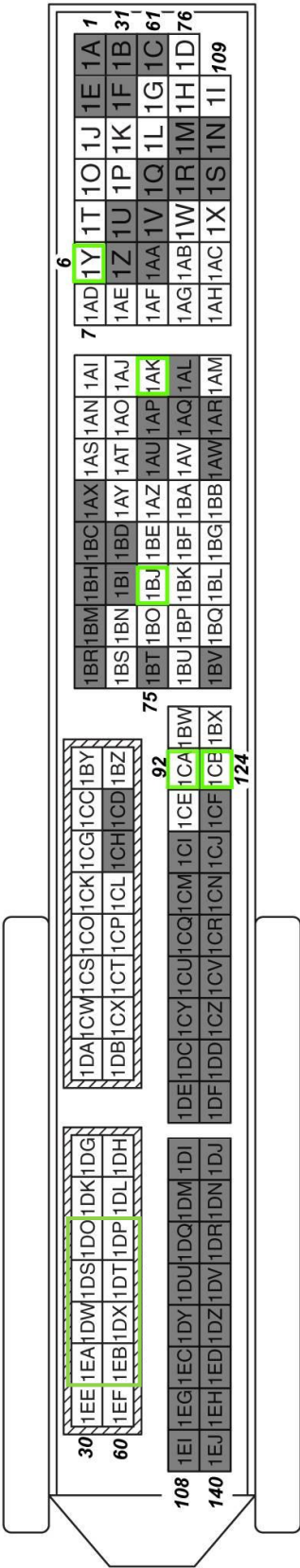


## Electrical connections

|                                                                                    |       |                                                                                                                                     |
|------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------|
| 1-32<br>MAIN GND ecu<br>MAIN GROUND SENSE                                          | Brown | Connect to the '-' of the battery ( -31 ) ;<br>use a ring terminal Ø6mm.<br>Wire location : left suspension strut, original ground. |
|  |       |                                                                                                                                     |

|                                                                                               |     |                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 – 13<br>+12V BATT sense<br>+12V BATT fused<br>+12V BATT boost pump<br>+12V BATT pump driver | Red | Connect to the '+' of the battery ( +30 ) ;<br>use a ring terminal Ø6mm.<br>Do not place the fuse in the<br>holder before having completed<br>the installation of the lpg system. |
|           |     |                                                                                                                                                                                   |

Petrol Ecu pinning, big connector



Electrical connections

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 ).**

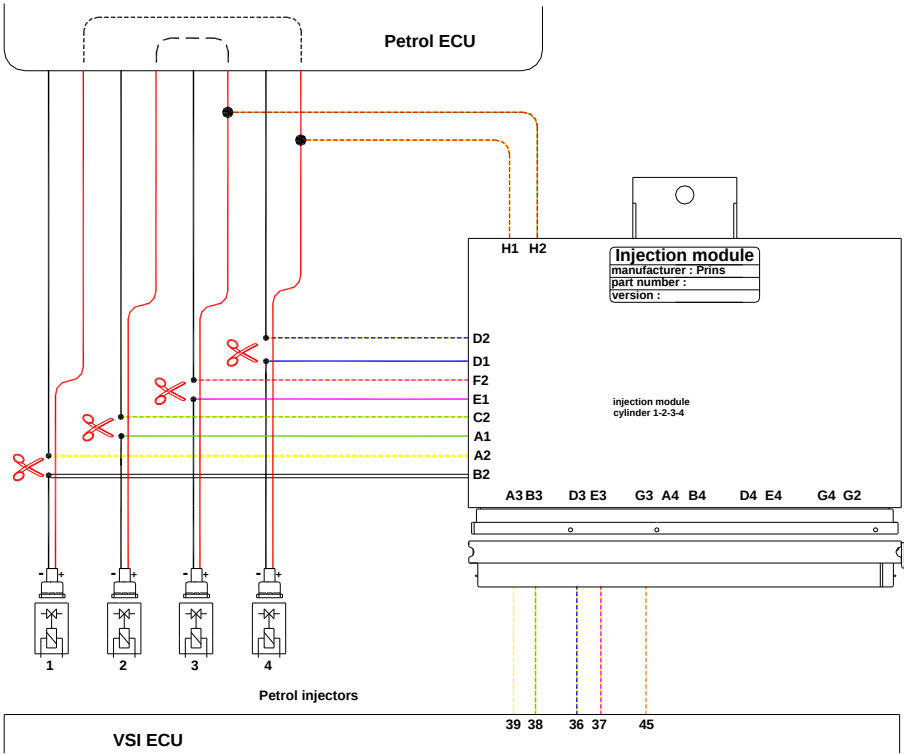
See diagrams: Installation manual general part 1 / 2.

