

Audi 100 1991 ➤

Heating, air conditioner

Edition 04.1997



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List of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Audi 100 1991 ➤

Heating, air conditioner

Repair Group

01 - Self-diagnosis

80 - Heating

82 - Auxiliary heating

87 - Air conditioning



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

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Audi Heating, air conditioner - Edition 04.1997



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01 - Self-diagnosis

1 - Air-conditioner self-diagnosis

1.1 - Air-conditioner self-diagnosis

1.2 - Function of self-diagnosis

Vehicles with manually controlled air conditioner

The magnetic clutch control unit -J153 is equipped with a fault memory on vehicles with a compressor driven by the ribbed V-belt.

Note:

No provision is made for self-diagnosis of:

- ♦ Vehicles with compressor driven by V-belt.
- ♦ Vehicles with 5-cylinder swirl chamber diesel engine (no slip detection).

The magnetic clutch control unit -J153 analyses the information and distinguishes 4 different faults => Fault table, Page **6** and stores these until the ignition is switched off.

Vehicles with fully automatic air conditioner

The operating and display unit -E87 of the fully automatic air conditioner is equipped with a fault memory.

After evaluating the information, the operating and display unit - E87 differentiates between up to 22 different faults => Fault Table on Page **17** and stores them until the fault memory is erased after interrogation.

1.3 - Fault recognition

Any faults occurring in the monitored sensors/components are stored in the fault memory together with an indication of the type of fault.

Always commence fault finding by starting self-diagnosis and interrogating the stored faults. The following may be used to retrieve the stored information:

- ♦ Fault reader V.A.G 1551
- ♦ Vehicle system tester V.A.G 1552

Appropriate repairs can then be performed on the basis of the fault information displayed and a fault table indicating the possible causes of trouble.

Notes on fault remedy:

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- ♦ The data output is only possible with the ignition switched on or with the engine running and an engine speed of less than 3000 rpm. At higher engine speeds, data output is restricted or terminated (for example, final control diagnosis is only possible up to an engine speed of 3000 rpm, if this speed is exceeded, the self-diagnosis is terminated).
- ♦ If a fault situation exists for longer than a specific period, the fault is stored as a static fault. If the fault situation does not recur within a certain time, the fault becomes a sporadic fault. This process is continuously repeated. Sporadic faults are also identified by /SP on the right-hand side of the display.



- ♦ Sporadic faults which do not re-occur within a specific period are automatically erased.

Self-diagnosis is only possible using fault reader V.A.G 1551 or vehicle system tester V.A.G 1552, mode 1, "Rapid data transfer".

Self-diagnosis is not restricted to storage, interrogation, erasing and final control diagnosis. It also has basic setting, control unit identification and encoding functions.

Operating mode -2- (flash code output) is not envisaged for the air conditioner/heating electronics. Operating modes-3- (self-test) and -4- (dealership identification) only apply to fault reader V.A.G 1551 and the vehicle system tester V.A.G 1552 and are described in the relevant operating instructions.

Note:

This workshop manual describes self-diagnosis using the fault reader V.A.G 1551.

Self-diagnosis can also be performed in the same manner with the vehicle system tester V.A.G 1552. In order to have a record of any faults occurring for dealing with subsequent queries, it is advisable, before erasing the fault memory, to connect to fault reader V.A.G 1551 and print out any faults present (V.A.G 1552 has no printer).

1.4 - Safety precautions

Observe the following if testers and measuring instruments have to be used during test drives:

- ♦ Always attach testers and measuring instruments to the back seat and have a second person operate them from there.
- ♦ Operation of testers and measuring instruments from the front passenger seat could result in injuries to the person sitting there in the event of an accident (activation of passenger's airbag).

