Workshop Manual

Audi TT 2007 ➢

TDI injection and glow plug system (4-cyl. 2.0 ltr. 4-valve common rail, generation II)									
Engine ID	CFG B								

Edition 05.2010

List of Workshop Manual Repair GroupsList of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Repair Group

23 - Mixture preparation - injection

28 - Glow plug system

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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23 – Mixture preparation - injection

1 Safety precautions and rules for cleanliness

⇒ “1.1 Safety precautions”, page 1

⇒ “1.2 Safety precautions for vehicles with start/stop system”, page 1

⇒ “1.3 Rules for cleanliness and instructions for working on fuel system”, page 2

⇒ “1.4 To avoid any risk of injuries to persons and/or damage to the injection and glow plug system, always observe the following safety precautions:”, page 3

⇒ “1.5 Checking vacuum system”, page 3

1.1 Safety precautions

Note the following if testers and measuring instruments have to be used during a road test:

WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Persons sitting in the front passenger's seat could be injured if the airbag is triggered in an accident.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*

◆ *Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.*

1.2 Safety precautions for vehicles with start/stop system

WARNING

Risk of injury due to automatic engine start on vehicles with start/stop system.

◆ *On vehicles with activated start/stop system (this is indicated by a message in the instrument cluster display), the engine may start automatically on demand.*

◆ *Therefore it is important to ensure that the start/stop system is deactivated when performing repairs (switch off ignition, if required switch on ignition again).*

1.3 Rules for cleanliness and instructions for working on fuel system

To prevent the high-pressure fuel pump from running while it is empty and to ensure that the engine starts quickly after parts have been renewed, it is important to observe the following:

- If components of the fuel system between the fuel tank and the high-pressure fuel pump are removed or renewed, the basic setting “Checking fuel system pressurisation pump” must be performed to bleed the fuel system.
- If the supplementary fuel pump, fuel line (between fuel tank and high-pressure fuel pump) or fuel filter is removed or renewed, the basic setting “Checking fuel system pressurisation pump” must be performed before the engine is started for the first time.
- If the high-pressure fuel pump is removed or renewed, the basic setting “Checking fuel system pressurisation pump” must be performed before the engine is started for the first time.

Procedure for first fuel filling ⇒ page 29

- Clean tools and workbench etc. before working on the injection system.
- Thoroughly clean all unions and surrounding areas before disconnecting.
- When removing components, plug all open connections immediately with suitable clean sealing caps.
- Do not remove sealing caps from components until immediately prior to installation. After removal, components should be kept in new, sealable plastic bags (use the original new part packaging if possible).
- Before installation, check the injectors and their surroundings visually; they must be undamaged and free of lint. Make sure the injector bores in the cylinder head are clean. Wipe out if necessary using a clean cloth, taking care not to cause damage. Do not use sharp objects of any kind.
- If the high-pressure fuel lines are to be re-used, you must mark them before removal. High-pressure fuel lines must always be re-installed in their original positions (i.e. on the same cylinder).
- The following components and seals/O-rings must always be renewed when the injectors are removed and installed: “copper seal” and “O-ring for injector bore”.
- The following components and seals/O-rings must always be renewed when an injector is renewed: “clamping piece”, “copper seal” and “O-ring for injector bore”.
- Always fit new copper seals for the injectors. Check all new O-rings for damage before installing. Lubricate O-rings lightly with assembly oil or clean engine oil before installing.
- Take care not to damage the injectors when removing the old copper seals.
- Align the high-pressure fuel lines so they are free of tension. Tighten all unions lightly to start with before tightening to final torque.
- Never attempt to bend high-pressure fuel lines to shape.
- When working on any parts of the high-pressure fuel system, tools may only be used for loosening and tightening pipe unions. All other components must always be removed and installed by hand without using tools or other equipment.

- Do not dismantle individual common rail components.
- If there is a fault, the complete components must be renewed.
- Do not bleed the common rail system by unfastening high-pressure components after the engine has been started.
- When the engine is running, do not perform any repairs to the common rail system; in particular, do not open or detach the high-pressure pipes.
- All cable ties which are released or cut open when removing must be refitted in the same position when installing.
- When the fuel system is open: Do not work with compressed air if this can be avoided. Do not move the vehicle unless absolutely necessary.
- Also ensure that no diesel fuel comes into contact with the coolant hoses. Should this occur, the hoses must be cleaned immediately. Damaged hoses must be renewed.

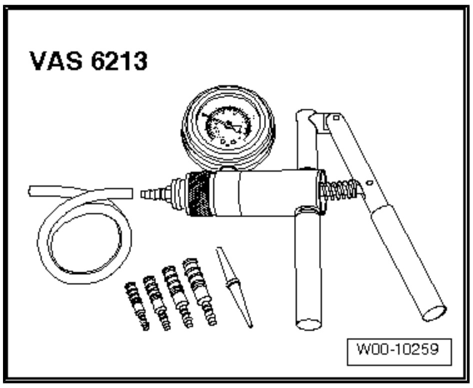
1.4 To avoid any risk of injuries to persons and/or damage to the injection and glow plug system, always observe the following safety precautions:

- ♦ Persons wearing a pacemaker should not lean over the engine compartment while the engine is running, as the injectors use high voltage pulses.
- ♦ Do not open any fuel line connections while the engine is running.
- ♦ Always switch off the ignition before connecting or disconnecting injection and glow plug system wiring or tester cables.
- ♦ Always switch off the ignition before cleaning the engine.
- ♦ Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.
- ♦ Certain tests may lead to a fault being detected by the control unit and stored. The event memory should therefore be interrogated and (if necessary) erased after completing the tests and any repair work that may be required.

1.5 Checking vacuum system

Special tools and workshop equipment required

- ♦ Hand vacuum pump -VAS 6213-



Procedure

– Check all vacuum lines in the complete vacuum system for:

- ♦ Cracks

- ♦ Traces of animal bites
- ♦ Kinked or crushed lines
- ♦ Lines porous or leaking

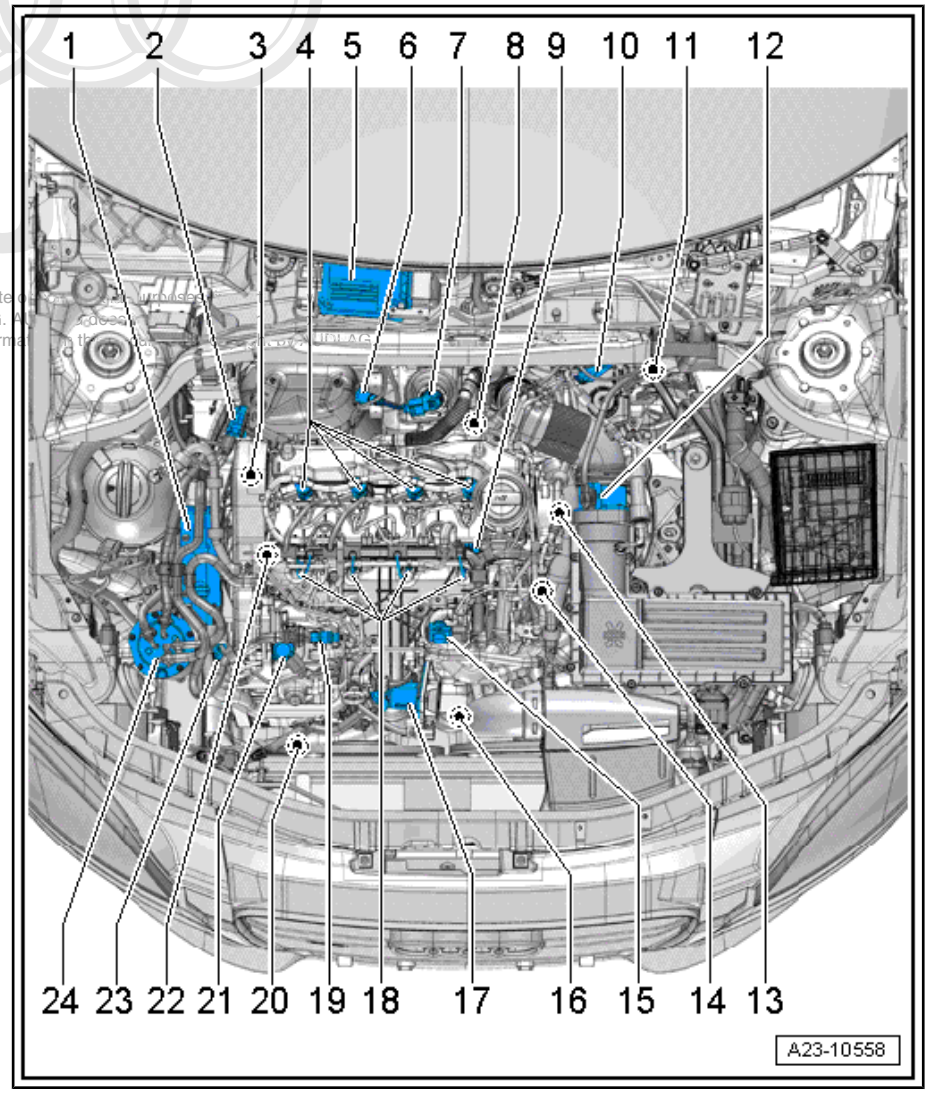
– Check vacuum line to solenoid valve and from solenoid valve to corresponding component.

– If a fault is stored in the event memory, check all vacuum lines leading to the corresponding component, and also check the remaining vacuum lines leading to other components.

– If it is not possible to build up a vacuum with the hand vacuum pump -VAS 6213- or if the vacuum pressure drops again immediately, check the hand vacuum pump and connecting hoses for leaks.

2 Overview of fitting locations

Components “A” to “H” are not shown in the illustration.



1 - Supplementary fuel pump -V393-

- ❑ Exploded view ⇒ Rep. Gr. 20

2 - Pressure differential sender -G505-

- ❑ Exploded view ⇒ page 58
- ❑ Adaption must be performed after renewing this component

3 - Hall sender -G40- (camshaft position sensor)

- ❑ Fitting location ⇒ page 10
- ❑ 10 Nm

4 - Injectors

- ❑ Exploded view ⇒ page 31

5 - Engine control unit -J623-

- ❑ Fitting location ⇒ page 7

6 - Lambda probe -G39- with Lambda probe heater -Z19-

- ❑ Exploded view ⇒ page 58
- ❑ 50 Nm

7 - Position sender for charge pressure positioner -G581-

- ❑ Fitting location ⇒ page 10

8 - Exhaust gas recirculation control motor -V338- with exhaust gas recirculation potentiometer -G212-

- ❑ Integrated into exhaust gas recirculation cooler
- ❑ Fitting location ⇒ page 9
- ❑ Removing and installing ⇒ Engine, mechanics; Rep. Gr. 26

9 - Fuel pressure regulating valve -N276-

- ❑ Exploded view ⇒ page 43
- ❑ Checking ⇒ page 46

10 - Charge pressure control solenoid valve -N75-

- ❑ Fitting location ⇒ page 9

11 - Electrical connector

- ❑ For exhaust gas temperature sender 4 -G648-
- ❑ For exhaust gas temperature sender 1 -G235-
- ❑ For Lambda probe -G39-
- ❑ Fitting location ⇒ page 9

12 - Coolant temperature sender -G62-

- ❑ Fitting location ⇒ page 10

13 - Air mass meter -G70-

- ❑ Exploded view ⇒ page 15

14 - Engine speed sender -G28-

- ❑ Fitting location ⇒ page 11
- ❑ 4.5 Nm

15 - Exhaust gas recirculation cooler change-over valve -N345-

- ❑ Fitting location ⇒ page 11

16 - Pump for exhaust gas recirculation cooler -V400-

- ❑ Fitting location ⇒ page 9

17 - Throttle valve module -J338- with throttle valve potentiometer -G69-

- ❑ Exploded view ⇒ page 21

18 - Glow plugs

- ❑ Glow plug 1 -Q10-
- ❑ Glow plug 2 -Q11-
- ❑ Glow plug 3 -Q12-
- ❑ Glow plug 4 -Q13-
- ❑ Removing and installing ⇒ page 67
- ❑ 17 Nm

19 - Fuel temperature sender -G81-

- ❑ In fuel supply line
- ❑ Fitting location ⇒ page 9

20 - Charge pressure sender -G31- with intake air temperature sender -G42-

- ❑ Fitting location ⇒ page 8

21 - High-pressure pump with fuel metering valve -N290-

- ❑ Exploded view ⇒ page 25
- ❑ Do not open fuel metering valve -N290-
- ❑ After renewing, first fuel filling operation MUST be performed (it is important not to allow pump to run while it is still empty) ⇒ page 29

22 - Fuel pressure sender -G247-

- ❑ Exploded view ⇒ page 31

23 - Radiator outlet coolant temperature sender -G83-

- ❑ Fitting location ⇒ page 10

24 - Fuel filter

- ❑ Exploded view ⇒ Rep. Gr. 20
- ❑ Renewing ⇒ Rep. Gr. 20

A - Low heat output relay -J359- and high heat output relay -J360-

- ❑ Fitting location ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

B - Brake light switch -F- and brake pedal switch -F47-

- ❑ Fitting location ⇒ page 7

C - Clutch position sender -G476-

- ❑ Fitting location ⇒ page 8
- ❑ Only fitted on vehicles with manual gearbox

D - Accelerator position sender -G79- and accelerator position sender 2 -G185-

- ❑ Fitting location ⇒ page 7

E - Exhaust gas temperature sender 1 -G235-

- ❑ Exploded view ⇒ page 58

F - Exhaust gas temperature sender 3 -G495-

- ❑ Exploded view ⇒ page 58

G - Exhaust gas temperature sender 4 -G648-

- ❑ Exploded view ⇒ page 58

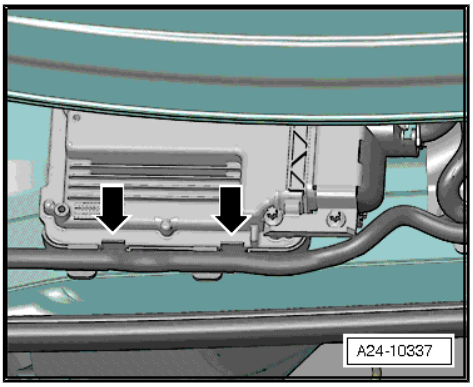
H - Particulate filter

- ❑ Combined with catalytic converter
- ❑ Adaption must be performed after renewing this component
- ❑ Removing and installing ⇒ Rep. Gr. 26

Fitting location of engine control unit -J623-

- ♦ In electronics box (plenum chamber)

Removing and installing ⇒ page 62



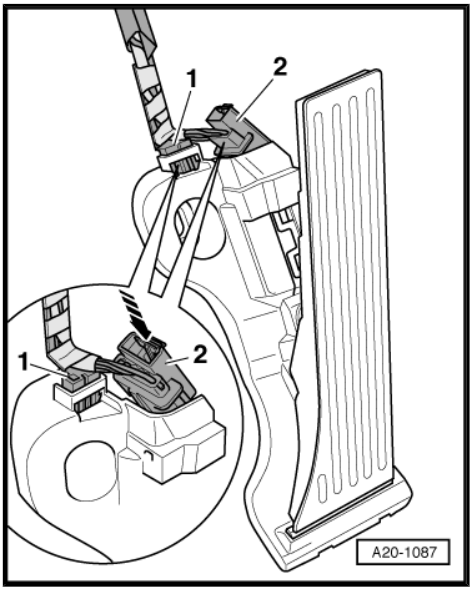
Fitting location: accelerator position sender -G79- and accelerator position sender 2 -G185-

- ♦ Combined with accelerator pedal module

Note

The illustration shows the set-up for left-hand drive vehicles.

Removing and installing accelerator pedal module ⇒ Rep. Gr. 20

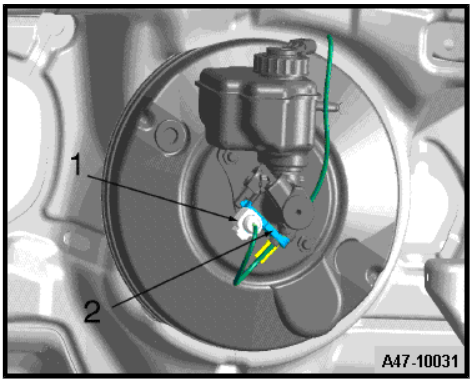


Fitting location of brake light switch -F- and brake pedal switch -F47-

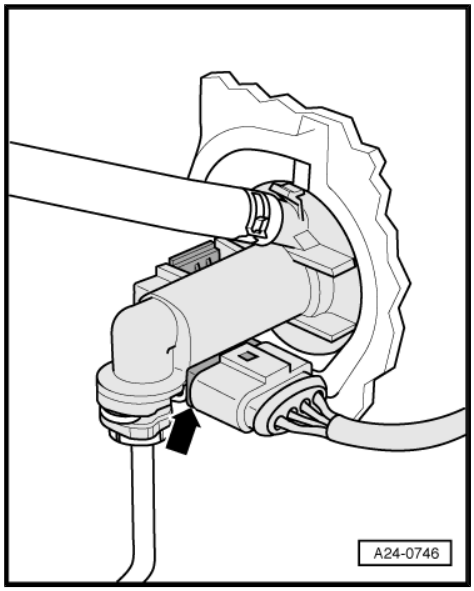
1 - Brake light switch -F- and brake pedal switch -F47-

- ♦ On brake master cylinder

Removing and installing ⇒ Rep. Gr. 47



Fitting location of clutch position sender -G476-

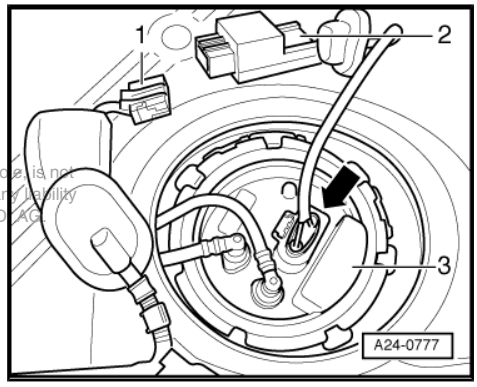


♦ On clutch master cylinder-arrow-.

Removing and installing ⇒ Rep. Gr. 30

Integrated functions: clutch pedal switch for engine start -F194- and clutch pedal switch -F36- (manual gearbox only)

Fitting location of fuel pump control unit -J538-



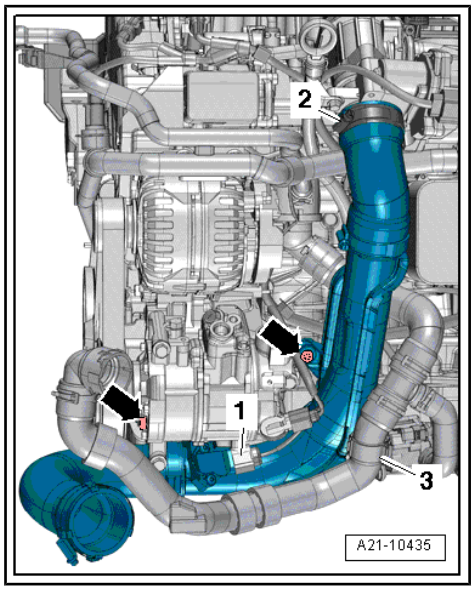
1 - Connector for fuel pump control unit -J538-

2 - Fuel pump control unit -J538-

3 - Fuel system pressurisation pump -G6-

Removing and installing ⇒ Rep. Gr. 20

Fitting location of charge pressure sender -G31- with intake air temperature sender -G42-



1 - Charge pressure sender -G31- with intake air temperature sender -G42-

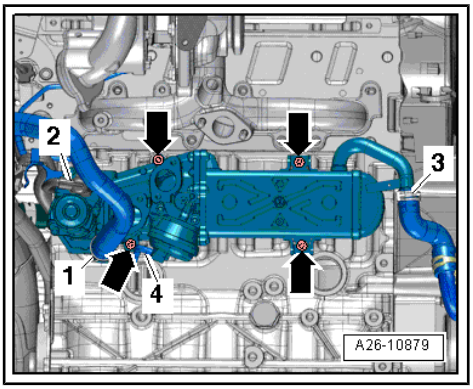
♦ At air pipe (right-side)

Removing and installing ⇒ Rep. Gr. 21

Components at rear of engine

2 - Exhaust gas recirculation control motor -V338- with exhaust gas recirculation potentiometer -G212-

4 - Vacuum unit for exhaust gas recirculation cooling system



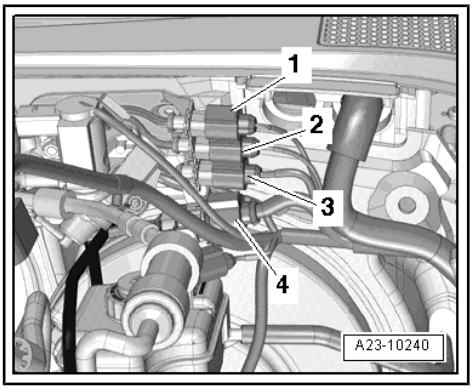
Electrical connectors

1 - For exhaust gas temperature sender 1 -G235-

2 - For exhaust gas temperature sender 4 -G648-

3 - For Lambda probe -G39-

4 - For exhaust gas temperature sender 3 -G495-

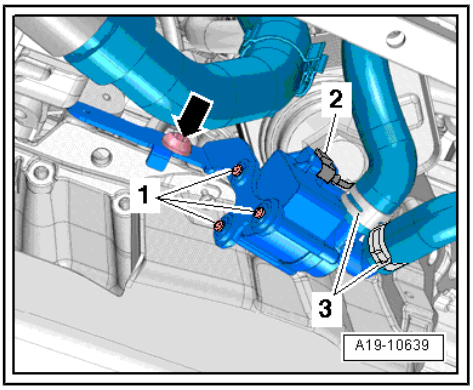


Fitting location of pump for exhaust gas recirculation cooler -V400-

2 - Pump for exhaust gas recirculation cooler -V400-

♦ At front of engine

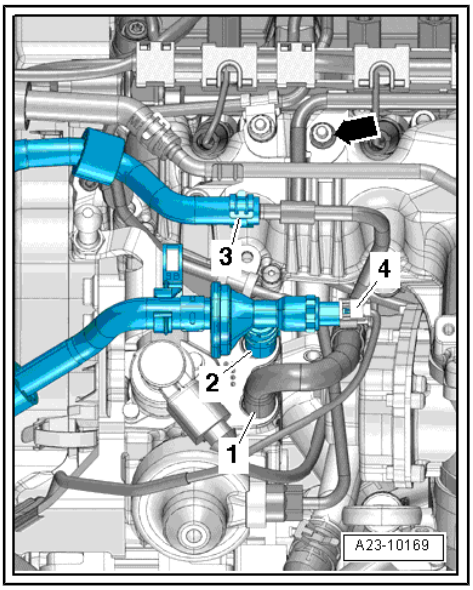
Removing and installing ⇒ Rep. Gr. 19



Fitting location of fuel temperature sender -G81-

4 - Fuel temperature sender -G81-

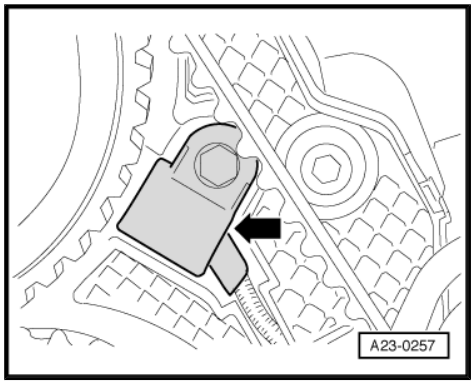
♦ In fuel supply line at high-pressure pump



Fitting location of Hall sender -G40-

♦ Next to camshaft sprocket -arrow-

Removing and installing ⇒ page 69

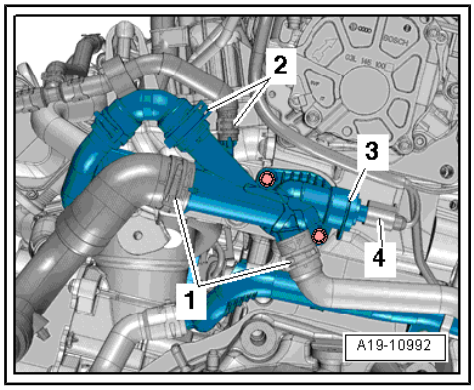


Fitting location of coolant temperature sender -G62-

4 - Coolant temperature sender -G62-

♦ On right side of engine under exhauster pump

Removing and installing ⇒ Rep. Gr. 19

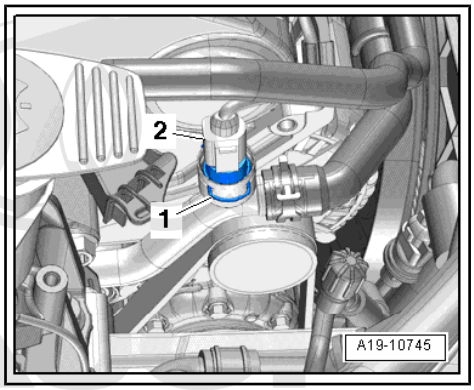


Fitting location of radiator outlet coolant temperature sender -G83-

2 - Radiator outlet coolant temperature sender -G83-

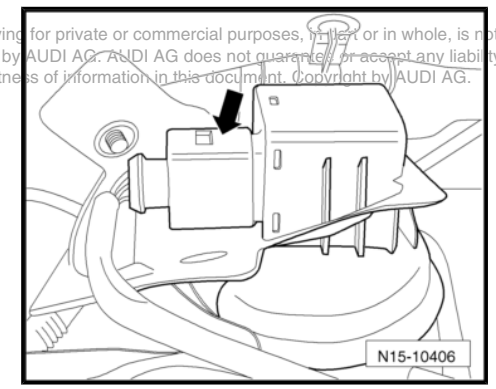
♦ In coolant pipe (right-side) above alternator

Removing and installing ⇒ Rep. Gr. 19

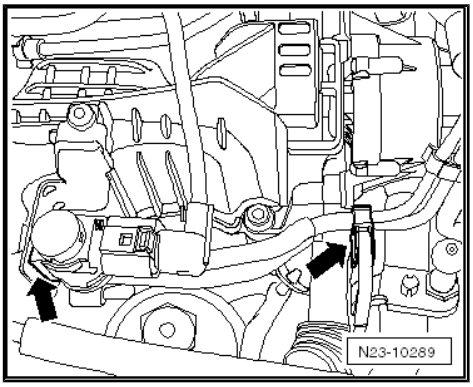


Fitting location of position sender for charge pressure positioner -G581-

♦ At rear of engine at turbocharger -arrow-.

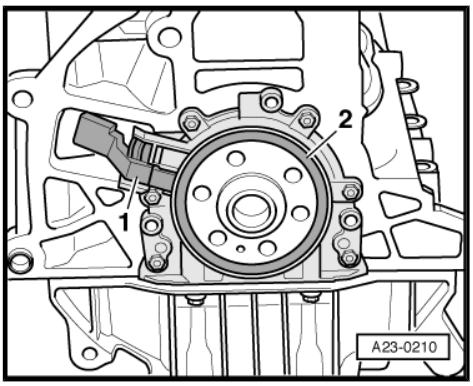


Fitting location of exhaust gas recirculation cooler change-over valve -N345-



♦ On intake manifold -left arrow-.

Fitting location of engine speed sender -G28-



1 - Engine speed sender -G28-

2 - Sender wheel

♦ On flywheel side of engine.

Removing and installing ⇒ page 70

3 System layout

WARNING

- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

Caution

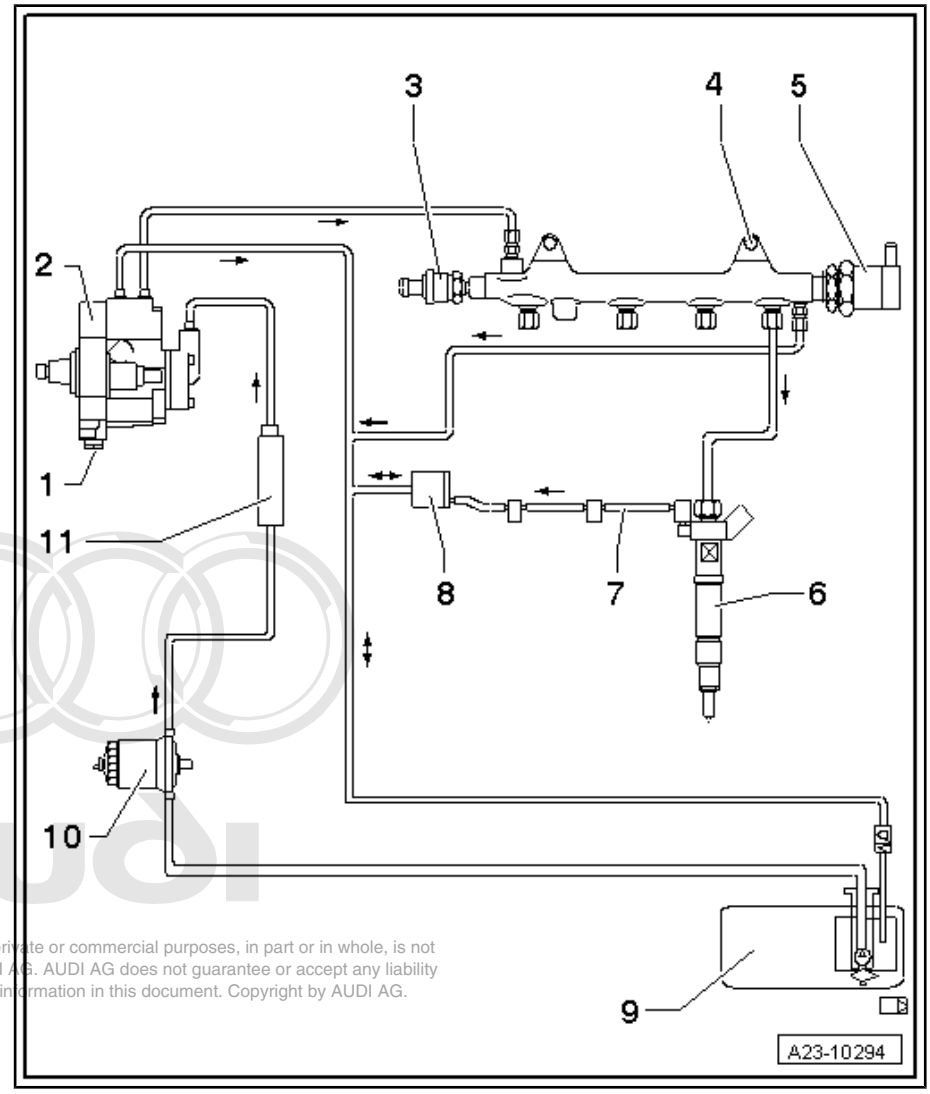
The high-pressure fuel pump has very close tolerances and must not be allowed to run without fuel. To prevent this and to enable the engine to start quickly after parts have been renewed, it is important to observe the following:

- *If components of the fuel system between the fuel tank and the high-pressure pump are removed or renewed, the first fuel filling operation must be performed.*
- *If a fuel pump, fuel line (between fuel tank and high-pressure pump) or fuel filter is removed or renewed, the fuel system must be bled before the engine is started for the first time.*
- *If the high-pressure pump is removed or renewed, the fuel system must be bled before the engine is started for the first time.*

Procedure for first fuel filling ⇒ page 29

Note

The high-pressure pump will be damaged if the first fuel filling procedure is not performed.



1 - Fuel metering valve -N290-

- ❑ Do not unscrew

2 - High-pressure pump

- ❑ Exploded view ⇒ page 25
- ❑ After renewing, first fuel filling operation MUST be performed (it is important not to allow pump to run while it is still empty) ⇒ page 29
- ❑ After renewing high-pressure pump or fuel pressure regulating valve -N276- , learnt values must be re-adapted; see “Guided Functions” in vehicle diagnostic tester

3 - Fuel pressure sender -G247-

- ❑ Exploded view ⇒ page 31

4 - Fuel rail

5 - Fuel pressure regulating valve -N276-

- ❑ Exploded view ⇒ page 31
- ❑ After renewing high-pressure pump or fuel pressure regulating valve -N276-, learnt values must be re-adapted; see “Guided Functions” in vehicle diagnostic tester

6 - Injector

- ❑ Exploded view ⇒ page 31

7 - Fuel return line

8 - Not fitted

9 - Fuel tank

- ❑ With fuel system pressurisation pump -G6-

10 - Fuel filter

- ❑ Exploded view ⇒ Rep. Gr. 20

11 - Supplementary fuel pump -V393-

- ❑ Exploded view ⇒ Rep. Gr. 20

4 Bleeding fuel system

Caution

If components of the fuel system between the fuel tank and the high-pressure fuel pump are removed or renewed, the basic setting "Checking fuel system pressurisation pump" must be performed to bleed the fuel system.

If the supplementary fuel pump, fuel line (between fuel tank and high-pressure fuel pump) or fuel filter is removed or renewed, the basic setting "Checking fuel system pressurisation pump" must be performed before the engine is started for the first time.

Proceed as follows to fill fuel system with fuel:

- Connect a vehicle diagnostic tester.
- Switch on ignition.
- Select "Engine electronics" in vehicle self-diagnosis.
- Then select "Basic setting".
- Select "Checking fuel system pressurisation pump" from the list.
- Press "Start" button.
- The fuel pumps start running.
- The fuel pumps must run for approx. 1 minute to ensure that the fuel system is filled sufficiently with fuel.

Note

To repeat basic setting, switch ignition off and on once. Then start basic setting again.

- Start engine after filling fuel system.
- Run engine at moderate speed for several minutes and then switch off.
- Check fuel system for leaks.
- Erase entry in event memory using diagnostic tester.
- After completing the repair, road-test the vehicle over a distance of at least 20 km. Accelerate with full throttle at least once. Then inspect the high-pressure section of the fuel system again for leaks.

Note

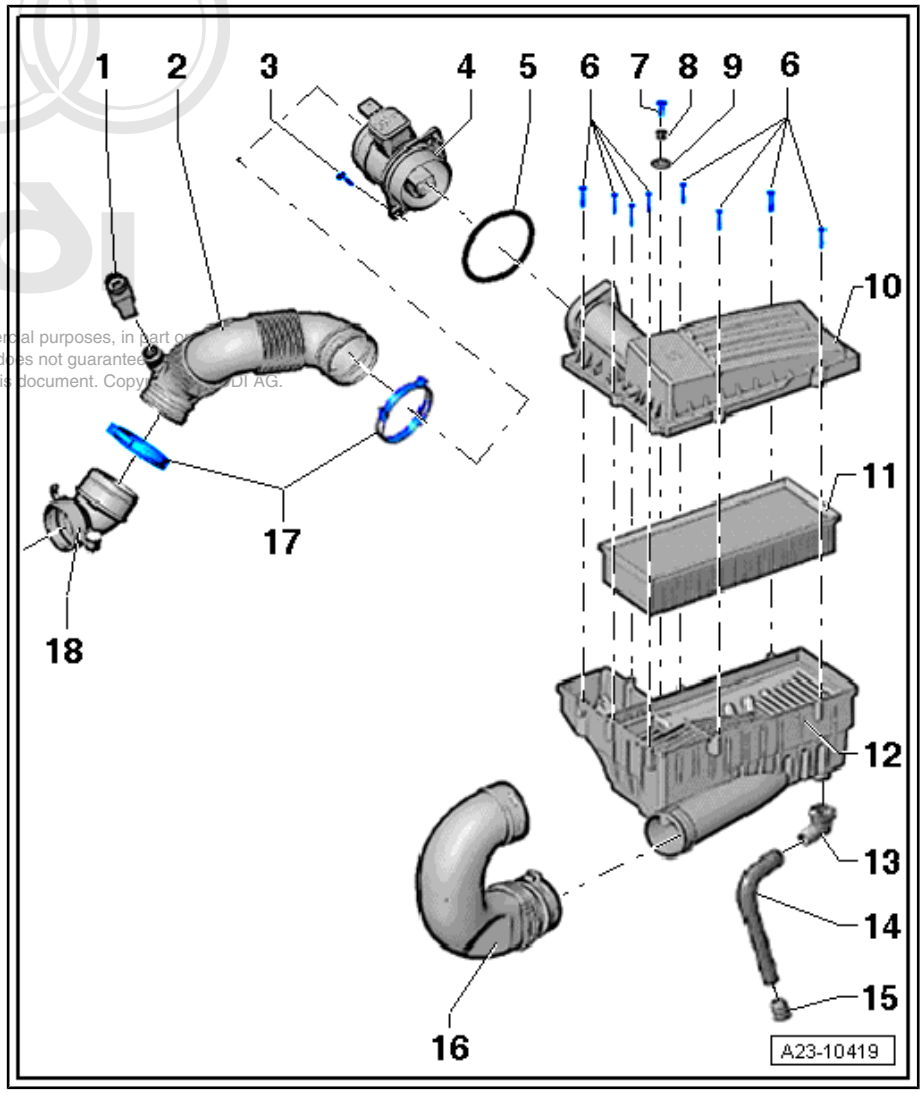
If there is any air left in the fuel system, the engine may switch to the backup mode ('emergency running' mode) during the road test. Switch off the engine and erase the event memory. Then continue the road test.

- Interrogate event memory.

5 Air cleaner

⇒ “5.1 Air cleaner - exploded view”, page 15
⇒ “5.2 Removing and installing engine cover panel”, page 16
⇒ “5.3 Removing and installing air filter element”, page 17
⇒ “5.4 Removing and installing air cleaner housing”, page 18
⇒ “5.5 Removing and installing air mass meter G70 ”, page 20

5.1 Air cleaner - exploded view



1 - Hose connection

2 - Air hose

- ❑ To turbocharger
- ❑ Check for dirt and accumulated leaves, etc.

3 - Bolt

- ❑ 2x
- ❑ 1.5 Nm

4 - Air mass meter -G70-

- ❑ Removing and installing ⇒ page 20

5 - O-ring

- ❑ Renew
- ❑ Use silicone-free lubricant when installing

6 - Bolts

- ❑ For air cleaner (top section)
- ❑ 1.5 Nm

7 - Bolt

- ❑ For air cleaner (bottom section)
- ❑ 8 Nm

8 - Sleeve

9 - Washer

10 - Air cleaner (top section)

- ❑ Clean out dirt, leaves and salt deposits

11 - Air filter element

- ❑ Always use genuine part for air filter element
- ❑ Removing and installing ⇒ page 17
- ❑ Observe change intervals ⇒ Maintenance ; Booklet 810

12 - Air cleaner (bottom section)

- ❑ Clean out dirt, leaves and salt deposits
- ❑ On vehicles for cold climates, air cleaner (bottom section) with hot-air-intake hose is installed
- ❑ Country-specific version with snow screen

13 - Connection for water drain hose

- ❑ Clean

14 - Water drain hose

- ❑ Clean

15 - Flutter valve

- ❑ Clean and re-install

16 - Intake air duct

- ❑ To lock carrier
- ❑ Clean out dirt, leaves and salt deposits

17 - Spring-type clip

18 - Connecting hose

- ❑ To turbocharger

5.2 Removing and installing engine cover panel

Removing

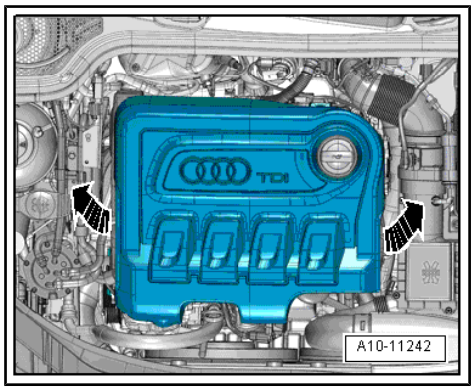
– Carefully pull engine cover panel off retaining pins one after the other -arrows-. Do not jerk the cover panel away, and do not try to pull on one side only.

Installing

– To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.

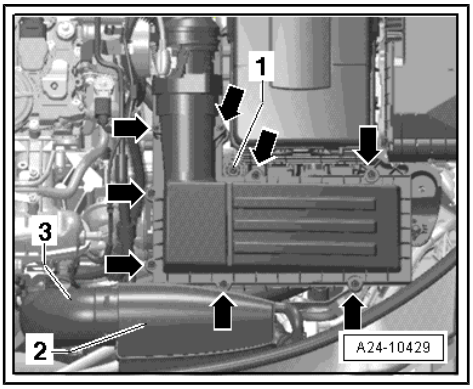
– Position engine cover panel on engine (note locations of oil filler neck and oil dipstick).

– Press engine cover panel with both hands into the rubber grommets at the rear and then into the grommets at the front.



5.3 Removing and installing air filter element

Removing



– Remove bolts -arrows-.

Note

Disregard -items 1, 2, 3-.

– Lift up air cleaner (top section) and take out air filter element.

Installing

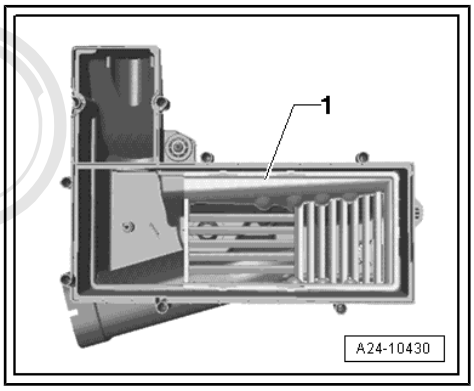
- Tightening torque
⇒ “5.1 Air cleaner - exploded view”, page 15

To ensure that the air mass meter functions properly, it is important to observe the following notes and instructions.

Note

- *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- *Always use genuine part for air filter element.*
- *The air cleaner housing MUST be clean.*
- *To prevent malfunctions, cover critical parts of the engine air intake (air mass meter, air pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*
- *Observe environmental requirements for disposal.*

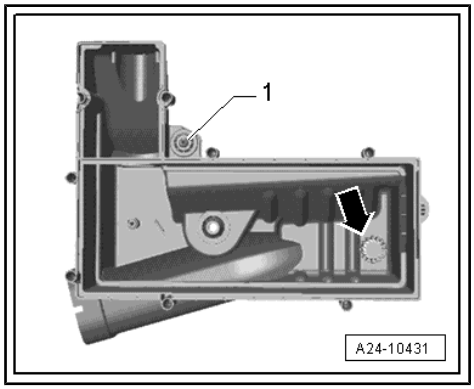
– Remove snow screen -1- and clean it.



Note

The snow screen is not fitted on all vehicles.

– Clean water drain -arrow- and air cleaner (bottom section).
– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections) using a vacuum cleaner.
– Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).
– Check for dirt and leaves in air duct going from lock carrier to air cleaner housing.
– When installing air filter element, check that it is properly centred in retainer in air cleaner (bottom section).
– Fit the top section of the air cleaner carefully on the bottom section, without using force. Make sure the top section of the air cleaner is fitted straight on the air filter element (note position of sealing lip on air filter element).
– Ensure secure fit of intake hose at air mass meter.

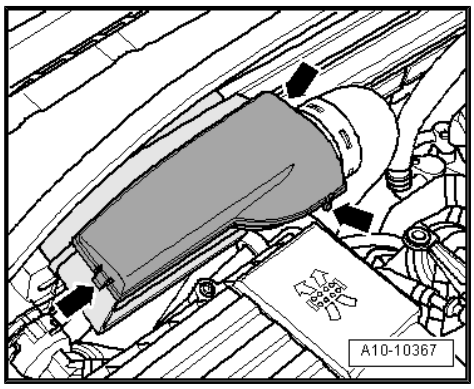


The remaining installation steps are carried out in the reverse sequence.

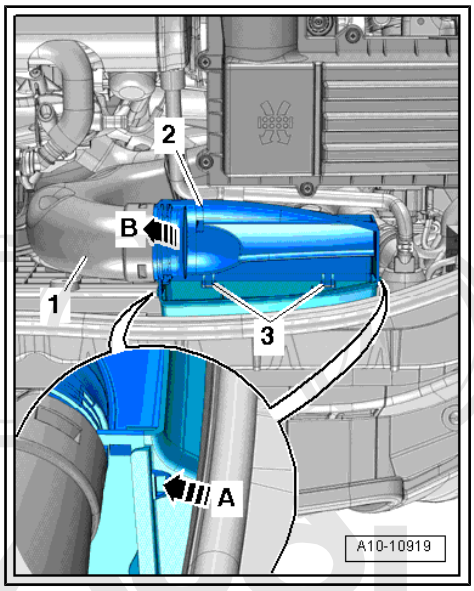
5.4 Removing and installing air cleaner housing

Removing

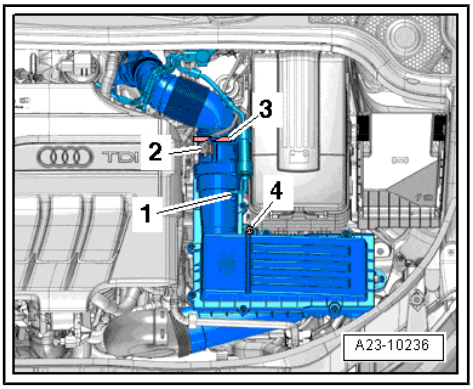
– Pull cover off air duct (release clips on sides) -arrows-.



– Release clips on left and right -arrow A- and unclip air duct at bottom -2-.
– Swivel air duct (bottom) slightly to the rear and detach air duct (bottom) from retainers -3-.
– Detach air pipe -1- from air duct (bottom) -arrow B-.



– Unplug electrical connector -2- from air mass meter -G70- .
– Detach hose -1-.
– Release hose clip -3- and detach air hose.
– Unscrew bolt -4- and remove air cleaner housing.



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque
  ⇒ “5.1 Air cleaner - exploded view”, page 15

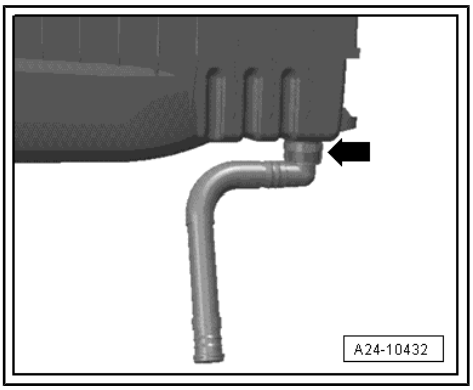
Note

♦ *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*

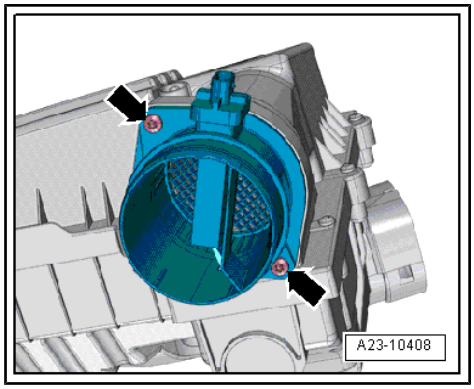
♦ *Use silicone-free lubricant when installing air hose.*

♦ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Disconnect water drain hose -arrow- from air cleaner (bottom section) and clean any dirt or leaves out of connection and hose.



5.5 Removing and installing air mass meter -G70-



Removing

– Remove air cleaner housing ⇒ page 18 .

– Remove bolts -arrows-.

– Carefully pull air mass meter -G70- out of guide on air cleaner housing.

Installing

- Tightening torque
  ⇒ “5.1 Air cleaner - exploded view”, page 15

To ensure the proper function of the air mass meter -G70- it is important to observe the following instructions.

Note

- *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- *Always use genuine part for air filter element.*
- *Always renew seal if damaged (air leaks in intake system).*
- *Use a silicone-free lubricant when installing the air hose and seal.*
- *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).

– Check for dirt in air duct leading to air filter element. If necessary, clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); wash out or use a vacuum cleaner as required.

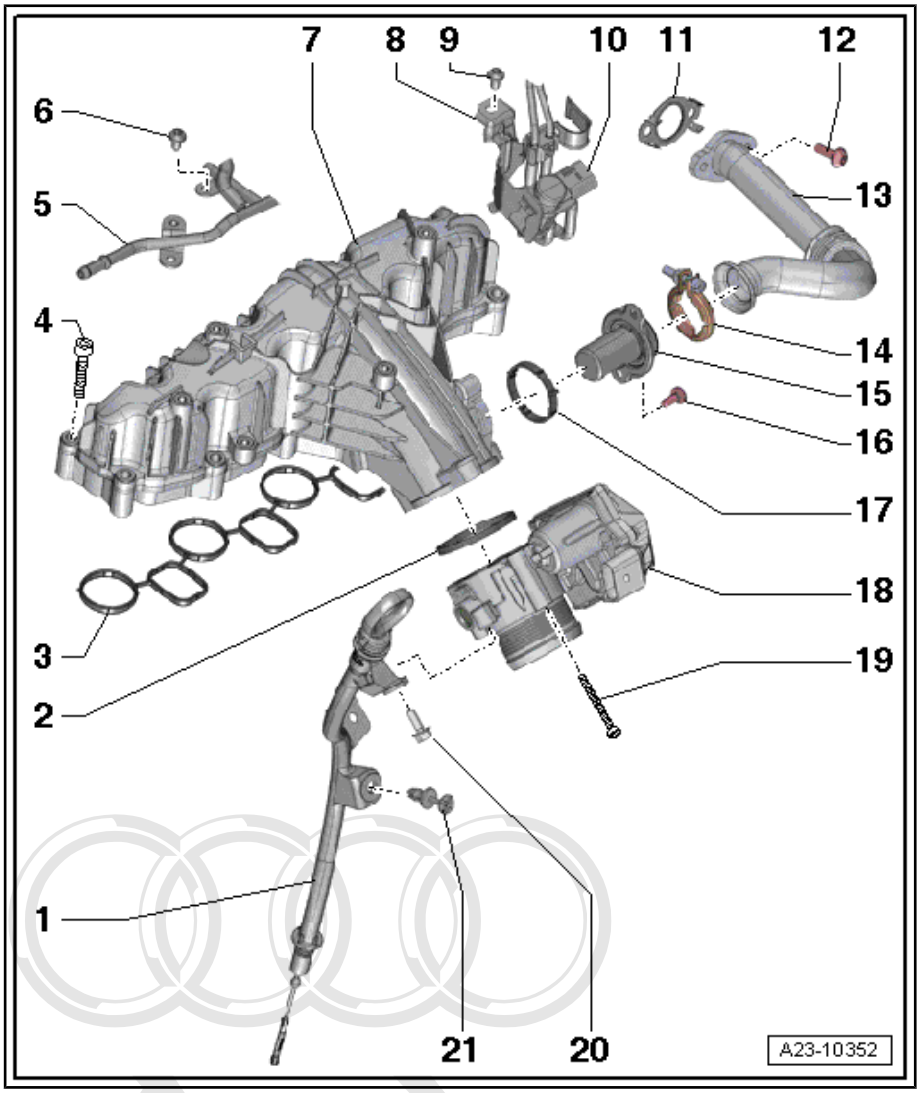
– Install air cleaner housing ⇒ page 18 .

6 Intake manifold

⇒ “6.1 Intake manifold with attached components - exploded view”, page 21

⇒ “6.2 Removing and installing intake manifold”, page 22

6.1 Intake manifold with attached components - exploded view



1 - Guide tube
- ❑ For oil dipstick

2 - Seal
- ❑ Renew

3 - Gasket
- ❑ Renew

4 - Bolt
- ❑ 8 Nm

5 - Fuel return line

6 - Bolt
- ❑ 9 Nm

7 - Intake manifold
- ❑ With intake manifold flap motor -V157- and intake manifold flap potentiometer -G336-
- ❑ Must not be dismantled
- ❑ Removing and installing ⇒ page 22

8 - Bracket
- ❑ For exhaust gas recirculation cooler change-over valve -N345-

9 - Bolt
- ❑ 9 Nm

10 - Exhaust gas recirculation cooler change-over valve -N345-

11 - Gasket
- ❑ Renew

12 - Bolt
- ❑ 20 Nm

13 - Connecting pipe
- ❑ To exhaust gas recirculation cooler

14 - Clamp
- ❑ Renew
- ❑ 5 Nm

15 - Connection
- ❑ For exhaust gas recirculation

16 - Bolt
- ❑ 8 Nm

17 - Seal

- ❑ Renew

18 - Throttle valve module -J338-

- ❑ With throttle valve potentiometer -G69-
- ❑ Removing and installing ⇒ page 43

19 - Bolt

- ❑ 8 Nm

20 - Bolt

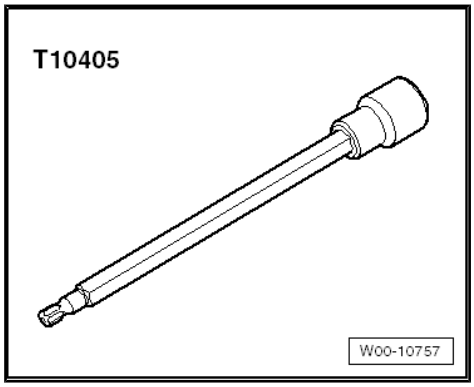
- ❑ 9 Nm

21 - Clip

6.2 Removing and installing intake manifold

Special tools and workshop equipment required

- ♦ Socket T30 -T10405-



Removing

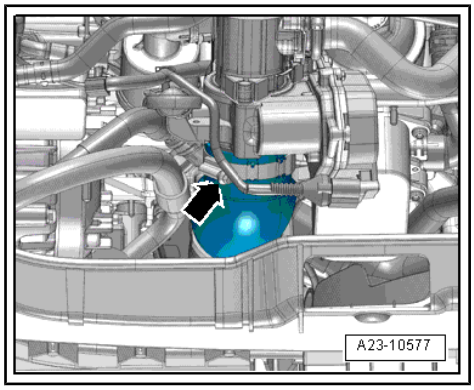
WARNING

- ♦ *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- ♦ *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

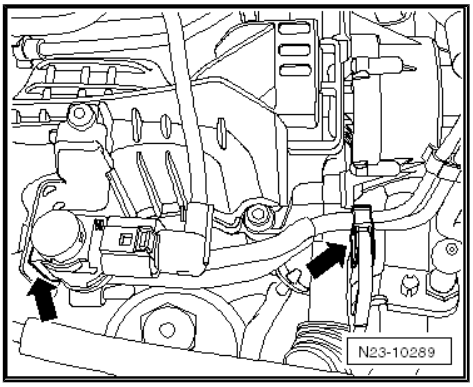
– Remove engine cover panel ⇒ page 16 .

– Loosen hose clip -arrow-.

– Detach electrical connectors at glow plugs ⇒ page 67 .



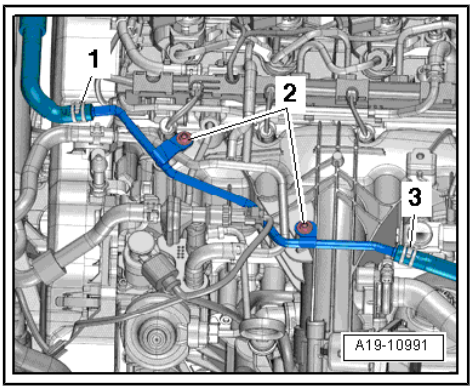
– Take exhaust gas recirculation cooler change-over valve - N345- -left arrow- out of bracket and move clear to one side.



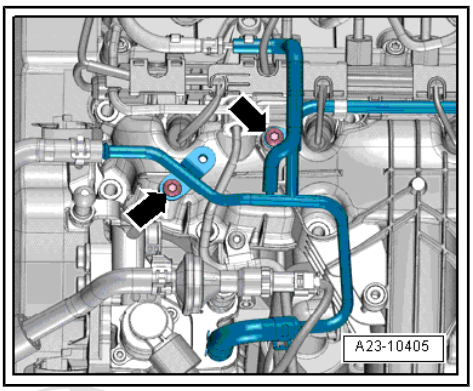
Note

Disregard -arrow- on right-side of illustration.

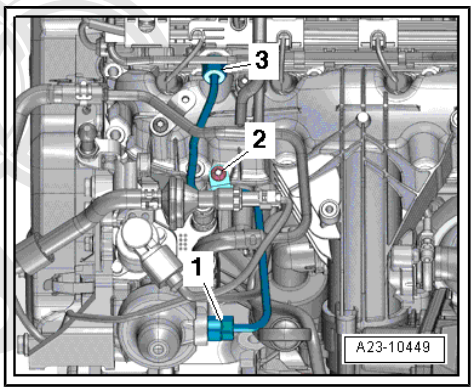
– Remove bolts -2- and place coolant return line to one side.



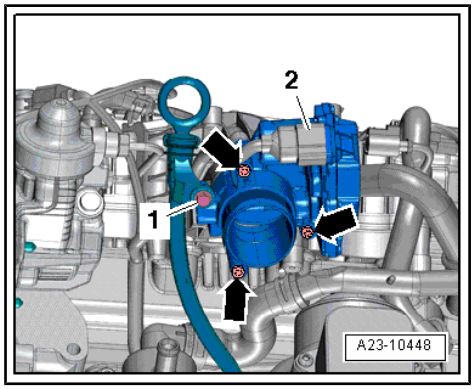
– Remove bolts -arrows- and place fuel return line to one side.



– Remove bolt -2- and union nuts -1 and 3- and detach high-pressure pipe.
– Remove fuel rail ⇒ page 55 .



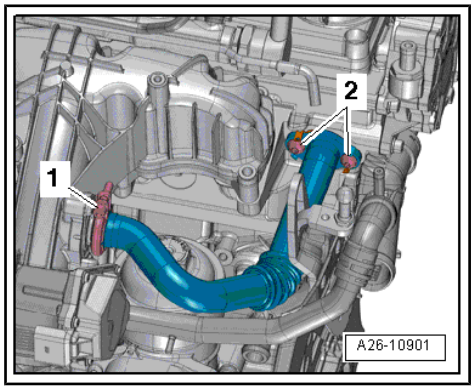
– Unplug electrical connector -2- at throttle valve module - J338- .
– Remove bolt -1- for dipstick guide tube.



Note

Disregard -arrows-.

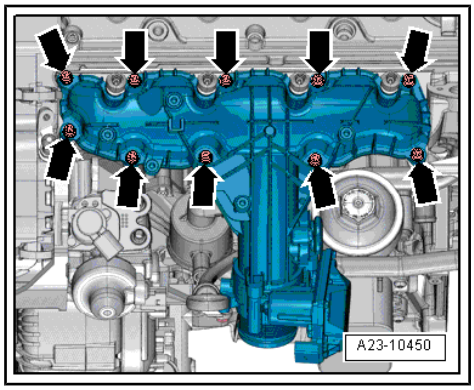
– Open clamp -1- and detach.



Note

Disregard -item 2-.

– Unscrew intake manifold bolts -arrows- in diagonal sequence starting from outside and working inwards using socket T30 - T10405- .
– Carefully take out intake manifold.



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque ⇒ “6.1 Intake manifold with attached components - exploded view”, page 21

Note

Renew seals and/or gaskets.

– Tighten intake manifold bolts in diagonal sequence, working from inside to outside.
– Install air pipe ⇒ Rep. Gr. 21 .
– Install fuel rail ⇒ page 55 .

7 High-pressure pump

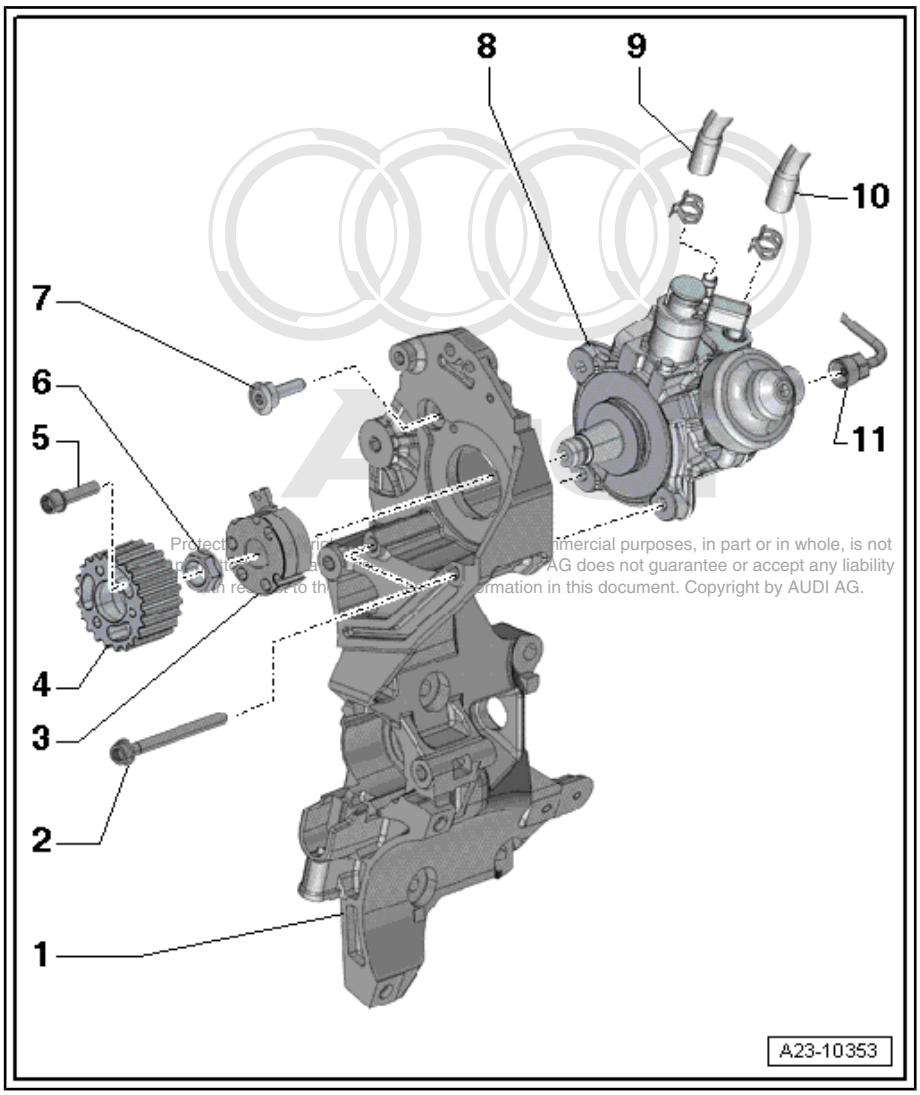
⇒ “7.1 High-pressure pump - exploded view”, page 25

⇒ “7.2 Removing and installing high-pressure pump”, page 26

⇒ “7.3 Performing first fuel filling operation after installing high-pressure pump”, page 29

⇒ “7.4 Checking fuel system for leaks”, page 30

7.1 High-pressure pump - exploded view



1 - Bracket for ancillaries

- ❑ Removing and installing ⇒ Rep. Gr. 13

2 - Bolt

- ❑ 2x
- ❑ Renew
- ❑ 20 Nm + 180° further

3 - Hub

- ❑ Use counterhold tool - T10051- when loosening and tightening
- ❑ To remove, use puller - T40064-

4 - High-pressure pump sprocket

5 - Bolt

- ❑ 3x
- ❑ Renew
- ❑ 20 Nm + 90° further

6 - Nut

- ❑ 95 Nm

7 - Bolt

- ❑ Renew
- ❑ 20 Nm + 45° further

8 - High-pressure pump

- ❑ With fuel metering valve -N290- (do not open)
- ❑ After renewing, first fuel filling operation MUST be performed (it is important not to allow pump to run while it is still empty) ⇒ page 29
- ❑ After renewing high-pressure pump or fuel pressure regulating valve -N276- , learnt values must be re-adapted; see “Guided Functions” in vehicle diagnostic tester
- ❑ Removing and installing ⇒ page 26

9 - Fuel supply hose

10 - Fuel return hose

11 - High-pressure pipes

- ❑ Between high-pressure pump and fuel rail
- ❑ Do not interchange

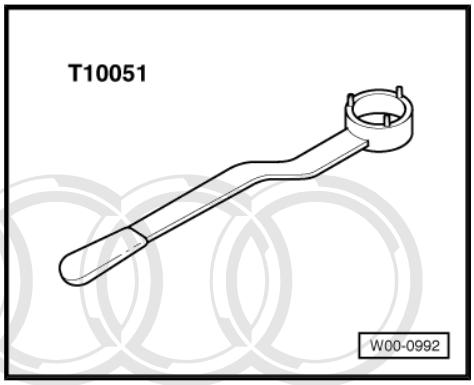
Note

- ❑ Install free of stress
- ❑ Tightening torque ⇒ Item 9 (page 32)

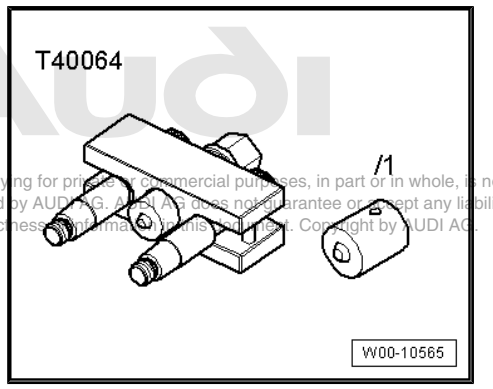
7.2 Removing and installing high-pressure pump

Special tools and workshop equipment required

- ♦ Counterhold tool -T10051-



- ♦ Puller -T40064- with T40064/1



Removing

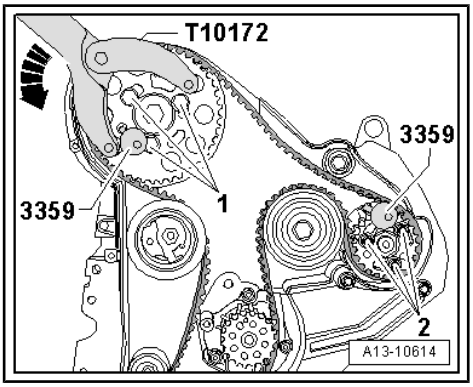
Caution

- ♦ *Always observe rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- ♦ *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

Running when dry causes irreparable damage to high-pressure pump.

- ♦ *The high-pressure pump must first be filled with fuel before the engine is started. The high-pressure pump must not be allowed to run while still empty. First fuel filling ⇒ page 29*

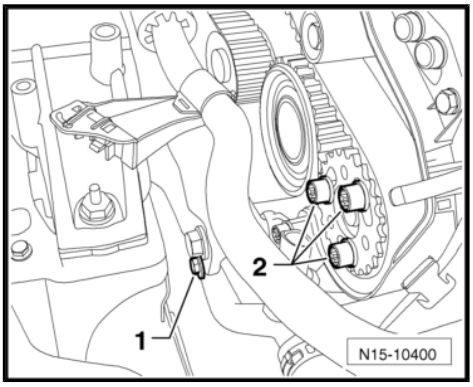
– Remove toothed belt from camshaft and high-pressure pump ⇒ Rep. Gr. 15 .



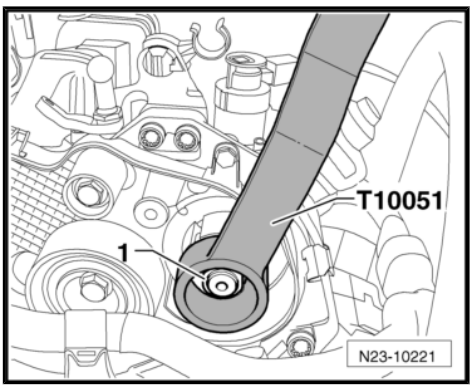
– Remove bolts -2- and detach toothed belt sprocket from high-pressure pump.

Note

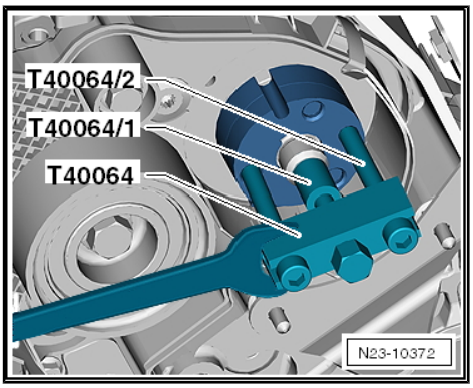
Disregard -item 1-.



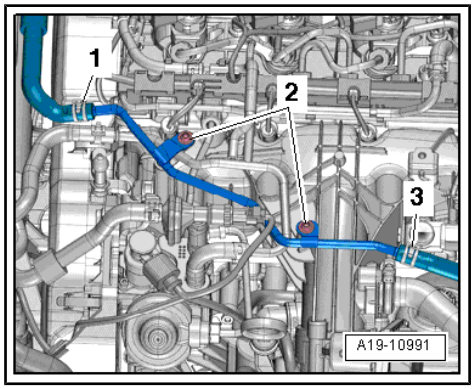
– Counterhold using counterhold tool -T10051- and remove nut -1- at hub of high-pressure pump.



– Apply puller -T40064- with thrust piece -T40064/1- and pin -T40064/2- as shown in illustration and pull hub off high-pressure pump. If necessary, counterhold using an open-end spanner (24 mm).



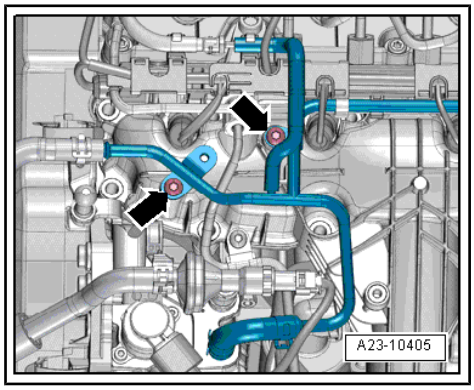
– Remove bolts -2- and place coolant return line to one side.



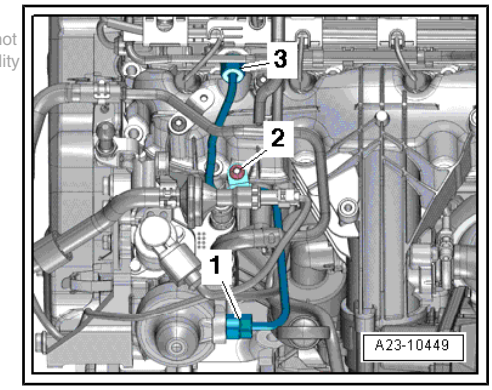
Note

Disregard -items 1, 3-.

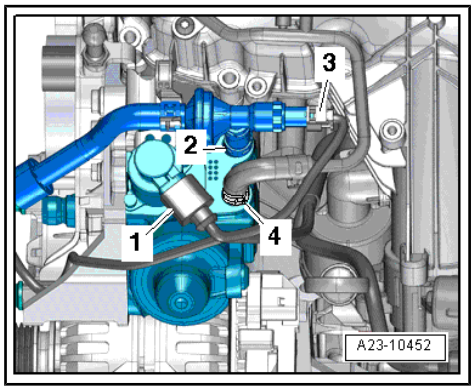
– Remove bolts -arrows- and place fuel return line to one side.



– Remove bolt -2- and union nuts -1 and 3- and detach high-pressure pipe.

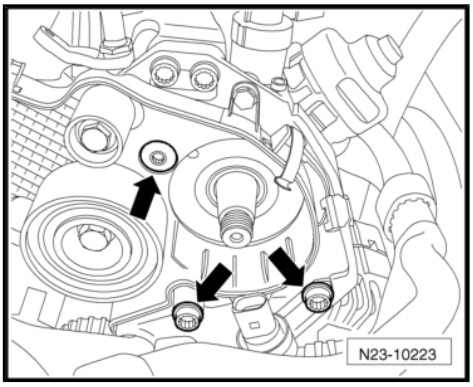


– Unplug electrical connectors -1- and -3-.
– Detach fuel supply hose -2- and fuel return hose -4-.



– Remove bolts -arrows- for high-pressure pump.

– Carefully take out high-pressure pump.



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torques
  ⇒ “7.1 High-pressure pump - exploded view”, page 25

– Install toothed belt ⇒ Rep. Gr. 15 .

– Install high-pressure pipe ⇒ page 45 .

Caution

Running when dry causes irreparable damage to high-pressure pump.

- ***The high-pressure pump must first be filled with fuel before the engine is started. The high-pressure pump must not be allowed to run while still empty. First fuel filling ⇒ page 29***

7.3 Performing first fuel filling operation after installing high-pressure pump

Caution

Running when dry causes irreparable damage to high-pressure pump.

- ***The high-pressure pump must first be filled with fuel before the engine is started. The high-pressure pump must not be allowed to run while still empty.***

Note

- *When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.*
- *Only remove sealing plugs immediately prior to installation of fuel pipes.*
- *There must be sufficient fuel in the tank.*

– Connect vehicle diagnostic tester.

– Switch on ignition.

– Select “Engine electronics” in vehicle self-diagnosis.

– Then select “Basic setting”.

– Select “Checking fuel system pressurisation pump” from the list.

– The fuel pumps start running.

– The fuel pumps must run for approx. 1 minute to ensure that the high-pressure pump is filled with sufficient fuel.

– Start engine after filling fuel system.

– Run engine at moderate speed for several minutes and then switch off.

– Check fuel system for leaks.
– Erase entry in event memory using vehicle diagnostic tester.
– After completing the repair, road-test the vehicle over a distance of at least 20 km. Accelerate with full throttle at least once. Then inspect the high-pressure section of the fuel system again for leaks.

Note

If there is any air left in the fuel system, the engine may switch to the backup mode ('emergency running' mode) during the road test. Switch off the engine and erase the event memory. Then continue the road test.

– Interrogate event memory.

7.4 Checking fuel system for leaks

– Run engine at idling speed for several minutes (do not press accelerator) and then switch off. Fuel system will bleed itself automatically.
– Check the entire fuel system for leaks.

Renew affected component if leakage still occurs after tightening to correct torque.

– After completing the repair, road-test the vehicle. Accelerate with full throttle at least once. Then check the high-pressure section of the fuel system again for leaks.

Note

If there is any air left in the fuel system, the engine may switch to the backup mode ('emergency running' mode) during the road test. Switch off the engine and erase the event memory. Then continue the road test.

8 Injectors

⇒ “8.1 Injectors - exploded view”, page 31

⇒ “8.2 Checking injectors”, page 33

⇒ “8.3 Performing adaption of injector delivery calibration values”, page 33

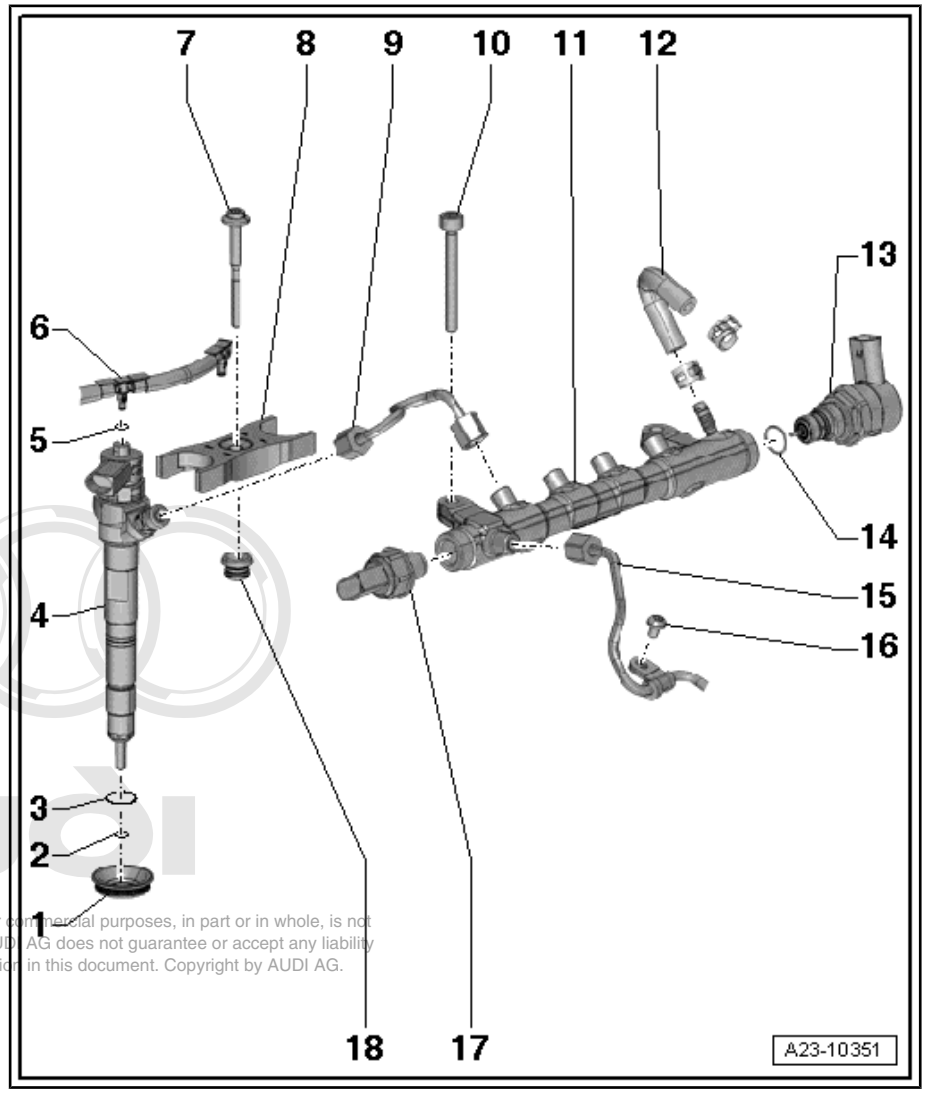
⇒ “8.4 Checking return flow rate of injectors with engine running”, page 33

⇒ “8.5 Checking return flow rate of injectors at starter cranking speed”, page 36

⇒ “8.6 Checking for injectors sticking open”, page 38

⇒ “8.7 Removing and installing injectors”, page 39

8.1 Injectors - exploded view



1 - Seal

- ❑ In cylinder head cover
- ❑ Removing and installing ⇒ Rep. Gr. 15

2 - Copper seal

- ❑ Renew

3 - O-ring

- ❑ Renew

4 - Injector

- ❑ The following components and seals/O-rings must always be renewed when the injectors are removed and installed: “copper seal” and “O-ring for injector bore”.
- ❑ The following components and seals/O-rings must always be renewed when an injector is renewed: “clamping piece”, “copper seal” and “O-ring for injector bore”.
- ❑ When re-installing “high-pressure injector pipe” check taper seats visually for damage, scores and corrosion (always renew if damaged)
- ❑ If they are to be re-installed, the injectors, high-pressure fuel pipes and clamping pieces must always be re-fitted on the same cylinder
- ❑ Removing and installing ⇒ page 39

5 - O-ring

- ❑ Renew

6 - Fuel return line

- ❑ To fuel tank
- ❑ Must not be kinked, damaged or clogged
- ❑ Do not dismantle
- ❑ After replacement, engine must be run at idling speed for approx. 2 minutes to bleed fuel system. Then check fuel return lines for leaks

7 - Bolt

- ❑ Renew
- ❑ 8 Nm + 180° further

8 - Clamping piece

- ❑ If they are to be re-installed, the injectors and clamping pieces must always be re-fitted on the same cylinder
- ❑ If an injector is renewed, the corresponding clamping piece must also be renewed
- ❑ Installation position ⇒ page 33

9 - High-pressure pipe

- ❑ Between fuel rail and injectors

Note

- ❑ Install free of stress
- ❑ Lubricate threads of union nuts with clean engine oil
- ❑ 25 Nm

10 - Bolt

- ❑ 22 Nm

11 - Fuel rail

- ❑ Removing and installing ⇒ page 55

12 - Fuel return hose

13 - Fuel pressure regulating valve -N276-

- ❑ Always renew after removing
- ❑ Removing and installing ⇒ page 51
- ❑ 80 Nm
- ❑ After renewing high-pressure pump or fuel pressure regulating valve -N276- , learnt values must be re-adapted; see “Guided Functions” in vehicle diagnostic tester

14 - O-ring

- ❑ Renew

15 - High-pressure pipe

- ❑ Between high-pressure pump and fuel rail

Note

- ❑ Lubricate threads of union nuts with clean engine oil
- ❑ 25 Nm

16 - Bolt

- ❑ 8 Nm

17 - Fuel pressure sender -G247-

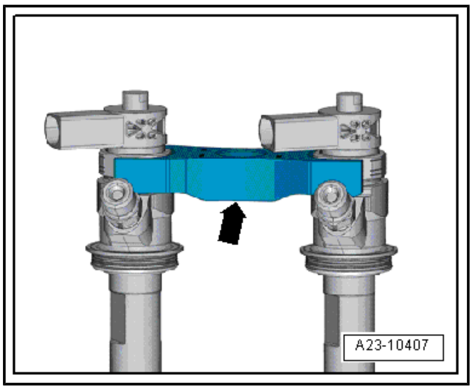
- ❑ Removing and installing ⇒ page 52
- ❑ 100 Nm

18 - Grommet

- ❑ In cylinder head cover

Installation position of clamping piece

- One clamping piece is always used to secure two injectors.
- The bulge -arrow- of the clamping piece should point downwards.



8.2 Checking injectors

There are three different tests for checking the operation of the injectors.

- Checking adaption of "Injector delivery calibration values" ⇒ page 33
- Checking return flow rate of injectors with engine running ⇒ page 33
- Checking return flow rate of injectors at starter cranking speed ⇒ page 36

8.3 Performing adaption of injector delivery calibration values

The "Injector delivery calibration values" function serves to correct the injection rates for each cylinder of a common rail system individually across the entire operating range.

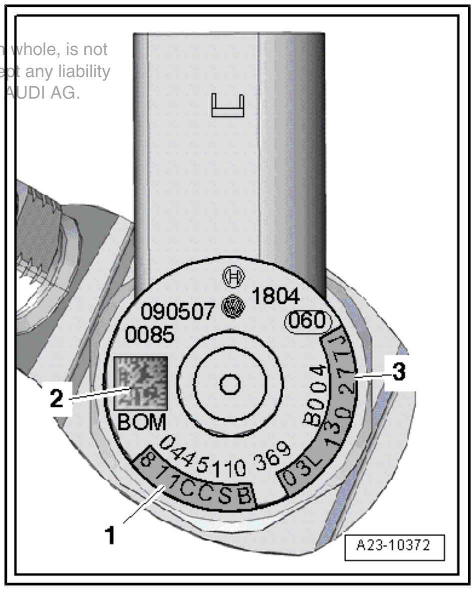
The 7-digit adaption values -1- (details in illustration are only an example) are marked separately on each injector. The values may consist of letters and/or numbers.

Injector (view from above)

1 - Check sum

2 - Data matrix code

3 - Part number



When a new injector is installed, the adaption value must be written into the engine control unit.

When a new engine control unit is installed, the "Adaption values for injectors" must be written into the new control unit.

Additionally, check that the "injector delivery calibration values" are correctly entered for all the other injectors. Do NOT attempt to re-enter these values if the correct values are already stored in the engine control unit.

The adaption procedure is described in the "Guided Fault Finding". (The procedure is also described under "Guided Functions".)

8.4 Checking return flow rate of injectors with engine running

A - Checking return flow rate of all injectors

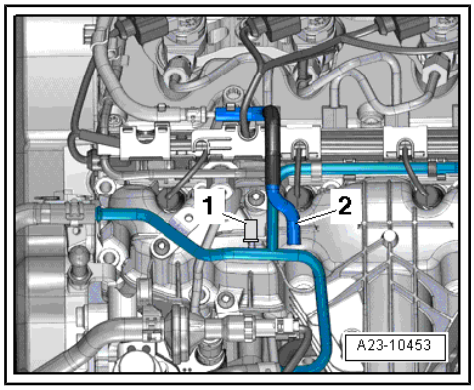
Special tools and workshop equipment required

- ♦ Fuel-resistant measuring container

WARNING

- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

– Remove engine cover panel ⇒ page 16 .
– Disconnect hose connection at fuel line.
– Seal off the open return connection with a plug -1-.
– Hold end of fuel return hose -2- (lengthen if necessary) in a measuring container to measure the total return flow rate.
– Start engine and let it idle for 2 minutes.
• Specification for 2 minutes: 0 ml to 50 ml
– If specification is attained, increase engine speed to 2000 ... 2500 rpm for approx. 2 minutes and then check return flow rate again.
• Specification for 2 minutes: less than 250 ml



Note

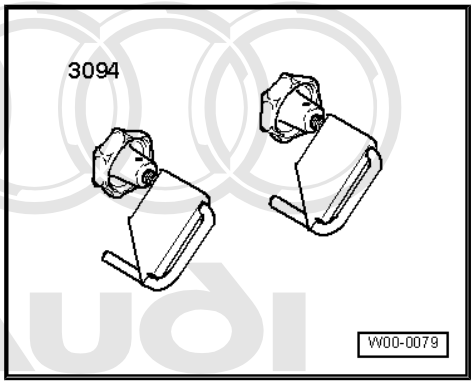
1000 ml = 1 litre

If specification is exceeded, this indicates that one or more injectors are defective. Check return flow rate from each injector individually.

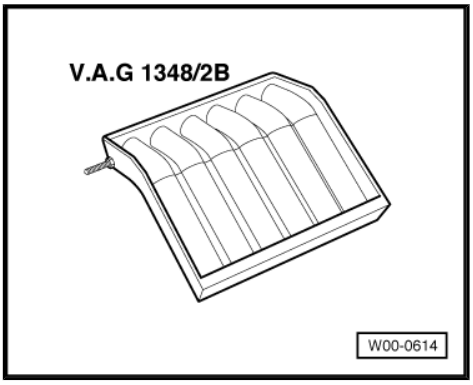
B - Checking return flow rate of individual injectors

Special tools and workshop equipment required

♦ Hose clamps for hoses up to 25 mm -3094-



♦ Injection rate comparison meter -V.A.G 1348/2 B-



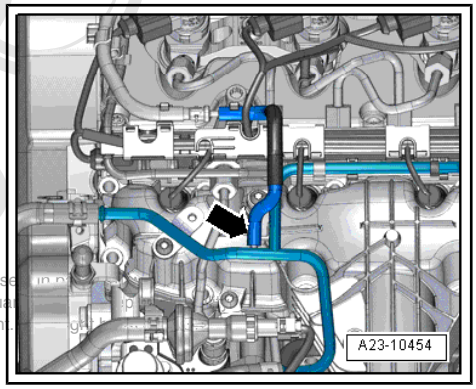
♦ 4 lengths of hose (made up in the workshop) to fit return line connections on injectors

Each injector normally has a relatively low return flow rate. If the return flow rate at one injector is relatively high compared to the other injectors, that injector is probably defective.

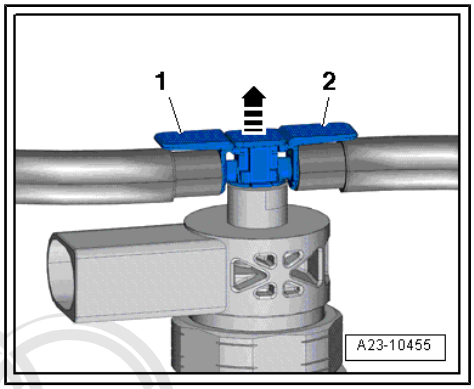
– Clean all return line connections (e.g. with commercial cleaning solution etc.) before removing.

– Dry all components after cleaning.

– Clamp off fuel return hose -arrow- using a hose clamp -3094- .



– Pull return line connections off injectors; to do so, press tabs -1- and -2- down and at the same time pull release pin upwards -arrow-.



Note

No dirt must be allowed to get into the disconnected return lines or the open connections on the injectors.

– Connect hoses onto return line connections of all 4 injectors.

– Run the 4 hoses into injection rate comparison meter -V.A.G 1348/2 B- .

– Start engine and let it idle for several minutes.

Caution

Risk of damage to injectors when return lines are disconnected.

- ***Do NOT press the accelerator during this test; the engine must only run at idling speed.***

– When the engine is warm and running at idling speed, the return flow rates at each of the 4 return lines must not differ by more than a small amount.

– If one injector has a significantly higher return flow rate than the others it must be renewed ⇒ page 39 .

Installing fuel return lines

– Push return line connections carefully onto injectors. The catch should engage audibly. Then press release pin down carefully.

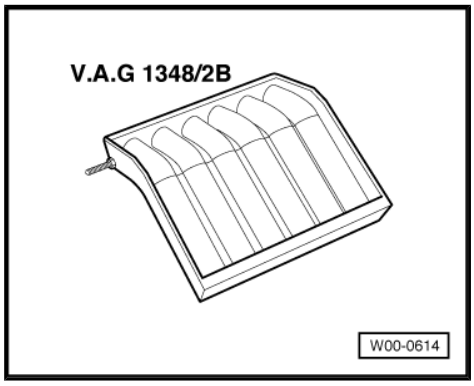
– Check fuel system for leaks ⇒ page 30 .

8.5 Checking return flow rate of injectors at starter cranking speed

If it is not possible to start engine, check return flow rate of injectors at starter cranking speed.

Special tools and workshop equipment required

- Injection rate comparison meter -V.A.G 1348/2 B-



- 4 lengths of hose (made up in the workshop) to fit return line connections on injectors

WARNING

- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

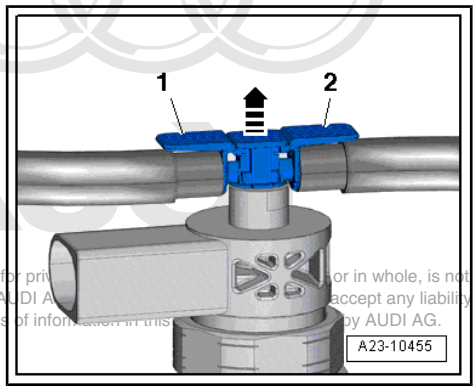
Each injector normally has a relatively low return flow rate. If the return flow rate at one injector is relatively high compared to the other injectors, that injector is probably defective.

– Remove engine cover panel ⇒ page 16 .

– Clean all return line connections (with commercial cleaning solution or similar) before removing.

– Dry all components after cleaning.

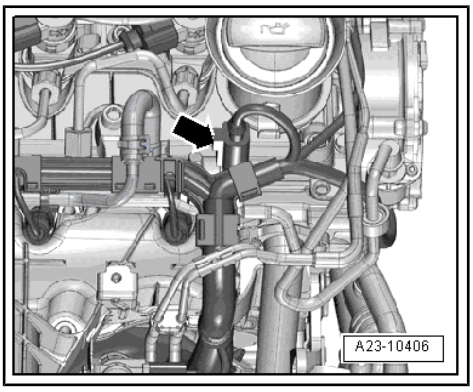
– Pull return line connections off injectors; to do so, press tabs -1- and -2- down and at the same time pull release pin upwards -arrow-.



Note

No dirt must be allowed to get into the disconnected return lines or the open connections on the injectors.

– Unplug electrical connector -arrow- at fuel pressure regulating valve -N276- .



Note

This prevents fuel from being injected when starter is operated.

– Connect the 4 hoses onto return line connections of all 4 injectors.

– Run the 4 hoses into injection rate comparison meter -V.A.G 1348/2 B- .

– Operate starter three times. (Wait approx. 20 seconds each time after operating starter to prevent it from overheating.)

• Specification of return flow rate: 0 ml

– If fuel comes out of one injector, that injector must be renewed.

– Re-attach electrical connector on fuel pressure regulating valve -N276- .

Installing fuel return lines

– Push return line connections carefully onto injectors. The catch should engage audibly. Then press release pin down carefully.

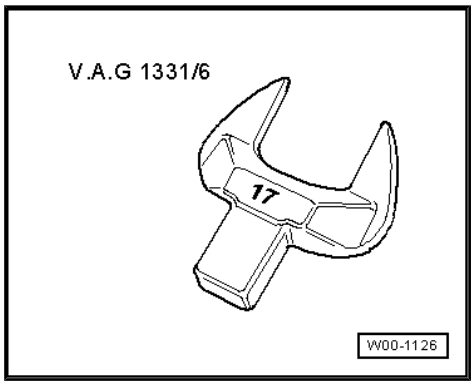
– Check fuel system for leaks ⇒ page 30 .

– Erase entry in event memory using vehicle diagnostic tester.

8.6 Checking for injectors sticking open

Special tools and workshop equipment required

- Tool insert, AF 17 -V.A.G 1331/6-



- Screw plug -T40204-

WARNING

- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

– Erase entry in event memory using vehicle diagnostic tester.

– Remove engine cover panel ⇒ page 16 .

– Clean all connections (with commercial cleaning solution or similar) before removing.

Note

- *Make sure all parts are clean; no dirt must be allowed to enter the fuel system.*
- *Check all cylinders in turn.*

– Dry all components after cleaning.

Start with cylinder No. 1.

– Unscrew union nut for cylinder 1 on fuel rail. Also loosen union nut on injector slightly. Seal off open connection on injector pipe.

– Plug open connection using plug -T40204- .

• The electrical connector of the relevant injector must remain connected.

– Erase all entries in the event memory.

– Perform test drive.

Note

- *The fault "positive fuel pressure control" should no longer be indicated when the defective injector has been located.*
- *Other fault messages may possibly be stored in the memory. These result from previous steps and can be disregarded.*

– Interrogate event memory after road-testing vehicle. If a fault relating to "positive fuel pressure control" is still indicated, repeat the above steps for all connections until the fault is no longer indicated after the road test.

Observe all instructions for connecting injector pipes.

– Lubricate threads of union nuts with fuel.

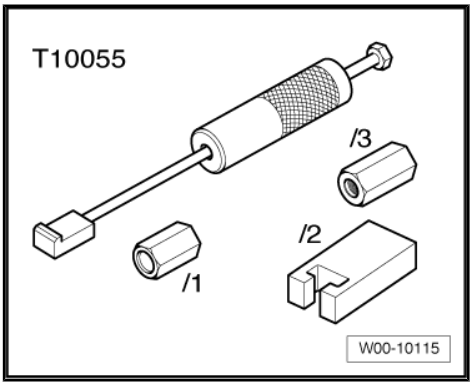
– Hand-tighten union nuts on high-pressure pipes. Make sure that connections are not under tension.

– Install high-pressure pipes ⇒ page 45 .

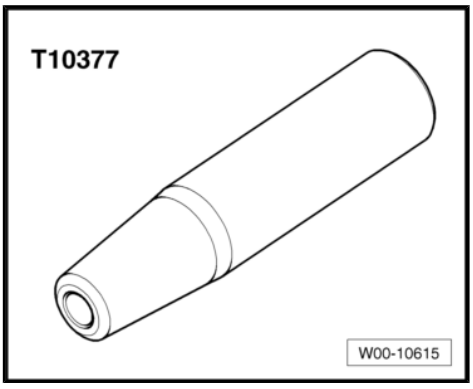
8.7 Removing and installing injectors

Special tools and workshop equipment required

- Puller -T10055-



- Assembly sleeve -T10377-



- Puller -T10415-

Removing

WARNING

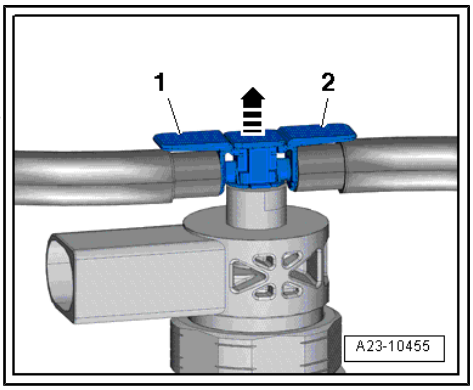
- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

– Remove engine cover panel ⇒ page 16 .

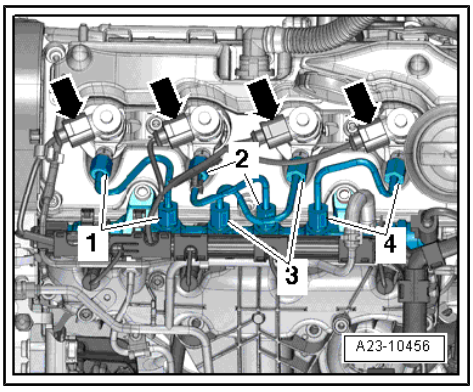
Caution

- *Mark cylinder numbers on injector units. They must always be re-installed on the same cylinders.*
- *Observe rules for cleanliness when working on the injection system.*
- *Plug open connections with suitable sealing caps immediately.*

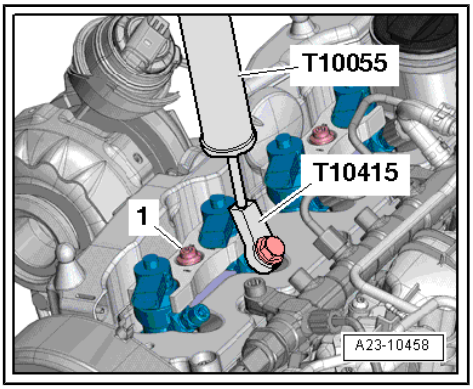
– Pull return line connections off injectors; to do so, press tabs -1- and -2- down and at the same time pull release pin upwards -arrow-.



– Unplug electrical connectors -arrows- at injectors.
– Unscrew union nuts on corresponding high-pressure pipe (-1 to 4-) and detach corresponding high-pressure pipe.
– Unscrew bolt -1- for clamping piece.



– Apply puller -T10055- with puller -T10415- as shown in illustration, and pull out injector upwards.



Note

To avoid damaging the sealing lip, rotate the injector while pulling it out.

– After removal, lay injectors on a clean cloth.

Important instructions for installing injectors:

- The following components and seals/O-rings must always be renewed when the injectors are removed and installed: “copper seal” and “O-ring for injector bore”.
- The following components and seals/O-rings must always be renewed when an injector is renewed: “clamping piece”, “copper seal” and “O-ring for injector bore”.
- Lubricate all O-rings with engine oil or assembly oil before installing.

Note

- *Note identification marks for cylinder allocation when re-installing high-pressure pipes.*
- *The high-pressure pipes can be re-used after performing the following checks:*
- *Check taper seats of high-pressure pipes for deformation and cracks.*
- *The bore of the pipe must not be distorted, restricted or otherwise damaged.*
- *Corroded pipes must not be used again.*

If a used injector is being re-installed:

– Spray tip of injector nozzle with rust-releasing spray. Wait approx. 5 minutes and wipe off soot particles and oil with a cloth.

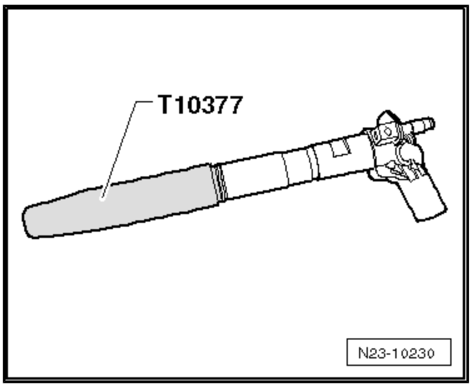
– If an injector is very dirty, the tip of the nozzle should also be cleaned with a soft brass wire brush to make it easier to remove the copper seal. Do not apply the wire brush to the bores in the nozzle.

– To remove the old copper seal from the injector, clamp the seal carefully in a vice so that it is just held between the jaws without turning. Then carefully pull and twist the injector out of the copper seal by hand.

– Clean off deposits under the copper seal using a suitable scraper.

Caution

To remove carbon deposits from the injector sealing surface, clean the injector seat in the cylinder head with a cloth soaked in engine oil or rust solvent. Take care not to damage the sealing surface.



– Renew seal for injector bore using assembly sleeve -T10377- .
– Install injectors.
– Hand-tighten union nuts on high-pressure pipes. Make sure that connections are not under tension.
• Tightening torques ⇒ “8.1 Injectors - exploded view”, page 31
– Press return line connections carefully over the seals and onto the injector units (check seal for damage before connecting return line). The catch should engage audibly. Then press release pin down carefully.

When one or more injectors have been renewed, the “Injector delivery calibration values” for the new injectors must be programmed in the engine control unit.

Additionally, check that the “injector delivery calibration values” are correctly entered for all the other injectors. Do NOT attempt to re-enter these values if the correct values are already stored in the engine control unit.

Bleeding fuel system and checking for leaks

Note

The fuel system is self-bleeding; do not open the high-pressure connections.

– Run engine at idling speed for several minutes and then switch off.
– Switch off ignition.
– Check the complete fuel system including all 4 return line connections for leaks.

Renew affected component if leakage still occurs after tightening to correct torque.

Note

The return lines can only be renewed together with the pressure retention valve as one unit.

– After completing the repair, road-test the vehicle over a distance of at least 20 km. Accelerate with full throttle at least once. Then inspect the high-pressure section of the fuel system again for leaks.

Note

If there is any air left in the fuel system, the engine may switch to the backup mode ('emergency running' mode) during the road test. Switch off the engine and erase the event memory. Then continue the road test.

9 Components of injection system

⇒ “9.1 Removing and installing throttle valve module J338 ”, page 43

⇒ “9.2 Installing high-pressure pipes”, page 45

⇒ “9.3 Checking fuel pressure regulating valve N276 ”, page 46

⇒ “9.4 Checking fuel pressure (low pressure)”, page 47

⇒ “9.5 Checking delivery rate of fuel pumps”, page 49

⇒ “9.6 Removing and installing fuel pressure regulating valve N276 ”, page 51

⇒ “9.7 Removing and installing fuel pressure sender G247 ”, page 52

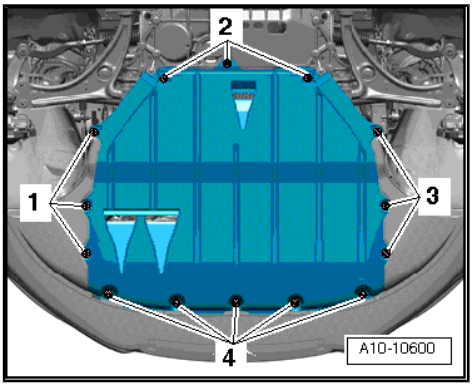
⇒ “9.8 Removing and installing fuel rail”, page 55

9.1 Removing and installing throttle valve module -J338-

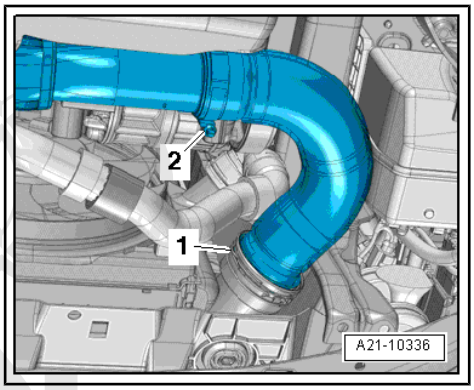
Removing

– Remove engine cover panel ⇒ page 16 .

– Remove noise insulation -1- ⇒ Rep. Gr. 66 .



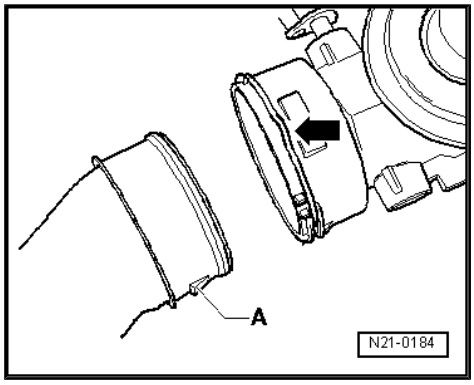
– Loosen hose clip -2- and remove air hose.



Removing air hoses with plug-in connectors

– Release tab -A- on plug-in connector by lifting retaining clip -arrow-.

– Disconnect air pipes and hoses by hand (do not use a tool).

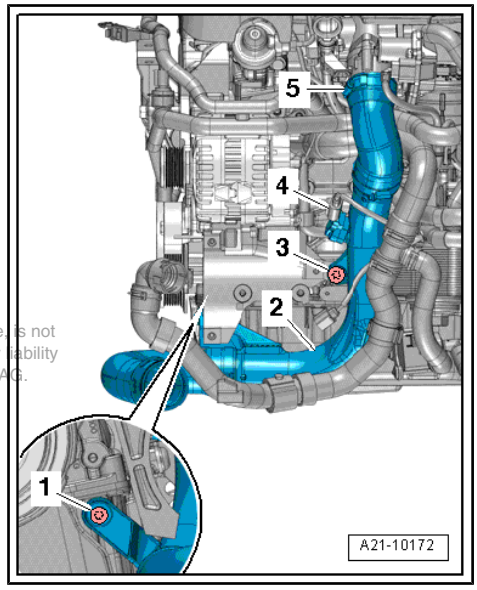


– Remove bolts -1- and -3-.

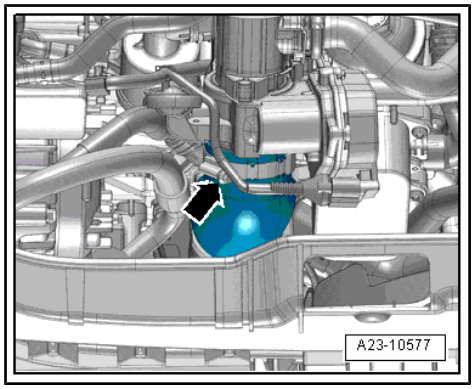
– Loosen hose clip -5- at throttle valve module -J338- , detach air pipe -2-, but leave in position.

Note

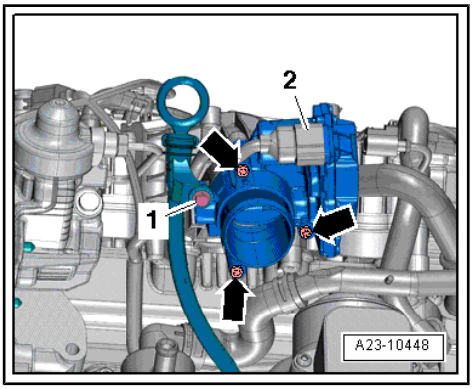
Disregard item -4-.



– Loosen hose clip -arrow-.



– Unplug electrical connector -2-.
– Remove bolt -1- for dipstick guide tube.
– Remove bolts -arrows- and detach throttle valve module - J338- .



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque
  ⇒ “6.1 Intake manifold with attached components - exploded view”, page 21

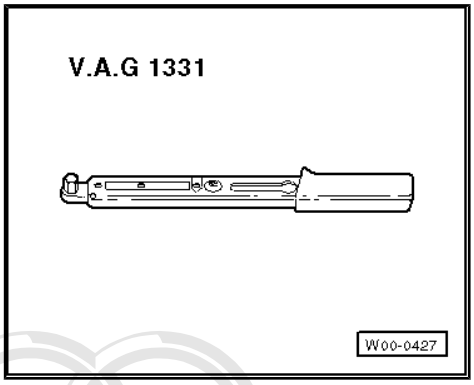
Note

Fit new O-ring.

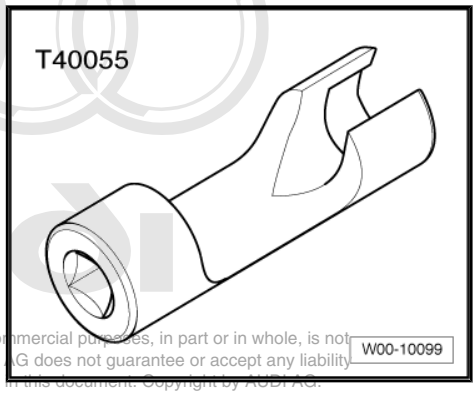
9.2 Installing high-pressure pipes

Special tools and workshop equipment required

♦ Torque wrench -V.A.G 1331-



♦ Socket -T40055-



Procedure

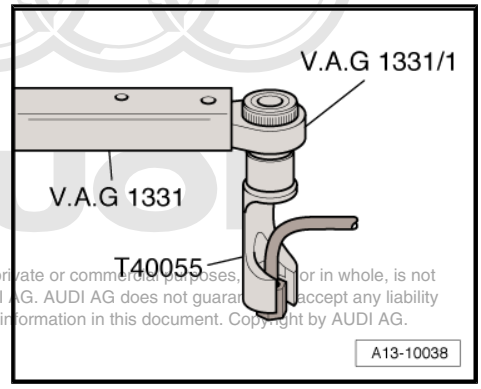
Note

- *Note identification marks for cylinder allocation when re-installing high-pressure pipes.*
- *The high-pressure pipes can be re-used after performing the following checks:*
- *Check taper seats of high-pressure pipes for deformation and cracks.*
- *The bore of the pipe must not be distorted, restricted or otherwise damaged.*
- *Corroded pipes must not be used again.*

Caution

The fuel rail and the clamping pieces can be slackened so that the injector pipes are not installed under tension. If necessary, move the fuel rail slightly and turn the corresponding injector slightly. Never bend the pipes or subject them to tension. Bending the pipes would ultimately cause them to fracture.

– Use vacuum cleaner to remove dirt from taper seat at fuel rail.
– Clean fuel pipe and end of pipe using cleaning solution and dry with compressed air.
– Lubricate threads of union nuts with fuel.
– Hand-tighten union nuts on high-pressure pipes (ensure that pipes are not under tension).
• Tightening torque ⇒ “8.1 Injectors - exploded view”, page 31
– To tighten unions of high-pressure pipes to fuel rail and injectors, use torque wrench -V.A.G 1331- with socket -T40055- .
– Check fuel system for leaks ⇒ page 30 .



9.3 Checking fuel pressure regulating valve -N276-

Special tools and workshop equipment required

- Fuel-resistant measuring container

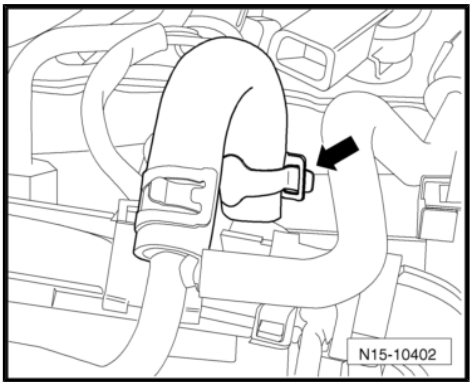
WARNING

- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

– Remove engine cover panel ⇒ page 16 .

– Release hose clip -arrow- and detach fuel return hose from fuel rail.

– Seal off open return line connection with a plug.



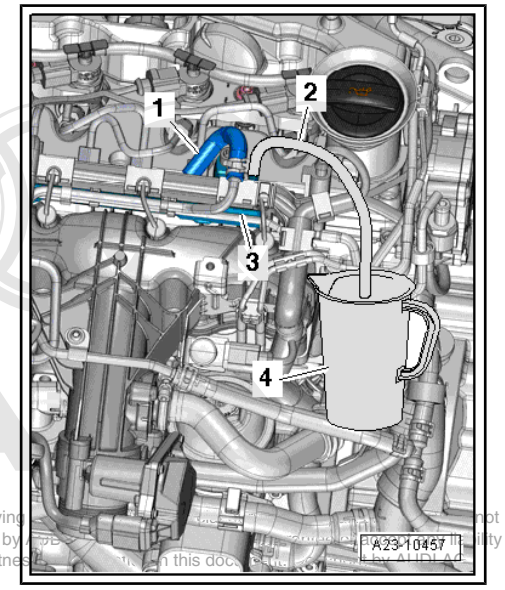
– Connect test hose -2- to return line connection of fuel rail -3-.

– Hold end of test hose into measuring container -4- to measure return flow rate.

– Start engine and let it idle for 30 seconds.

• Specification: 90 … 110 ml in 30 seconds

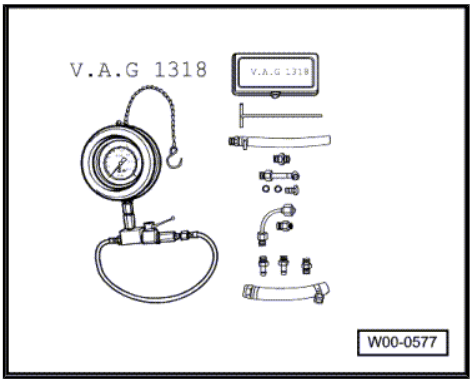
If specification is not obtained, fuel pressure regulating valve -N276- is defective.



9.4 Checking fuel pressure (low pressure)

Special tools and workshop equipment required

♦ K-Jetronic pressure tester -V.A.G 1318-



Test conditions:

- Battery voltage at least 12.5 V.
- Fuel filter OK.
- Fuel tank at least 1/2 full.
- Ignition off.

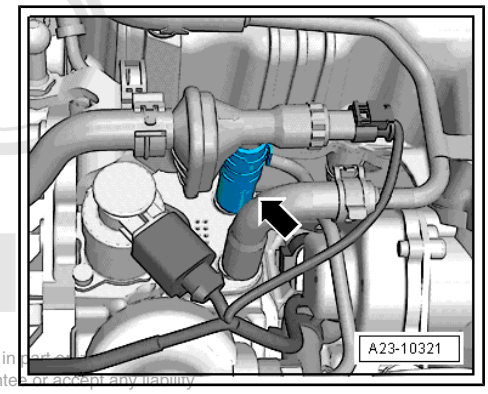
Checking residual pressure

– Remove engine cover panel ⇒ page 16 .

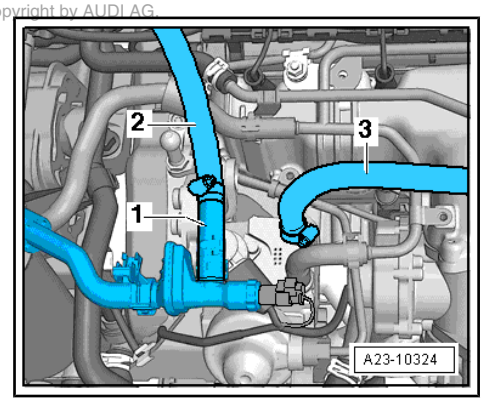
WARNING

- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*
- *To reduce the pressure in the fuel system, wrap a clean cloth around the connection and carefully loosen the connection.*

– Release hose clip and detach fuel supply line -arrow- from high-pressure pump.

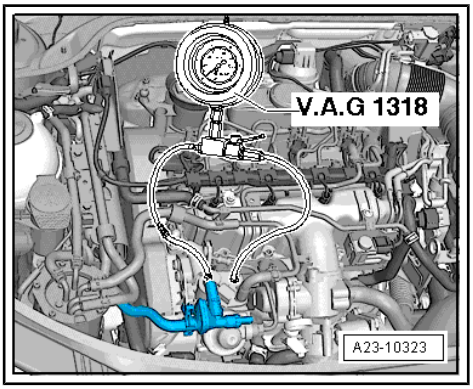


– Connect K-Jetronic pressure tester -V.A.G 1318- to fuel supply line -1- with suitable adapter -2-.
– Connect second hose -3- (from K-Jetronic pressure tester -V.A.G 1318-) to open connection on high-pressure pump, as shown in illustration below.



Note

In this way the K-Jetronic pressure tester -V.A.G 1318- is connected into the fuel supply line.



– Connect vehicle diagnostic tester (e.g. vehicle diagnostic, testing and information system -VAS 5051B-).
– Switch on ignition.
– Select “Engine electronics” in vehicle self-diagnosis.
– Then select “Basic setting”.
– Select “Checking fuel system pressurisation pump” from the list.
– Press “Start” button.
– Press “Start” key: The fuel pump will start running.
– Let fuel pump run until maximum fuel pressure has built up.

• Specification: at least 3.5 bar

If specification is not obtained:

♦ Leak in union between pressure gauge and fuel line
♦ Leak in pressure tester
♦ Leak in fuel lines and their connections
♦ Fuel filter is blocked.

– Check delivery rate of fuel pump ⇒ page 49 .

Note

Check fuel system for leaks.

9.5 Checking delivery rate of fuel pumps

Special tools and workshop equipment required

♦ Measuring container (fuel-resistant)

Test conditions:

• Battery voltage at least 12.5 Volt.
• Fuel filter OK.
• Fuel tank at least $^1/_2$ full.
• Ignition switched off

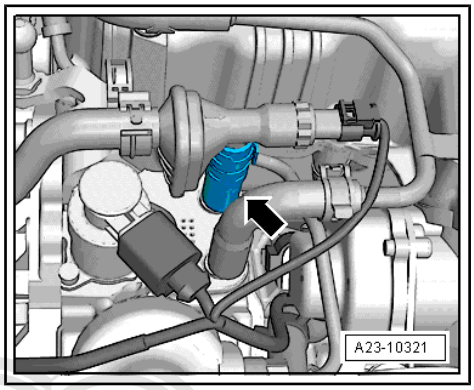
Checking fuel delivery rate

– Remove engine cover panel ⇒ page 16 .

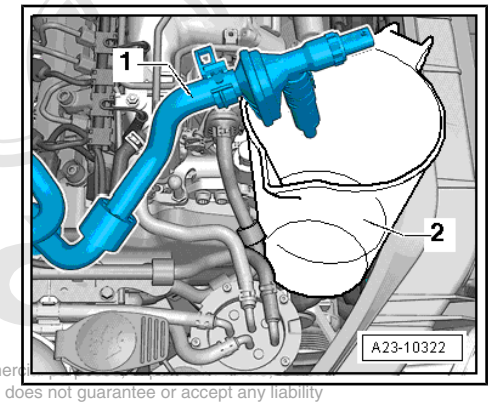
WARNING

- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*
- *To reduce the pressure in the fuel system, wrap a clean cloth around the connection and carefully loosen the connection.*

– Release hose clip and detach fuel supply line -arrow- from high-pressure pump.



– Hold fuel supply line -1- into a measuring container -2-.
– Connect vehicle diagnostic tester.
– Switch on ignition.
– Select “Engine electronics” in vehicle self-diagnosis.
– Then select “Basic setting”.
– Select “Checking fuel system pressurisation pump” from the list.
– Press “Start” key: The fuel pump will start running.
– Let fuel pump run for 15 seconds and exit activation function.



• Specification in 15 seconds: at least 600 ml

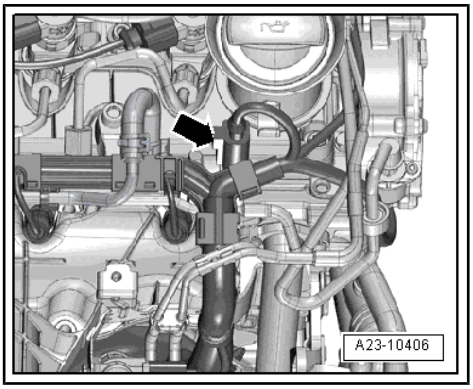
If minimum delivery rate is not reached, check for the following causes:

- Fuel pump was not running for 15 seconds
- Fuel lines have been crushed
- Fuel filter is blocked
- Fuel pumps defective: Checking ⇒ Rep. Gr. 20

Note

Check fuel system for leaks.

9.6 Removing and installing fuel pressure regulating valve -N276-



The fuel pressure regulating valve -N276- -2- is located in the fuel rail. It maintains a constant pressure in the fuel rail and the injector pipes (high-pressure fuel circuit).

If the pressure in the high-pressure fuel circuit is too high, the regulating valve opens to allow some of the fuel to flow back from the fuel rail to the fuel tank via a return line.

If the pressure in the high-pressure fuel circuit is too low, the fuel pressure regulating valve -N276- closes and seals off the high-pressure section of the system from the low-pressure section.

Note

Fuel pressure regulating valve -N276- must always be renewed after it has been removed.

Removing

WARNING

- ***Always observe rules for cleanliness and instructions for working on fuel system ⇒ page 2 .***
- ***Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.***

– Remove fuel rail ⇒ page 55 .

– Before removal, clean area around thread for fuel pressure regulating valve -N276- using commercial cleaning solution or similar (no dirt must enter opening in fuel rail).

Note

Clean carefully; cleaning solution must not enter the electrical connector.

– Dry off fuel pressure regulating valve -N276- .

– Slacken union nut (counterhold at hexagon flats on housing). Then unscrew and remove by hand.

– Extract dirt from opening in fuel rail (thread and sealing surface) using a vacuum cleaner. Do not use metal tools, etc.

– Seal off open fuel rail connections with clean plugs.

Installing

• Tightening torque ⇒ “8.1 Injectors - exploded view”, page 31

Note

- *The fuel pressure regulating valve -N276- has a deformable sealing lip and no separate seal; it can therefore be used only once.*
- *Check that sealing surfaces (deformable sealing lip) and threads on new fuel pressure regulating valve -N276- are not damaged.*
- *Check sealing surface at opening in fuel rail.*
- *The beginning of the thread and the deformable sealing lip of the fuel pressure regulating valve -N276- must be coated with diesel fuel.*

– Screw on union nut by hand.
– Align new regulating valve so that connecting wire is free of tension after connector is attached.
– Hold regulating valve in this position by holding hexagon flats on housing of regulating valve with open-end spanner or pliers (water pump pliers or similar).
– Use suitable torque wrench with an open-end spanner insert (30 mm) to tighten union nut.
– Install fuel rail ⇒ page 55 .
– After installation, run engine at moderate speed for several minutes and then switch off.
– Check fuel system for leaks.
– Interrogate event memory.

After renewing high-pressure pump and/or fuel pressure regulating valve -N276- , adaption must be performed. (The procedure is described under Guided Functions.)

– After completing the repair, road-test the vehicle. Accelerate with full throttle at least once. Then check the high-pressure section of the fuel system again for leaks.
– Interrogate event memory again.

9.7 Removing and installing fuel pressure sender -G247-

The fuel pressure sender -G247- is located in the fuel rail and continuously measures the fuel pressure in the high-pressure system. It transmits a corresponding voltage signal to the engine control unit -J623- .

Removing

WARNING

- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

– Remove engine cover panel ⇒ page 16 .

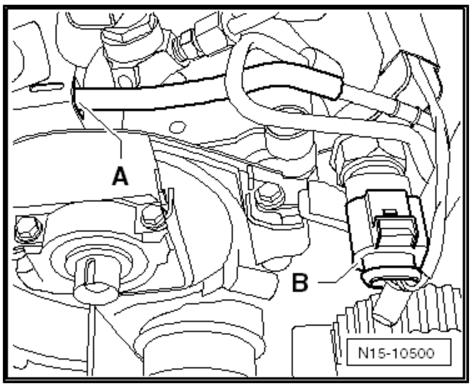
– Before removal, clean area around thread for fuel pressure sender using commercial cleaning solution etc. (no dirt must enter opening).

Note

Clean carefully; cleaning solution must not enter the electrical connector.

– Dry off fuel pressure sender -G247- .

– Unplug electrical connector -B- at fuel pressure sender -G247- .



– Unscrew fuel pressure sender -G247- .
– Extract dirt from opening in fuel rail (thread and sealing surface) using a vacuum cleaner. Do not use metal tools, etc.
– Seal off opening in fuel rail with a plug.

Installing

• Tightening torques ⇒ “8.1 Injectors - exploded view”, page 31

Note

♦ *The fuel pressure sender -G247- does not have a seal; instead, it has a deformable sealing lip.*
♦ *Check that sealing surfaces (deformable sealing lip) and threads on fuel pressure sender -G247- are not damaged. If inspection of fuel pressure sender -G247- shows that it is OK, it can be used again.*
♦ *Also check sealing surface at opening in fuel rail.*
♦ *The beginning of the thread and the deformable sealing lip of the fuel pressure regulating valve -N276- must be coated with diesel fuel.*

– Screw in fuel pressure sender -G247- by hand.
– Then tighten fuel pressure sender -G247- to specified torque.
– After installing fuel pressure sender -G247- , leave engine running at moderate speed for a few minutes when bleeding fuel system and then switch off again.

Note

The fuel system is “self-bleeding”; do NOT open the high-pressure connections.

– Interrogate event memory and erase it if necessary.
– Switch off ignition.
– Carefully check the entire fuel system for leaks.
– Renew affected component if leakage still occurs after tightening to correct torque.
– After completing the repair, road-test the vehicle. Accelerate with full throttle at least once. Then check the high-pressure section of the fuel system again for leaks.

Note

If there is any air left in the fuel system, the engine may switch to the backup mode ('emergency running' mode) during the road test. Switch off the engine and erase the event memory. Then continue the road test.

– After road test, interrogate event memory again.

9.8 Removing and installing fuel rail

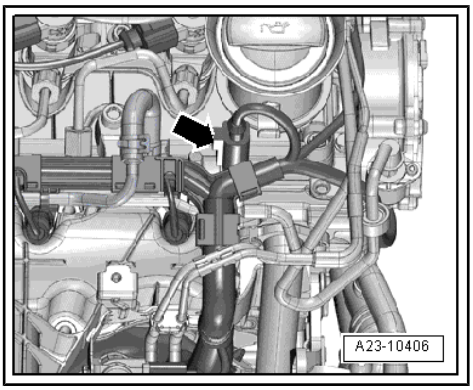
Removing

WARNING

- *Always read rules for cleanliness and instructions for working on fuel system ⇒ page 2 .*
- *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

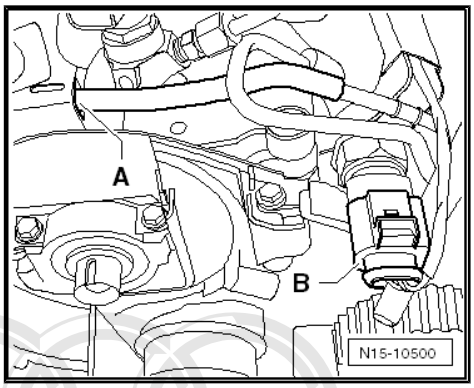
– Remove engine cover panel ⇒ page 16 .

– Unplug electrical connector -arrow- at fuel pressure regulating valve -N276- .

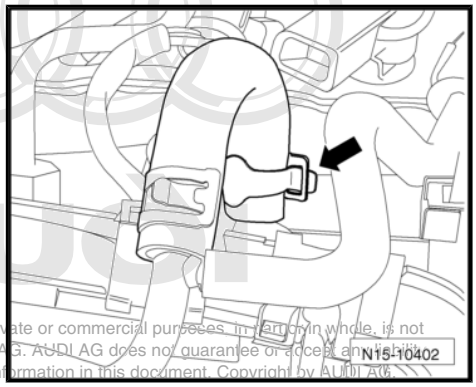


– Unplug electrical connector -B- at fuel pressure sender -G247- .

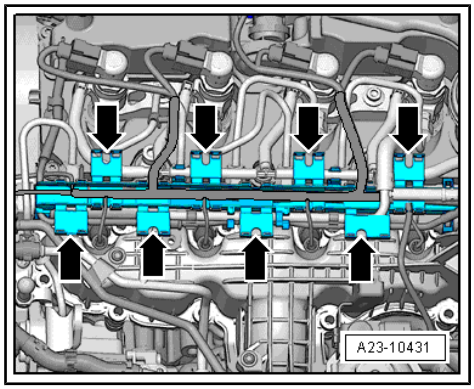
– Disconnect vacuum hose -A- from cylinder head cover.



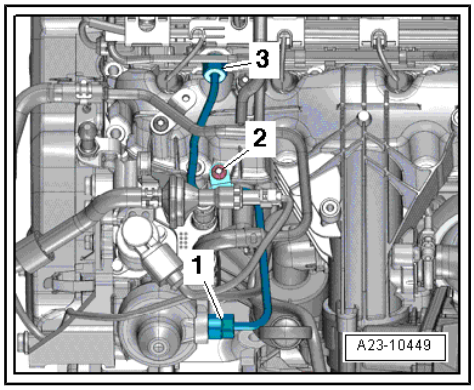
– Release hose clip -arrow- and detach fuel return hose from fuel rail.



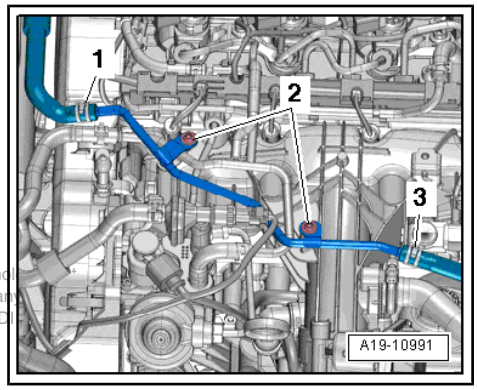
– Release retaining clips -arrows- at wiring harness and detach electrical connectors from glow plugs.



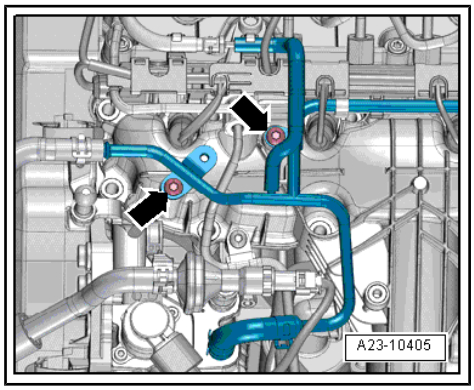
– Remove bolt -2- and union nuts -1 and 3- and detach high-pressure pipe.



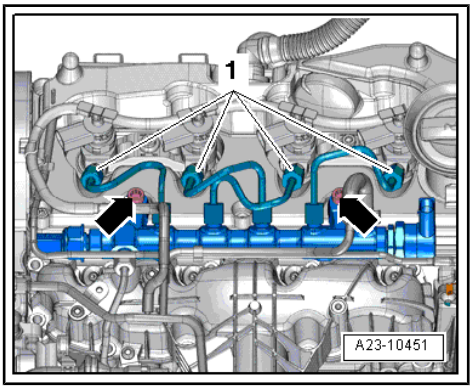
– Remove bolts -2- and place coolant return line to one side.



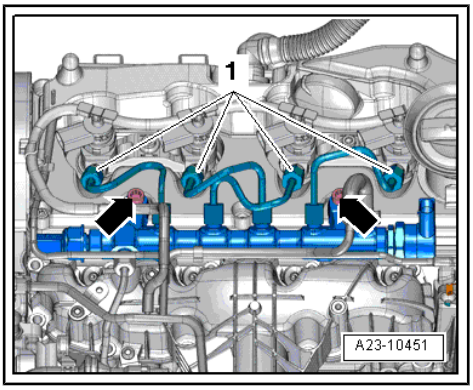
– Remove bolts -arrows- and place fuel return line to one side.
– Disconnect wiring guide from fuel rail and move clear to one side.



– Loosen union nuts on the 4 high-pressure pipes -1-.
– After removal, lay high-pressure pipes on a clean cloth.



– Unscrew both bolts -arrows- and remove fuel rail.



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ “8.1 Injectors - exploded view”, page 31

– Install high-pressure pipes so they are free of tension
⇒ page 45 .

Note

- *Note identification marks for cylinder allocation when re-installing high-pressure pipes.*
- *The high-pressure pipes can be re-used after performing the following checks:*
- *Check taper seats of high-pressure pipes for deformation and cracks.*
- *The bore of the pipe must not be distorted, restricted or otherwise damaged.*
- *Corroded pipes must not be used again.*

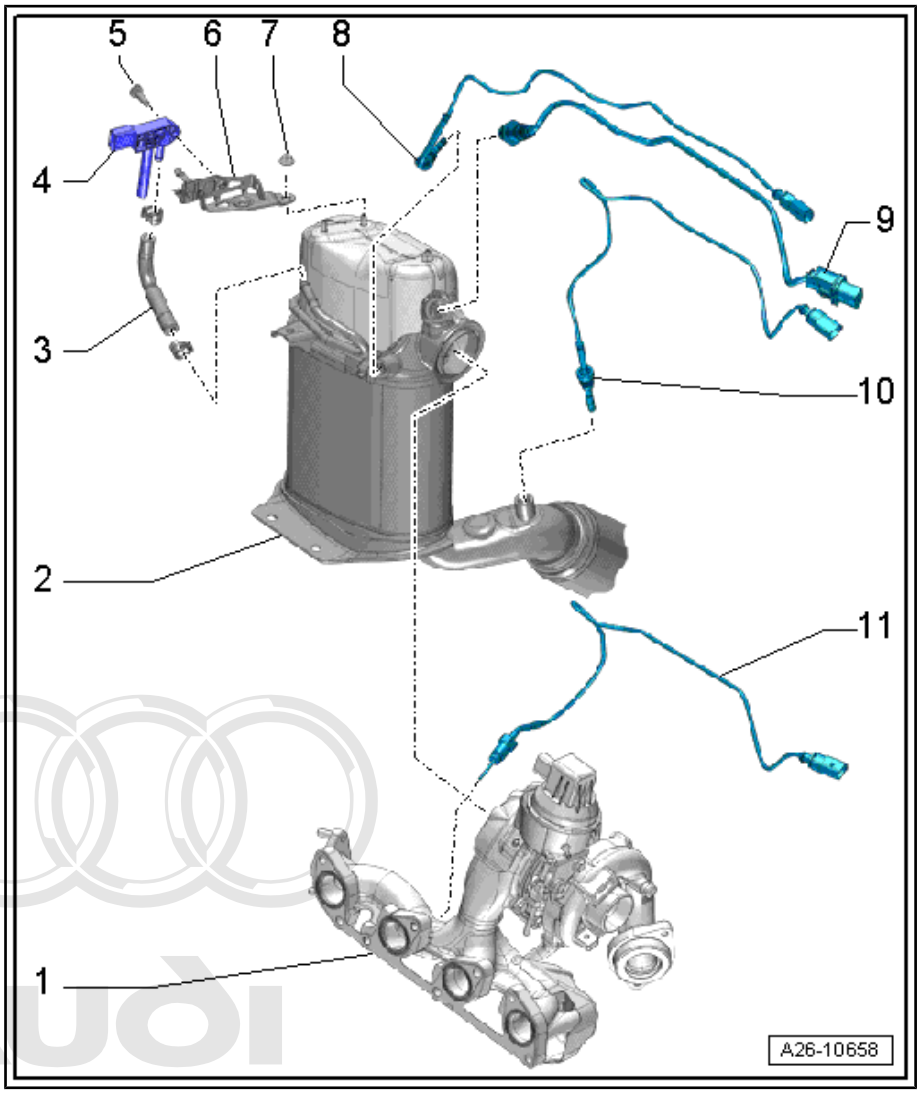
10 Lambda probe and exhaust gas temperature senders

⇒ “10.1 Lambda probe and exhaust gas temperature senders - exploded view”, page 58

⇒ “10.2 Removing and installing Lambda probe G39 with Lambda probe heater Z19 ”, page 58

⇒ “10.3 Removing and installing pressure differential sender G505 ”, page 59

10.1 Lambda probe and exhaust gas temperature senders - exploded view



1 - Turbocharger

2 - Particulate filter

3 - Hose

4 - Pressure differential sender -G505-

- ❑ Removing and installing ⇒ page 59

5 - Bolt

- ❑ 8 Nm

6 - Bracket

- ❑ For pressure differential sender -G505-

7 - Nut

- ❑ 9 Nm

8 - Exhaust gas temperature sender 3 -G495-

- ❑ 45 Nm
- ❑ Removing and installing ⇒ Rep. Gr. 26

9 - Lambda probe -G39- with Lambda probe heater -Z19-

- ❑ 50 Nm
- ❑ Removing and installing ⇒ page 58

10 - Exhaust gas temperature sender 4 -G648-

- ❑ 45 Nm
- ❑ Removing and installing ⇒ Rep. Gr. 26

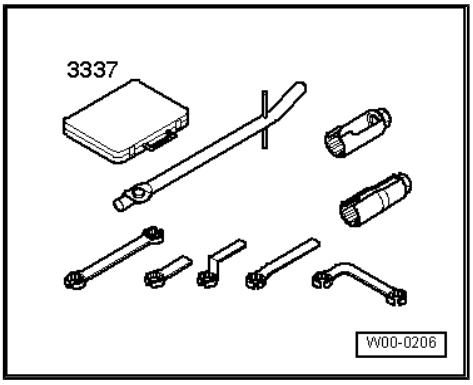
11 - Exhaust gas temperature sender 1 -G235-

- ❑ 45 Nm
- ❑ Removing and installing ⇒ Rep. Gr. 26

10.2 Removing and installing Lambda probe -G39- with Lambda probe heater -Z19-

Special tools and workshop equipment required

♦ Lambda probe open ring spanner set -3337-

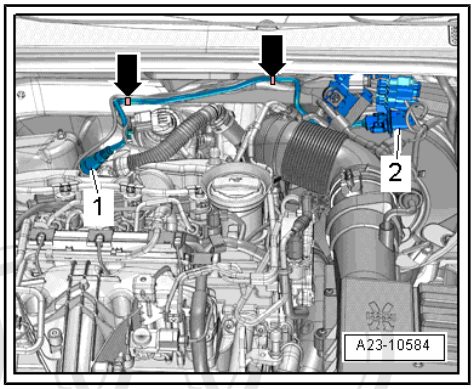


Removing

– Remove engine cover panel ⇒ page 16 .

– Unplug electrical connector -2- for Lambda probe -G39- and move electrical wiring clear.

– Unscrew Lambda probe -G39- -1- using tool from Lambda probe open ring spanner set -3337- .



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque
  ⇒ “10.1 Lambda probe and exhaust gas temperature senders - exploded view”, page 58

Note

♦ *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*

♦ *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. For high-temperature paste refer to ⇒ Electronic parts catalogue*

♦ *When installing, the Lambda probe wiring must always be re-attached at the same locations to prevent it from coming into contact with the exhaust pipe.*

10.3 Removing and installing pressure differential sender -G505-

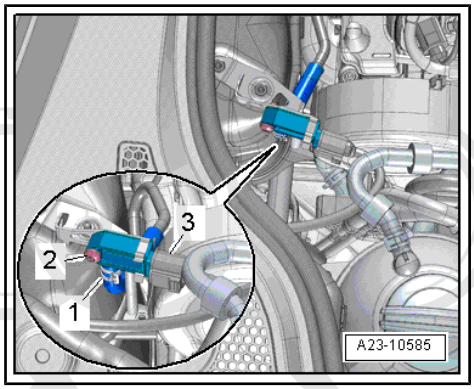
The pressure differential sender -G505- detects the amount of deposits in the particulate filter.

Removing

– Remove engine cover panel ⇒ page 16 .

– Detach heat shield sleeve.

– Unplug electrical connector -3-.
– Remove bolt -2- and detach pressure differential sender -G505- from bracket.
– Detach retaining clips from both hoses.
– Before disconnecting, spray the hoses for the pressure differential sender -G505- with suitable release agent.
– Carefully disconnect the hoses from their connections (take care to keep the hoses straight: the connections on pressure sensor can break off easily).



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque
⇒ “10.1 Lambda probe and exhaust gas temperature senders - exploded view”, page 58

Note

- *Before installing, blow out control pipes from pressure differential sender -G505- to particulate filter towards particulate filter with compressed air (pipes can become obstructed or may ice up due to condensation).*
- *Make sure that hoses are securely fitted and seal properly.*
- *If pressure pipes are detached from particulate filter, tighten pressure pipe connections ⇒ Rep. Gr. 26 .*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Secure the heat insulation sleeve in the original position when installing.*

Adaption must be performed after renewing pressure differential sender -G505- and/or particulate filter. (The procedure is described under Guided Functions.)

11 Engine control unit

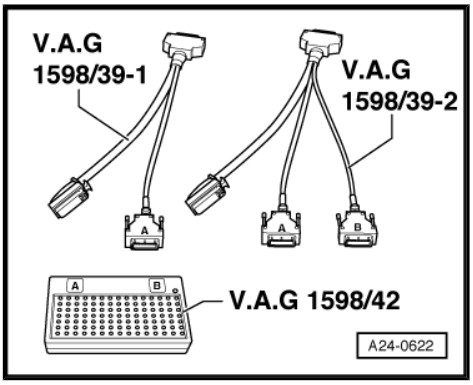
⇒ “11.1 Wiring and component check with test box V.A.G 1598/42 ”, page 61

⇒ “11.2 Removing and installing engine control unit J623 ”, page 62

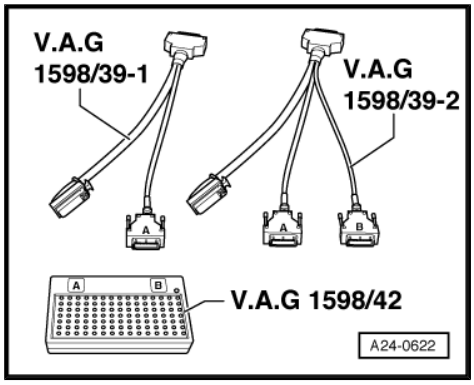
11.1 Wiring and component check with test box -V.A.G 1598/42-

Special tools and workshop equipment required

- Adapter cable -V.A.G 1598/39-



- Test box -V.A.G 1598/42-



Note

- *The test box has 105 sockets. The connecting cable can be disconnected from the test box. This means that only the cable (and not the test box) has to be purchased for future engine control units with different types of connectors.*
- *The smaller of the two connectors on the engine control unit has the contacts 1 to 60. The larger of the two connectors has the contacts 1 to 94.*
- *To carry out tests on the 60-pin wiring harness connector, the adapter cable -V.A.G 1598/39-1- is connected to connector -A- on the test box. For components connected to 60-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.*
- *To carry out tests on the 94-pin wiring harness connector, the adapter cable -V.A.G 1598/39-2- must be connected to connectors -A- and -B- on the test box. For components connected to 94-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.*
- *The test box -V.A.G 1598/42- is designed so it can be connected both to the wiring harness for the engine control unit and to the engine control unit itself at the same time.*
- *The advantage of this is that the electronic engine control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).*
- *The relevant test procedure will state whether it is necessary to also connect the engine control unit to the test box.*

The engine control unit has to be removed before connectors can be unplugged from engine control unit ⇒ page 62 .

WARNING

To prevent damage to the electronic components, select appropriate measuring range before connecting the measuring cables and observe the test requirements.

– Connect the test box -V.A.G 1598/42- to wiring harness with adapter cable -V.A.G 1598/39-1- or adapter cable -V.A.G 1598/39-2- . Connect earth clip of test box to negative terminal of battery. The instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test box.
– Carry out test as described in appropriate repair procedures.

Installing engine control unit

Installation is performed in the reverse sequence.

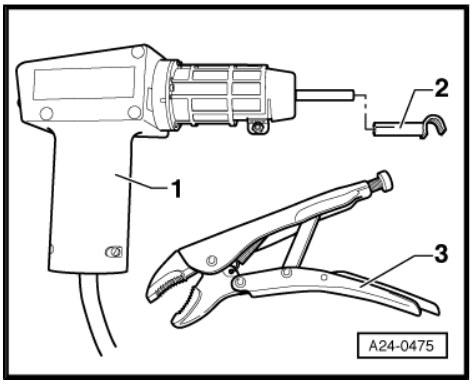
Perform the following after reconnecting engine control unit:

– Interrogate event memory and erase if necessary.

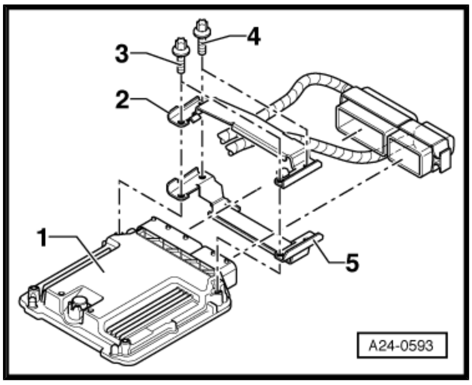
11.2 Removing and installing engine control unit -J623-

Special tools and workshop equipment required

- Hot air blower -VAS 1978/14A- -item 1- with nozzle attachment -2- from wiring harness repair set -VAS 1978 B-



- Small vice-grip pliers -3- (commercially available)



Note

- *Not every engine control unit is bolted to a protective housing. Whether a protective housing is fitted depends on the engine/gearbox combination.*
- *The engine control unit -1- is bolted to the protective housing -5-. To make it more difficult to unscrew the shear bolts -4- for locking plate -2-, their threads have been coated with locking fluid.*
- *The protective housing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).*

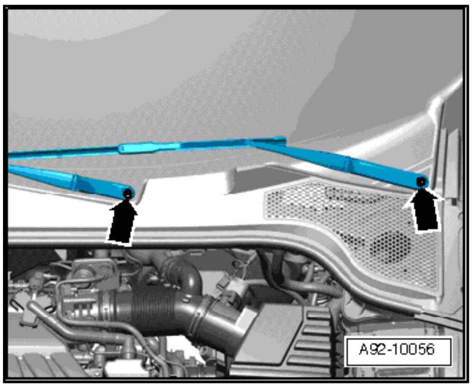
Removing

- Before removing the engine control unit -J623- , the adaption values of the injectors and the ash deposit mass must be read out. Use vehicle diagnostic tester to do so.
- Store adaption values as electronic file.
- Switch off ignition and remove ignition key after storing electronic file containing adaption values.

Note

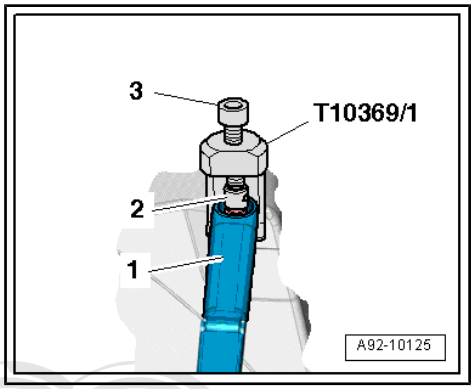
If the adaption values of the injectors of the old (defective) engine control unit cannot be read out, the adaption values must be entered into the new engine control unit manually and the adaption procedure must be performed accordingly.

- Loosen hexagon nuts -arrows- several turns.
- Loosen wiper arms from wiper shafts by tilting slightly.
- Completely remove hexagon nuts and detach wiper arms from wiper shafts.



Note

If necessary, use puller -T10369- or a commercially available puller to remove wiper arms.



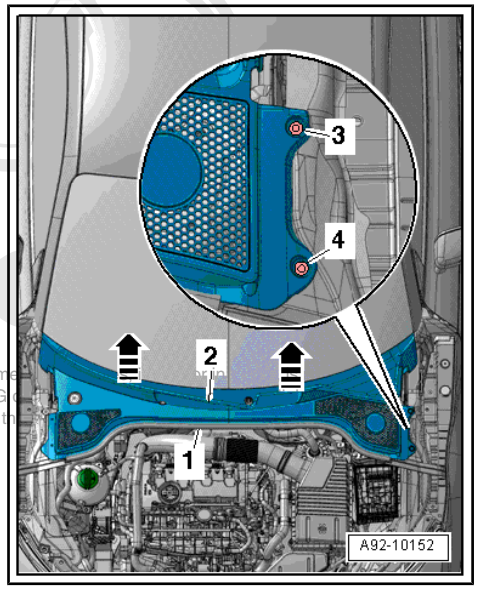
– Remove seal -1-.

Caution

Risk of damage to plenum chamber cover.

- ***Apply a small amount of soap solution to transition between windscreen and plenum chamber cover.***

– Starting at edge of windscreen, carefully pull plenum chamber cover -2- vertically upwards off retainer at windscreen -arrows-.

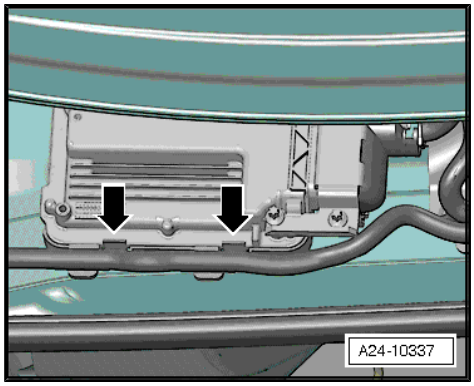


Note

Disregard -items 3, 4-.

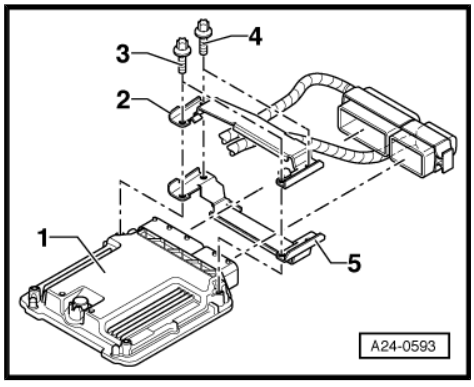
– Move clear engine wiring harness at rear of plenum chamber partition panel.

– Release clip -arrow- and remove engine control unit -J623- .

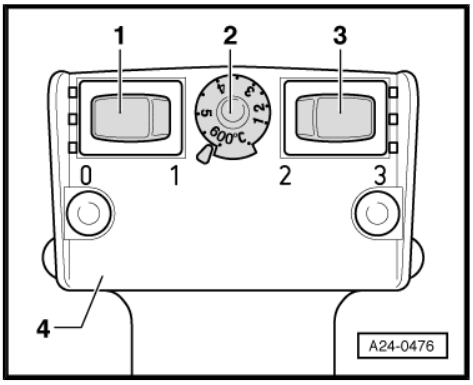


The threads of the two shear bolts -4- which are not screwed into the engine control unit are secured with locking fluid. To unscrew these two bolts, the threads must therefore be heated with the hot air blower.

The threads of the two shear bolts -3- which are screwed into the engine control unit are not secured with locking fluid. Do not apply heat to the threads in the control unit housing; this is not necessary and would cause overheating of the control unit.



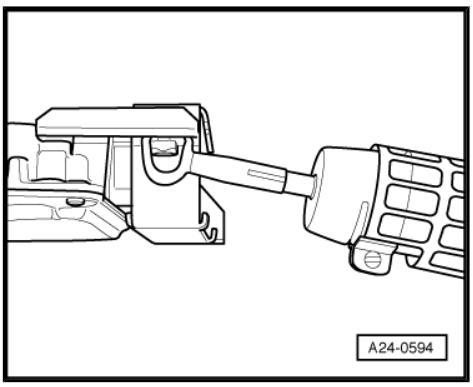
Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.



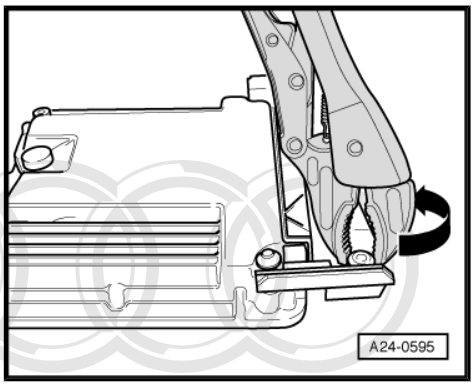
WARNING

Heating the thread of the locking plate also heats up the shear bolts and parts of the metal housing. Take care to avoid burns. It is also important to ensure that only the thread is heated and none of the surrounding components if at all possible. These should be covered if necessary.

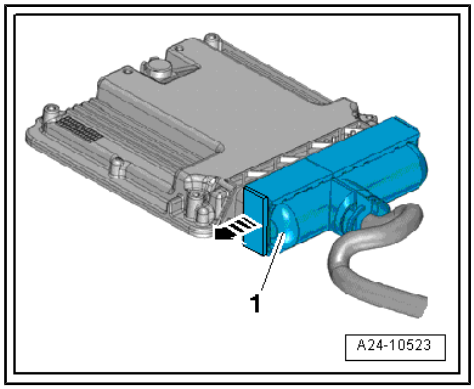
Switch on the hot air blower and heat the bolt for approximately 20 ... 30 seconds.



- Unscrew shear bolts using suitable vice-grip pliers (see arrow in illustration).
- The two shear bolts screwed into the engine control unit do not need to be heated. They can be removed without heating.
- Detach protective housing from control unit connectors.
- Unscrew both securing bolts from engine control unit -J623- .



– Release multi-pin connectors -1- -arrow- and disconnect.



Installing

Installation is performed in the reverse sequence.

– After installation, the protective housing must be re-fitted on the engine control unit -J623- .

– Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.

– Always use new shear bolts.

The procedure required after connecting the new engine control unit is described in the Guided Fault Finding or Guided Functions. Use vehicle diagnostic tester to do so.

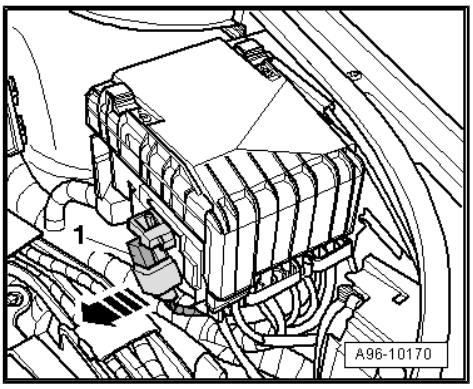
– The injector delivery calibration and the injector voltage calibration must additionally be re-adapted in the engine control unit -J623- after the control unit has been renewed (these functions influence engine power and exhaust emissions).

– On vehicles with particulate filter the current mileage (km) reading must be stored in the engine control unit via an adaption procedure.

– Install wiper arms ⇒ Electrical system; Rep. Gr. 92 .

28 – Glow plug system

1 Checking glow plug system



Automatic glow period control unit -J179- is located in relay and fuse holder in electronics box in plenum chamber.

1 - Automatic glow period control unit -J179-

The glow plug system is activated via the automatic glow period control unit -J179- . The automatic glow period control unit -J179- is capable of self-diagnosis.

A fault is stored in the engine control unit if a fault occurs in the glow plug system.

The procedure for checking the glow plug system is described in the “Guided Fault Finding”.

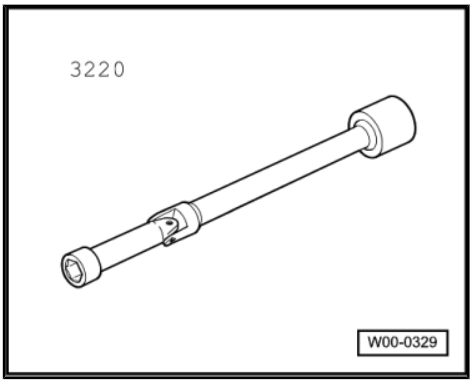
For faster starting, the vehicle is equipped with electronically controlled glow plugs and a separate glow period control unit.

Each glow plug is activated and diagnosed separately.

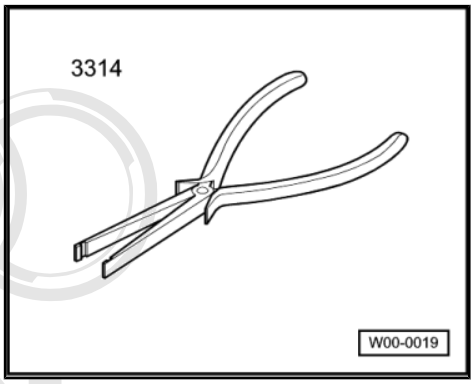
1.1 Removing and installing glow plugs

Special tools and workshop equipment required

- U/J extension and socket, 10 mm -3220-



- Pliers -3314-



Removing

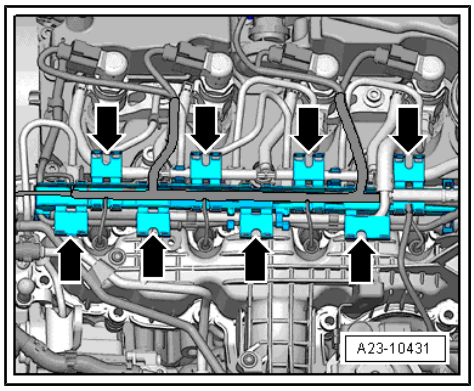
– Switch off ignition.

– Remove engine cover panel ⇒ page 16.

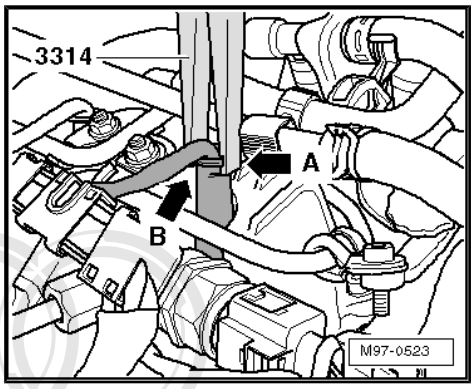
Caution

- *Make sure that no wire connection is damaged when unplugging the glow plug connectors; otherwise the entire wiring harness must be renewed.*
- *When unplugging the glow plug connectors, do not compress the pliers -3314- with too much force so that the support sleeve is not damaged.*

– Release retaining clips -arrows- at wiring harness and detach electrical connectors from glow plugs.



– Apply groove -arrow A- of pliers -3314- to collar of support sleeve -arrow B- and pull glow plug connectors off glow plugs.

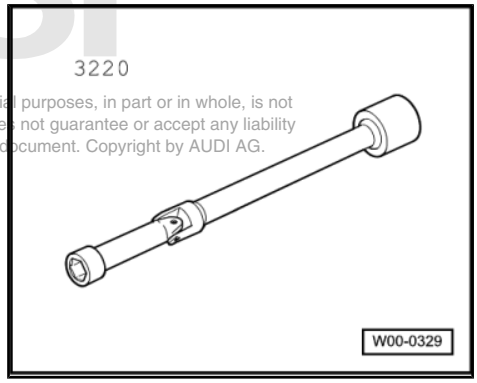


– Clean glow plug openings in cylinder head; make sure no dirt gets into cylinder.

Note

- *Cleaning procedure:*
- *Use a vacuum cleaner to remove coarse dirt.*
- *Spray brake cleaner or suitable cleaning agent into glow plug openings, let it work in briefly, and blow out with compressed air.*
- *Then clean the glow plug openings using a cloth moistened with oil.*

– To slacken the glow plugs use special tool U/J extension and socket, 10 mm -3220-

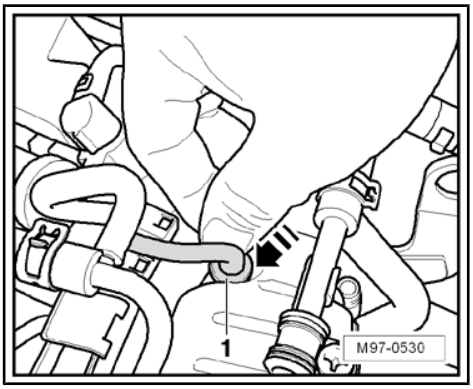


Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque ⇒ “2 Overview of fitting locations”, page 5

– Fit glow plug connectors -1- back onto glow plugs -arrow-.



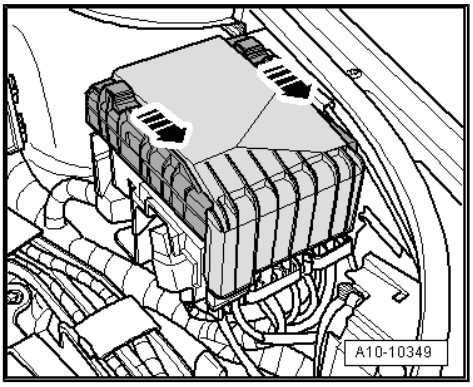
Note

Check that glow plug connectors are securely seated.

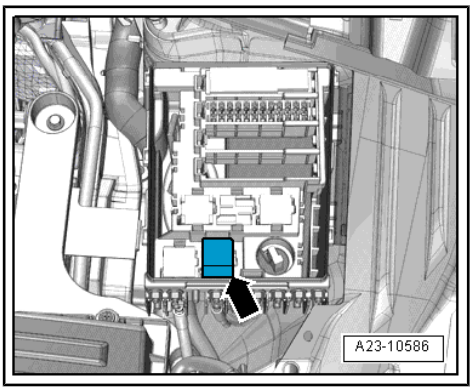
1.2 Removing and installing automatic glow period control unit -J179-

Removing

– Slide the two clips in the direction of the -arrows- and remove cover from electronics box in engine compartment.



– Pull automatic glow period control unit -J179- -arrow- out of relay carrier below electronics box in engine compartment.



Installing

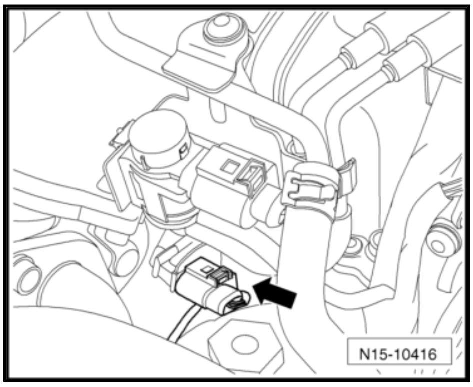
Install in reverse order.

1.3 Removing and installing Hall sender - G40-

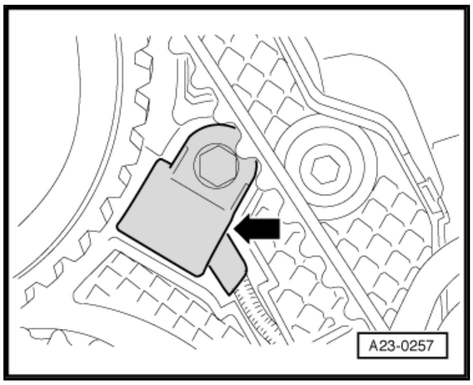
Removing

– Remove toothed belt ⇒ Rep. Gr. 15 .

– Unplug electrical connector -arrow- from Hall sender -G40- and detach connector from retainer.

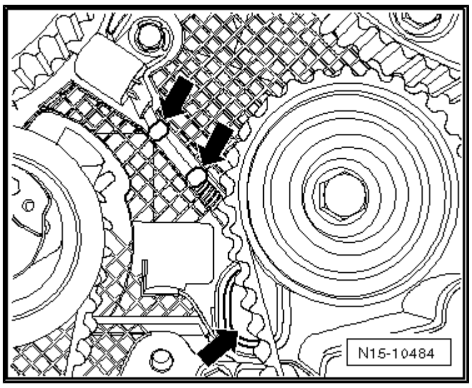


– Unbolt Hall sender -G40- -arrow-.



– Using a screwdriver, remove projections and take out cover for repair opening -arrows-.

– Take Hall sender -G40- off cylinder head and guide its connector through repair opening in toothed belt cover.



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque ⇒ “2 Overview of fitting locations”, page 5

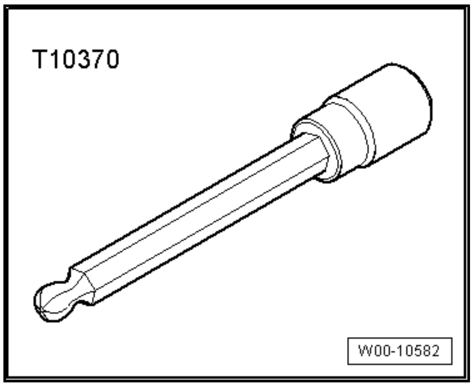
– Seal repair opening in toothed belt cover with rubber plug; for rubber plug refer to ⇒ Electronic parts catalogue .

– Fit toothed belt and adjust valve timing ⇒ Rep. Gr. 15 .

1.4 Removing and installing engine speed sender -G28-

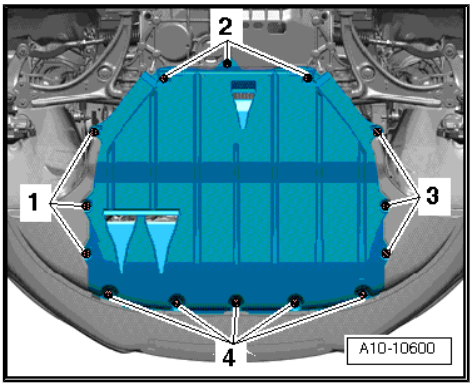
Special tools and workshop equipment required

♦ Socket, 4 mm -T10370-

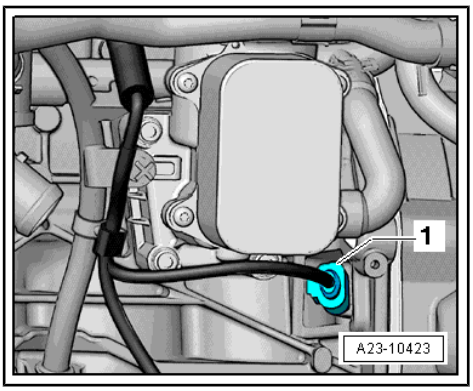


Removing

– Remove noise insulation ⇒ Rep. Gr. 66 .



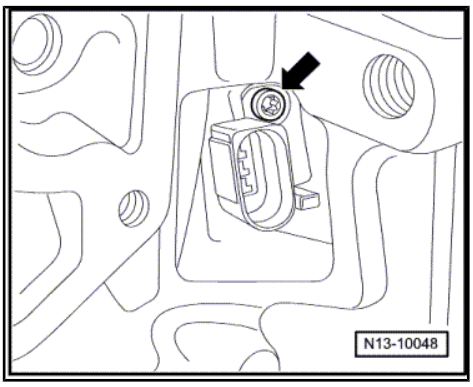
– Unplug electrical connector -1- at engine speed sender -G28- using assembly tool -T10118- .



Note

To release electrical connector without assembly tool -T10118- , press connector on engine speed sender in with a screwdriver and at the same time lift release tab with a thin wire hook.

– Unscrew bolt -arrow- for engine speed sender -G28- using socket (4 mm) -T10370- .



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque ⇒ “2 Overview of fitting locations”, page 5