List of Workshop Manual Repair Groups

Repair Group

00 - Technical data
10 - Removing and installing engine
13 - Crankshaft group
15 - Cylinder head, valve gear
17 - Lubrication
19 - Cooling
21 - Turbocharging/supercharging
24 - Mixture preparation - injection
26 - Exhaust system
28 - Ignition 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.

00 – Technical data

1 Safety information

(VRL015876; Edition 07.2021)

⇒ r1.1 egulations for working on fuel supply", page 1

⇒ m1.2 easures when working on vehicles with start/stop system", page 1

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1.1 Safety regulations for working on fuel supply

Risk of injury from highly pressurised fuel.

The fuel system is pressurised. Injury from fuel spray possible.

Before opening the fuel system:

– Wear safety goggles.

– Wear protective gloves.

– To release pressure, wrap a clean cloth around the connection and carefully loosen the connection.

Danger of fire caused by escaping fuel

When the battery is connected and the driver door opens, the door contact switch activates the fuel pump. Escaping fuel can ignite and cause a fire.

– Disconnect voltage supply to fuel pump before opening the fuel system.

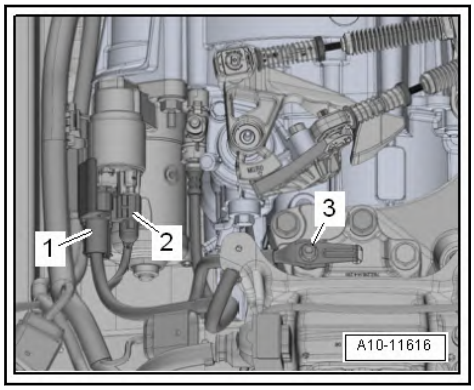
1.2 Safety measures when working on vehicles with start/stop system

Risk of injury from engine starting unexpectedly

If the vehicle's start/stop system is activated, the engine can start unexpectedly. A message in the dash panel insert indicates whether the start/stop system is activated.

– Deactivate start/stop system by switching off the ignition.

Vehicles with manual gearbox:



– Disconnect electrical connector -2-.

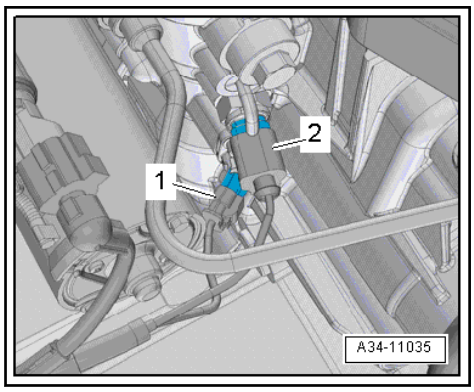
– Push back cover for battery positive terminal -1-, and unbolt battery positive cable from starter solenoid switch.

– Unscrew nut -3- and remove earth wire.

Note

Depending on vehicle version, the earth wire is secured to the starter bolt.

– Disconnect electrical connections at front left of gearbox.



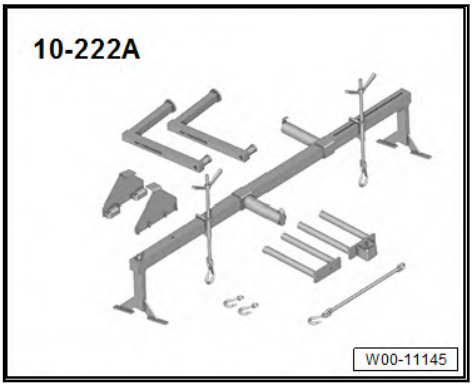
1 - For gearbox neutral position sender -G701-

2 - For reversing light switch -F4-

– Disconnect gear selector cable and gate selector cable from gearbox. Then, unbolt cable support bracket, and lay it to one side together with cables ⇒ Rep. gr. 34; Selector mechanism; Removing and installing selector mechanism.

– Remove bleeder connection -3- from gearbox.