Warning

Attach fault reader to rear seat and operate it from there

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1.5 - Technical self-diagnosis data

	Magnetic clutch control unit -J153 1)	Operating and display unit -E87 2)
Fault memory		
- Non-volatile memory	no	yes
- Volatile memory	yes	no
Data output		
- Rapid data transfer	yes	yes
- Flash code output	no	no
Final control diagnosis	yes	yes
Basic setting	no	yes
Coding control unit	no	yes
Reading measured value block	yes	yes

	Magnetic clutch control unit -J153 1)	Operating and display unit -E87 2)
Fault memory		
Fitting locations of components	=> Page 192	=> Page 212

1) No provision is made for self-diagnosis of:

Vehicles with compressor driven by V-belt,

Vehicles with ribbed V-belt drive exclusively for compressor (e.g. 4-cylinder-5V engine),

Vehicles with 5-cylinder swirl chamber diesel engine (no slip detection).

2) No control cycle is performed during self-diagnosis (compressor, radiator fan etc. are not actuated).

2 - Performing self-diagnosis of manually controlled air conditioner

2.1 - Performing self-diagnosis of manually controlled air conditioner

2.2 - Connecting fault reader V.A.G 1551 and selecting functions

Notes:

- ◆ No provision is made for self-diagnosis of vehicles with compressor driven by V-belt and vehicles with 5-cylinder swirl chamber diesel engine (no slip detection).
- ◆ Vehicle systems tester V.A.G 1552 can also be used instead of fault reader V.A.G 1551.
- ◆ Do not switch off engine after conducting road test (fault memory is erased).

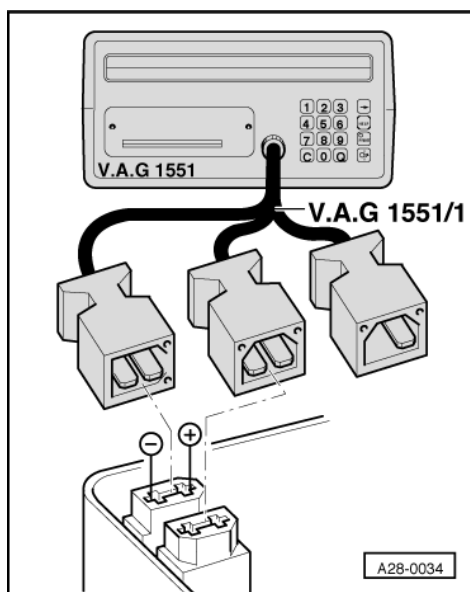
Requirements:

- Supply voltage of electrical system OK
- All fuses OK:

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=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- Conduct a road test lasting at least 10 minutes at high engine revs at an ambient temperature of more than 10 °C with air conditioner switched on.
- Let engine run after road test and leave ignition switched on.





- -> Connect fault reader V.A.G 1551 with diagnostic cable V.A.G 1551/1 to diagnostic sockets as follows:
 - Remove cover of auxiliary relay carrier I in left of plenum chamber.
 - Plug in black connector to black diagnostic socket.

-> Indicated on display:

```
V.A.G - SELF DIAGNOSIS      HELP
1 - Rapid data transfer 1)
2 -Flash code output 1)
```

- 1) appears alternately

Note:

*If no display appears, do not plug in white connector. In this case, test power supply for black diagnostic socket
=> Page 55.*

- Plug in white connector to white diagnostic socket (blue connector is not required).
- Press PRINT key to switch on printer - (indicator lamp in key lights up).
- Press key 1 for mode 1, "Rapid data transfer".

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-> When indicated on display:

```
Rapid data transfer      HELP
Enter address word xx
```

- Press keys 0 and 8 for address word "AC/heating electronics".

-> When indicated on display:

```
Rapid data transfer      Q
08 -AC/heating electronics
```

- Confirm input with Q key.

-> When indicated on display:

```
Rapid data transfer
Tester transmits address word 08
```

- Wait until the next display appears.

-> When indicated on display (example):

```
4A0919579X AC compr. ctrl. 6-cyl. DXX
□
```

Control unit identification (example)

- 4A0919579X: Part No.; Index X = assignment to engine
=> Parts Catalogue
- AC compr. Ctrl.: Control unit for air conditioner compressor
- 6-cyl.: Assignment to 6-cyl. engine
- DXX: EPROM (Data)

Control unit no.	Assignment
4A0 919 579	5-cylinder petrol engine
4A0 919 579 E	5-cylinder TDI engine
4A0 919 579 A, 4A0 919 579 F	6-cylinder petrol engine

Control unit no.	Assignment
4A0 919 579 C	4-cylinder TDI engine

Notes:

- ♦ The control unit on 4-cylinder petrol engines and on 5-cylinder swirl chamber diesel engine do not have a self-diagnosis capability.
- ♦ Replace control unit if Part no. of control unit does not agree with engine fitted to vehicle.
- Press =>key.

