ALTERNATIVE FUEL SYSTEMS

Prins

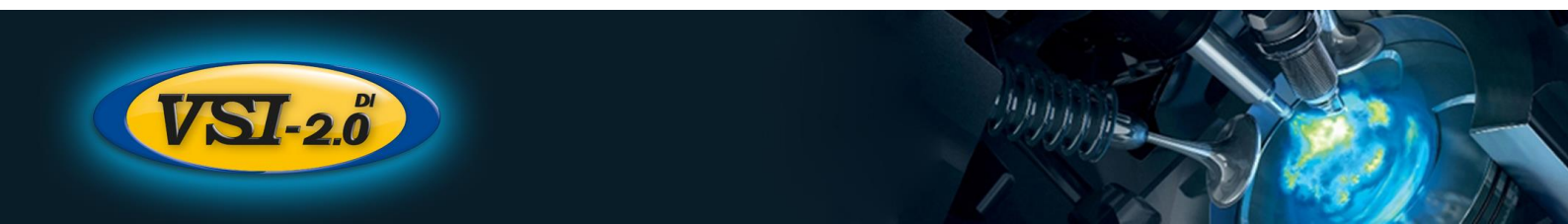
Quality, innovation and customer care, it's in our nature

# Installation manual

## PART 2/2

| | |
|---|---|
| MAKE OF AUTOMOBILE: | VAG |
| PISTON DISPLACEMENT: | 1400cc |
| NUMBER OF VALVES: | 16 |
| ENGINE NUMBER: | CAXA - 90kW / CAXC - 92kW |
| FIRING ORDER: | 1-3-4-2 |
| TRANSMISSION TYPE ( MT / AT ) | MT / AT |
| VEHICLE CATEGORIES M or N | M |
| TYPE VSI INJECTOR | KN9 - 52cc |
| TYPE INJECTION MODULE | Gen2 Type 1 |
| VERSION ( LPG ) | VSI-2.1 DI LPG |
| INJECTION SYSTEM: | BOSCH MED 17.5.5 / 17.5.20 |
| MODEL YEAR: | 2008- |
| SYSTEM APPROVAL NUMBER ( R115 ) | E4-115R-000020 / VSI-LPG 31 |
| LOCATION SYSTEM STICKER | right side, centre door post |
| SET NUMBER : | 366/121000/B |
| MANUAL | 076/2618500-1 |
| DATE : | 1-12-2015 |

Revision: 1



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

EXPLANATION OF SYMBOLS :

= IMPORTANT, CAUTION

## 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 is 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.

  **ATTENTION: please check, after activation of the AFC and switching the system to LPG, if DTC’s are stored in the Prins diagnostic software.**
  **If DTC’s are stored, please contact our After Sales department for a software update in relation to the CAN-BUS compatibility. aftersales@prinsautogas.com**
- 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 portal completely within 8 days after installation.

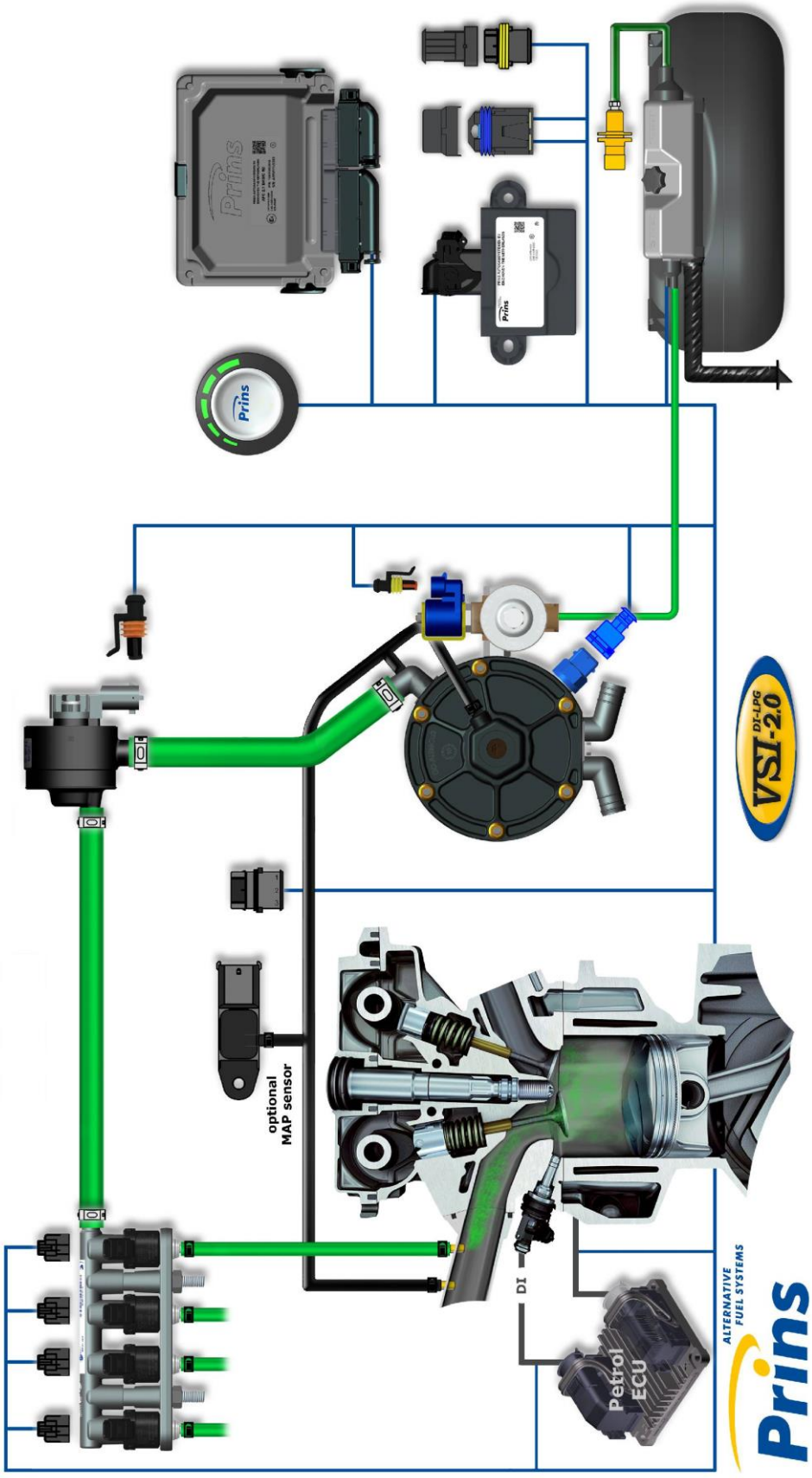
## Required equipment / tools / materials for installing a complete system

- 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 VSI diagnostic software
- Prins VSI serial interface
- Prins VSI break out box ( part nr. 080/70090 )
- Torque wrench ( 10Nm )
- Portable light
- Assortment drill bits 4 to 12 mm
- Assortment cutters ( ø 20, 30, 50, 70 mm )
- Punching tool ø 70 mm
- Round file
- Portable drill or pneumatic drill
- Thread cutting device ( male M6x1, M8x1, M10x1 )
- Pipe-flaring tool ( for 6 and 8 mm copper pipe )
- Air gun
- Vacuum cleaner
- Hot air gun
- Allan spanner for inlet couplings 3,5mm ( part nr. 099//9970 )
- Reducer adjustment tool ( part nr. 099/9960 )
- Molex extraction tool for VSI switch connector ( part nr. 090/9929 )
- 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
- Engine coolant