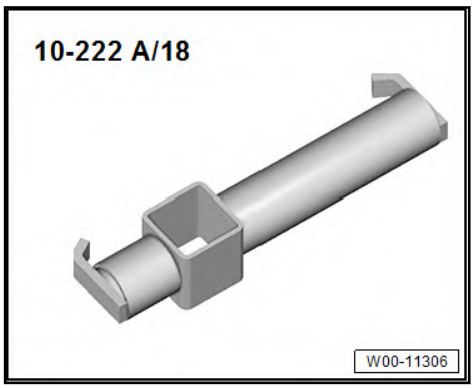
- Support bracket -10 - 222 A-



- 2 x adapter -10 - 222 A /29-



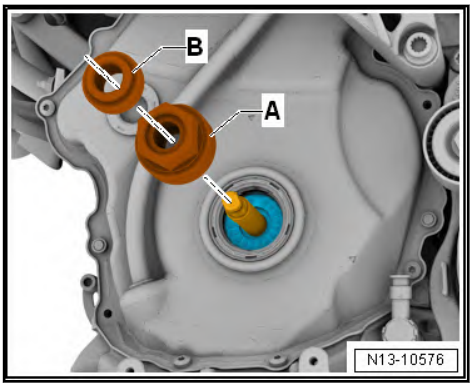
- Adapter -10 - 222 A /18-



- Hook -10 - 222 A /20-



Installing

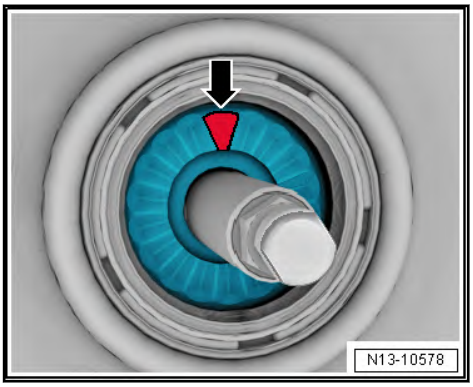


Install in reverse order of removal, observing the following:

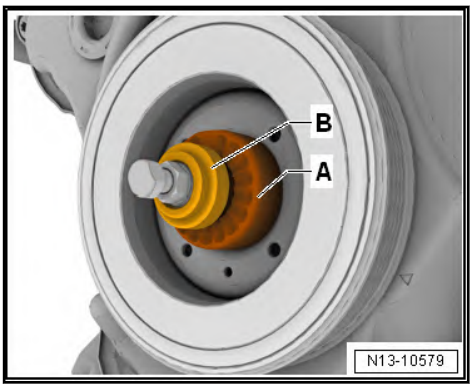
- Renew bolt with O-ring after removal.

– If necessary, remove flange nut -T10531/4- -B- and turning over tool -T10531/3- -A- from clamping pin -T10531/6-.

– Fit vibration damper in TDC position. Pay attention to teeth of chain sprocket -arrow- while doing so.



– Fit turning over tool -T10531/3- -A- on clamping pin -T10531/6-.



- The hexagon faces the vibration damper.

– Screw on flange nut -T10531/4- -B-. Move vibration damper slightly back and forth while doing so to ensure that vibration damper is properly seated on teeth.

– Tighten flange nut until vibration damper can no longer be turned.

– Position support -T10531/1- on vibration damper as shown and screw knurled screws -1, 3- into adapters finger-tight.

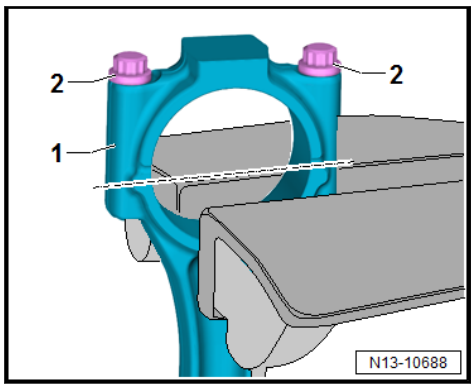
Piston ring	New mm	Wear limit mm
2 compression ring	0.40 to 0.50	0.70
Oil scraper ring	Cannot be measured	

5.5 Separating new conrod

On a new conrod, it is possible that the breaking point has not been fully separated. Proceed as follows if the conrod bearing cap cannot be removed by hand:

– Mark the cylinder to which the conrod belongs ⇒ Item 4 (page 127) .

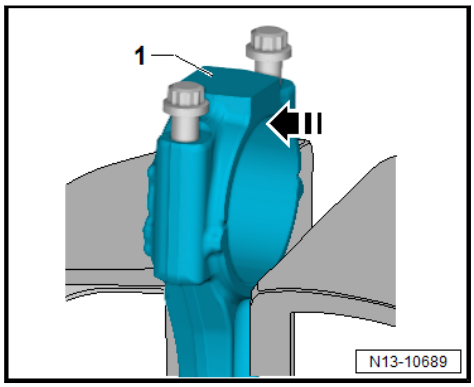
– Clamp conrod -1- in a vice below the dashed line using aluminium vice clamps.



- Only clamp the conrod lightly in order to avoid damaging it.

– Unscrew both bolts -2- about 5 turns.

– Using a plastic hammer, carefully knock against conrod bearing cap -1- in direction of -arrow- until it is loose.