-> When indicated on display:

Rapid data transfer HELP
 Select function XX

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- Select a function => Page **5**.
- A list of the possible functions is printed out after pressing the HELP key:

Notes on fault messages:

-> When indicated on display:

Control unit does not answer! HELP

or

Rapid data transfer HELP
 K-line not switching to earth

or

Rapid data transfer HELP
 K-line not switching to positive

- Print a list of possible fault causes by pressing the HELP key.
- Check wiring of diagnostic socket => Page **55**.
- In addition, test power supply and earth connection to magnetic clutch control unit -J153

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- After rectifying possible causes of fault, re-enter 0 and 8 for "AC/heating electronics" and confirm entry with Q key.

-> When indicated on display:

Rapid data transfer HELP
 Communication fault

- Separate wiring between individual systems =>Page **58** and check wiring.

2.3 - Overview of function selection

	Page
01 - Interrogating control unit version	3
02 - Interrogating fault memory	6
03 - Final control diagnosis	9
08 - Reading measured value block	11

Further functions which are printed off after pressing the HELP key can be ignored.



2.4 - Interrogating fault memory

- Connect fault reader V.A.G 1551 and enter address word 08 for "AC/heating electronics", confirm entry and move forward in programme => Page 3 .

-> When indicated on display:

Rapid data transfer	HELP
Select function XX	

- Press keys 0 and 2 for "Interrogating fault memory" function.

-> When indicated on display:

Rapid data transfer	Q
02 - Interrogating fault memory	

- Confirm input with Q key.

-> When indicated on display:

No fault detected!

- Press =>key.

or

-> When indicated on display:

X faults detected!

If printer is switched on, stored faults will be displayed and printed out in sequence.

- When the last fault has been displayed and printed out, press =>key.
- Switch off ignition in order to erase fault memory.
- Rectify faults printed out as specified in fault table => Page 6 .
- Conduct a road test and then interrogate fault memory.

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If magnetic clutch does not operate although no fault has been recognised, carry out the following steps:

- Read measured value block => Page 11 .
- Perform final control diagnosis => Page 9 .

2.5 - Fault table

Notes:

- ♦ All the faults detected by the magnetic clutch control unit -J153 and displayed by V.A.G 1551/V.A.G 1552 on interrogating content of the fault memory are listed in the following in ascending order of fault codes.
- ♦ Faults are erased when ignition is switched off.
- ♦ In the "Rapid Data Transfer" mode, the fault code is only printed out if the V.A.G 1551 printer is switched on. Example: Fault code (5-digit) 01270. Fault code does not appear in display of V.A.G 1551.
- ♦ Sporadically occurring faults are marked on the display by "/SP".
- ♦ Faults which are not identified with "/SP", are not stored. They appear in display only for as long as they exist.
- ♦ If defective components are detected when the fault memory is read out, also use the current flow diagram to check the wiring to the components for short circuits and open circuits.

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- ♦ Check the appropriate plug contacts before replacing a component.
- ♦ Additionally check power supply and earth connection before replacing magnetic clutch control unit -J153.