## 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 )

## Base diagram



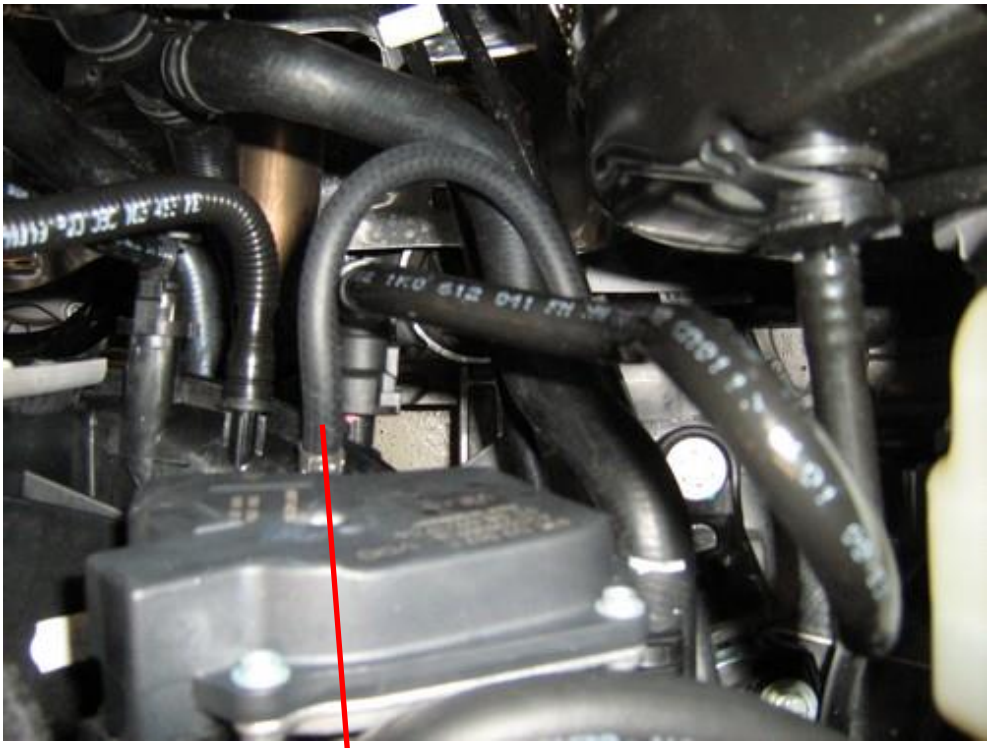
## VSI approval numbers

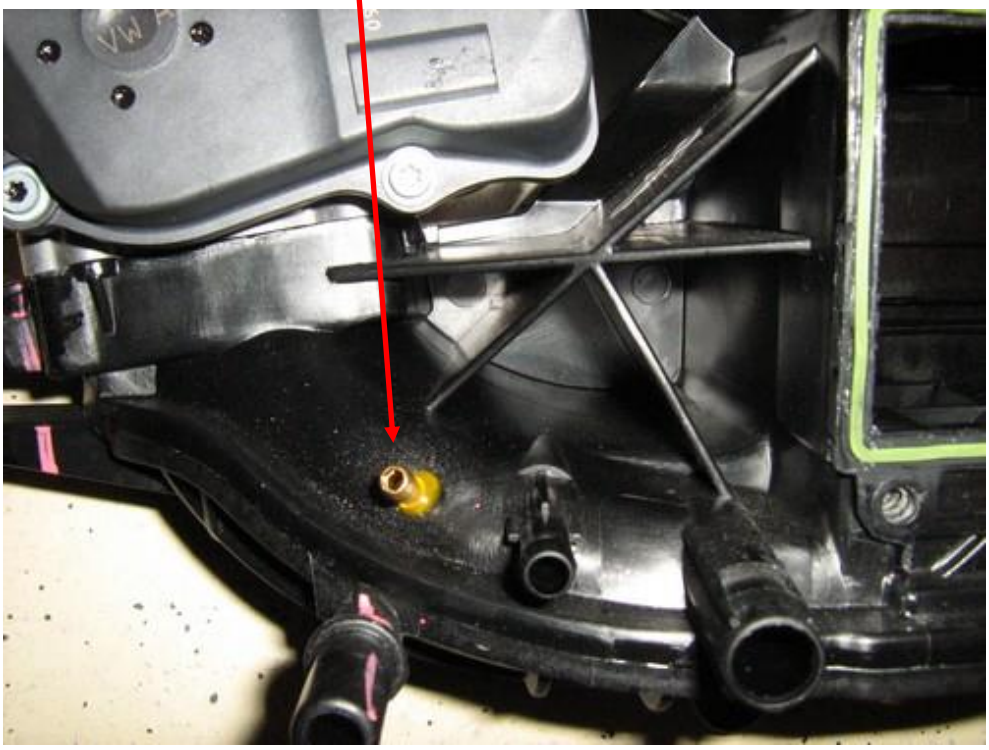
| | |
|---|---|
|  |  |
| Reducer VSI LPG Prins : E4-67R-010054<br>Lock-off valve OMB : E8-67R-014327<br>Lock-off valve Valtek : E4-67R-010041 | Injector rail Prins : LPG E4-67R-010093<br>CNG E4-110R-000021 |
|  |  |
| Filter unit T1 / T2 Prins : LPG E4-67R-010096<br>CNG E4-110R-000028 | Injector Keihin :LPG E4-67R-010092<br>CNG E4-110R-000020 |
|  |  |
| Prins AFC : E4-67R-010098<br>E4-10R-030507 | LPG hoses Tubithor : LPG E13-67R-010145<br>CNG E13-110R-000017<br>Rubia : LPG E4-67R-010068<br>CNG E4-110R-000003 |

## Overpressure / MAP connection

Drill Ø5mm, cut M6x1 threat

## Overpressure / MAP connection

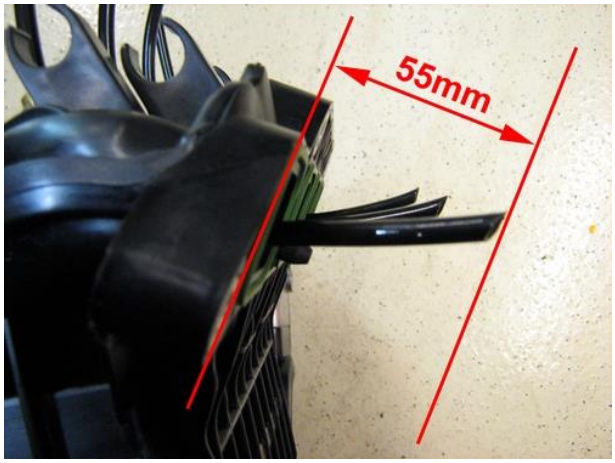




Back side manifold :
Drill a hole Ø5mm into the back of the manifold and cut M6x1 thread into the hole for the MAP coupling.

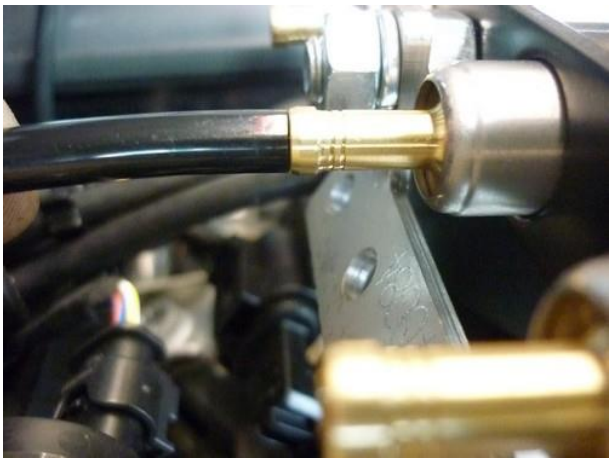
## Mounting the inlet manifold couplings

Remove the inlet manifold. Carefully remove the heater from the manifold.
Drill **4** holes of 9 mm in the inlet manifold. Cut M10x1 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.

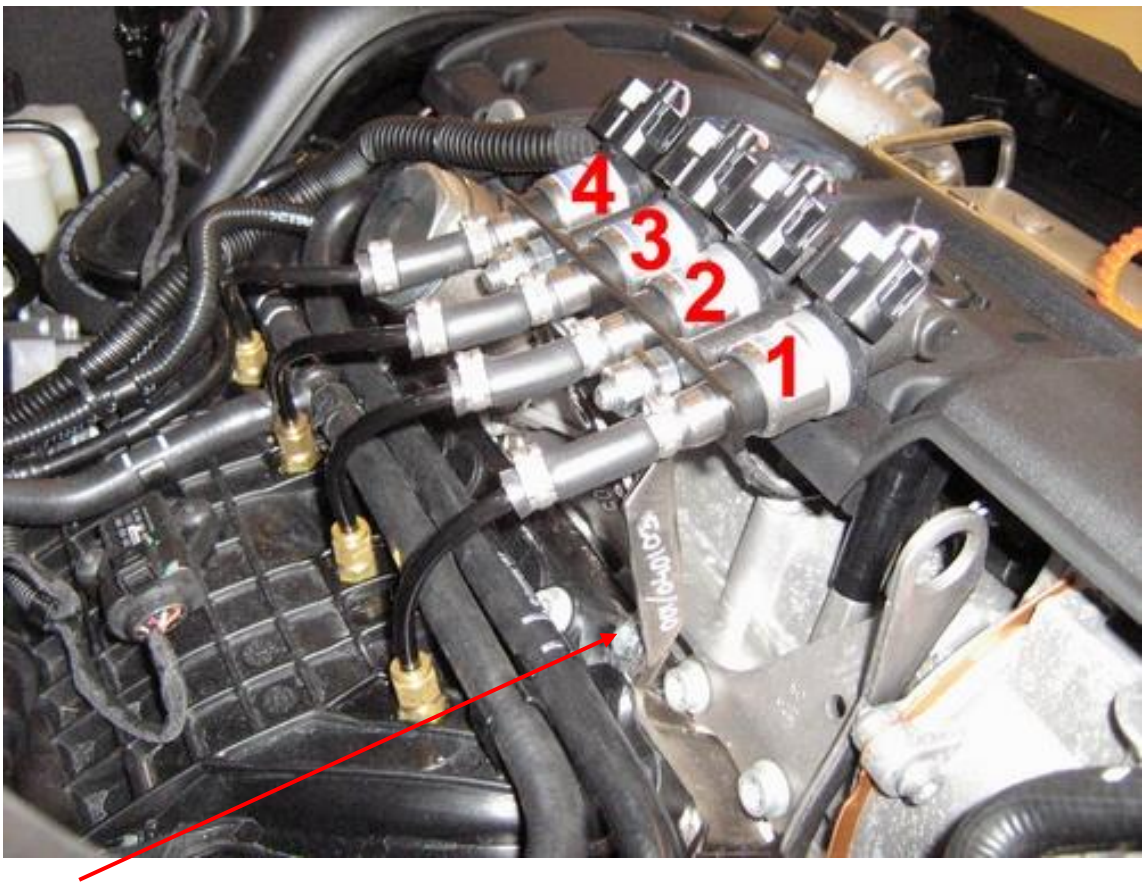

4x Nylon hoses : 35cm ( cut on length later )

Connect nylon to Injector with LPG hose:



# Mounting the VSI injector rail

Mount the injection rail with the bracket.




M6x16 bolt, original threaded hole.

| | | | | |
|---|---|---|---|---|
| 98 98 G INJ OUT<br>106 106 G + INJ 1 | **1** | **White - yellow**<br>red | Connector VSI-injector to cylinder **1**.<br>Timing belt side |
| 99 99 G INJ OUT<br>107 107 G + INJ 2 | **2** | **Green - yellow**<br>red | Connector VSI-injector to cylinder **2**. |
| 100 100 G INJ OUT<br>108 108 G + INJ3 | **3** | **Pink - yellow**<br>red | Connector VSI-injector to cylinder **3**. |
| 82 82 G INJ OUT<br>90 90 G + INJ4 | **4** | **Blue - yellow**<br>red | Connector VSI-injector to cylinder **4**.<br>Gear box side |

## LPG hoses

4x Nylon hoses : 35cm ( cut on length later )

Connect Nylon to Injector:

| | | | | | |
|---|---|---|---|---|---|
| Length of hose, | ø | 6 mm | VSI injector 1 -> manifold coupling | = ± 4 | cm |
| Length of hose, | ø | 6 mm | VSI injector 2 -> manifold coupling | = ± 4 | cm |
| Length of hose, | ø | 6 mm | VSI injector 3 -> manifold coupling | = ± 4 | cm |
| Length of hose, | ø | 6 mm | VSI injector 4 -> manifold coupling | = ± 4 | cm |

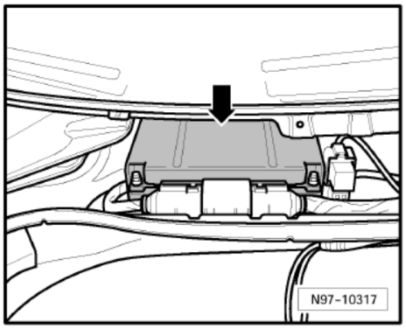
Cut the hoses on length.
Please observe that there is no damage or fouling to the hoses.

# Petrol ECU

## Engine control unit -J623-

### Fitting location:

under centre of plenum chamber cover -arrow-




## 154-pin connector:

**A - Engine control unit -J623-**

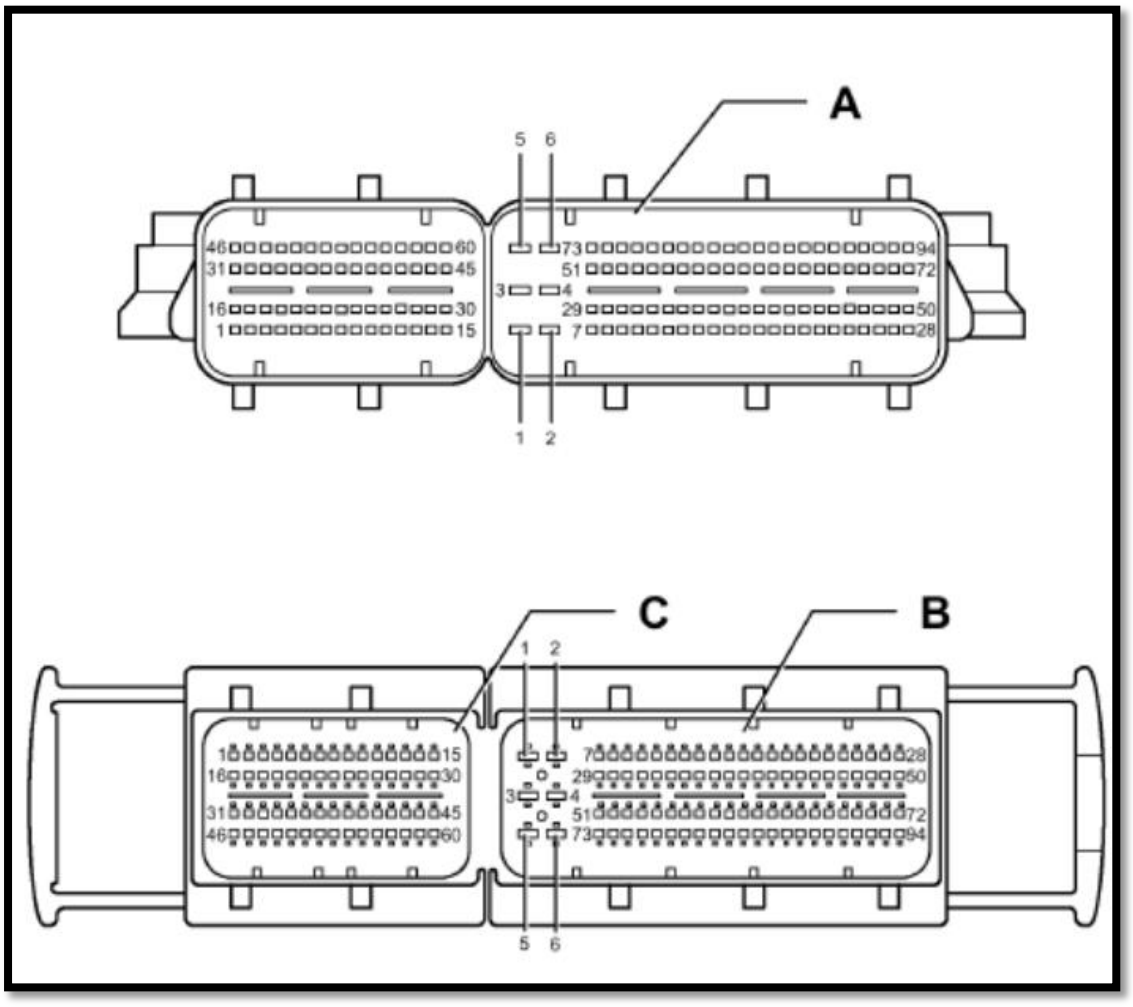
**154-pin connector:**

**B - 94-pin connector -T94-**

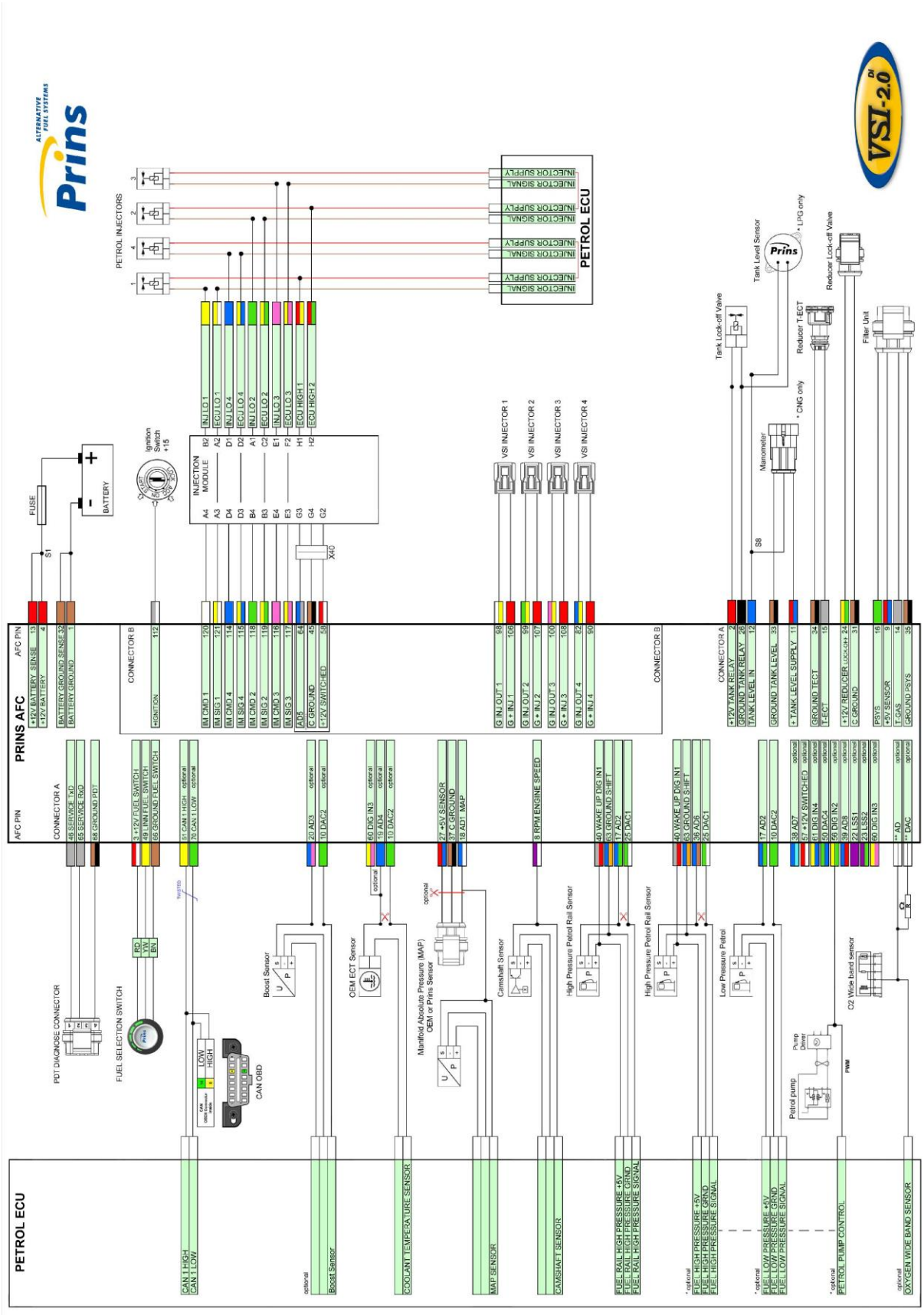
**C - 60-pin connector -T60-**

***Note***

*Connector -T154- is comprised of a 94-pin connector -T94- and a 60-pin connector -T60- .*



# Base diagram



# Electrical connections

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

| Wire number / code | Wire colour | Connection |
|---|---|---|
| 32 Ground sense<br>1 Ground battery | Brown<br>Brown | Connect to the '–' of the battery; use a ring terminal or solder:<br>Wire colour : **Black**<br>Wire location : **- (ground) battery** |
| 4 +12V Battery | Red | Do not place the fuse in the holder before having completed the installation of the LPG system.<br>Wire colour : **Red**<br>Wire location : **+ Battery** |

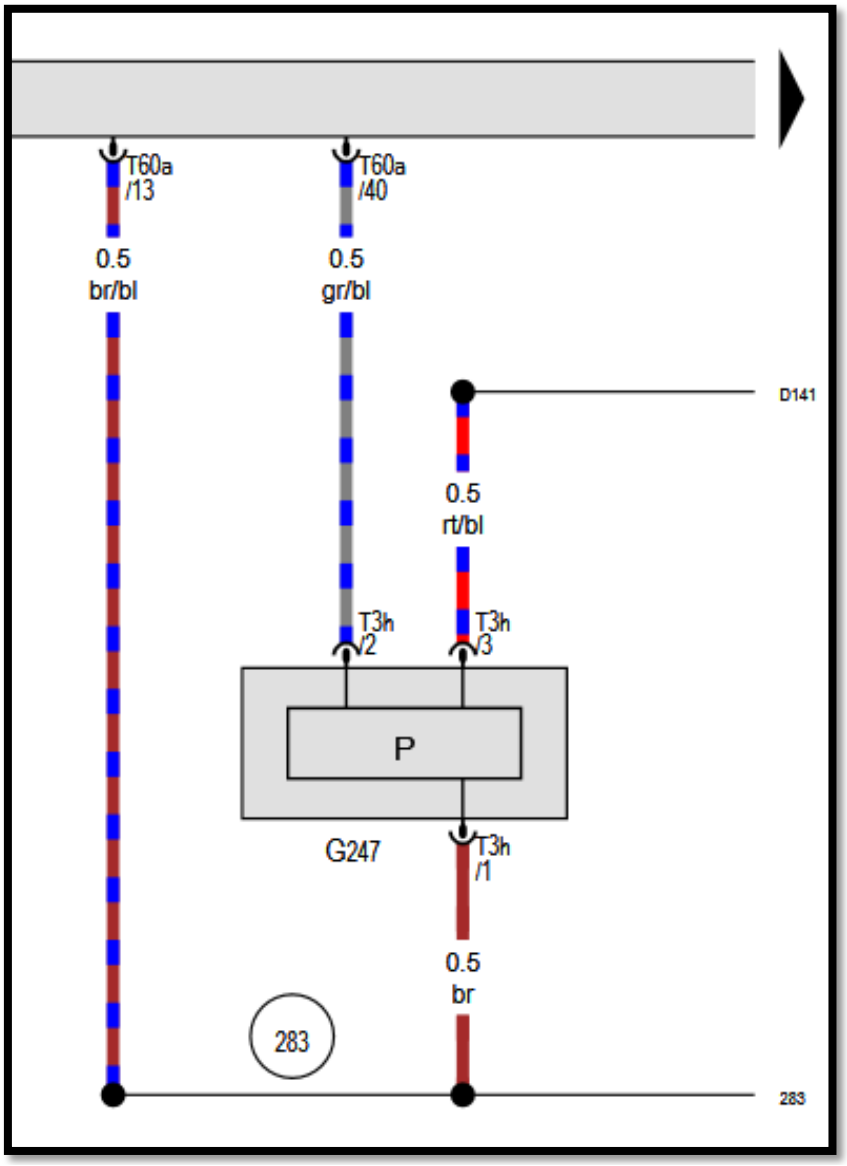
| | | |
|---|---|---|
| 98 98 G INJ OUT **1**<br>106 106 G + INJ 1 | **White - yellow**<br>red | Connector VSI-injector to cylinder **1**.<br>Timing belt side |
| 99 99 G INJ OUT **2**<br>107 107 G + INJ 2 | **Green - yellow**<br>red | Connector VSI-injector to cylinder **2**. |
| 100 100 G INJ OUT **3**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

# Electrical connections Petrol Pressure sensor

**Interruption and ground shift**

**Check and measure the wiring in case of changes in the cars wiring colours.**
**Pin=Leading !**

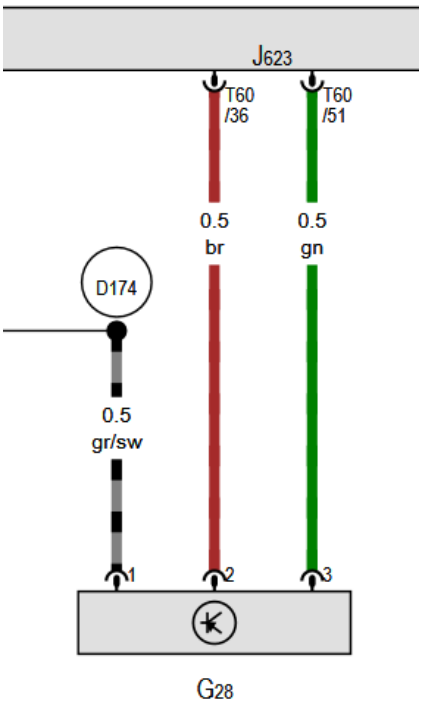
| | | |
|---|---|---|
| 17 AD2<br>25 DAC1 | Blue–green<br>Green-white | *High pressure petrol sensor signal interruption.*<br>Sensor side.<br>ECU side.<br>Wire colour : ***Grey-blue***<br>Wire location : Petrol ECU, connector **T60**, pin **40**<br>**or**<br>Wire location : Petrol ECU, connector **T60**, pin **41** |
| 63 Ground shift | Blue–orange | *Make a connection to ground high pressure petrol sensor.*<br>Wire colour : ***Brown-blue***<br>Wire location : Petrol ECU, connector **T60**, pin **13 or 12** |

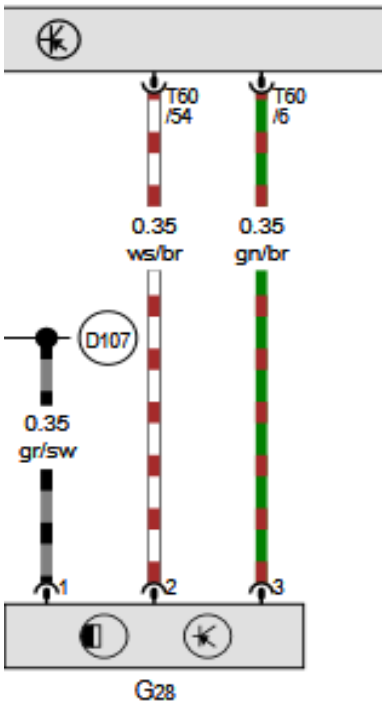


# Electrical connections Crank Shaft
## Engine RPM

**Check and measure the wiring in case of changes in the cars wiring colours.**
**Pin=Leading !**
**Check wire colour @ crank shaft sensor**

| | | | |
|---|---|---|---|
| 8 | RPM engine speed | Purple-white | *For measuring the engine speed.*<br>***2007-2014:***<br>Wire colour : **Brown ( Audi )**<br>Wire location : Petrol ECU, connector **T60**, pin**36**<br><br>Wire colour : **Brown ( Seat )**<br>Wire location : Petrol ECU, connector **T60**, pin**36**<br><br>Wire colour : **White-brown ( Skoda )**<br>Wire location : Petrol ECU, connector **T60**, pin**36**<br><br>Wire colour : **White-brown ( VW )**<br>Wire location : Petrol ECU, connector **T60**, pin**36**<br><br>***2007-2009:***<br>Wire colour : **White-brown ( VW / Seat )**<br>Wire location : Petrol ECU, connector **T60**, pin**54** |

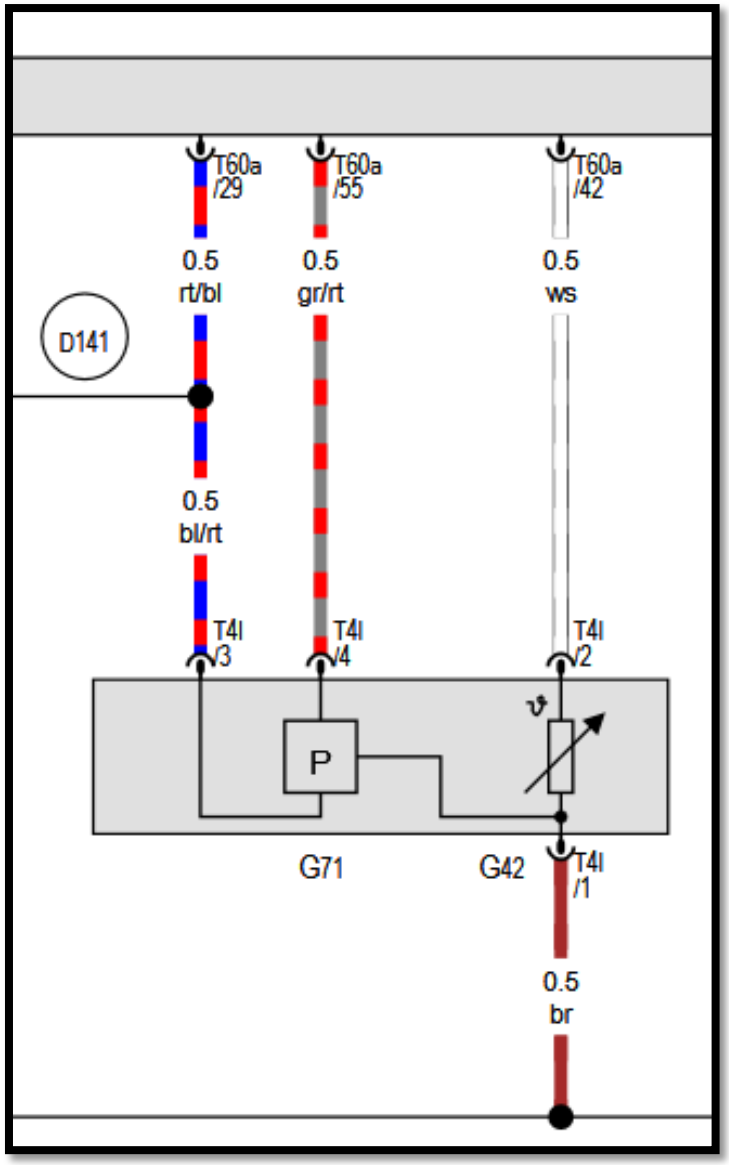


# Electrical connections Petrol Pressure sensor
## Wake-Up

**Check and measure the wiring in case of changes in the cars wiring colours.**
**Pin=Leading !**

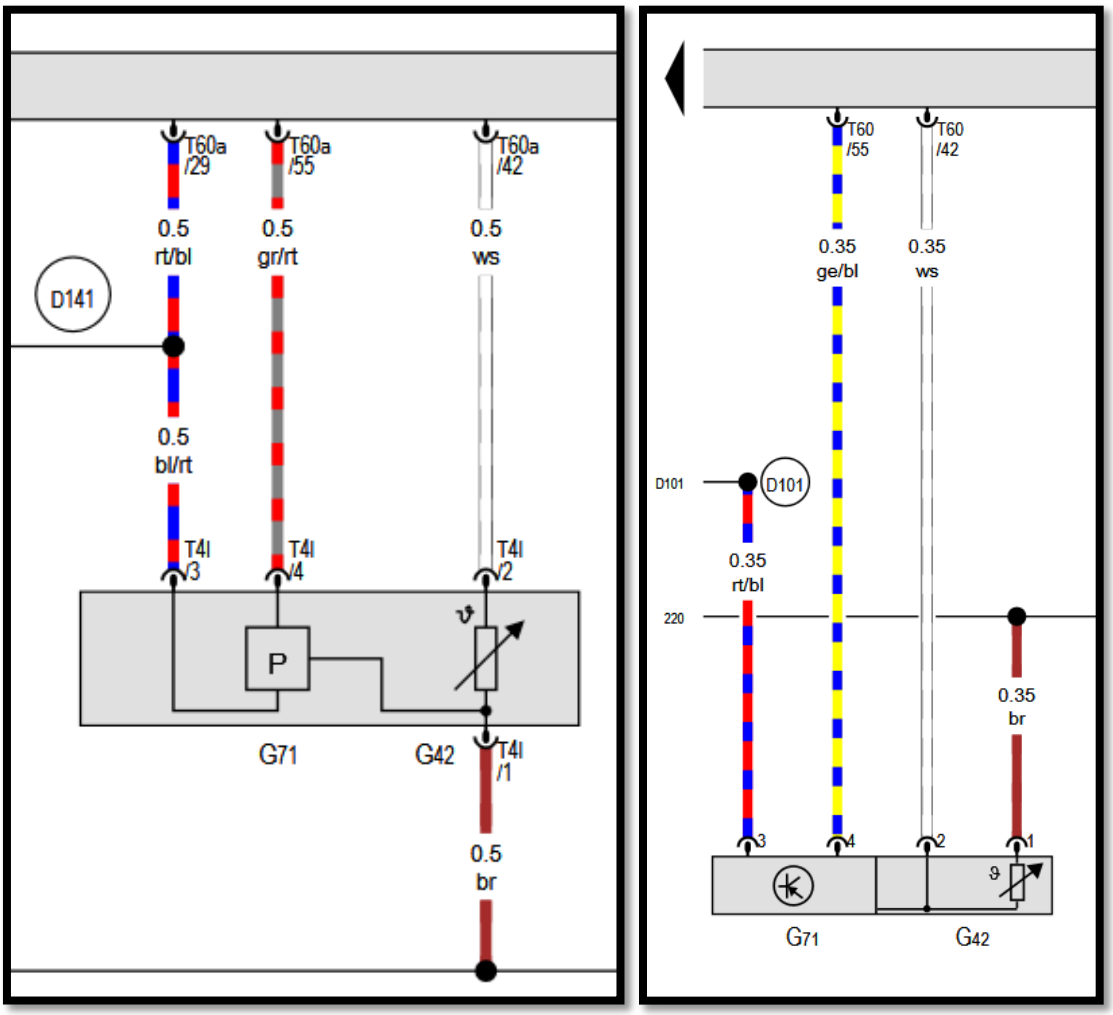
| | | | |
|---|---|---|---|
| 40 | Wake-up | Grey-red | *High pressure petrol sensor 5Volt supply / car wake-up*<br><br>Wire colour : ***Red-blue***<br>Wire location : Petrol ECU, connector **T60, pin 29 or pin 8** |



# Electrical connections
## MAP

**Check and measure the wiring in case of changes in the cars wiring colours.**
**Pin=Leading !**

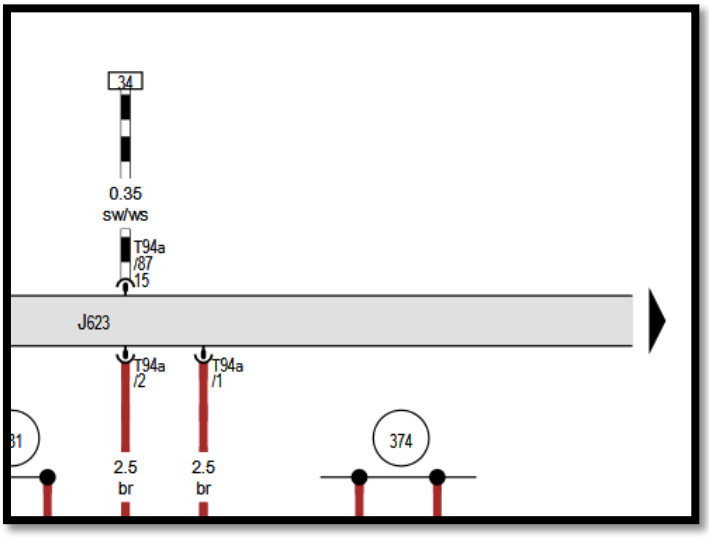
| | | |
|---|---|---|
| 27 +5V Sensor<br>37 C ground | Red – blue (not used)<br>Brown - black (not used) | *For measuring the inlet manifold pressure (MAP).* |
| 18 AD1 | Blue-white | Wire colour : ***Grey-red or Blue-yellow***<br>Wire location : Petrol ECU, connector **T60**, pin **55** |

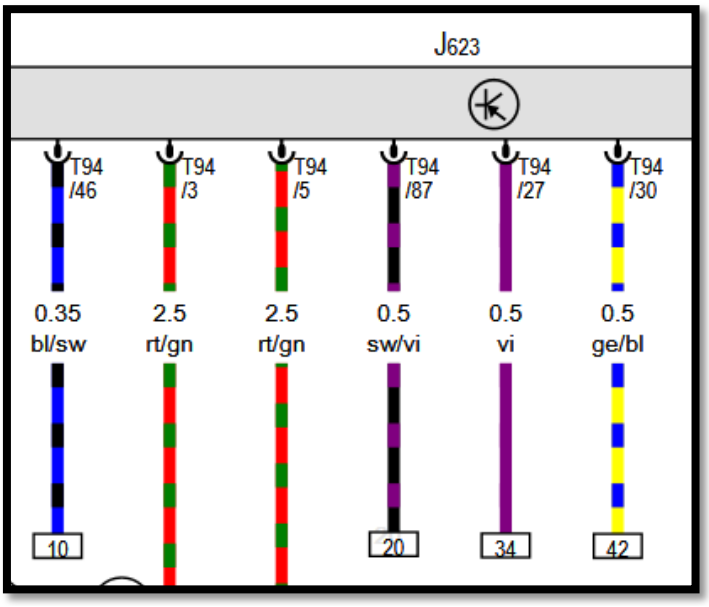


# Electrical connections Ignition+

**Check and measure the wiring in case of changes in the cars wiring colours.**
**Pin=Leading !**

| | | |
|---|---|---|
| 112 + Ignition | Red-grey | *Make a connection to ignition + / contact +.*<br>Do not place the fuse in the holder before having completed the installation of the LPG system.<br>Wire colour : **black-violet / grey-black** or **black-white**<br>**Pin=Leading !**<br><br>Wire location : Petrol ECU, BIG connector **T94**, pin **87** |



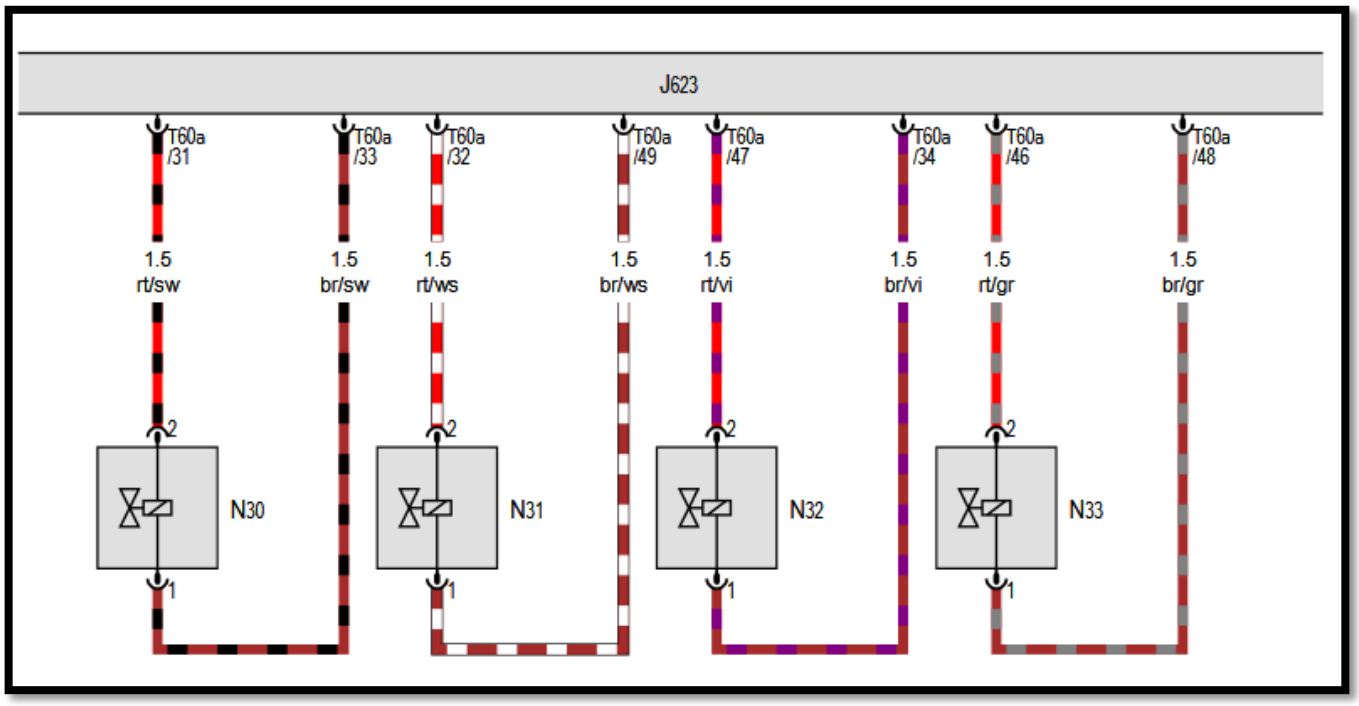



# Electrical connections MED 17.5.5

**Check and measure the wiring in case of changes in the cars wiring colours.**
**Pin=Leading !**
**Insulate not used wires.**

⚠ 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 Module position** | **Interrupt petrol injector wire** |
|---|---|---|
| VSI wire inj / ecu **1**<br>*Petrol injector cyl. 1* | white / white-yellow<br>B2 / A2 | Colour : **Brown - black**<br>Location : Petrol ECU, **T60,** pin **33 N30** |
| VSI wire inj / ecu **2**<br>*Petrol injector cyl. 2* | green / green-yellow<br>A1 / C2 | Colour : **Brown - white**<br>Location : Petrol ECU, T**60**, pin **49 N31** |
| VSI wire inj / ecu **3**<br>*Petrol injector cyl. 3* | pink / pink-yellow<br>E1 / F2 | Colour : **Brown - purple**<br>Location : Petrol ECU, **T60**, pin **34 N32** |
| VSI wire inj / ecu **4**<br>*Petrol injector cyl. 4* | blue / blue-yellow<br>D1 / D2 | Colour : **Brown - grey**<br>Location : Petrol ECU, **T60**, pin **48 N33** |
| Module wire pos. H1<br>ECU HIGH A ( cil. 1-4 ) | red-yellow<br>H1 | Colour : **Red – black**<br>Location : Petrol ECU, **T60**, pin **31 N30** |
| Module wire pos. H2<br>ECU HIGH B ( cil. 2-3 ) | red-green<br>H2 | Colour : **Red - white**<br>Location : Petrol ECU, **T60**, pin **32 N31** |

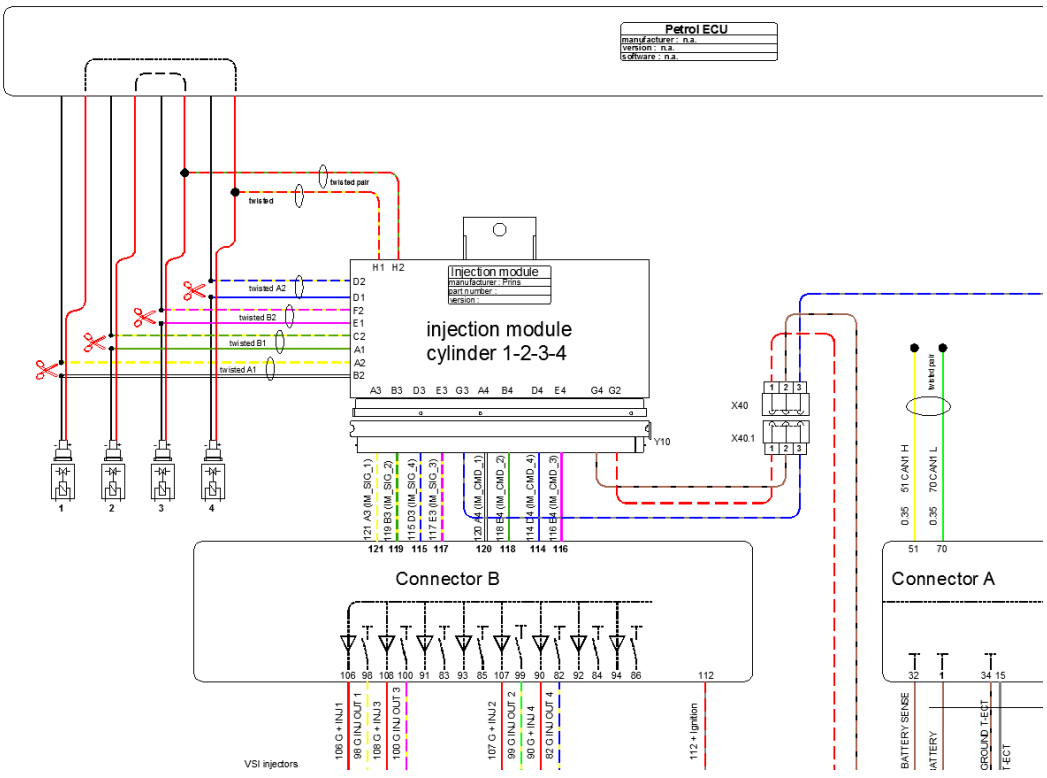


# Electrical connections MED 17.5.20

**Check and measure the wiring in case of changes in the cars wiring colours.**
**Pin=Leading !**
**Insulate not used wires.**

⚠ 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 Module position | Interrupt petrol injector wire |
|---|---|---|
| VSI wire inj / ecu **1**<br>*Petrol injector cyl. 1* | white / white-yellow<br>B2 / A2 | Colour : **Brown - black**<br>Location : Petrol ECU, **T60,** pin **33 N30** |
| VSI wire inj / ecu **2**<br>*Petrol injector cyl. 2* | green / green-yellow<br>A1 / C2 | Colour : **Brown - white**<br>Location : Petrol ECU, T**60**, pin **34 N31** |
| VSI wire inj / ecu **3**<br>*Petrol injector cyl. 3* | pink / pink-yellow<br>E1 / F2 | Colour : **Brown - purple**<br>Location : Petrol ECU, T**60**, pin **49 N32** |
| VSI wire inj / ecu **4**<br>*Petrol injector cyl. 4* | blue / blue-yellow<br>D1 / D2 | Colour : **Brown – grey**<br>Location : Petrol ECU, **T60**, pin **48 N33** |
| Module wire pos. H1<br>ECU HIGH A ( cil. 1-4 ) | red-yellow<br>H1 | Colour : **Red – black**<br>Location : Petrol ECU, **T60**, pin **31 N30** |
| Module wire pos. H2<br>ECU HIGH B ( cil. 2-3 ) | red-green<br>H2 | Colour : **Red – white**<br>Location : Petrol ECU, **T60**, pin **32 N31** |



# Electrical connections

***Connectors in wiring loom***

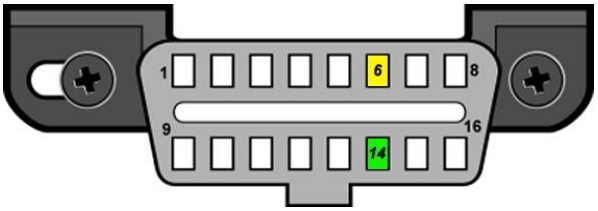
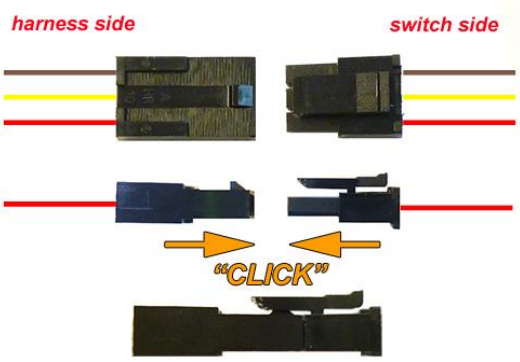
| | | |
|---|---|---|
| 2-pole blue connector<br>15 T-ECT<br>34 Ground T-ECT | <br>Grey<br>Brown - black | *For measuring the engine coolant temperature ( Tect ).*<br><br>Connect the connector to the reducer temperature sensor. |
| 4-pole connector<br>35 Ground Psys<br>14 T-Gas<br>9 +5 Volt sensor<br>16 Psys | <br>Brown - black<br>Grey<br>Red - blue<br>green | *For measuring gas pressure and gas temperature*.<br><br>Connect the connector to the filter unit sensor. |
| 2-pole connector<br>24 +12V reducer lock-off<br>31 C Ground | <br>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 | <br>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 | <br>red<br>blue<br>black | <br>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 | <br>Brown – black<br>Red – white<br>Blue - grey | <br>Connection from AFC connector A to connector B |
| | | |

***Optional:***

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

# Electrical connections

***Driver room***

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

## 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 VSI computer with the diagnostic software. When the VSI computer has not been activated, the switch will keep blinking. To activate the VSI computer, select function activate ECM in the diagnostic software.

3. Check whether the program in the VSI computer matches with the car ( dedicated engine set ):
   Refer the car description in the diagnostic software ( Basic → Indentification ) 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 64 - 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 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 Basic → System in the diagnostic software 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.

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 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.

**ATTENTION: please check, after activation of the AFC and switching the system to LPG, if DTC's are stored in the Prins diagnostic software.**
**If DTC's are stored, please contact our After Sales department for a software update in relation to the CAN-BUS compatibility. aftersales@prinsautogas.com**

ALTERNATIVE FUEL SYSTEMS
Prins