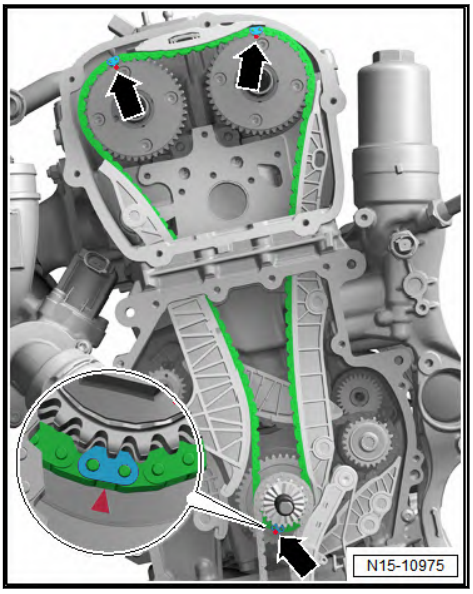
5.6 Checking radial clearance of conrods

Special tools and workshop equipment required

◆ Plastigage

Procedure

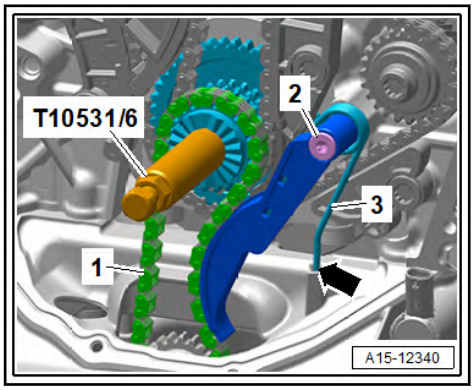
– Mark installation position and allocation of conrod bearing caps -1- to conrods ⇒ Item 2 (page 127) .



- Coloured chain links must align with markings on chain sprockets -arrows-.

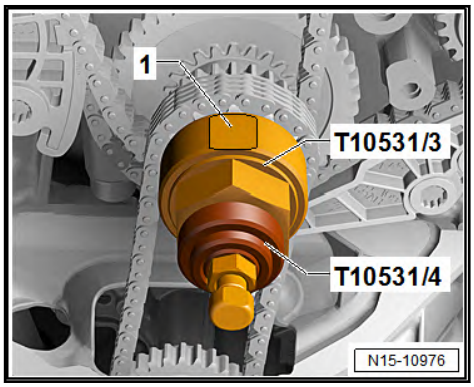
– Install timing valves ⇒ Item 8 (page 169) .

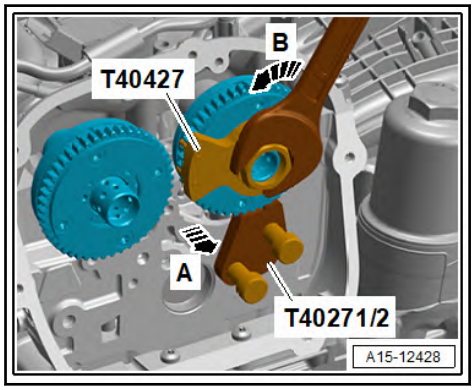
– Fit drive chain for oil pump.



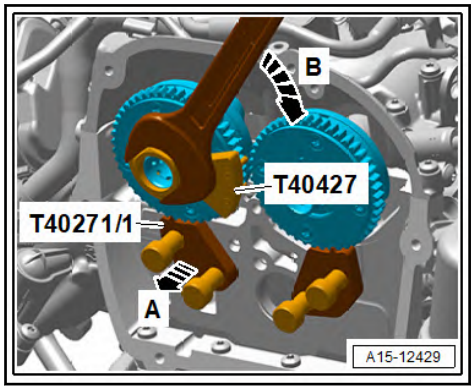
– Insert chain tensioner and tighten guide pins -2-.

– Attach retaining clip of tensioning spring -3- in recess on top section of sump -arrow-.

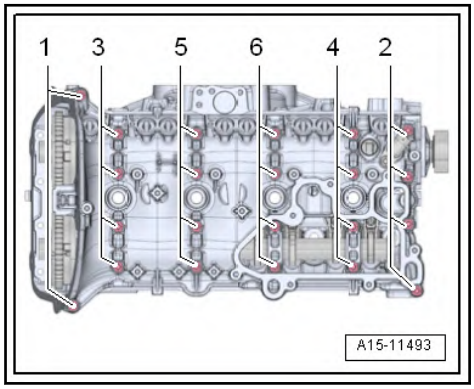




– Use assembly tool -T40427- to release pretension on exhaust camshaft in direction of -arrow B-, pull clamp -T40271/1- out of sprocket teeth -arrow A- and bring exhaust camshaft to rest position.

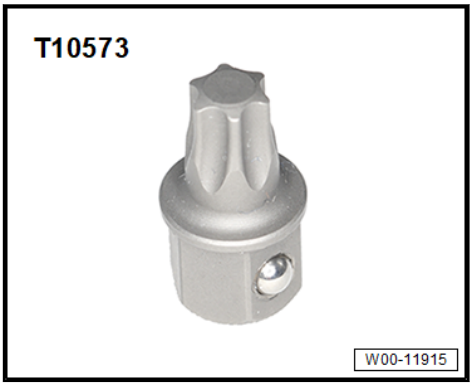


– Unscrew cylinder head cover bolts in the sequence -1 … 6-.