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00000 No fault detected			If problems exist: Read measured value block => Page 199

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00529 Speedo info missing /SP	- Open circuit between dash panel insert and magnetic clutch control unit -J153	▪ Compressor not running ▪ No refrigeration capacity	- Read measured value block => Page 11 Check wiring and connectors according to current flow diagram
	- No engine speed signal from dash panel insert		- Check engine speed signal at dash panel insert: => Fuel injection and ignition system; Repair group 24 => Diesel direct injection and glow plug system; Repair group 23
	- Magnetic clutch control unit -J153 defective		- Replace control unit -J153

Notes on fault code 00529:

- ♦ This fault is only detected during final control diagnosis.
- ♦ No additional fault display is provided.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00532 Supply voltage -N25 Value too small 1)	- Air conditioner switched off (AC button in switch for air conditioner -E30 not pressed)	▪ Compressor not running ▪ No or insufficient refrigeration capacity	
	- Air conditioner low-pressure switch -F73 open - Air conditioner high-pressure switch -F118 open		- Check switching pressures and operation of switches - F73 and -F118 => Page 155
	- Open circuit to magnetic clutch control unit -J153 (pins 30 and 75)		- Check wiring and connectors according to current flow diagram
	- System voltage less than 10 V at magnetic clutch control unit -J153 (pin 30)		- Check alternator and voltage regulator according to current flow diagram
	- Ambient temperature switch -F38 open		- Check ambient temperature switch -F38 => Fig. 198

1) This display will appear in addition to relevant component.

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V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00624			



Air conditioner compressor cuts in Short to positive 1) /SP	- Short circuit to positive between magnetic clutch control unit -J153 and engine control	- Pilot control value of idling stabilisation too high - Engine speed fluctuates when compressor cuts in	- Check wiring and connectors according to current flow diagram
	- Engine control unit defective		- Carry out final control diagnosis =>Page 9 . - Check engine control unit: => Fuel injection and ignition system; Repair group 01; Self-diagnosis Self-diagnosis => Diesel direct injection and glow plug system; Repair group 01, Self-diagnosis

1) This display will appear in addition to relevant component.

Note on fault code 00624:

The effect depends on type of engine control.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01270 Air conditioner magnetic clutch -N25 Speed variation too great 1) /SP	- Ribbed V-belt not correctly tensioned	- Compressor not running - Compressor no longer runs after driving a few kilometres - No or insufficient refrigeration capacity after driving a few kilometres	- Inspect tension of ribbed V-belt => Engine mechanical components; Repair group 13
	- Incorrect magnetic clutch control unit -J153		- Interrogate control unit identification => Page 3 onwards.
	- Air conditioner magnetic clutch -N25 slipping		- Repair magnetic clutch -N25 => Page 180
	- Compressor stiff		- Check compressor for ease of operation Hand over vehicle to Audi and VW Air-conditioning Service Centre to replace compressor
	Continued ▼		

1) This display will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01270 Air conditioner magnetic clutch -N25 Open circuit 1) /SP	(Fault 01270 continued) - Open circuit between magnetic clutch control unit -J153 and magnetic clutch -N25 - Open circuit between magnetic clutch control unit -J153 and air conditioner compressor speed sender -G111	- Compressor not running - No refrigeration capacity	- Check wiring and connectors according to current flow diagram
	- Air conditioner compressor speed sender -G111 defective		- Check sender -G111 => Page 53

	- Air conditioner magnetic clutch -N25 defective Continued ▼		- Repair magnetic clutch -N25 => Page 180
--	---	--	---

1) This display will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01270 Air conditioner magnetic clutch - N25 Open circuit /SP 1)	(Fault 01270 continued) - Compressor stiff	- Compressor not running - No refrigeration capacity	- Check compressor for ease of operation - Hand over vehicle to Audi or VW Air-conditioning Service Centre to replace compressor
Mechanical fault /SP 1)	- Belt and clutch plate in magnetic clutch - N25 are stuck	- Compressor running constantly - Air conditioner iced up	- Service magnetic clutch -N25 => Page 180
	- Short circuit to positive between magnetic clutch control unit -J153 and magnetic clutch - N25		- Check wiring and connectors according to current flow diagram
	- Magnetic clutch control unit -J153 defective		- Replace control unit - J153

1) One of these displays will appear in addition to relevant component.

2.6 - Performing final control diagnosis

Requirements:

- Fault memory interrogated => Page 6 and faults displayed rectified.
- Engine still idling after interrogation of fault memory.
- Measured value block read => Page 11 (no compressor shut-off conditions should exist).
- Air conditioner switched on.