**Attention:**

Each bicoloured measuring wire corresponds to a specific LPG injector and petrol injector / cylinder number.

**Do not interchange the wires.**

| VSI measure wire nr. :                          | Full coloured / Bicoloured<br>Module position | Interrupt petrol injector wire                                  |
|-------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------|
| VSI wire inj/ecu-lo-1<br>Petrol injector cyl. 1 | white / white-yellow<br>B2 / A2               | Colour : white<br>Location : petrol ecu, 1DO, pin nr 26         |
| VSI wire inj/ecu-lo-4<br>Petrol injector cyl. 4 | blue / blue-yellow<br>D1 / D2                 | Colour : dark-blue<br>Location : petrol ecu, 1DS, pin nr 27     |
| Module wire pos. H1<br>ECU HIGH A ( cil. 1-4 )  | red-yellow<br>H1                              | Colour : red<br>Location : petrol ecu, 1DP, pin nr 56           |
| VSI wire inj/ecu-lo-2<br>Petrol injector cyl. 2 | green / green-yellow<br>A1 / C2               | Colour : pink or brown<br>Location : petrol ecu, 1DW, pin nr 28 |
| VSI wire inj/ecu-lo-3<br>Petrol injector cyl. 3 | pink / pink-yellow<br>E1 / F2                 | Colour : light-blue<br>Location : petrol ecu, 1EA, pin nr 29    |
| Module wire pos. H2<br>ECU HIGH B ( cil. 2-3 )  | red-green<br>H2                               | Colour : pink<br>Location : petrol ecu, 1EB, pin nr 59          |



## Electrical connections

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

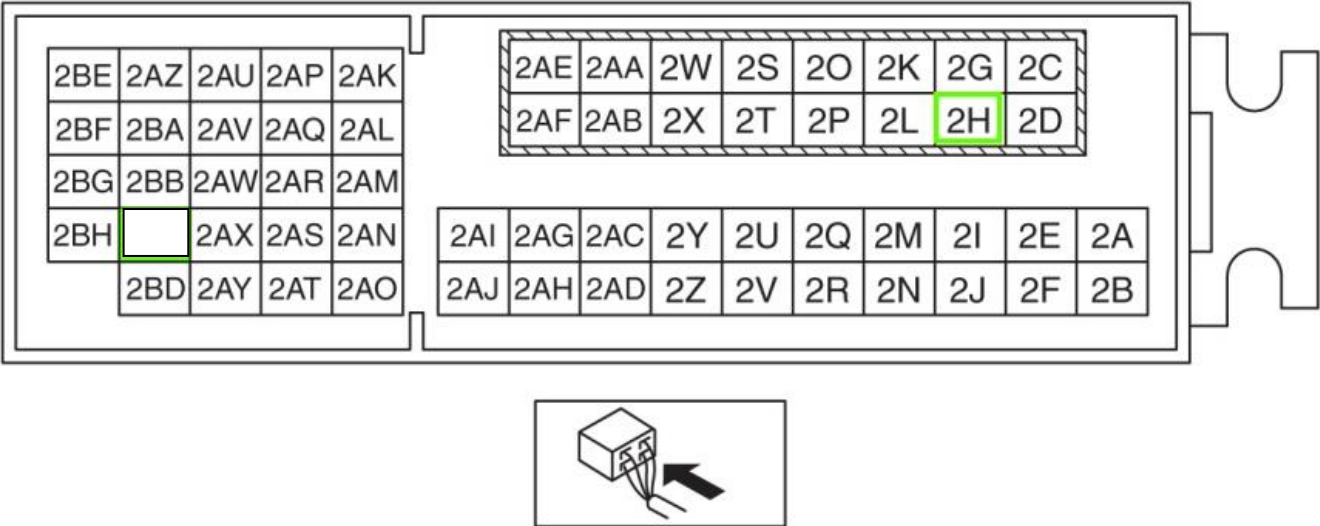
|       |              |               |                                                                                                                                                                                           |
|-------|--------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 27    | +5V Sensor   | Red - blue    | For measuring the inlet manifold pressure (MAP).<br><b>Cut off</b> the 3-pole connector to the Prins MAP sensor.<br>Insulate, not used                                                    |
| 37    | C ground     | Brown - black | Insulate, not used                                                                                                                                                                        |
| 18    | AD1          | Blue - white  | connect to:<br>Wire colour : red<br>Wire location : petrol ecu 1BW ( pin nr 91 ) or<br>MAP sensor on manifold, after throttle body                                                        |
|       |              |               |                                                                                                         |
| 17&25 |              |               | High pressure petrol sensor signal interruption<br>3-pole connector high pressure petrol sensor<br>Wire colour : Green, petrol ecu 1CA ( pin nr 92 ) or @sensor                           |
| 17    | AD2          | Blue-green    | Sensor side                                                                                                                                                                               |
| 25    | DAC1         | Green-white   | Ecu side                                                                                                                                                                                  |
| 63    | Ground Shift | Blue-orange   | High pressure petrol sensor ground shift<br>3-pole connector high pressure petrol sensor<br>Wire colour : Tan ( light-brown )<br>Wire location : petrol ecu 1CB ( pin nr 124 ) or @sensor |
| 40    | Wake up      | Grey-red      | 3-pole connector high pressure petrol sensor<br>Wire colour : Pink<br>Wire location : petrol ecu 1BJ ( pin nr 73 ) or @sensor                                                             |
|       |              |               |                                                                                                       |

Electrical connections

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

|   |                  |                |                                                                                                                                                                                                                                            |
|---|------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8 | RPM engine speed | Purple - white | <p>For measuring the engine speed, cam shaft sensor signal.</p> <p>Wire colour :green</p> <p>Wire location : petrol ecu, 1Y (pin nr 6 ) or @sensor:</p>  |
|---|------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|     |            |            |                                                                                                                                                                                                                                                                                         |
|-----|------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 112 | + Ignition | Red - grey | <p>Make a connection to ignition + / contact +.</p> <p>Do not place the fuse in the holder before having completed the installation of the LPG system.</p> <p><b>Small ecu connector!</b></p> <p>Wire colour : <b>white</b></p> <p>Wire location : petrol ecu <b>2H</b> (pin nr 15)</p> |
|-----|------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## Electrical connections

### Connectors in wiring loom

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

### Optional:

|                                                                               |                      |                                                    |
|-------------------------------------------------------------------------------|----------------------|----------------------------------------------------|
| 3-pole connector<br>11 + manometer<br>12 tank level in<br>33 ground manometer | red<br>blue<br>brown | <b><i>Cut off connector and insulate wires</i></b> |
|-------------------------------------------------------------------------------|----------------------|----------------------------------------------------|



## Checklist after installation

1. Connect the serial interface wire and run the VSI diagnosis program.  
Install the VSI fuse, and program the switch.  
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 VSI computer with the diagnosis software. When the VSI computer has not been activated, it will keep generating error code 160. To activate the VSI computer, select function F11 (activate ECM).
3. Check whether the program in the VSI computer matches with the car ( dedicated engine set ):  
Refer with F2 to the box number and car description in the diagnosis software and compare these with the set number.
4. The system will switch over to LPG as soon as the temperature of the coolant (T-ect) becomes higher than the parameter T-min set and when the TSO-cold time is expired.
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 evaporator heats up.  
Check the engine signals, petrol injection time, RPM, ECT, lambda, MAP signal, petrol pressure signal.  
Let the engine run idle on LPG.  
Adjust the evaporator pressure. Refer to the parameter list ( or F2 : ID box) for the idle level value set.  
Adjust the evaporator 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 evaporator to adjust the pressure.  
An error code will be generated whenever the pressure variation is to high.  
Seal the evaporator with the sticker included in the delivery after having adjusted the pressure.
7. Use the diagnosis software to check again all input and output signals.
8. Check the system for error codes and solve these, if required.  
Check the petrol MMS for EOBD error codes.  
Place the protection connector on the VSI communication connector.
9. Make a test drive and check the drivability on LPG and petrol.