– Carefully detach cylinder head cover -2- from adhesive bond using a screwdriver -1- and remove together with camshafts.

- Bit -T10573-



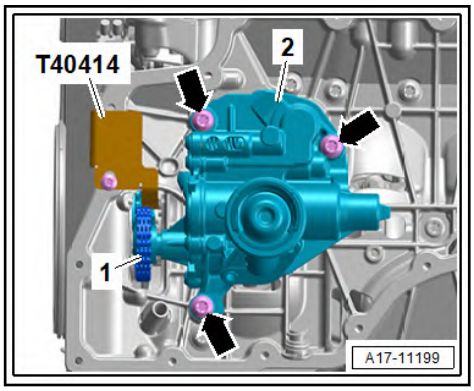
- Hand drill with plastic brush
- Safety goggles
- Sealant ⇒ Electronic Parts Catalogue

Removing

- Gearbox removed ⇒ Gearbox; Rep. gr. 34; Removing and installing gearbox; Removing gearbox.

– Remove sealing flange on gearbox side ⇒ a2.3 nd installing sealing flange on gearbox side", page 99 .

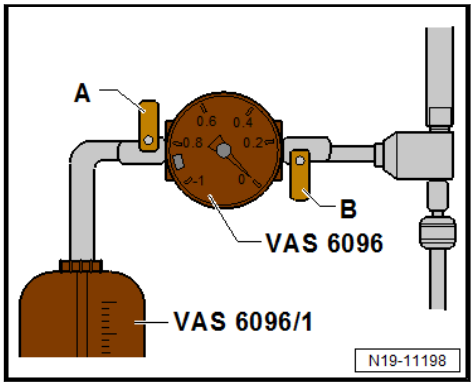
– Remove oil pump -2- ⇒ a1.4 nd installing oil pump", page 253 .



– Unscrew front air pipe but leave in installation position ⇒ a2.6.1 nd installing air intake pipe for throttle valve module/charge air cooler, DNFC, DNFE, DNFG, DSFB, DSFE, DSFF", page 368 .

– Remove locating pins -T40414- and bring tensioning rail for drive chain -1- into rest position.

– Separate electrical connector -1- for valve for oil pressure control -N428-.



- In cooling system, vacuum is generated by suction jet pump; needle of gauge must move into green area.

– Also briefly open valve -A- (turn lever in direction of flow to do this) so that hose on -VAS 6096- coolant reservoir fills with coolant.

– Close valve -A- again.

– Leave valve -B- open for a further 2 minutes.

- Vacuum continues to be generated in the cooling system by the suction jet pump; the needle of gauge must remain in green range.

– Close valve -B-.

- The needle on the gauge should stop in the green zone. The vacuum level in the cooling system is then sufficient for subsequent filling.
- If the needle does not reach the green zone, repeat the process.
- If the vacuum drops, check the cooling system for leaks.

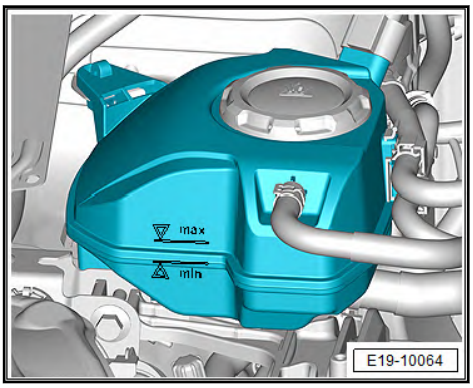
– Pull off compressed air hose.

– Open valve -A-.

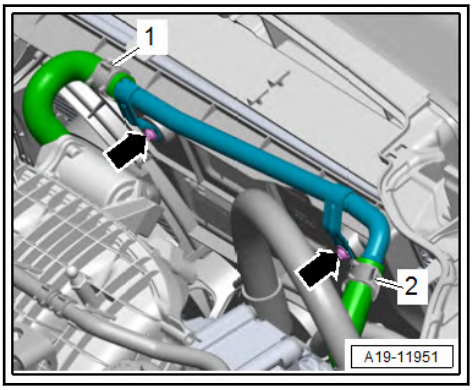
- Vacuum in cooling system causes coolant to be extracted from -VAS 6096- coolant reservoir and coolant system to be filled.

– Remove cooling system charge unit -VAS 6096- from coolant expansion tank.

– Fill coolant up to “max.” mark.