-> When indicated on display:

Rapid data transfer HELP
 Select function XX

- Press keys 0 and 3 for "Final control diagnosis" function

-> When indicated on display:

Rapid data transfer Q
 03 - Final control diagnosis

- Confirm input with Q key.

-> When indicated on display:

Final control diagnosis
 Air conditioner compressor cut-in



Note:

Test this actuator (=> Page 10) only if the following problem exists:

- ♦ Pilot control value of idling stabilisation too high.
- ♦ Compressor does not run and code "5" appears in display zone in measured value block.
- ♦ Engine speed fluctuates or idling is irregular when air conditioner operating.
- ♦ Fault display "Air conditioner compressor cut-in - short circuit to positive".

- Press =>key.

-> When indicated on display:

Final control diagnosis
Air conditioner magnetic clutch -N25

Magnetic clutch is engaged and disengaged in a 3-second cycle, the compressor is driven with magnetic clutch engaged.

Note:

-> If following display appears after magnetic clutch is first switched on:

Function unknown or cannot
be carried out at present.

- Once again interrogate fault memory => Page 6 . This fault is only detected during final control diagnosis.
- If the compressor is not driven:
- Test power supply of magnetic clutch:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- With ignition switched off check ease of operation of compressor by hand.
- Service magnetic clutch => Page 180 .
- Press =>key.

Performing final control diagnosis of "air conditioner compressor cut-in"

- Switch off ignition.
- Wait 30 seconds.
- Remove engine control unit:

=> Fuel injection and ignition system; Repair group 01

=> Diesel direct injection and glow plug system; Repair group 01

- Connect test box V.A.G 1598 A to connectors for engine control unit.
- Connect V.A.G 1527 voltage tester at test box between earth and input for compressor cut-in:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- Switch the ignition on.
- Enter address word 08 for "AC/heating electronics", confirm entry and move forward in programme => Page 3 .

-> When indicated on display:

Rapid data transfer HELP
Select function XX

- Press keys 0 and 3 for "Final control diagnosis" function

-> When indicated on display:

Rapid data transfer Q
 03 - Final control diagnosis

- Confirm input with Q key.

-> When indicated on display:

Final control diagnosis
 Air conditioner compressor cut-in

The voltage tester flashes at 3-second intervals.

- If the voltage tester does not flash:
- Check wiring between magnetic clutch control unit -J153 and connector for engine control unit for open circuit and short to earth/positive.

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- Press =>key.

-> When indicated on display:

Final control diagnosis
 Air conditioner magnetic clutch -N25

- Magnetic clutch is switched on and off for 3 seconds each.
- Press =>key.

2.7 - Reading measured value block

Requirements:

- Fault memory interrogated => Page 6 and faults displayed rectified.
- Engine still idling after interrogation of fault memory.
- Air conditioner switched on.

Notes:

- ♦ If displayed values are to be read out while moving, a second operator is required.
- ♦ Observe safety precautions => Page 2

-> When indicated on display:

Rapid data transfer HELP
 Select function XX

- Press keys 0 and 8 for "Reading measured value block" function.
- Press keys 0 and 8 for "Reading measured value block" function.

-> When indicated on display:

Rapid data transfer Q
 08 - Reading measured value block

- Confirm input with Q key.

-> When indicated on display:

Reading measured value block Q
 Enter display group number XX

- Press keys 0 and 1 for "Display group number 01 or 001" (depending on software status of V.A.G 1551).



- Confirm input with Q key.

-> Indicated on display (example):

Reading	measured	value	block	1
1	2	3	4	

The measured value block shows 4 display zones. Explanation of readouts 1 ... 4 in individual display zones
=> Page 12.

Note:

If printer is switched on, the current display will be printed out on the record slip.

- If specified values are attained in all display fields, press => key.

