

Audi

protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted. Audi AG does not accept any liability for the correctness of information in this document. Copyright by AUDI AG.

Workshop Manual

Audi A3 2004 ➤

Audi A3 Sportback 2005 ➤

TDI injection and glow plug system (4-cyl. 2.0 ltr. 4-valve common rail)

Engine ID	CBA A	CBA B	CBB B	CBE A					
-----------	----------	----------	----------	----------	--	--	--	--	--

Edition 03.2018

List 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.

Contents

23 - Mixture preparation - injection	1
1 Safety precautions and rules for cleanliness	1
1.1 Safety precautions when using testers and measuring instruments during a road test	1
1.2 Safety precautions for vehicles with start/stop system	1
1.3 Safety precautions when working on the fuel system	2
1.4 Safety precautions when working on the injection and glow plug system	3
1.5 Safety precautions when working on the exhaust system	4
1.6 Checking vacuum system	4
2 Overview of fitting locations - injection system	6
3 System layout	18
4 Exploded view - fuel system	20
5 Filling and bleeding fuel system	24
6 Checking fuel system for leaks	25
7 Air cleaner	26
7.1 Exploded view - air cleaner	26
7.2 Removing and installing engine cover panel	27
7.3 Removing and installing air filter element	28
7.4 Removing air cleaner (bottom section)	29
8 Intake manifold	31
8.1 Exploded view - intake manifold with attached components	31
8.2 Removing and installing intake manifold	32
8.3 Removing and installing fuel rail	36
8.4 Removing and installing intake manifold flap motor V157	39
8.5 Removing and installing throttle valve module J338	42
9 High-pressure pump	45
9.1 Removing and installing high-pressure pump	45
10 Injectors	47
10.1 Checking injectors	47
10.2 Performing adaption of correction values for injectors	47
10.3 Checking for injectors sticking open	48
10.4 Checking return flow rate of injectors with engine running	49
10.5 Checking return flow rate of injectors at starter cranking speed	52
10.6 Removing and installing injectors	54
11 Senders and sensors	61
11.1 Removing and installing air mass meter G70	61
11.2 Installing high-pressure pipes	61
11.3 Checking pressure retention valve in fuel return line	63
11.4 Checking fuel pressure regulating valve N276	65
11.5 Checking fuel pressure (low pressure) system	66
11.6 Checking delivery rate of fuel pumps	68
11.7 Removing and installing fuel pressure regulating valve N276	69
11.8 Removing and installing fuel pressure sender G247	72
12 Lambda probe and exhaust gas temperature sensors (CBAA, CBAB, CBBB)	76
12.1 Exploded view - Lambda probe and exhaust gas temperature sensors	76
12.2 Removing and installing Lambda probe G39 with Lambda probe heater Z19	77
12.3 Removing and installing exhaust gas pressure sensor 1 G450	78
13 Lambda probe and exhaust gas temperature sensors (CBEA)	80
13.1 Exploded view - Lambda probe and exhaust gas temperature sensors	80
13.2 Removing and installing Lambda probe G39 with Lambda probe heater Z19	83
13.3 Removing and installing Lambda probe after catalytic converter G130 with Lambda probe 1 heater after catalytic converter Z29	85



13.4	Removing and installing pressure differential sender G505	87
13.5	Removing and installing exhaust gas pressure sensor 1 G450	88
13.6	Removing and installing control pipe for pressure sensors	89
13.7	Removing and installing control pipe for exhaust gas pressure sensor 1 G450	92
14	Engine control unit	95
14.1	Wiring and component check with test box V.A.G 1598/42	95
14.2	Renewing engine control unit J623	97
28	Glow plug system	101
1		101
1.1	Removing and installing glow plugs	102
1.2	Removing and installing automatic glow period control unit J179	105
1.3	Removing and installing Hall sender G40	106
1.4	Removing and installing engine speed sender G28	107



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

23 – Mixture preparation - injection

1 Safety precautions and rules for cleanliness

(ARL005711; Edition 03.2018)

Overview

⇒ [“1.1 Safety precautions when using testers and measuring instruments during a road test”, page 1](#)

⇒ [“1.2 Safety precautions for vehicles with start/stop system”, page 1](#)

⇒ [“1.3 Safety precautions when working on the fuel system”, page 2](#)

⇒ [“1.4 Safety precautions when working on the injection and glow plug system”, page 3](#)

⇒ [“1.5 Safety precautions when working on the exhaust system”, page 4](#)

⇒ [“1.6 Checking vacuum system”, page 4](#)

1.1 Safety precautions when using testers and measuring instruments during a road test

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

Risk of injury if test equipment is not secured

If an accident occurs and the front passenger's airbag is triggered, test equipment which is not secured adequately may be catapulted through the vehicle with potentially serious consequences.

- Secure test equipment on the rear seat with a strap.

Or:

- Have a second mechanic operate test equipment on the rear seat.

1.2 Safety precautions for vehicles with start/stop system

When performing repairs on vehicles with start/stop system, note the following:

Risk of injury - engine may start unexpectedly

The engine can start unexpectedly if the vehicle's start/stop system is activated. A message in the instrument cluster indicates whether the start/stop system is activated.

- To deactivate the start/stop system, switch off the ignition.

1.3 Safety precautions when working on the fuel system

When working on the fuel system note the following warnings:

Risk of fire due to escaping fuel

If the battery is connected, the door contact switch activates the fuel pump when the driver's door is opened. Escaping fuel may ignite, causing a fire.

- Before opening the fuel system, disconnect power supply to fuel pump.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Risk of injury - fuel system operates under high pressure

The fuel system is pressurised. There is a risk of injury as fuel may spray out.

Before opening the fuel system:

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap a clean cloth around connection and open connection carefully).

If components of the fuel system between the fuel tank and the high-pressure pump are removed or renewed, the fuel system must be bled ➔ [page 24](#) .

Risk of irreparable damage to fuel pump

After working on the fuel system, the fuel pump may be irreparably damaged if it is allowed to run while empty.

- Never allow fuel pump to run while it is empty.
- Fill/bleed fuel pump.

- Clean tools and workbench etc. before working on the injection system.
- Clean connections and surrounding area thoroughly with engine cleaner or brake cleaner and dry cleaned area before loosening.
- 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. Keep components that are to be re-used in new, sealable plastic bags.
- Before installing, check the injectors and their surroundings visually; they must be undamaged and clean. 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 pipes must always be re-installed on the same cylinder.
- Take care not to damage the injectors when removing the old copper seals.
- Check all new O-rings for damage before installing. Lubricate O-rings with engine oil or assembly oil before installing.
- Position high-pressure pipes so they are free of stress. 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.
- Press the fuel return hoses onto the injectors by hand from above so that they engage audibly on each injector (do not press in the release pins when doing this). Then press down the release pin after connecting the return line. Check that the fuel return hoses are seated securely by pulling them by hand from above. Also check that they seal properly (fuel pressure in return line as far as pressure retention valve: between 8 and 10 bar).
- Do not dismantle individual common rail components. If there is a fault, the complete components must be renewed.
- When the engine is running, do not perform any repairs to the common rail system.
- Do not bleed the common rail system by unfastening high-pressure components after the engine has been started.
- 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. If possible, do not move vehicle.
- 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 Safety precautions when working on the injection and glow plug system

To prevent injuries to persons and/or damage to the fuel injection and glow plug system, note the following:

- ◆ Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as piezo systems and xenon headlights.
- ◆ Always switch off the ignition before connecting or disconnecting tester cables or electrical wiring for the injection or glow plug system.
- ◆ Do not open any fuel line connections while the engine is running.
- ◆ Always switch off ignition before washing engine.
- ◆ Certain tests may lead to faults being detected and stored by the engine control units. Therefore the event memory must be interrogated after completing all tests and repair work ("Interrogate event memory").

1.5 Safety precautions when working on the exhaust system

Do not dismantle exhaust gas temperature sender - risk of injury.

Risk of injury when disconnecting the exhaust system

There is a risk of eye irritation caused by soot particles in the air.

- Put on safety goggles.

Danger from toxic exhaust gases

Auxiliary/supplementary heater produces toxic exhaust gases.

There is a risk of poisoning and of damage to the respiratory tract.

- In enclosed spaces, only switch on the auxiliary/supplementary heater if there is an exhaust extraction system.
- In enclosed spaces without an exhaust extraction system, switch off the auxiliary/supplementary heater.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Risk of damage to flexible joint

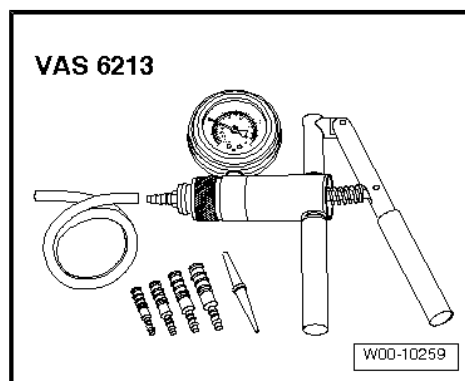
The flexible joint can be damaged or develop leaks if it is handled incorrectly.

- Do not bend flexible joint more than 10°.
- Install flexible joint so that it is not under tension.

1.6 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

◆ Porous or leaking lines

- 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 pressure with the hand vacuum pump - VAS 6213- or if the pressure drops again immediately, check the hand vacuum pump and connecting hoses for leaks.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2 Overview of fitting locations - injection system

Components A to N are not shown on the exploded view.

1 - Pressure sensor

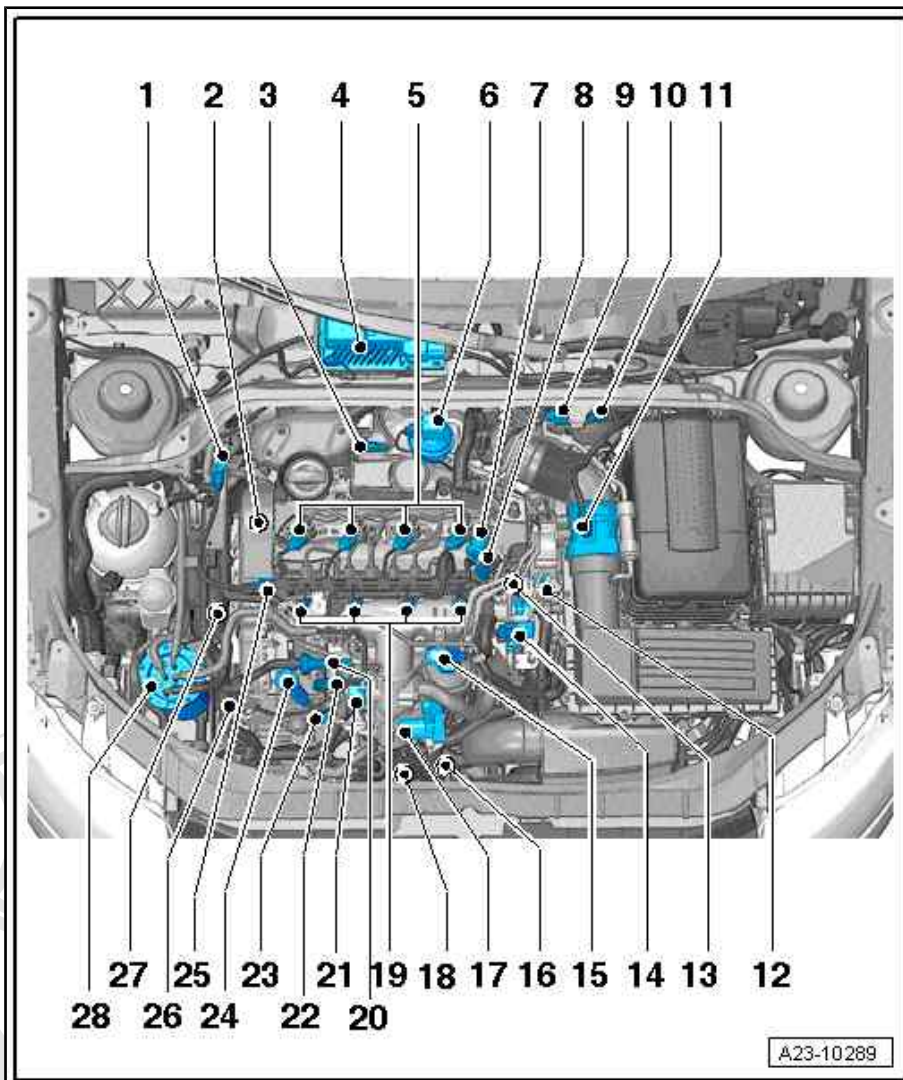
- ☐ On vehicles with engine codes CBAA, CBAB and CBBB, the component's designation is exhaust gas pressure sensor 1 - G450-
- ☐ Removing and installing
⇒ [page 87](#)
- ☐ On vehicles with engine code CBEA, the component's designation is pressure differential sender - G505-
- ☐ Removing and installing
⇒ [page 87](#)
- ☐ Fitting location
⇒ [page 14](#)
- ☐ Adaption must be performed after renewing this component

2 - Hall sender - G40-

- ☐ Fitting location
⇒ [page 14](#)
- ☐ Removing and installing
⇒ [page 106](#)
- ☐ 10 Nm

3 - Lambda probe - G39- with Lambda probe heater - Z19-

- ☐ Fitting location
⇒ [page 16](#)
- ☐ Removing and installing
⇒ [page 77](#)
- ☐ Removing and installing



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

(CBEA) ➔ [page 83](#)

- ☐ 50 Nm

4 - Engine control unit - J623-

- ☐ Fitting location ➔ [page 10](#)
- ☐ Removing and installing ➔ [page 95](#)

5 - Injectors

- ☐ Fitting location ➔ [page 13](#)
- ☐ Removing and installing ➔ [page 54](#)

6 - Position sender for charge pressure positioner - G581-

- ☐ Fitting location ➔ [page 12](#)

7 - Pressure retention valve

- ☐ The pressure retention valve maintains a residual pressure of approx. 10 bar in the return lines
- ☐ This residual pressure is required for the control function of the injectors
- ☐ The pressure retention valve may only be renewed together with the fuel return lines
- ☐ After replacement, engine must be run at idling speed for approx. 2 minutes to bleed fuel system
- ☐ Checking pressure retention valve ➔ [page 63](#)

8 - Fuel pressure regulating valve - N276-

- ☐ Fitting location ➔ [page 12](#)
- ☐ Checking ➔ [page 65](#)
- ☐ Removing and installing ➔ [page 69](#)
- ☐ 80 Nm

9 - Charge pressure control solenoid valve - N75-

- ☐ Fitting location ➔ [page 13](#)
- ☐ Electrical connector for exhaust gas temperature sender 3 - G495-

10 - Electrical connector

- ☐ For exhaust gas temperature sender 4 - G648-
- ☐ For exhaust gas temperature sender 1 - G235-
- ☐ For Lambda probe - G39-
- ☐ Fitting location ➔ [page 13](#)

11 - Air mass meter - G70-

- ☐ Removing and installing ➔ [page 61](#)

12 - Coolant temperature sender - G62-

- ☐ Fitting location ➔ [page 15](#)
- ☐ Removing and installing ➔ Rep. gr. 19

13 - Engine speed sender - G28-

- ☐ Fitting location ➔ [page 15](#)
- ☐ 4.5 Nm

Protected by copyright. This document is intended for informational purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

14 - Component on side of intake manifold

- ☐ Variable intake manifold motor - V183- (engine codes CBAA, CBAB, CBBB only)
- ☐ Intake manifold flap motor - V157- (engine code CBEA only)
- ☐ Fitting location ➔ [page 12](#)

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

- ☐ Engine codes CBAA, CBAB, CBBB only
- ☐ Fitting location ➔ [page 12](#)

16 - Pump for exhaust gas recirculation cooler - V400-

- ☐ Fitting location ➔ [page 14](#)



17 - Component on front of intake manifold

- ☐ Intake manifold flap motor - V157- with throttle valve potentiometer - G69- (engine codes CBAA, CBAB, CBBB only)
- ☐ Throttle valve module - J338- (engine code CBEA only)
- ☐ Fitting location ⇒ [page 12](#)
- ☐ Exploded view - intake manifold ⇒ [page 31](#)
- ☐ Removing and installing ⇒ [page 39](#)

18 - Charge pressure sender - G31-

- ☐ Combined with intake air temperature sender - G42-
- ☐ Fitting location ⇒ [page 11](#)
- ☐ Removing and installing ⇒ Rep. gr. 21

19 - Glow plugs

- ☐ Glow plug 1 - Q10-
- ☐ Glow plug 2 - Q11-
- ☐ Glow plug 3 - Q12-
- ☐ Glow plug 4 - Q13-
- ☐ Removing and installing ⇒ [page 102](#)

20 - Fuel temperature sender - G81- in fuel supply line

- ☐ Fitting location ⇒ [page 12](#)

21 - Exhaust gas recirculation

- ☐ Exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212- (engine codes CBAA, CBAB, CBBB only)
- ☐ Exhaust gas recirculation control motor - V338- with exhaust gas recirculation potentiometer - G212- (engine code CBEA only)
- ☐ Fitting location ⇒ [page 12](#)

22 - Fuel return line connection to fuel filter

23 - Fuel supply line connection (high-pressure pipe) to fuel rail (high-pressure reservoir)

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

- ☐ Do not open fuel metering valve - N290-
- ☐ After renewing, first fuel filling MUST be performed (it is important not to allow pump to run while it is still empty) ⇒ [page 24](#)
- ☐ Removing and installing ⇒ [page 45](#)

25 - Fuel pressure sender - G247-

- ☐ Fitting location ⇒ [page 12](#)
- ☐ Removing and installing ⇒ [page 72](#)
- ☐ 100 Nm

26 - Radiator outlet coolant temperature sender - G83-

- ☐ Fitting location (engine codes CBAA, CBAB, CBBB only) ⇒ [page 15](#)
- ☐ Fitting location (engine code CBEA only) ⇒ [page 15](#)
- ☐ Removing and installing ⇒ Rep. gr. 19

27 - Supplementary fuel pump - V393-

28 - Fuel filter

- ☐ Exploded view - fuel filter ⇒ Rep. gr. 20
- ☐ Renewing fuel filter ⇒ 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 10](#)
- ☐ In footwell on brake pedal

C - Clutch position sender - G476-

- ☐ Fitting location ➔ [page 11](#)
- ☐ Only fitted on vehicles with manual gearbox

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

- ☐ Fitting location ➔ [page 10](#)
- ☐ Removing and installing ➔ Rep. gr. 20

E - Exhaust gas recirculation temperature sensor - G98- (engine code CBEA only)

- ☐ Is screwed into housing for exhaust gas recirculation
- ☐ Electrical connector ➔ [page 16](#)
- ☐ Removing and installing ➔ Rep. gr. 26

F - Exhaust gas recirculation control motor - V338- with exhaust gas recirculation potentiometer 2 - G466- (engine code CBEA only)

- ☐ Is screwed into housing for exhaust gas recirculation
- ☐ Removing and installing ➔ Rep. gr. 26

G - Exhaust gas pressure sensor 1 - G450- (engine code CBEA only)

- ☐ Fitting location ➔ [page 14](#)
- ☐ Removing and installing ➔ [page 88](#)

H - Exhaust gas temperature sender 1 - G235-

- ☐ Fitting location ➔ [page 16](#)
- ☐ Exploded view - Lambda probes and exhaust gas temperature sensors ➔ [page 76](#)
- ☐ Removing and installing ➔ Rep. gr. 26

I - Exhaust gas temperature sender 2 - G448- (engine code CBEA only)

- ☐ Fitting location ➔ [page 16](#)
- ☐ Fitting location of electrical connector ➔ [page 13](#)
- ☐ Exploded view - Lambda probes and exhaust gas temperature sensors ➔ [page 80](#)
- ☐ Removing and installing ➔ Rep. gr. 26

J - Exhaust gas temperature sender 3 - G495-

- ☐ Fitting location ➔ [page 16](#)
- ☐ Exploded view - Lambda probes and exhaust gas temperature sensors ➔ [page 76](#)
- ☐ Removing and installing ➔ Rep. gr. 26

K - Exhaust gas temperature sender 4 - G648-

- ☐ Fitting location ➔ [page 16](#)
- ☐ Exploded view - Lambda probes and exhaust gas temperature sensors ➔ [page 76](#)
- ☐ Removing and installing ➔ Rep. gr. 26

L - Lambda probe after catalytic converter - G130- (engine code CBEA only)

- ☐ Fitting location of electrical connector ➔ [page 17](#)
- ☐ Fitting location ➔ [page 17](#)
- ☐ Removing and installing ➔ [page 85](#)

M - Exhaust flap control unit - J883- (engine code CBEA only)

- ☐ Fitting location ➔ [page 17](#)

N - Particulate filter

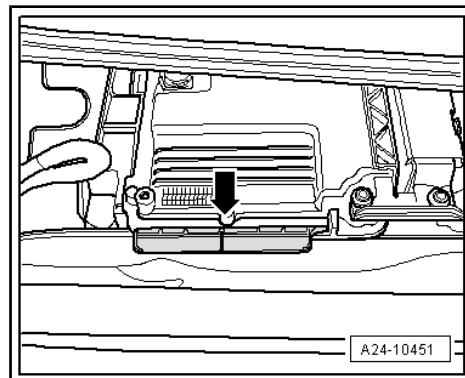
- ☐ Fitted on underbody
- ☐ Combined with a catalytic converter
- ☐ Adaption must be performed after renewing this component



❑ Removing and installing ⇒ Rep. gr. 26

Fitting location of engine control unit - J623-

Removing and installing ⇒ [page 97](#)



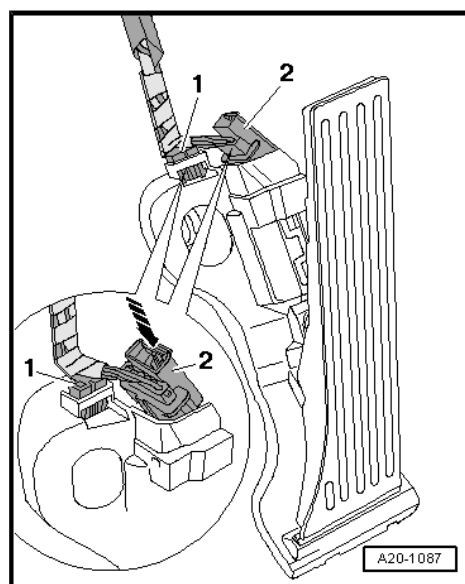
Accelerator position sender - G79- and accelerator position sender 2 - G185-

Removing and installing ⇒ Rep. gr. 20



Note

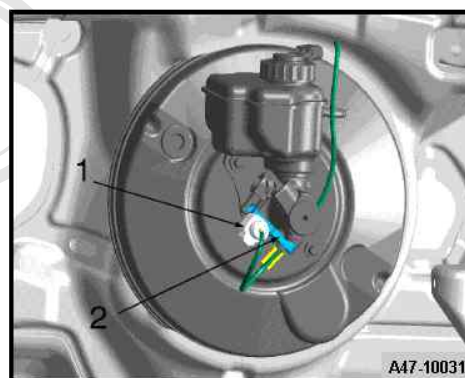
The accelerator position sender - G79- and accelerator position sender 2 - G185- are integrated in the accelerator pedal module and cannot be renewed individually.



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

◆ On brake master cylinder

Removing and installing ⇒ Rep. gr. 47



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

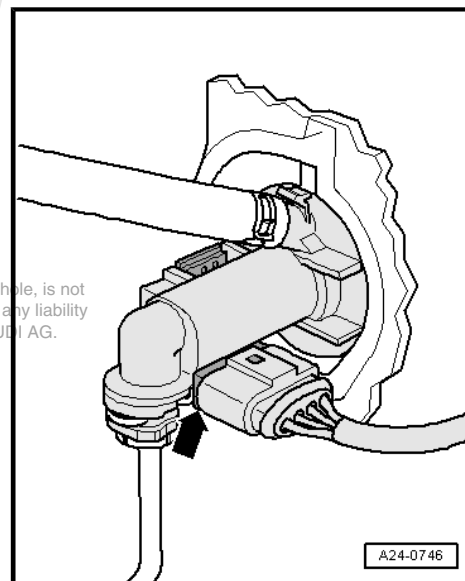
Clutch position sender - G476-

- ◆ On clutch master cylinder -arrow-.

Removing and installing ⇒ Rep. gr. 30

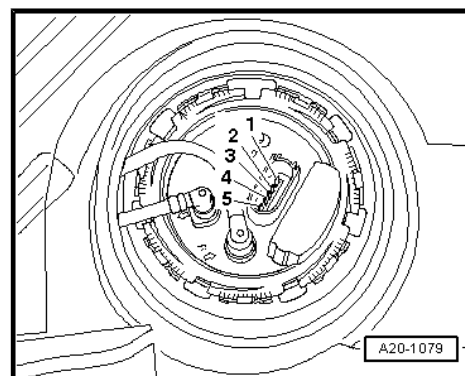
Integrated functions: clutch pedal switch for engine start - F194-
and clutch pedal switch - F36- (manual gearbox only)

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



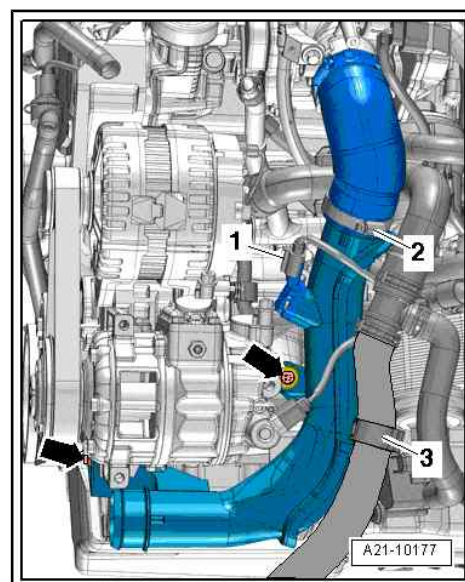
Fuel system pressurisation pump - G6-

Removing and installing ⇒ Rep. gr. 20



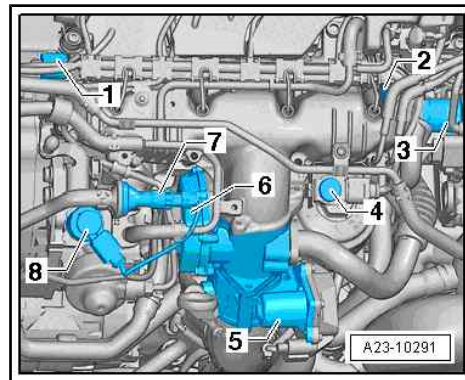
Charge pressure sender - G31- with intake air temperature sender - G42- -1-

Removing and installing ⇒ Rep. gr. 21



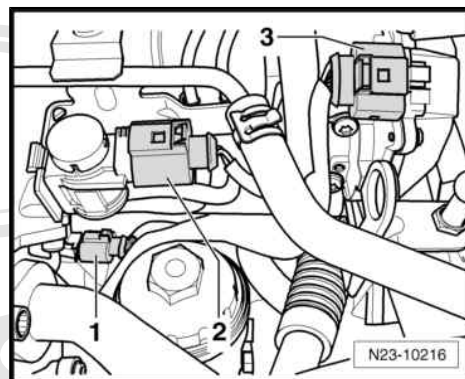
Fitting locations

- 1 - Fuel pressure sender - G247-
- 2 - Fuel pressure regulating valve - N276-
- 3 - (Engine codes CBAA, CBAB, CBBB) variable intake manifold motor - V183- with variable intake manifold position sender - G513-
- 3 - (Engine code CBEA) intake manifold flap motor - V157- with intake manifold flap potentiometer - G336-
- 4 - (Fitting location only applies for engine codes CBAA, CBAB, CBBB) exhaust gas recirculation cooler changeover valve - N345-
- 5 - (Engine codes CBAA, CBAB, CBBB) intake manifold flap motor - V157- with throttle valve potentiometer - G69-
- 5 - (Engine code CBEA) throttle valve module - J338-
- 6 - Exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212-
- 6 - (Engine code CBEA) exhaust gas recirculation control motor - V338- with exhaust gas recirculation potentiometer - G212-
- 7 - Fuel temperature sender - G81-
- 8 - Fuel metering valve - N290-



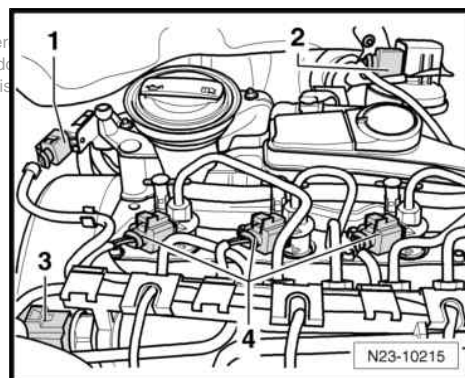
Components at front of engine

- 1 - Electrical connector for Hall sender - G40-
- 2 - (Fitting location only applies for engine codes CBAA, CBAB, CBBB) exhaust gas recirculation cooler changeover valve - N345-
- 3 - (Engine codes CBAA, CBAB, CBBB) variable intake manifold motor - V183-
- 3 - (Engine code CBEA) intake manifold flap motor - V157-



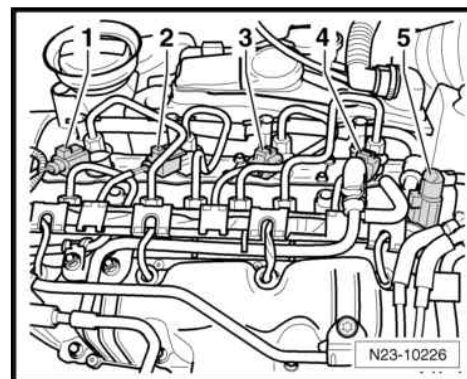
Components on engine

- 1 - (Engine codes CBAA, CBAB, CBBB) exhaust gas pressure sensor 1 - G450-
- 1 - (Engine code CBEA) pressure differential sender - G505-
- 2 - Position sender for charge pressure positioner - G581-
- 3 - Fuel pressure sender - G247-
- 4 - Injectors (N30 to N32)



Injectors

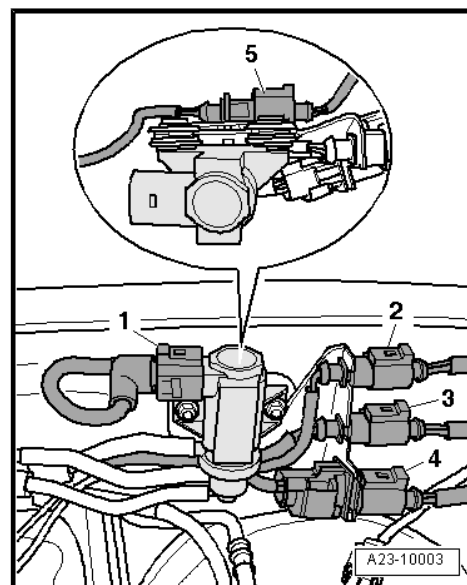
- 1 - Injector, cylinder 1 - N30-
- 2 - Injector, cylinder 2 - N31-
- 3 - Injector, cylinder 3 - N32-
- 4 - Injector, cylinder 4 - N33-
- 5 - Fuel pressure regulating valve - N276-



Fitting locations and connectors (engine codes CBAA, CBAB, CBBB)

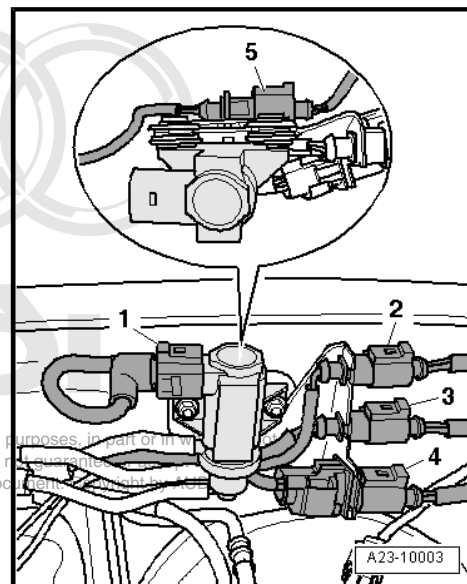
- 1 - For charge pressure control solenoid valve - N75-
- 2 - For exhaust gas temperature sender 4 - G648-
- 3 - For exhaust gas temperature sender 1 - G235-
- 4 - For Lambda probe - G39-
- 5 - For exhaust gas temperature sender 3 - G495-

For fitting locations for vehicles with engine code CBEA, see next illustration.



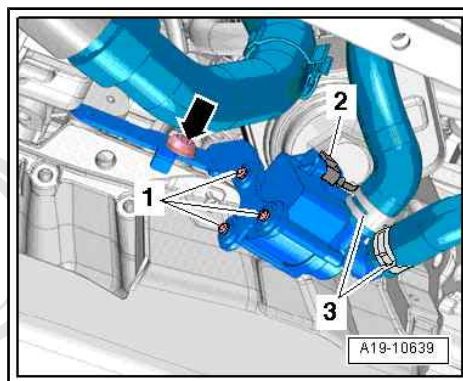
Fitting locations and connectors (engine code CBEA)

- 1 - For charge pressure control solenoid valve - N75-
- 2 - For exhaust gas temperature sender 2 - G448-
- 3 - For exhaust gas temperature sender 1 - G235-
- 4 - For Lambda probe - G39-
- 5 - For exhaust gas temperature sender 3 - G495-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the correctness of information in this document with respect to the correctness of information in this document.

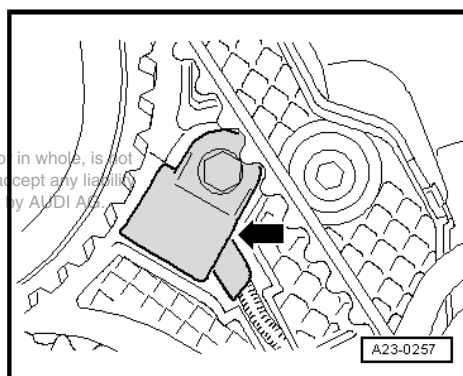
Pump for exhaust gas recirculation cooler - V400-



Hall sender - G40-



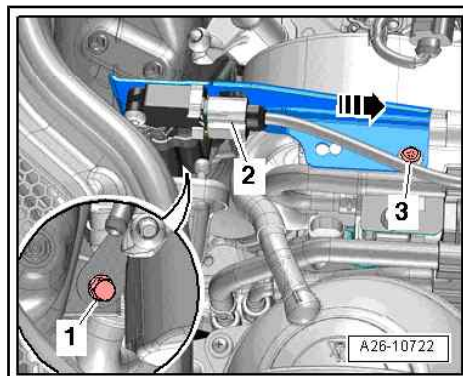
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



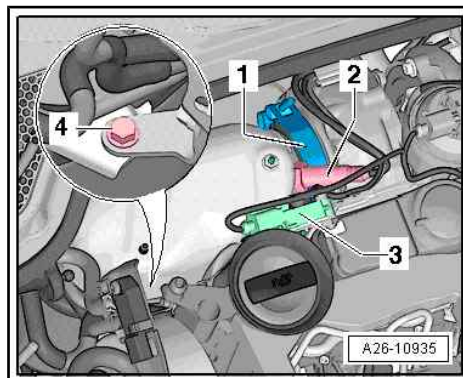
Pressure sensor

On vehicles with engine codes CBAA, CBAB and CBBB, the component's designation is exhaust gas pressure sensor 1 - G450-

On vehicles with engine code CBEA, the component's designation is pressure differential sender - G505-

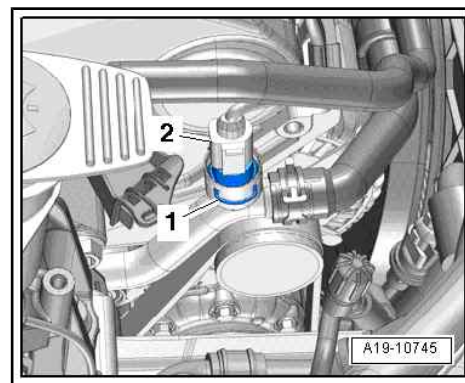


Exhaust gas pressure sensor 1 - G450- -3- (engine code CBEA)



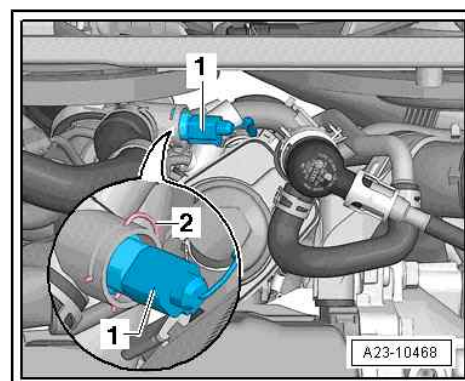
Radiator outlet coolant temperature sender - G83- (engine codes CBAA, CBAB, CBBB)

Removing and installing ⇒ Rep. gr. 19



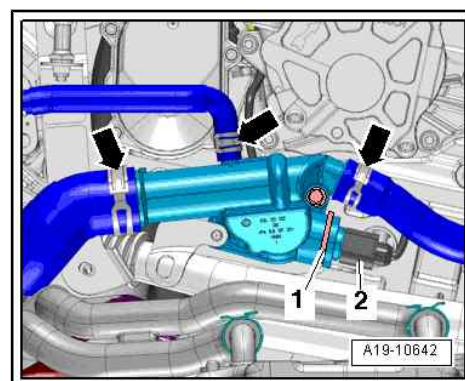
Radiator outlet coolant temperature sender - G83- (engine code CBEA)

Removing and installing ⇒ Rep. gr. 19

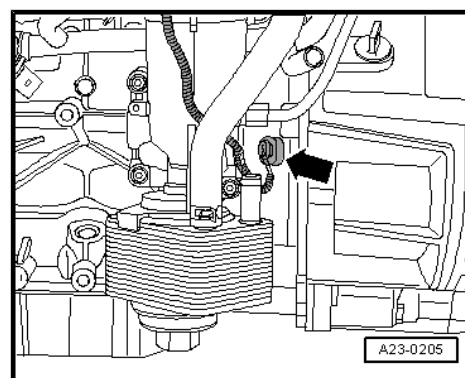


Coolant temperature sender - G62- -2-

Removing and installing ⇒ Rep. gr. 19



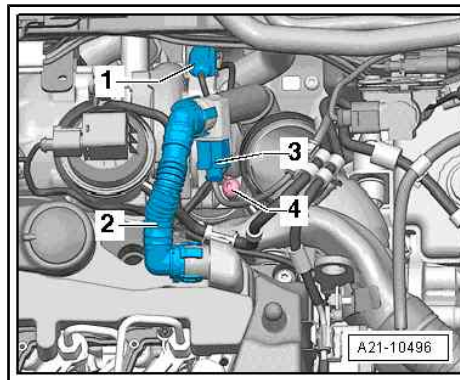
Engine speed sender - G28- -arrow-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

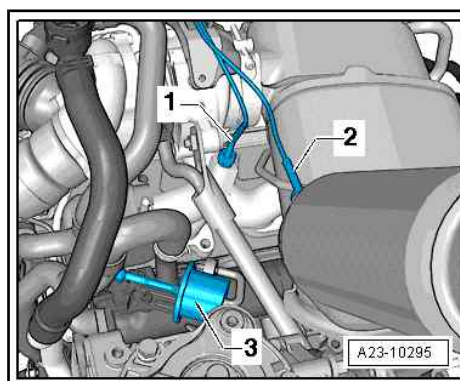
Electrical connectors

- 1 - Exhaust gas recirculation temperature sensor - G98-
- 2 - Crankcase breather hose
- 3 - Heating element for crankcase breather - N79-
- 4 - Bolt



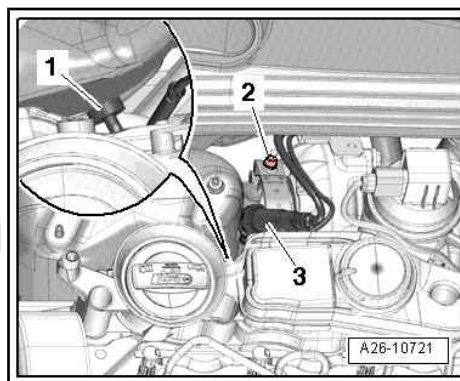
Components at rear of engine

- 1 - Exhaust gas temperature sender 1 - G235-
- 2 - Exhaust gas temperature sender 4 - G648-
- 3 - Vacuum unit for exhaust gas recirculation cooling system



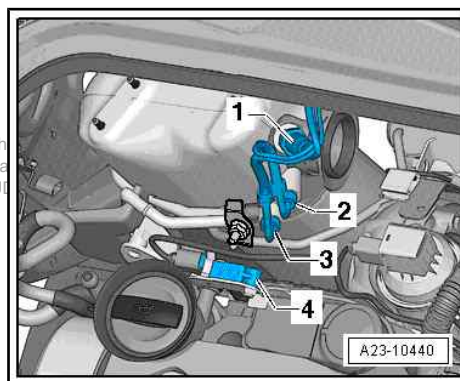
Components in particulate filter (engine codes CBAA, CBAB, CBBB)

- 1 - Exhaust gas temperature sender 3 - G495-
- 3 - Lambda probe - G39-

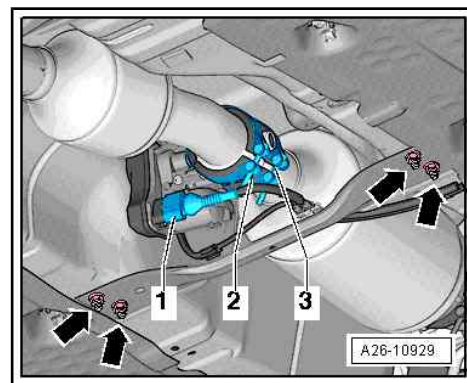


Components in particulate filter (engine code CBEA)

- 1 - Lambda probe - G39-
- 2 - Exhaust gas temperature sender 2 - G448-
- 3 - Exhaust gas temperature sender 3 - G495-
- 4 - Exhaust gas pressure sensor 2 - G451-

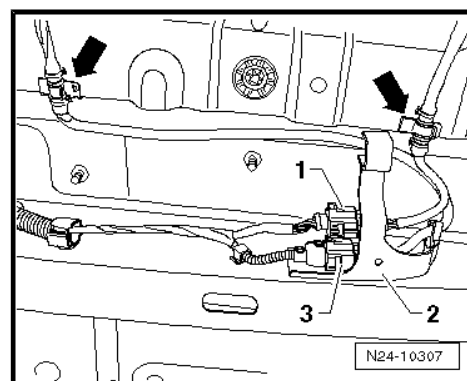


Exhaust flap control unit - J883- (engine code CBEA)

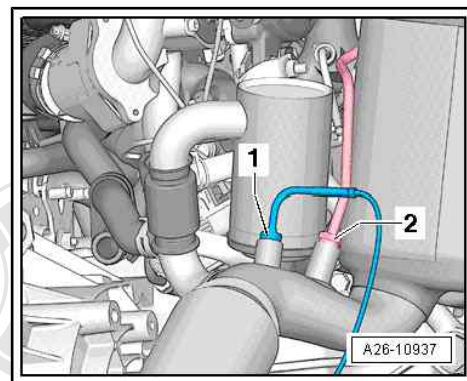


Fitting locations and connectors (engine code CBEA)

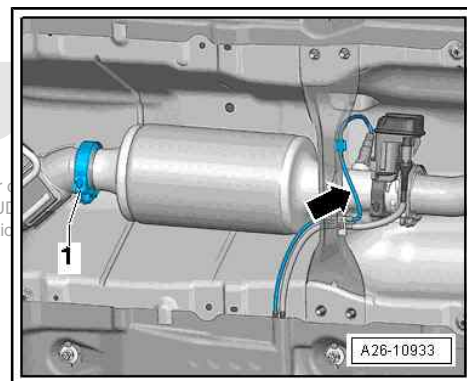
- 1 - Exhaust gas temperature sender 4 - G648-
- 2 - Bracket
- 3 - Lambda probe after catalytic converter - G130-



Exhaust gas temperature sender 4 - G648- -1-



Electrical wiring -arrow- of Lambda probe after catalytic converter - G130- (engine code CBEA)



Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG is not responsible for the correctness of information.

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 fuel pump are removed or renewed, the first fuel filling must be performed.*
- ◆ *If a fuel pump, fuel line (between fuel tank and high-pressure fuel 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 fuel 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 24](#)



Note

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

1 - Fuel tank

- ☐ With fuel system pressurisation pump - G6-

2 - Fuel filter

- ☐ Exploded view - fuel filter ⇒ Rep. gr. 20
- ☐ Renewing fuel filter ⇒ Rep. gr. 20

3 - Supplementary fuel pump - V393-

4 - Filter strainer

5 - Fuel temperature sender - G81-

6 - High-pressure pump

- ☐ After renewing, first fuel filling operation **MUST** be performed (it is important not to allow pump to run while it is still empty) ⇒ [page 24](#)
- ☐ Removing and installing ⇒ [page 45](#)

7 - Fuel metering valve - N290-

- ☐ Do not unscrew

8 - Fuel pressure regulating valve - N276-

- ☐ 80 Nm
- ☐ Cannot be re-installed
- ☐ Removing and installing ⇒ [page 69](#)

9 - Fuel rail

10 - Fuel pressure sender - G247-

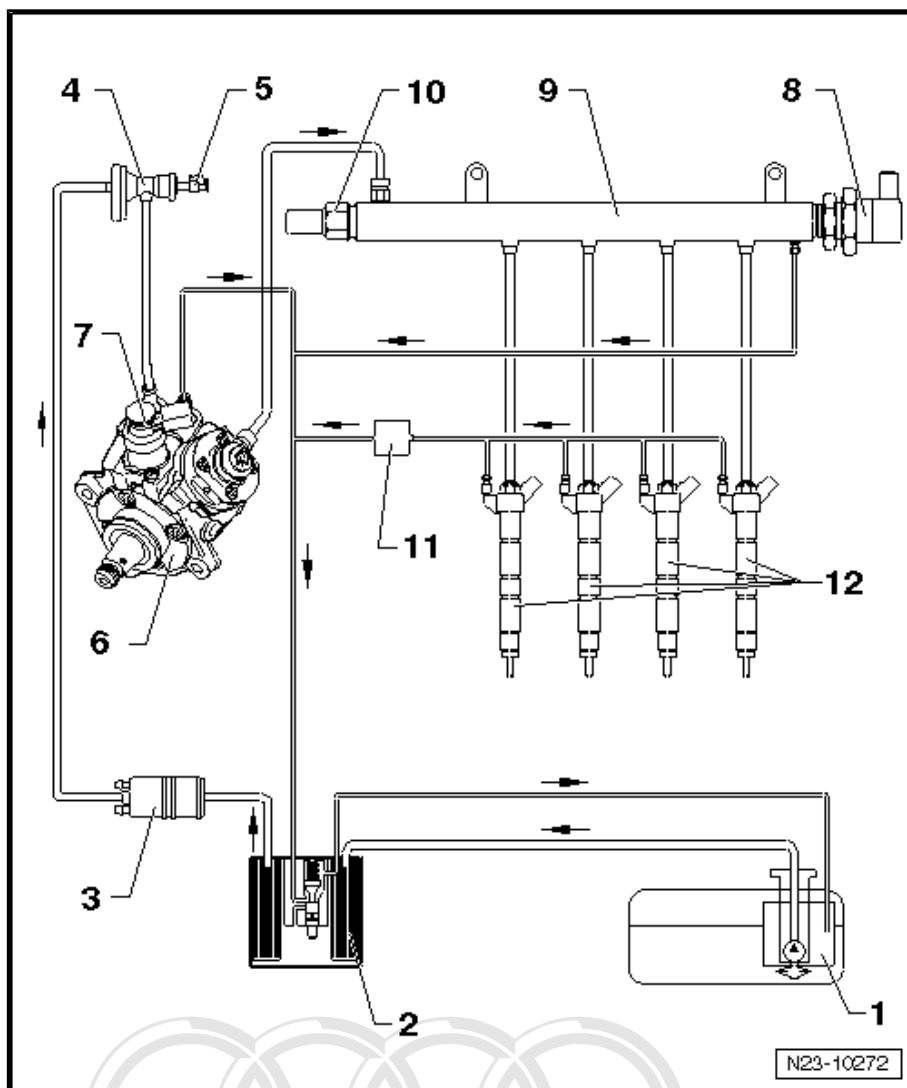
- ☐ 100 Nm
- ☐ Removing and installing ⇒ [page 72](#)

11 - Pressure retention valve

- ☐ The pressure retention valve maintains a residual pressure of approx. 10 bar in the return lines.
- ☐ This residual pressure is required for the control function of the injectors
- ☐ The pressure retention valve may only be renewed together with the fuel return lines.
- ☐ After replacement, engine must be run at idling speed for approx. 2 minutes to bleed fuel system
- ☐ Checking pressure retention valve ⇒ [page 63](#)

12 - Injectors

- ☐ Injector, cylinder 1 - N30-
- ☐ Injector, cylinder 2 - N31-
- ☐ Injector, cylinder 3 - N32-
- ☐ Injector, cylinder 4 - N33-
- ☐ Removing and installing ⇒ [page 54](#)



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

4 Exploded view - fuel system



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 fuel pump are removed or renewed, the first fuel filling must be performed.*
- ◆ *If a fuel pump, fuel line (between fuel tank and high-pressure fuel 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 fuel 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 24](#)



Note

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

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1 - Bolt

- ☐ 10 Nm

2 - High-pressure pipe

- ☐ 25 Nm
- ☐ Between high-pressure pump and fuel rail

3 - Fuel return lines

- ☐ To fuel tank
- ☐ Fuel return line must not be kinked, damaged or clogged
- ☐ The fuel return lines must not be dismantled; if necessary they must be renewed complete with pressure retention valve.
- ☐ The pressure retention valve maintains a residual pressure of approx. 10 bar in the return lines.
- ☐ This residual pressure is required for the control function of the injectors
- ☐ Checking pressure retention valve
 ⇒ [page 63](#)
- ☐ After replacement, engine must be run at idling speed for approx. 2 minutes to bleed fuel system; then check fuel return lines for leaks

4 - Bolt

- ☐ 10 Nm

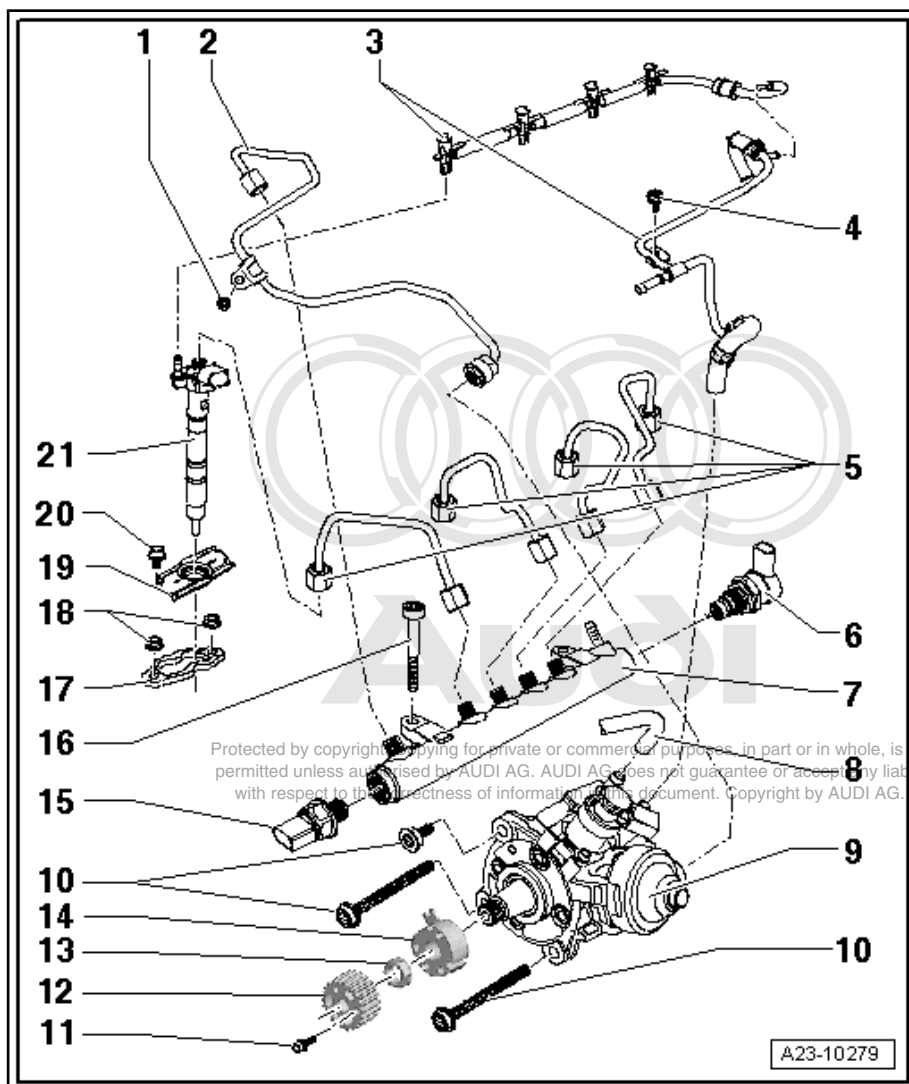
5 - High-pressure pipes

- ☐ 25 Nm
- ☐ Between fuel rail and injectors
- ☐ Do not interchange
- ☐ Install free of stress



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.*





6 - Fuel pressure regulating valve - N276-

- ☐ Cannot be re-installed
- ☐ Remove and install using open-end spanner insert, 30 mm - T10553-
- ☐ Removing and installing ⇒ [page 69](#)
- ☐ 80 Nm

7 - Fuel rail

- ☐ Removing and installing ⇒ [page 36](#)

8 - Fuel supply line

9 - High-pressure pump

- ☐ With fuel metering valve - N290- (do not open)
- ☐ Removing and installing ⇒ [page 45](#)

10 - Bolt

- ☐ Renew
- ☐ 20 Nm
- ☐ Turn long bolts 180° further
- ☐ Turn short bolts 45° further

11 - Bolt

- ☐ 20 Nm

12 - High-pressure pump sprocket

13 - Nut

- ☐ 95 Nm

14 - Hub

- ☐ With sender wheel
- ☐ Use counterhold tool - T10051- to loosen and tighten
- ☐ To remove, use puller - T40064-

15 - Fuel pressure sender - G247-

- ☐ Always renew after removing
- ☐ 100 Nm
- ☐ Removing and installing ⇒ [page 72](#)

16 - Bolt

- ☐ 22 Nm

17 - Clamping piece

- ☐ Renew

18 - Hexagon flange nut

- ☐ For clamping piece
- ☐ 10 Nm

19 - Cover for injector

20 - Bolt

- ☐ 5 Nm

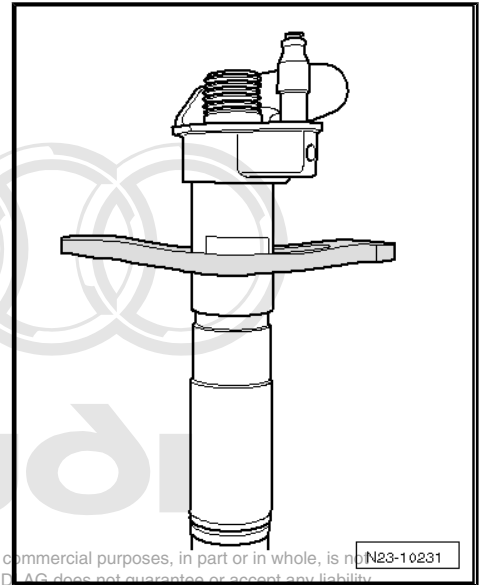
21 - Injector

- ☐ Use a coloured pen to mark injectors and corresponding high-pressure pipes and cylinder for re-installation; pay attention to markings when installing
- ☐ Always renew copper seal when removing and installing
- ☐ To remove carbon deposits from the injector sealing surface, clean the injector bore in the cylinder head with cleaning kit - VAS 6811- (it is important to do this to avoid leaks)
- ☐ Removing and installing ⇒ [page 54](#)



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Installation position of clamping piece



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

5 Filling and bleeding fuel system

Special tools and workshop equipment required

- ◆ Vehicle diagnostic tester

If components of the fuel system between the fuel tank and the high-pressure pump are removed or renewed, the fuel system must be bled.

Risk of irreparable damage to fuel pump

After working on the fuel system, the fuel pump may be irreparably damaged if it is allowed to run while empty.

- Never allow fuel pump to run while it is empty.
- Fill/bleed fuel pump.

Proceed as follows to fill high-pressure pump with fuel.

- Check fuel gauge in instrument cluster; fuel gauge needle must indicate that fuel is above reserve level.
- Connect a ➔ Vehicle diagnostic tester.
- Switch on ignition.
- Select “Engine electronics” in vehicle self-diagnosis.
- Then select “Basic setting”.
- Select “Display group 35”.
- Press “activate” button.
- 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.
- Road-test vehicle and accelerate with full throttle at least once.
- Then check high-pressure system again for leaks.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

6 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.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

7 Air cleaner

Overview

⇒ [“7.1 Exploded view - air cleaner”, page 26](#)

⇒ [“7.2 Removing and installing engine cover panel”, page 27](#)

⇒ [“7.3 Removing and installing air filter element”, page 28](#)

⇒ [“7.4 Removing air cleaner \(bottom section\)”, page 29](#)

7.1 Exploded view - air cleaner

1 - Spring-type clip

2 - Air hose

- ☐ To turbocharger
- ☐ Check air intake hose for dirt and leaves

3 - Air mass meter - G70-

- ☐ 1.5 Nm
- ☐ Removing and installing
⇒ [page 61](#)

4 - Bolts

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

5 - Bolts

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

6 - Air cleaner (top section)

- ☐ Clean any salt residue, leaves and dirt out of air cleaner (top section)

7 - Air filter element

- ☐ Always use genuine part for air filter element
- ☐ Removing and installing
⇒ [page 28](#)
- ☐ Observe change intervals ⇒ Maintenance ; Booklet 808

8 - Bolt

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

9 - Snow screen

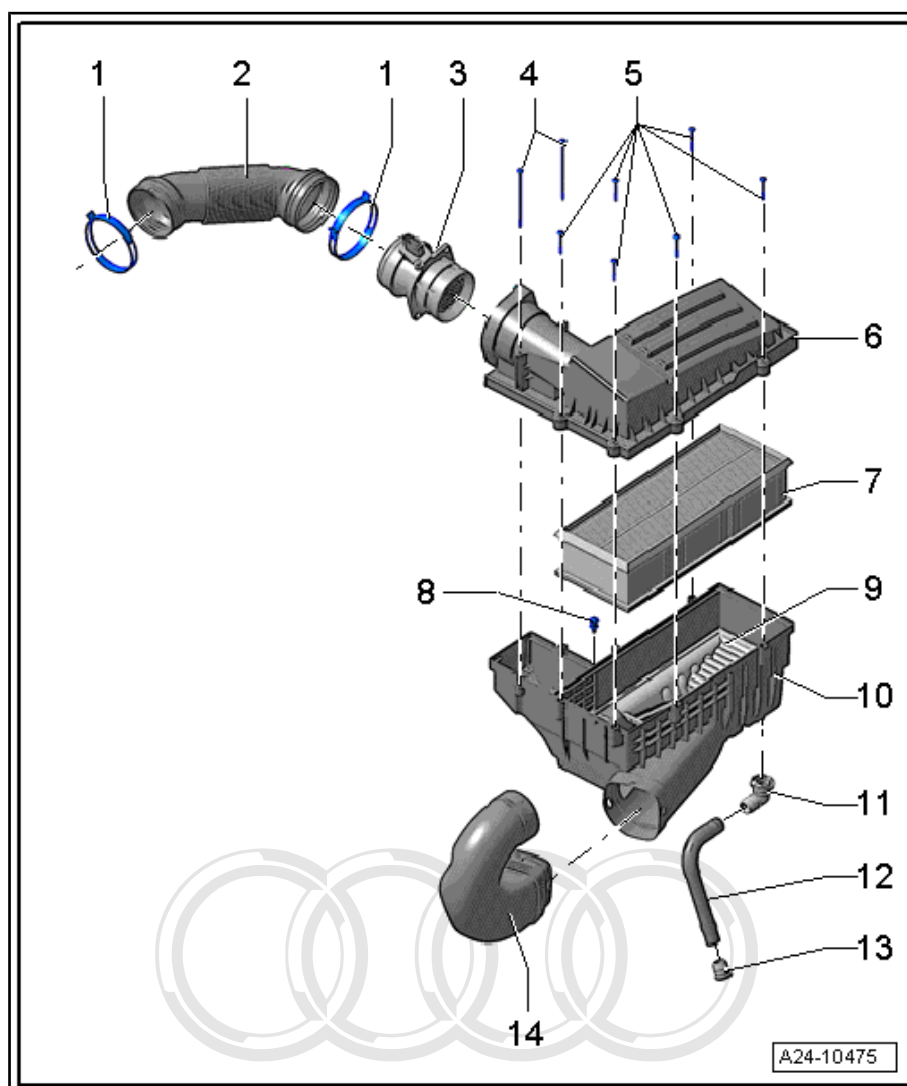
- ☐ Not installed in all vehicles

10 - Air cleaner (bottom section)

- ☐ Clean any salt residue, leaves and dirt out of air cleaner (bottom section)
- ☐ On vehicles for cold climates, air cleaner (bottom section) with hot air intake is installed

11 - Connection for water drain hose

- ☐ Clean connection



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

12 - Water drain hose

- ☐ Clean water drain hose

13 - Flutter valve

- ☐ Clean and re-install

14 - Intake air duct

- ☐ To lock carrier
- ☐ Clean any leaves and dirt out of intake air duct

7.2 Removing and installing engine cover panel

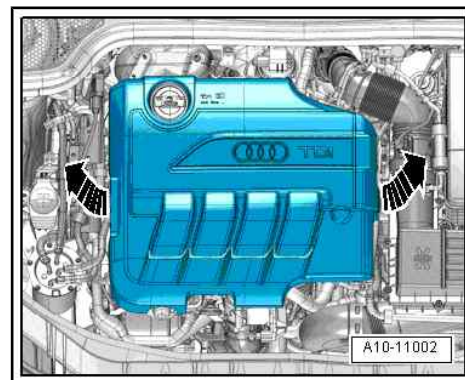
Removing

- 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).
- First press engine cover panel into rear rubber grommets and then into front rubber grommets with both hands.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted. Responsibility for any damage or liability arising from the use of this document is assumed by the user. Copyright by AUDI AG.



7.3 Removing and installing air filter element

Removing

- Unscrew bolts -arrows- from air cleaner (top section).



Note

Disregard items 1 to 3.

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

Installing

To ensure the correct function of the air mass meter - G70- , it is important to observe the following notes and instructions.



Note

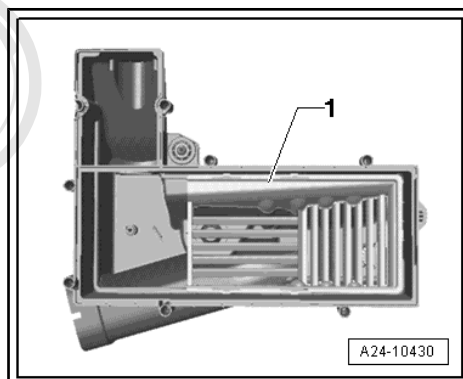
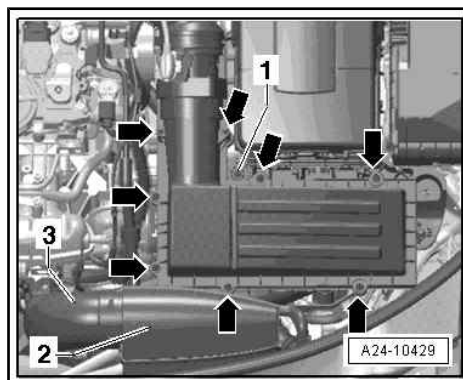
- ◆ If the air filter element is very dirty or wet, dirt particles or water can reach the air mass meter - G70- and falsify the detected air mass values. This will cause a loss of power, as the calculated injection quantities will be too low.
- ◆ Always use genuine air filter elements (same as original equipment).
- ◆ Hose connections and charge air system hoses must be free of oil and grease prior to fitting. Do not use any lubricants containing silicone when assembling.
- ◆ Both sections of the air cleaner housing must be clean.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .
- ◆ To prevent malfunctions, cover all critical parts of the engine air intake tract (air mass meter, intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.
- ◆ Please observe requirements for disposal.

- Remove and clean snow screen -1-.



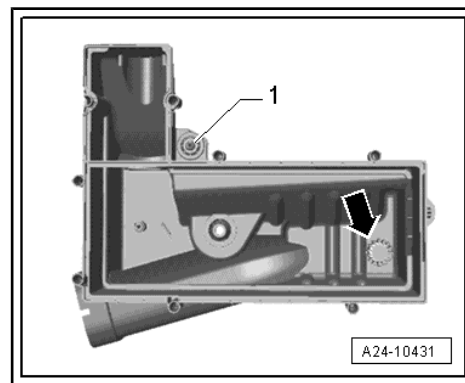
Note

The snow screen is not installed in all vehicles.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Clean water drain -arrow- and air cleaner (bottom section).
- Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.
- Check air mass meter and air hose (engine intake side) for salt residue, dirt and leaves.
- Check air duct leading from lock carrier to air cleaner housing for dirt and leaves.
- When installing the air filter element, check that it is properly centred in the retainer in the air cleaner (bottom section).
- Carefully fit air cleaner (top section) on air cleaner (bottom section) without applying any 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).
- Make sure that air hose is correctly seated at air mass meter - G70- .

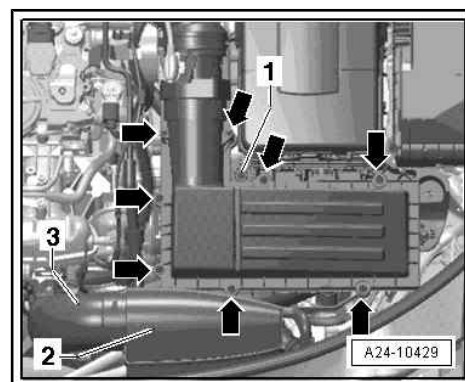


The remaining installation steps are carried out in the reverse sequence.

7.4 Removing air cleaner (bottom section)

Removing

- Unscrew bolts -arrows- from air cleaner (top section).
- Lift up air cleaner (top section) and take out air filter element.
- Remove air duct leading from lock carrier to air cleaner housing -2 and 3-.



- Slacken bolt -1-.
- Carefully lift air cleaner (bottom section).

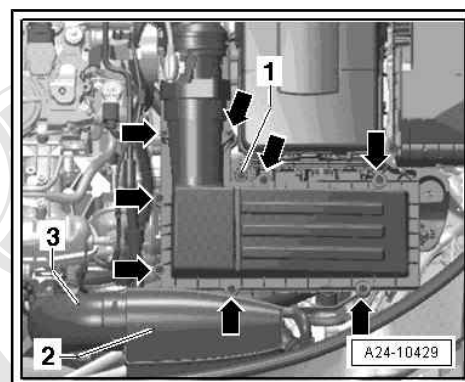
Installing

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 particles or water can reach the air mass meter - G70- and falsify the detected air mass values. This will cause a loss of power, as the calculated injection quantities will be too low.*
- ◆ *Always use genuine air filter elements (same as original equipment).*
- ◆ *Use a silicone-free lubricant when installing the intake hose.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .*



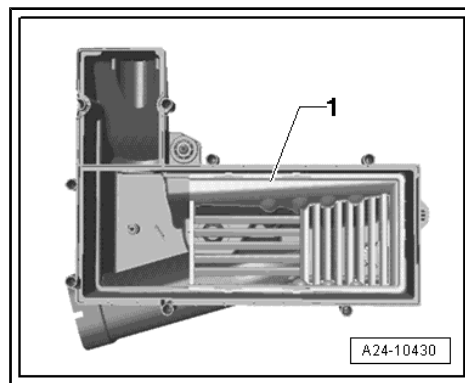


- Remove and clean snow screen -1-.

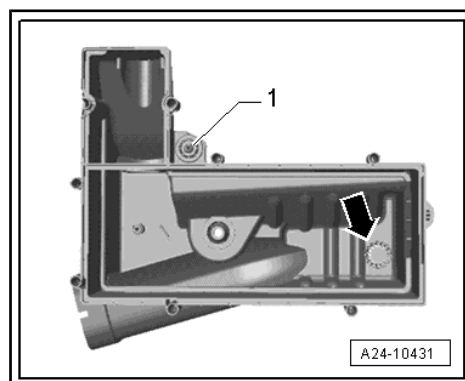


Note

The snow screen is not installed in all vehicles.

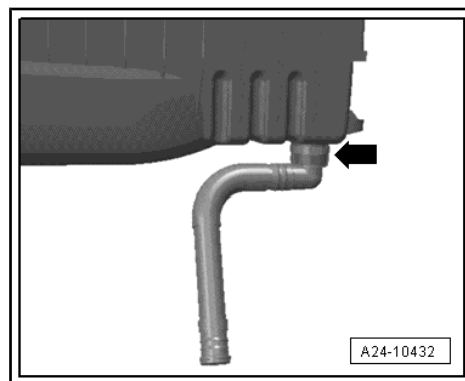


- Clean water drain -arrow- and air cleaner (bottom section).



- Disconnect water drain hose -arrow- from air cleaner (bottom section) and clean any dirt or leaves out of connection and hose.
- When installing the air filter element, check that it is properly centred in the retainer in the air cleaner (bottom section).
- Carefully fit air cleaner (top section) on air cleaner (bottom section) without applying any 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).

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



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

8 Intake manifold

Overview

⇒ [“8.1 Exploded view - intake manifold with attached components”, page 31](#)

⇒ [“8.2 Removing and installing intake manifold”, page 32](#)

⇒ [“8.3 Removing and installing fuel rail”, page 36](#)

⇒ [“8.4 Removing and installing intake manifold flap motor V157”, page 39](#)

8.1 Exploded view - intake manifold with attached components

1 - Intake manifold

- ☐ With combined variable intake manifold motor - V183- and variable intake manifold position sender - G513- (engine codes CBAA, CBAB, CBBB only)
- ☐ With combined intake manifold flap motor - V157- and intake manifold flap potentiometer - G336- (engine code CBEA only)
- ☐ Must not be dismantled
- ☐ Removing and installing
⇒ [page 32](#)

2 - Bolt

- ☐ 8 Nm

3 - Gasket

- ☐ Renew

4 - Seal

- ☐ Renew

5 - Connecting pipe

- ☐ To exhaust gas recirculation cooler

6 - Bolt

- ☐ 9 Nm

7 - Gasket

- ☐ Renew

8 - Bolt

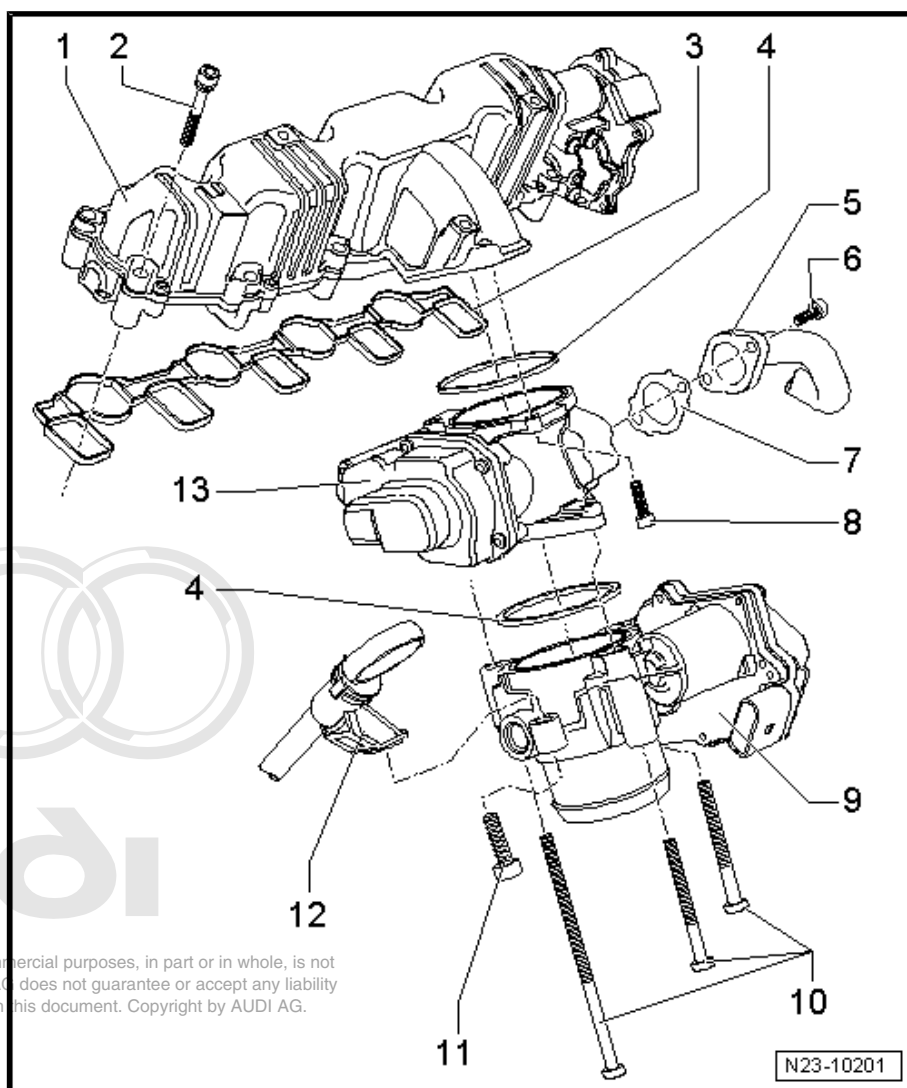
- ☐ 10 Nm

9 - Component

- ☐ Removing and installing intake manifold flap motor - V157- with throttle valve potentiometer - G69- (engine codes CBAA, CBAB, CBBB only) ⇒ [page 39](#)
- ☐ Removing and installing throttle valve module - J338- (engine code CBEA) only ⇒ [page 42](#)
- ☐

10 - Bolt

- ☐ 10 Nm



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written authorisation by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



11 - Bolt

- 10 Nm

12 - Oil dipstick

13 - Exhaust gas recirculation

- Exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212- (engine codes CBAA, CBAB, CBBB only)
- Exhaust gas recirculation control motor - V338- with exhaust gas recirculation potentiometer - G212- (engine code CBEA only)

8.2 Removing and installing intake manifold

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-



- ◆ Ratchet - V.A.G 1331/1-

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

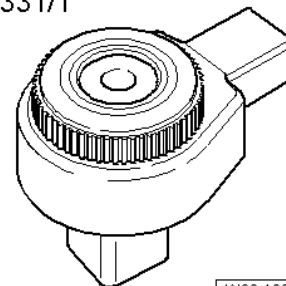
- ◆ Pliers - 3314-

V.A.G 1331



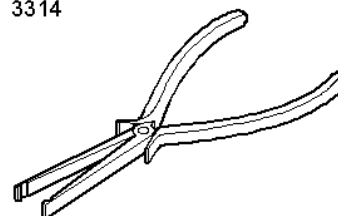
W00-0427

V.A.G 1331/1



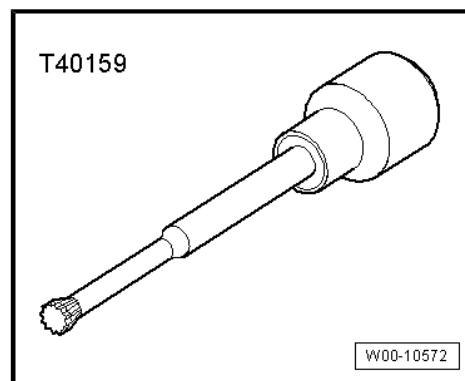
W00-10045

3314

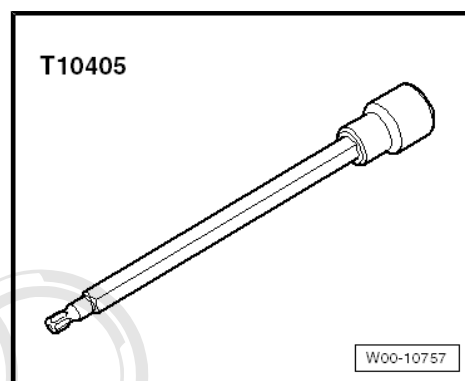


W00-0019

- ◆ Bit XZN 8 - T40159- for vehicles with aluminium intake manifold



- ◆ Socket T30 - T10405- for vehicles with plastic intake manifold



Removing

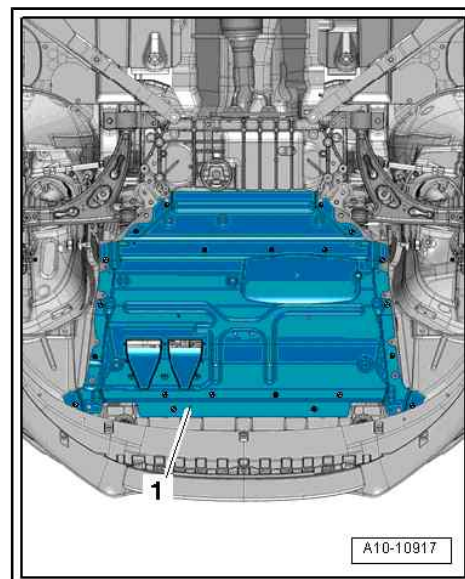


WARNING

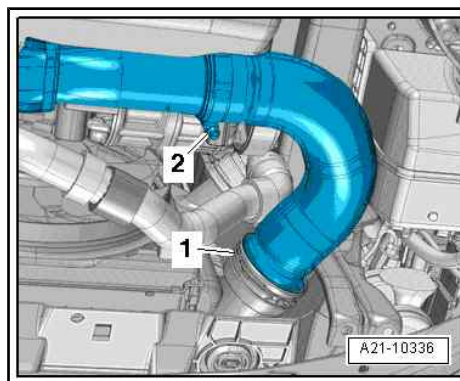
- ◆ *Always read rules for cleanliness and instructions for working on fuel system ➔ [page 2](#) .*
- ◆ *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

Protected by Copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove engine cover panel ➔ [page 27](#) .
- Take noise insulation off cylinder head cover.
- Remove noise insulation -1- ➔ Rep. gr. 66 .

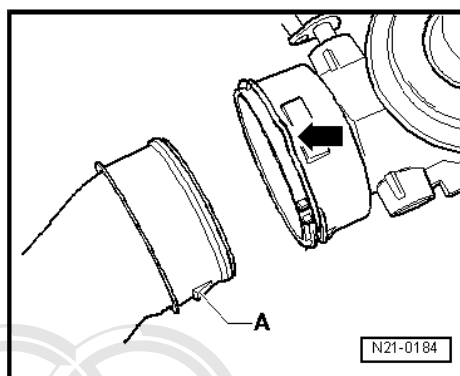


- Loosen hose clip -2- and remove air hose.



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).



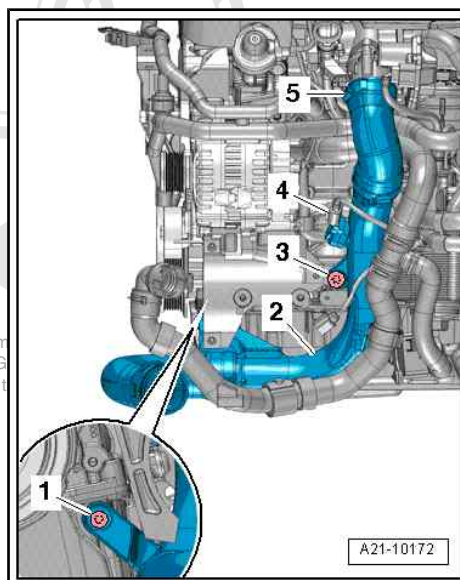
- Remove bolts -1- and -3-.
- Loosen hose clip -5- and disconnect air pipe -2-, but leave in position.



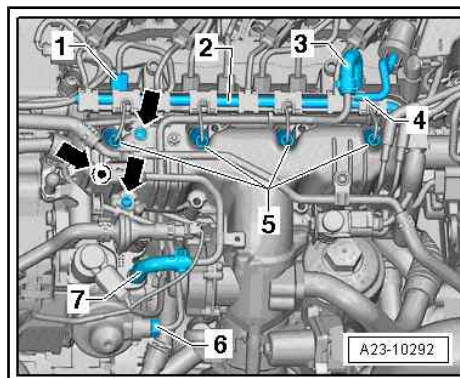
Note

Disregard -item 4-.

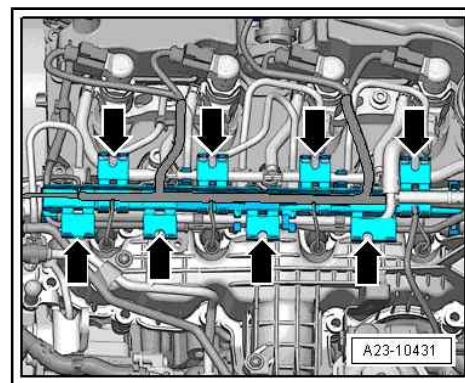
Protected by copyright. Copying for private or commercial use without permission is prohibited. All rights reserved. Audi AG. Audi AG is not responsible for the correctness of information in this document.



- Unplug electrical connectors -5- from glow plugs.
- Unscrew union nuts at high-pressure pump -6- and fuel rail -1- and remove high-pressure fuel pipe.
- Remove bolts -arrows- securing retainers for high-pressure fuel pipe.

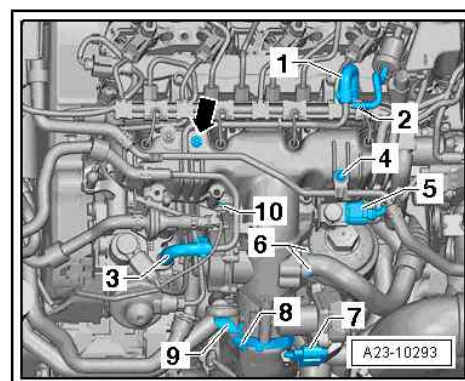


- Release retaining clips -arrows- and move wiring harness clear.



- Detach fuel return lines -1, 2 and 3-.
- Remove bolts securing brackets and take out return line.
- Remove bolt -4- from bracket.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

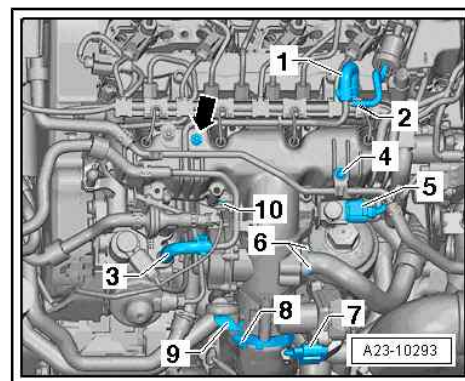


- Unplug connectors -9- and -7-.
- Remove bolts -6- from connecting pipe for exhaust gas recirculation.

Additional step for vehicles with plastic intake manifold:

- Remove fuel rail ➔ [page 36](#) .

Continued for all vehicles:

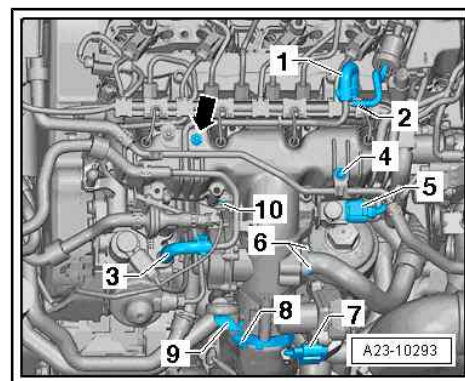


- Open hose clip -8- at air hose and disconnect hose downwards.
- Remove bolt -9- on bracket for oil dipstick.
- Remove bolts securing intake manifold in diagonal sequence starting from outside and working inwards.
- Remove intake manifold.

Installing

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

- Renew seals and/or gaskets.
- Tighten bolts securing intake manifold in diagonal sequence starting from outside and working inwards.
- ♦ Tightening torque for intake manifold: refer to exploded view of intake manifold ➔ [Item 2 \(page 31\)](#) .
- Install air pipe: Exploded view - charge air cooler ➔ Rep. gr. 21 .

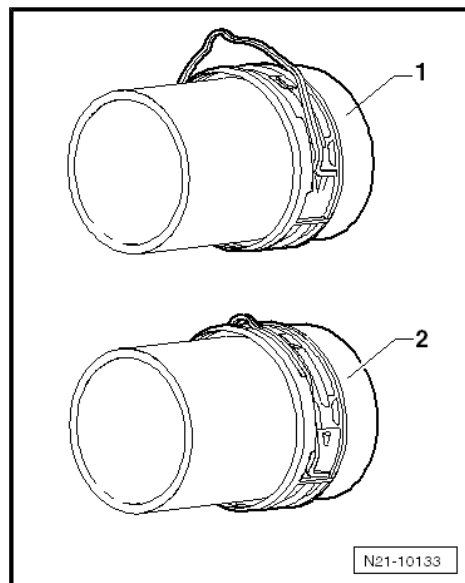


Installing air hoses with plug-in connectors



Note

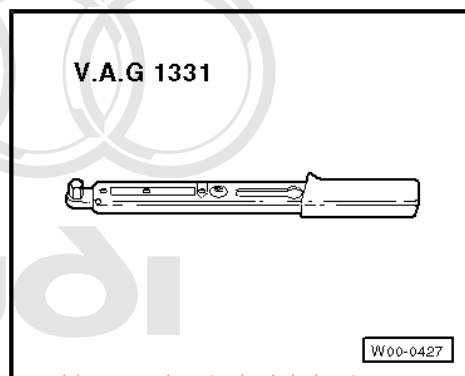
- ◆ *Renew seal if damaged.*
- ◆ *Make sure that the seal is correctly seated in the groove on the complete circumference of the air pipe/hose.*
- ◆ *Apply a thin coating of silicon-free lubricant to the sealing area and the seal.*
- Release retaining clip (position -1-).
- Push air pipe/hose in as far as stop and press retaining clip to lock -2-.
- Press air pipe/hose again and pull again to check that plug-in connector is correctly engaged.
- Install noise insulation ⇒ Rep. gr. 66 .



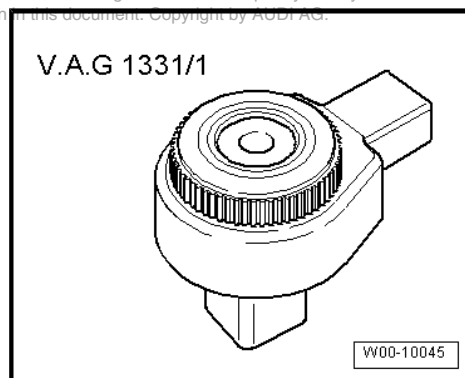
8.3 Removing and installing fuel rail

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-

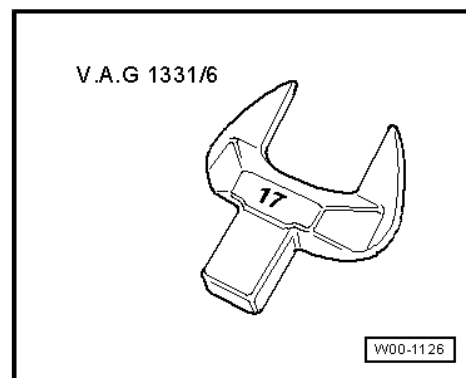


- ◆ Ratchet - V.A.G 1331/1-

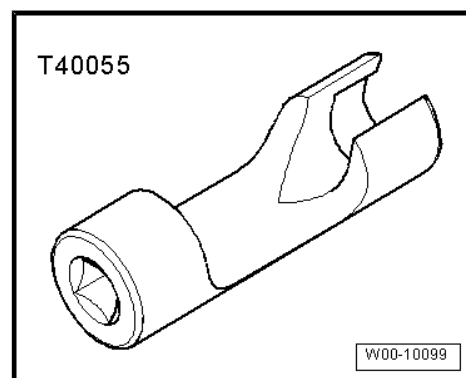


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Open end spanner insert, AF 17 - V.A.G 1331/6-



- ◆ Socket - T40055-



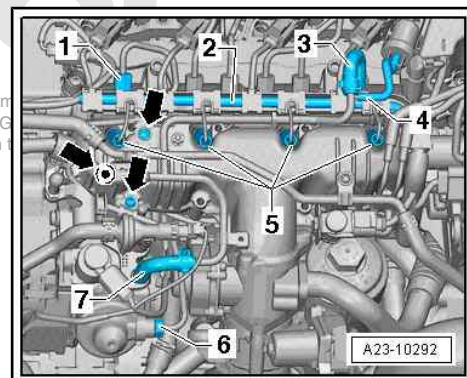
Removing



WARNING

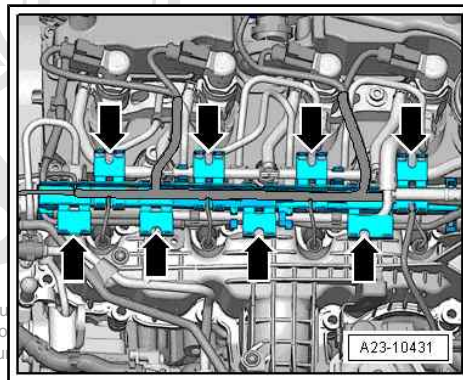
- ◆ *Always read rules for cleanliness and instructions for working on fuel system ➔ [page 2](#).*
- ◆ *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

- Remove engine cover panel ➔ [page 27](#) .
- Take noise insulation off cylinder head cover.
- Unscrew union nuts at high-pressure pump -6- and fuel rail -1- and remove high-pressure fuel pipe.
- Remove bolts -arrows- for high-pressure fuel pipe.
- Detach fuel return hose -3-.





- Release retaining clips -arrows- and move wiring harness clear.



Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this document.

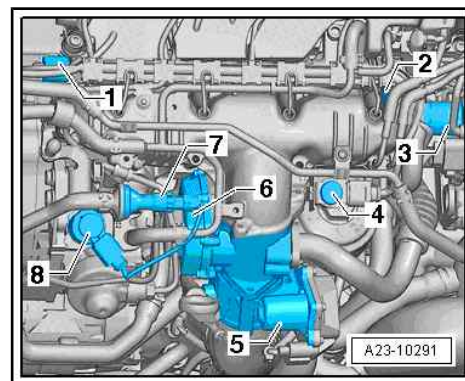
– To do so, unplug the following electrical connectors:

- 1 - Fuel pressure sender - G247-
- 2 - Fuel pressure regulating valve - N276-
- Injectors
- Glow plugs



Caution

- ◆ **Mark cylinder numbers on high-pressure pipes. 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.**



- Loosen union nuts for high-pressure pipes at injectors using socket - T40055- , 17 mm.
- Loosen union nuts for high-pressure pipes at fuel rail using open end spanner insert, AF 17 - V.A.G 1331/6- .
- After removal, lay high-pressure pipes on a clean cloth.
- Unscrew both bolts and remove fuel rail.

Installing

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

- Install high-pressure pipes so they are free of tension.



Note

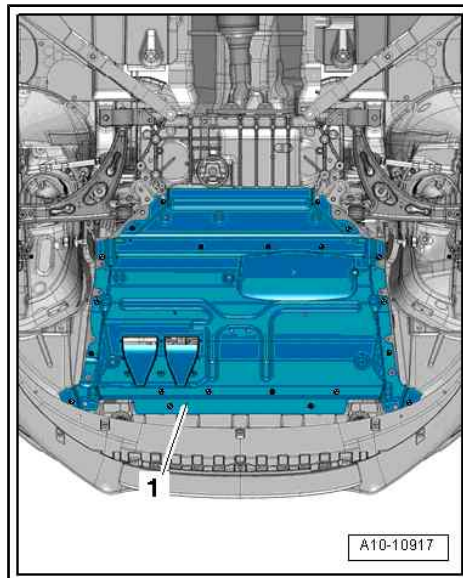
- ◆ *Note identification marks for cylinder allocation when re-installing high-pressure pipes.*
- ◆ *The high-pressure pipes can be re-used after performing the following checks:*
- ◆ *Check taper seats of high-pressure pipes for deformation and cracks.*
- ◆ *The bore of the pipe must not be distorted, restricted or otherwise damaged.*
- ◆ *Corroded pipes must not be used again.*
- Tightening torques: refer to exploded view of fuel system
⇒ [page 20](#) .

8.4 Removing and installing intake manifold flap motor - V157-

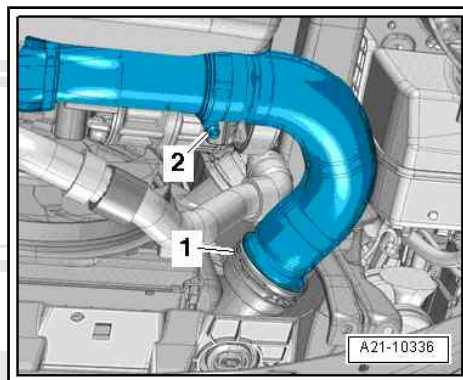
Removing

- Remove engine cover panel -arrows-.

- Remove noise insulation -1- ➔ Rep. gr. 66 .

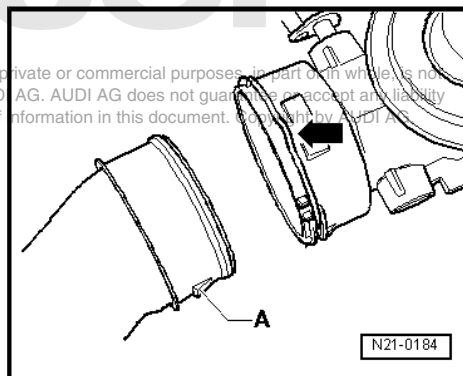


- Loosen hose clip -2- and remove air hose.



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).

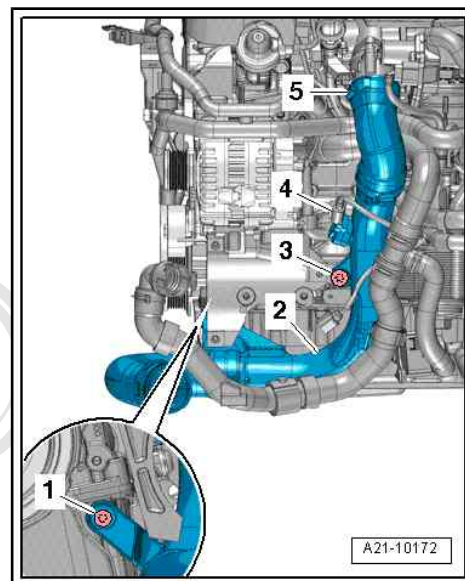


- Remove bolts -1- and -3-.
- Loosen hose clip -5- and disconnect air pipe -2-, but leave in position.



Note

Disregard -item 4-.



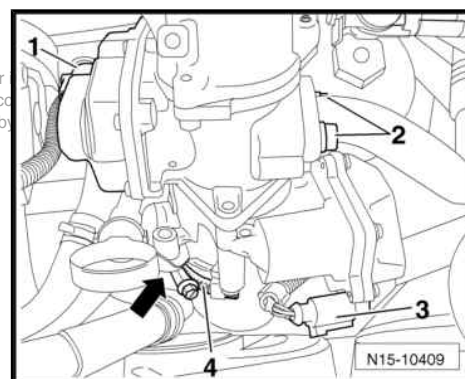
- Unplug electrical connector -3-.



Note

Protected by copyright. Copying for private or commercial purposes, in part or permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept responsibility with respect to the correctness of information in this document. Copyright by Audi AG.

Disregard -items 1, 2, 4- and -arrow-.



- Unscrew bolts -arrows- and detach intake manifold flap motor - V157- .

Installing

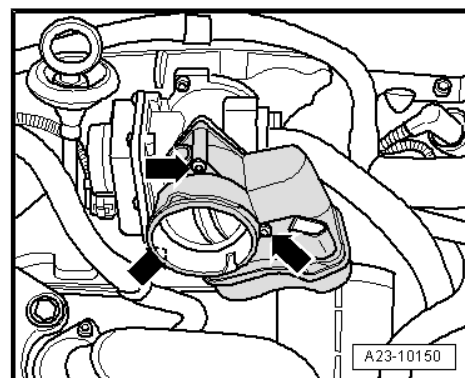
Installation is carried out in reverse order; note the following:



Note

Renew O-ring.

- Install air pipe: Exploded view - charge air cooler ⇒ Rep. gr. 21 .



Installing air hoses with plug-in connectors



Note

- ◆ *Renew seal if damaged.*
- ◆ *Make sure that the seal is correctly seated in the groove on the complete circumference of the air pipe/hose.*
- ◆ *Apply a thin coating of silicon-free lubricant to the sealing area and the seal.*
- Release retaining clip (position -1-).
- Push air pipe/hose in as far as stop and press retaining clip to lock -2-.
- Press air pipe/hose again and pull again to check that plug-in connector is correctly engaged.
- Install noise insulation ⇒ Rep. gr. 66 .

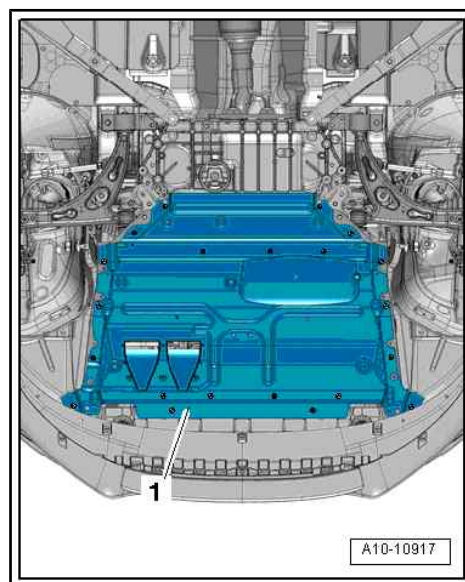
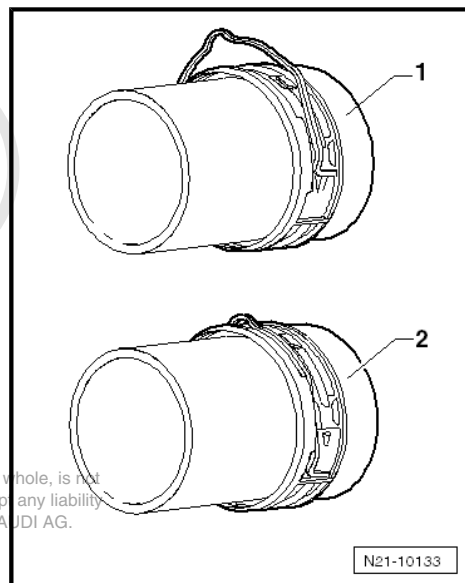
Tightening torques:

- ◆ ⇒ [“8.1 Exploded view - intake manifold with attached components”, page 31](#)

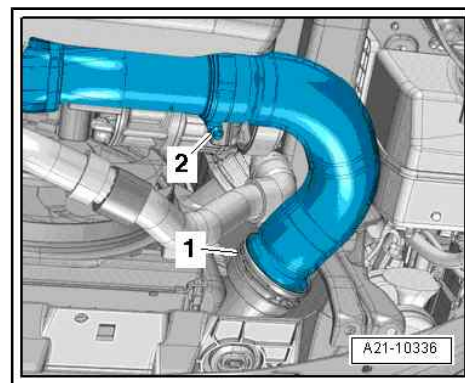
8.5 Removing and installing throttle valve module - J338-

Removing

- Remove engine cover panel -arrows-.
- Remove noise insulation -1- ⇒ Rep. gr. 66 .



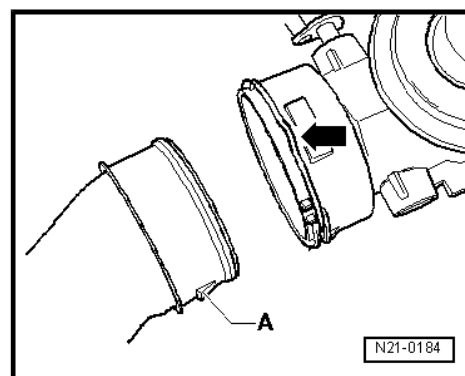
- Loosen hose clip -2- and remove air hose.



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).

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

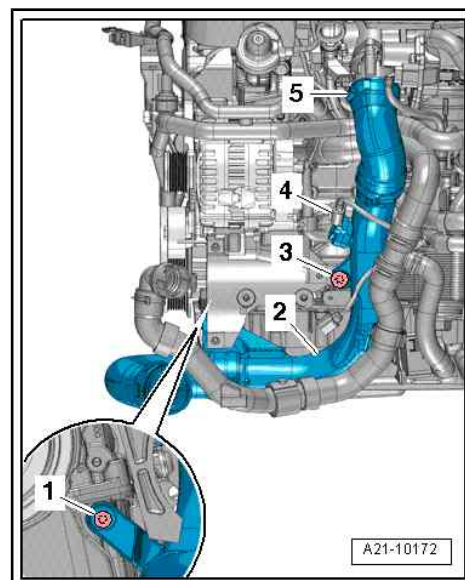


- Remove bolts -1- and -3-.
- Loosen hose clip -5- and disconnect air pipe -2-, but leave in position.



Note

Disregard -item 4-.

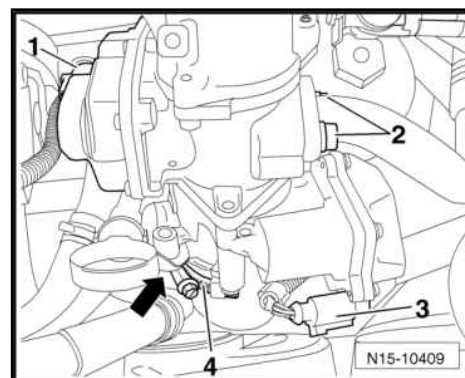


- Unplug electrical connector -3-.



Note

Disregard -items 1, 2, 4- and -arrow-.



- Unscrew bolts -arrows- and detach throttle valve module - J338- .

Installing

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



Note

Renew O-ring.

- Install air pipe: Exploded view - charge air cooler ⇒ Rep. gr. 21 .

Installing air hoses with plug-in connectors

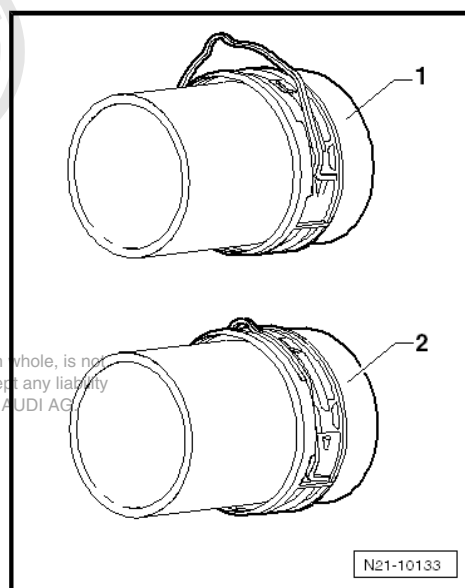
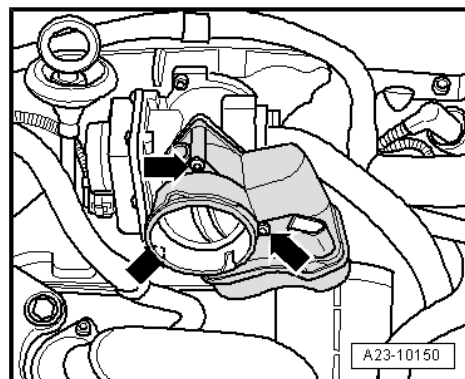


Note

- ♦ *Renew seal if damaged.*
- ♦ *Make sure that the seal is correctly seated in the groove on the complete circumference of the air pipe/hose.*
- ♦ *Apply a thin coating of silicon-free lubricant to the sealing area and the seal.*
- Release retaining clip (position -1-).
- Push air pipe/hose in as far as stop and press retaining clip to lock -2-.
- Press air pipe/hose again and pull again to check that plug-in connector is correctly engaged.
- Install noise insulation ⇒ Rep. gr. 66 .

Tightening torques:

- ♦ ⇒ ["8.1 Exploded view - intake manifold with attached components", page 31](#)



9 High-pressure pump

Overview

⇒ "9.1 Removing and installing high-pressure pump", page 45

9.1 Removing and installing high-pressure pump

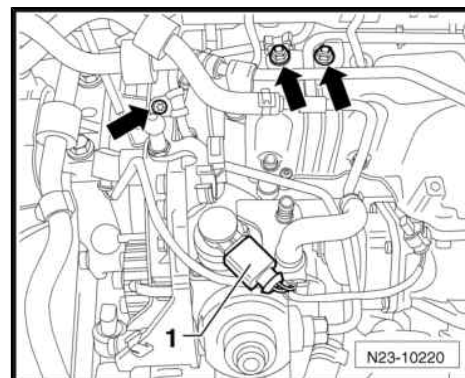
Removing



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 (performing first fuel filling ⇒ [page 24](#)).*

- Remove toothed belt from camshaft and high-pressure pump
⇒ Rep. gr. 15.
- Unplug electrical connector -1- at fuel metering valve - N290-.
- Remove securing bolts for coolant line on intake manifold and move coolant line to one side.



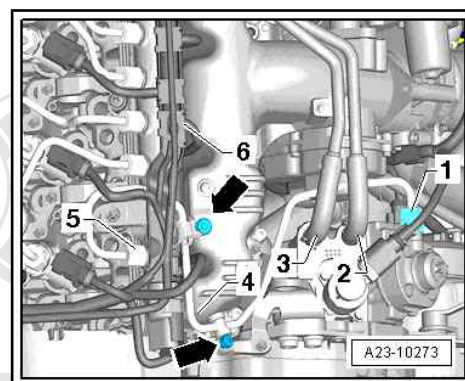
- Pull fuel pipe connections -2 and 3- off high-pressure pump.
- Unscrew union nuts at high-pressure pump -1- and fuel rail -5- and remove high-pressure fuel pipe -4-.



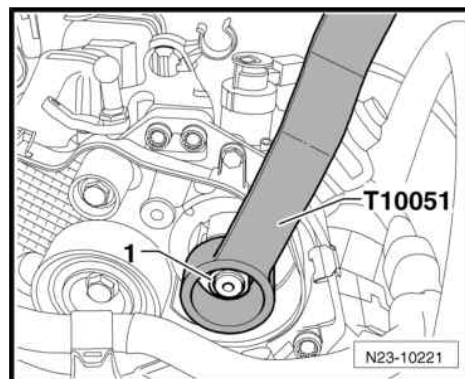
Note

Do not bend fuel lines.

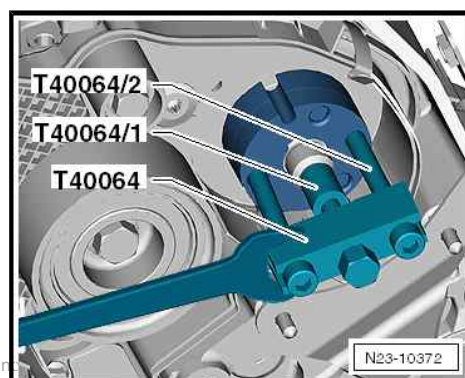
- Remove toothed belt sprocket from high-pressure pump.



- Counterhold hub of high-pressure pump using counterhold tool - T10051- and unscrew securing nut -1-.



- 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).

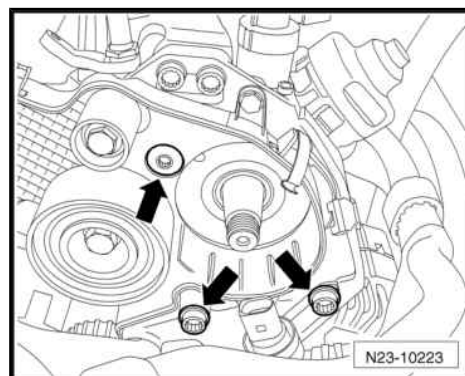


- Unscrew securing bolts -arrows- for high-pressure pump.
- Carefully take out high-pressure pump.

Installing

Installation is carried out in reverse sequence.

- Tightening torques: refer to exploded view of fuel system ⇒ [page 20](#) .
- Install toothed belt for high-pressure pump ⇒ Rep. gr. 15 .
- Install high-pressure pipes ⇒ [page 61](#) .



Caution

- ♦ *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 24](#)*
- ♦ *Running when dry causes irreparable damage to high-pressure pump.*

10 Injectors

Overview

⇒ [“10.1 Checking injectors”, page 47](#)

⇒ [“10.2 Performing adaption of correction values for injectors”, page 47](#)

⇒ [“10.3 Checking for injectors sticking open”, page 48](#)

⇒ [“10.4 Checking return flow rate of injectors with engine running”, page 49](#)

⇒ [“10.5 Checking return flow rate of injectors at starter cranking speed”, page 52](#)

⇒ [“10.6 Removing and installing injectors”, page 54](#)

10.1 Checking injectors

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

- Checking adaption of “Injector delivery calibration values” and “Injector voltage calibration values” ⇒ [page 47](#)
- Checking for injectors sticking open ⇒ [page 48](#)
- Checking return flow rate of injectors with engine running ⇒ [page 49](#)
- Checking return flow rate of injectors at starter cranking speed ⇒ [page 52](#)

Perform the following tests first if the engine does not start at all:

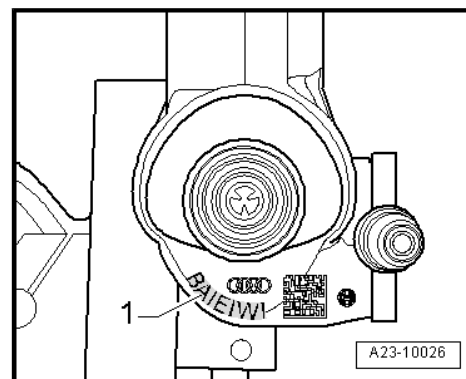
- ◆ Checking for injectors sticking open ⇒ [page 48](#)
- ◆ Checking return flow rate of injectors at starter cranking speed ⇒ [page 52](#)
- ◆ Checking fuel pressure regulating valve - N276- ⇒ [page 65](#)

10.2 Performing adaption of correction values for injectors

The “Injector delivery calibration” and “Injector voltage calibration” functions serve to correct the injection rates for each cylinder of a common rail system individually across the entire operating range.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions.

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



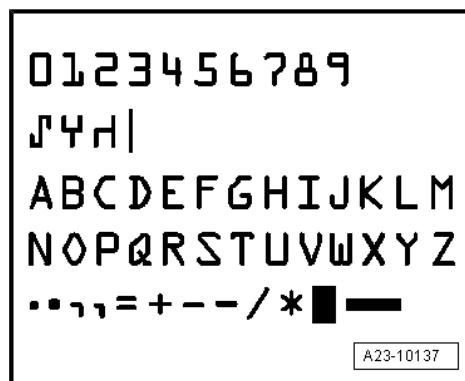
Reference table for reading out letters and/or numbers on each injector

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

When the engine control unit is renewed, the appropriate "injector delivery calibration" values with "injector voltage calibration" values 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.

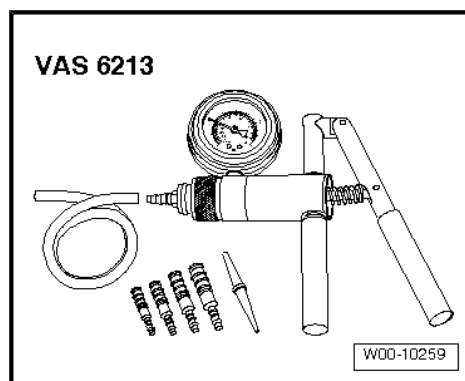
The adaption procedure is described in "Guided Fault Finding". (The procedure is also described under "Guided Functions".)



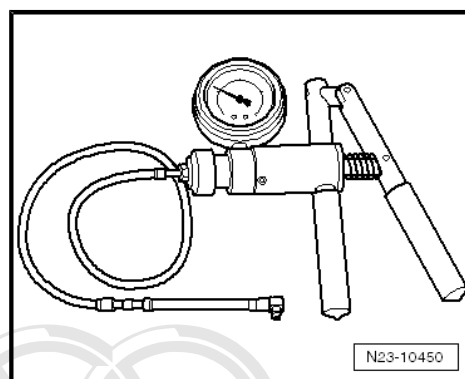
10.3 Checking for injectors sticking open

Special tools and workshop equipment required

- ◆ Hand vacuum pump - VAS 6213-



- ◆ Use a return line to make an -adapter-.



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 27](#) .
- Clean all connections (with commercial cleaning solution or similar) before removing.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the written consent of AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

 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.

- 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-.
- Connect adapter to return line connection of injector to be tested after adapter has been cleaned and blown out.
- Generate a vacuum of -500 mbar using the hand vacuum pump - VAS 6213- .

If the vacuum reading remains the same for 30 seconds, the injector is OK.

If the injector is faulty, the vacuum reading will fall back to 0 bar within 2 to 3 seconds.

Repeat test if necessary; note drop in vacuum reading on hand vacuum pump - VAS 6213- .

- Renew faulty injectors ⇒ [page 54](#) .

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 the affected component if leakage occurs.

- 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.
- Install engine cover panel ⇒ [page 27](#) .

10.4 Checking return flow rate of injectors with engine running

Checking return flow rate of all injectors

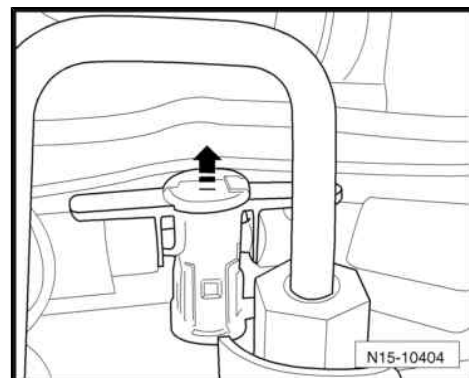
Special tools and workshop equipment required

- ◆ Fuel-resistant measuring container



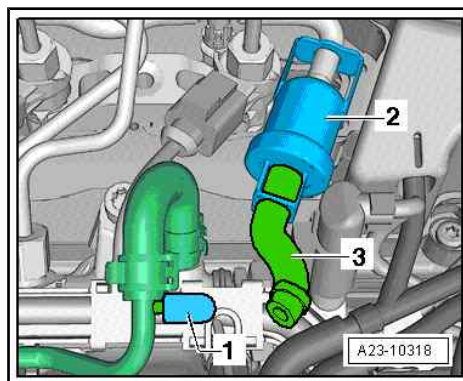
WARNING

- ◆ *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 27](#) .
- Remove noise insulation from injectors.

- Disconnect hose connection downstream of pressure retention valve -2- in fuel return lines.
- Seal off open return line connection with plug -1-.
- Hold the end of this hose -3- (lengthen if necessary) in a suitable 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

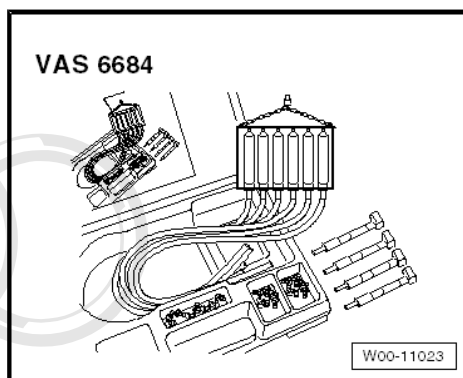
1000 ml = 1 litre

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

Checking return flow rate of individual injectors

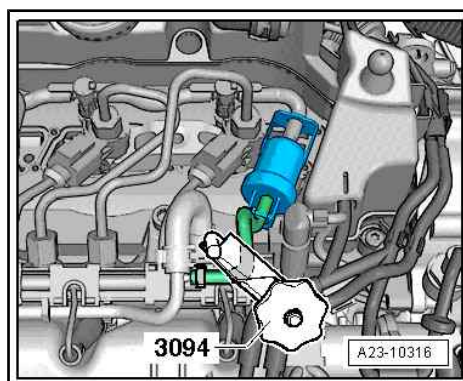
Special tools and workshop equipment required

- ◆ Return flow meter - VAS 6684-



Each injector normally has a relatively low fuel 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 line downstream of pressure retention valve using hose clamp up to 25 mm - 3094- .



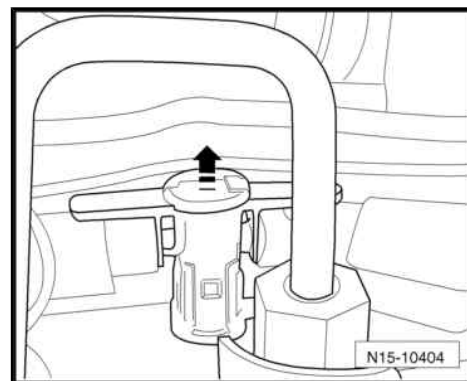
- Pull return line connections off injectors; to do so, press both tabs down and at the same time pull release pin upwards -arrow-.



Note

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

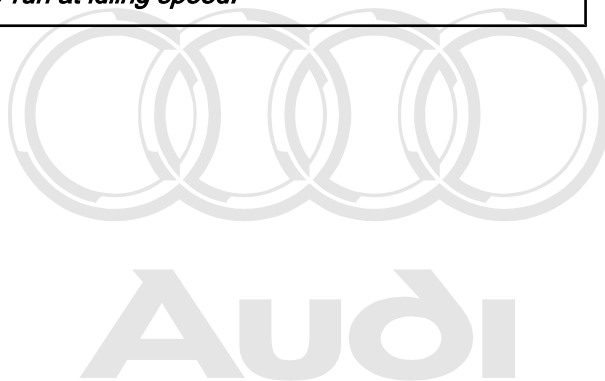
- Connect hoses onto return line connections of all 4 injectors.
- Run the 4 hoses into injection rate comparison meter - V.A.G 1348/2 B- .
- Start engine and let it idle for several minutes.



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.*



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- 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.
- 1 - Injectors OK. Return flow rate approx. identical on all injectors.
- 2 - Injector for cylinder 3 not OK. Return flow rate greater than three times the volume of smallest measured return flow rate.



Note

There is a mechanical fault at the injector if the return flow rate is greater than three times the volume of the smallest measured return flow rate.

- If one injector has a significantly higher return flow rate than the others it must be renewed ⇒ [page 54](#) .

Installing fuel return lines

- Check O-ring for fuel return line connection for damage and deformation.

If O-ring is damaged or deformed, renew O-ring.



Note

Lubricate all seals with engine oil or assembly oil before installing.

- Push return line connections carefully over seals and onto injectors. The catch should engage audibly. Then press release pin down carefully.

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.

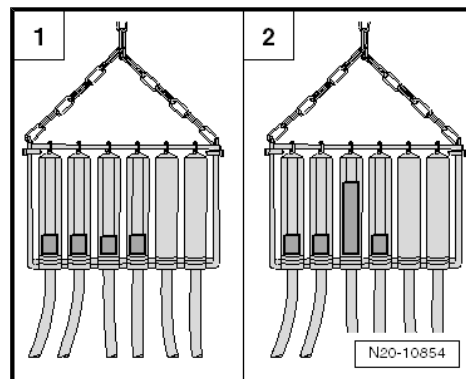
Renew the affected component if leakage occurs.

- 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.
- Install engine cover panel ⇒ [page 27](#) .

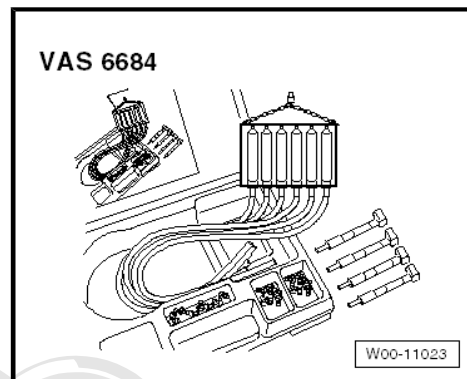
10.5 Checking return flow rate of injectors at starter cranking speed

Only perform this test if the engine does not start at all.

Special tools and workshop equipment required



◆ Return flow meter - VAS 6684-



WARNING

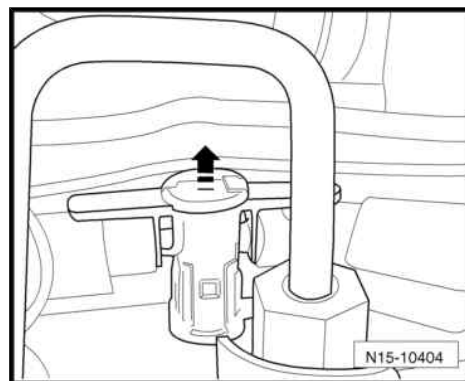
- ◆ *Always read rules for cleanliness and instructions for working on fuel system ➔ [page 2](#).*
- ◆ *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

Each injector normally has a relatively low fuel 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 27](#).
- Remove noise insulation from injectors.
- Clean all return line connections (with commercial cleaning solution or similar) before removing.
- Dry all components after cleaning.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Pull return line connections off injectors; to do so, press both tabs down and at the same time pull release pin upwards -arrow-.
- Connect hoses of return flow meter - VAS 6684- to return line connections of all four injectors.
- Run the 4 hoses into return flow meter - VAS 6684- .
- 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 an injector, that injector must be renewed.



Installing fuel return lines

- Check O-ring for fuel return line connection for damage and deformation.



Note

Lubricate all seals with engine oil or assembly oil before installing.

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

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.

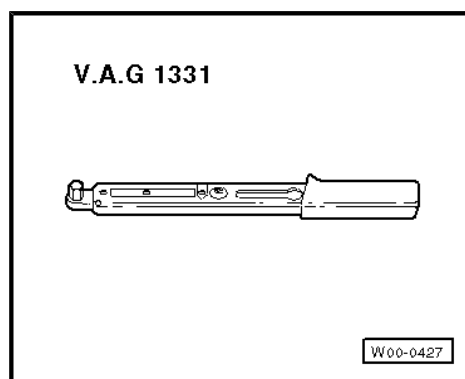
Renew the affected component if leakage occurs.

- 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.
- Install engine cover panel ⇒ [page 27](#) .

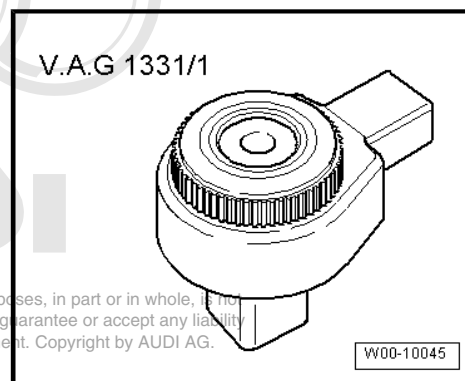
10.6 Removing and installing injectors

Special tools and workshop equipment required

- ◆ Cleaning kit - VAS 6811-
- ◆ Torque wrench - V.A.G 1331-

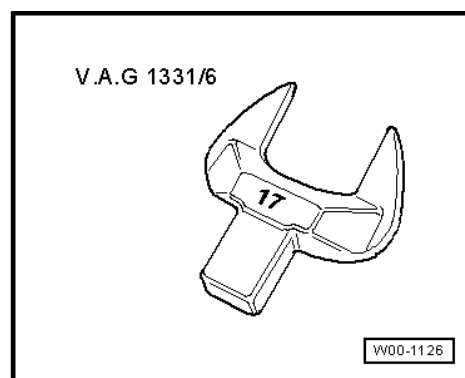


◆ Ratchet - V.A.G 1331/1-

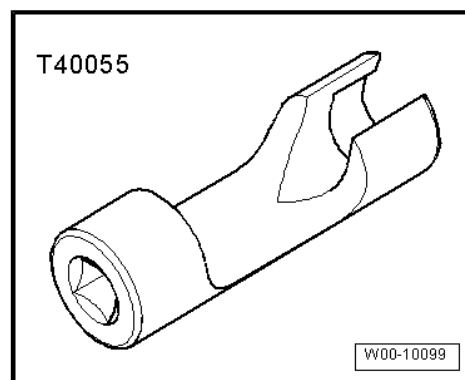


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

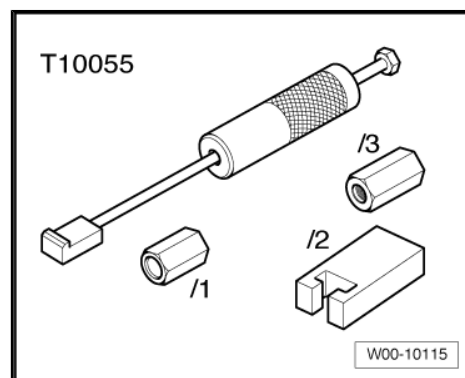
◆ Open end spanner insert, AF 17 - V.A.G 1331/6-



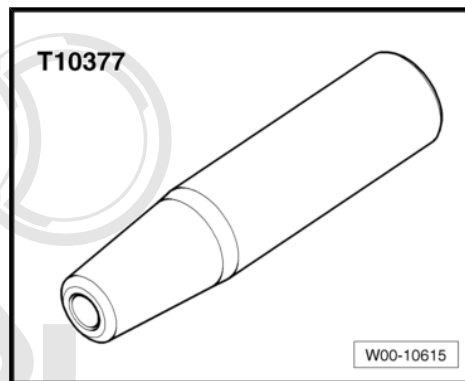
◆ Socket - T40055-



◆ Puller - T10055- with adapter - T10055/1-



◆ Assembly sleeve - T10377-



Removing

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**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 27](#) .
- Take noise insulation off cylinder head cover.

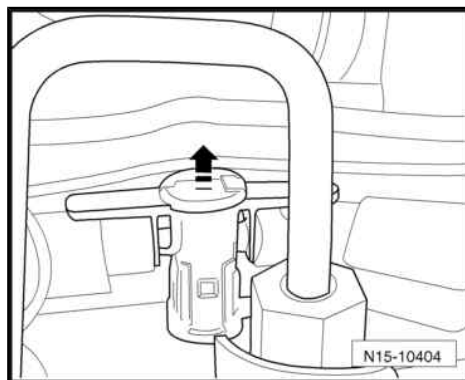
**Caution**

- ◆ *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.*

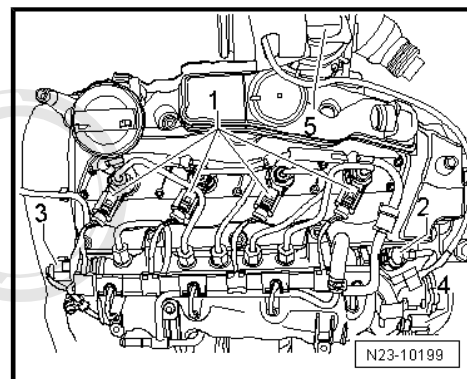
- Pull return line connections off injectors; to do so, press both tabs down and at the same time pull release pin upwards -arrow-.

**Note**

Should you not be able to pull the return line connection upwards, open the connection by turning it with a small screwdriver.



- Unplug electrical connectors -1- at injectors which are to be removed.
- Loosen union nuts for high-pressure pipes at injectors using socket - T40055- , 17 mm.
- Loosen union nuts for high-pressure pipes at fuel rail using open end spanner insert, AF 17 - V.A.G 1331/6- .

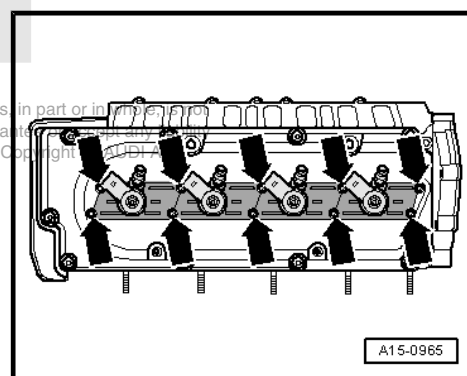


- Unbolt covers for injectors -arrows-.
- Pull covers upwards and turn them $\frac{1}{4}$ turn (90°).

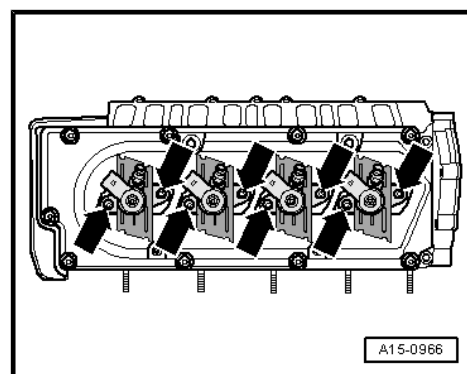


Caution

When removing the securing nuts on the injectors there is a risk that the nuts will drop into the cylinder head. Proceed very carefully to prevent unnecessary dismantling or further damage.



- Unbolt clamping pieces for injectors -arrows-.



- Apply puller - T10055- with adapter - T10055/1- as shown in illustration and pull injector out upwards by tapping gently.
- After removal, lay injectors on a clean cloth.

Important instructions for installing injectors:

When installing injectors, the following components must be renewed:

- ◆ Clamping piece
- ◆ Copper seal
- ◆ O-ring for injector bore
- ◆ O-ring for fuel return line connection



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.*

Permitted only for private use. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions. Copyright by AUDI AG.

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.
- 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.

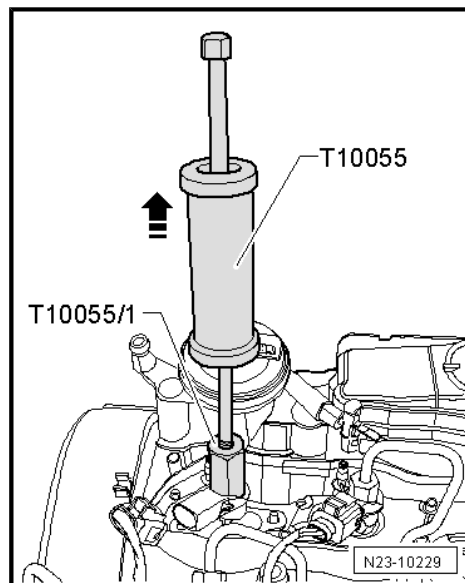
Continued (same procedure for used and new injectors):



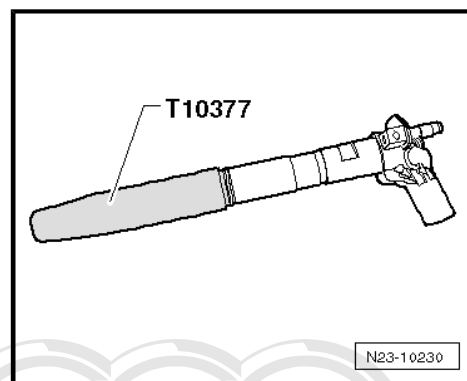
Caution

Risk of damage to injector sealing surface.

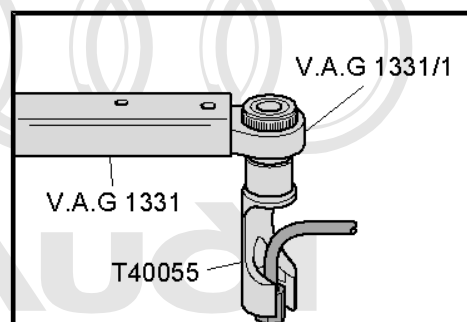
- ◆ *To remove carbon deposits from the injector sealing surface, clean the injector bore in the cylinder head with cleaning kit - VAS 6811-.*



- Renew seal for injector using assembly sleeve - T10377- .
- To prevent damage to the new O-ring, lubricate it with oil and carefully push it onto the fuel return line connection.
- Install injectors.
- Hand-tighten union nuts on high-pressure pipes. Make sure that connections are not under tension.

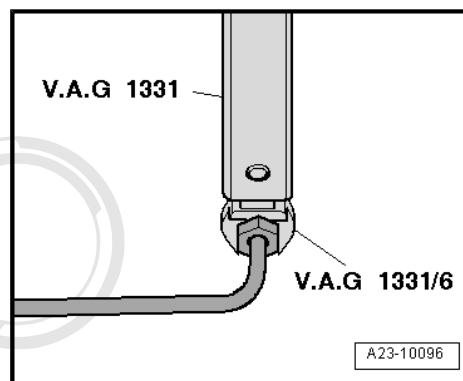


- To tighten unions of high-pressure pipes at injectors, use torque wrench - V.A.G 1331- with ratchet - V.A.G 1331/1- and socket - T40055- .



Protected by copyright. Copying for private or commercial purposes, in part or in full, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- To tighten unions of high-pressure pipes to fuel rail, use torque wrench - V.A.G 1331- with tool insert, AF 17 - V.A.G 1331/6- .
- Observe tightening torque: Installing high-pressure pipes
⇒ [page 61](#) .
- Tightening torques: refer to exploded view of fuel system
⇒ [page 20](#) .
- Press return line connections carefully over injector seals (check seal for damage before connecting return line). The catch should engage audibly. Then press release pin down carefully.



After renewing an injector, the “injector delivery calibration values” and “injector voltage calibration values” for the new injectors must be written into the engine control unit.

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

This document, including all illustrations and diagrams, is for informational purposes only. It is not to be used for any other purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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. 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.

11 Senders and sensors

Overview

⇒ [“11.1 Removing and installing air mass meter G70 ”](#),
[page 61](#)

⇒ [“11.2 Installing high-pressure pipes”](#), [page 61](#)

⇒ [“11.3 Checking pressure retention valve in fuel return line”](#),
[page 63](#)

⇒ [“11.4 Checking fuel pressure regulating valve N276 ”](#),
[page 65](#)

⇒ [“11.5 Checking fuel pressure \(low pressure\) system”](#),
[page 66](#)

⇒ [“11.6 Checking delivery rate of fuel pumps”](#), [page 68](#)

⇒ [“11.7 Removing and installing fuel pressure regulating valve
N276 ”](#), [page 69](#)

⇒ [“11.8 Removing and installing fuel pressure sender G247 ”](#),
[page 72](#)

11.1 Removing and installing air mass meter - G70-

Removing

- Unplug electrical connector -1- at air mass meter - G70- .
- Unscrew both bolts from air mass meter - G70- and carefully pull air mass meter - G70- out of guide on air cleaner housing.

Installing

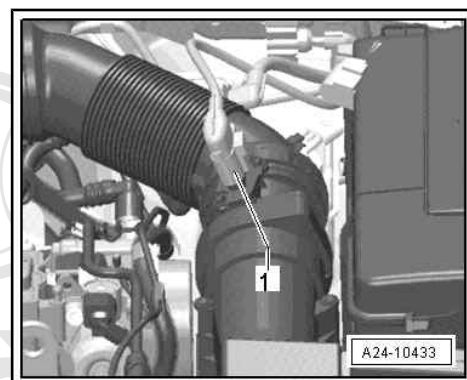
To ensure the correct function of the air mass meter - G70- , it is important to observe the following notes and instructions.



Note

- ◆ *If the air filter element is very dirty or wet, dirt particles or water can reach the air mass meter - G70- and falsify the detected air mass values. This will cause a loss of power, as the calculated injection quantities will be too low.*
- ◆ *Always use genuine air filter elements (same as original equipment).*
- ◆ *Use a silicone-free lubricant when installing the air hose.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Parts catalogue](#) .*
- Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).
- Check intake duct as far as air filter element for dirt. 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. Removing and installing air cleaner
⇒ [page 29](#) .

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

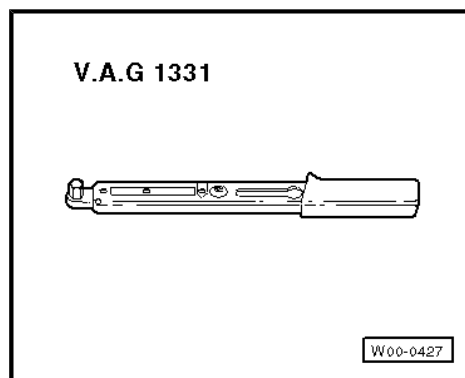


11.2 Installing high-pressure pipes

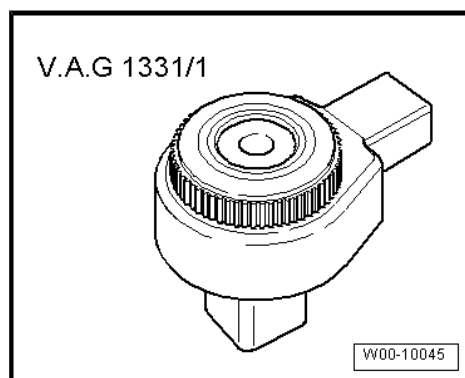
Special tools and workshop equipment required



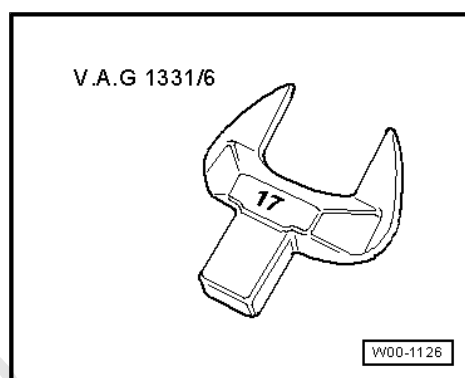
- ◆ Torque wrench - V.A.G 1331-



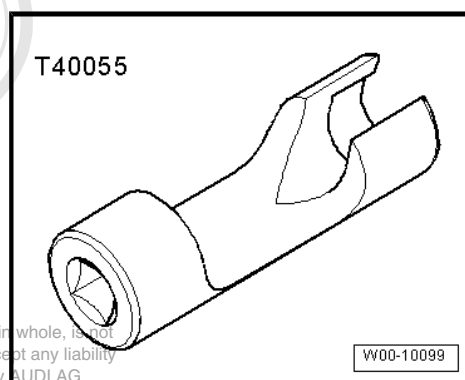
- ◆ Ratchet - V.A.G 1331/1-



- ◆ Open end spanner insert, AF 17 - V.A.G 1331/6-



- ◆ Socket - T40055-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

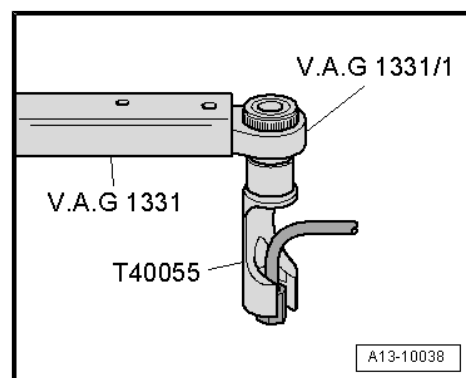
Procedure



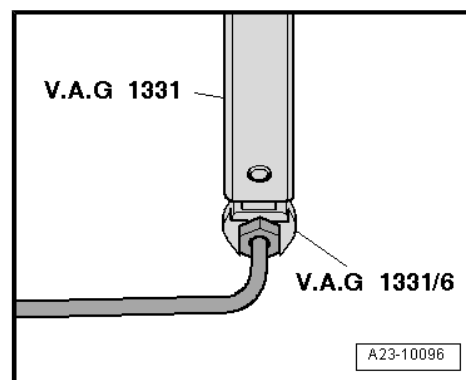
Note

- ◆ *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.*
- 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: 25 Nm**
- To tighten unions of high-pressure pipes at injectors, use torque wrench - V.A.G 1331- with ratchet - V.A.G 1331/1- and socket - T40055- .

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the written permission of AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- To tighten unions of high-pressure pipes to fuel rail, use torque wrench - V.A.G 1331- with tool insert, AF 17 - V.A.G 1331/6- .
- Check fuel system for leaks
 ⇒ ["6 Checking fuel system for leaks", page 25](#) .



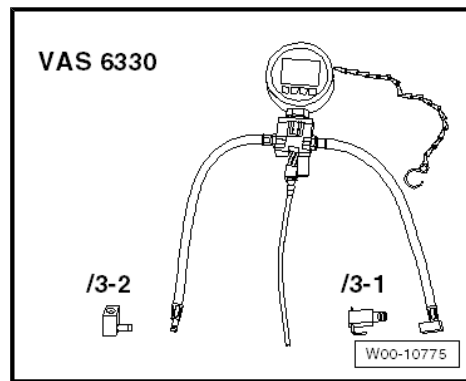
11.3 Checking pressure retention valve in fuel return line

The pressure retention valve maintains a residual pressure of approx. 10 bar in the fuel return line.

This residual pressure is required for the control function of the injectors

Special tools and workshop equipment required

◆ Tester for fuel return system - VAS 6330-



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.*

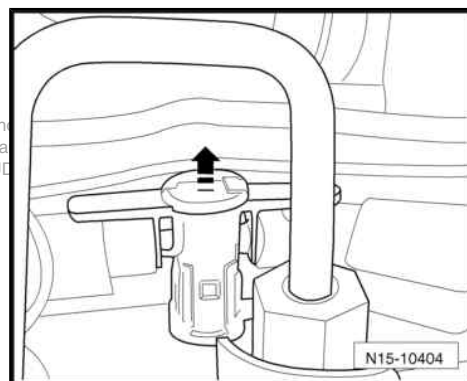
- Remove engine cover panel ➔ [page 27](#) .
- Remove noise insulation from injectors.
- Clean return line connection on cylinder 1 (with commercial cleaning solution or similar) before removing.
- Dry return line connection on cylinder 1.
- Cover return line connection on cylinder 1 with a cloth.
- Pull return line connection off cylinder 1; to do so, press both tabs down and at the same time pull release pin upwards -arrow-.



Note

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

No dirt must be allowed to get into the disconnected return line or the open connection on the injector.



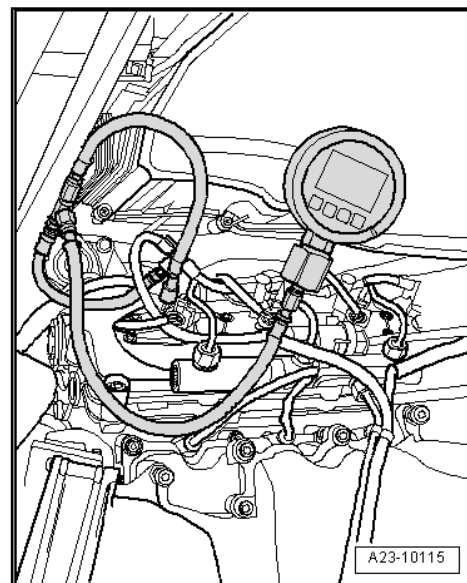
- Connect tester for fuel return system - VAS 6330- between return line connection on injector and return line.
- Start engine.
- Check pressure indicated on tester.
- Specification: approx. 10 bar

If the value does not match the specification, fit a new pressure retention valve.



Note

The pressure retention valve may only be renewed together with the fuel return lines.



11.4 Checking fuel pressure regulating valve - N276-

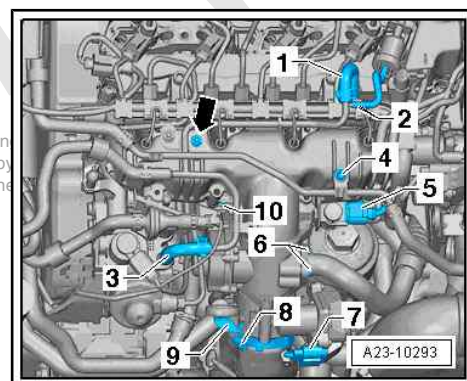


WARNING

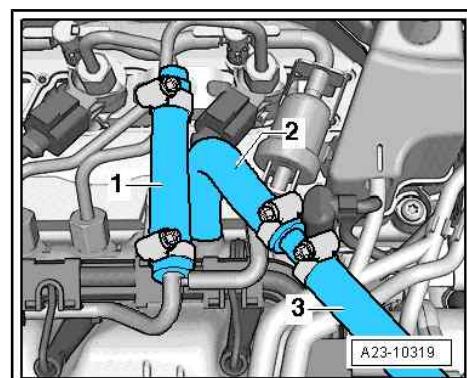
- ◆ *Always read rules for cleanliness and instructions for working on fuel system ➔ [page 2](#).*
- ◆ *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*

- Remove engine cover panel ➔ [page 27](#) .
- Remove noise insulation from injectors.
- Detach fuel return line -1-.

Protected by copyright. Copying permitted unless authorised by Audi AG with respect to the correctness of the information.



- Seal off open return line connection with a plug -1-.



- Attach a suitable hose -3- to return line -2-.

1) Checking while engine is running

- Start the engine and run at idling speed.
- Specification: more than 75 ml in 30 seconds

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

2) Checking while engine is running

If condition for 1) is met, start engine and increase engine speed to ≥ 2000 rpm.

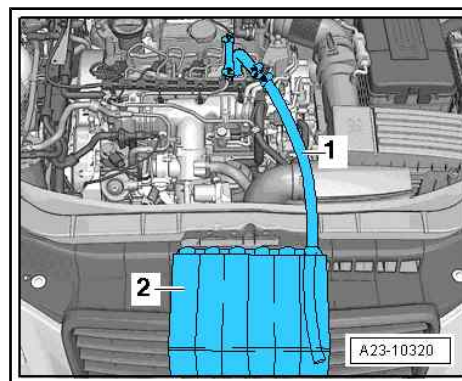
- Fuel is still discharged in the first few seconds after the engine is started
- Specification after a few seconds: return flow rate = 0 ml
- Drip leaks are permissible

If specification is not obtained, fuel pressure regulating valve - N 276- is defective.

3) If engine can no longer be started

Perform check at cranking speed.

- Specification of return flow rate: 0 ml
- Drip leaks are permissible
- If specification is not obtained, fuel pressure regulating valve - N 276- is defective.

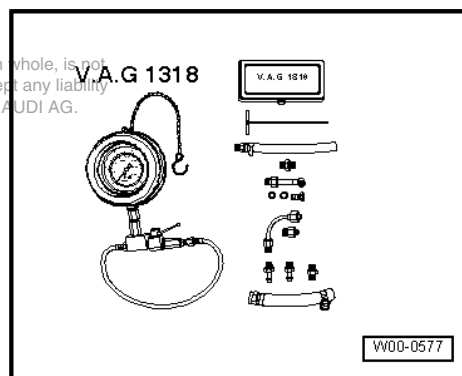


11.5 Checking fuel pressure (low pressure) system

Special tools and workshop equipment required

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

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Test conditions:

- Battery voltage at least 12.5 V
- Fuel filter OK.
- Fuel tank at least $\frac{1}{2}$ full
- Ignition switched off.

Checking residual pressure

- Remove engine cover panel ➤ [page 27](#) .

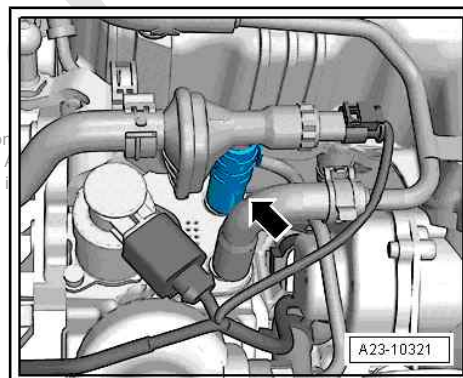


WARNING

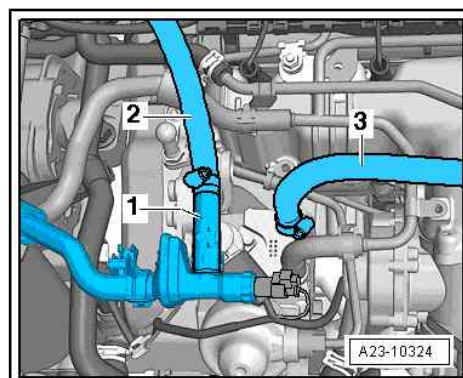
- ◆ *Always read rules for cleanliness and instructions for working on fuel system ➔ [page 2](#).*
- ◆ *Follow these instructions and rules for cleanliness before starting work and while working on the fuel system.*
- ◆ *To reduce the pressure in the fuel system, wrap a clean cloth around the connection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

- Disconnect fuel supply line -arrow- at high-pressure pump.

Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG is not responsible with respect to the correctness of information.



- Connect K-Jetronic pressure tester - V.A.G 1318- to fuel supply line -1- with suitable adapter -2-. Connect the other adapter -3- from K-Jetronic pressure tester - V.A.G 1318- to open connection at high-pressure pump.



**Note**

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

- Connect a ➔ Vehicle diagnostic tester.
- Switch on ignition.
- Select "Engine electronics" in vehicle self-diagnosis.
- Then select "Basic setting".
- Select "Display group 35".
- Press "activate" button.
- The fuel pumps start running.
- Let fuel pumps run until maximum fuel pressure has built up.

- Specification: at least 3.5 bar

If specification is not obtained.

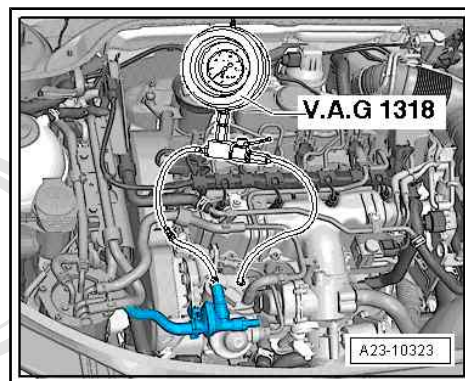
Check union between pressure tester and fuel line for leaks.

Check pressure tester for leaks.

Check fuel lines and their connections for leaks.

Fuel filter is blocked.

Check delivery rate of fuel pump ➔ [page 68](#) .

**Note**

Check fuel system for leaks.

11.6 Checking delivery rate of fuel pumps

Special tools and workshop equipment required

- ◆ Measuring container (fuel-resistant)

Test conditions:

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

Checking fuel delivery rate

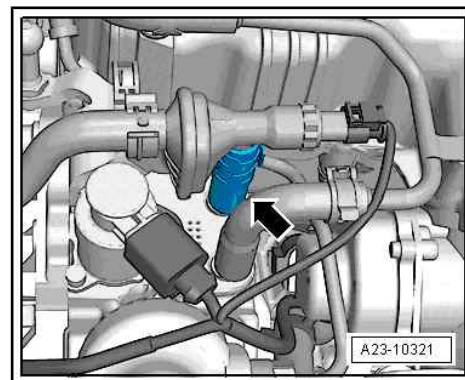
- Remove engine cover panel ➔ [page 27](#) .
- Take noise insulation off cylinder head cover.



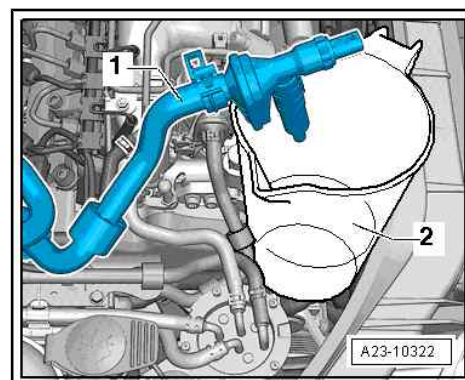
WARNING

- ◆ *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.*

- Disconnect fuel supply line -arrow- at high-pressure pump.



- Hold fuel supply line -1- into a measuring container -2-.
- Connect a ➔ Vehicle diagnostic tester.
- Switch on ignition.
- Select “Engine electronics” in vehicle self-diagnosis.
- Then select “Basic setting”.
- Select “Display group 35”.
- Press “activate” button.
- The fuel pumps start running.
- Let fuel pumps run for 15 seconds and exit activation function.
- Specification in 15 seconds: at least 500 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.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

11.7 Removing and installing fuel pressure regulating valve - N276-

Special tools and workshop equipment required

- ◆ Open-end spanner insert, 30 mm - T10553-



- ◆ Torque wrench



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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).

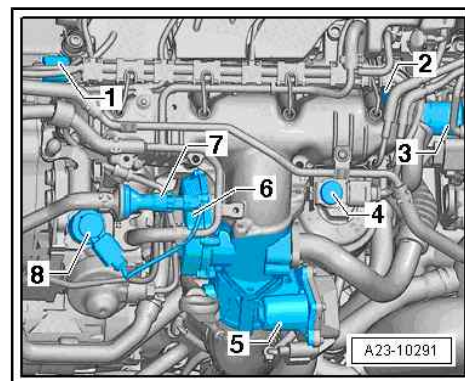
If the pressure in the high-pressure fuel circuit is too high, the regulating valve opens to allow some of the fuel to flow back from the fuel rail to the fuel tank via a return line.

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 engine cover panel ➔ [page 27](#) .
- Take noise insulation off cylinder head cover.
- Remove fuel rail ➔ [page 36](#) .
- 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.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Dry off fuel pressure regulating valve - N276- .
- Loosen union nut using open-end spanner insert, 30 mm - T10553- (at the same time, 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 connection with clean plug.

Installing



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, the deformable sealing lip and the O-ring 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).
- Tighten union nut using open-end spanner insert, 30 mm - T10553- (at the same time, counterhold at hexagon flats on housing) ➔ [page 20](#) .
- Install fuel rail ➔ [page 36](#) .
- After installation, run engine at moderate speed for several minutes and then switch off.
- Check fuel system for leaks.
- Interrogate event memory.
- 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.

11.8 Removing and installing fuel pressure sender - G247-

Special tools and workshop equipment required

- ◆ Bit (27 mm) - T40218- or commercially available socket (27 mm)

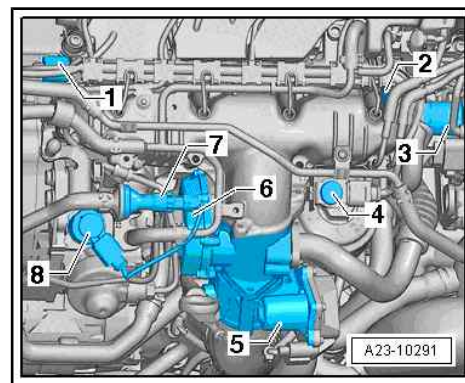
Protected by copyright. Copying for private or commercial purposes, in part or in full, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright © 2018 by AUDI AG.



- ◆ Torque wrench

 Note

- ◆ The fuel pressure sender - G247- -1- continuously measures the fuel pressure in the high-pressure system. It transmits a corresponding voltage signal to the engine control unit - J623-.
- ◆ Should the fuel pressure sender fail, the engine control unit will control the fuel pressure via a mapped open-loop backup function. Maximum engine speed in this mode is restricted.
- ◆ The fuel pressure sender - G247- has a deformable sealing lip and no separate seal; it can therefore be used only once.



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 27](#).
- Take noise insulation off cylinder head cover.
- 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-.

Audi

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Unplug electrical connector at fuel pressure sender - G247- .
- Unscrew fuel pressure sender - G247- using socket, 27 mm - T40218- .



Note

An open-end spanner must not be used for loosening or tightening.

- 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



Note

- ◆ *Fuel pressure sender - G247- must always be renewed after it has been removed.*
- ◆ *Also check sealing surface at opening in fuel rail.*
- ◆ *The beginning of the thread and the deformable sealing lip of the fuel pressure sender - G247- must be coated with diesel fuel.*
- Screw in fuel pressure sender - G247- by hand.
- Then tighten fuel pressure sender - G247- to specified torque.

Tightening torques

- ⇒ **“4 Exploded view - fuel system”, page 20**
- 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.**

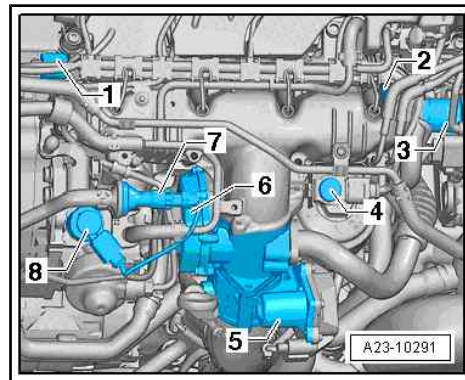
Renew affected component if leakage still occurs after tightening to correct torque.

- 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.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

12 Lambda probe and exhaust gas temperature sensors (CBAA, CBAB, CBBB)

Overview

⇒ [page 76](#)

⇒ [page 77](#)

⇒ [page 78](#)

12.1 Exploded view - Lambda probe and exhaust gas temperature sensors

1 - Bolt for exhaust gas pressure sensor 1 - G450-

- ☐ 4.5 Nm
- ☐ Removing and installing
⇒ [page 87](#)
- ☐ Pressure pipes to particulate filter: 45 Nm
- ☐ Adaption must be performed after renewing this component

2 - Control pipe for exhaust gas pressure sensor 1 - G450-

3 - Particulate filter

- ☐ Adaption must be performed after renewing particulate filter

4 - Exhaust gas temperature sender 3 - G495-

- ☐ Removing and installing
⇒ [Rep. gr. 26](#)
- ☐ 45 Nm

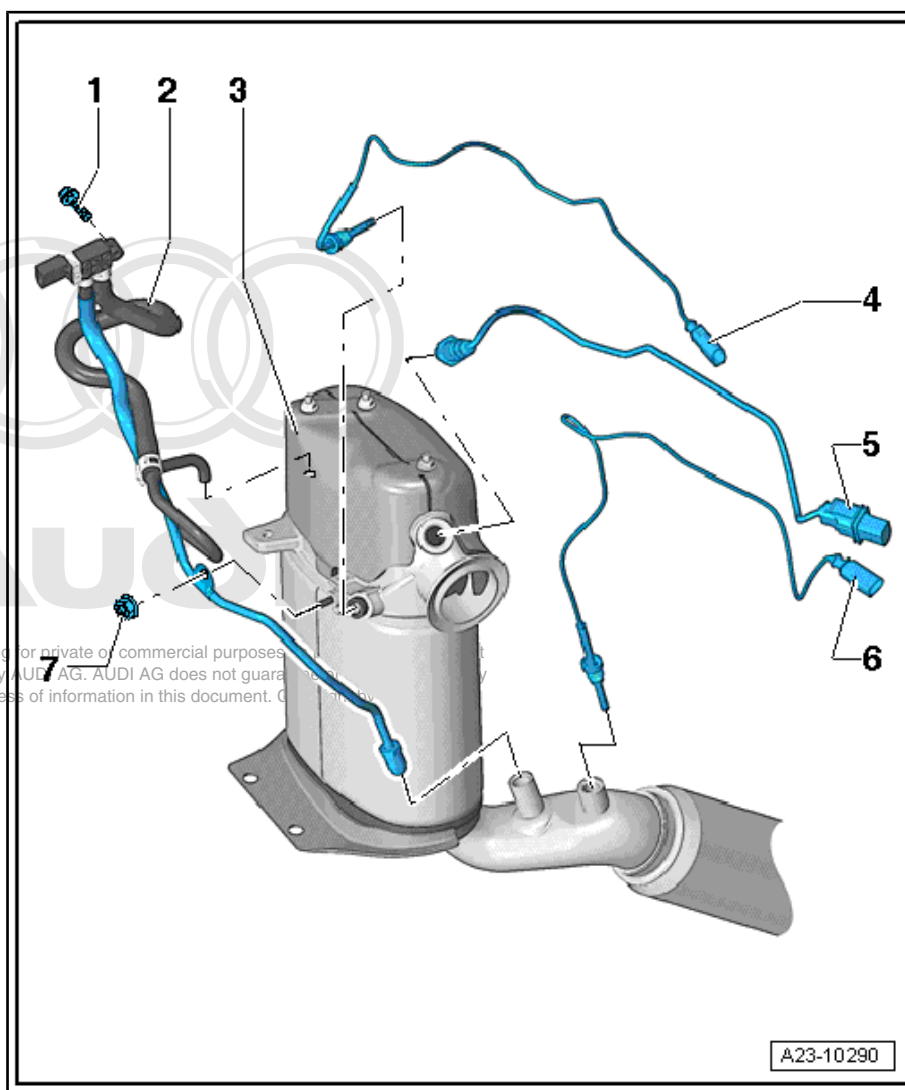
5 - Lambda probe - G39- with Lambda probe heater - Z19-

- ☐ New Lambda probes are coated with an assembly paste
- ☐ In the case of a used Lambda probe, coat only thread with high-temperature paste; refer to ⇒ [Parts catalogue for high-temperature paste](#)
- ☐ The assembly paste/ high-temperature paste must not make contact with the slots on the Lambda probe body
- ☐ Removing and installing ⇒ [page 77](#)
- ☐ 50 Nm

6 - Exhaust gas temperature sender 4 - G648-

- ☐ Removing and installing ⇒ [Rep. gr. 26](#)
- ☐ 45 Nm

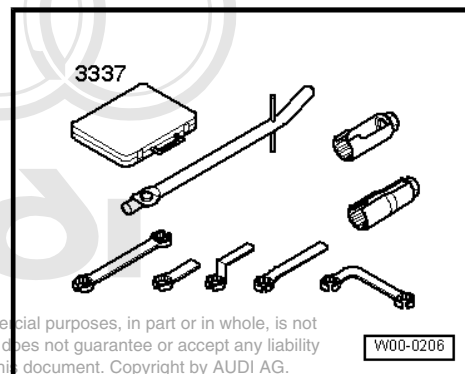
7 - Nut



12.2 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 27](#) .

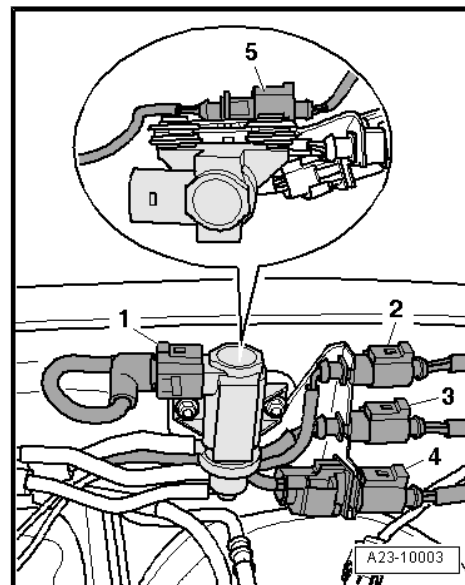


WARNING

When working on all parts of the exhaust system:

- ◆ *Observe safety precautions when working on the exhaust system*
➔ ***"1.5 Safety precautions when working on the exhaust system", page 4 .***

- Unplug electrical connector -4- for Lambda probe - G39- .



- Unscrew Lambda probe - G39- -3- using tool from Lambda probe open ring spanner set - 3337- .

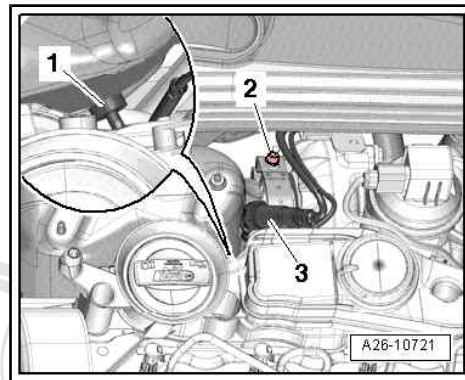
Installing

When installing, note the following:



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 ⇒ [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.*
- Tightening torque: exploded view - Lambda probe ⇒ [page 76](#)



12.3 Removing and installing exhaust gas pressure sensor 1 - G450-

The pressure sensor is connected to the take-off points upstream and downstream of the particulate filter via two pipes. Exploded view - Lambda probe ⇒ [page 76](#)

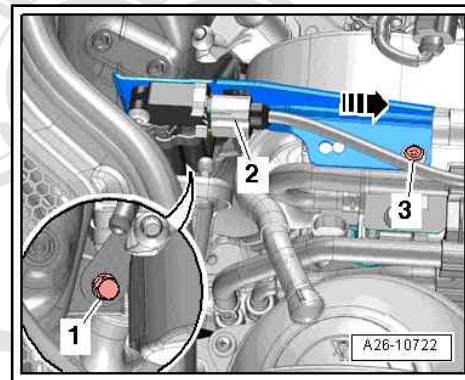
Exhaust gas pressure sensor 1 - G450- detects the amount of deposits in the particulate filter.

Removing

- Remove engine cover panel ⇒ [page 27](#) .

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Unplug electrical connector -2- on exhaust gas pressure sensor 1 - G450- .
- Remove bolt -3- and detach exhaust gas pressure sensor 1 - G450- from bracket -arrow-.
- Detach retaining clips from both hoses.
- Before disconnecting, spray hoses coming from exhaust gas pressure sensor 1 - G450- 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

- When installing, note the following:
- Tightening torques: Exploded view - Lambda probe
⇒ [page 76](#)

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Note

- ◆ *Before installing, blow out control pipes from exhaust gas pressure sensor 1 - G450- 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 connections are detached from particulate filter, tighten to 45 Nm.*

After renewing exhaust gas pressure sensor 1 - G450- and/or particulate filter, adaption must be performed in order to reset learnt values. The adaption procedure is described in the Guided Fault Finding or Guided Functions; use a vehicle diagnostic tester.

13 Lambda probe and exhaust gas temperature sensors (CBEA)

Overview

⇒ [“13.1 Exploded view - Lambda probe and exhaust gas temperature sensors”, page 80](#)

⇒ [“13.2 Removing and installing Lambda probe G39 with Lambda probe heater Z19”, page 83](#)

⇒ [“13.3 Removing and installing Lambda probe after catalytic converter G130 with Lambda probe 1 heater after catalytic converter Z29”, page 85](#)

⇒ [“13.4 Removing and installing pressure differential sender G505”, page 87](#)

⇒ [“13.4 Removing and installing pressure differential sender G505”, page 87](#)

⇒ [“13.5 Removing and installing exhaust gas pressure sensor 1 G450”, page 88](#)

⇒ [“13.6 Removing and installing control pipe for pressure sensors”, page 89](#)

⇒ [“13.7 Removing and installing control pipe for exhaust gas pressure sensor 1 G450”, page 92](#)

13.1 Exploded view - Lambda probe and exhaust gas temperature sensors

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1 - Bolt

- ☐ 8 Nm

2 - Bolt

- ☐ 8 Nm

3 - Pressure differential sender - G505-

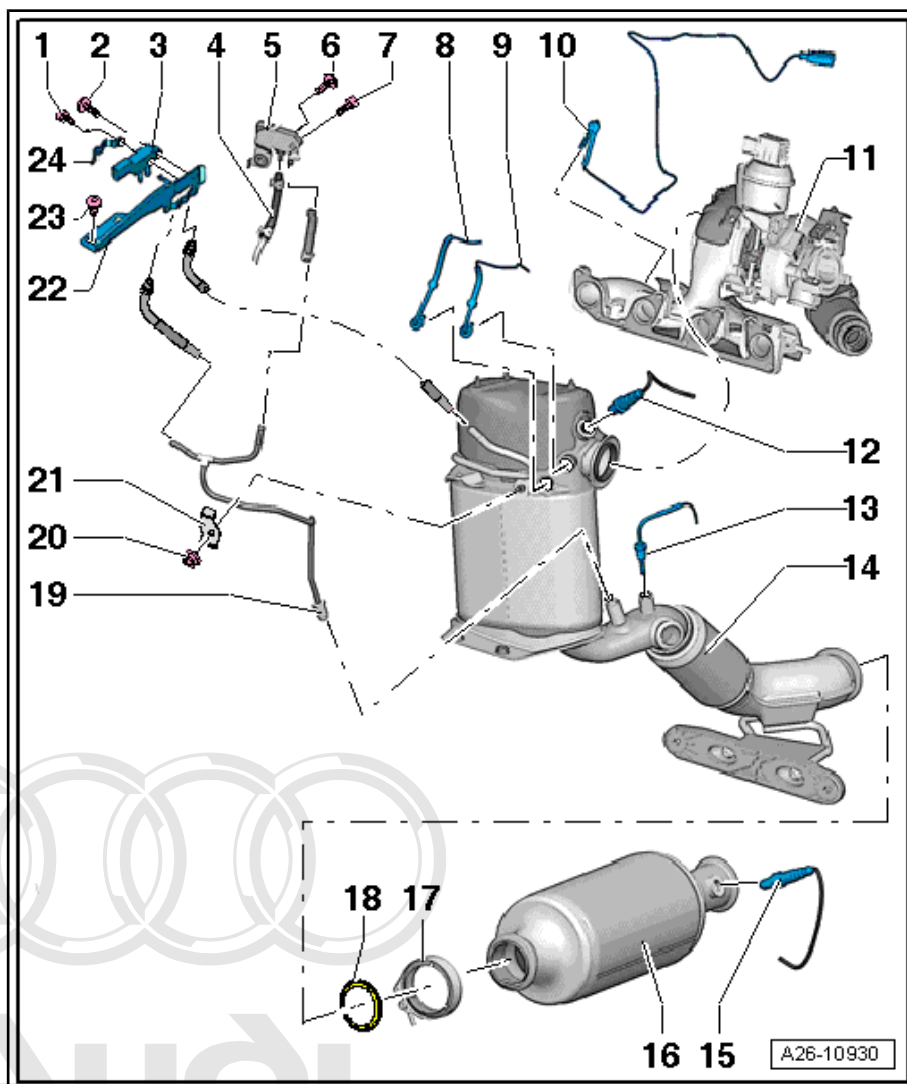
- ☐ Removing and installing
⇒ [page 87](#)
- ☐ Reset learnt values after
renewing ⇒ Vehicle di-
agnostic tester, [01 -
Engine electronics,
functions, [01 - Re-
set learnt values]

4 - Control pipe

- ☐ Control pipe from ex-
haust gas recirculation
cooler to exhaust gas
pressure sensor 2 -
G451-

5 - Exhaust gas pressure sensor 1 - G450-

- ☐ Removing and installing
⇒ [page 88](#)
- ☐ Reset learnt values after
renewing ⇒ Vehicle di-
agnostic tester, [01 -
Engine electronics,
functions, [01 - Re-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



set learnt values

6 - Bolt

- ☐ 8 Nm

7 - Bolt

- ☐ 8 Nm

8 - Exhaust gas temperature sender 3 - G495-

- ☐ Removing and installing ⇒ Rep. gr. 26
- ☐ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ☐ 45 Nm

9 - Exhaust gas temperature sender 2 - G448-

- ☐ Before removing mark installation position
- ☐ Removing and installing ⇒ Rep. gr. 26
- ☐ Note installation position: see exhaust gas temperature control (vehicles with engine code CBEA) ⇒ Rep. gr. 26
- ☐ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ☐ 45 Nm

10 - Exhaust gas temperature sender 1 - G235-

- ☐ Before removing mark installation position
- ☐ Removing and installing ⇒ Rep. gr. 26
- ☐ Note installation position: see exhaust gas temperature control (vehicles with engine code CBEA) ⇒ Rep. gr. 26
- ☐ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ☐ 45 Nm

11 - Turbocharger

12 - Lambda probe - G39- with Lambda probe heater - Z19-

- ☐ New Lambda probes are coated with an assembly paste
- ☐ In the case of a used Lambda probe, coat only thread with high-temperature paste; refer to ⇒ Parts catalogue for high-temperature paste
- ☐ The assembly paste/high-temperature paste must not make contact with the slots on the Lambda probe body
- ☐ Reset learnt values after renewing ⇒ Vehicle diagnostic tester, 01 - Engine electronics, functions, 01 - Reset learnt values
- ☐ Removing and installing ⇒ [page 83](#)
- ☐ 50 Nm

13 - Exhaust gas temperature sender 4 - G648-

- ☐ Removing and installing ⇒ Rep. gr. 26
- ☐ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ☐ 45 Nm

14 - Particulate filter

- ☐ Removing and installing ⇒ Rep. gr. 26
- ☐ Adaption must be performed after renewing particulate filter

15 - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

- ☐ New Lambda probes are coated with an assembly paste
- ☐ In the case of a used Lambda probe, coat only thread with high-temperature paste; refer to ⇒ Parts catalogue for high-temperature paste
- ☐ The assembly paste/high-temperature paste must not make contact with the slots on the Lambda probe body
- ☐ Reset learnt values after renewing ⇒ Vehicle diagnostic tester, 01 - Engine electronics, functions, 01 - Reset learnt values
- ☐ Removing and installing ⇒ [page 85](#)
- ☐ 50 Nm

16 - NOx storage catalytic converter

- ☐ Reset learnt values after renewing ⇒ Vehicle diagnostic tester, 01 - Engine electronics, functions, 01 - Reset learnt values
- ☐ Removing and installing ⇒ [Rep. gr. 26](#)

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

17 - Clamp

18 - Seal

19 - Control pipe

- ☐ Tighten to 45 Nm at exhaust
- ☐ Secure to pressure sensor with hose clip
- ☐ Do not attempt to bend control pipe to a different shape
- ☐ Install free of stress
- ☐ Removing and installing ⇒ [page 92](#)

20 - Nut

- ☐ 9 Nm

21 - Bracket

- ☐ For control pipe

22 - Bracket

- ☐ For pressure differential sender - G505-

23 - Bolt

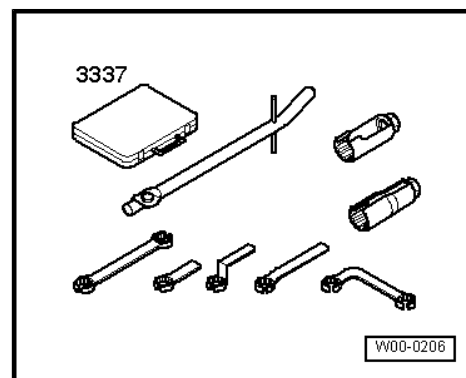
- ☐ 9 Nm

24 - Bracket

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

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-



- ◆ Vehicle diagnostic tester

Removing

- Remove engine cover panel ➤ [page 27](#) .

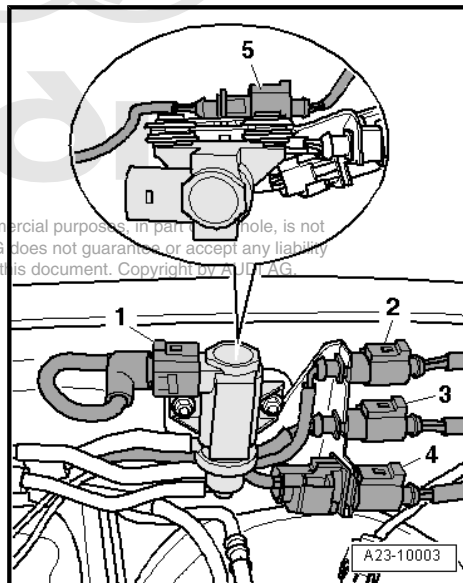


WARNING

When working on all parts of the exhaust system:

- ♦ *Observe safety precautions when working on the exhaust system*
➤ ***"1.5 Safety precautions when working on the exhaust system", page 4*** .

- Unplug electrical connector -4- for Lambda probe - G39- .



Protected by copyright. Copying for private or commercial purposes, in particular for advertising or promotional purposes, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

Installing

When installing, note the following:



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 ⇒ 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.*

- Learnt values must be reset on engine control unit after re-newing Lambda probe - G39- .
- Switch on ignition and select following menu options on ⇒ Vehicle diagnostic tester:

- ◆ [01 - Self-diagnosis compatible systems]
- ◆ [01 - Engine electronics]
- ◆ [01 - Engine electronics, functions]
- ◆ [01 - Reset learnt values]

Tightening torques

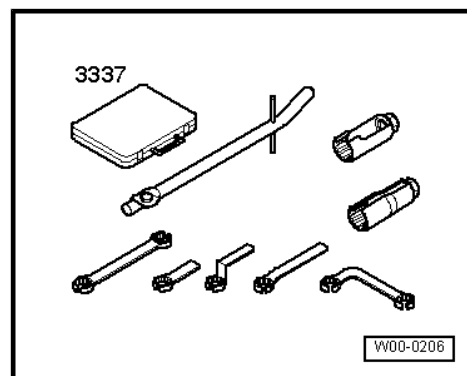
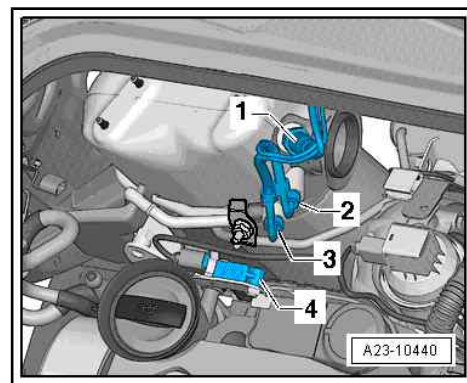
- ◆ ⇒ ["13.1 Exploded view - Lambda probe and exhaust gas temperature sensors", page 80](#)

13.3 Removing and installing Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless expressly permitted by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-



- ◆ Vehicle diagnostic tester

Removing

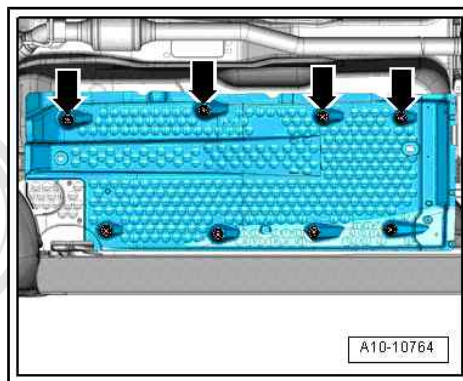


WARNING

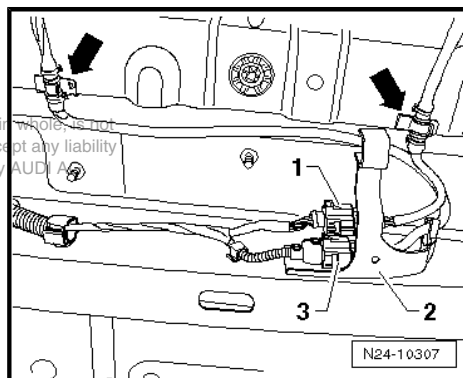
When working on all parts of the exhaust system:

- ◆ *Observe safety precautions when working on the exhaust system*
⇒ *"1.5 Safety precautions when working on the exhaust system", page 4.*

- Unscrew nuts -arrows- and pull underbody cover down slightly.



- Unplug connector -3- for Lambda probe after catalytic converter - G130- .



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG

- Move clear wiring connection -arrow-.
- Unscrew Lambda probe after catalytic converter - G130- using tool from Lambda probe open ring spanner set - 3337- .

Installing

When installing, note the following:



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 ⇒ 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.*

- Learnt values must be reset on engine control unit after renewing Lambda probe after catalytic converter - G130- .
- Switch on ignition and select following menu options on ⇒ Vehicle diagnostic tester:

- ◆ 01 - Self-diagnosis compatible systems
- ◆ 01 - Engine electronics
- ◆ 01 - Engine electronics, functions
- ◆ 01 - Reset learnt values

Tightening torques

- ◆ ⇒ ["13.1 Exploded view - Lambda probe and exhaust gas temperature sensors", page 80](#)

13.4 Removing and installing pressure differential sender - G505-

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the written consent of Audi AG. Audi AG does not warrant or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

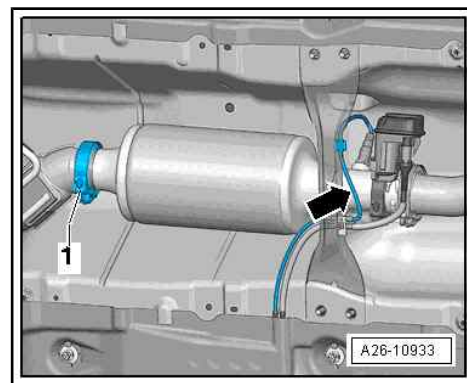
- ◆ Vehicle diagnostic tester

The pressure differential sender - G505- is connected to the take-off points upstream and downstream of the particulate filter via two pipes. Exploded view - Lambda probe ⇒ [page 80](#)

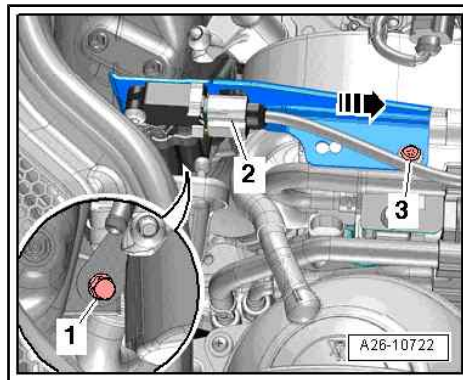
The pressure differential sender - G505- detects the amount of deposits in the particulate filter.

Removing

- Remove engine cover panel ⇒ [page 27](#) .



- Unplug electrical connector -2- at pressure differential sender - G505- .
- Remove bolt -3- and detach pressure differential sender - G505- from bracket -arrow-.
- 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

- When installing, note the following:



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 connections are detached from particulate filter, tighten to 45 Nm.*
- Learnt values must be reset on engine control unit after renewing pressure differential sender - G505- and/or particulate filter.
- Switch on ignition and select following menu options on ⇒ Vehicle diagnostic tester:
 - ◆ 01 - Self-diagnosis compatible systems
 - ◆ 01 - Engine electronics
 - ◆ 01 - Engine electronics, functions
 - ◆ 01 - Reset learnt values

Tightening torques

- ◆ ⇒ ["13.1 Exploded view - Lambda probe and exhaust gas temperature sensors", page 80](#)

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

13.5 Removing and installing exhaust gas pressure sensor 1 - G450-

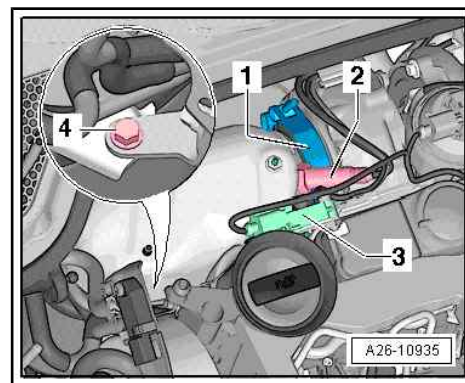
Special tools and workshop equipment required

- ◆ Vehicle diagnostic tester

Removing

- Remove engine cover panel ⇒ [page 27](#) .
- Detach heat insulation sleeve from exhaust gas pressure sensor 1 - G450- -3-.

- Detach electrical connector from exhaust gas pressure sensor 1 - G450- -3-.
- Unscrew bolt and detach bracket from exhaust gas pressure sensor 1 - G450- .
- Release retaining clips from both hoses.
- Before disconnecting, spray hoses coming from exhaust gas pressure sensor 1 - G450- with suitable release agent.
- Carefully pull hoses off connections (take care to keep the hoses straight; the connections can easily break off exhaust gas pressure sensor 1 - G450-).



Installing

- When installing, note the following:



Note

- ◆ *Before installing, blow out control pipes from exhaust gas pressure sensor 1 - G450- 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 connections are detached from particulate filter, tighten to 45 Nm.*
- Learnt values must be reset on engine control unit after renewing pressure differential sender - G505- and/or particulate filter.
- Switch on ignition and select following menu options on ⇒ Vehicle diagnostic tester:
 - ◆ 01 - Self-diagnosis compatible systems
 - ◆ 01 - Engine electronics
 - ◆ 01 - Engine electronics, functions
 - ◆ 01 - Reset learnt values

Tightening torques

- ◆ ⇒ "13.1 Exploded view - Lambda probe and exhaust gas temperature sensors", page 80

13.6 Removing and installing control pipe for pressure sensors

Removing

- Remove engine cover panel ⇒ page 27 .

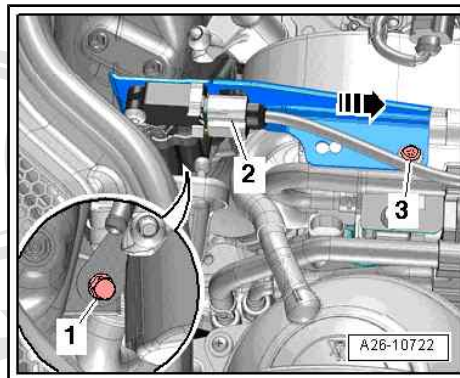


WARNING

When working on all parts of the exhaust system:

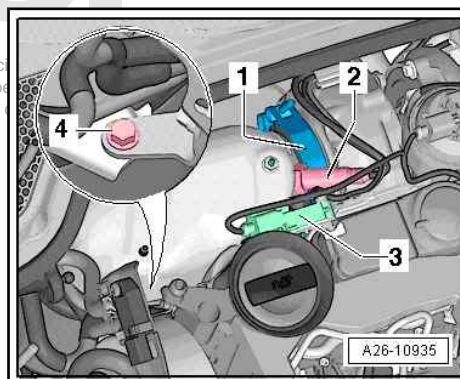
- ◆ *Observe safety precautions when working on the exhaust system*
 ⇒ "1.5 Safety precautions when working on the exhaust system", page 4 .

- Remove pressure differential sender - G505- -2- ➤ [page 87](#) .

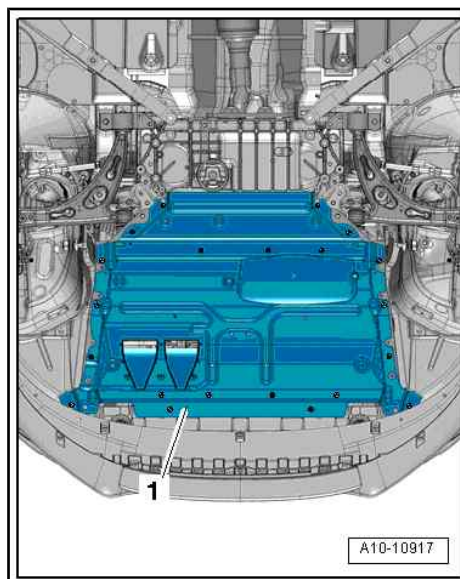


- Detach heat insulation sleeve and remove exhaust gas pressure sensor 1 - G450- -3- ➤ [page 88](#) .
- Detach clamp -1-

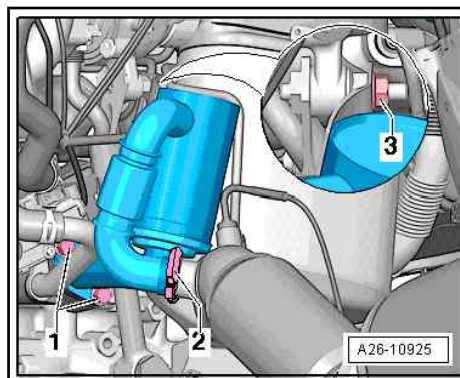
Protected by copyright. Copying for private or commercial use is prohibited without the written permission of Audi AG. Audi AG does not assume any liability with respect to the correctness of information in this document.



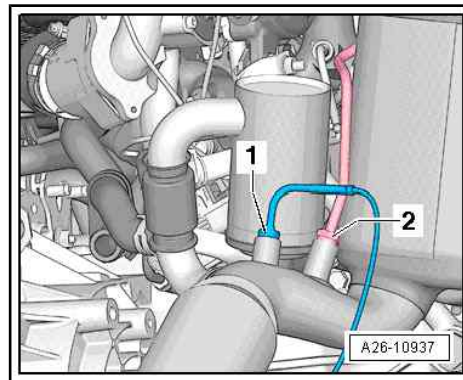
- Remove noise insulation -1- ➤ Rep. gr. 66 .



- Detach clamp -2-, unscrew bolts -1- and take out filter.



- Disconnect control pipe -2- from exhaust pipe behind particulate filter.

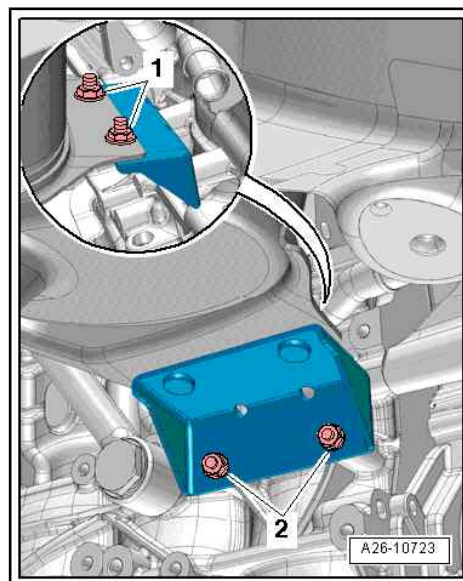


- Remove nuts -2-.

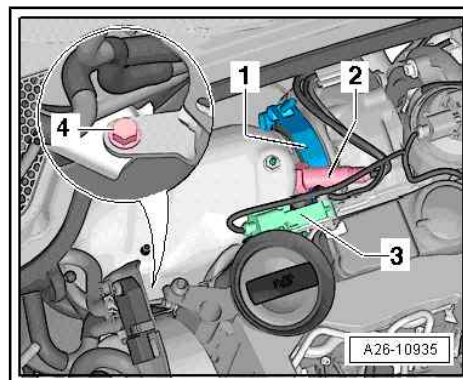


Note

Disregard -item 1-.



- Remove bolt -4- and move particulate filter towards rear.
- Slacken nut -2- only until control pipe is loose.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Guide out and remove control pipe.

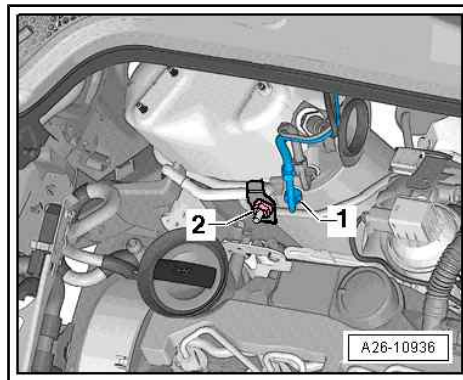
Installing

- Installation is carried out in reverse sequence.
- Tightening torque: Exploded view - Lambda probe
⇒ [page 80](#)



Note

- ♦ *Before installing, blow out control pipes 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.*



13.7 Removing and installing control pipe for exhaust gas pressure sensor 1 - G450-

Removing

- Remove engine cover panel ⇒ [page 27](#) .

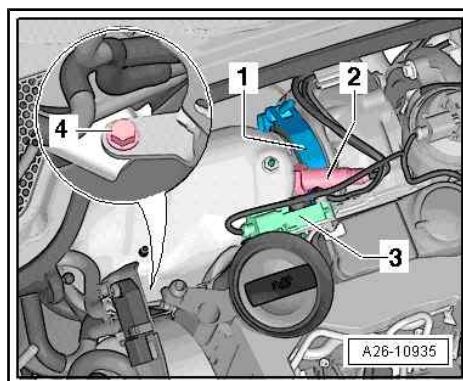


WARNING

When working on all parts of the exhaust system:

- ♦ *Observe safety precautions when working on the exhaust system*
⇒ ***"1.5 Safety precautions when working on the exhaust system", page 4*** .

- Detach heat insulation sleeve and remove exhaust gas pressure sensor 1 - G450- -3- ⇒ [page 88](#) .

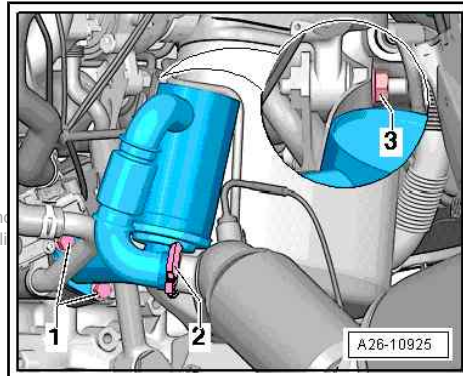


- Remove nut -3-.



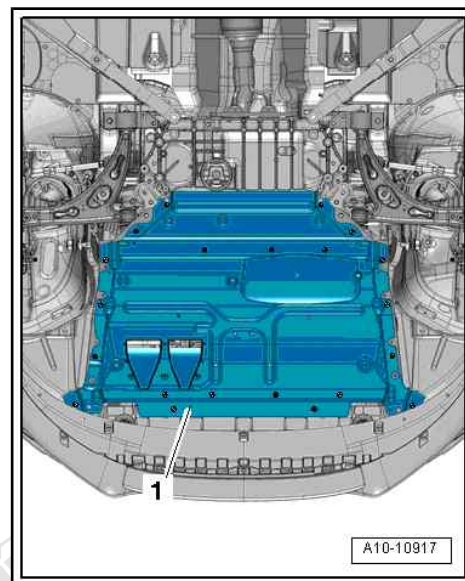
Note

Nut -3- is accessible from above.

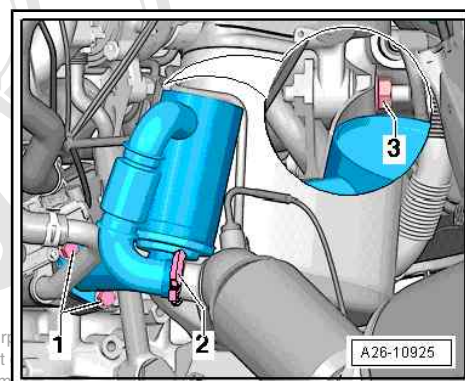


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove noise insulation -1- ➔ Rep. gr. 66 .

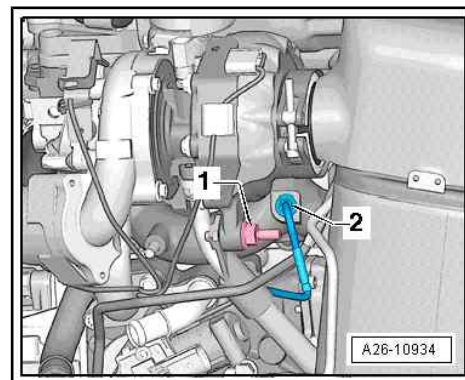


- Detach clamp -2-, unscrew bolts -1- and take out filter.

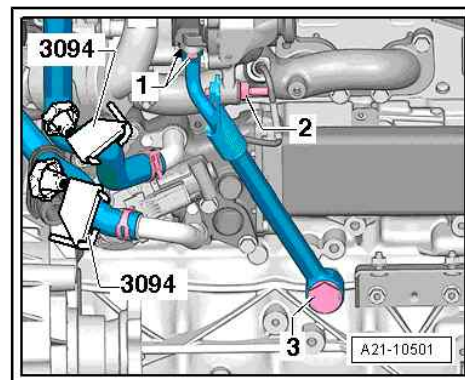


Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this document.

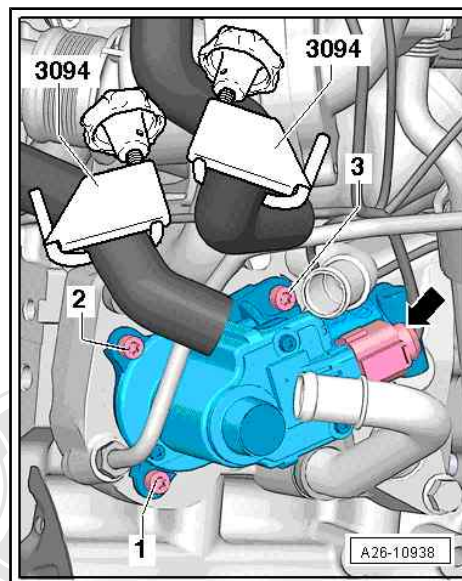
- Unscrew exhaust gas temperature sender 1 - G235- -2- from exhaust manifold using a crow foot wrench.



- Clamp off coolant hoses with hose clamps up to 25 mm - 3094- as shown in illustration.



- Disconnect coolant hoses.



- Remove nut -3- and union nut -1- and take out control pipe.

Installing

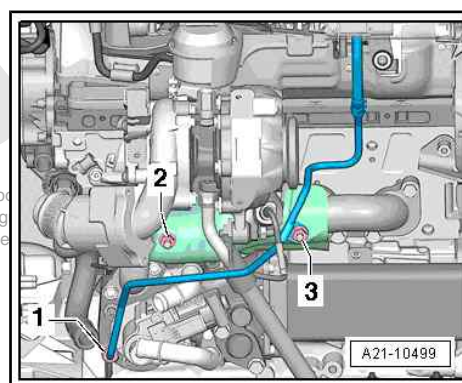
- Perform installation in reverse order of removal.
- Tightening torque: Exploded view - Lambda probe
⇒ [page 80](#)

Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not give any warranty with respect to the correctness of information in this document.



Note

- ♦ *Before installing, blow out control pipes 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.*



14 Engine control unit

Overview

⇒ [“14.1 Wiring and component check with test box V.A.G 1598/42”](#), page 95

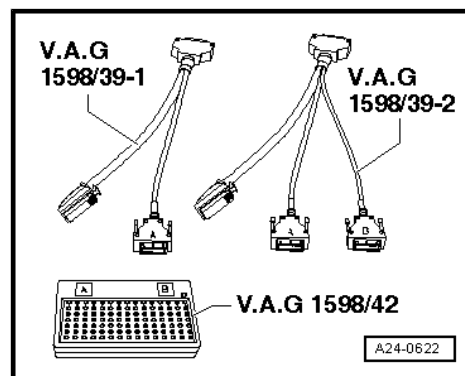
⇒ [“14.2 Renewing engine control unit J623”](#), page 97

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

Special tools and workshop equipment required

- ◆ Adapter cable - V.A.G 1598/39-1-
- ◆ Adapter cable - V.A.G 1598/39-2-
- ◆ Test box - V.A.G 1598/42-

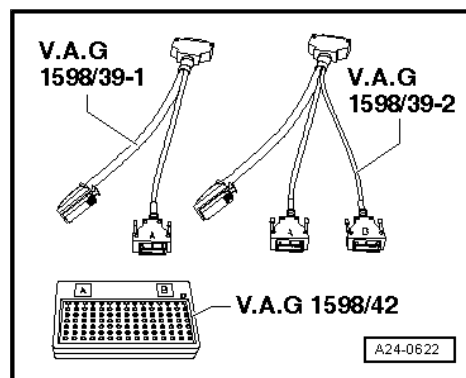
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.





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.



WARNING

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

- Remove engine control unit ➔ [page 97](#) .
- 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

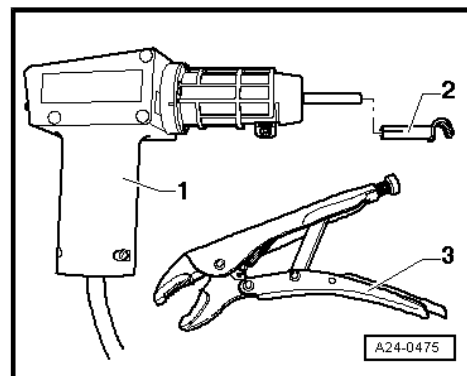
Installation is performed in the reverse sequence.

- After installation, the locking plate must be re-fitted on the control unit.
- 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.
- Interrogate event memory and erase if necessary.

14.2 Renewing 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, commercially available mole grips -3-



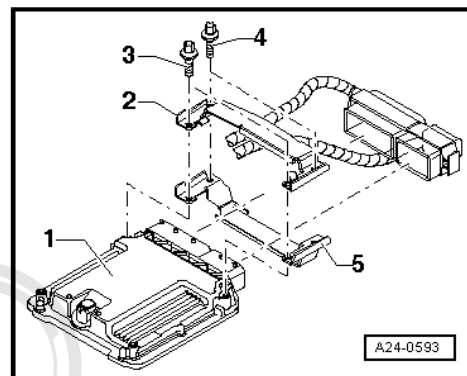
Removing

- 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.
- Store adaption values as electronic file.
- Switch off ignition and remove ignition key after storing electronic file containing adaption values.



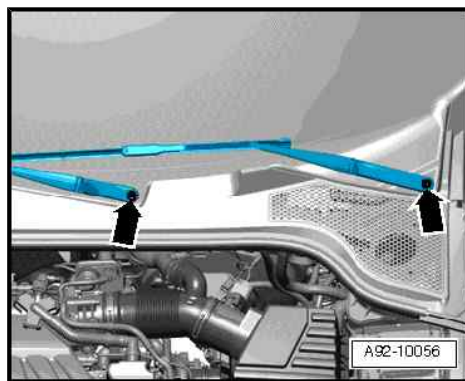
Note

- ◆ *Not every engine control unit is bolted to a protective housing. Whether a protective housing is fitted depends on the engine/gearbox combination.*
 - ◆ *If the adaption values of the injectors cannot be read out of the old (defective) engine control unit, the adaption values must be entered into the new engine control unit manually and the adaption procedure must be performed accordingly.*
 - ◆ *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).*
- Switch off ignition and remove ignition key.
 - Lever off caps on windscreen wiper arms with a screwdriver.



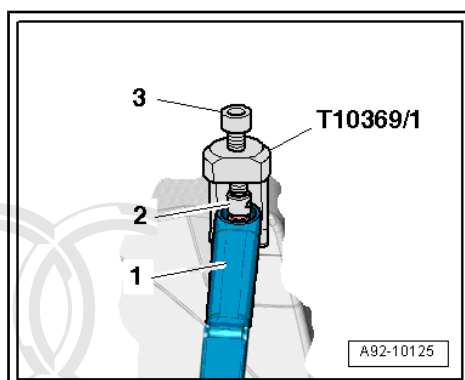
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- 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.

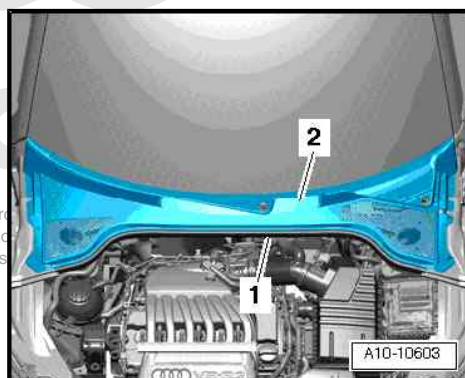


Note

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



- Pull off rubber seal -1- and remove plenum chamber cover -2-.



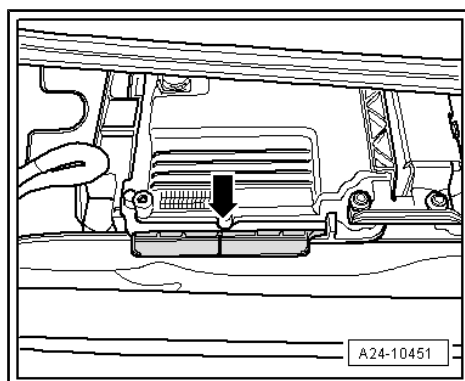
Protected by copyright. Copying for private or commercial use without permission is prohibited. Audi AG does not accept any liability for errors or omissions with respect to the correctness of information in this document.

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

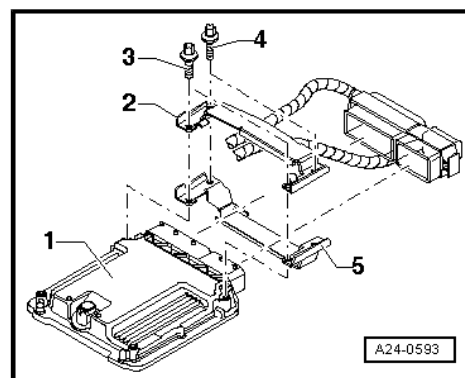


Note

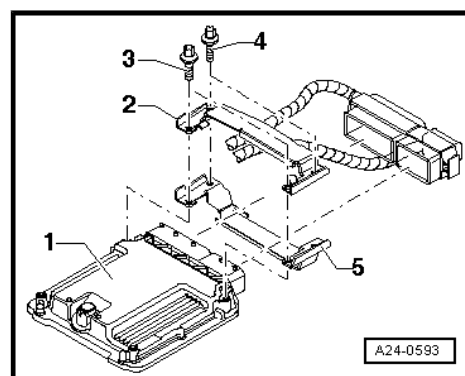
Cover painted surfaces with a cloth to prevent scratching.



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.

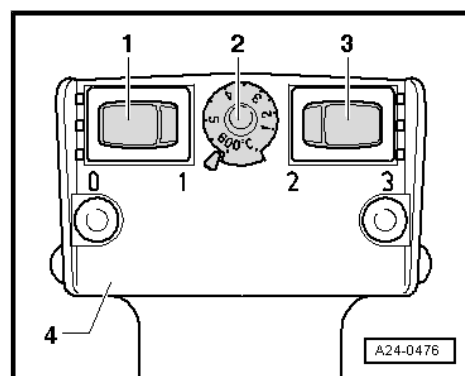


Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.



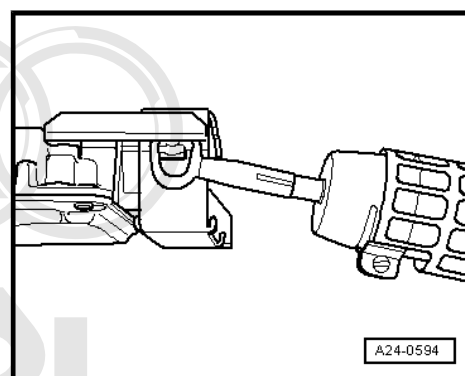
WARNING

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.



Apply heat to the threads of the shear bolts on the connector side as shown in the illustration.

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 should be removed without being heated.
- Detach protective housing from connectors.
- Release connectors on engine control unit - J623- and unplug connectors.

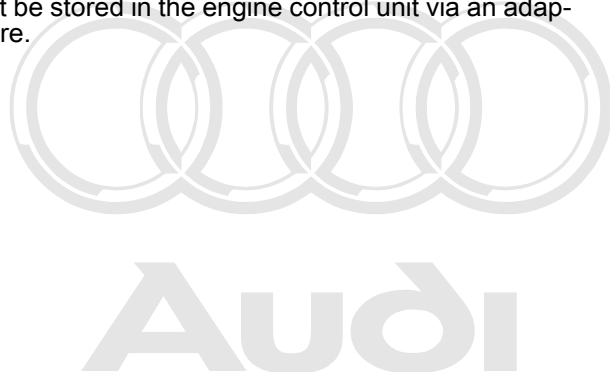
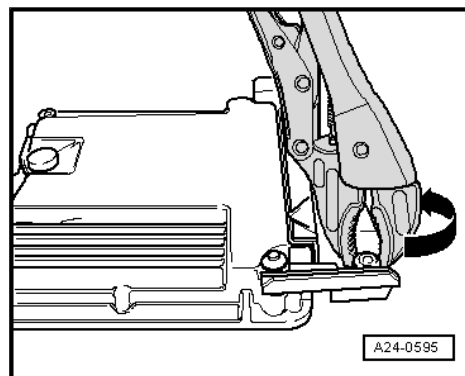
Installing

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.
- Install wiper arms ⇒ Electrical system; Rep. gr. 92 .

The procedure required after connecting the new engine control unit is described in the Guided Fault Finding or Guided Functions. Use ⇒ Vehicle diagnostic tester.

- 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 adaptation procedure.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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-

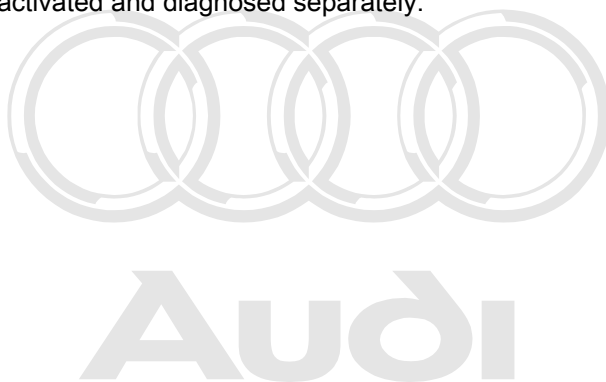
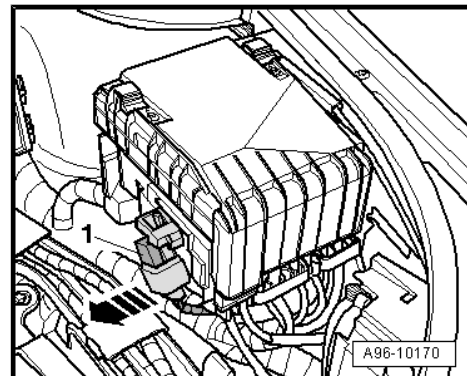
The glow plug system is activated via the automatic glow period control unit - J179- . The automatic glow period control unit - J179- is capable of self-diagnosis.

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.

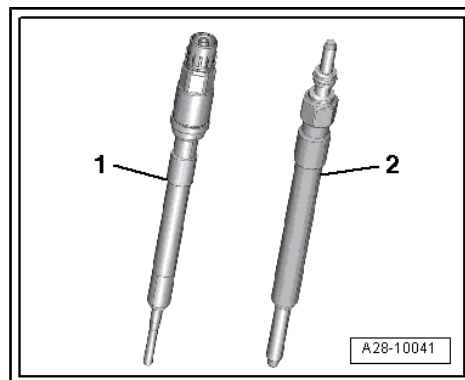
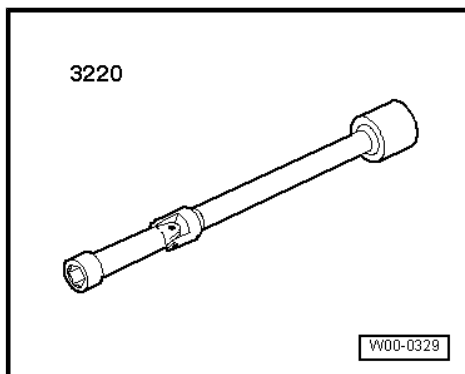


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

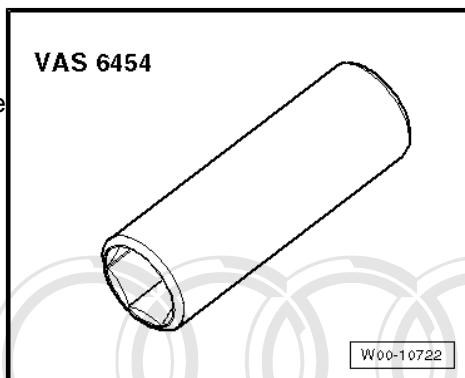
1.1 Removing and installing glow plugs

Special tools and workshop equipment required

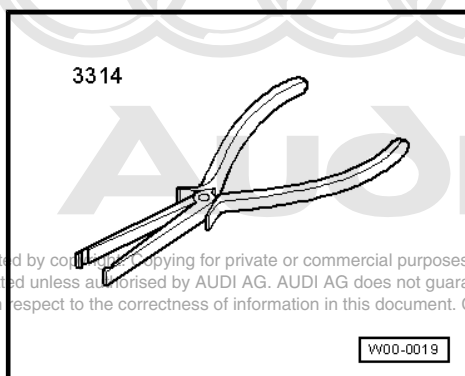
- ◆ U/J extension and socket, 10 mm - 3220- for engine codes CBAA, CBAB, CBBB



- ◆ Socket insert AF 12 for glow plugs 4-cyl. TDI CR diesel - VAS 6454- for engine code CBEA



- ◆ Pliers - 3314-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Glow plug versions

1 - Glow plug with combustion chamber pressure sender (only installed on vehicles with engine code CBEA)

2 - Glow plug without combustion chamber pressure sender



Note

- ◆ *On vehicles with engine code CBEA, a combustion chamber pressure sender is integrated in each glow plug.*
- ◆ *Designation: glow plug 1 - Q10- with internal cylinder pressure sender for cylinder 1 - G620-*
- ◆ *Designation: glow plug 2 - Q11- with internal cylinder pressure sender for cylinder 2 - G621-*
- ◆ *Designation: glow plug 3 - Q12- with internal cylinder pressure sender for cylinder 3 - G622-*
- ◆ *Designation: glow plug 4 - Q13- with internal cylinder pressure sender for cylinder 4 - G623-*



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing

- Switch off ignition.
- Remove engine cover panel ➔ [page 27](#) .

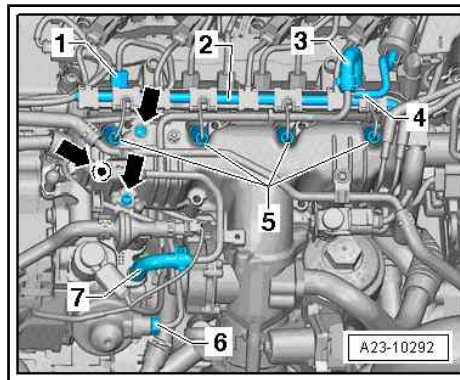


Caution

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 and move clear wiring harness -2-.

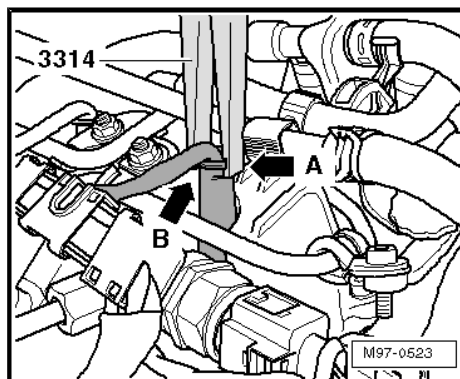


- Apply groove -arrow A- of pliers - 3314- to collar of support sleeve -arrow B- and pull glow plug connectors off glow plugs.
- Clean glow plug openings in cylinder head; make sure no dirt gets into cylinder.



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- .

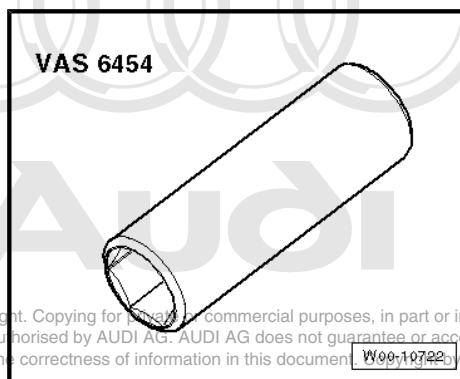
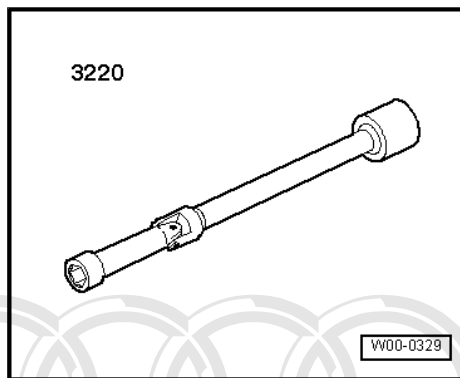


Note

For vehicles with engine code CBEA, use socket insert AF 12 for glow plugs 4-cyl. TDI CR diesel - VAS 6454- to slacken the glow plugs.

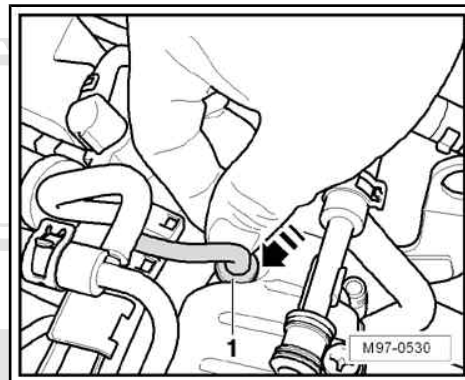
Installing

- Use a suitable torque wrench to tighten glow plugs.
- Then tighten glow plugs to specified torque.
- Tightening torque for vehicles with engine codes CBAA, CBAB, CBBB: 17 Nm
- Tightening torque for vehicles with engine code CBEA: 12 Nm



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document.

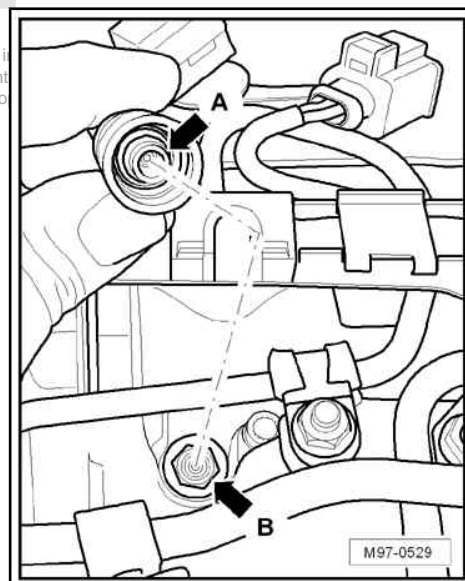
- Fit glow plug connectors back onto glow plugs.



Note

Protected by copyright. Copying for private or commercial purposes, is permitted unless authorised by AUDI AG. AUDI AG does not guarantee with respect to the correctness of information in this document. Co

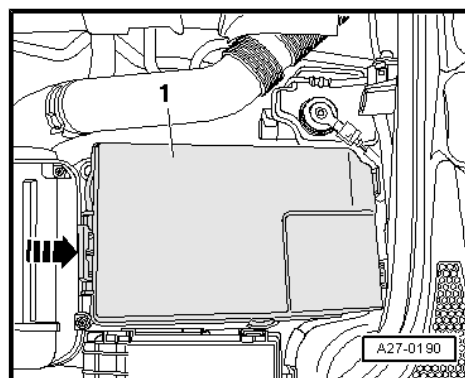
- ◆ *Illustration shows glow plug connector of vehicle with engine code CBEA.*
- ◆ *Check that glow plug connectors are securely seated.*



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

Removing

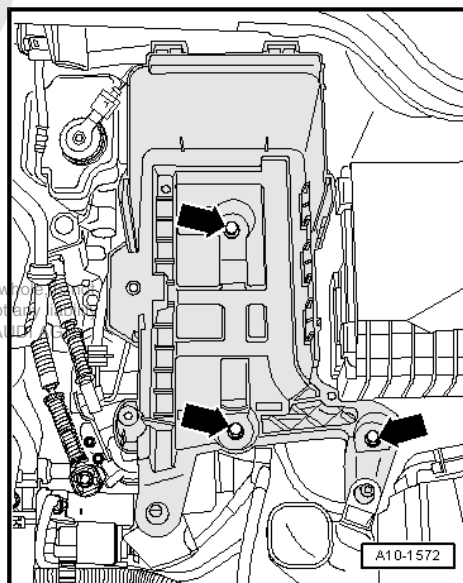
- Switch off ignition and remove ignition key.
- Remove cover -1- over battery; to do so, press release tab -arrow-.
- Remove battery ⇒ Electrical system; Rep. gr. 27 .



- Remove battery tray -arrows-.
- Detach battery tray from front of air duct.

Audi

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

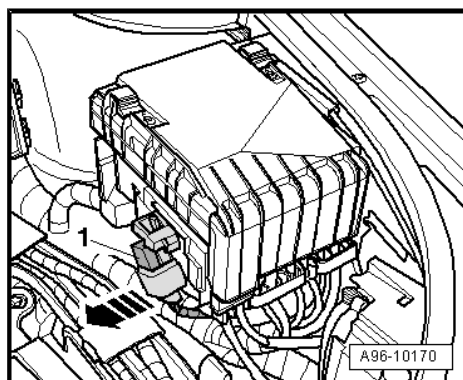


- Pull out the relay carrier from under the electronics box in engine compartment -arrow-.
- Pull automatic glow period control unit - J179- -item 1- out of relay carrier below electronics box in engine compartment.

Installing

Installation is carried out in reverse sequence.

- Install battery ⇒ Electrical system; Rep. gr. 27 .



1.3 Removing and installing Hall sender - G40-

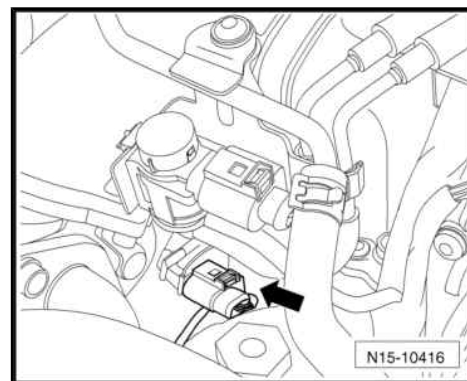
- Remove poly V-belt ⇒ Rep. gr. 13 .
- Remove vibration damper ⇒ Rep. gr. 13 .
- Remove toothed belt ⇒ Rep. gr. 15 .
- Remove exhaust gas recirculation valve - N18- ⇒ Rep. gr. 26 .



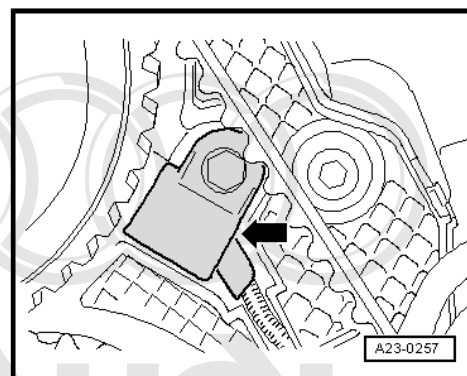
Note

On vehicles with engine code CBEA, the exhaust gas recirculation valve - N18- is called exhaust gas recirculation control motor - V338- .

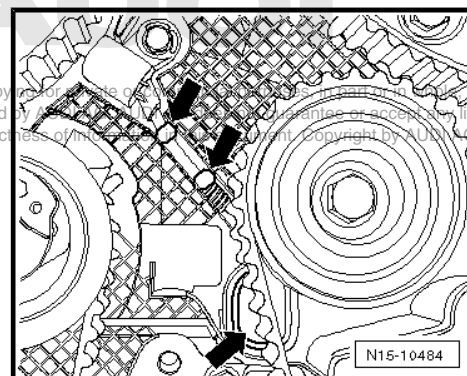
- Unplug electrical connector -arrow- from Hall sender - G40- and detach connector from retainer.



- 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

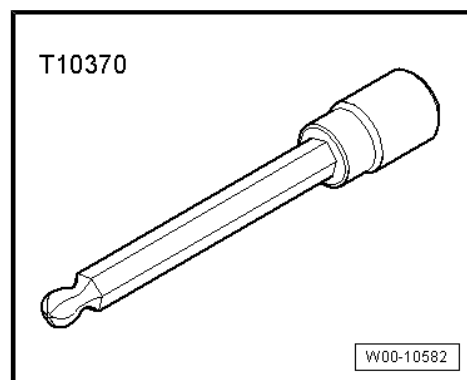
Installation is carried out in reverse sequence. Note the following:

- ◆ Seal repair opening in toothed belt cover with rubber plug; for rubber plug refer to ⇒ ETKA (Electronic parts catalogue) .
- Fit toothed belt and adjust valve timing ⇒ Rep. gr. 15 .
- Install vibration damper ⇒ Rep. gr. 13 .
- Install poly V-belt ⇒ Rep. gr. 13 .

1.4 Removing and installing engine speed sender - G28-

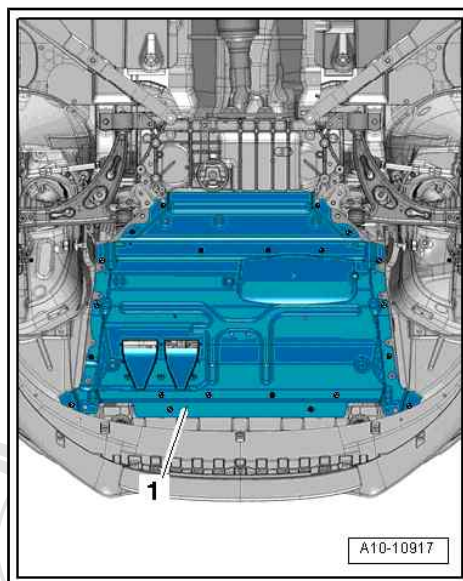
Special tools and workshop equipment required

- ◆ Socket (4 mm) - T10370-



Removing

- Remove noise insulation -1- ⇒ Rep. gr. 66 .

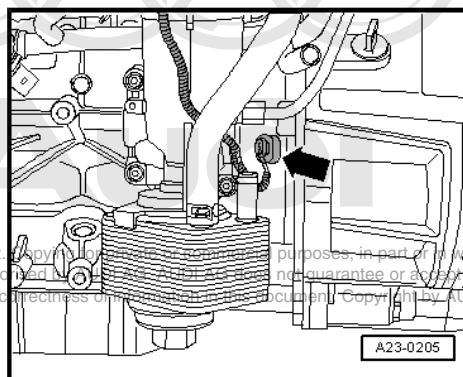


- Remove oil filter bracket ⇒ Rep. gr. 17 .
- Unplug electrical connector -arrow- at engine speed sender - G28- using assembly tool - T10118- .



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 securing bolt -2- for engine speed sender - G28- -item 1- using socket (4 mm) - T10370- .

Installing

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

- Install oil filter bracket ⇒ Rep. gr. 17 .
- Tightening torque
⇒ ["2 Overview of fitting locations - injection system", page 6](#)