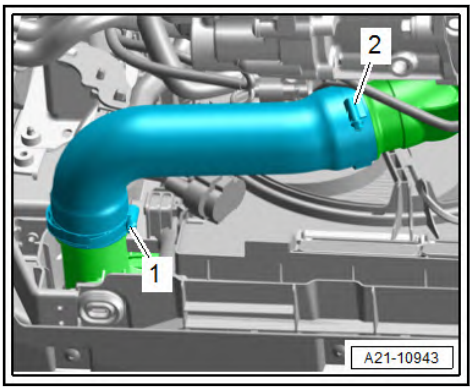


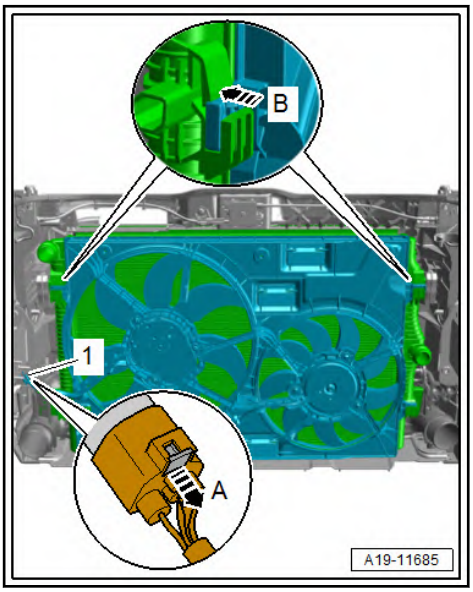
– Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Assembly overview – noise insulation.



– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Assembly overview - noise insulation.

– Release hose clips -1, 2- and remove air intake hose.



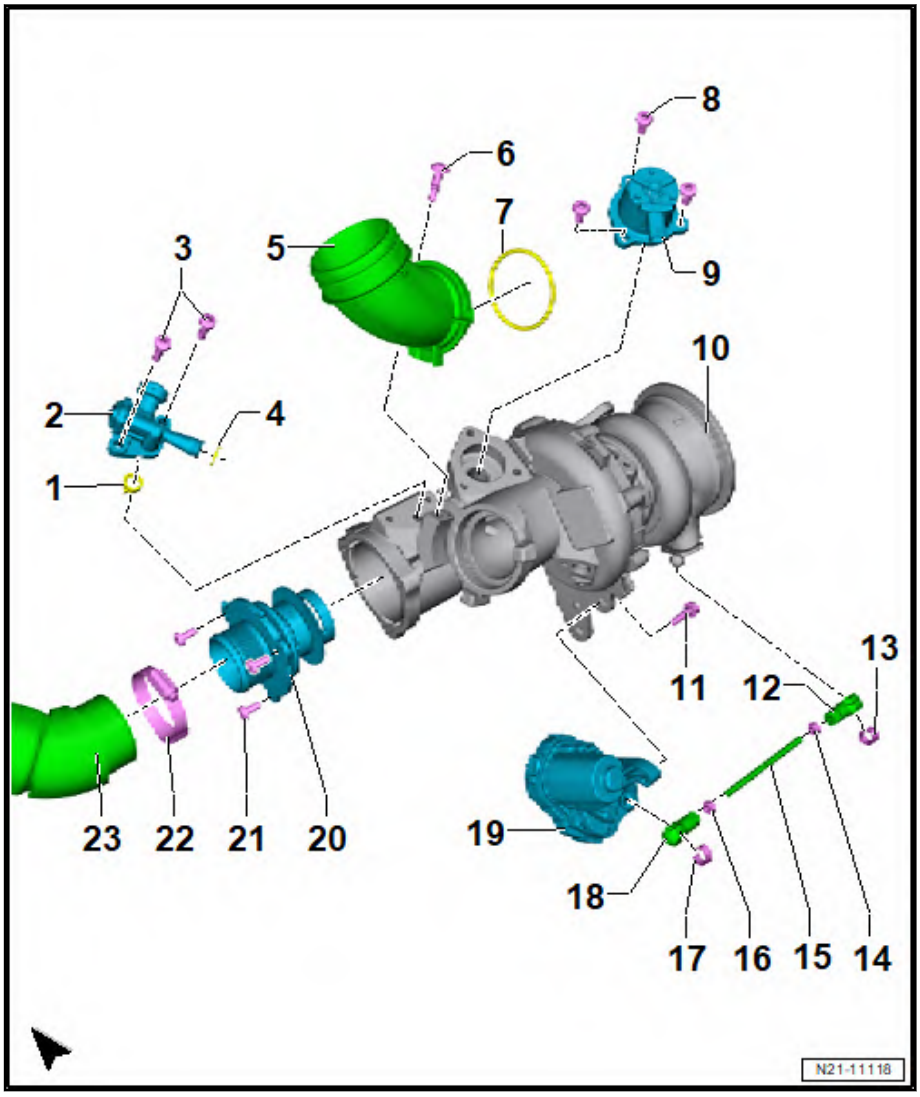


⚠ CAUTION

Danger of injury; the radiator fans can run at any time.

– Disconnect electrical connectors.

– Unplug electrical connector -1- for radiator fan (push retainer in direction of -arrow A- and press release catch down).



1 - O-ring
- ❑ Renew after removal

2 - Venturi nozzle

3 - Bolt
- ❑ 9 Nm

4 - O-ring
- ❑ Renew after removal

5 - Union

6 - Bolt
- ❑ 9 Nm

7 - O-ring
- ❑ Renew after removal

8 - Bolt
- ❑ 9 Nm

9 - Turbocharger air recirculation valve -N249-

10 - Turbocharger
- ❑ Removing and installing ⇒ page 347
- ❑ Adaptations are necessary after this component has been renewed ⇒ d3.2 iagnoses", page 6

11 - Bolt
- ❑ 9 Nm

12 - Ball socket

13 - Securing spring
- ❑ Renew after removal

14 - Nut
- ❑ 8 Nm

15 - Control rod

16 - Nut
- ❑ 8 Nm

17 - Securing spring
- ❑ Renew after removal

18 - Ball socket

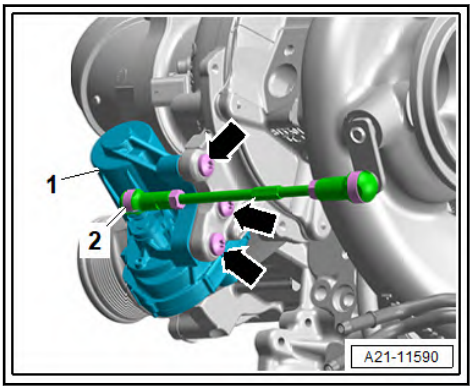
19 - Charge pressure control module -GX34-
- ❑ Consisting of

♦ Charge pressure positioner -V465-

♦ Position sender for charge pressure positioner -G581-
- ❑ Before removing charge pressure control module -GX34- from turbocharger, ensure that this item is available on its own ⇒ Electronic parts catalogue.
- ❑ Removing and installing ⇒ a1.3 nd installing charge pressure control moduleGX34", page 353
- ❑ Adaptations are necessary after this component has been renewed ⇒ d3.2 iagnoses", page 6

20 - Connection

21 - Bolt



– Unscrew bolts -arrows- and remove charge pressure control module -GX34- -item 1-.

Installing

Install in reverse order of removal, observing the following:

- Secure all hose connections with hose clips corresponding to the series equipment ⇒ Electronic parts catalogue.

– Push control rod onto ball stud until it audibly engages.

– Fit engine cover panel ⇒ a3.1 nd installing engine cover", page 76 .

– Add coolant ⇒ w1.3.2 ith coolant", page 282 .

Adaptations must be carried out after renewing charge pressure control module ⇒ d3.2 iagnoses", page 6 .

Specified torques

♦ ⇒ o1.1 verview – turbocharger", page 337

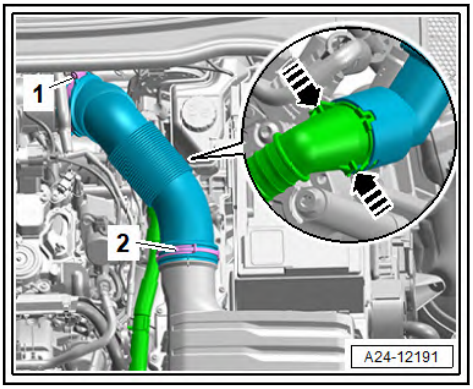
1.4 Removing and installing sender 1 for turbocharger speed -G688-, DNFC, DNFE, DNFG, DSFB, DSFE, DSFF

Removing

- Observe rules for cleanliness ⇒ f3.1 or cleanliness", page 6 .

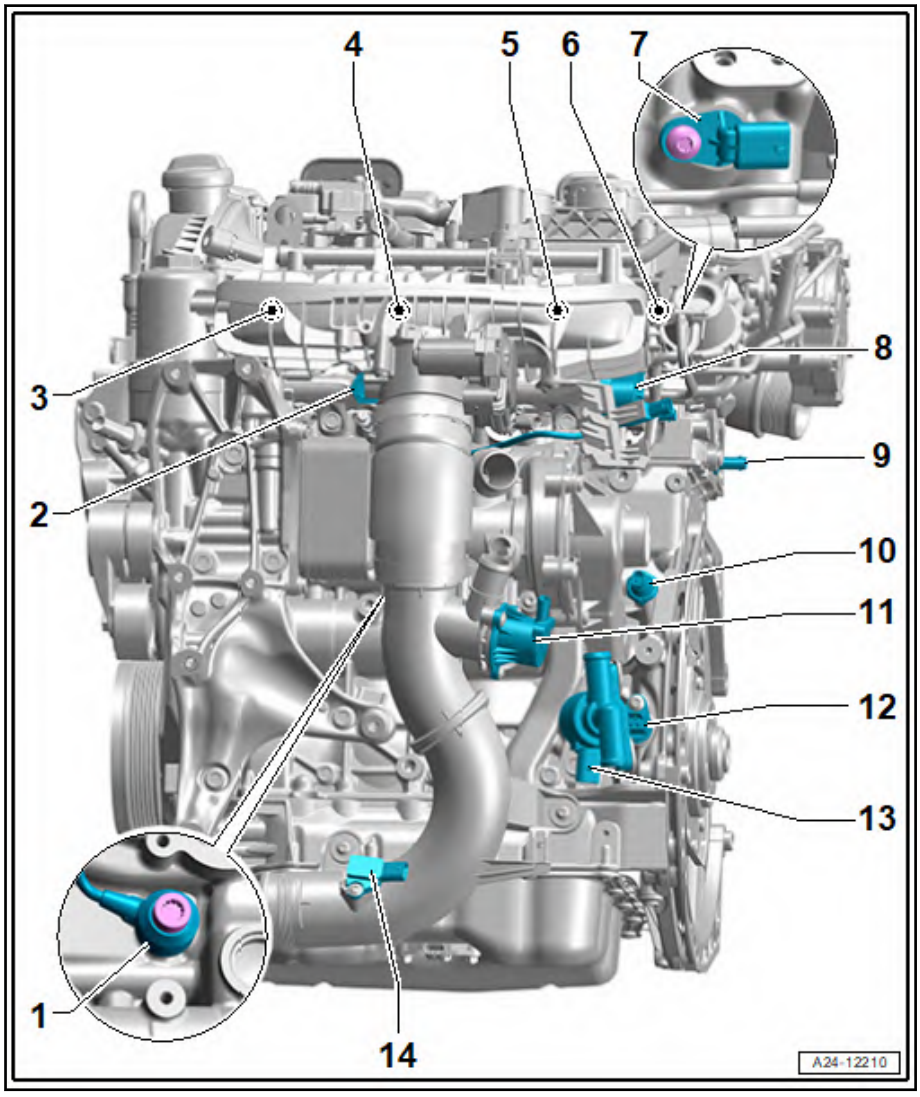
– Remove engine cover panel ⇒ a3.1 nd installing engine cover", page 76 .

– Release hose clips -1, 2- and remove air intake pipe.



– Release fasteners -arrows-, separate air intake hose.

– Disconnect electrical connector -2-.



1 - Knock sensor 1 -G61-

- ❑ Assembly overview ⇒ o1.1 verview - ignition system", page 492

2 - Throttle valve module - GX3-

- ❑ Consisting of

- ♦ Throttle valve module - J338-
- ♦ Throttle valve drive for electronic power control - G186-
- ♦ Throttle valve drive angle sender 1 for electronic power control -G187-
- ♦ Throttle valve drive angle sender 2 for electronic power control -G188-

- ❑ Assembly overview ⇒ o5.1 verview – intake manifold", page 404

3 - No. 1 cyl. injector -N30-

- ❑ Assembly overview ⇒ o3.1 verview - fuel rail with injectors", page 387

4 - No. 2 cyl. injector -N31-

- ❑ Assembly overview ⇒ o3.1 verview - fuel rail with injectors", page 387

5 - No. 3 cyl. injector -N32-

- ❑ Assembly overview ⇒ o3.1 verview - fuel rail with injectors", page 387

6 - No. 4 cyl. injector -N33-

- ❑ Assembly overview ⇒ o3.1 verview - fuel rail with injectors", page 387

7 - Hall sender -G40-

- ❑ Assembly overview ⇒ o1.1 verview - ignition system", page 492

8 - Intake manifold flap air flow control valve -N316-

- ❑ Assembly overview ⇒ o5.1 verview – intake manifold", page 404

9 - Radiator outlet coolant -G62-

- ❑ Assembly overview ⇒ o2.4 verview - coolant temperature sender", page 294

10 - Stage 2 oil pressure switch -F446-

- ❑ Assembly overview ⇒ o4.2 verview - oil pressure switches/oil pressure control", page 267

11 - Turbocharger air recirculation valve -N249-

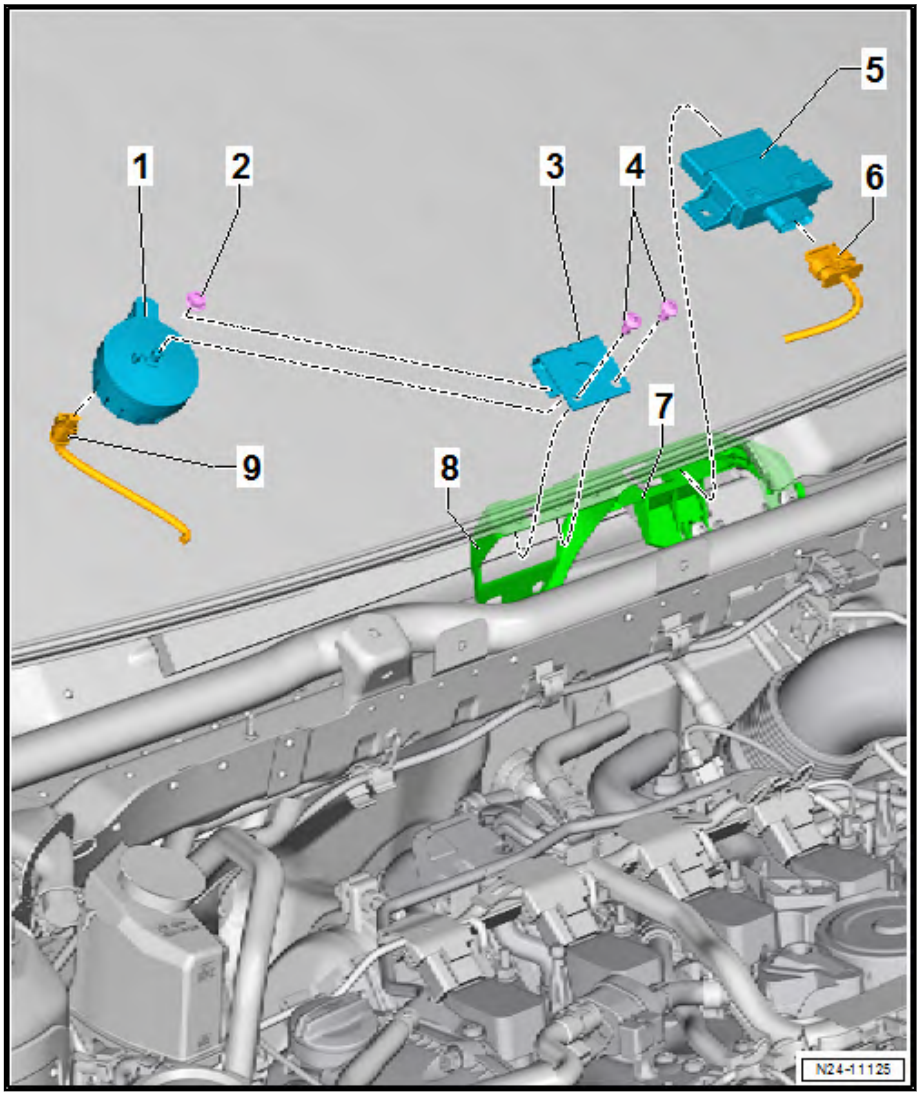
- ❑ DNPA, DNNA, DRNA installed on turbocharger
- ❑ Assembly overview ⇒ o1.1 verview – turbocharger", page 337

12 - Engine speed sender -G28-

- ❑ Assembly overview ⇒ o1.1 verview - ignition system", page 492

13 - Coolant valve for gearbox -N488-

- ❑ Assembly overview ⇒ o2.3 verview – coolant valves", page 293



1 - Actuator for structure-borne sound -R214-

- ❑ Fitting location: in plenum chamber
- ❑ To remove or install, remove plenum chamber bulkhead ⇒ General body repairs, exterior; Rep. gr. 50; Plenum chamber bulkhead; Removing and installing plenum chamber bulkhead.
- ❑ Attached to bracket with nut, item -2-

2 - Nut

- ❑ for actuator for structure-borne sound -R214-
- ❑ Loosen and tighten using roughened open-end spanner
- ❑ 7 Nm

3 - Bracket

- ❑ for actuator for structure-borne sound -R214-
- ❑ Can only be renewed with windscreen removed

4 - Bolts

- ❑ Can only be unscrewed with windscreen removed
- ❑ 9 Nm

5 - Control unit for structure-borne sound -J869-

- ❑ Fitting location: in plenum chamber
- ❑ Remove plenum chamber for removing ⇒ General body repairs, exterior; Rep. gr. 50; Plenum chamber bulkhead; Removing and installing plenum chamber cover.
- ❑ Secured by threaded fasteners or clips depending on version

6 - Connector

- ❑ for control unit for structure-borne sound -J869-

7 - Support

- ❑ for control unit for structure-borne sound -J869-
- ❑ May vary slightly depending on version

8 - Support

- ❑ for actuator for structure-borne sound -R214-
- ❑ May vary slightly depending on version

9 - Connector

- ❑ for actuator for structure-borne sound -R214-