List of display group number 001

Indicated on display (example)	Display group no.	Display zone	Designation
Reading measured value block 1 => 0 720 rpm 920 rpm 0%	001	1 2 3 4	Compressor shut-off conditions; explanation => Page 12 Engine speed Compressor speed Momentary belt slip

Notes:

- ♦ Belt slip less than 30% is permissible.
- ♦ Belt slip greater than 30%, but less than 60% results in compressor being shut off for about 10 seconds. If belt slip greater than 30%, but less than 60%, is detected 10 times within a driving period, compressor is no longer switched on.
- ♦ Belt slip greater than 60% results in compressor being switched off for entire driving period.

Explanation of compressor shut-off conditions in display zone 1

Code	Meaning	Cause of fault
0	Compressor on No compressor shut-off detected	protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for the content of this document. Copyright by AUDI AG. - If compressor is not switched on, carry out final control diagnosis =>Page 10.
1	Compressor off a) Cut-in delay approx. 3 seconds after engine start b) Insufficient or no engine speed detected	- Engine speed less than 600 rpm - Open circuit between control unit -J153 and dash panel insert - No speed signal from dash panel insert. Checking: => Fuel injection and ignition system; Repair group 24

Code	Meaning	Cause of fault
2	Compressor off	

Code	Meaning	Cause of fault
	a) Voltage at pin 75 of control unit -J153 less than 3 V	- Air conditioner switched off - High-pressure switch for magnetic clutch -F118 open - Ambient temperature less than 5 °C - Ambient temperature switch -F38 open - Open circuit
	b) Voltage at pin 30 of control unit -J153 less than 10 V	- Air conditioner low-pressure switch - F73 open - Open circuit - Voltage drop in electrical system

Code	Meaning	Cause of fault
3	Compressor off Warning lamp for excess coolant temperature	- Short to earth in wiring to pin "HLS" of control unit -J153 - Contact "R" of electronic thermostatic switch -F76 closed - Coolant temperature overheating warning switch -F14 closed - Control unit for diesel direct-injection system -J248 input to earth => "Current flow diagrams, Electrical fault finding and fitting locations" binder
4	Compressor off Air conditioner compressor cut-in (de-energised at pin 87a of control unit -J153)	- Short to earth in wiring to pin 87a - Engine control unit has switched to earth => Fuel injection and ignition system; Repair group 01; Self-diagnosis => Diesel direct injection and glow plug system; Repair group 01; Self-diagnosis

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Code	Meaning	Cause of fault
5	Compressor off a) Belt slip greater than 60% once or greater than 30%, but less than 60%, ten times	- Belt tension not OK - Compressor stiff
	b) Magnetic clutch control unit - J153 incorrect	- Check part no.
	c) No compressor speed signal detected	- Open circuit or short circuit to positive or to earth between pin "K" of control unit -J153 and sender -G111 - Open circuit between pin "87" of control unit -J153 and magnetic clutch -N25 or in earth connection of magnetic clutch -N25 - Air conditioner compressor speed sender -G111 defective. Testing => Page 180

Notes:

- ◆ If shut-off condition 2 is additionally displayed alternately, first of all determine cause for this shut-off condition.
- ◆ Belt slip => Display zone 4.

Code	Meaning	Cause of fault
6	Kickdown Compressor off for 12 seconds after kickdown switch closes	



Code	Meaning	Cause of fault
7	Kickdown switch closed No voltage at pin U of control unit -J153	- Short to earth in wiring to pin "U" of control unit -J153 - Kickdown switch -F46 and gearbox switch -F15 closed (TDI with manual gearbox) - Control unit for automatic gearbox -J217 has switched input to earth => "Current flow diagrams, Electrical fault finding and fitting locations" binder

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3 - Performing self-diagnosis of fully automatic air conditioner

3.1 - Performing self-diagnosis of fully automatic air conditioner

3.2 - Connecting fault reader V.A.G 1551 and selecting functions

Notes:

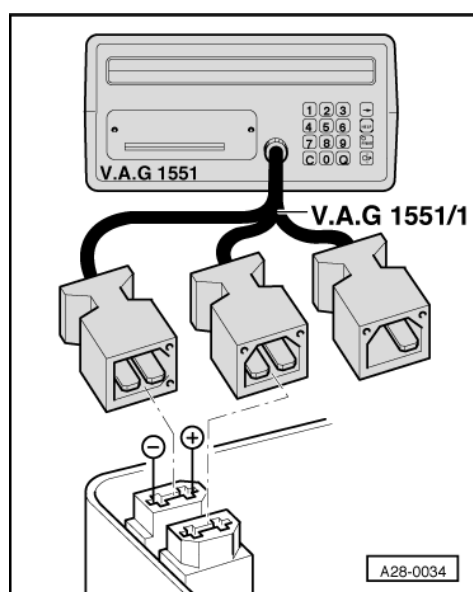
- ♦ Vehicle systems tester V.A.G 1552 can also be used instead of fault reader V.A.G 1551.
- ♦ The main programme of operating and display unit is switched off during self-diagnosis. No control cycle is carried out =>Page 2.
- ♦ On vehicles with stationary heater, it is also possible to interrogate the fault memory with stationary heater operating.
- ♦ From software status D04 it is possible to alter the air flow in stationary heater mode (start always in position "Def" and "22 oC").
- ♦ Vehicles with 6- and 8-cylinder engine 07.95 ➤ are equipped with a Nippondenso compressor (phased introduction). This compressor does not have a compressor speed sender -G111. In the event of a stiff compressor, the magnetic clutch is disengaged by an overheating cut-out in the magnetic clutch's solenoid.

Requirements:

- Supply voltage of electrical system OK
- All fuses OK:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- Start the engine.
- Press the "AUTO" button of operating and display unit -E87.



- Drive the vehicle a few metres at walking speed.
- -> Connect fault reader V.A.G 1551 with diagnostic cable V.A.G 1551/1 to diagnostic sockets as follows:
 - Remove cover of auxiliary relay carrier I in left of plenum chamber.
 - Plug in black connector to black diagnostic socket.

-> Indicated on display:

```
V.A.G - SELF DIAGNOSIS      HELP
1 - Rapid data transfer 1)
2 -Flash code output 1)
```

- 1) appears alternately

Note:

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If no display appears, do not plug in white connector. In this case, test power supply for black diagnostic socket => Page 55.

- Plug in white connector to white diagnostic socket (blue connector is not required).
- Press PRINT key to switch on printer - (indicator lamp in key lights up).
- Press key 1 for mode 1, "Rapid data transfer".

-> When indicated on display:

```
Rapid data transfer      HELP
Enter address word XX
```

- Press keys 0 and 8 for address word "AC/heating electronics".

-> When indicated on display:

```
Rapid data transfer      Q
08 -AC/heating electronics
```

- Confirm input with Q key.

-> When indicated on display:

```
Rapid data transfer
Tester transmits address word 08
```

- Wait until the next display appears.

Control unit identification (examples)

-> When indicated on display (example):

```
4A0820043X Air conditioner-fully
automatic DXX
Coding 00040      WSC XXXXX
```

Example for vehicles with Zexel compressor up to index H and 4-cylinder engine

- 4A0820043X: Part no.
- Air conditioner-Vollautomat: Control unit for fully automatic air conditioner
- DXX: EPROM (Data)
- Coding 00040: Different codes => Page 36
- WSC XXXXX: Workshop Code for the V.A.G 1551 which was used to perform the last encoding

-> When indicated on display (example):

```
4A0820043K Air conditioner-fully
automatic D05
Coding 00160      WSC XXXXX
```

**Example for vehicles with Nippondenso compressor and 6-cylinder engine**

- 4A0820043K:	Part no.; assignment => Parts Catalogue
- Air conditioner-fully auto- matic:	Control unit for fully au- tomatic air conditioner
- D04:	EPROM (Data)
- Coding 00160:	Different codes => Page 36
- WSC XXXXX:	Workshop Code for the V.A.G 1551 which was used to perform the last encoding

**Note:**

Depending on programme card version of V.A.G 1551, the first two digits do not appear in display (e.g. 140 instead of 00140).

- Press =>key.

-> When indicated on display:

Rapid data transfer	HELP
Select function XX	

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- Select a function => Page **16**.
 - A list of the possible functions is printed out after pressing the HELP key:

Notes on fault messages:

-> When indicated on display:

Control unit does not answer!	HELP
-------------------------------	------

or

Rapid data transfer	HELP
K-line not switching to earth	

or

Rapid data transfer	HELP
K-line not switching to positive	

- Print a list of possible fault causes by pressing the HELP key.
- Check wiring of diagnostic socket => Page **55**.
- After rectifying possible causes of fault, re-enter 0 and 8 for "AC/heating electronics" and confirm entry with Q key.

-> When indicated on display:

Rapid data transfer	HELP
Communication fault	

- Separate wiring between individual systems =>Page **58** and check wiring.

3.3 - Overview of function selection

	Page
01 - Interrogating control unit version	14
02 - Interrogating fault memory	17

	Page
03 - Final control diagnosis	28
04 - Basic setting	32
05 - Erasing fault memory	34
06 - End of output	35
07 - Coding operating and display unit	35
08 - Reading measured value block	37

Further functions which are printed off after pressing the HELP key can be ignored.

3.4 - Interrogating fault memory

- Connect fault reader V.A.G 1551 and enter address word 08 for "AC/heating electronics", confirm entry and move forward in programme => Page 14 .

-> When indicated on display:

Rapid data transfer HELP Select function XX

- Press keys 0 and 2 for "Interrogating fault memory" function.

-> When indicated on display:

Rapid data transfer Q 02 - Interrogating fault memory

- Confirm input with Q key.

-> When indicated on display:

No fault recognised!

- Press =>key.

or

-> When indicated on display:

X faults recognised!

If printer is switched on, stored faults will be displayed and printed out in sequence.

- When the last fault has been displayed and printed out, press =>key.
- Rectify faults printed out as specified in fault table => Page 17 .

Note:

If magnetic clutch does not operate although no fault has been recognised, carry out the following steps:

- Read measured value block => Page 37 .
- Pay particular attention to compressor shut-off conditions in display zone 1 of display group 001.
- Perform final control diagnosis => Page 28 .

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3.5 - Fault table

Notes:

- ♦ Listed below, by fault code number, are all the possible faults which may be detected by the operating and display unit -E87 and displayed on the V.A.G 1551 or V.A.G 1552 when the fault memory is interrogated.



- ♦ The content of the fault memory is retained until it is erased. => Page 34 .
- ♦ In the "Rapid Data Transfer" mode, the fault code is only printed out if the V.A.G 1551 printer is switched on. Example: Fault code (5-digit) 01270.
- ♦ Sporadically occurring faults are marked on the display by "/SP".
- ♦ If defective components are detected when the fault memory is read out, also use the current flow diagram to check the wiring to the components for short circuits and open circuits.

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- ♦ Check the appropriate plug contacts before replacing a component.
- ♦ Before replacing the operating and display unit -E87, also check the power supply and the earth connections.

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- ♦ If the operating and display unit -E87 continues to operate when the ignition has been switched off, check the wiring to the operating and display unit -E87, connector D, contact 1 for a short to positive; on vehicles with auxiliary heater, follow the additional current flow diagram:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- ♦ If on vehicles with a air conditioner compressor speed sender -G111, compressor only comes on briefly when the engine is started and then switches off again immediately, check wiring between air conditioner compressor speed sender -G111 and operating and display unit -E87 for an open circuit:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- ♦ In on vehicles with Nippondenso compressors (with no air conditioner compressor speed sender -G111), the compressor only comes on briefly when engine starts and then switches off again immediately, check the coding for operating and display unit -E87 => Page 35 .

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00000 No fault detected			If problems exist: Read measured value block => Page 219

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00529 Speedo info missing /SP	- No engine speed signal detected	▪ Compressor not running ▪ No refrigeration capacity	- Read measured value block => Page 37 Check wiring and connectors according to current flow diagram
	- Open circuit between dash panel insert and operating and display unit -E87		- Check engine speed signal at dash panel insert: => Fuel injection and ignition system; Repair group 24

Notes on fault code 00529:

- ♦ This fault is only detected during final control diagnosis.
- ♦ No additional fault display is provided.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00532 Supply voltage	- