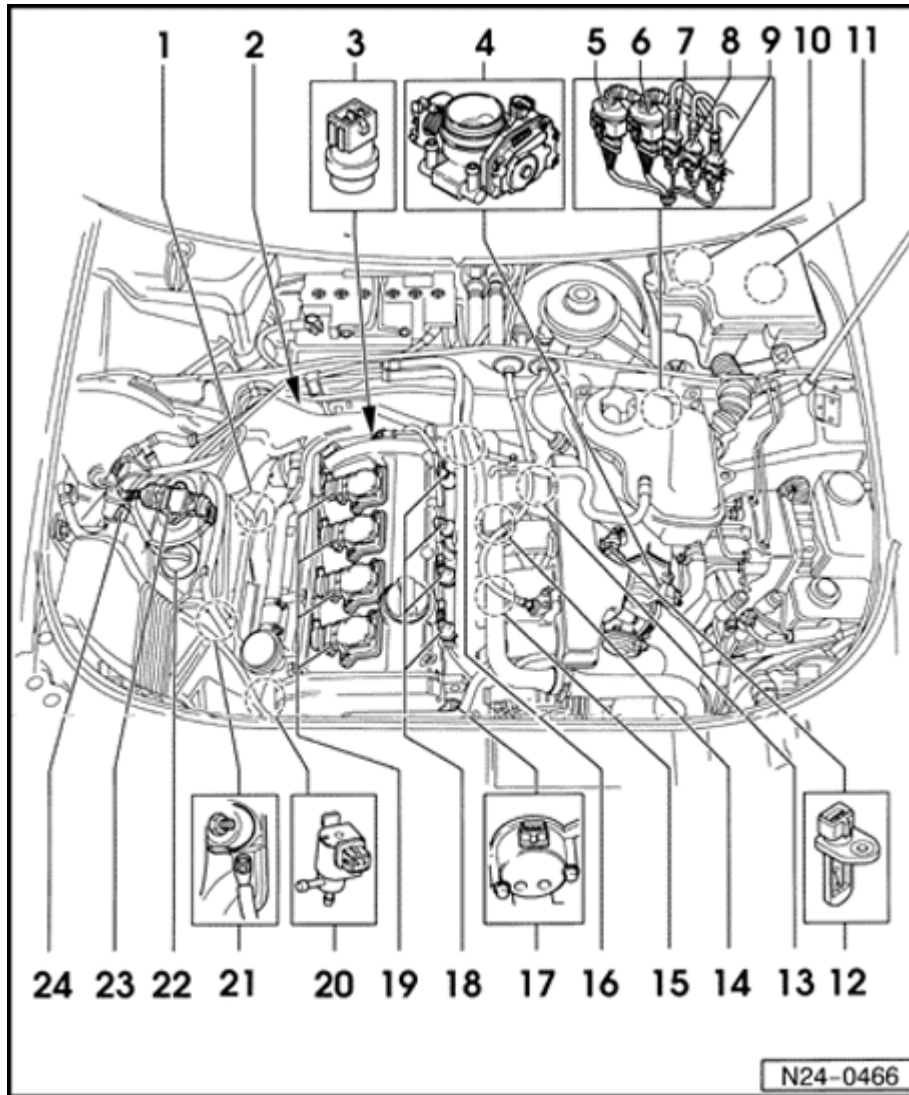


Fuel injection system, servicing

Component locations overview

- 1 - Oxygen sensor 1 before Three Way Catalyst G39
- 2 - Oxygen sensor 2 after Three Way Catalyst G130
- 3 - Engine Coolant Temperature sensor G62
- 4 - Throttle Body Control Module J338
- 5 - 4-pin harness connector
 - ◆ Brown for Oxygen sensor 1 G39
- 6 - 4-pin harness connector
 - ◆ Black for Oxygen sensor 2 G130
- 7 - 3-pin harness connector
 - ◆ Grey for engine speed sensor G28
- 8 - 3-pin harness connector
 - ◆ Green for knock sensor 1 G61
- 9 - 3-pin harness connector
 - ◆ Blue for knock sensor 2 G66



10 - Barometric sensor F96

- ◆ Installing location: In protective housing, plenum chamber, left

11 - Engine Control Module J220

- ◆ Installing location: In protective housing, plenum chamber, left

12 - Intake Air Temperature sensor G42

13 - Engine speed sensor G28

14 - Knock sensor 2 G66

- ◆ ⇒ [page 28-4](#) , item 15

15 - Knock sensor 1 G61

- ◆ ⇒ [page 28-3](#) , item 14

16 - Fuel pressure regulator

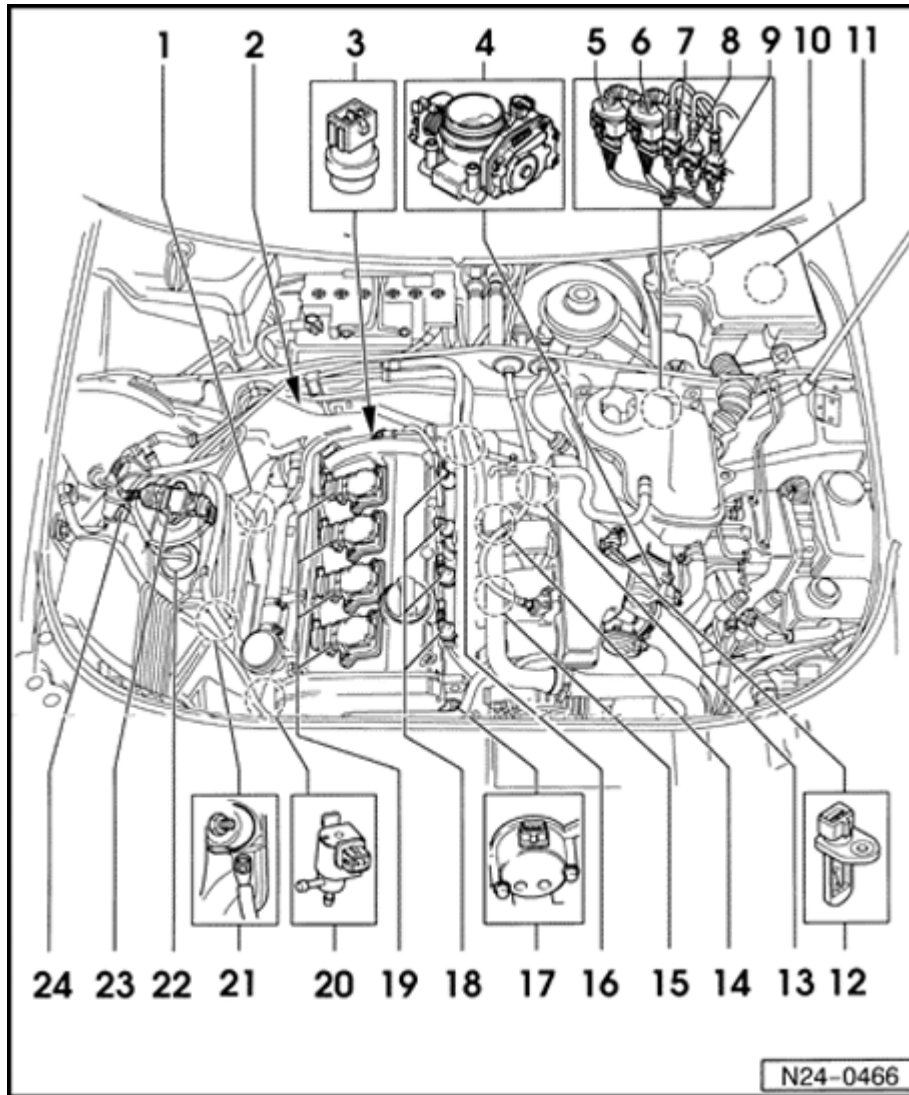
17 - Camshaft Position sensor G40

- ◆ ⇒ [page 28-4](#) , item 18

18 - Fuel Injector N30, N31, N32, N33

19 - Ignition coils N, N128, N158 and N163

- ◆ ⇒ [page 28-3](#) , item 9



20 - Wastegate Bypass Regulator Valve N75

- ◆ Boost pressure system:

⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Engine Code\(s\): AEB, ATW, Repair Group 21](#)

21 - Ground connection

- ◆ On engine support, right

22 - Mass Air Flow sensor G70

23 - Power Output stage N122

⇒ [page 28-2](#) , item 2

24 - EVAP canister purge regulator valve 1 N80

- ◆ On Air Cleaner
- ◆ Evaporative emissions system (EVAP)

⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Engine Code\(s\): AEB, ATW, Repair Group 20](#)



Fuel Injection system, general notes

Ignition system, servicing ⇒ [page 28-1](#)

- ◆ *The Engine Control Module (ECM) is equipped with On board Diagnostic. Before carrying out repairs and Troubleshooting; DTC memory must be checked. Also check the vacuum hoses and connections for leaks or unmeasured air.*

- ◆ *Fuel hoses in engine compartment must only be secured with spring clips. The use of clamp or screw clips is not permissible.*

- ◆ *VAG 1921 pliers are recommended for installing spring clips.*

- ◆ *Disconnecting and connecting the battery must only be done with the ignition switched off, otherwise the Engine Control Module could be damaged.*

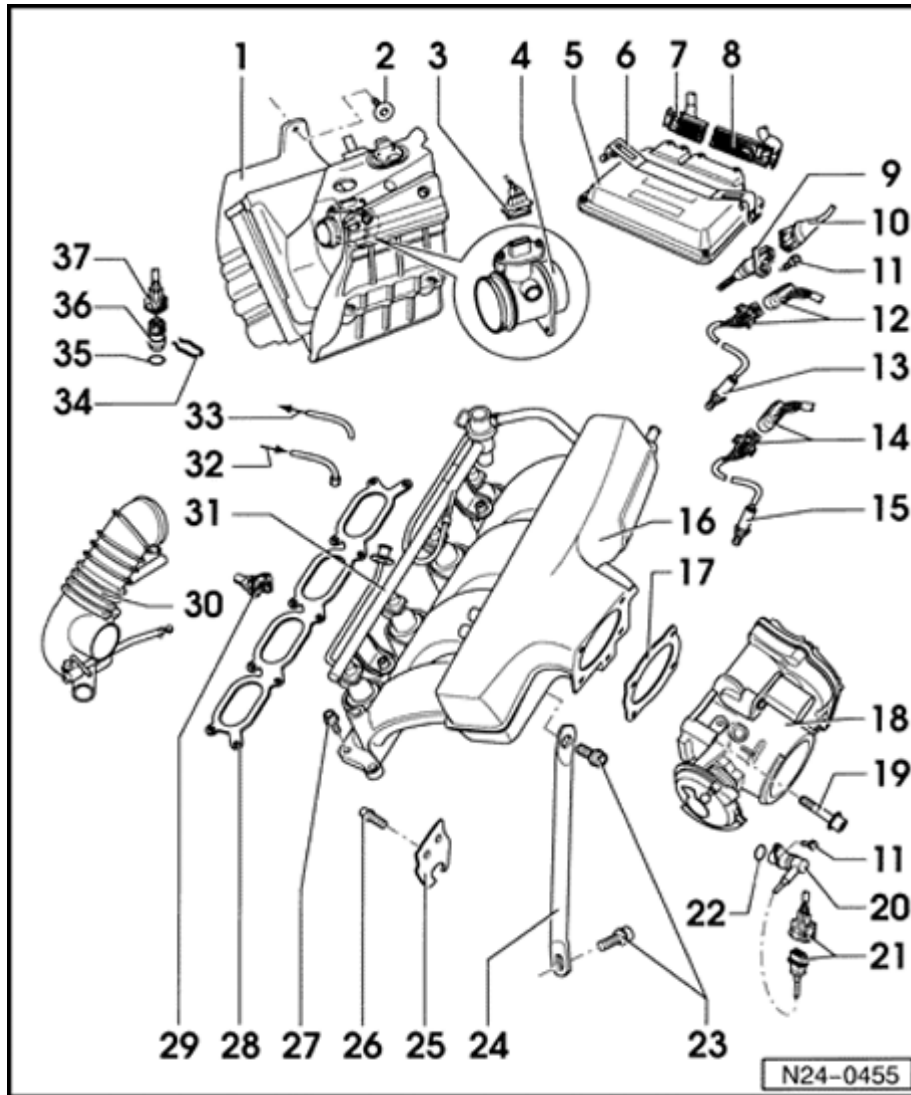
- ◆ *Components marked with * are checked via the On Board Diagnostic system ⇒ [page 01-11](#) , checking and erasing DTC memory.*

- ◆ *Components marked with ** can be checked via the Output Diagnostic Test Mode (DTM) ⇒ [page 01-37](#) .*

- ◆ *For trouble-free operation of the electrical components, 11.5 Volts minimum is required.*

- ◆ *Do not use sealants containing silicone. Particles of silicone drawn into the engine, will not be burnt in the engine and can impair Oxygen sensor function.*

- ◆ *During some checks it is possible that the Control Module will recognise and store a malfunction. Therefore after completing all checks and repairs DTC memory must be checked and if necessary erased. ⇒ [page 01-11](#) , checking and erasing DTC memory*



Fuel injection system components, removing and installing

WARNING!

Fire Hazard! Do NOT have anything in area that can ignite fuel!

Safety precautions ⇒ [page 24-16](#)

Rules for cleanliness ⇒ [page 24-17](#)

Technical data ⇒ [page 24-18](#)

Engine operating mode, checking ⇒ [page 24-117](#)

1 - Air Cleaner

◆ Dismantling and assembling ⇒ [page 24-12](#)

2 - 20 Nm (15 ft lb)

3 - 4-pin harness connector

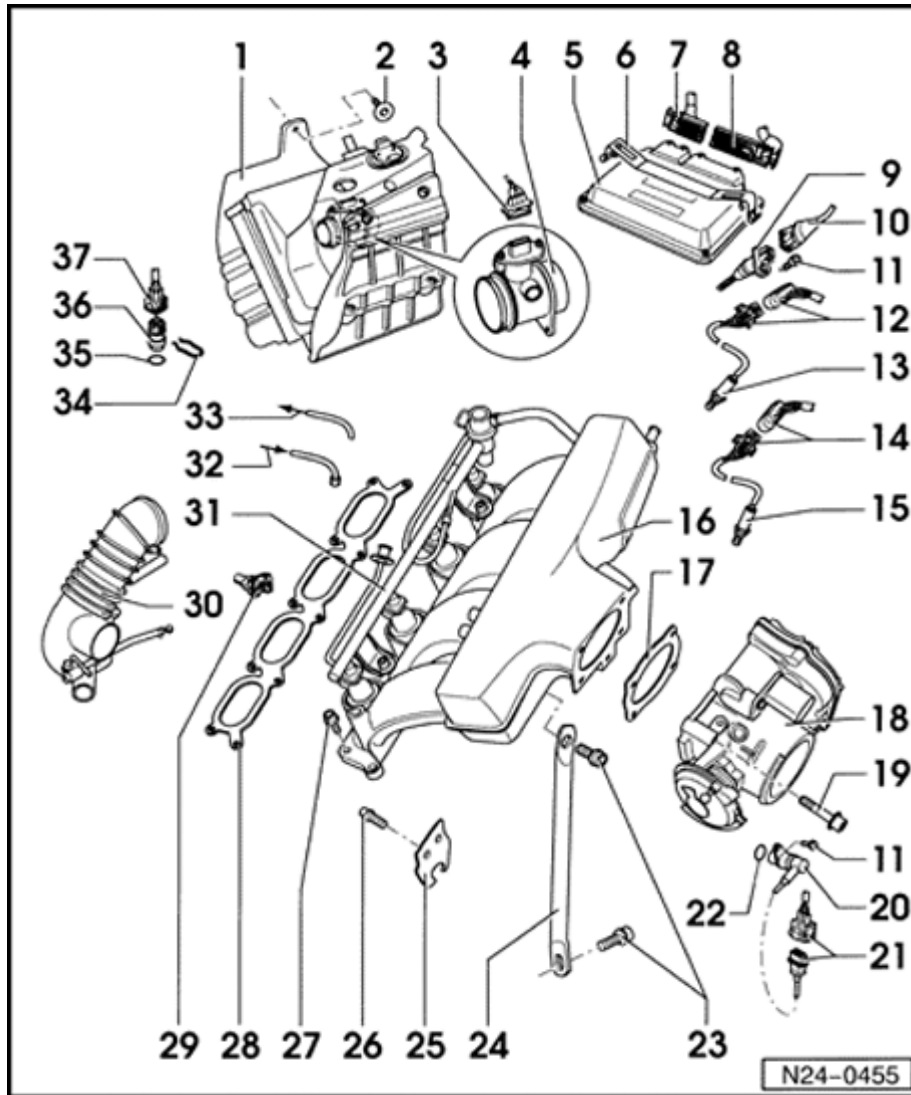
◆ Black

◆ for Mass Air Flow sensor G70

4 - Mass Air Flow sensor G70*

◆ Installing location: In Air Cleaner housing

◆ Checking ⇒ [page 24-31](#)



5 - Engine Control Module J220*

- ◆ Installing location: In protective housing, plenum chamber, left
- ◆ Checking Voltage supply ⇒ [page 24-121](#)
- ◆ Procedure after Voltage supply open circuit ⇒ [page 24-126](#)
- ◆ Replacing ⇒ [page 24-121](#)

6 - Mounting plate

7 - 28-pin harness connector

- ◆ Only disconnect or connect with ignition switched OFF
- ◆ Unlatch to disconnect

8 - Connector

- ◆ Only disconnect or connect with ignition switched OFF
- ◆ Unlatch to disconnect

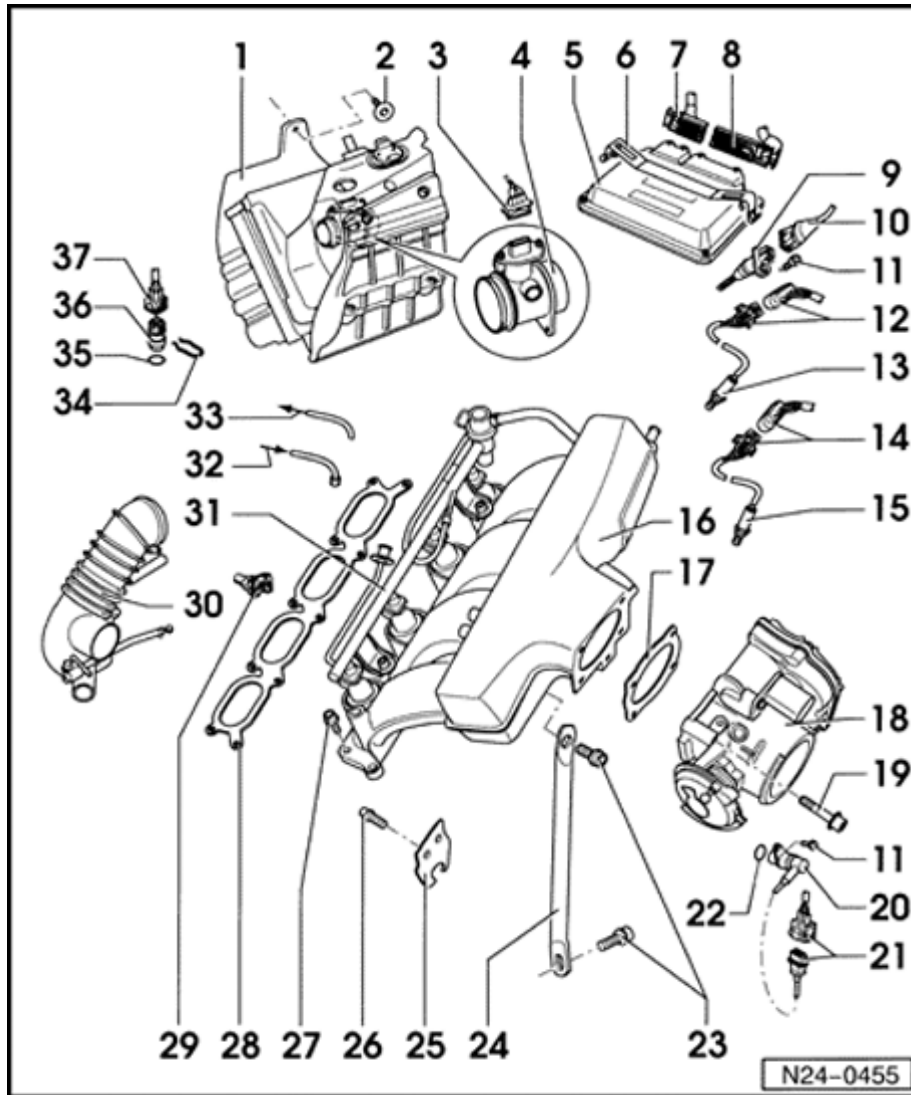
9 - Intake Air Temperature sensor G42*

- ◆ Checking ⇒ [page 24-61](#)
- ◆ Resistance graph ⇒ [page 24-15](#) , Fig. ⇒ [2](#)

10 - 2-pin harness connector

◆ Black

◆ For Intake Air Temperature sensor G42



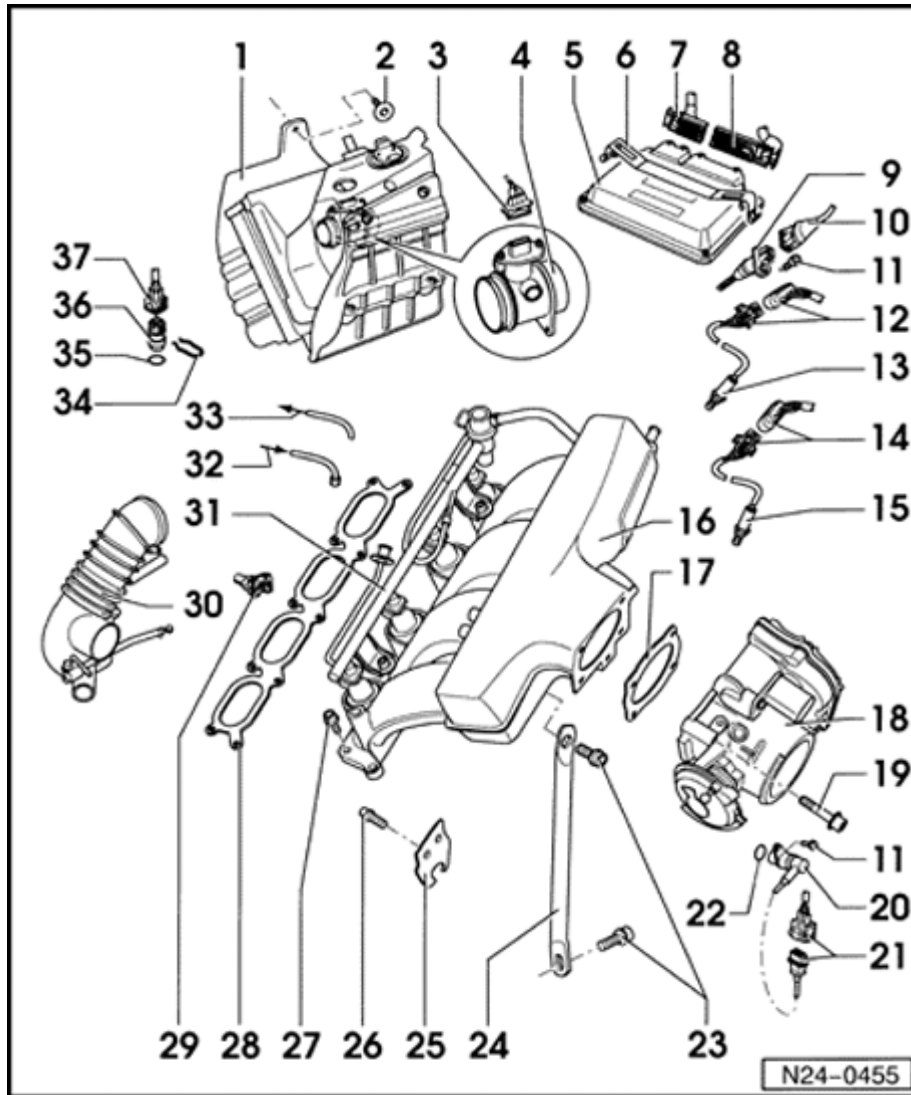
11 - 10 Nm (7 ft lb)

12 - 4-pin harness connector

- ◆ Brown
- ◆ For Oxygen sensor and Oxygen sensor heating before Three Way Catalyst (Location: Three Way Catalyst)
- ◆ Installing location ⇒ [page 24-1](#)

13 - Oxygen sensor 1 G39*

- ◆ 50 Nm (37 ft lb)
- ◆ Installing location: Three Way Catalyst
- ◆ Grease threads with "G5" only; it must not get into the slots on the sensor body
- ◆ Checking Oxygen sensor and Oxygen sensor control before Three Way Catalyst ⇒ [page 24-97](#)
- ◆ Oxygen sensor aging Checking Oxygen sensor before Three Way Catalyst ⇒ [page 24-114](#)
- ◆ Oxygen sensor heating Voltage supply via Fuel pump relay J17
- ◆ Checking Oxygen sensor heating for sensor before Three Way Catalyst ⇒ [page 24-19](#)
- ◆ Installing location ⇒ [page 24-1](#)



18 - Throttle Body Control Module J338*

- ◆ Checking ⇒ [page 24-37](#)
- ◆ If replaced, match to ECM ⇒ [page 24-134](#)

19 - 10 Nm (7 ft lb)

20 - Engine speed sensor G28*

- ◆ Checking ⇒ [page 24-69](#)

21 - 3-pin harness connector

- ◆ Grey
- ◆ For engine speed sensor
- ◆ Installing location ⇒ [page 24-1](#)

22 - O-ring

23 - 20 Nm (15 ft lb)

24 - Support

- ◆ Between intake manifold and assembly bracket

25 - Support bracket

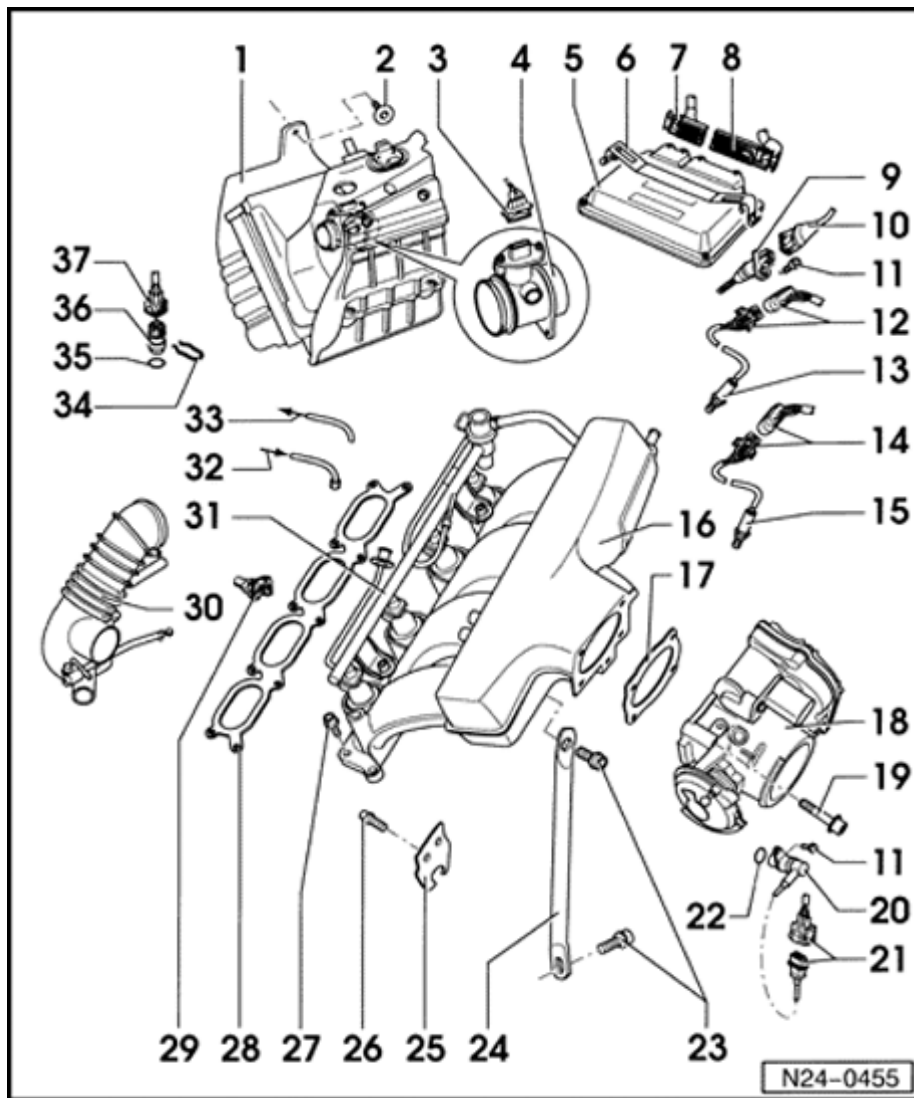
- ◆ for throttle cable

26 - 10 Nm (7 ft lb)

27 - 10 Nm (7 ft lb)

28 - Seal

◆ Replace



29 - 2-pin harness connector

- ◆ Black
- ◆ for Fuel injectors N30 to N33

30 - Intake hose

⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Engine Code\(s\): AEB, ATW, Repair Group 21](#)

31 - Fuel manifold with injectors

- ◆ Disassembling and assembling ⇒ [page 24-14](#)

32 - Supply line

- ◆ Black
- ◆ From fuel filter:

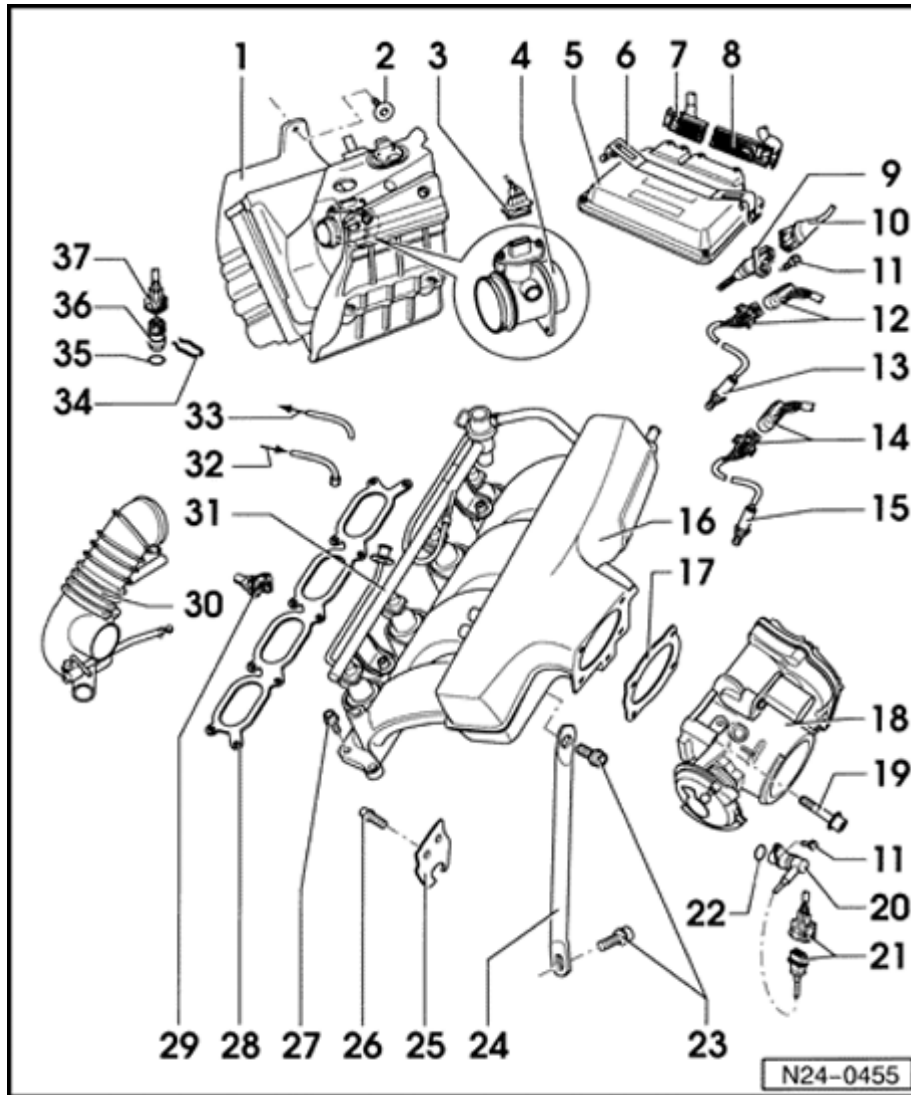
⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Engine Code\(s\): AEB, ATW, Repair Group 20](#)

33 - Return line

- ◆ Secure with spring clips
- ◆ Ensure it is securely seated
- ◆ Blue

◆ to fuel delivery unit in fuel tank

⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Engine
Mechanical, Engine Code\(s\): AEB, ATW, Repair Group 20](#)



34 - Retaining clip

- ◆ Check seated securely

35 - O-ring

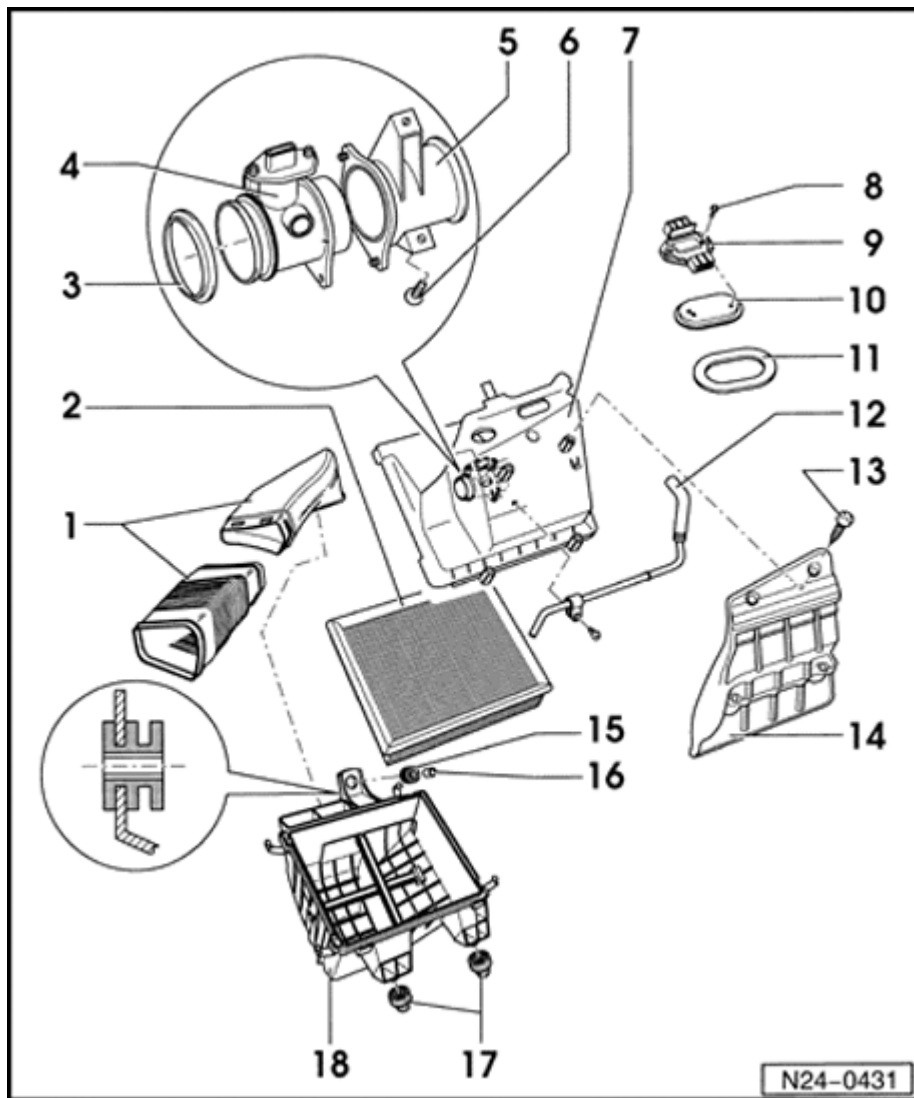
- ◆ Replace if damaged

36 - Engine Coolant Temperature sensor G62*

- ◆ Blue
- ◆ For Engine Control Module
- ◆ With coolant temp gauge sensor
- ◆ Checking ⇒ [page 24-53](#)
- ◆ If necessary, release cooling system pressure before removing
- ◆ Resistance graph ⇒ [page 24-15](#) , Fig. ⇒ [1](#)

37 - 4-pin harness connector

- ◆ Blue
- ◆ For Engine Coolant Temperature sensor G62



Air Cleaner assembly, disassembling and assembling

1 - Air ducting

- ◆ to lock carrier

2 - Filter element

3 - Oil seal

4 - Mass Air Flow sensor G70*

- ◆ Checking ⇒ [page 24-31](#)

5 - Air duct

6 - 6 Nm (53 in. lb)

7 - Air Cleaner upper part

8 - 6 Nm (53 in. lb)

9 - Power Output stage N122

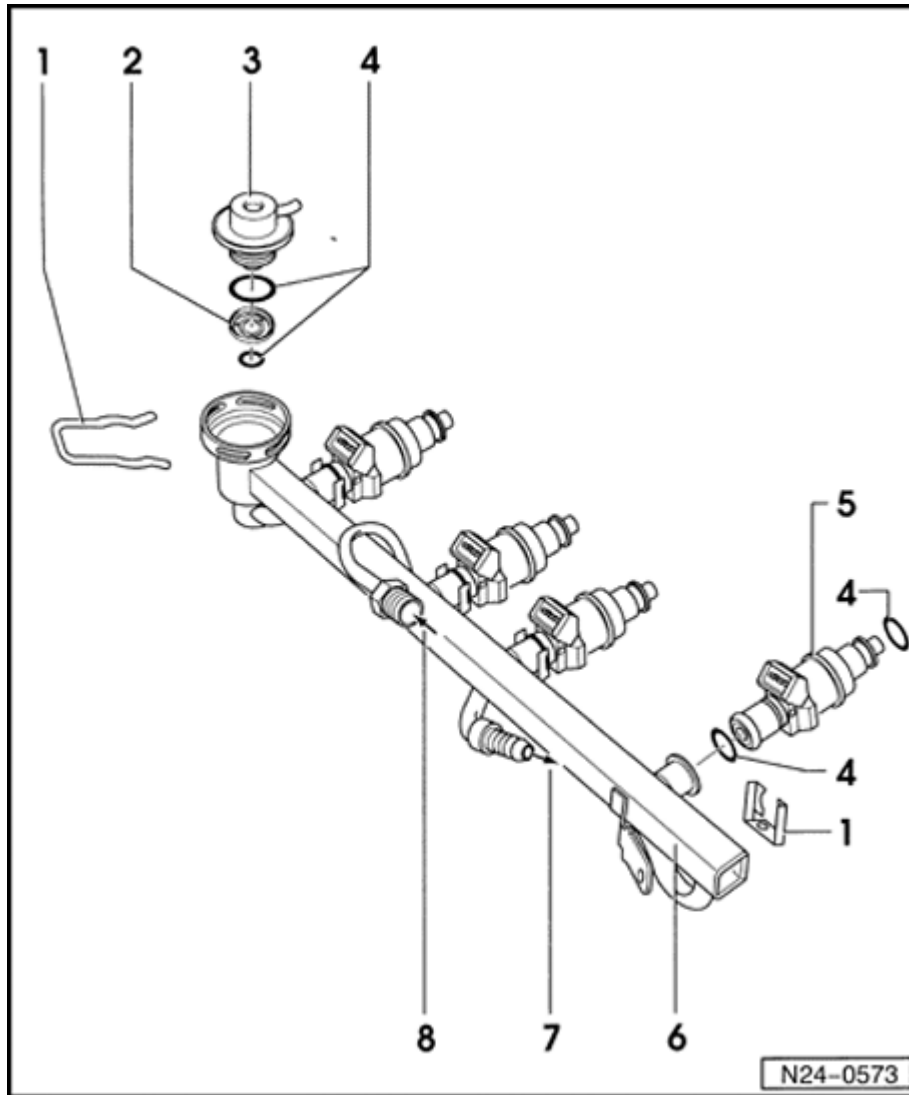
- ◆ ⇒ [page 28-2](#) (item 2)

10 - Cooling element

11 - Rubber grommet

12 - Pipe

- ◆ for Evaporative emissions system



Fuel injection manifold assembly, disassembling and assembling

WARNING!

Fire Hazard! Do NOT have anything in area that can ignite fuel!

1 - Retaining clip

- ◆ Ensure seated correctly at fuel injector and fuel rail

2 - Strainer

3 - Fuel pressure regulator

- ◆ Checking ⇒ [page 24-81](#)

4 - O-ring

- ◆ Replace if damaged

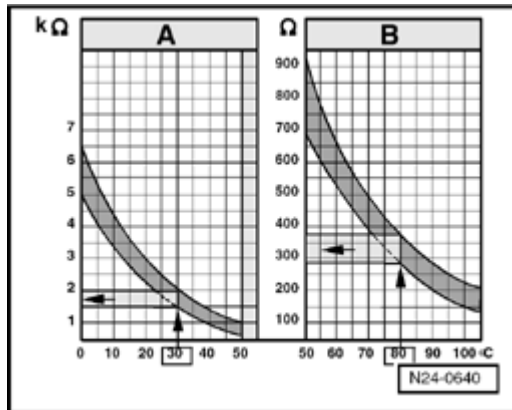
5 - Fuel injectors N30 to N33*

- ◆ Checking ⇒ [page 24-75](#)
- ◆ Resistance 12 to 15 Ω

6 - Fuel rail

7 - Return connection

8 - Supply connection



A

Fig. 1 Resistance graph

The diagram is valid for Engine Coolant Temperature sensor G62 and intake air sensor G42.

The diagram is divided into two temperature ranges:

A - From 0 to 50 ° C

B - From 50 to 105 ° C

Examples:

- ◆ 30 ° C is range A and corresponds to a resistance of 1.5 to 2.0 kΩ
- ◆ 80 ° C is range B and corresponds to a resistance of 275 to 375 Ω



Safety precautions

Warning!

The fuel system is pressurized! Before loosening hose connections or opening the test connection, wrap a cloth around the connection. Then release pressure by carefully pulling off the hose or carefully unscrewing sealing plug.

To prevent injuries to persons and/or damage to the fuel injection and ignition systems, observe the following precautions:

- ◆ Do not touch or disconnect ignition wiring when the engine is running or being turned over via the starter.
- ◆ Switch OFF the ignition before connecting or disconnecting fuel injection or ignition system wiring or tester cables.
- ◆ If the engine is to be turned at starter speed, without starting:

**A**

- Disconnect 5-pin harness connector -1- from ignition coil Power Output stage -2-

Observe following if test instruments are required during test drive:

- ◆ Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location. If test and measuring instruments are operated from front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.



Rules for cleanliness

When working on the fuel supply/injection system, pay careful attention to the following "5 rules":

- ◆ Thoroughly clean all unions and the adjacent areas before disconnecting.
- ◆ Place parts that have been removed on a clean surface and cover. Do not use fluffy cloths!
- ◆ Carefully cover opened components or seal, if the repair cannot be carried out immediately.
- ◆ Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- ◆ When the system is open: Do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.



Technical data

Engine code	AEB
Idle speed check Idle speed ¹⁾ rpm	820 to 920
Engine Control Module²⁾ System Part number	Motronic M 3.8.2 ⇒ Parts catalog
Engine governed speed rpm	from approx. 6500

1) Not adjustable

2) Engine Control Module, replacing ⇒ [page 24-121](#)



Oxygen sensor heating (Oxygen sensor before Three Way Catalyst), checking

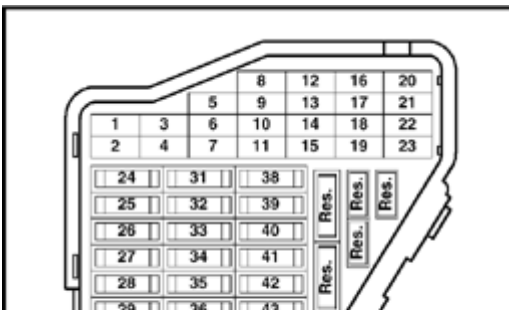
Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551/1552 Scan Tool with VAG 1551/3B adaptor cable
- ◆ VAG 1598/22 Test Box
- ◆ Fluke 83 Multimeter
- ◆ VW 1594 Adaptor kit
- ◆ Wiring diagram

Check conditions

- Fuse 29 OK.
- Battery Voltage 11.5 Volts minimum
- Fuel pump relay OK

Test sequence



A

- Connect VAG 1551/1552 Scan Tool ⇒ [page 01-8](#)
- Start engine and let idle
- Press 0 and 1 buttons to select "Address word" 01 "Engine electronics"



Rapid data transfer

HELP

Select function XX



Display will appear as shown

- Press 0 and 8 buttons to select Function 08: "Read measuring value block"
- Press Q button to enter input

Read measuring value block

HELP

Input Display group number XXX



Display will appear as shown

- Press buttons 0, 4 and 1 to select "Display group 41"
- Press Q button to enter input

Read measuring value block 41



1 2 3 4



Display will appear as shown (1 to 4 = Display zones)

- Check specifications in Display zones 1 and 2 on chart, next page:



	Display zones			
	1	2	3	4
Display group 41: Oxygen sensor heating (before and after Three Way Catalyst)				
Display	xx.x Ω	Htg.bC.ON / Htg.bC.OFF	xx.x Ω	Htg.aC.ON / Htg.aC.OFF
Indicated	Oxygen sensor heating resistance (before Three Way Catalyst)	Oxygen sensor heating before Three Way Catalyst ON or Oxygen sensor heating before Three Way Catalyst OFF	Oxygen sensor heater resistance after Three Way Catalyst	Oxygen sensor heating before Three Way Catalyst ON or Oxygen sensor heating before Three Way Catalyst OFF
Working range	0.0 to 65.0 W	---	---	---
Specification	4.9 to 19.1 W	Htg.bC.ON Htg.bC.OFF (alternating at times)	---	---
	If the specifications are not obtained ⇒ page 24-22 for a continuation		---	---

If specifications obtained:

- Press → button.

- Press 0 and 6 buttons to select Function 06:
"End data transfer"

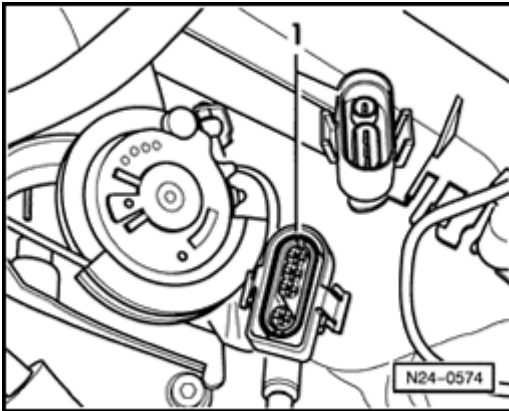
- Press Q button to enter input

- Switch OFF ignition.

,

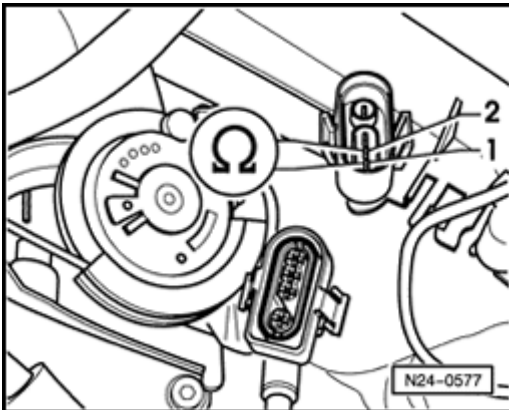


Continuation



A

- Disconnect 4-pin harness connector (brown) from Oxygen sensor G39 (before Three Way Catalyst -1-).
- Switch Multimeter to "Resistance measurement" range.



A

- Connect Multimeter between terminals 1 + 2 of G39 harness connector using jumper wires from VW 1594 adaptor kit
- Measure resistance
 - Specification: 0.0 to 19.9 Ω

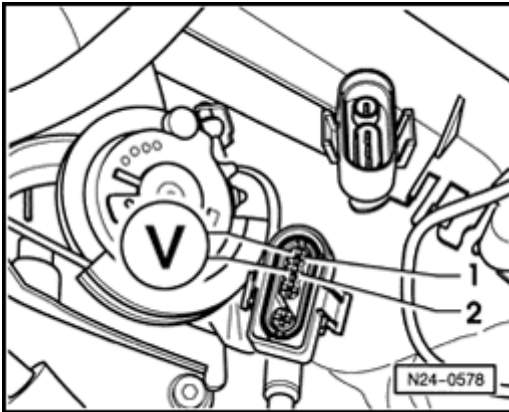
If specification not obtained:

- Replace Oxygen sensor G39 (before Three Way Catalyst).



If specification obtained:

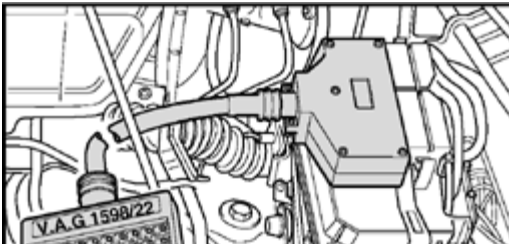
- Switch Multimeter to "Voltage measurement" range.



A

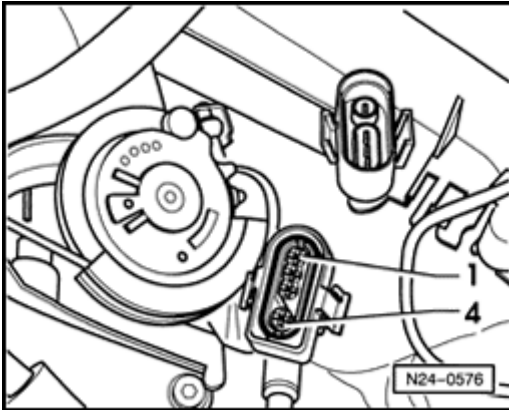
- Connect Multimeter between terminals 1 + 2 of ECM harness connector using jumper wires from VW 1594 adaptor kit
- Start engine and let idle
- Measure Voltage supply
 - When Display group 41, Display zone 2 shows
 - Display, Htg.bC.ON:
Specification: 11.0 to 14.5 Volts
 - Display, Htg. bC.ON/Htg.bC.OFF (alternating)
Specification: between 0.0 and 12.0 Volts fluctuating
- Switch OFF ignition.

If NO Voltage present:



A

- Connect VAG 1598/22 Test Box to Control Module harness connector.

**A**

- Check wiring for open circuit between Test Box and 4-pin harness connector using Wiring diagram.

Terminal 2 + socket 27

Wire resistance: Max. 1.5 Ω

If specification obtained

- Check wiring between terminal 1 and fuel pump relay J17 using Wiring diagram.

⇒ *Electrical Wiring Diagrams Troubleshooting & Component Locations*

If wiring OK

- Replace Engine Control Module ⇒ [page 24-128](#) .
- Display Readiness Code ⇒ [page 01-44](#) .

Note:

If DTC memory has been erased or the Engine Control Module was disconnected from its Voltage supply, the Readiness Code must be created again ⇒ [page 01-46](#) .



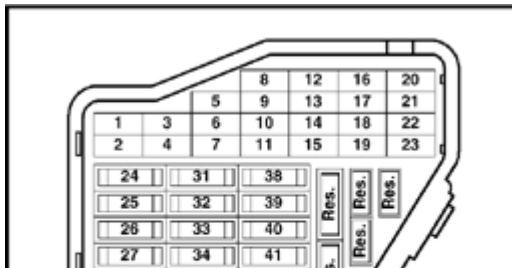
Oxygen sensor heating (for Oxygen sensor after Three Way Catalyst), checking

Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551/1552 Scan Tool with VAG 1551/3B adaptor cable
- ◆ VAG 1598/22 Test Box
- ◆ Fluke 83 Multimeter
- ◆ VW 1594 Adaptor kit
- ◆ Wiring diagram

Check conditions

- Fuse 29 must be OK.
- Battery Voltage 11.5 Volts minimum
- Fuel pump relay must be OK



A



Test sequence

- Connect VAG 1551/1552 Scan Tool ⇒ [page 01-8](#)
- Start engine and let idle
- Press 0 and 1 buttons to select "Address word"
01 "Engine electronics"

Rapid data transfer HELP
Select function XX



Display will appear as shown

- Press 0 and 8 buttons to select Function 08: "Read measuring value block"
- Press Q button to enter input

Read measuring value block HELP
Input Display group number XXX



Display will appear as shown

- Press 0, 4 and 1 buttons to select "Display group 41"
- Press Q button to enter input

Read measuring value block 41 →
1 2 3 4



Display will appear as shown (1 to 4 = Display zones)

- Check specifications in Display zones 3 and 4, next page:



	Display zones			
	1	2	3	4
Display group 120: Oxygen sensor heating (before Three Way Catalyst)				
Display	xx.x Ω	Htg.bC.ON / Htg.bC. OFF	xx.x Ω	Htg.aC.ON / Htg.aC.OFF
Indicated	Oxygen sensor heater resistance (before Three Way Catalyst)	Oxygen sensor heating before Three Way Catalyst ON or Oxygen sensor heating before Three Way Catalyst OFF	Oxygen sensor heater resistance after Three Way Catalyst	Oxygen sensor heating after Three Way Catalyst ON or Oxygen sensor heating after Three Way Catalyst OFF
Working range	---	---	0.0 to 65.0 Ω	---
Specification	---	---	4.9 to 19.9 Ω	Htg.aC.ON Htg.aC.OFF (alternating at times)
	---	---	If specifications not obtained \Rightarrow page 24-28 , Continuation	

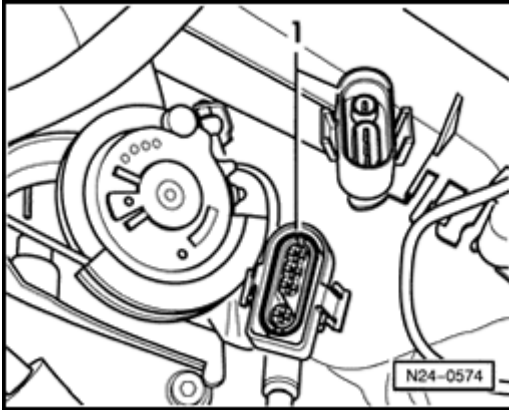
If specification obtained

- Press \rightarrow button.
- Press 0 and 6 buttons to select Function 06
"End data transfer"

- Press Q button to enter input
- Switch OFF ignition.

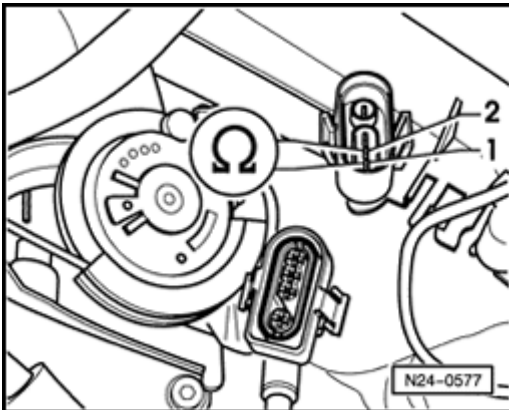


Continuation



A

- Disconnect 4-pin harness connector (black) to Oxygen sensor -1- G108 (after Three Way Catalyst).
- Switch Multimeter to "Resistance" range



A

- Connect Multimeter between terminals 1 + 2 of Oxygen sensor connector using jumper wires from VW 1594 adaptor kit.
- Measure resistance.
 - Specification: 0.0 to 19.9 Ω

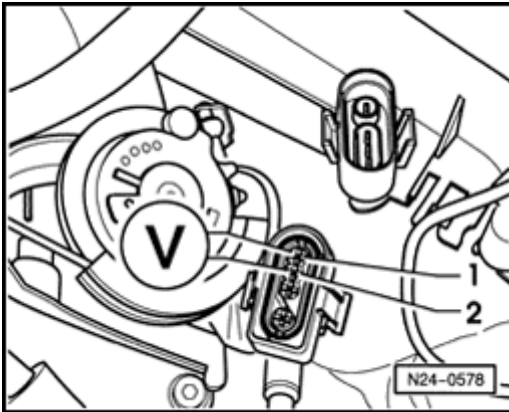
If specification not obtained

- Replace Oxygen sensor G108 (after Three Way Catalyst).



If specification obtained

- Set Multimeter to "Voltage measurement" range.



A

- Connect Multimeter using aux. cables from VW 1594 to measure Voltage at terminals 1 + 2 (connector to Engine Control Module).
- Start engine and let idle.
- Measure the Voltage supply:

When Display group 41, Display zone 4 shows

Display, Htg.aC.ON:

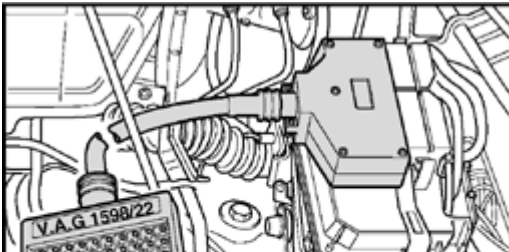
Specification: 11.0 to 14.5 Volts

Display, Htg. aC.ON/Htg.aC.OFF (alternating)

Specification: Between 0.0 and 12.0 Volts, fluctuating

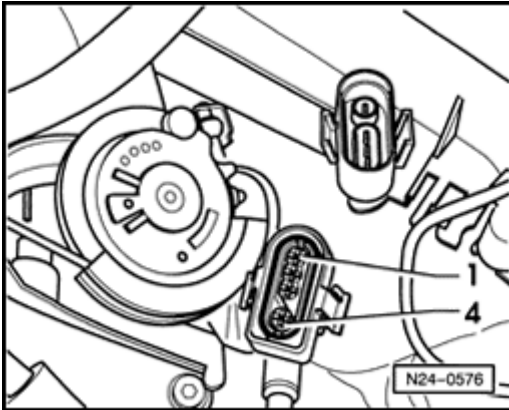
- Switch OFF ignition.

If NO Voltage present:



A

- Connect VAG 1598/22 Test Box to Control Module harness connector.



A

- Check wiring for open circuit between Test Box and 4-pin harness connector using Wiring diagram.

Terminal 2 + socket 28

Wire resistance: Max. 1.5 Ω

If specification obtained

- Check wiring between terminal 1 and fuel pump relay J17 using Wiring diagram.

⇒ *Electrical Wiring Diagrams Troubleshooting & Component Locations*

If wiring OK

- Replace engine electronics Control Module ⇒ [page 24-128](#) .
- Display Readiness Code ⇒ [page 01-44](#) .

Note:

If DTC memory has been erased or the Engine Control Module was disconnected from its Voltage supply, the Readiness Code must be created again ⇒ [page 01-46](#) .



Mass Air Flow sensor, checking

Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551/1552 Scan Tool with VAG 1551/3B adaptor cable
- ◆ VAG 1598/22 Test Box
- ◆ Fluke 83 Multimeter
- ◆ VW 1594 Adaptor kit
- ◆ Wiring diagram

Check conditions

A

- Fuse 29 OK.
- Engine Coolant Temperature must be at least 85 °C, ⇒ Display group 04, Display zone 3
- All electrical consumers, e.g. lights and rear window defroster must be switched OFF
- A/C switched OFF (if installed).



- Transmission Range selector lever in "P" or "N" position (automatic transmission only)



Test sequence

- Connect VAG 1551/1552 Scan Tool ⇒ [page 01-8](#)
- Start engine and let idle
- Press 0 and 1 buttons to select "Address word"
01 "Engine electronics"

Rapid data transfer HELP
Select function XX



Display will appear as shown

- Press 0 and 8 buttons to select Function 08: "Read measuring value block"
- Press Q button to enter input

Read measuring value block HELP
Input Display group number XXX



Display will appear as shown

- Press 0, 0 and 2 buttons to select "Display group 2"
- Press Q button to enter input

Read measuring value block 2 →
1 2 3 4



Display will appear as shown (1 to 4 = Display zones)

- Check the load registration specifications (Display zones 2 and 4 on chart, next page)



	Display zones			
	1	2	3	4
Display group 2: Load registration				
Display	xxx rpm	xx.xx ms	xx.xx ms	xx.x g/s
Indicated	Engine speed (in steps of 40)	Engine load	Injection period	Air mass
Working range	0 to 6800 rpm	0.00..8.50 ms	0.00 to 25.00 ms	0.0 to 140 g/s
Specification	820 to 900 rpm	0.50 to 1.50 ms	1.00 to 3.00 ms	1.8 to 4.0 g/s
Specification	2520 rpm	0.80 to 2.00 ms	1.5 to 4.00 ms	7.5 to 12.0 g/s
	---	If specifications not obtained ⇒ page 24-36 , Evaluating Display group 2	---	If specifications not obtained ⇒ page 24-36 , Evaluating Display group 2

- Press → button.
- Press 0 and 6 buttons to select Function 06:
"End data output"
- Press Q button to enter input

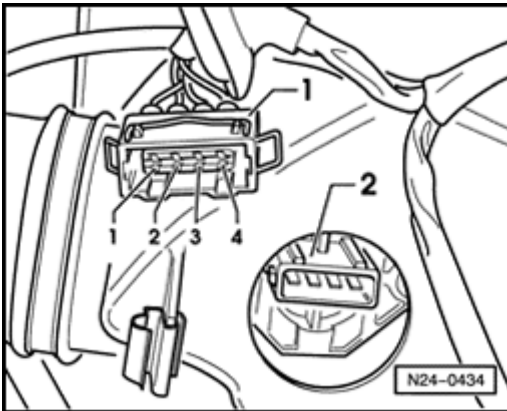
- Switch OFF ignition.



If the specifications are not obtained or there is a DTC stored in DTC memory related to the Mass Air Flow sensor:

- Check Mass Air Flow sensor Voltage supply as follows:

Voltage supply, checking



A

- Disconnect 4-pin harness connector -1- from Mass Air Flow sensor -2-.
- Switch Multimeter to Voltage range
- Connect Multimeter between connector terminals 1 and 3.
- Start engine and let idle.
 - Specification: 11 to 15 Volts
- Switch OFF ignition.

If Voltage supply OK

- Test signal and Ground wires ⇒ [page 24-35](#) .

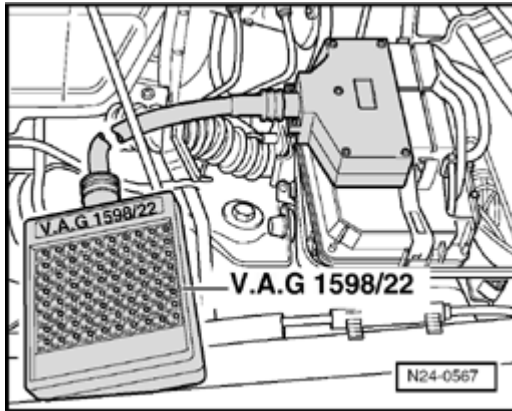
If NO Voltage present:

- Check wiring between terminal 3 to fuel pump relay J17 using Wiring diagram.

⇒ *Electrical Wiring Diagrams Troubleshooting & Component Locations*



Signal wire, checking



A

- Connect VAG 1598/22 Test Box to ECM wiring harness.
- Check wiring for open circuit between Test Box and 4-pin harness connector using Wiring diagram.

Terminal 4 + socket 13

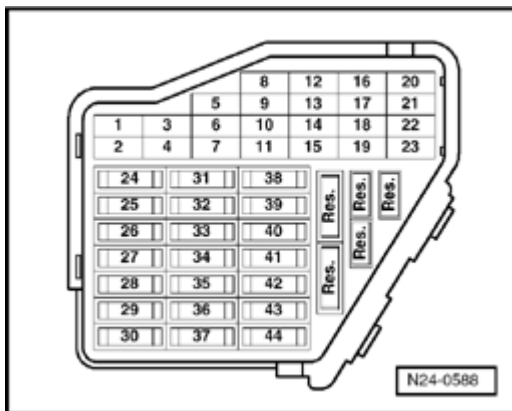
Terminal 2 + socket 12

Wire resistance: Max. 1.5 Ω

- Check wiring for open circuit between 4-pin harness connector and Ground using Wiring diagram.

Terminal 1 + Ground

Wire resistance: Max. 1.5 Ω



A

- Remove fuse 28.
- Check all wires for shorting to one another.
 - Specification: $\infty \Omega$

Note:

If fuse 28 is not removed the fuel pump will short circuit between connector terminals 1 + 3.

If wiring OK

- Replace Mass Air Flow sensor G70.



Evaluating Display group2

Display group: 2		
Display zone: 2 Engine load	Possible cause of malfunction	Malfunction elimination steps
Less than 0.50 ms	<ul style="list-style-type: none"> ◆ Lesser values can only occur when in overrun 	
Greater than 1.50 ms	<ul style="list-style-type: none"> ◆ Select Transmission Range (automatic transmission) ◆ Engine loaded by ancillary consumer 	<ul style="list-style-type: none"> - Position selector lever in P or N - Remove load (A/C, power steering, Generator)
	<ul style="list-style-type: none"> ◆ Poor idle quality (not running on all cylinders) 	<ul style="list-style-type: none"> - Check spark plugs - Check fuel injectors ⇒ page 24-75
	<ul style="list-style-type: none"> ◆ Throttle Body Control Module -J338 faulty 	<ul style="list-style-type: none"> - Check Throttle Body Control Module ⇒ page 24-37
Display zone: 4 Air mass	Possible cause of malfunction	Malfunction elimination steps
Less than 1.8 g/s	<ul style="list-style-type: none"> ◆ Large amounts of unmeasured air between intake manifold and Mass Air Flow sensor 	<ul style="list-style-type: none"> - Check intake system for leaks (unmeasured air) ⇒ page 24-85
Greater than 4.0 g/s	<ul style="list-style-type: none"> ◆ Select a Transmission Range (automatic transmission) 	<ul style="list-style-type: none"> - Position selector lever in P or N

	◆ Engine loaded by ancillary consumer	- Remove load (A/C, power steering, Generator)
	◆ Wiring open circuit in wire 3 or 4 between Mass Air Flow sensor and ECM	- Check Voltage supply ⇒ page 24-34
	◆ Wiring open circuit in wire 1 or 2 between Mass Air Flow sensor and ECM	- Check wiring ⇒ page 24-35



Throttle Body Control Module, checking

Note:

*If the Throttle Body Control Module is replaced, the new assembly **MUST BE** matched to the Engine Control Module ⇒ [page 24-134](#) .*

Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551/1552 Scan Tool with VAG 1551/3B adaptor cable
- ◆ VAG 1598/22 Test Box
- ◆ Fluke 83 Multimeter
- ◆ VW 1594 Adaptor kit
- ◆ Wiring diagram

Function notes:

- ◆ *Components of Throttle Body Control Module J338: Throttle body drive G186, throttle body*

drive angle sensor G187, Throttle Position sensor G69 and Closed Throttle switch F60

- ◆ *All settings are made using VAG 1551 Scan Tool in Function 04*
- ◆ *If the complete Throttle Body Control Module has no current (e.g. connector disconnected) the throttle valve moves to a pre-determined mechanically determined position which will increase idle speed to 1200 - 1300 rpm when engine is at normal operating temperature.*



- ◆ *If no current reaches the Throttle Body Drive G186, the throttle will move to the mechanically predetermined position (emergency running gap), but because the Closed Throttle Position sensor speed switch F60 is still recognised an almost normal idling speed of approx. 900 rpm is achieved by relatively retarding the ignition .*

- ◆ *If the Engine Control Module recognises a DTC for the Throttle Body Drive angle sensor G187 the Throttle Body Drive G186 is switched to receive no current by the Engine Control Module and the throttle moves again to the mechanically predetermined position (emergency running gap).*

Closed Throttle Position switch F60

- Connect VAG 1551/1552 Scan Tool ⇒ [page 01-8](#)

- Switch ON ignition

- Press 0 and 1 buttons to select "Address word"
01 "Engine electronics"

Rapid data transfer HELP
Select function XX



Display will appear as shown

- Press 0 and 8 buttons to select Function 08: "Read measuring value block"
- Press Q button to enter input

Read measuring value block HELP
Input Display group number XXX



Display will appear as shown

- Press 0, 0 and 5 buttons to select "Display number 5"
- Press Q button to enter input

Read measuring value block 5 →
1 2 3 4



Display will appear as shown (1 to 4 = Display zones)

- Check the Closed Throttle Position switch (Display zone 4)

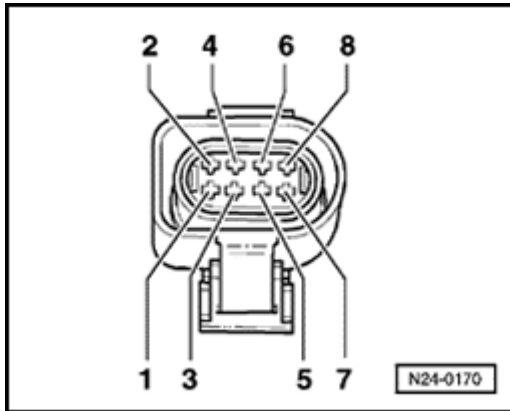


	Display zones			
	1	2	3	4
Display group 5: General engine data				
Display	xxx rpm	xx.xx ms	xxx km/h	Idle speed Part throttle Wide Open Throttle Overrun Enrichment
Indicated	Engine speed (in steps of 40)	Engine load	Vehicle speed	Operating modes
Working range	0 to 6800 rpm	0.00 to 8.50 ms	---	---
Specification	0 rpm	0.00 ms	0 km/h	Closed throttle = engine idling Throttle valve slightly open = part load
	---	---	---	If specifications are not obtained ⇒ page 24-40 Continuation

- Press → button.
- Press 0 and 6 buttons to select Function 06:
"End data output"
- Press Q button to enter input



Continuation of check when Display shows partly open throttle



A

- Disconnect 8 pin harness connector from Throttle Body Control Module.
- Bridge connector terminals 3 + 7 using jumper wires from VW 1594 and observe display.

If display shows idling:

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Replace Throttle Body Control Module J338.

If display shows Partially Open Throttle:

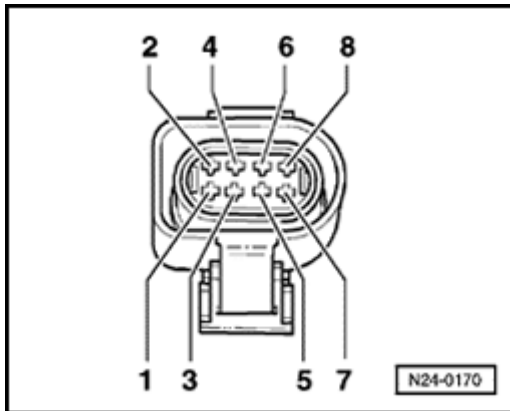
- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Check Voltage supply of Throttle Body Control Module and wiring to Control Module ⇒ [page 24-51](#) .



If Voltage supply and wiring OK

- Replace Engine Control Module ⇒ [page 24-128](#) .

Continuation when display constantly shows idling



A

- Disconnect 8-pin harness connector from Throttle Body Control Module.

If Display shows Partially Open Throttle:

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Replace Throttle Body Control Module J338.

If Display shows idling:

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.

- Check Throttle Body Control Module Voltage supply and wiring to the Control Module ⇒ [page 24-51](#) .

If Voltage supply and wiring OK:

- Replace Engine Control Module ⇒ [page 24-128](#) .



Throttle Body Drive G186 and Throttle Body Drive angle sensor G187, checking

Test conditions

- Engine Coolant Temperature at least 85 ° C.

Test sequence

- Connect VAG 1551/1552 Scan Tool ⇒ [page 01-8](#)
- Start engine and let idle
- Press 0 and 1 buttons to select "Address word" 01 "Engine electronics"

Rapid data transfer HELP
Select function XX



Display will appear as shown

- Press 0 and 8 buttons to select Function 08: "Read measuring value block"
- Press Q button to enter input

Read measuring value block HELP
Input Display group number XXX



Display will appear as shown

- Press 0, 5 and 5 buttons to select "Display group 55"
- Press Q button to enter input

Read measuring value block 55 →

1 2 3 4

⚠ Display will appear as shown (1 to 4 = Display zones)

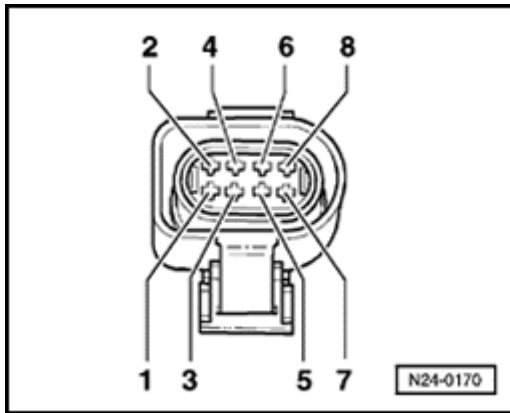
- Check idle speed control specifications (Display zones 1 to 4)



	Display zones			
	1	2	3	4
Display group 55: Idle Speed Control				
Display	xxx rpm	x.xx g/s	x.xx g/s	xxxx
Indicated	Engine speed (in steps of 10)	Idling air mass control value (idling regulator)	Idling speed air mass learned value	Operating mode
Working range	0 to 2550 rpm	-2.8 to 4.17 g/s	-1.94 to 2.22 g/s	---
Specific.	820 to 900 rpm	-1.11 to 1.11 g/s	-1.1 to 1.11 g/s	0000
	If specifications are not obtained ⇒ page 24-44 , continuation	If specifications are not obtained ⇒ page 24-45 , Evaluating Display group 55		Significance ⇒ page 24-45

If specification not obtained

- Press → button.
- Press 0 and 6 buttons to select Function 06:
"End data output"
- Press Q button to enter input
- Switch OFF ignition.



Continuation

A

- Disconnect 8-pin harness connector to Throttle Body Control Module.
- Switch Fluke 83 Multimeter to resistance range
- Measure throttle valve positioner resistance between connector terminals 1 + 2.
 - Specification: 3 to 200 Ω
- Check Throttle Body Control Module Voltage supply and wiring to Control Module \Rightarrow [page 24-51](#) .

If NO malfunction detected:

- Replace Throttle Body Control Module J338.



Evaluating Display group 55

Display group: 55	Possible cause of malfunction	Malfunction elimination steps
Display zone: 2 + 3		
Greater than 1.11 g/s	<ul style="list-style-type: none"> ◆ Load increased (consumers switched ON) ◆ Throttle valve mechanical components sticking ◆ Throttle valve air guide dirty in area of throttle valve mechanism 	<ul style="list-style-type: none"> - Switch OFF consumers - Visually check, correct cause as necessary
Less than - 1.11 g/s	<ul style="list-style-type: none"> ◆ Unmeasured air behind throttle valve 	<ul style="list-style-type: none"> - Check Intake Air system for leaks (unmeasured air) ⇒ page 24-85 - Check exhaust system ⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Engine Code(s): AEB, ATW, Repair Group 26

Significance of 4 position Display

Significance when Display position = 0				
x	x	x	x	(Display group 55)
			0	A/C compressor OFF (0 = A/C compressor OFF / 1 = A/C compressor ON)

		0	Transmission Range Selector lever in P or N position (0 = lever in P or N / 1 = lever in 2 / 3 / 4 / R / D)
	0		Always "0"
0			Always "0"



Throttle Position sensor G69, checking

Test conditions

- Coolant temperature at least 85 ° C.

Test sequence

- Connect VAG 1551/1552 Scan Tool ⇒ [page 01-8](#)
- Switch ON ignition
- Press 0 and 1 buttons to select "Address word"
01 "Engine electronics"

Rapid data transfer HELP
Select function XX



Display will appear as shown

- Press 0 and 8 buttons to select Function 08: "Read measuring value block"
- Press Q button to enter input

Read measuring value block HELP
Input Display group number XXX



Display will appear as shown

- Press 0, 0 and 3 buttons to select "Display group 3"
- Press Q button to enter input

Read measuring value block 3 →

1 2 3 4

⚠ Display will appear as shown (1 to 4 = Display zones)

- Read off throttle valve angle in Display zone 3.



	Display zones			
	1	2	3	4
Display group 3: Load registration 1				
Display	xxx rpm	xx.x g/s	xxx \angle°	xx.x $^\circ$ BTDC
Indicated	Engine speed (in steps of 40)	Air mass	Throttle valve angle	Ignition timing angle
Working range	0 to 6800 rpm	---	0 to 90 \angle°	0.0 to 50.0 $^\circ$ BTDC
Specification	0 rpm	---	0 to 5 \angle°	0.0 $^\circ$ ATDC

- Slowly but fully open throttle, observe angle in Display zone 3
 - Value must increase uniformly over the complete range.
- Press the → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input

- Switch OFF ignition.

Note:

The displayed value is dependent on the tolerances of the Throttle Position sensor and does not correspond to the actual opening angle.



If the value does not increase uniformly:

- Replace Throttle Body Control Module J338.

If the display constantly shows 0 \angle° or is above 90 \angle° :

Display	Cause	Continue of check
0 \angle°	Open circuit or short to positive	⇒ page 24-48
above 90 \angle°	Short to Ground	⇒ page 24-49

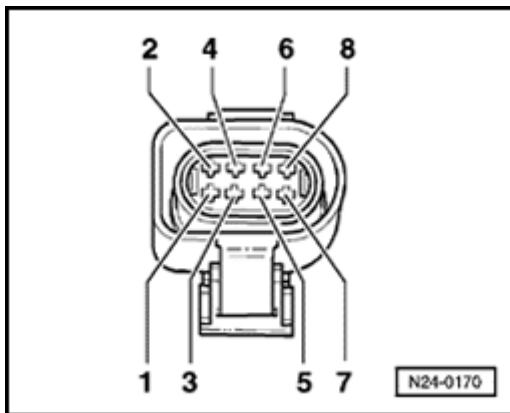
Continuation of check when display 0 \angle° :

A

- Disconnect 8-pin harness connector to Throttle Body Control Module.
- Bridge harness connector terminals 5 + 7 using jumper wires from VW 1594 adaptor kit and observe display.

If display is above 90 \angle° :

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"



- Press Q button to enter input



- Switch OFF ignition.
- Replace Throttle Body Control Module J338.

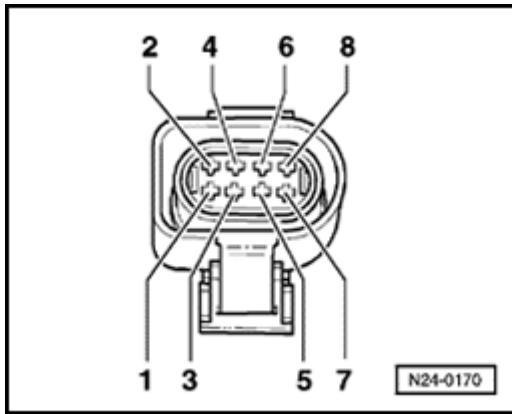
If Display is 0 \angle ° :

- Press \rightarrow button.
- Press 0 and 6 buttons to select Function 06:
"End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Check Throttle Body Control Module Voltage supply and wiring to Control Module \Rightarrow [page 24-51](#) .

If Voltage supply and wiring OK

- Replace Engine Control Module \Rightarrow [page 24-128](#) .

Continuation of check when Display is above



90 ∠ ° :

A

- Disconnect 8-pin harness connector to Throttle Body Control Module.

If Display is 0 ∠ ° :

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input



- Switch OFF ignition.
- Replace Throttle Body Control Module J338.

If display is above 90 \angle° :

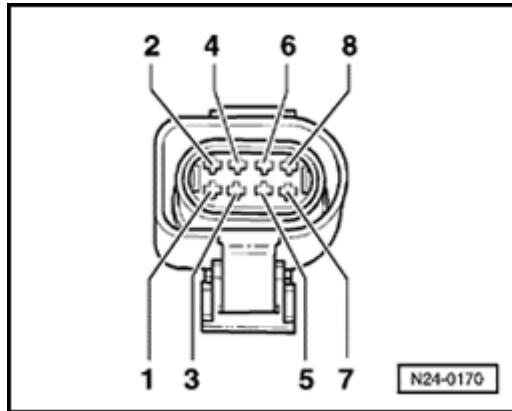
- Press \rightarrow button.
- Press 0 and 6 buttons to select Function 06:
"End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Check Throttle Body Control Module Voltage
supply and wiring to Control Module \Rightarrow [page 24-51](#) .

If Voltage supply and wiring OK:

- Replace Engine Control Module \Rightarrow [page 24-128](#) .

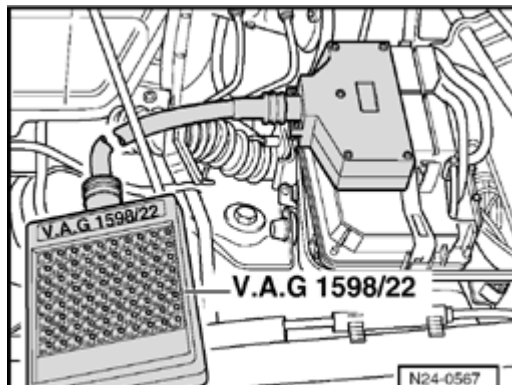


Voltage supply and wiring to Control Module, checking



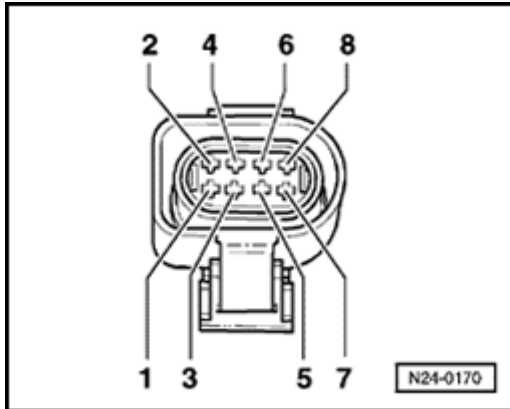
A

- Disconnect 8-pin harness connector to Throttle Body Control Module.
- Switch Multimeter to Voltage range
- Connect Multimeter between connector terminals 4 + 7.
- Switch ON ignition.
 - Specification: 4.5 Volts minimum
- Switch OFF ignition.
- Connect Multimeter between connector terminals 3 + 7.
- Switch ON ignition.
 - Specification: 9 Volts minimum
- Switch OFF ignition.



A

- Connect VAG 1598/22 Test Box to Engine Control Module harness connector.



A

- Check wiring for open circuit between Test Box and harness connector using Wiring diagram.

Terminal 1 + socket 66

Terminal 2 + socket 59

Terminal 3 + socket 69

Terminal 4 + socket 62

Terminal 5 + socket 75

Terminal 7 + socket 67

Terminal 8 + socket 74

Wire resistance: Max. 1.5 Ω

- Check wires for shorting to one another.
 - Specification: $\infty \Omega$

If wiring OK

- Check Engine Control Module Voltage supply \Rightarrow [page 24-121](#) .



Engine Coolant Temperature sensor, checking

Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551/1552 Scan Tool with VAG 1551/3B adaptor cable
- ◆ VAG 1598/22 Test Box
- ◆ Fluke 83 Multimeter
- ◆ VW 1594 Adaptor kit
- ◆ Wiring diagram

Note:

The Engine Control Module will use the Intake Air Temperature as a replacement value for an engine start (start temperature replacement value) as soon as there is a DTC stored in DTC memory, which affects the Engine Coolant Temperature sensor G62. The temperature then rises using a model stored in the Control Module. When the engine has reached normal working

temperature a fixed replacement value will be displayed after a certain period. This fixed value is also dependent upon the Intake Air Temperature.



Test conditions

- Engine must be cold.

Test sequence

- Connect VAG 1551/1552 Scan Tool ⇒ [page 01-8](#)
- Switch ON ignition
- Press 0 and 1 buttons to select "Address word"
01 "Engine electronics"

Rapid data transfer
Select function XX

HELP



Display will appear as shown

- Press 0 and 8 buttons to select Function 08: "Read measuring value block"
- Press Q button to enter input

Read measuring value block
Input Display group number XXX

HELP



Display will appear as shown

- Press 0, 0 and 1 buttons to select "Display group 1"
- Press Q button to enter input

Read measuring value block 1



Display will appear as shown (1 to 4 = Display zones)

1 2 3 4

- Check the specification for Engine Coolant Temperature sensor in Display zone 2, chart on next page



	Display zones			
	1	2	3	4
Display group 1: Idling test				
Display	xxxx rpm	xxx.x °C	xx.x%	XXXXXX
Indicated	Engine speed (in steps of 40)	Engine Coolant Temperature	Oxygen sensor control	Adjustment conditions
Working range	0 to 6800 rpm	-46.5 to 141.0 °C	-25.0 to 25.0 %	---
Specification	0 rpm	Approx. ambient temperature ¹⁾	The value must fluctuate at least 2 % in range -10.0 to 10.0 %	---
	---	If specification is not obtained ⇒ page 24-56 , evaluating Display group 1	---	---

¹⁾ If a temperature is displayed which deviates greatly from the ambient temperature of the sensor, check sensor wiring for transfer resistances / open circuit.

**Continuation:**

- Start engine and let idle.
- Engine Coolant Temperature value must increase uniformly

If specification not obtained

- Replace Engine Coolant Temperature sensor G62.
- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.

Notes:

- ◆ *Display on Scan Tool increments in 1.5 °C steps.*

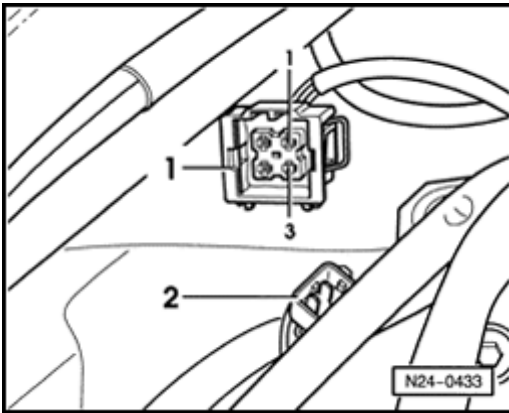
◆ *If irregular engine running occurs in certain temperature ranges and the temperature figure does not increase without interruption, the temperature signal is temporarily interrupted and the sensor must be replaced.*

Evaluating Display group 1

Display group: 1	Possible cause of malfunction	Malfunction elimination steps
Display zone: 2		
Approx. -46.6 °C	◆ Wiring open circuit or short to positive	- Continuation ⇒ page 24-57
Approx. 141.0 °C	◆ Short to Ground	- Continuation ⇒ page 24-58



Continuation of check when Display approx. -46 ° C:



A

- Disconnect 4-pin harness connector -1- from Engine Coolant Temperature sensor G62 -2-.
- Bridge connector terminals 1 + 3 using jumper wires from VW 1594 adaptor kit and observe display.

When Display is approx. 141 ° C:

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Replace Engine Coolant Temperature sensor G62.

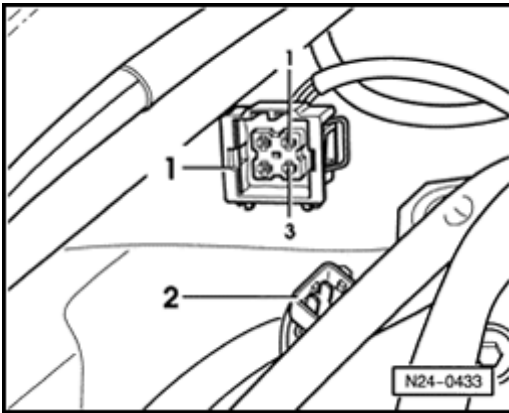
When Display is approx. -46 ° C:

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Check wiring using Wiring diagram ⇒ [page 24-59](#)



Continuation of check when Display approx.

141 ° C:



A

- Disconnect 4-pin harness connector -1- from Engine Coolant Temperature sensor G62 -2-.

When Display is approx. -46 ° C:

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Replace Engine Coolant Temperature sensor G62.

When Display is approx. 141 ° C:

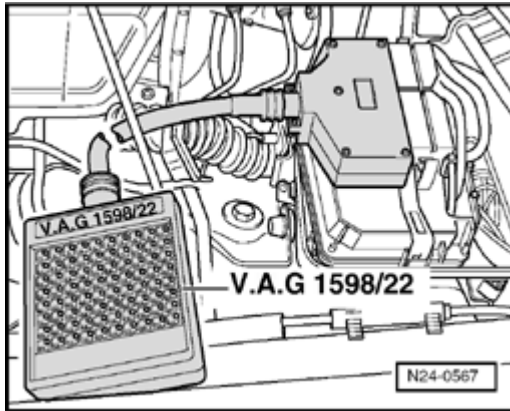
- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Check wiring using Wiring diagram ⇒ [page 24-59](#)



Wiring, checking

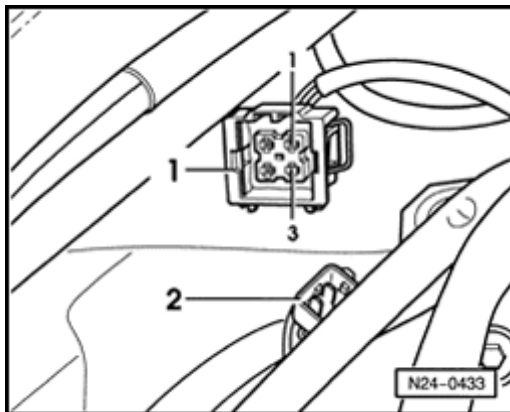
A

- Connect VAG 1598/22 Test Box to Control Module harness connector.



A

- Disconnect 4-pin harness connector -1- from Engine Coolant Temperature sensor G62 -2-.
- Check wire for open circuit between Test Box socket 67 and 4-pin harness connector terminal 3 using Wiring diagram.
 - Wire resistance: Max. 1.5 Ω
- Check wire for open circuit between Test Box socket 53 and 4-pin harness connector terminal 1 using Wiring diagram.
 - Wire resistance: Max. 1.5 Ω





- Check 4-pin connector wires for short using Wiring diagram.

Terminal 1 + Test Box socket 67

Terminal 1 + vehicle Ground

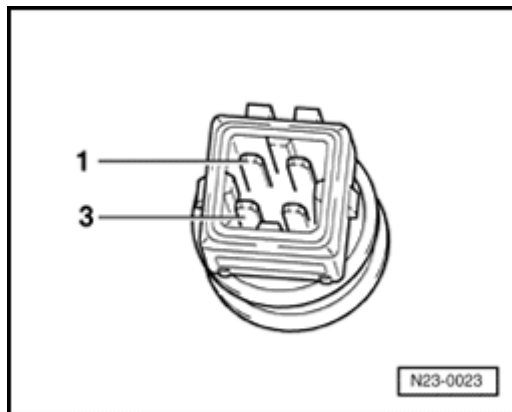
Specification: $\infty \Omega$

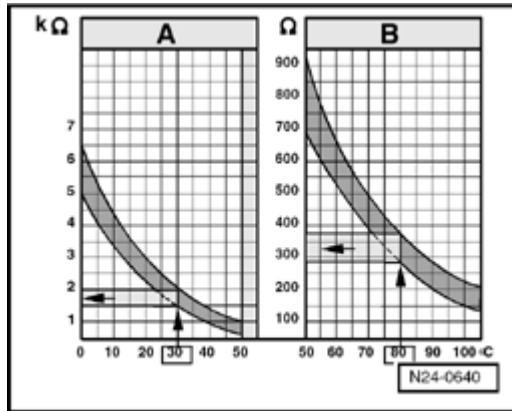
- Check both wires for short to Battery +.
- Specification: $\infty \Omega$

If wiring OK

A

- Perform resistance measurement at Engine Coolant Temperature sensor G62 terminal 1 (signal) and 3 (Ground).





A

Scale A shows resistance values for temperature range 0 to 50 °C and scale B the values for temperature range 50 to 100 °C.

Examples:

- ◆ 30 °C is in range A and corresponds to 1.5 to 2.0 kΩ
- ◆ 80 °C is in range B and corresponds to 275 to 375 Ω

If specification not obtained

- Replace Engine Coolant Temperature sensor G62.

If wiring OK and resistance measurement values OK

- Replace Engine Control Module ⇒ [page 24-128](#) .

Note:

If DTC memory has been erased or the Engine Control Module was disconnected from its Voltage supply, the Readiness Code must be created again ⇒ [page 01-46](#) .



Intake Air Temperature sensor, checking

Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551/1552 Scan Tool with VAG 1551/3B adaptor cable
- ◆ VAG 1598/22 Test Box
- ◆ Fluke 83 Multimeter
- ◆ VW 1594 Adaptor kit
- ◆ Wiring diagram
- ◆ Chilling spray (commercially available)

Note:

If sensor or connecting wiring is faulty the Control Module operates with a fixed substitute temperature of 19.5 ° C.

Test sequence

- Connect VAG 1551/1552 Scan Tool ⇒ [page 01-8](#)

- Switch ON ignition

- Press 0 and 1 buttons to select "Address word"
01 "Engine electronics"

Rapid data transfer
Select function XX

HELP



Display will appear as shown

- Press 0 and 8 buttons to select Function 08: "Read measuring value block"
- Press Q button to enter input



Read measuring value block **HELP**

Input Display group number XXX



Display will appear as shown

- Press 0, 0 and 4 buttons to select "Display group 4"
- Press Q button to enter input

Read measuring value block 4 →

1 2 3 4



Display will appear as shown (1 to 4 = Display zones)

- Check specification for Intake Air Temperature sensor, Display zone 4:

	Display zones			
	1	2	3	4
Display group 4: General engine data				
Display	xxx rpm	xx.xxx V	xxx.x °C	xxx.x °C
Indicated	Engine speed (in steps of 40)	Battery Voltage	Engine Coolant Temperature	Intake Air Temperature
Working range	0 to 6800 rpm	0.000 to 16.500 Volts	-46.5 to 141.0	-46.5 to 141.0
Specification	0 rpm	10.000 to 14.500 Volts	---	Approx. ambient air temperature ¹⁾
	---	---	---	Continuation ⇒ page 24-63 , evaluating Display group 4

¹⁾ If a temperature is displayed which deviates greatly from the ambient temperature of the sensor, check sensor wiring for transfer

resistances / open circuit.

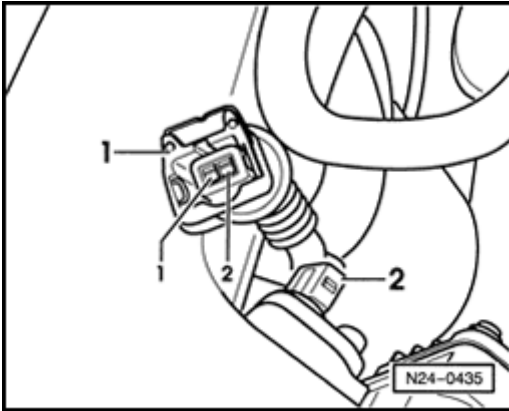


Evaluating Display group 4

Display group: 4	Possible cause of malfunction	Malfunction elimination steps
Display zone: 4		
-46.5 ° C	◆ Wiring open circuit or short to positive	- Continuation ⇒ page 24-64
141.0 ° C	◆ Short to Ground	- Continuation ⇒ page 24-65
Approx. ambient air temperature	◆ Signal periodically interrupted	- Check sensor ⇒ page 24-66 , continuation at ambient temperature



Continuation check when Display reads approx. -46 ° C



A

- Disconnect harness connector -1- from Intake Air Temperature sensor G42 -2-.
- Bridge connector terminals using jumper wires from VW 1594 adaptor kit and observe display.

When display reaches approx. 141 ° C

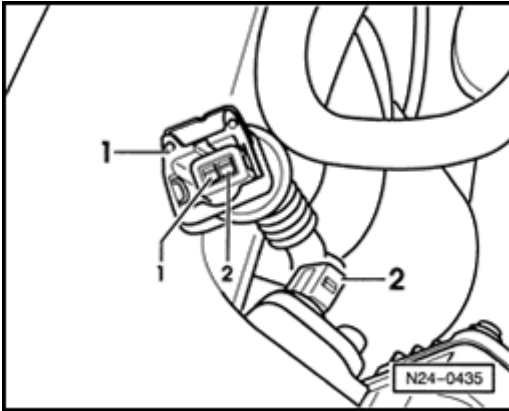
- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Replace Intake Air Temperature sensor G42.

When Display is approx. -46 ° C:

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Check wiring using Wiring diagram ⇒ [page 24-67](#)



Continuation check when display reads approx. 141 ° C



A

- Disconnect harness connector -1- from Intake Air Temperature sensor G42 -2-.

When Display is approx. -46 ° C:

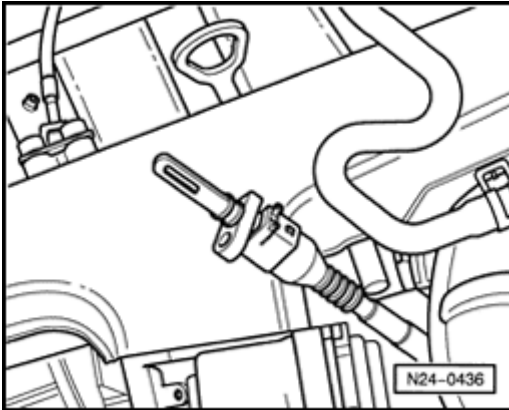
- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Replace Intake Air Temperature sensor G42.

When Display is approx. 141 ° C:

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input
- Switch OFF ignition.
- Check wiring using Wiring diagram ⇒ [page 24-67](#)



Continuation of check when Display = ambient temperature:

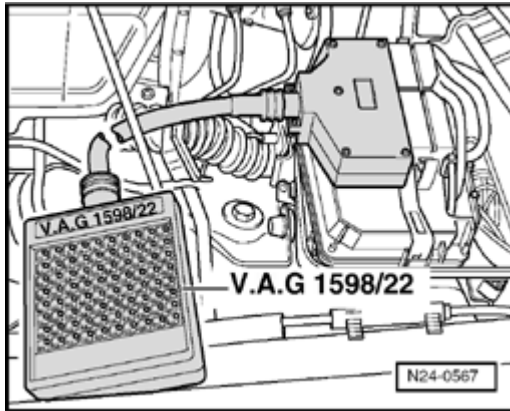


A

- Disconnect Intake Air Temperature sensor harness connector
- Re-connect harness connector.
- Note Intake Air Temperature value in shown in Display zone 4.
- Spray sensor with commercial chilling agent while observing temperature value
 - displayed temperature value must decrease
- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input

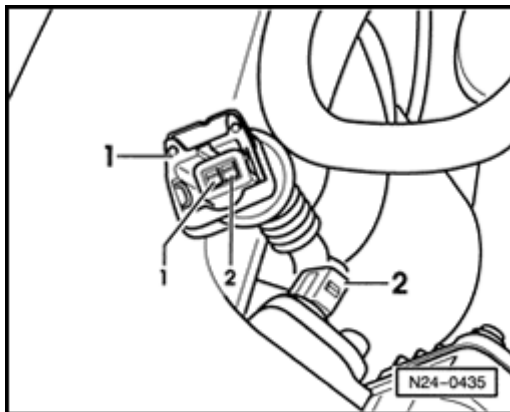


Wiring, checking



A

- Connect VAG 1598/22 Test Box to Engine Control Module harness connector.

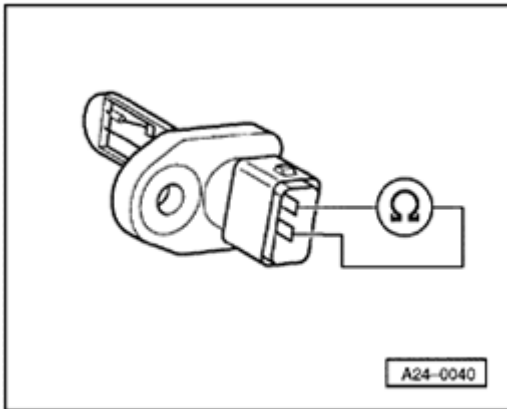


A

- Disconnect harness connector -1- from Intake Air Temperature sensor G42 -2-.
- Check wire for open circuit between Test Box socket 67 + 2-pin harness connector terminal 2 using Wiring diagram.
 - Wire resistance: Max. 1.5 Ω
- Check wire for open circuit between Test Box socket 54 + 2-pin harness connector terminal 1 using Wiring diagram.
 - Wire resistance: Max. 1.5 Ω
- Check wiring for short circuit to Battery +.
 - Specification: $\infty \Omega$

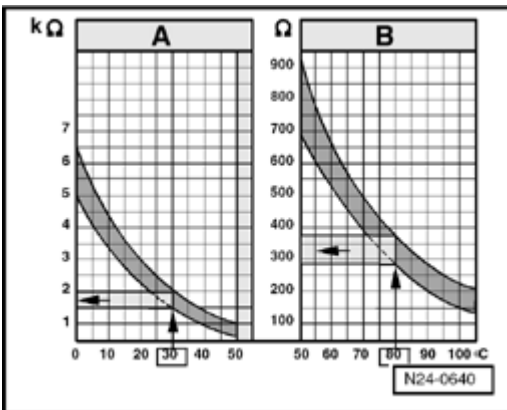


If wiring OK



A

- Measure resistance between Intake Air Temperature sensor G42 terminals 1 (signal) and 2 (Ground)



A

Scale A shows resistance values for temperature range 0 to 50 °C and scale B shows the values for temperature range 50 to 100 °C.

Examples:

- ◆ 30 °C is in range A and corresponds to 1.5 to 2.0 kΩ
- ◆ 80 °C is in range B and corresponds to 275 to 375 Ω

If specification not obtained

- Replace Intake Air Temperature sensor G42.

If wiring OK and resistance measurement values OK

- Replace Engine Control Module ⇒ [page 24-128](#) .

Note:

If DTC memory has been erased or the Engine Control Module was disconnected from its Voltage supply, the Readiness Code must be created again ⇒ [page 01-46](#) .



Engine Speed sensor (RPM), checking

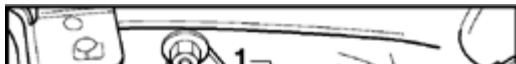
Note:

Engine Speed sensor G28 is a speed and reference mark sensor. The engine will not start without a speed signal. If the speed signal fails while the engine is running, the engine will stall immediately.

Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551/1552 Scan Tool with VAG 1551/3B adaptor cable
- ◆ VAG 1598/22 Test Box
- ◆ Fluke 83 Multimeter
- ◆ VW 1594 Adaptor kit
- ◆ Wiring diagram

Test sequence

**A**

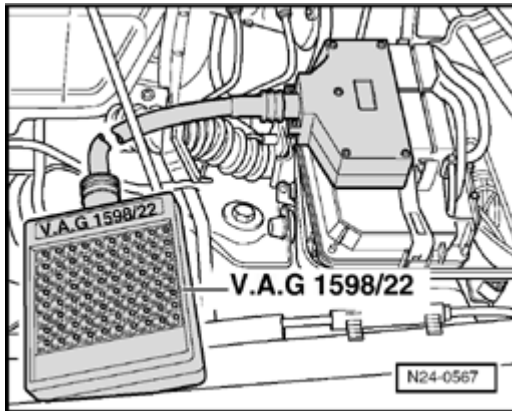
- Disconnect gray 3-pin Engine Speed sensor harness connector -arrow-.
- Measure resistance between terminals 1 + 2 of connector -1-
 - Specification: 400 to 1000 Ω
- Check sensor for shorting between terminals 1 + 3 and 2 + 3
 - Specification: $\infty \Omega$



If specifications not obtained:

- Replace Engine Speed sensor G28.

If Engine Speed sensor OK



A

- Connect VAG 1598/22 Test Box to Engine Control Module harness connector.
- Check wiring for open circuit between Test Box and 3-pin harness connector -2- using Wiring diagram.

Terminal 1 + socket 56

Terminal 2 + socket 63

Terminal 3 + socket 2

Wire resistance: Max. 1.5 Ω

- Check wires for shorting to one another.
 - Specification: $\infty \Omega$

If wiring OK

- Remove sensor and check sensor wheel for secure fit, damage and run-out.

Note:

There is a larger gap on the sensor wheel. This gap is the reference mark and does not mean that the sensor wheel is damaged.

If sensor wheel OK

- Replace Engine Control Module ⇒ [page 24-128](#) .



Barometric pressure (BARO) sensor - F96-, checking

Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1598/22 Test Box
- ◆ Fluke 83 Multimeter
- ◆ VW 1594 Adaptor kit
- ◆ Wiring diagram

Test conditions

- Vehicle is stationary, engine running at idle.



Test sequence

- Connect VAG1551 Scan Tool (or VAG1552 mobile scan tool). Then start engine and select Engine Control Module (ECM) via "address word" 01.

(connecting Scan Tool and selecting Engine Control Module (ECM) ⇒ [page 01-8](#))

Rapid data transfer HELP
Select function XX



Indicated on display:

- Press buttons -0- and -8- to select function "Read measuring value block" and press -Q- button to confirm input.

Read measuring value block HELP
Enter display group number XXX



Indicated on display:

- Press buttons -1-, -1- and -3- to select "Display group number 113" and then press the -Q- button to confirm input.

Read measuring value block 113 →
1 2 3 4



Indicated on display:

(1 through 4 = display fields)

- Check indicated value of Barometric pressure (BARO) sensor in display field 4.
Specified value: actual air pressure (approx. 1000 mbar)



Note:

Compare indicated value in display field 4 with the VAG1397/A turbocharger test tool if necessary.

If the specified value is not obtained:

- Disconnect the 3-pin connector at sensor ⇒ [page 24-1](#) ; Component location overview

- Switch ignition on.

A

- Connect multimeter to the following terminals of the connector for a voltage measurement:

Terminal 1 + 3

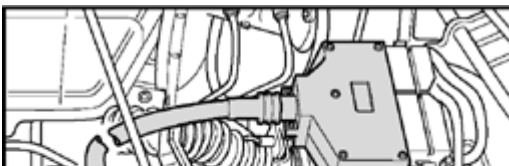
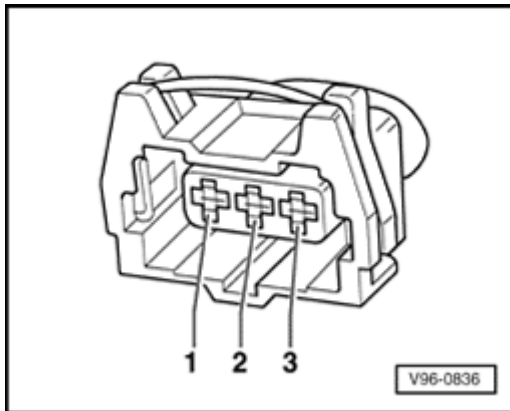
Terminal 2 + 3

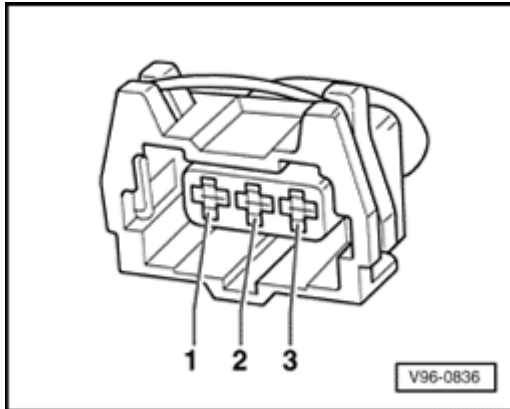
Specified value: 4.5 to 5.5V

If the specified values are not obtained:

A

- Connect the VAG1598/22 test box to wiring harness of control module.



**A**

- Check wires between test box and 3-pin connector for open circuit according to wiring diagram.

Terminal 1 + socket 61

Terminal 2 + socket 62

Terminal 3 + socket 67

Wire resistance: max. 1.5 Ω

- Also check wires for short circuit to each other.

Specified value: $\infty \Omega$

- Also check wire for short circuit to B+ and Ground (GND)

Specified value: $\infty \Omega$

If no malfunctions are found in the wires:

- Replace Barometric pressure (BARO) sensor -F96-



Fuel injectors, checking

Special tools, testers, measuring instruments and auxiliary items required

WARNING!

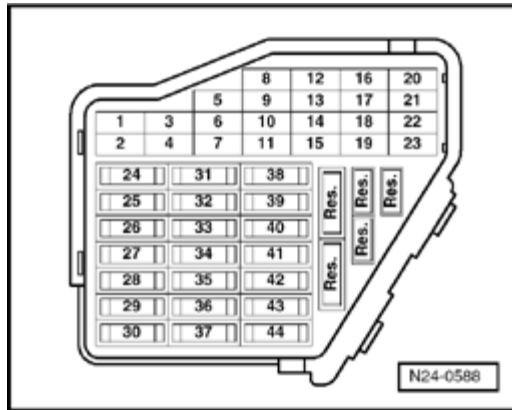
Fire Hazard! Do NOT have anything in area that can ignite fuel!

- ◆ VAG 1551/1552 Scan Tool with VAG 1551/3B adaptor cable
- ◆ VAG 1598/22 Test Box
- ◆ Fluke 83 Multimeter
- ◆ VAG 1527B Voltage tester
- ◆ VW 1594 Adaptor kit
- ◆ VAG 1348/3A Remote control with VAG 1348/3-2 adaptor cable
- ◆ Wiring diagram

Checking conditions

- Engine speed sensor OK, checking ⇒ [page 24-69](#) .
- Fuel pump relay OK
- Fuse 34 OK.

A





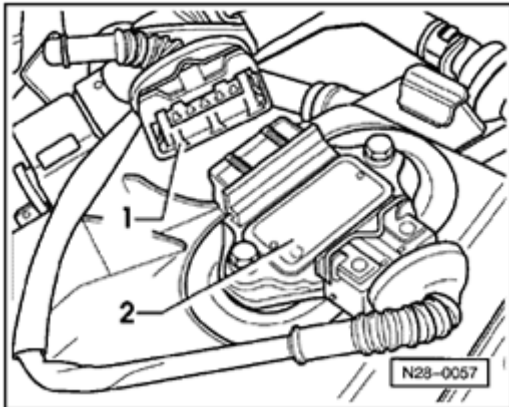
Warning!

Fuel system is under pressure! Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.

Activation, checking

- First check activation of Fuel injectors via Output Diagnostic Test Mode (DTM) ⇒ [page 01-37](#) .

If one or more injectors do not click, continue checking activation as follows



A

- Disconnect 5-pin harness connector -1- from Ignition coil Power Output stage -2-



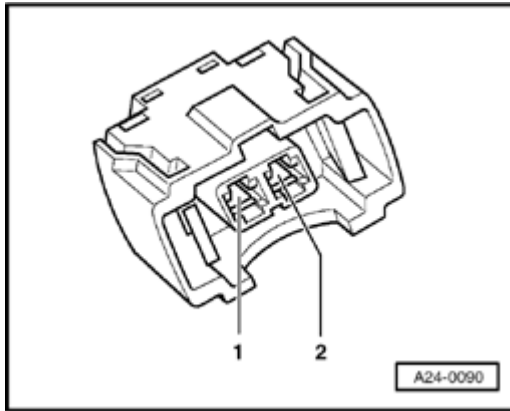
A

- Disconnect all Fuel injector harness connectors

- Connect VAG 1527 B Voltage tester to cyl. 1 connector terminals using jumper wires from VW 1594 adaptor kit.
- Operate starter and check Voltage supply for cyl. 1 Fuel injector
 - LED must flicker
- Repeat check at remaining injector connectors
- Switch OFF ignition.



If LED does not flicker for any cylinder checked:



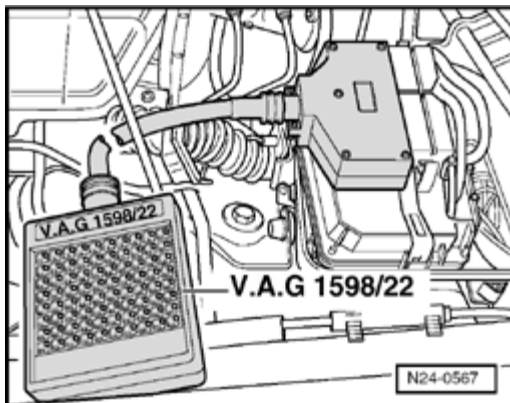
A

- Connect VAG 1527B Voltage tester between cyl. 1 harness connector terminal 1 and Ground.
- Operate starter.
 - LED tester must light up

If LED does not light up:

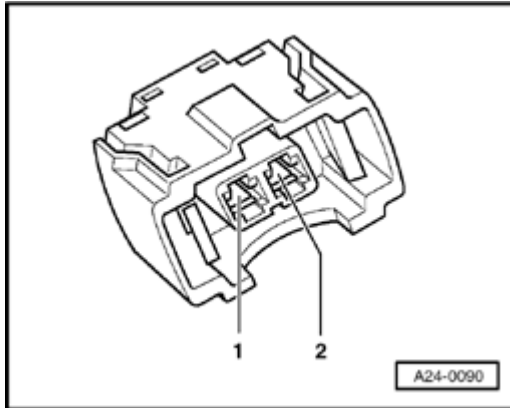
- Switch OFF ignition
- Check wiring for open circuit between 2-pin harness connector terminal 1 and fuel pump relay J17 using Wiring diagram.
 - Wire resistance: max. 1.5 Ω

If LED flickers on one or several cylinders:



A

- Connect VAG 1598/22 Test Box to Engine Control Module harness connector.



A

- Check wiring for open circuit between Test Box and connector using Wiring diagram.

Injector 1: Terminal 2 + socket 73

Injector 2: Terminal 2 + socket 80

Injector 3: Terminal 2 + socket 58

Injector 4: Terminal 2 + socket 65

Wire resistance: Max. 1.5 Ω

- Check wires for shorting to one another.

- Specification: $\infty \Omega$

- Check wiring for open circuit between connector terminals 1 of fuel injectors.

- Wire resistance: Max. 1.5 Ω

Fuel injector resistance, checking

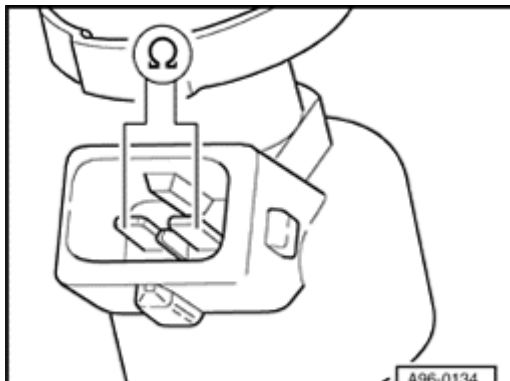
A

- Check fuel injector resistance between connector terminals on the fuel injector.

- Specification: 12.0 to 15.0 Ω

If specification not obtained

- Replace faulty fuel injector





Fuel injection leak checking and delivery rate, checking

Test conditions

- Fuel pressure must be within specification range ⇒ [page 24-81](#) , checking
- Disconnect harness connector from all injectors.
- Remove fuel rail assembly.
- Disconnect vacuum hose from fuel pressure regulator.
- Lift fuel rail (complete with injectors) off of intake manifold and support as required.

Leak-checking

- Perform Output Diagnostic Test Mode (DTM) and activate cyl. 1 Fuel injector N30 ⇒ [page 01-37](#)
- Fuel pump must run

Note:

This work sequence allows the fuel pump to run when the engine is not running. Closed Throttle Position switch must remain closed during this check, otherwise selected injector will inject 5 times.

- Visually check injector for leaks
 - Only 1 to 2 drops per minute, per injector with fuel pump running

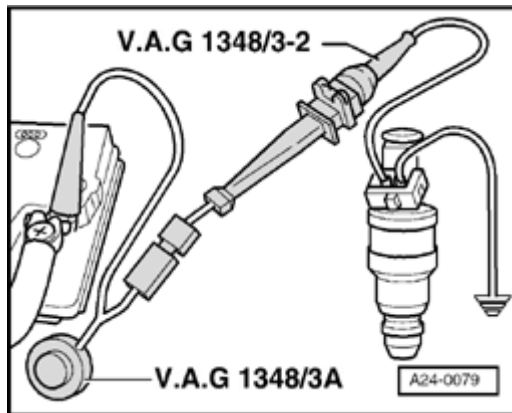
If fuel leakage is greater than specification

- Switch OFF ignition and replace that injector.
 - Always replace seals



Fuel injection quantity, checking

- Insert injector to be checked in VAG 1602 fuel analyzer tube.



A

- Connect one terminal of injector to be tested to engine Ground using jumper wires from VW 1594 adaptor kit.
- Connect other injector terminal and jumper wire to VAG 1348/3A remote control using VAG 1348/3-2 adaptor cable .
- Connect crocodile clip to Battery +.
- Perform Output Diagnostic Test Mode (DTM) and activate cyl.1 injector N30 ⇒ [page 01-37](#)
 - Fuel pump must run
- Operate VAG 1348/3A Remote control for 30 seconds.
- Repeat check on remaining injectors using new measuring tubes
- After all injectors have been activated, place measuring tubes on horizontal surface and compare injected quantities.
 - Specification: 110 to 130 ml per injector

If the measured values of one or more injectors are above or below the prescribed specifications:

- Replace faulty injector.

Perform fuel injector installation in reverse order.

- ◆ Replace O-rings on all injectors and lightly moisten with clean oil.
- ◆ Insert injectors vertically and in correct position into fuel rail and secure with retaining clips.
- ◆ Install fuel rail assembly onto intake manifold and press in evenly.



Residual pressure and fuel pressure regulator, checking

The fuel pressure regulator controls the fuel pressure dependent upon intake manifold pressure.

Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1318 Pressure tester
- ◆ 1318/6 adaptor
- ◆ 1318/7 adaptor

WARNING!

Fire Hazard! Do NOT have anything in area that can ignite fuel!

Test conditions

- Fuel pump delivery rate OK

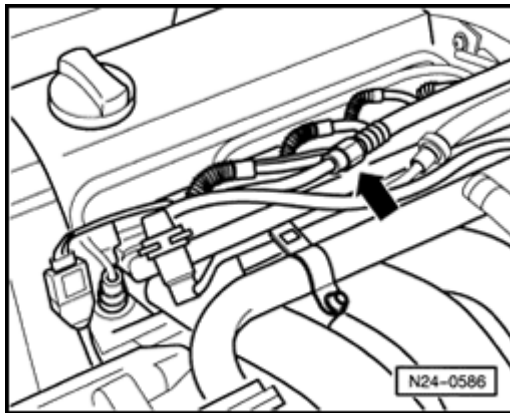
⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo
Engine Mechanical, Engine Code(s): AEB, ATW,
Repair Group 20, checking



Test sequence

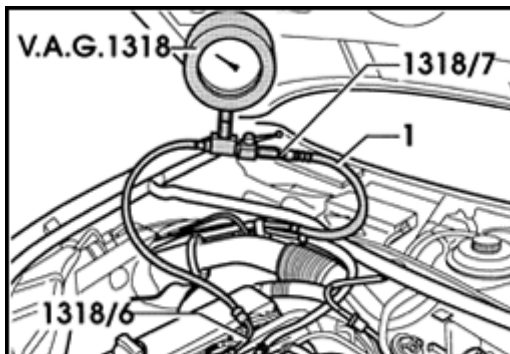
Warning!

Fuel system is under pressure! Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.



A

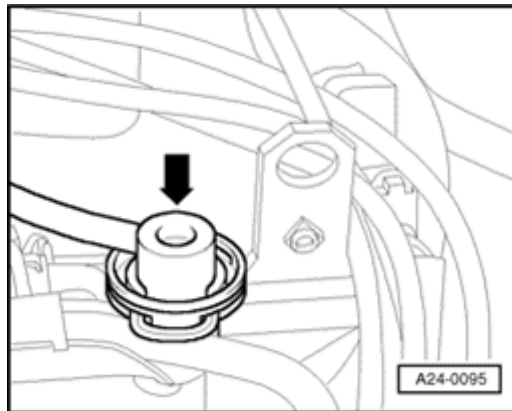
- Open the union -arrow- and catch escaping fuel with a cloth.



A

- Connect pressure gauge VAG 1318 to fuel supply pipe -1- and to fuel rail using adaptors 1318/6 and 1318/7.
- Open shut-off tap on pressure gauge.
 - Handle points in direction of flow
- Start the engine and run at idling speed.
- Measure fuel pressure.

- Specification: Approx. 3.5 bar



If specification obtained

A

- Disconnect the vacuum hose off fuel pressure regulator -arrow-
 - Fuel pressure must increase to approx. 4.0 bar
- Switch OFF ignition.
- Check for leakage and residual pressure by observing pressure drop on gauge.
 - After 10 minutes residual pressure must be 2.0 bar minimum

If the holding pressure drops below 2 bar:

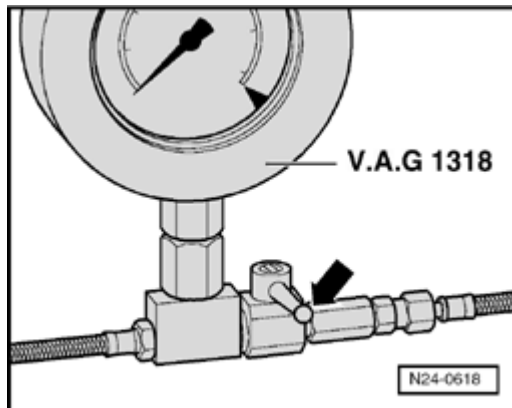
- Start engine and let idle.

A

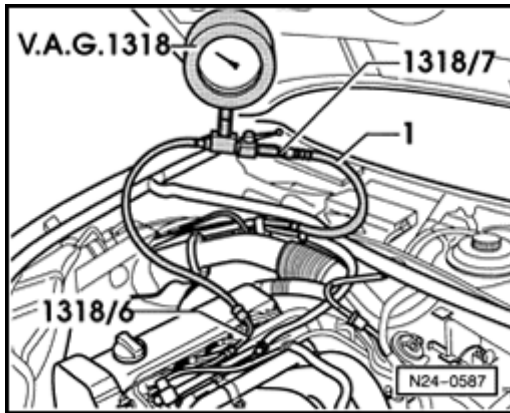
- Switch OFF ignition after pressure has built-up, at same time close pressure tap
 - VAG 1318 handle perpendicular to direction of flow -arrow-
- Observe pressure drop on gauge.

If pressure does not drop:

- Check fuel pump check valve.



⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Engine Code\(s\): AEB, ATW, Repair Group 20](#)



If pressure drops again

A

- Open pressure tester VAG 1318 shut-off tap.
 - VAG 1318 handle in direction of flow
- Start engine and let idle.
- Switch OFF ignition after pressure has built-up, at same time pinch/seal return hose.

If pressure does not drop

- Replace fuel pressure regulator

If pressure drops again

- Check line connections, O-rings on fuel manifold and fuel injectors for leakage.
- Check pressure gauge for leaks.

Warning!

Fuel system is under pressure! Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.



Intake Air system, leak-testing

Checking with engine leak detector spray G 001 800 A1

Special tools, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551/1552 Scan Tool with VAG 1551/3B adaptor cable
- ◆ G 001 800 A1 Engine leak detector spray

Test conditions

- Engine Coolant Temperature 85 °C minimum.

Test sequence

Notes:

- ◆ *The vacuum in the intake system will cause the leak detector spray to be drawn in with the unmeasured air. The leak detector spray reduces the ignitability of the mixture. This leads to a drop in engine speed and to a change of Oxygen sensor reading.*

◆ *Observe all safety precautions listed on the container.*



- Connect VAG 1551/1552 Scan Tool ⇒ [page 01-8](#)

- Start engine and let idle

- Press 0 and 1 buttons to select "Address word"
01 "Engine electronics"

Rapid data transfer HELP

Select function XX



Display will appear as shown

- Press 0 and 8 buttons to select Function 08: "Read measuring value block"

- Press Q button to enter input

Read measuring value block HELP

Input Display group number XXX



Display will appear as shown

- Press 0, 0 and 1 buttons to select "Display group 1"

- Press Q button to enter input

Read measuring value block 1 →

1 2 3 4



Display will appear as shown (1 to 4 = Display zones)

- Note Oxygen sensor control in Display zone 3 on chart, next page.



	Display zones			
	1	2	3	4
Display group 1: Idle speed test				
Display	xxxx rpm	xxx.x °C	xx.x%	XXXXXX
Indicated	Engine speed (increments of 40)	Engine Coolant Temperature	Oxygen sensor control	Adjustment conditions
Working range	0 to 6800 rpm	---	-25.0 to 25.0 %	---
Specification	820 to 900 rpm	---	Value must fluctuate at least 2 % in range: -10.0 to 10.0 %	---

- Systematically spray parts of air intake system with engine leak detector spray.

If engine speed drops or if value displayed for Oxygen sensor control changes:

- Press → button.
- Press 0 and 6 buttons to select Function 06: "End data output"
- Press Q button to enter input

- Switch OFF ignition.
- Check sprayed areas of air intake system for leaks and correct as necessary.