

Workshop Manual Audi A3 2004 ➤

Direct injection and ignition system (4-cyl. 1.4 ltr. 4-valve TFSI engine)

Engine ID	CAX C	CMS A							
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Edition 03.2015



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List of Workshop Manual Repair Groups

Repair Group

24 - Mixture preparation - injection

28 - Ignition system



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

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24 – Mixture preparation - injection

1 Safety precautions and rules for cleanliness

(ARL004201; Edition 03.2015)

⇒ [“1.1 General notes on self-diagnosis”, page 1](#)

⇒ [“1.2 Rules for cleanliness and instructions for working on fuel system”, page 1](#)

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

⇒ [“1.4 Safety precautions when working on the cooling system”, page 2](#)

⇒ [“1.5 Safety precautions when working on vehicles with start/stop system”, page 2](#)

⇒ [“1.6 Safety precautions when using testers and measuring instruments during a road test”, page 3](#)

⇒ [“1.7 Safety precautions when working on the ignition system”, page 3](#)

⇒ [“1.8 Checking vacuum system”, page 3](#)

1.1 General notes on self-diagnosis

- ◆ The engine control unit has a self-diagnosis capability. Before carrying out repairs and fault finding, the event memory must be interrogated. The vacuum hoses and connections must also be checked (unmetered air).
- ◆ Fuel hoses in engine compartment must only be secured with spring-type clips. O-type clips or screw-type clips must not be used.
- ◆ A voltage of at least 11.5 V is required for proper operation of the electrical components.
- ◆ Do not use sealants containing silicone. Particles of silicone drawn into the engine will not be burnt in the engine and will damage the Lambda probe.
- ◆ The vehicles are fitted with a crash/fuel shut-off system. This system is designed to reduce the risk of a vehicle fire after a crash by deactivating the fuel pump via the fuel pump relay.
- ◆ At the same time, this system also improves the engine's starting performance. When the driver's door is opened, the fuel pump is activated for two seconds in order to build up pressure in the fuel system.

1.2 Rules for cleanliness and instructions for working on fuel system

Even small amounts of dirt can cause faults in the injection system. When working on the fuel supply/injection system, pay careful attention to the following basic rules:

- ◆ Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- ◆ Plug open lines and connections with suitable protective caps immediately.



- ◆ Place parts that have been removed on a clean surface and cover them over. Do not use fluffy cloths.
- ◆ Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have been previously unpacked and stored away loose (e.g. in toolboxes, etc.).
- ◆ When the system is open: Do not work with compressed air. Do not move the vehicle unless absolutely necessary.

1.3 Safety precautions when working on the fuel system

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 clean cloth around connection and open connection carefully).

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.

1.4 Safety precautions when working on the cooling system

Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

- Wear protective gloves.
- Wear safety goggles.
- Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).

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1.5 Safety precautions when working on vehicles with start/stop system

Risk of injury - engine may start unexpectedly

On vehicles with the start/stop system activated, the engine may start unexpectedly. If the start/stop system is activated, this is indicated by a message on the dash panel insert.

- Deactivate start/stop system by switching off ignition.

1.6 Safety precautions when using testers and measuring instruments 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.

1.7 Safety precautions when working on the ignition system

Risk of injury caused by electric shock

When the engine is running, there are high voltage levels in the ignition system. There is a risk of electric shock when touching the ignition system!

- Never touch or disconnect ignition wiring when the engine is running or being turned at cranking speed.

Risk of damage to components

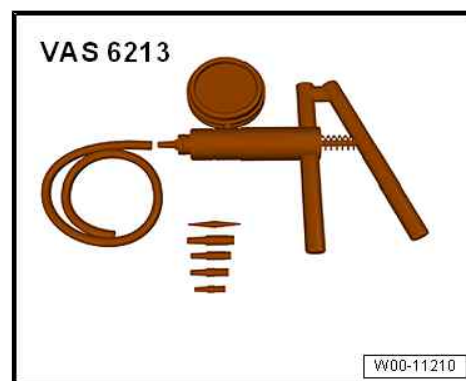
Washing the engine or connecting/disconnecting electrical wiring may result in components being damaged if the engine is running.

- Switch off ignition before connecting/disconnecting electrical wiring.
- Switch off ignition before cleaning engine.

1.8 Checking vacuum system

Special tools and workshop equipment required

- ♦ Hand vacuum pump - VAS 6213-



Procedure

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



- ◆ Cracks
- ◆ Traces of animal bites
- ◆ Kinked or crushed lines
- ◆ Lines porous or leaking
- Check vacuum line to solenoid valve and from solenoid valve to corresponding component.
- If an entry is stored in the event memory, check the vacuum lines leading to the corresponding component and also check the other 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.



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2 Technical data

Engine data		1.4 ltr. / 92 kW turbo FSI engine
Idling speed is not adjustable; controlled by the idling speed stabilisation		640 ... 800 rpm
Maximum rpm governed by deactivation of fuel injectors		6500 rpm
Fuel pressure	Initial fuel pressure up to high-pressure pump (generated by electric fuel pump in fuel tank)	3 to 7 bar
	Pressure in high-pressure fuel circuit (generated by mechanical single-plunger high-pressure pump) at a coolant temperature of approx. 85°C	approx. 35 bar at idling speed approx. 140 bar in certain parts of operating range

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3 Overview of fitting locations

Engine compartment (right-side)

1 - Fuel pressure regulating valve - N276-

- ☐ Fitting location
⇒ [page 12](#)

2 - High-pressure pump with fuel pressure regulating valve - N276-

- ☐ Removing and installing
⇒ [page 34](#)

3 - Activated charcoal filter solenoid valve 1 - N80-

- ☐ Fitting location
⇒ [page 10](#)

4 - Intake air temperature sender - G42- and intake manifold pressure sender - G71-

- ☐ Fitting location
⇒ [page 11](#)

5 - Engine control unit - J623-

- ☐ Fitting location
⇒ [Fig. "Engine control unit - J623-"](#), [page 9](#)
- ☐ Removing and installing
⇒ ["11.2 Renewing engine control unit J623"](#), [page 56](#)

6 - Knock sensor 1 - G61-

- ☐ Fitting location
⇒ [page 11](#)
- ☐ Removing and installing
⇒ ["2.4 Removing and installing knock sensor 1 G61"](#), [page 63](#)
- ☐ 20 Nm

7 - Engine speed sender - G28-

- ☐ Fitting location ⇒ [page 11](#)
- ☐ Removing and installing ⇒ [page 63](#)

8 - Lambda probe - G39- and Lambda probe heater - Z19-

- ☐ Fitting location ⇒ [page 14](#)
- ☐ Removing and installing ⇒ [page 46](#)

9 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

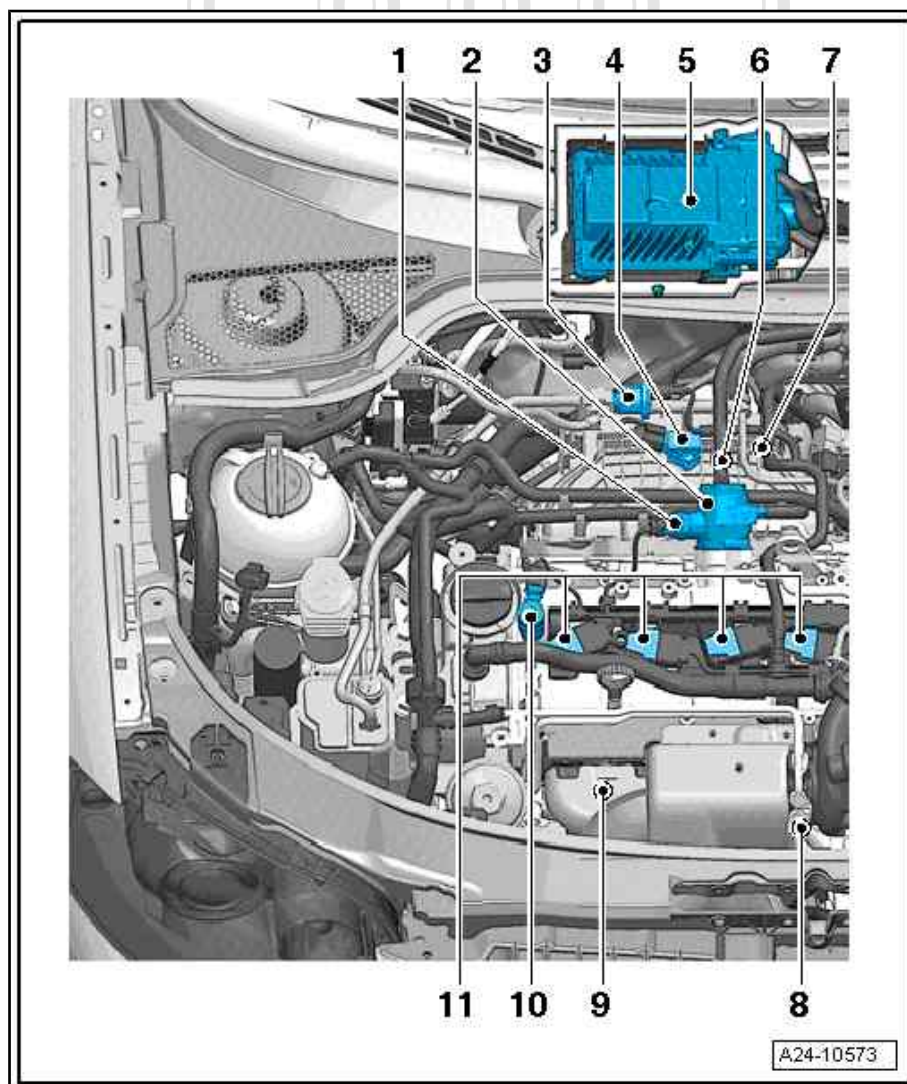
- ☐ Fitting location ⇒ [page 14](#)
- ☐ Removing and installing ⇒ [page 47](#)

10 - Camshaft control valve 1 - N205-

- ☐ Fitting location ⇒ [page 11](#)
- ☐ Removing and installing, refer to engine - mechanics ⇒ Rep. gr. 15

11 - Ignition coils with output stages

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



- ☐ Ignition coil 1 with output stage - N70-
- ☐ Ignition coil 2 with output stage - N127-
- ☐ Ignition coil 3 with output stage - N291-
- ☐ Ignition coil 4 with output stage - N292-
- ☐ Puller - T40039- is required for removing ignition coils from cylinder head.

Engine compartment (left-side)

Components A to G are not shown in the overview.

1 - Hall sender - G40- (cam-shaft position sensor)

- ☐ Fitting location: beneath engine cover panel
⇒ [page 12](#)
- ☐ Removing and installing
⇒ [page 63](#)

2 - Throttle valve module - J338- , throttle valve drive for electric throttle - G186-

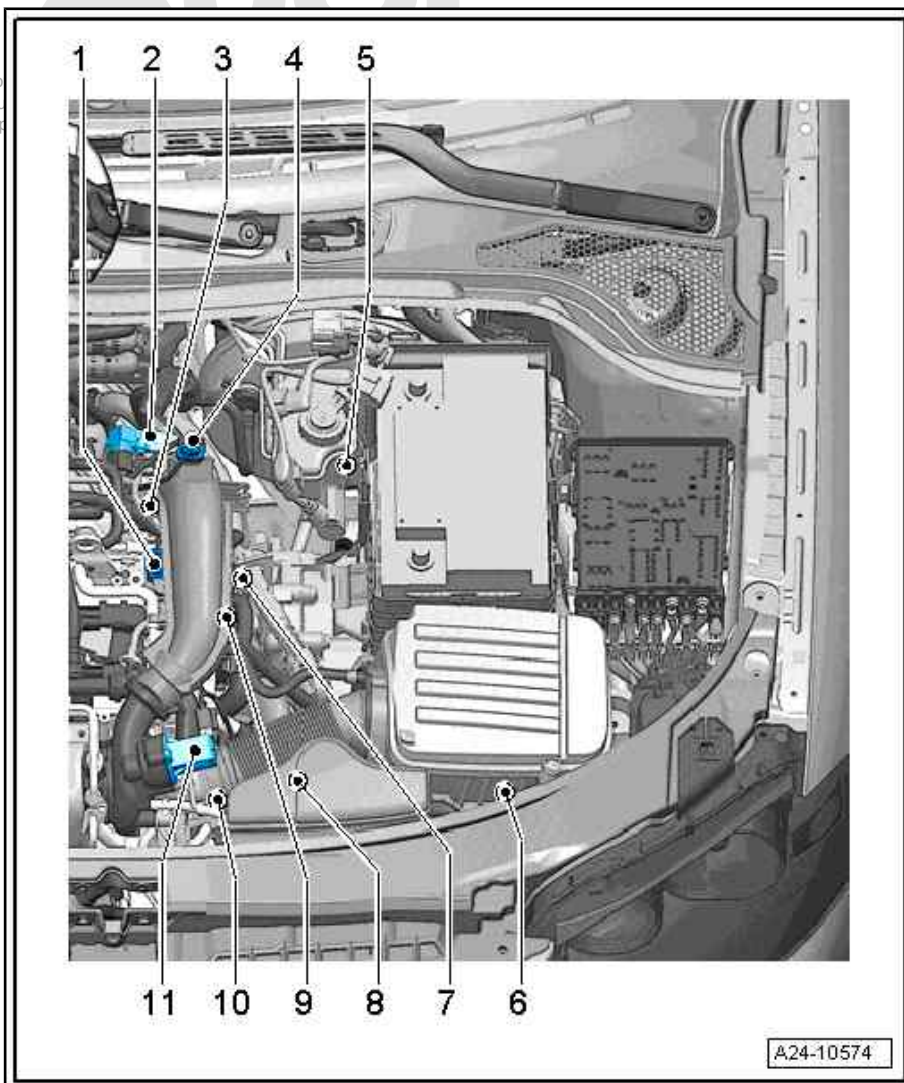
- ☐ Throttle valve drive angle sender 1 for electric throttle - G187- and throttle valve drive angle sender 2 for electric throttle - G188-
- ☐ After throttle valve module - J338- or engine control unit has been renewed, throttle valve module must be re-adapted to engine control unit - J623-

3 - Fuel pressure sender - G247-

- ☐ Fitting location
⇒ [page 10](#)
- ☐ Removing and installing
⇒ [page 49](#)

4 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

- ☐ Fitting location
⇒ [page 13](#)
- ☐ Removing and instal-



ling, refer to engine -
mechanics ⇒ Rep. gr. 21

5 - Clutch position sender - G476-

- ☐ Only fitted on vehicles with manual gearbox
- ☐ Fitting location ⇒ [page 9](#)
- ☐ Removing and installing, see Power transmission, clutch ⇒ Rep. gr. 30

6 - Radiator outlet coolant temperature sender - G83-

- ☐ Fitting location ⇒ [page 12](#)
- ☐ Removing and installing, refer to engine - mechanics ⇒ Rep. gr. 19

7 - Coolant temperature sender - G62-

- ☐ Fitting location ⇒ [page 12](#)

8 - Electrical connectors for Lambda probes

- ☐ Fitting locations ⇒ [page 14](#)

9 - Oil pressure switch - F1-

- ☐ Removing, installing and checking; engine - mechanics ⇒ Rep. gr. 17

10 - Charge pressure control solenoid valve - N75-

- ☐ Located directly on turbocharger ⇒ [page 14](#)

11 - Turbocharger air recirculation valve - N249-

- ☐ Located directly on turbocharger ⇒ [page 14](#)

A - Injectors

- ☐ Removing and installing ⇒ [page 38](#)
- ☐ Injector, cylinder 1 - N30-
- ☐ Injector, cylinder 2 - N31-
- ☐ Injector, cylinder 3 - N32-
- ☐ Injector, cylinder 4 - N33-

B - Brake light switch - F- and brake pedal switch - F63-

- ☐ Fitting location ⇒ [page 10](#)
- ☐ For removing and installing refer to Brake system ⇒ Rep. gr. 45

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

- ☐ Fitting location ⇒ [page 9](#)
- ☐ On accelerator pedal (both senders are accommodated in one housing)
- ☐ If accelerator pedal module or engine control unit is renewed, kick-down function must be adapted on vehicles with automatic gearbox
- ☐ Removing and installing; Fuel supply system, petrol engines ⇒ Rep. gr. 20

D - Fuel pump control unit - J538-

- ☐ Fitting location ⇒ [page 10](#)

E - Radiator fan control unit - J293-

- ☐ Fitting location ⇒ [page 13](#)
- ☐ Removing and installing, refer to engine - mechanics ⇒ Rep. gr. 19

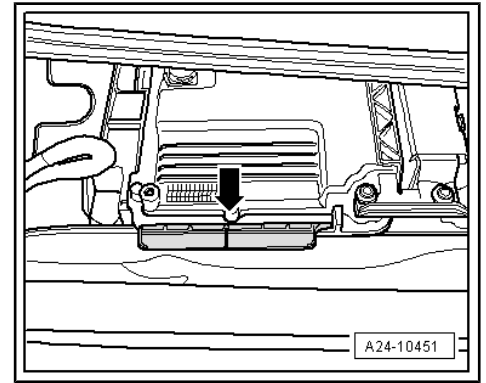
F - Relay and fuse holder in electronics box

- ☐ Relay and fuse assignment see ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

G - Coolant circulation pump - V50-

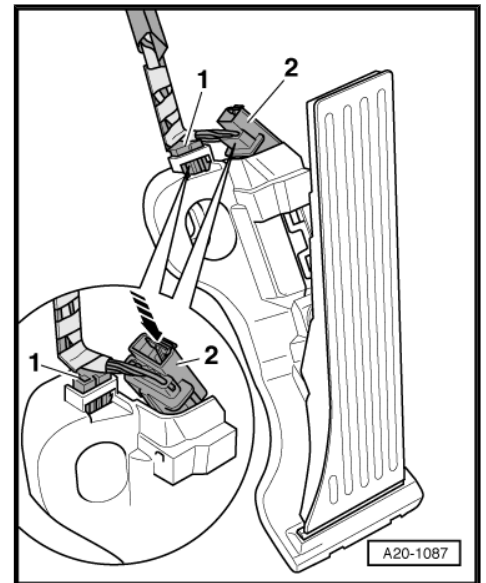
- ☐ Fitting location ⇒ [page 13](#)

Engine control unit - J623-



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

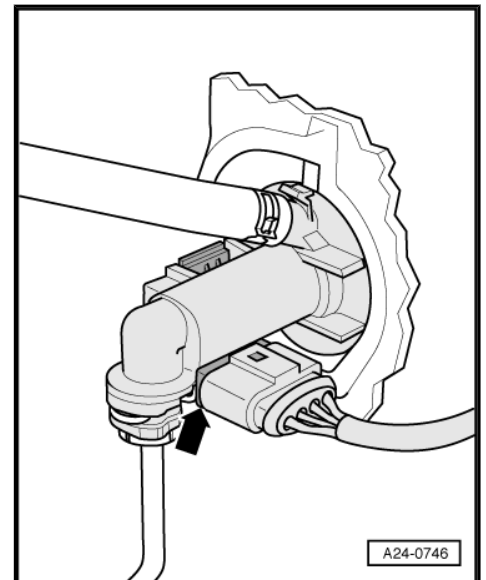
2 - Electrical connector for accelerator pedal module



Clutch position sender - G476-

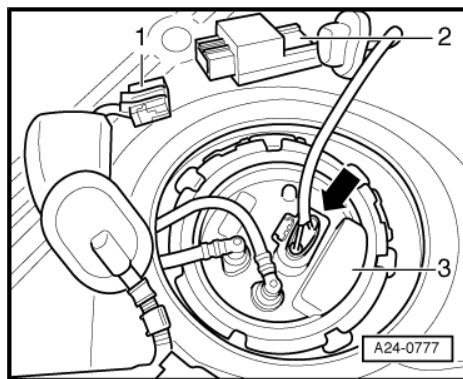


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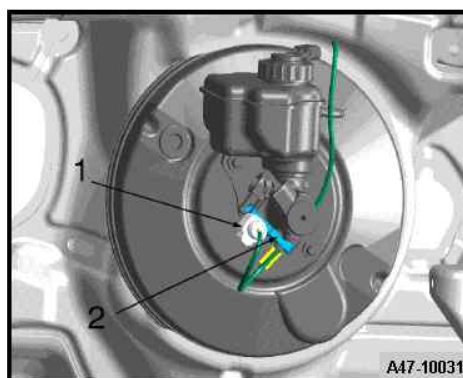


Fuel pump control unit - J538-

- 1 - Connector for fuel pump control unit - J538-
- 2 - Fuel pump control unit - J538-
- 3 - Fuel system pressurisation pump - G6-

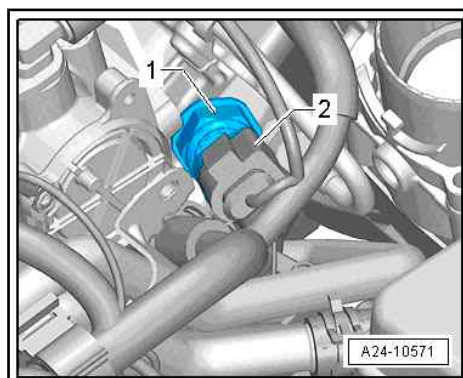


Brake light switch - F- and brake pedal switch - F63-

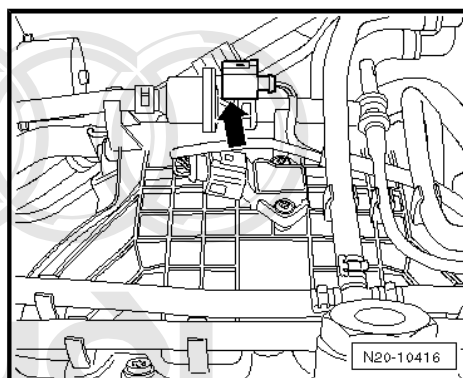


Fuel pressure sender - G247- -1-

- Removing and installing ⇒ [page 49](#)

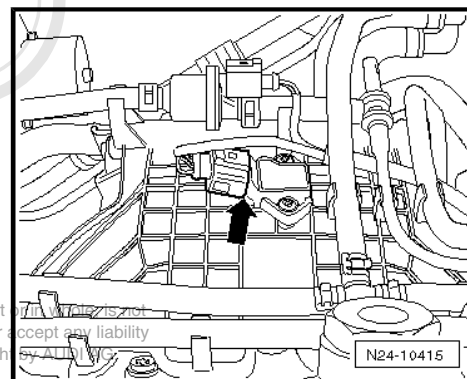


Activated charcoal filter solenoid valve 1 - N80-



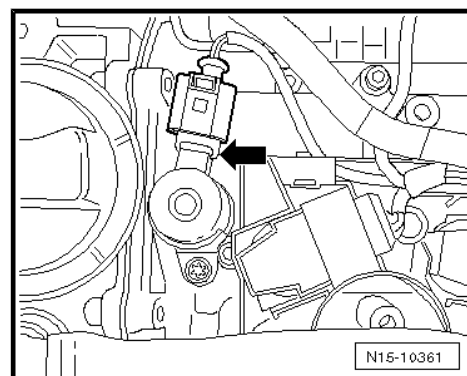
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Intake air temperature sender - G42- with intake manifold pressure sender - G71- -arrow-

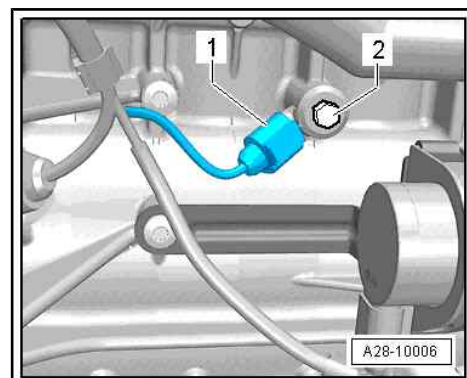


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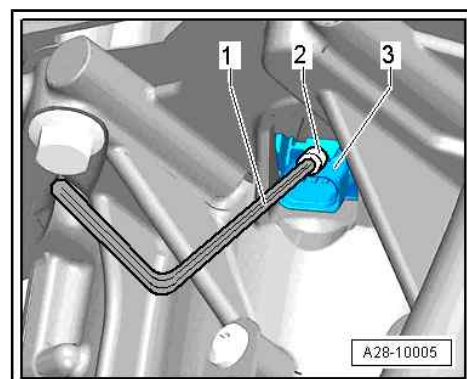
Camshaft control valve 1 - N205- -arrow-



Knock sensor 1 - G61-

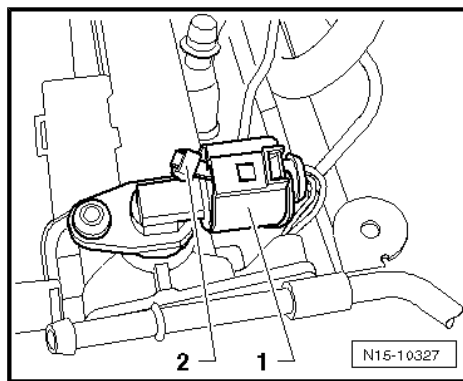


Engine speed sender - G28- -3-

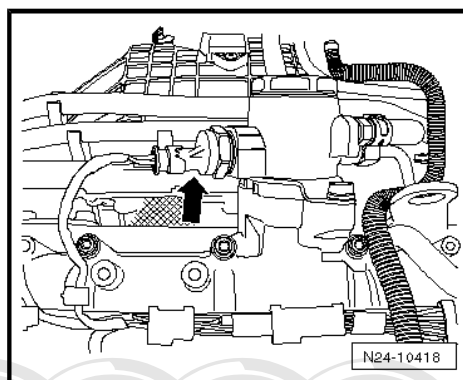




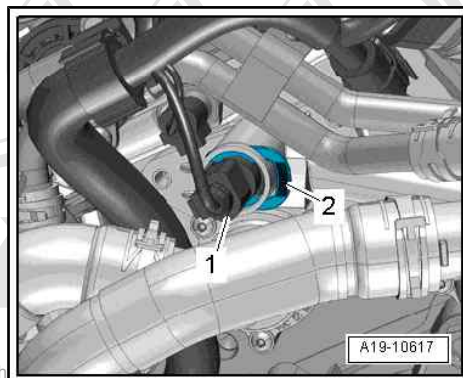
Hall sender - G40-



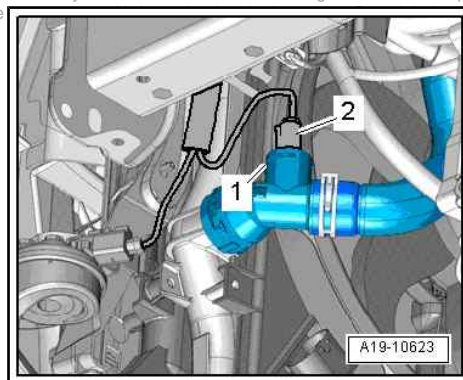
Fuel pressure regulating valve - N276- -arrow-



Coolant temperature sender - G62- -1-

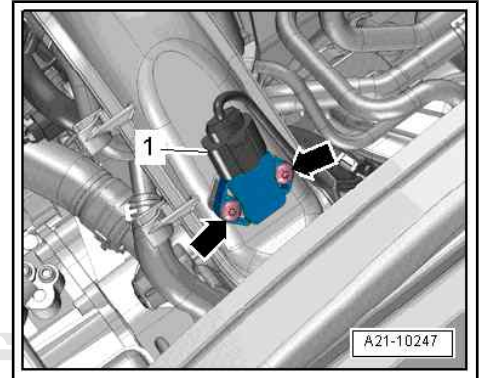


Radiator outlet coolant temperature sender - G83- -2-



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Charge pressure sender - G31- / intake air temperature sender 2
- G299- -1-

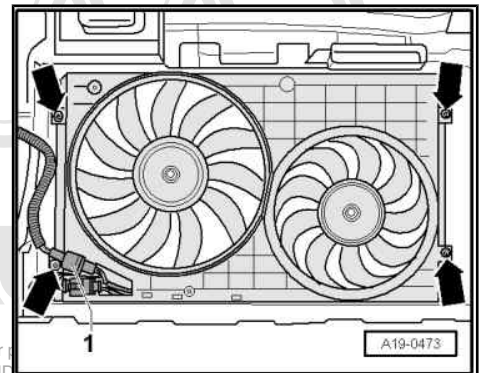


Radiator fan control unit - J293-

1 - Connector for radiator fan control unit - J293-

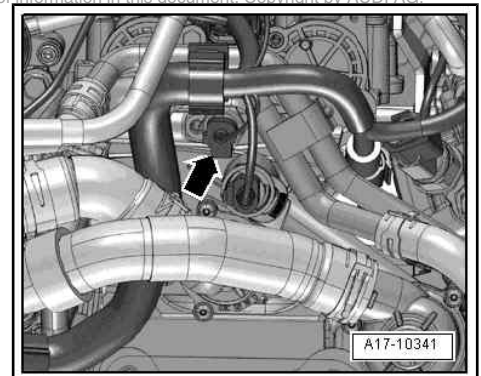


The radiator fan control unit - J293- is integrated into the radiator fan - V7- .

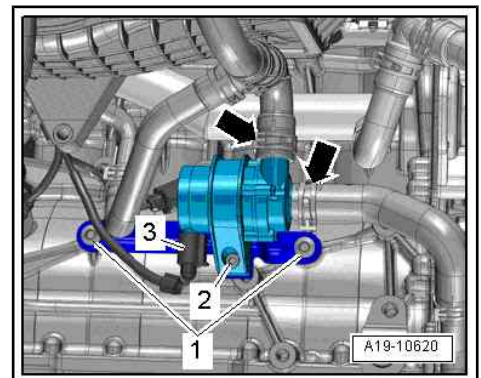


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Oil pressure switch - F1- -arrow-



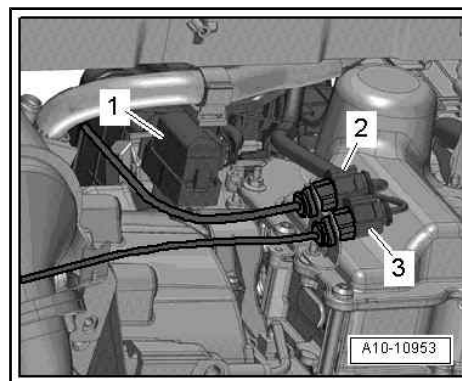
Coolant circulation pump - V50-



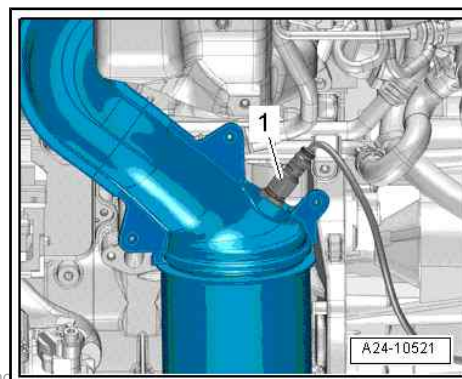
Electrical connector for Lambda probes

2 - Lambda probe - G39- and Lambda probe heater - Z19-

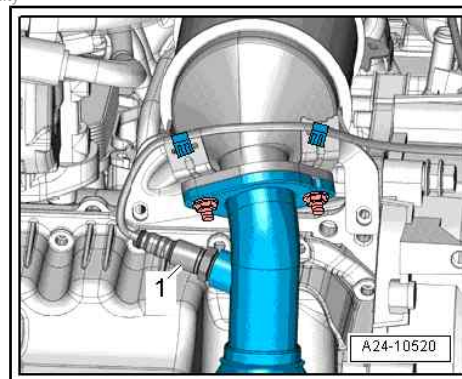
3 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-



Lambda probe - G39- and Lambda probe heater - Z19- -1-



Lambda probe after catalytic converter - G130- and Lambda probe 1 heater after catalytic converter - Z29- -1-

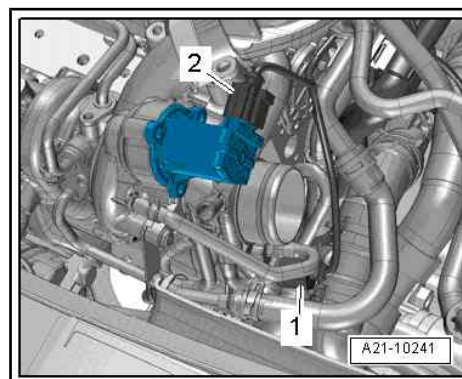


Components on turbocharger

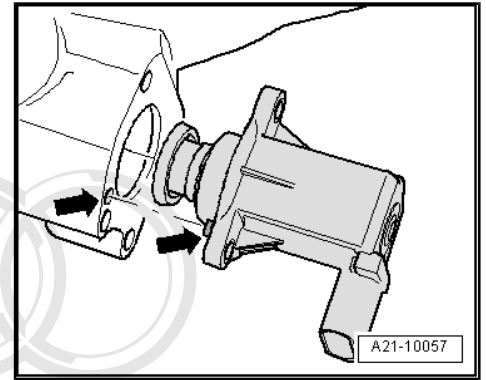
1 - Removing and installing turbocharger ⇒ Rep. gr. 21

1 - Tighten charge pressure control solenoid valve - N75- to 10 Nm

2 - Tighten turbocharger air recirculation valve - N249- to 11 Nm (note installation position, refer to next illustration)



Pay attention to installation position of turbocharger air recirculation valve - N249-



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4 Air cleaner

⇒ "4.1 Exploded view - air cleaner", page 16

⇒ "4.2 Removing and installing engine cover panel", page 17

⇒ "4.3 Removing and installing air filter element", page 17

⇒ "4.4 Removing and installing air cleaner housing", page 18

4.1 Exploded view - air cleaner

1 - Air cleaner (top section)

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

2 - Bolt

- ❑ Tighten to 1.5 Nm using torque screwdriver - VAS 6494-

3 - Bolt

- ❑ Tighten to 1.5 Nm using torque screwdriver - VAS 6494-

4 - Bracket

5 - Filter element

- ❑ Always use genuine part for air filter element
- ❑ Removing and installing ⇒ page 17
- ❑ Observe change intervals ⇒ Maintenance ; Booklet 808

6 - Bonded rubber mounting

- ❑ 8 Nm

7 - Sealing strips

- ❑ Renew if damaged

8 - Air cleaner (bottom section)

- ❑ Clean any salt residue, leaves and dirt out of air cleaner (bottom section)
- ❑ Clean water drain

9 - Rubber mounting

10 - Intake connecting pipe

11 - Bolt

- ❑ Tighten to 3 Nm using torque screwdriver - VAS 6494-

12 - Intake air duct

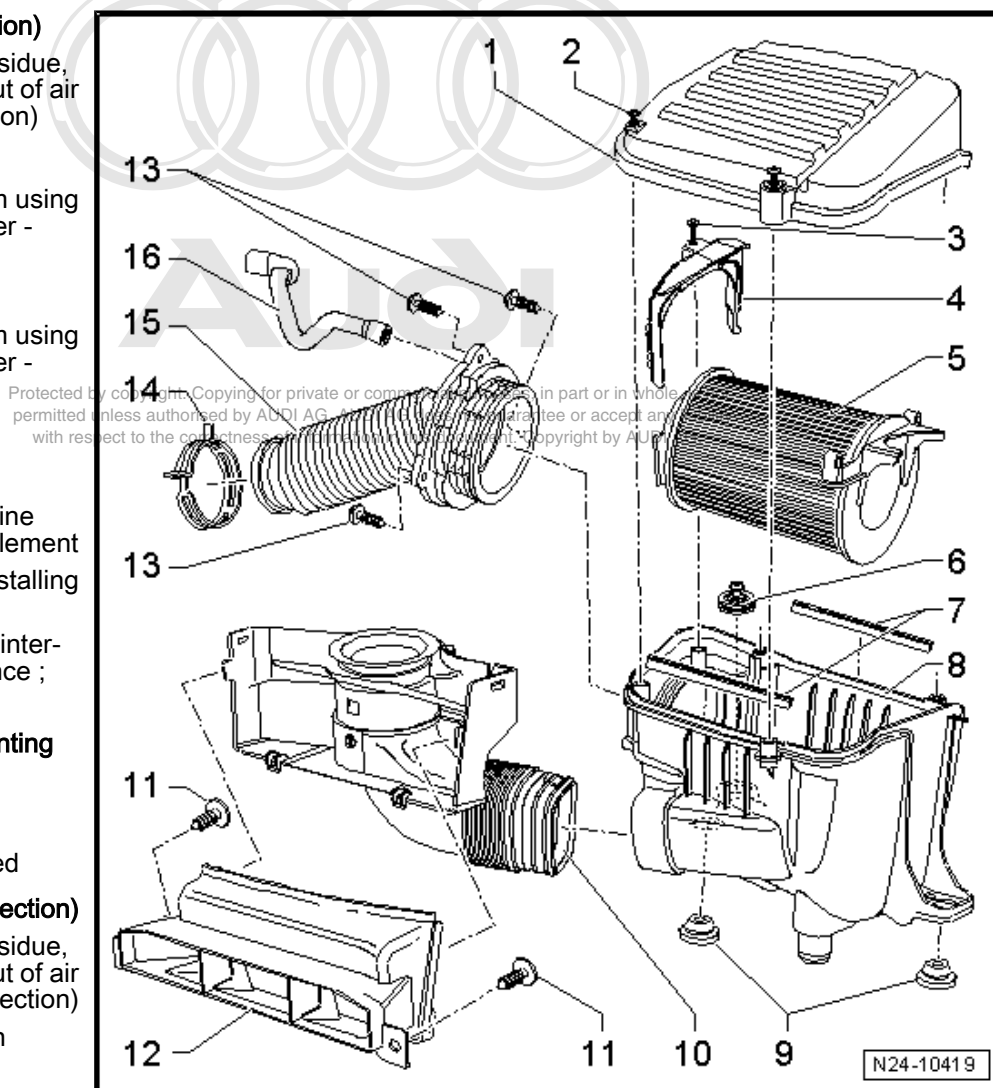
- ❑ Clean any leaves and dirt out of intake air duct

13 - Bolt

- ❑ Tighten to 1.5 Nm using torque screwdriver - VAS 6494-

14 - Spring-type clip

- ❑ Remove and install using hose clip pliers - VAS 6340-



15 - Air hose

- ☐ Check air intake hose for dirt and leaves

16 - Vacuum hose

- ☐ Renew if damaged

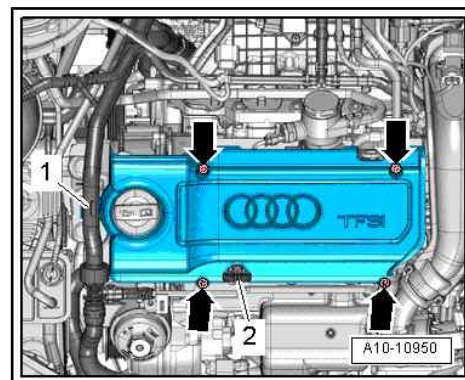
4.2 Removing and installing engine cover panel

Removing

- Disengage coolant hose -1- at engine cover panel.
- Pull oil dipstick -2- out of guide tube.
- Unscrew bolts -arrows- and remove engine cover panel.

Installing

Install in reverse order.



4.3 Removing and installing air filter element

Removing

- Unscrew four securing bolts and detach air cleaner (top section).



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- Remove bolt -1- from bracket -2- for air filter element -3-.
- Pull out bracket -2-.
- Remove air filter element -3-.

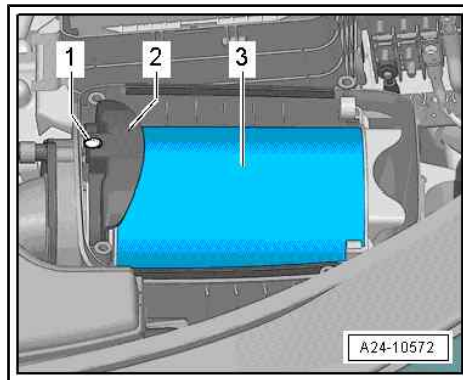
Installing



Note

- ◆ *Always use genuine part for air filter element.*
 - ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly. Do not use any lubricants containing silicone when assembling.*
 - ◆ *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 with a clean cloth when blowing out the air cleaner housing with compressed air.*
 - ◆ *Please observe requirements for disposal.*
- Check for salt residue, dirt and leaves in air intake hose (engine intake side).
 - Check for dirt in air intake hose from air duct.
 - Clean water drain and air cleaner (bottom section).
 - When installing the air filter element, check that it is properly centred in the retainer in the air cleaner (bottom section).
 - Fit the top section of the air cleaner carefully on the bottom section, without using force. Also ensure that both sealing strips are fitted (see item 7, Air cleaner - exploded view ⇒ ["4.1 Exploded view - air cleaner", page 16](#)).

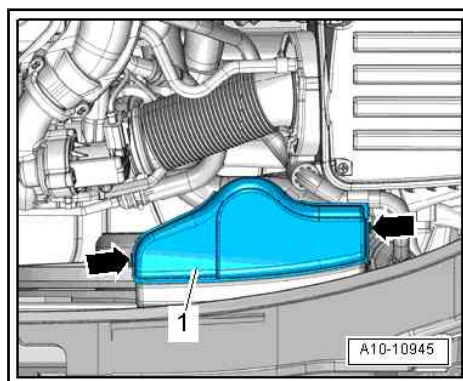
The remaining installation steps are carried out in the reverse sequence.



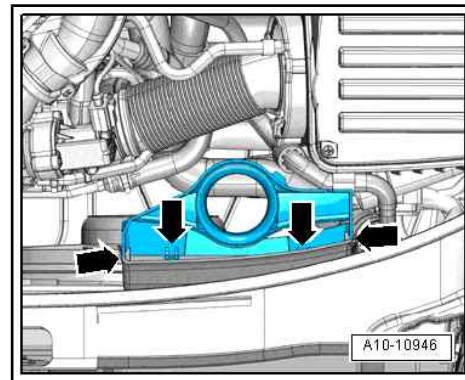
4.4 Removing and installing air cleaner housing

Removing

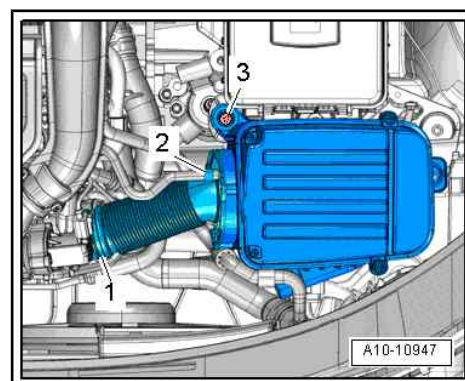
- Press retainers -arrows- and detach cover -1- from intake connecting pipe.



- Unclip air duct by releasing clips -arrows-.



- Pull off spring clip -1- together with intake hose from turbo-charger.
- Detach vacuum hose -2- at air cleaner housing.
- Remove securing bolt -3- and lift air cleaner housing off mounting pin.



Installing



Note

- ◆ *Always use genuine part for air filter element.*
- ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly. Do not use any lubricants containing silicone when assembling.*
- ◆ *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 with a clean cloth when blowing out the air cleaner housing with compressed air.*
- ◆ *Please observe requirements for disposal.*
- Check for salt residue, dirt and leaves in air intake hose (engine intake side).
- Check for dirt in air intake hose from air duct.
- Clean water drain and air cleaner (bottom section).
- When installing the air filter element, check that it is properly centred in the retainer in the air cleaner (bottom section).
- Fit the top section of the air cleaner carefully on the bottom section, without using force. Also ensure that both sealing strips are fitted (see item 7, Air cleaner, exploded view).

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

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5 Intake manifold

⇒ ["5.1 Intake manifold \(part 1\) - exploded view", page 20](#)

⇒ ["5.2 Intake manifold \(part 2\) - exploded view", page 21](#)

⇒ ["5.3 Intake manifold \(part 3\) - exploded view", page 22](#)

⇒ ["5.4 Intake manifold \(bottom section\) - exploded view", page 24](#)

⇒ ["5.5 Removing and installing intake manifold", page 24](#)

⇒ ["5.6 Removing and installing intake manifold \(bottom section\)", page 26](#)

5.1 Intake manifold (part 1) - exploded view

1 - Connecting hose

2 - Fuel pipe

☐ High pressure

Tightening torques for union nuts

At high-pressure pump: 18 Nm

At intake manifold (bottom section): 20 Nm

3 - Bolt

☐ 8 Nm

4 - Retaining clamp

5 - Fuel hose

☐ Initial fuel pressure

☐ To high-pressure pump

6 - Spring-type clip

☐ Remove and install using hose clip pliers - VAS 6340-

☐ Renew

7 - Connecting piece

☐ For fuel supply

8 - Non-return valve

☐ For crankcase breather

9 - Bolt

☐ 8 Nm

10 - O-ring

☐ Renew

11 - Connecting piece

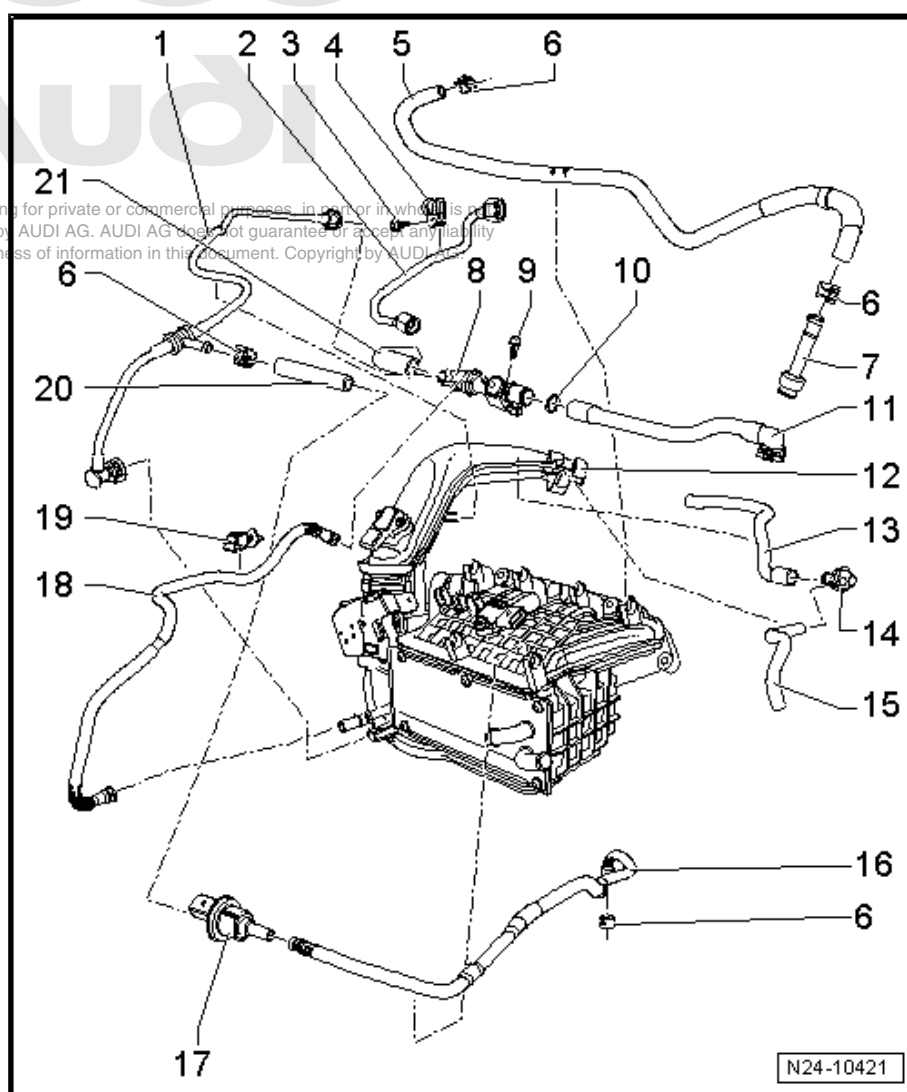
☐ To valve timing housing

12 - Pressure pipe

☐ From turbocharger

13 - Connecting hose

☐ To camshaft housing



14 - Non-return valve**15 - Connecting hose**

- ☐ To air cleaner housing

16 - Connecting hose

- ☐ To activated charcoal filter

17 - Activated charcoal filter solenoid valve 1 - N80-**18 - Connecting hose****19 - Retaining clamp****20 - Connecting hose****21 - Connecting hose**

- ☐ to turbocharger

5.2 Intake manifold (part 2) - exploded view**1 - Retaining clip****2 - Bolt**

- ☐ 7 Nm

3 - Pressure pipe**4 - O-ring**

- ☐ Renew

5 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-**6 - Bolt**

- ☐ 5 Nm

7 - Bolt

- ☐ 7 Nm

8 - Adapter**9 - Intake manifold**

- ☐ Removing and installing
⇒ [page 24](#)

10 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-**11 - Bolt**

- ☐ 5 Nm

12 - Bolt

- ☐ 20 Nm

13 - Throttle valve module - J338-

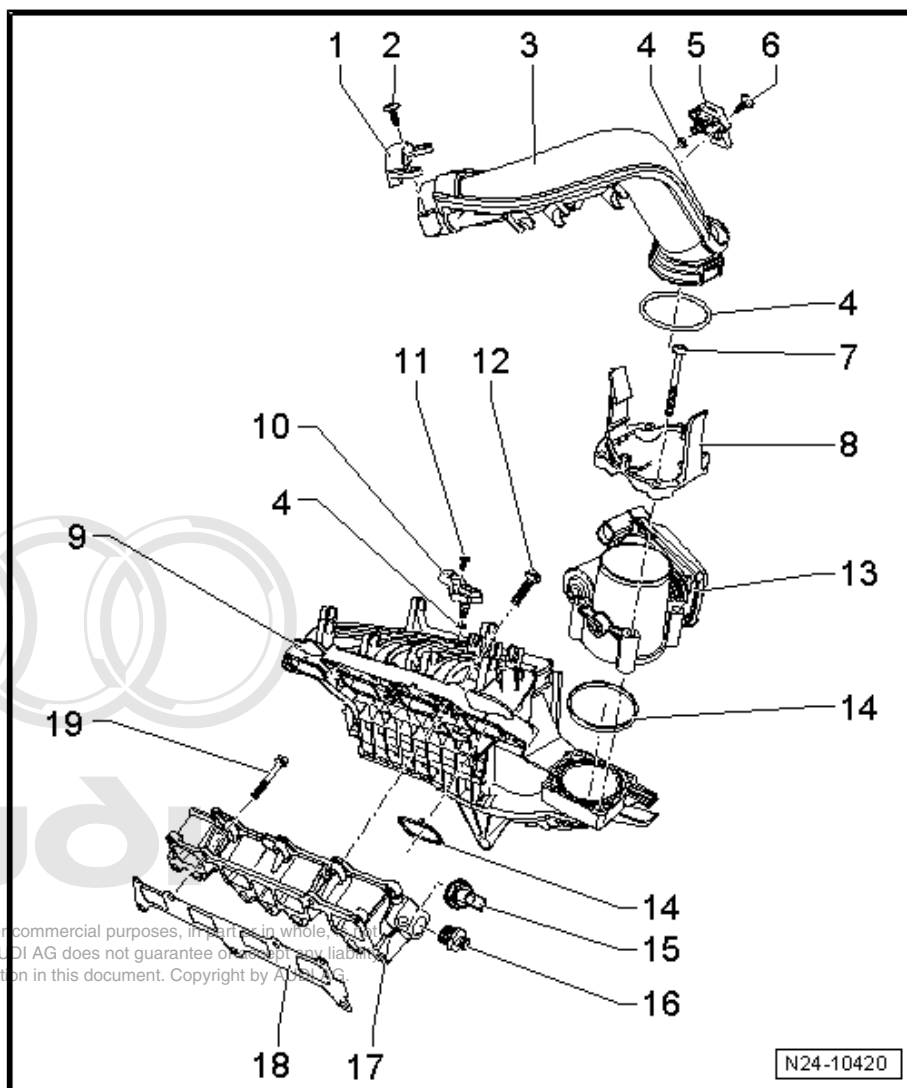
- ☐ Removing and installing
⇒ [page 29](#)

- ☐ Cleaning ⇒ [page 30](#)

- ☐ After throttle valve module - J338- or engine control unit has been renewed, throttle valve must be re-adapted to engine control unit - J623-

14 - Seal

- ☐ Renew



15 - Fuel pressure sender - G247-

- ☐ 22 Nm
- ☐ Removing and installing ⇒ [page 49](#)

16 - Fuel line connection

- ☐ Renew
- ☐ 80 Nm

17 - Intake manifold (bottom section)

- ☐ Removing and installing intake manifold ⇒ [page 24](#)

18 - Gasket

- ☐ Renew

19 - Bolt

- ☐ 20 Nm

5.3 Intake manifold (part 3) - exploded view

1 - Intake manifold

- ☐ Removing and installing
⇒ [page 24](#)

2 - Seal

- ☐ Renew

3 - Throttle valve module - J338-

- ☐ Removing and installing
⇒ [page 29](#)
- ☐ Cleaning ⇒ [page 30](#)
- ☐ After throttle valve module - J338- or engine control unit has been renewed, throttle valve must be re-adapted to engine control unit - J623-

4 - Adapter

5 - Bolt

- ☐ 7 Nm

6 - O-ring

- ☐ Renew

7 - Air pipe

- ☐ Use lubricant when installing

8 - Retaining clip

9 - Bolt

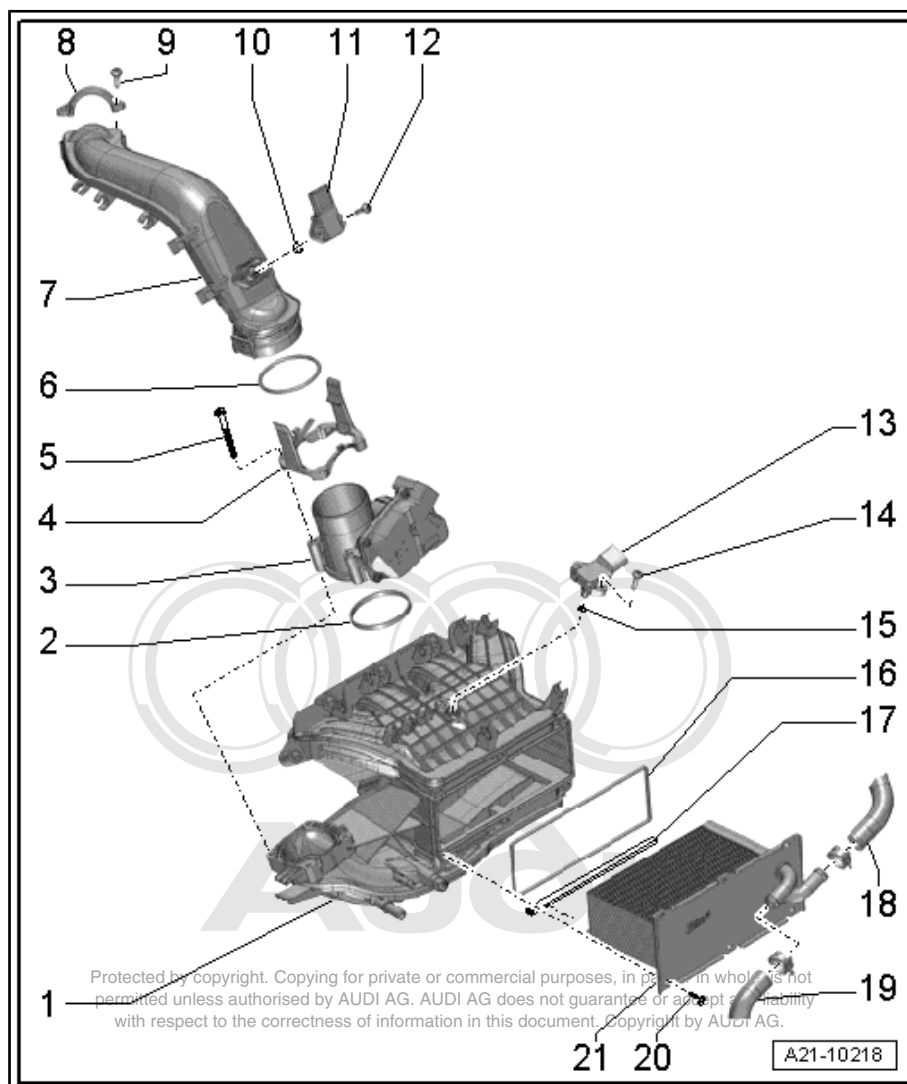
- ☐ 7 Nm

10 - O-ring

- ☐ Renew

11 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

- ☐ Removing and installing ⇒ Rep. gr. 21



12 - Bolt

- ☐ 5 Nm

13 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

14 - Bolt

- ☐ 5 Nm

15 - O-ring

- ☐ Renew

16 - Gasket

- ☐ Renew

17 - Sealing strip

- ☐ When installing charge air cooler, make sure sealing strip is properly seated.
- ☐ If sealing strip is not correctly fitted, vibrations will cause the charge air cooler to fracture and leak.
- ☐ Do not use any lubricants

18 - Coolant return hose

19 - Coolant supply hose

20 - Bolt

- ☐ Screw in hand-tight initially
- ☐ 7 Nm

21 - Charge air cooler

- ☐ Removing and installing ⇒ Rep. gr. 21



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5.4 Intake manifold (bottom section) - exploded view

1 - O-ring

- ☐ Renew
- ☐ Before installing, lubricate lightly with clean engine oil

2 - Spring element

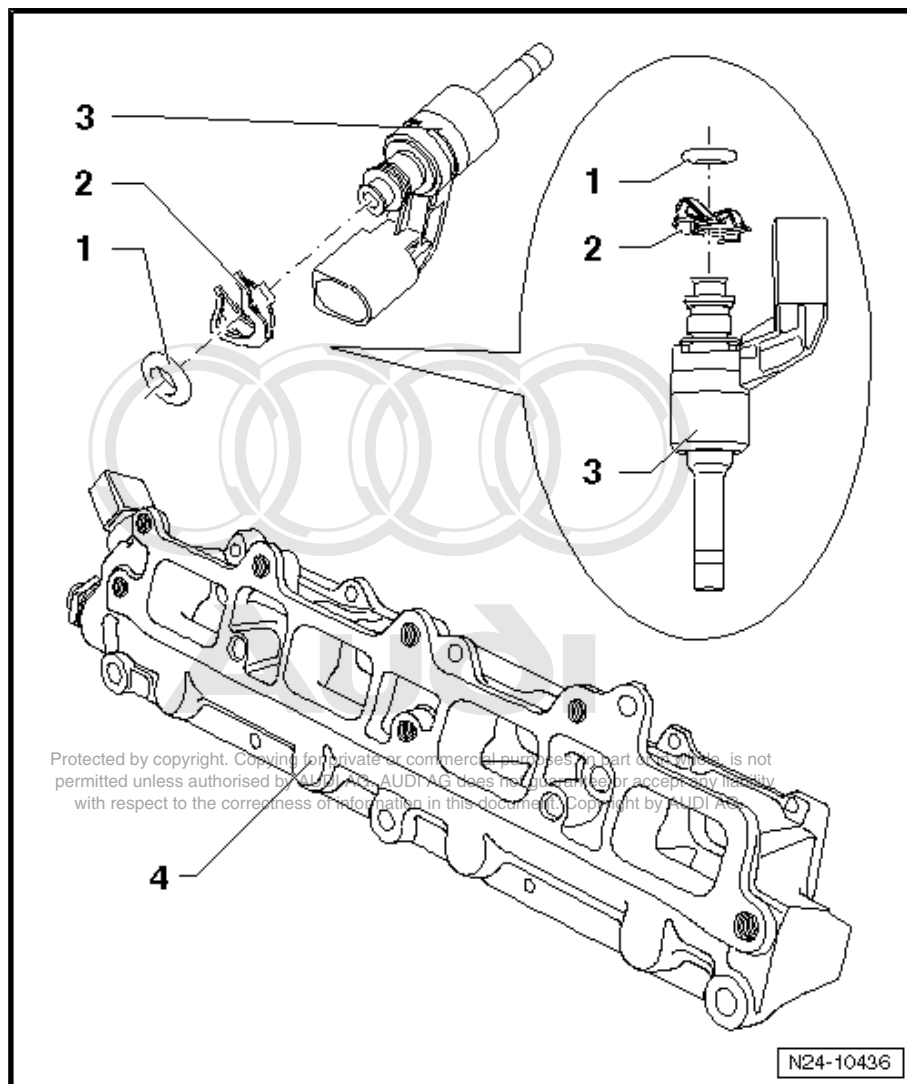
- ☐ Always renew if intake manifold (bottom section) is removed
- ☐ Check for correct fit on injector

3 - Injector, cylinder 4 - N33-

- ☐ Injector, cylinder 1 - N30-
- ☐ Injector, cylinder 2 - N31-
- ☐ Injector, cylinder 3 - N32-
- ☐ Always renew teflon ring seal and support ring after removing injector
⇒ [page 40](#)
- ☐ Removing and installing injectors ⇒ [page 38](#)

4 - Intake manifold (bottom section)

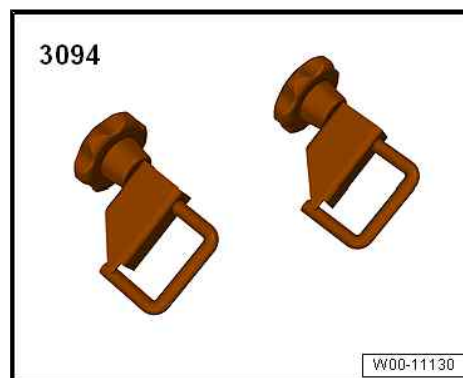
- ☐ Intake manifold must first be removed before intake manifold (bottom section) can be removed



5.5 Removing and installing intake manifold

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Drip tray for workshop hoist - VAS 6208-

VAS 6208



W00-11209

- ◆ Torque wrench (4...20 Nm) - V.A.G 1410-

V.A.G 1410

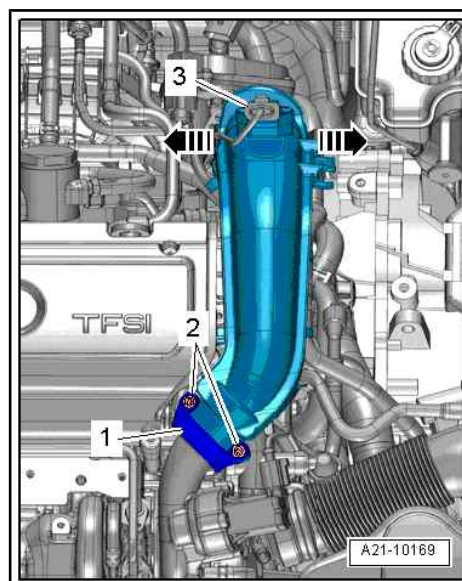


W00-11174

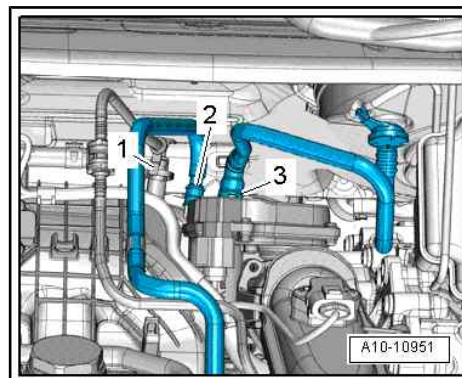
- ◆ Hose clip pliers - V.A.G 1921-

Removing

- Unscrew bolts -2- and detach retaining bracket -1-.
- Unplug electrical connector -3- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .
- Release retainers -arrow- and detach pressure pipe first from throttle valve module - J338- and then from turbocharger.
- Move hoses on pressure pipe clear.



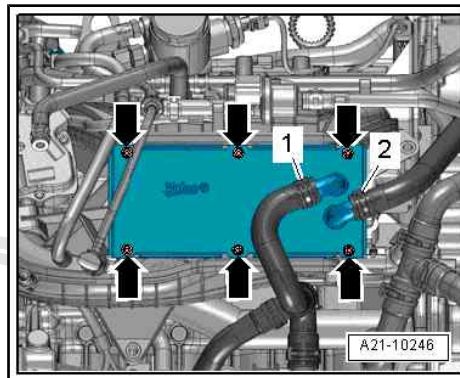
- Press release tabs and disconnect vacuum line -1 and 3-.
- Detach vacuum line -2-.
- Place drip tray for workshop hoist - VAS 6208- beneath engine.



- Use hose clamps up to 25 mm - 3094- to clamp off coolant hoses -1 and 2- and detach coolant hoses from charge air cooler.


Note

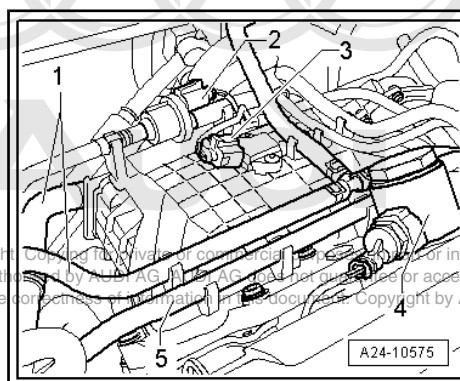
Arrows show securing bolts for charge air cooler. Disregard.



- Unplug electrical connector at intake manifold pressure sender - G71- -3-.
- Move activated charcoal filter solenoid valve 1 - N80- -2- clear to one side (do not disconnect hoses and electrical connector).
- Move clear hoses -1 and 5- at intake manifold.
- Unscrew bolts securing manifold.
- Carefully remove intake manifold upwards.

Installing

- Install in reverse order.



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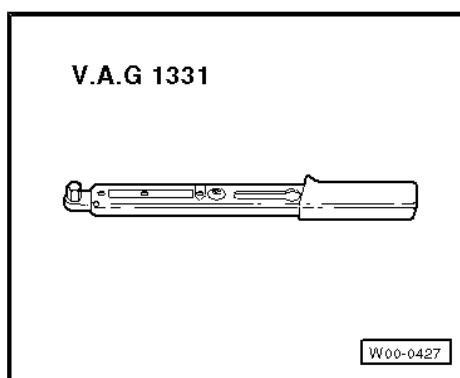

Note

After installing intake manifold check coolant level, refer to engine - mechanics ⇒ Rep. gr. 19.

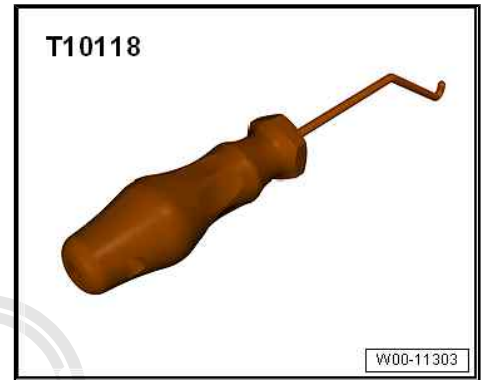
5.6 Removing and installing intake manifold (bottom section)

Special tools and workshop equipment required

- ◆ Torque wrench (5...0.50 Nm) - V.A.G 1331-



- ◆ Assembly tool - T10118-



- ◆ Hose clip pliers - V.A.G 1921-



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Removing

- Remove intake manifold ⇒ [page 24](#) .

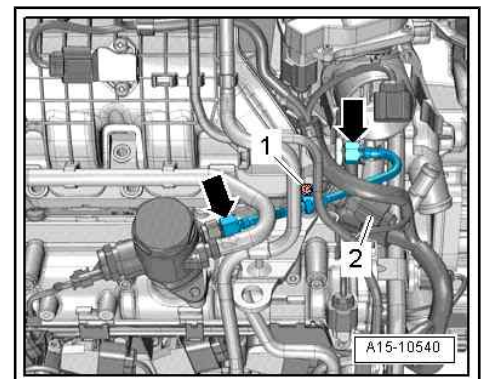


WARNING

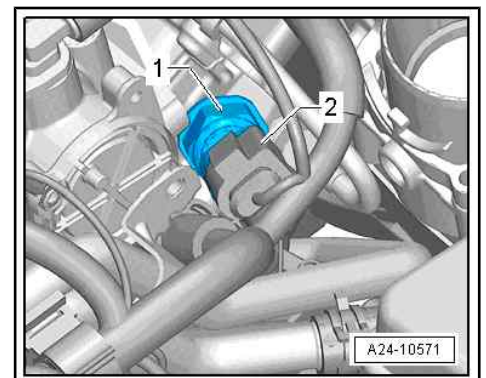
The fuel system is pressurised.

Risk of injury as fuel may spray out.

- *Wear safety goggles.*
- *Wear protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



- Remove union nuts -arrows- and bolt -1- and detach high-pressure pipe.
- Unplug electrical connector -2- at fuel pressure sender - G247-1-.





- Pull wiring duct for injectors out of both clips -1-.
- Unscrew securing bolts -arrows- from intake manifold (bottom section).
- Detach intake manifold (bottom section) carefully from injectors.

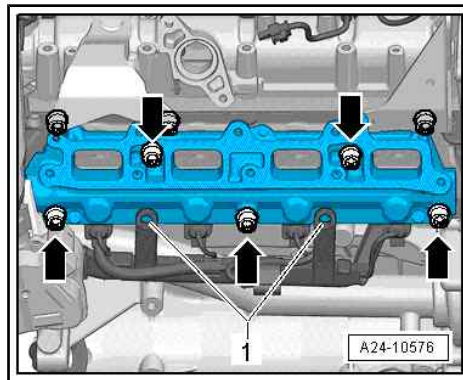
Installing



Note

Make sure that injectors are installed correctly.

- The remaining installation steps are carried out in the reverse sequence.
- Tightening torque: intake manifold (part 2) - exploded view
⇒ [page 21](#)
- Tightening torque: intake manifold (bottom section) - exploded view
⇒ [page 24](#)



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6 Throttle valve module - J338-

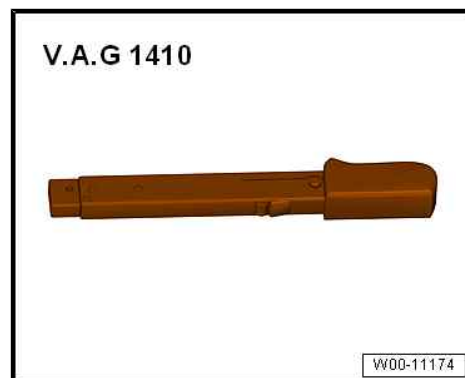
⇒ ["6.1 Removing and installing throttle valve module J338", page 29](#)

⇒ ["6.2 Cleaning throttle valve module J338", page 30](#)

6.1 Removing and installing throttle valve module - J338-

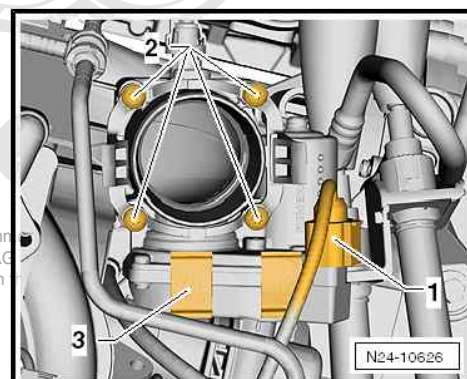
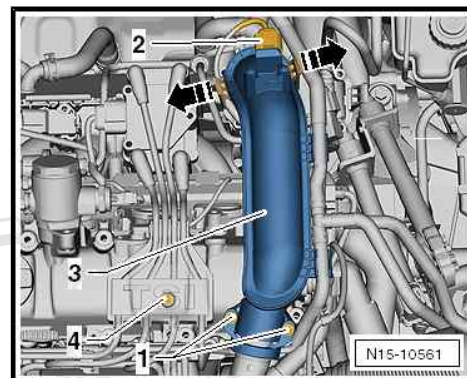
Special tools and workshop equipment required

- ◆ Torque wrench (4...20 Nm) - V.A.G 1410-



Removing

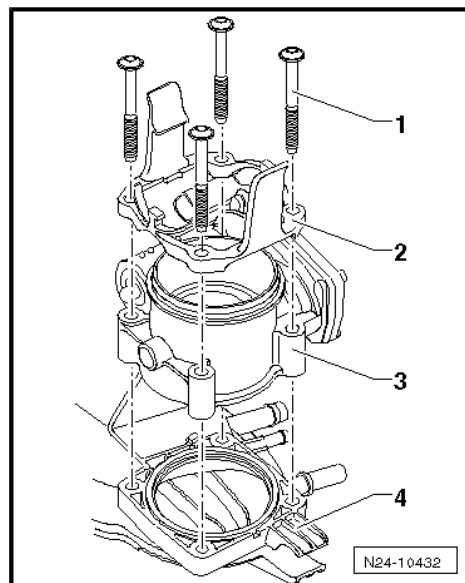
- Remove bolts -1- and remove retaining bracket.
- Unplug connector -2- at charge pressure sender - G31- with intake air temperature sender 2 - G299- .
- Release retainers in direction of -arrow- and detach pressure pipe -3- first from throttle valve module - J338- and then from turbocharger.
- Detach connector -1- from throttle valve module - J338- .
- Remove securing bolts -2- and detach throttle valve module -3- from intake manifold.



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Installing

- Insert new seal in groove on intake manifold.
- Fit throttle valve module - J338- -3- together with adapter -2- and securing bolts -1- onto intake manifold -4-.

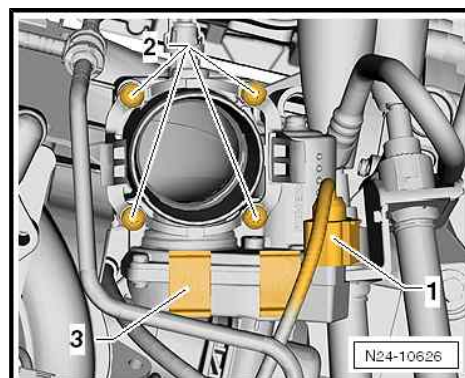


- Tighten securing bolts -2-.
- Tightening torque: Intake manifold (part 2) - exploded view
⇒ [page 21](#)
- Plug in electrical connector -1- at throttle valve module - J338- -3-.

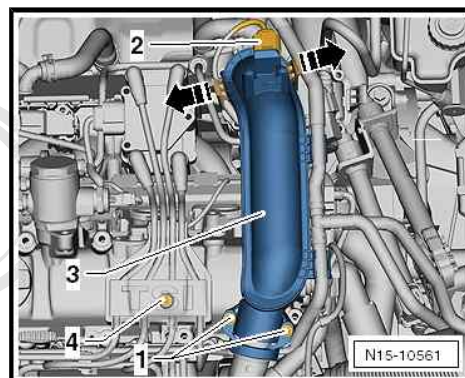


Note

Before installing, lubricate O-rings at turbocharger and in pressure pipe lightly with engine oil.



- Fit pressure pipe -3- on turbocharger.
 - Push pressure pipe -3- onto throttle valve module - J338- .
- Retaining clips -1- should engage audibly.
- Tighten securing bolts -1- for retaining clips.
 - Tightening torque: intake manifold (part 2) - exploded view
⇒ [page 21](#)
 - Plug in electrical connector at charge pressure sender - G31- with intake air temperature sender 2 - G299- .



If a new throttle valve module - J338- has been installed:

- Erase learnt values and adapt engine control unit - J623- to throttle valve module - J338- .

6.2 Cleaning throttle valve module - J338-

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Note

- ♦ If a new engine control unit - J623- is installed, it must be adapted to the throttle valve module.
- ♦ Carbon deposits and dirt in the limit stop can lead to incorrect adaption values.
- ♦ Take care not to scratch the throttle valve housing when cleaning it.

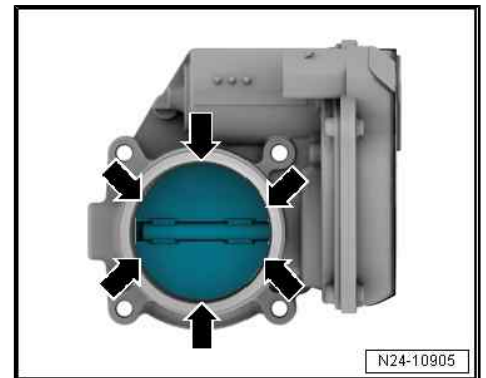
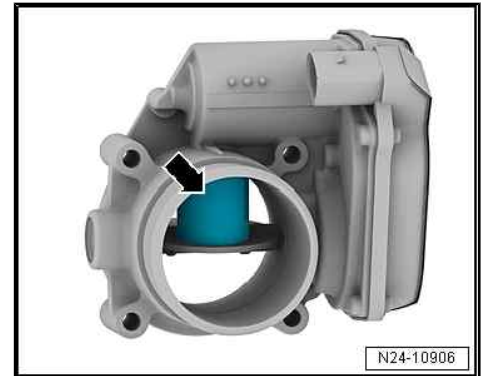
- Remove throttle valve module - J338- → [page 29](#) .
- Open throttle valve by hand and block it in the open position with a suitable object (e.g. plastic or wooden wedge) -arrow-.

**WARNING**

Acetone is highly flammable. Please observe all accident prevention regulations and safety precautions when handling flammable liquids. Do not use compressed air when cleaning the throttle valve. Wear safety goggles and protective clothing to avoid possible injury and skin contact.

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- Clean throttle valve housing thoroughly, especially around the points -arrows- where the throttle valve closes, using commercially available acetone and a small brush.
- Wipe out throttle valve housing with a lint-free cloth.
- Allow acetone to evaporate completely and re-install throttle valve module after cleaning.
- Erase learnt values and adapt engine control unit - J623- to throttle valve module using a vehicle diagnostic tester.



7 High-pressure pump

⇒ "7.1 Exploded view - high-pressure pump", page 32

⇒ "7.2 Removing and installing high-pressure pump", page 34

7.1 Exploded view - high-pressure pump



Note

Observe installation instructions for high-pressure pump.

1 - Bolts for high-pressure pump

- ☐ Hand-tighten in diagonal sequence, then tighten to 5 Nm
- ☐ Final torque: 20 Nm
- ☐ Do not tilt high-pressure pump

2 - Connecting piece for fuel supply line from fuel tank

3 - Spring-type clip

- ☐ Remove and install using hose clip pliers - VAS 6340-
- ☐ Renew

4 - Fuel supply line

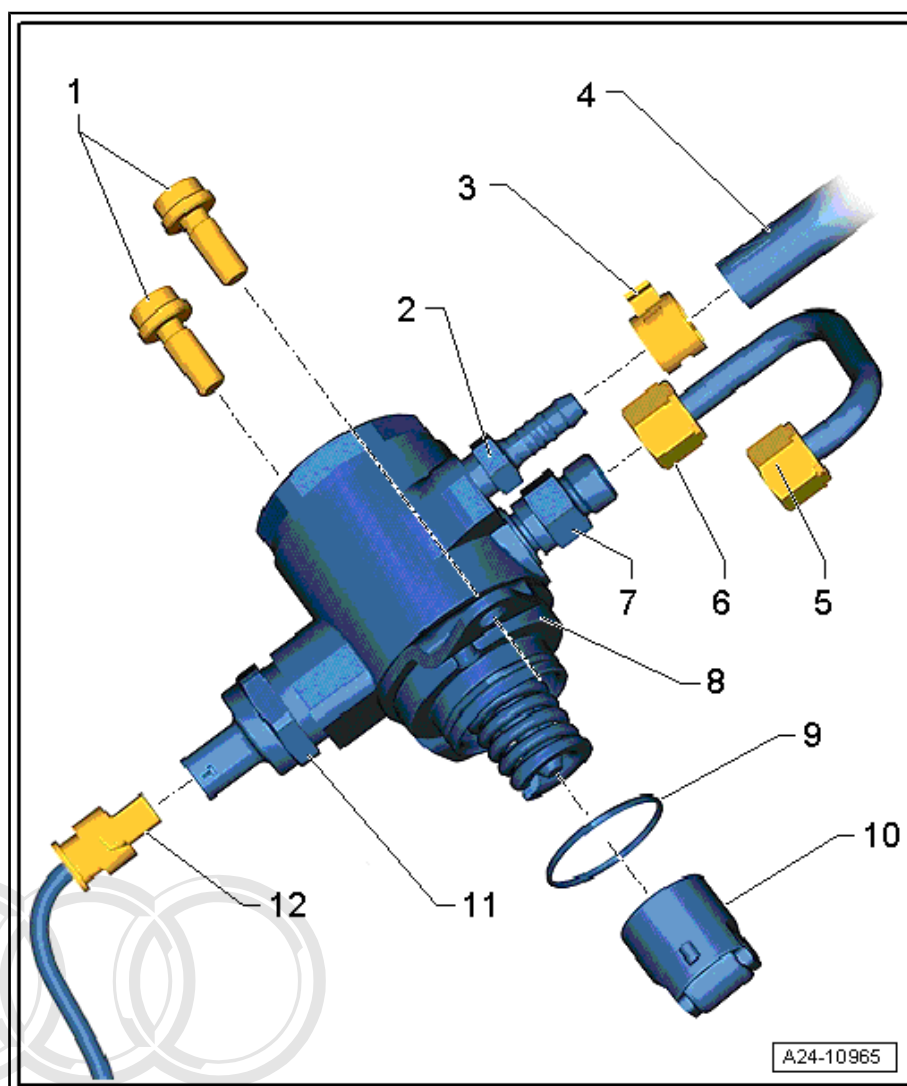
- ☐ From fuel tank

5 - High-pressure pipe

- ☐ Do not alter shape
- ☐ Tighten bracket for fuel supply line to 8 Nm
- ☐ Check for damage before re-installing
- ☐ Lubricate thread of union nut with fuel
- ☐ 25 Nm

6 - High-pressure pipe

- ☐ Do not alter shape
- ☐ Counterhold at connecting piece when loosening



ing union nut

- ☐ Tighten bracket for fuel supply line to 8 Nm
- ☐ Check for damage before re-installing
- ☐ Lubricate thread of union nut with fuel
- ☐ 25 Nm

7 - Connecting piece

- ☐ Check tightening torque: 30 Nm
- ☐ Renew

8 - High-pressure pump with fuel pressure regulating valve - N276-

- ☐ An electric fuel pump (fitted in fuel tank) supplies fuel to the mechanical high-pressure pump
- ☐ When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.
- ☐ Fuel lines must be free of tension when installed.
- ☐ When connector is unplugged, high-pressure pump switches to full delivery (approx. 140 bar)



Caution

When removing or installing the high-pressure pump, take hold of it only by the housing.

If the piston spring assembly of the high-pressure pump comes loose, the high-pressure pump will leak and must be renewed.

- ☐ Removing and installing ⇒ [page 34](#)

9 - O-ring

- ☐ Renew
- ☐ When installing lubricate lightly with engine oil

10 - Roller tappet

- ☐ May possibly remain lodged in camshaft housing when high-pressure pump is removed
- ☐ When installing lubricate lightly with engine oil

11 - Fuel pressure regulating valve - N276-

12 - Electrical connector for fuel pressure regulating valve - N276-

7.2 Removing and installing high-pressure pump

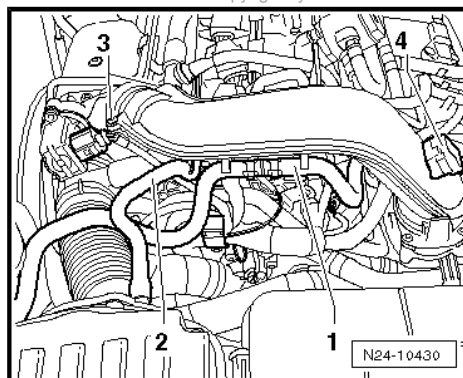
Removing



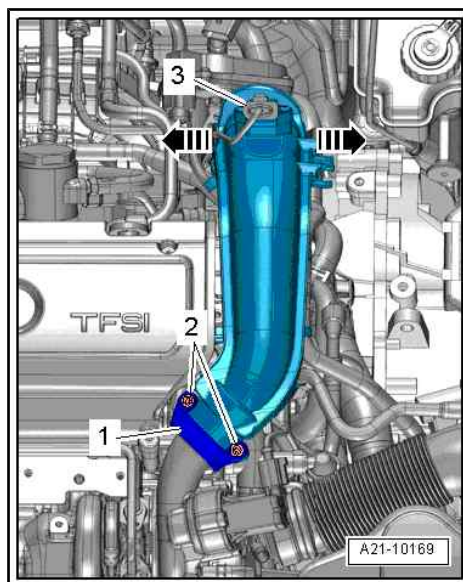
Note

- ◆ *The high-pressure fuel pump should only be removed and installed when the engine is cold.*
- ◆ *When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.*
- ◆ *Use a cloth to catch escaping fuel.*
- ◆ *The O-ring must always be renewed.*
- ◆ *Always ensure that the high-pressure fuel pipes are free of tension when tightening the connections.*

- Disengage hoses -1- and -2- at pressure pipe.



- Unplug electrical connector -3- on charge pressure sender - G31- / intake air temperature sender 2 - G299- .
- Unscrew bolts -2- and detach retaining bracket -1-.
- Release retainers -arrow- and detach pressure pipe first from throttle valve module - J338- and then from turbocharger.

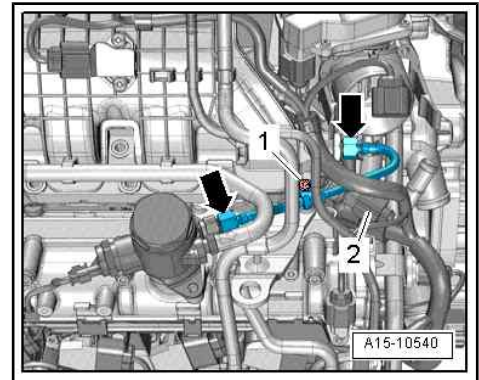


**WARNING**

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- *Wear safety goggles.*
- *Wear protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



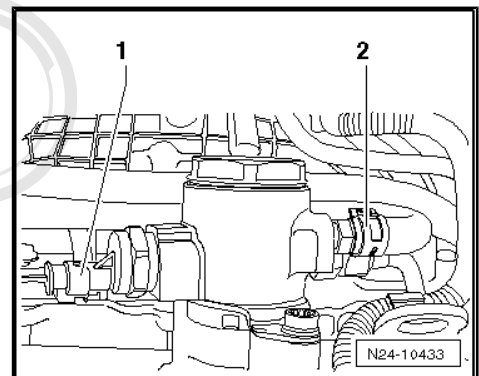
- Remove union nuts -arrows- and bolt -1- and detach high-pressure pipe.

**Note**

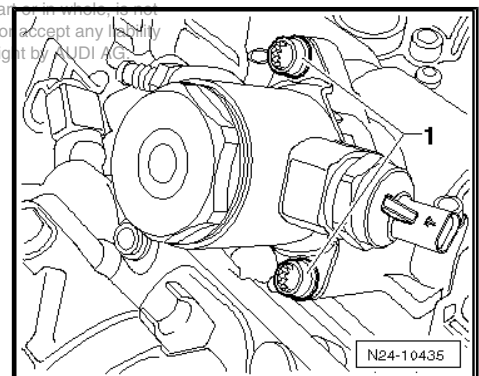
- ◆ *Do NOT bend open bracket for fuel line.*
- ◆ *If bracket has been bent open or fuel line has to be renewed, bracket must also be renewed.*
- Unplug electrical connector -1- on fuel pressure regulating valve - N276- .
- Detach fuel supply line -2- from high-pressure pump.

**Note**

Use a cloth to catch escaping fuel.



- Unscrew securing bolts -1- evenly



- Pull high-pressure pump -3- and roller tappet -1- out of camshaft housing.



Caution

When removing or installing the high-pressure pump, take hold of it only by the housing.

If the piston spring assembly of the high-pressure pump comes loose, the high-pressure pump will leak and must be renewed.

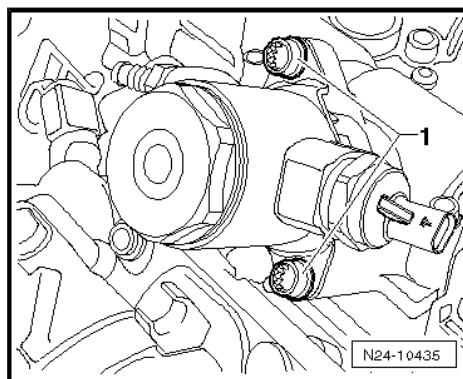
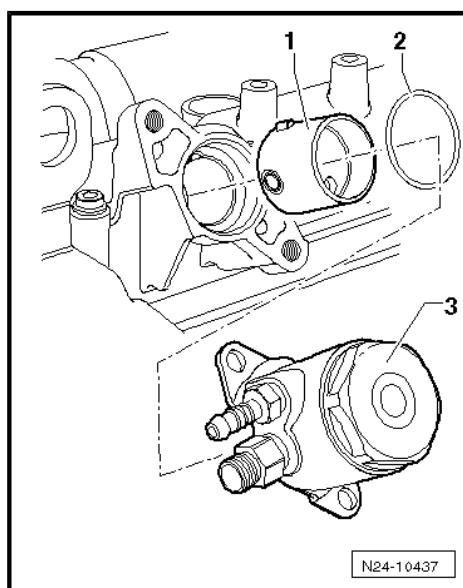
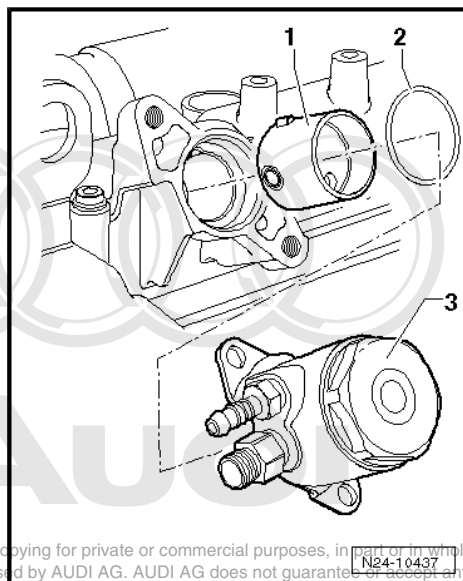
Installing



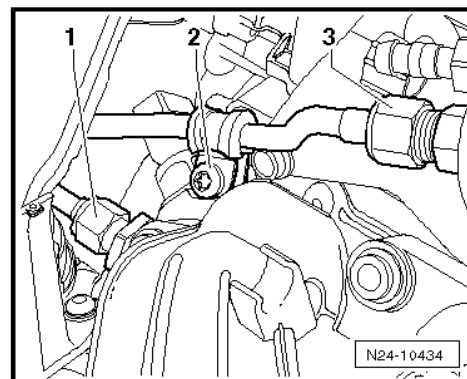
Note

Renew O-ring for high-pressure pump.

- Check roller tappet for damage and renew if necessary.
 - Lubricate roller tappet -1- with clean engine oil.
 - Insert lubricated roller tappet -1- into camshaft housing.
 - Turn crankshaft in direction of engine rotation until roller tappet is positioned at lowest point.
 - Renew connecting piece for high-pressure pipe at high-pressure pump.
 - Insert a new, oiled O-ring -2- into groove on high-pressure pump -3-.
 - Carefully insert high-pressure pump -3-.
 - Press high-pressure pump down by hand as far as possible onto stop.
 - At the same time, tighten securing bolts -1- by hand.
 - Then tighten securing bolts -1- alternately to 5 Nm (do not tilt high-pressure pump).
 - Now tighten securing bolts -1- alternately to final torque.
 - Tightening torque: exploded view - high-pressure pump
⇒ [page 32](#)
- Fitting instructions for high-pressure pipe: (install free of stress)
- Screw in union nuts -1- and -3- on high-pressure pipe (two threads by hand).
 - Screw in bolt -2- by hand.
 - Tighten both union nuts -1- and -3- as far as stop.
 - Tighten bolt -2- to 8 Nm.



- Tighten both union nuts -1- and -3- to specified torque.
- Re-connect fuel supply line -2- to high-pressure pump (make sure it is securely fitted).

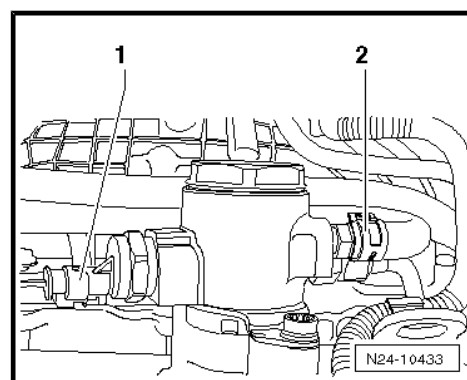


- Re-attach electrical connector -1- for fuel pressure regulating valve - N276- .



Note

Check fuel system for leaks.



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8 Injectors

⇒ ["8.1 Removing and installing injectors", page 38](#)

⇒ ["8.2 Renewing combustion chamber ring seal \(teflon ring seal\)", page 40](#)

⇒ ["8.3 Cleaning injectors", page 43](#)

8.1 Removing and installing injectors

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-

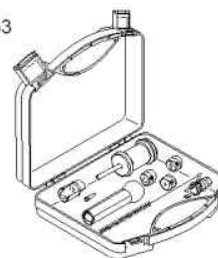
V.A.G 1331



W00-0427

- ◆ Tool set for FSI engines - T10133-

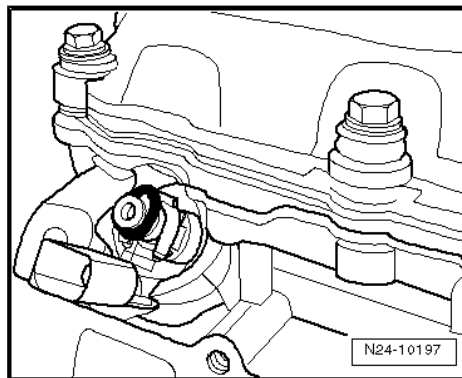
T10133



W00-1258

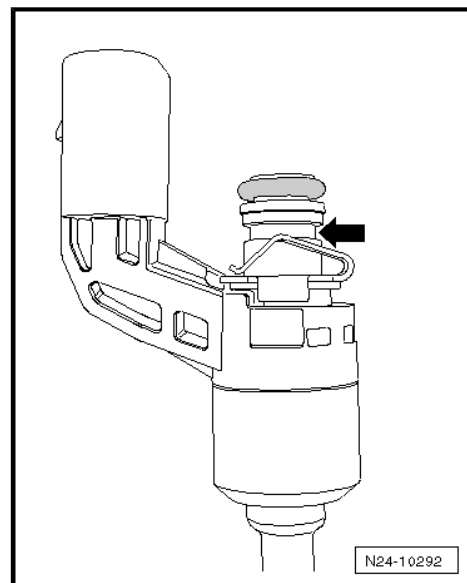
Removing

- Remove intake manifold ⇒ [page 24](#) .
- Remove intake manifold (bottom section) ⇒ [page 26](#) .
- Press O-ring by hand upwards (as illustrated) and remove from injector.
- Screw striker - T10133/3- onto puller - T10133/15- .

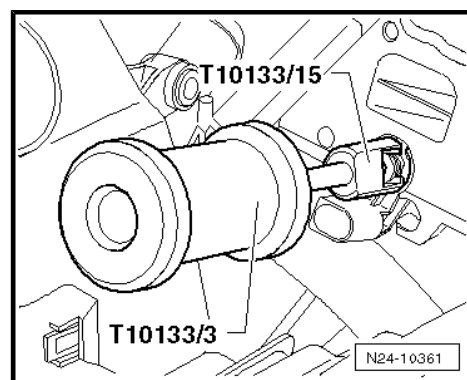


N24-10197

- Then guide puller - T10133/15- into groove -arrow- on injector.

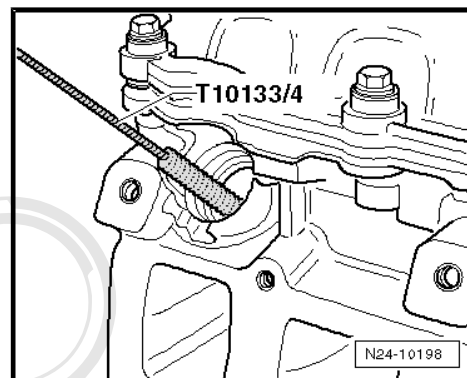


- Pull out injector by knocking carefully.

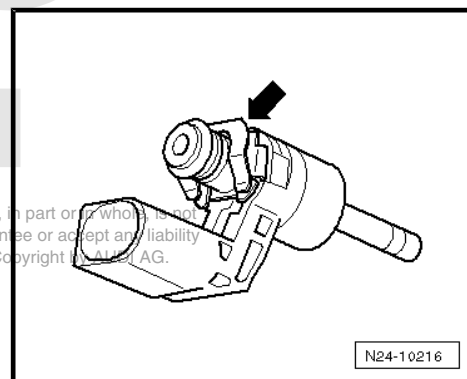


Installing

- The combustion chamber ring seal must always be renewed before the injector is re-installed ⇒ [page 40](#) .
- Clean holes for injectors in cylinder head thoroughly with nylon brush - T10133/4- .
- Check plastic support ring for damage and renew if necessary ⇒ [page 40](#) .



- Spring element -arrow- and teflon seal must always be renewed if injectors are removed ⇒ [page 40](#) .
- Renew O-rings between injector and intake manifold (bottom section), and apply thin coating of clean engine oil.

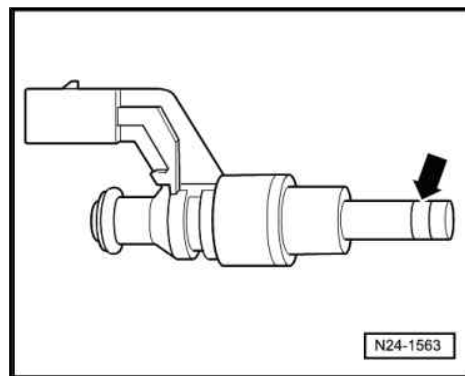


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Note

- ◆ *The teflon seal -arrow- must not be lubricated when fitting the injector.*
- ◆ *Make sure that there is no cleaning fluid or oil in the holes in the cylinder head when installing the injectors.*
- ◆ *It should be possible to insert the injector easily. If necessary, wait until the teflon ring seal has contracted sufficiently.*
- ◆ *Note correct installation position and ensure that injectors are properly seated in cylinder head.*



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

- Push injector by hand as far as it will go into aperture in cylinder head.



Note

It should be possible to insert the injector easily. If necessary, wait until the seal has contracted sufficiently.

- Install intake manifold (bottom section) ⇒ [page 26](#) .
- Install intake manifold ⇒ [page 24](#) .

8.2 Renewing combustion chamber ring seal (teflon ring seal)



Note

The combustion chamber ring seal must always be renewed before the injector is re-installed.

Renewing combustion chamber ring seal

- Remove injector ⇒ [page 38](#) .
- Carefully remove old combustion chamber ring seal using suitable tools (e.g. cut open ring using razor blade, or prise open ring with small screwdriver and then pull off forwards). It is important to ensure that the groove and the continuous ridge in the bottom of the groove are not damaged.

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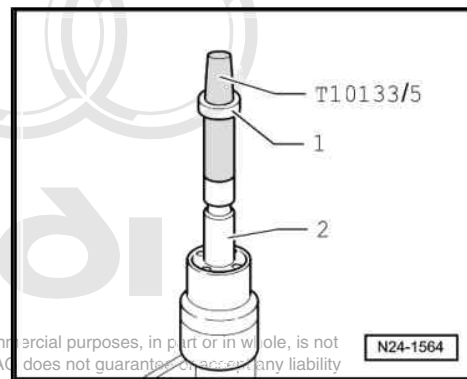


Note

The injector must be renewed if the groove is damaged.

- Before new combustion chamber ring seal is fitted, any combustion residue must be removed from ring groove and injector stem using a clean cloth.
- Remove any carbon deposits with a brass wire brush.

- Fit assembly cone - T10133/5- with new combustion chamber ring seal -1- onto injector -2-.

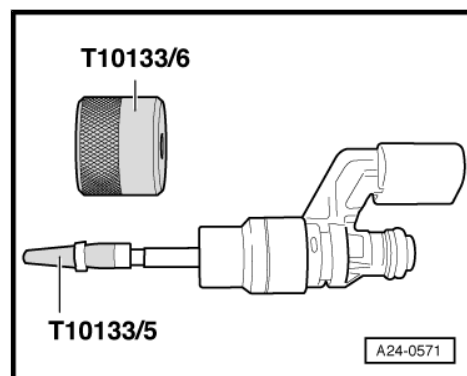


- Use assembly sleeve - T10133/6- to press combustion chamber ring seal further onto assembly cone - T10133/5- until it seats in groove. Do not use any lubricants during this procedure.

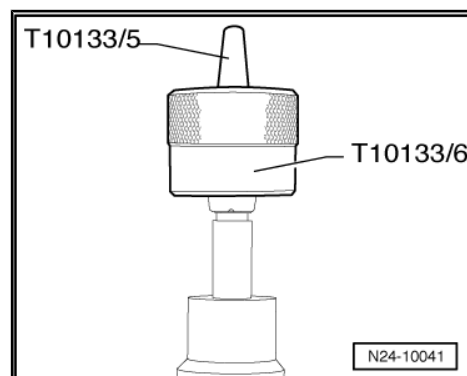


Note

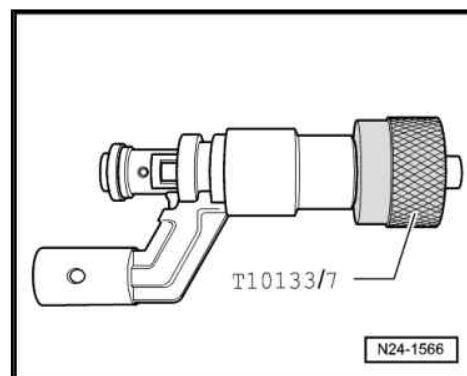
The teflon ring is widened as it is pushed onto the injector. The teflon ring must therefore be compressed again after it has been fitted. This is done in two steps. The procedure is described below.



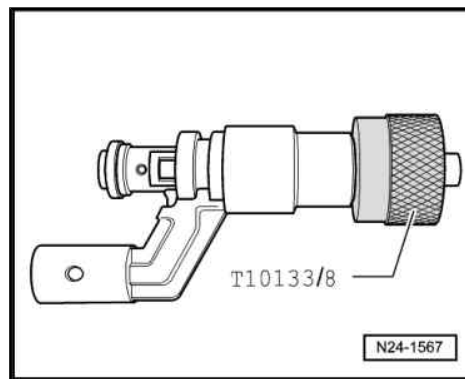
- Remove assembly sleeve - T10133/6- and assembly cone - T10133/5- .
- If necessary, slide seal by hand into ring groove.



- Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.

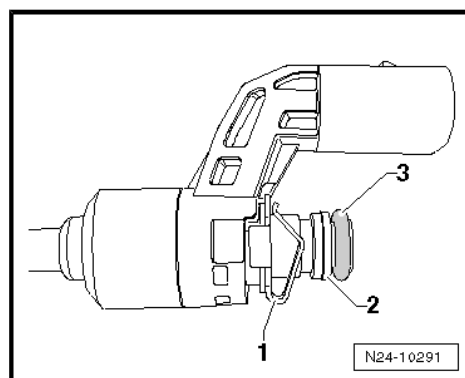


- Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.

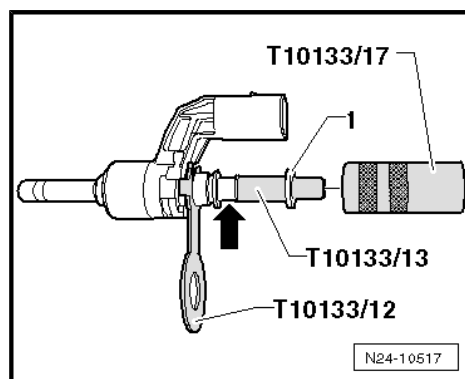


Renewing support ring and O-ring

- Remove O-ring -3-.
- Cut open support ring -2- with small side-cutting pliers and remove support ring.
- Detach spring element -1- from injector and fit locking plate -T10133/12- in place of spring element.



- Fit a new support ring -1- onto assembly cone -T10133/13- and fit onto injector (as illustrated).
- Using calibration sleeve -T10133/17- (knurled side faces towards injector), push support ring -1- into first groove -arrow- on injector.

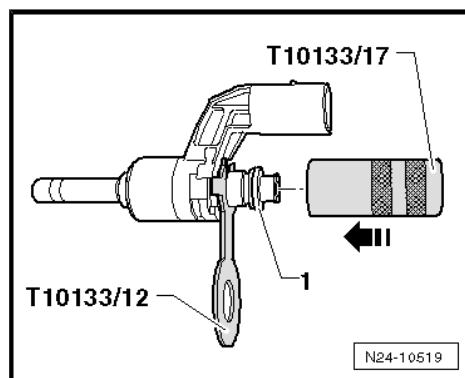


- Then turn round calibration sleeve -T10133/17- (knurled side now faces away from injector). Push calibration sleeve over support ring -1- in direction of -arrow- until it makes contact with locking plate -T10133/12-.

- Pull calibration sleeve -T10133/17- off again.

Support ring now has its correct installation depth.

- Now install a new spring element -1- in place of locking plate -T10133/12-.



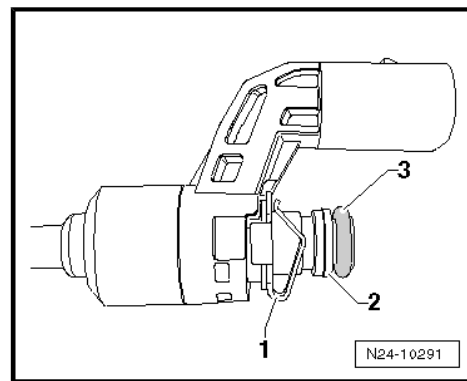
- Renew O-ring -3-.



Note

Lubricate O-ring lightly with assembly oil or engine oil before installing.

- Install injector ⇒ [page 38](#) .



8.3 Cleaning injectors

Special tools and workshop equipment required

- ◆ Ultrasonic cleaning unit - VAS 6418-
- ◆ Mounting plate for injection modules - VAS 6418/1-
- ◆ Cleaning fluid - VAS 6418/2-



Note

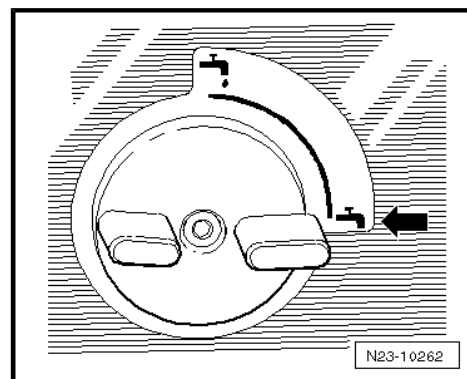
Observe safety precautions and operating instructions for ultrasonic unit.

Cleaning

- Remove injectors ⇒ [page 38](#) .
- Close drain tap -arrow- on ultrasonic cleaning unit - VAS 6418- (located on right side of housing).
- Fill ultrasonic unit with 2,120 ml of water which has been allowed to settle for a few minutes and cleaning fluid - VAS 6418/2- .

Mixture ratio for cleaning fluid

- 2,100 ml of tap water which has been allowed to settle for a few minutes and 20 ml of cleaning fluid - VAS 6418/2-



- Place mounting plate for injection modules - VAS 6418/1- on top of cleaning unit.

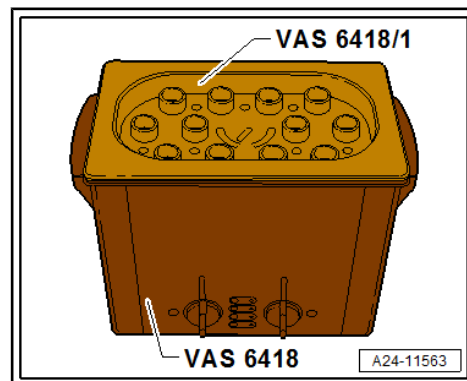
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WARNING

It is important to read the safety notes in the operating instructions before switching on the ultrasonic cleaning unit - VAS 6418- .

The ideal fluid level is approx. 1-4 mm above the base of the mounting plate. The ultrasonic cleaning unit - VAS 6418- can be damaged if the fluid level is too low.



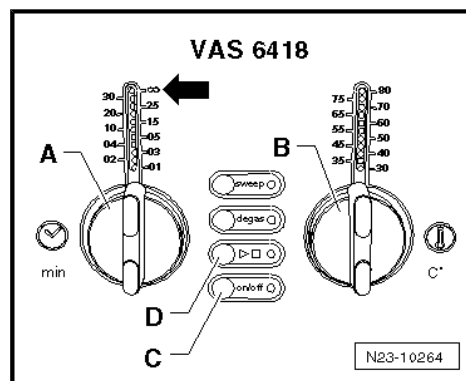
- Insert FSI injectors all the way into guides of mounting plate for injection modules - VAS 6418/1- .

- Switch on cleaning unit by pressing **[on/off]** button -C-.
- Select a cleaning time of 30 minutes with rotary control -A-.
- Set rotary control -B- to a temperature of 50°C.
- Press **[▶]** button -D- to start cleaning procedure.



Note

- ◆ *The temperature-controlled cleaning process is now started. While the fluid is being heated, the ultrasound is activated at intervals in order to circulate the cleaning solution. The ultrasound is activated continuously when the preselected temperature is reached.*
- ◆ *The actual cleaning process commences when the temperature reaches at least 50 °C and must last for at least 30 minutes.*
- After cleaning, always renew combustion chamber ring seal (teflon ring seal) for each injector.
- Install injectors ⇒ [page 38](#) .



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9 Lambda probe

⇒ [“9.1 Lambda probe - overview”, page 45](#)

⇒ [“9.2 Removing and installing Lambda probe G39 and Lambda probe heater Z19 before catalytic converter”, page 46](#)

⇒ [“9.3 Removing and installing Lambda probe after catalytic converter G130 and Lambda probe 1 heater after catalytic converter Z29”, page 47](#)

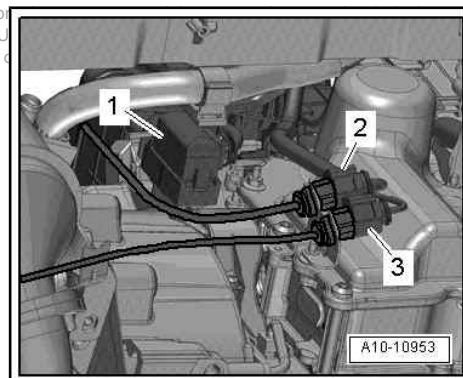
9.1 Lambda probe - overview

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Electrical connector for Lambda probes

2 - Lambda probe - G39- (brown connector)

3 - Lambda probe after catalytic converter - G130- (black connector)



Lambda probe - G39- and Lambda probe heater - Z19- -1-

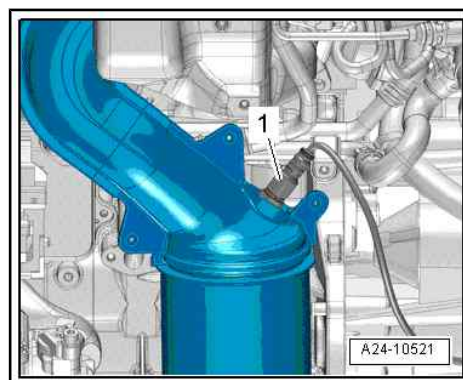


Note

- ◆ *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. High-temperature paste ⇒ Parts catalogue*
- ◆ *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*

- Tightening torque: 55 Nm

Removing and installing Lambda probe - G39- and Lambda probe heater - Z19- ⇒ [page 46](#) .



Lambda probe after catalytic converter - G130- and Lambda probe 1 heater after catalytic converter - Z29- -1-



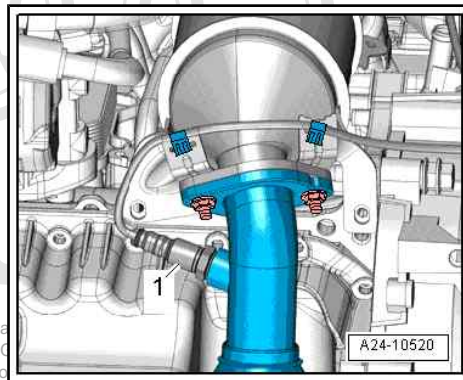
Note

- ◆ *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. High-temperature paste → Parts catalogue*
- ◆ *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*

- Tightening torque: 55 Nm

Removing and installing Lambda probe - G39- and Lambda probe heater - Z19- ⇒ [page 46](#) .

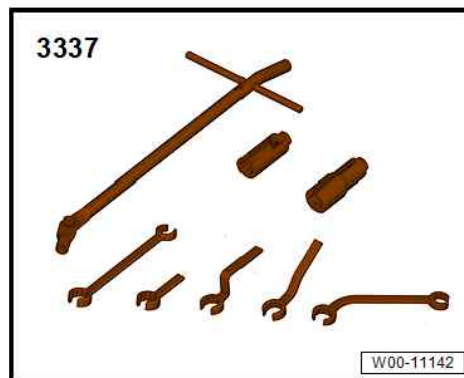
Removing and installing Lambda probe after catalytic converter - G130- and Lambda probe 1 heater after catalytic converter - Z29- ⇒ [page 47](#)



9.2 Removing and installing Lambda probe - G39- and Lambda probe heater - Z19- before catalytic converter

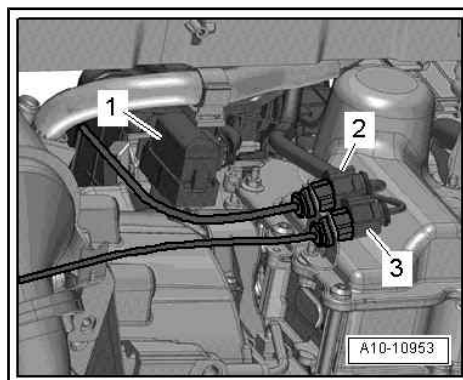
Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-



Removing

- Unplug electrical connector -2- for Lambda probe - G39- and Lambda probe heater - Z19- .



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

Installing

When installing, note the following:



Note

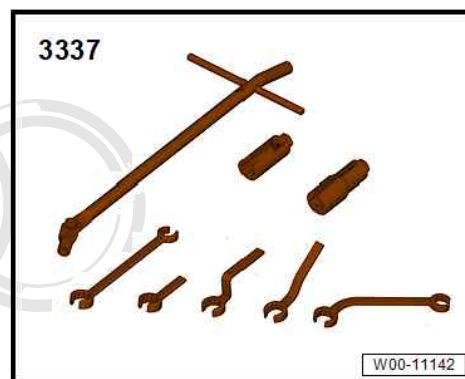
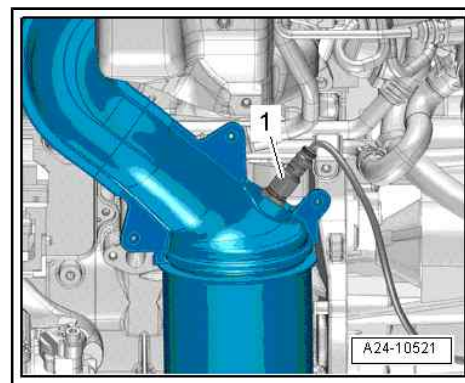
- ◆ *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- ◆ *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Parts catalogue*
- ◆ *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*

- Tightening torque: Lambda probe - overview ⇒ [page 45](#)

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

Special tools and workshop equipment required

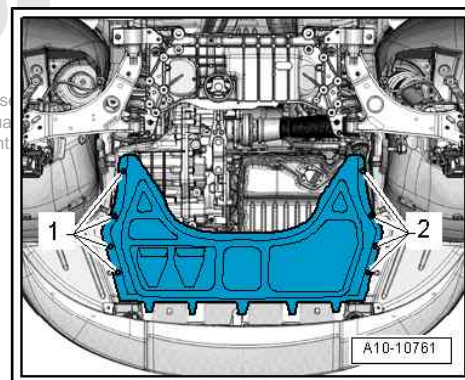
- ◆ Lambda probe open ring spanner set - 3337-



Removing

- Remove noise insulation.

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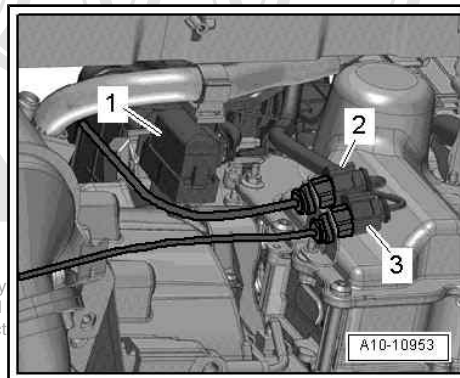
- Unplug electrical connector -3- for Lambda probe after catalytic converter - G130- and Lambda probe heater - Z19- .



Note

Item 1 can be disregarded.

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- Move clear electrical wiring connection for Lambda probe after catalytic converter - G130- .
- Unscrew Lambda probe after catalytic converter - G130- -1- using tool from Lambda probe open ring spanner set - 3337- .

Installing

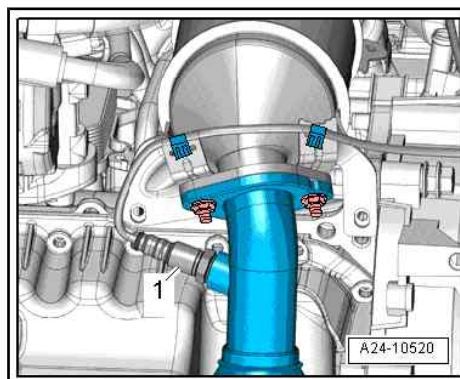
When installing, note the following:



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. High-temperature paste → Parts catalogue*
- ◆ *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*

- Tightening torque: Lambda probe - overview ⇒ [page 45](#)



10 Components of injection system

⇒ [“10.1 Removing and installing fuel pressure sender G247 ”, page 49](#)

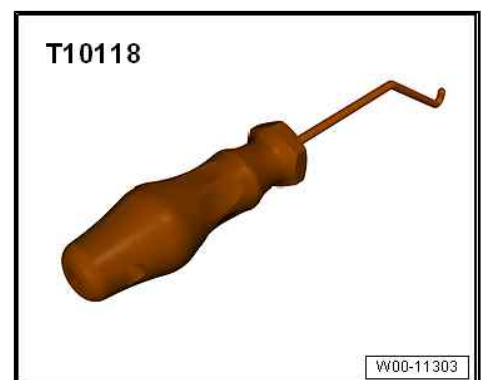
⇒ [“10.2 Checking fuel pressure and residual pressure \(up to high-pressure pump\)”, page 50](#)

10.1 Removing and installing fuel pressure sender - G247-

If the fuel pressure sender - G247- fails, the fuel pressure regulating valve - N276- is switched off, the electric fuel pump is fully activated and the engine is operated with the fuel pressure which remains. This will reduce engine torque considerably.

Special tools and workshop equipment required

- ◆ Assembly tool - T10118-



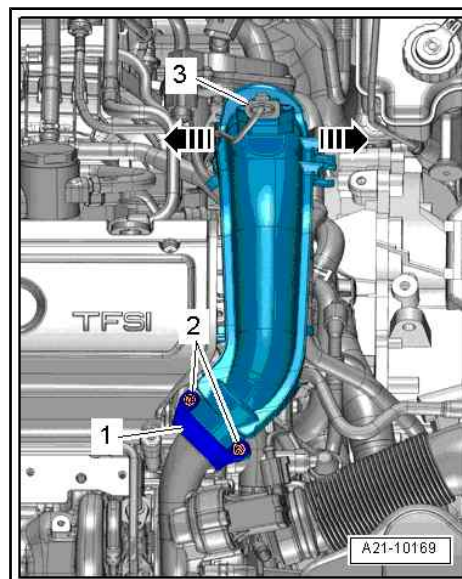
- ◆ Bit (27 mm) - T40218- or commercially available socket (27 mm)



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Removing

- Unscrew bolts -2- and detach retaining bracket -1-.
- Unplug electrical connector -3- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .
- Release retainers -arrow- and detach pressure pipe first from throttle valve module - J338- and then from turbocharger.
- Move hoses on air pipe clear.



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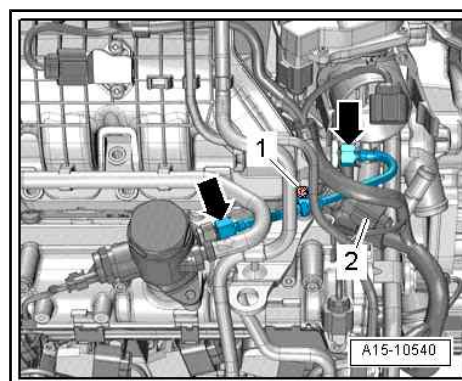


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

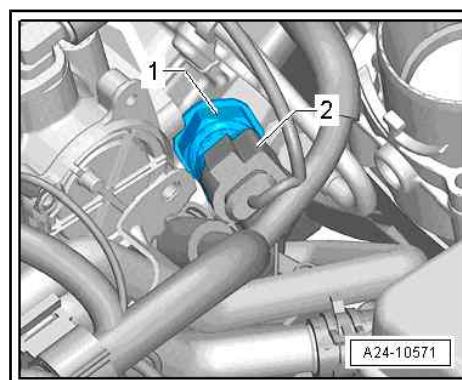
- *Wear safety goggles.*
- *Wear protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



- Remove union nuts -arrows- and bolt -1- and detach high-pressure pipe.
- Unplug electrical connector -2- at fuel pressure sender - G247- -1- using assembly tool - T10118- .
- Unscrew fuel pressure sender - G247- -1- using bit, 27 mm - T40218- .

Installing

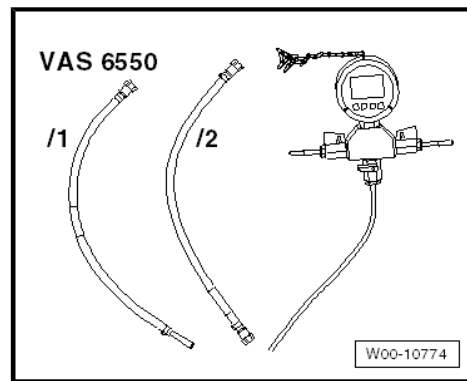
- Install in reverse order.
- Tightening torque for Fuel pressure sender - G247- :
⇒ ["5.2 Intake manifold \(part 2\) - exploded view", page 21](#)



10.2 Checking fuel pressure and residual pressure (up to high-pressure pump)

Special tools and workshop equipment required

- ◆ Pressure tester - VAS 6550- with adapters - VAS 6550/1- and -VAS 6550/2-



- ◆ Fuel-resistant measuring container

Test conditions

- Battery voltage at least 12.5 V
- Fuel filter OK.
- Fuel tank at least $\frac{1}{4}$ full.
- Fuel pump control unit - J538- OK (check)
- Ignition off.

Test sequence

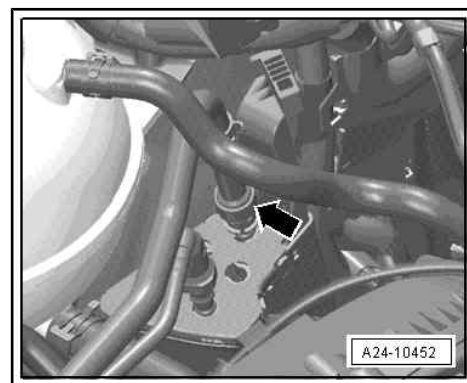


WARNING

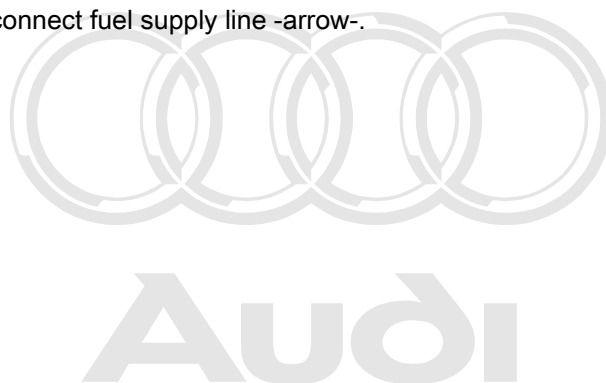
The fuel system is pressurised.

Risk of injury as fuel may spray out.

- *Wear safety goggles.*
- *Wear protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



- Lift release tab and disconnect fuel supply line -arrow-.



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- Connect pressure tester - VAS 6550- with adapters - VAS 6550/1- and -VAS 6550/2- to fuel supply line.
- Make sure that drain tap (centre hose) is closed and cut-off valves (left and right) are open.
- Switch on ignition.
- Fuel pump will run for approx. 5 seconds and build up fuel pressure.
- Read fuel pressure off pressure tester - VAS 6550- .
- Specification: 4.0 ... 7.0 bar

If specification is not obtained:

- Check delivery rate of fuel pump ⇒ Fuel supply system, petrol engines; Rep. gr. 20 .

Checking residual pressure

- Check system for leaks and check residual pressure by watching the drop in pressure on the pressure tester - VAS 6550- .
- After 10 minutes pressure should still be at least 3 bar.

If the residual pressure drops below 3 bar:

- ◆ Check union between pressure tester - VAS 6550- and fuel supply line for leaks.
- ◆ Check pressure tester - VAS 6550- for leaks.
- ◆ Check fuel lines and their connections for leaks.
- ◆ Renew fuel filter with integrated fuel pressure regulator ⇒ Fuel supply system, petrol engines; Rep. gr. 20 . Then repeat the test.
- ◆ If fuel filter is OK, renew fuel pump ⇒ Fuel supply system, petrol engines; Rep. gr. 20 .

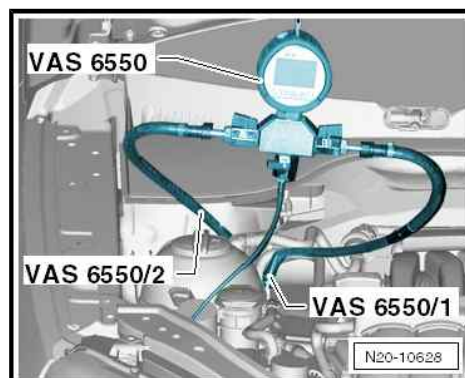
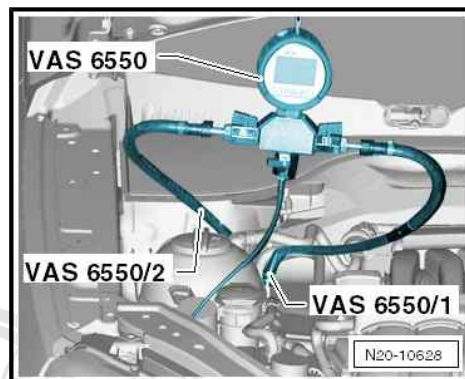
Assembly is carried out in the reverse order; note the following:

- The ignition must be switched off.

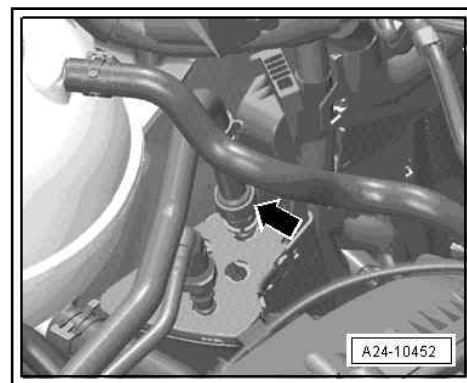


Note

Before removing the pressure tester, release the fuel pressure by opening the drain tap (centre hose). Hold end of hose into a measuring container.



- Re-attach fuel supply line -arrow- (make sure that all parts are clean and that there are no leaks).



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11 Engine control unit

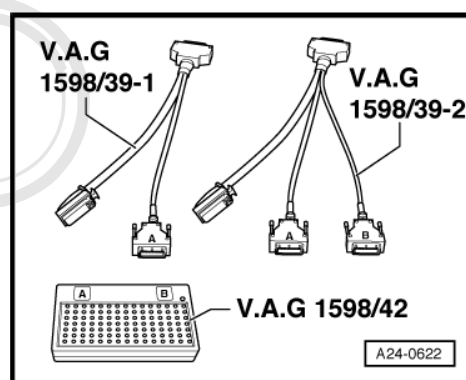
⇒ ["11.1 Wiring and component check with test box V.A.G 1598/42", page 54](#)

⇒ ["11.2 Renewing engine control unit J623", page 56](#)

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

Special tools and workshop equipment required

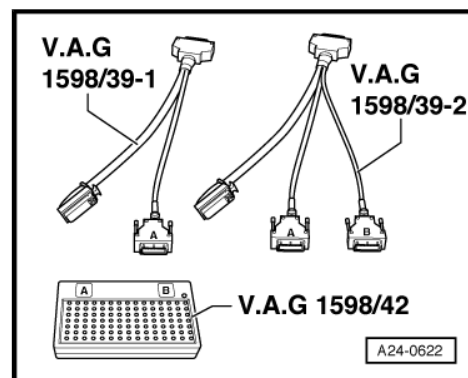
- ◆ Adapter cable - V.A.G 1598/39-1-
- ◆ Adapter cable - V.A.G 1598/39-2-
- ◆ Test box - V.A.G 1598/42-



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**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.
- ◆ Always use auxiliary measuring set - V.A.G 1527 B- to connect test equipment (e.g. voltage tester - V.A.G 1526 C-, hand-held multimeter - V.A.G 1594 C- etc.).

**WARNING**

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

The engine control unit has to be removed before multi-pin connectors can be unplugged from engine control unit. [page 56](#)

- Connect test box - V.A.G 1598/42- to wiring harness connector. The earth clip on the test box must be connected to the negative battery terminal. 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

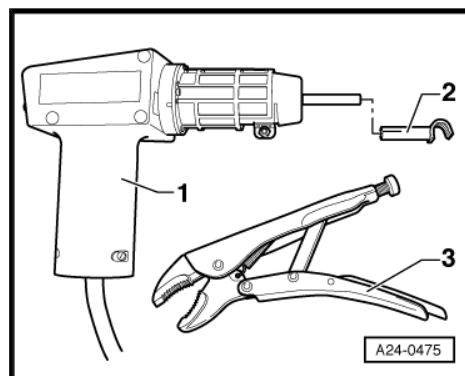
Installation is performed in the reverse sequence.

- 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.

11.2 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-



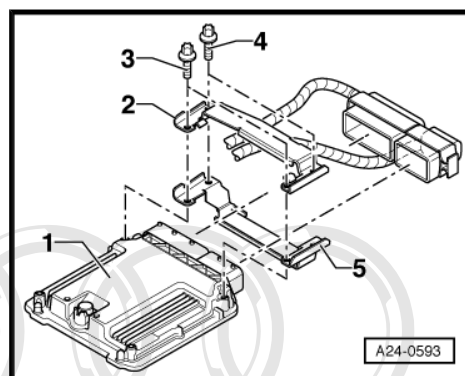
- ♦ Mole grips (commercially available) -3-
- ♦ Vehicle diagnostic tester

The engine control unit -1- is bolted to the locking plates -2 and 5-. To make it more difficult to unscrew the shear bolts -4- for locking plate -2-, their threads have been coated with locking fluid.

The protective housing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).

Removing

- Switch off ignition and remove ignition key.
- Lever off caps on windscreen wiper arms with a screwdriver.

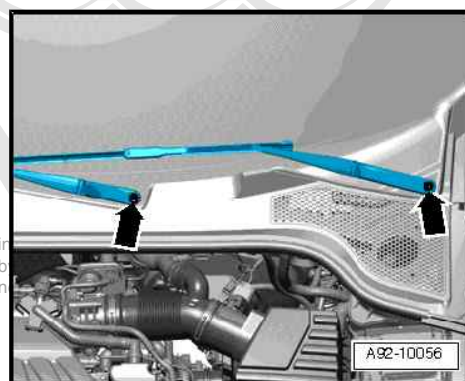


- Loosen hexagon nuts -arrows- several turns.
- Loosen wiper arms from wiper shafts by tilting them slightly.
- Completely remove hexagon nuts and detach wiper arms from wiper shafts.

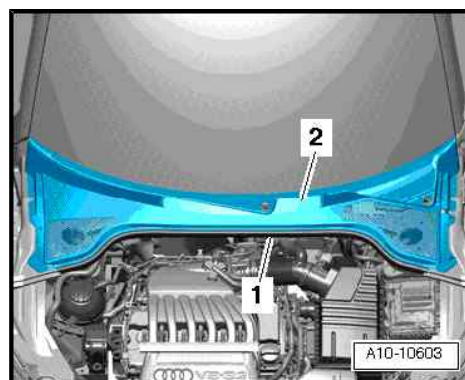


Note

Use puller (commercially available) to remove wiper arms if necessary.



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

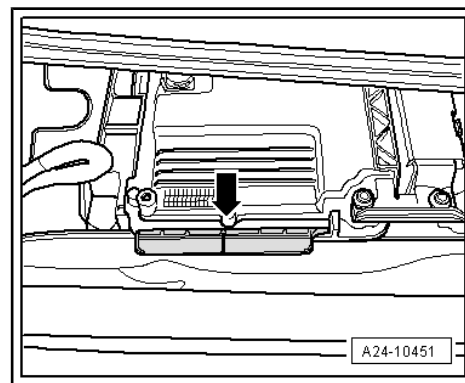


- Release clip -arrow- and remove engine control unit - J623- .

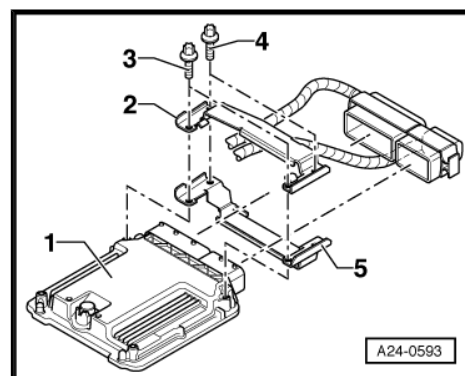


Note

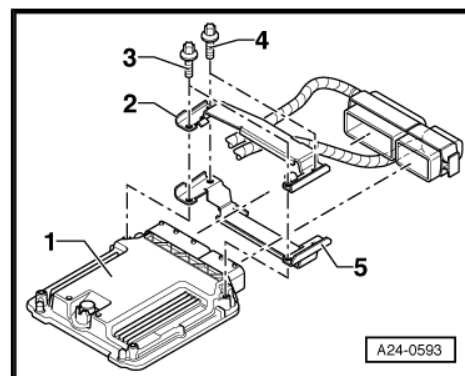
Cover painted surfaces with a cloth to prevent scratching.



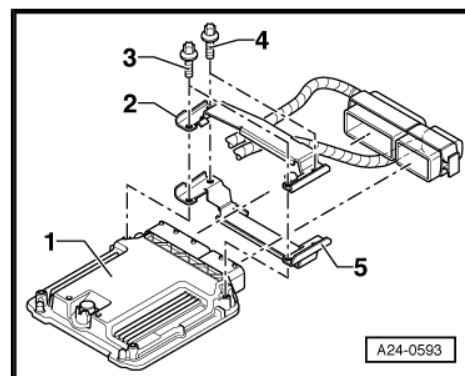
To help prevent unauthorised access to the connectors on the engine control unit, the control unit is secured by means of shear bolts to a locking plate or a metal casing.



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.



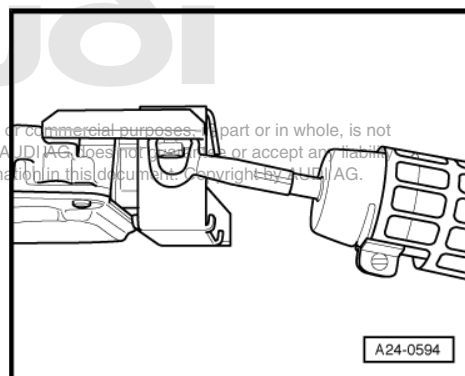
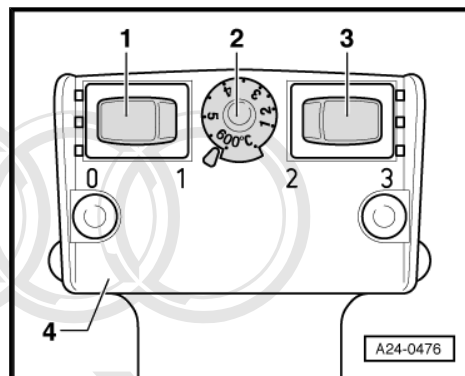
Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.



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 for approx. 25 to 30 seconds.
- Unscrew shear bolts using suitable vice-grip pliers (see arrow in illustration).



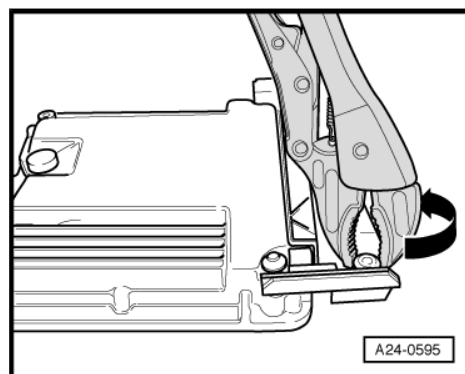
- The two shear bolts screwed into the engine control unit do not need to be heated. They should be removed without being heated.
- Detach metal locking plate from control unit connectors.
- Release connectors on engine control unit - J623- and unplug connectors.
- Take out old engine control unit - J623- and connect new engine control unit - J623- .

Installing engine control unit

Installation is performed in the reverse sequence.

- After installation, the locking plate must be re-fitted on the engine control unit - J623- .
- Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
- Always use new shear bolts.

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



28 – Ignition system

1 General notes and safety precautions

⇒ [“1.1 General notes on ignition system”, page 59](#)

⇒ [“1.2 Safety precautions when working on the ignition system”, page 59](#)

1.1 General notes on ignition system

- ◆ The engine control unit has a self-diagnosis capability.
- ◆ A voltage of at least 11.5 V is required for proper operation of the electrical components.
- ◆ Certain tests may lead to a fault being detected by the control unit and stored. The event memory should therefore be interrogated and (if necessary) erased after completing the tests and any repair work that may be required.
- ◆ If the engine starts, runs for a short period and then cuts out after completing fault finding, repairs or component tests, this may be due to the immobiliser disabling the engine control unit. The event memory must then be interrogated and, if necessary, the control unit must be adapted.

1.2 Safety precautions when working on the ignition system

Risk of injury caused by electric shock

When the engine is running, there are high voltage levels in the ignition system. There is a risk of electric shock when touching the ignition system!

- Never touch or disconnect ignition wiring when the engine is running or being turned at cranking speed.

Risk of damage to components

Washing the engine or connecting/disconnecting electrical wiring may result in components being damaged if the engine is running.

- Switch off ignition before connecting/disconnecting electrical wiring.
- Switch off ignition before cleaning engine.



2 Servicing ignition system

⇒ [“2.1 Test data”, page 60](#)

⇒ [“2.2 Exploded view - ignition system”, page 60](#)

⇒ [“2.3 Removing and installing ignition coils with output stages”, page 61](#)

⇒ [“2.4 Removing and installing knock sensor 1 G61”, page 63](#)

⇒ [“2.5 Removing and installing Hall sender G40”, page 63](#)

⇒ [“2.6 Removing and installing engine speed sender G28”, page 63](#)

2.1 Test data

Engine data	1.4 ltr. / 92 kW turbo FSI engine
Idling speed is not adjustable; controlled by the idling speed stabilisation	640...800 rpm
Engine speed limiter (deactivates injectors/closes throttle valve)	approx. 6,500 rpm
Ignition timing is determined by the control unit. Ignition timing cannot be adjusted.	
Ignition system	Multi-coil system with 4 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors. The ignition coils can be removed from the cylinder head using puller - T40039 - .
Firing order	1-3-4-2

2.2 Exploded view - Ignition system

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1 - Connector

- ☐ Unplug using assembly tool - T10118-

2 - Ignition coil with output stage - (N70, N127, N291, N292)-

- ☐ Removing and installing ⇒ [page 61](#)
- ☐ Use puller - T40039- for removal

3 - Connector for knock sensor 1 - G61-

- ☐ Unplug using assembly tool - T10118-

4 - Knock sensor 1 - G61-

- ☐ Contacts gold-plated

5 - Bolt

- ☐ 20 Nm
- ☐ Tightening torque influences the function of the knock sensor

6 - Connector

- ☐ Unplug using assembly tool - T10118-

7 - Hall sender - G40-

- ☐ Contacts gold-plated
- ☐ Removing and installing ⇒ [page 63](#)

8 - O-ring

- ☐ Renew O-Ring if damaged

9 - Bolt

- ☐ 10 Nm

10 - Spark plug

- ☐ 30 Nm
- ☐ Use spark plug socket and extension, 3122 B- for removal
- ☐ Removing and installing ⇒ [Maintenance Booklet 808](#)

11 - Cable guide

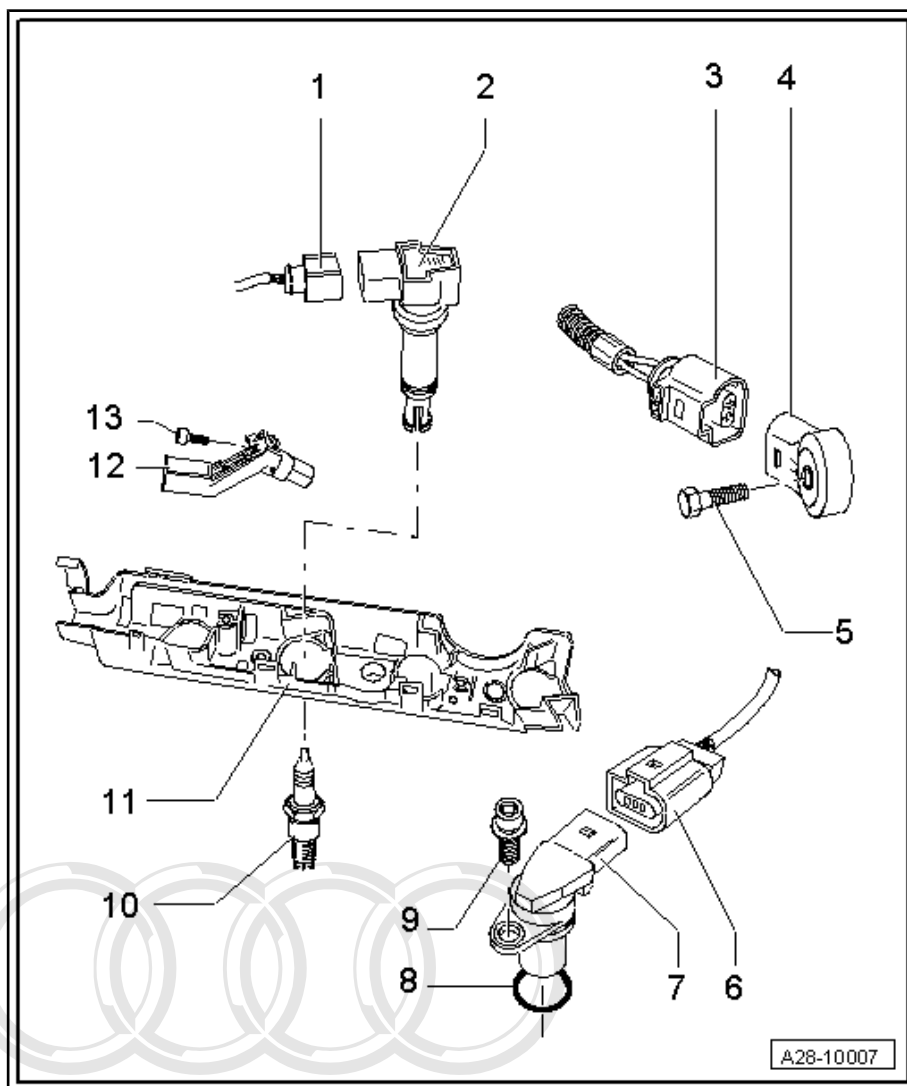
- ☐ 5 Nm

12 - Engine speed sender - G28-

- ☐ Removing and installing ⇒ [page 63](#)
- ☐ Lubricate O-ring with clean engine oil

13 - Bolt

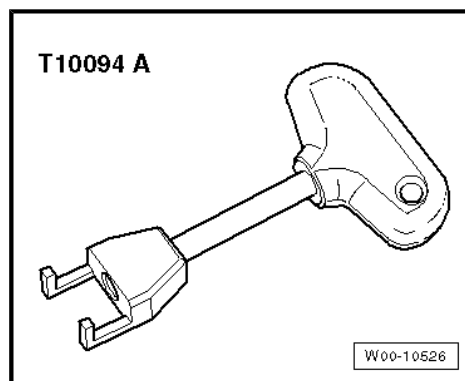
- ☐ 4.5 Nm



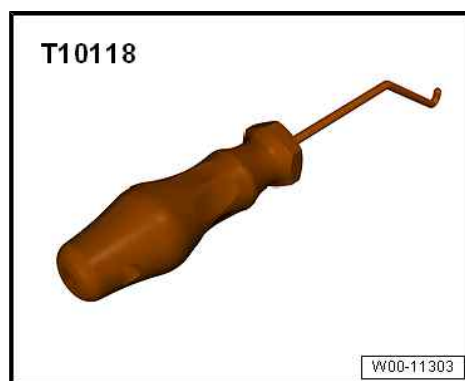
2.3 Removing and installing ignition coils with output stages

Special tools and workshop equipment required

◆ Puller - T10094 A-



◆ Assembly tool - T10118-

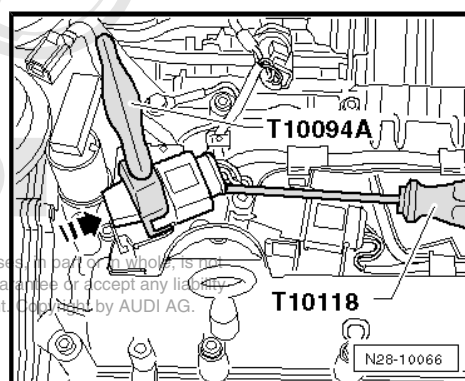


Removing:

- Remove engine cover panel ⇒ [page 17](#) .
- Apply puller - T10094 A- to all ignition coils, pull out ignition coils and at the same time unplug electrical connectors at ignition coils for cylinders 1 ... 4.
- Position assembly tool - T10118- as shown.
- Release electrical connectors and pull all connectors off ignition coils at the same time.

Installing:

- Fit all ignition coils loosely into spark plug holes.
- Align the ignition coils with the connectors and attach all connectors onto ignition coils simultaneously.
- Press ignition coils onto spark plugs by hand with uniform pressure (do not use tool).
- Install engine cover panel ⇒ [page 17](#) .



2.4 Removing and installing knock sensor 1 - G61-

Removing:

- Unplug electrical connector -1- at knock sensor 1 - G61- .



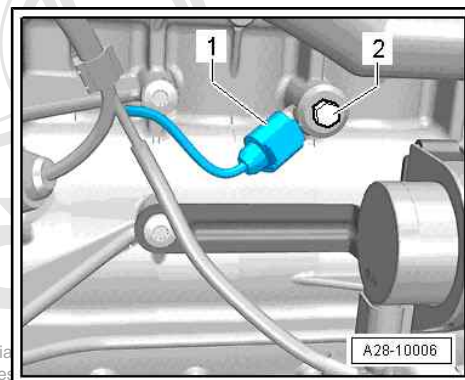
Note

Knock sensor 1 - G61- is located below intake manifold and knock sensor 1 - G61- must therefore be removed from below.

- Remove knock sensor 1 - G61- -2-.

Installing:

- Install in reverse order.
- Tightening torque: refer to exploded view of ignition system [⇒ page 60](#) .



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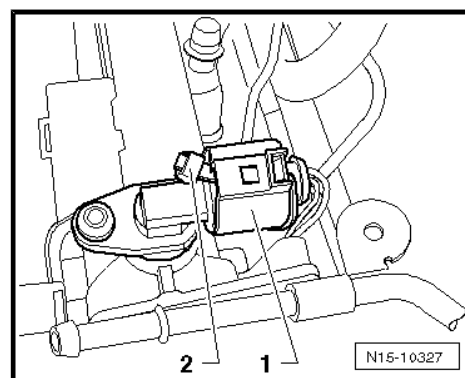
2.5 Removing and installing Hall sender - G40-

Removing:

- Remove engine cover panel [⇒ page 17](#) .
- Unplug electrical connector -1- and remove Hall sender - G40- .

Installing:

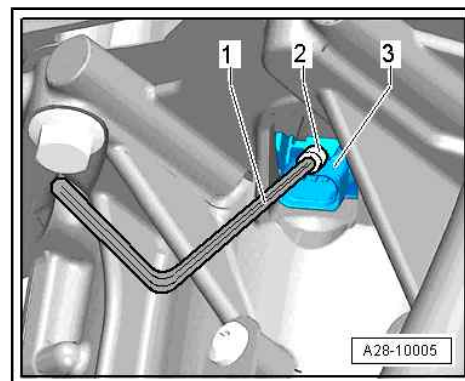
- Install in reverse order.
- Tightening torque: refer to exploded view of ignition system [⇒ page 60](#) .



2.6 Removing and installing engine speed sender - G28-

Removing:

- Remove intake manifold [⇒ page 24](#) .
- Unplug electrical connector at engine speed sender - G28- .
- Using Allen key -1-, unscrew bolt -2- for engine speed sender - G28- -3-.





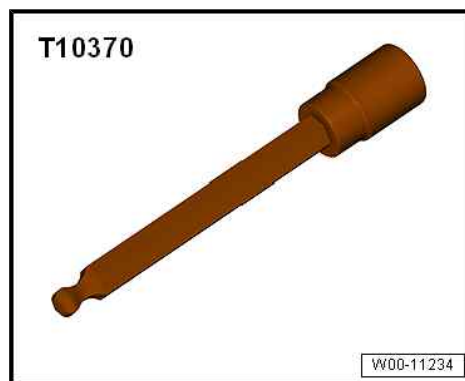
Note

If access is difficult, use socket (4 mm) - T10370- .

- Pull out engine speed sender - G28- .

Installing:

- Lubricate O-ring with clean engine oil.
- Carefully insert engine speed sender - G28- into guide (do not knock in).
- Install intake manifold ⇒ [page 24](#) .
- Install in reverse order.



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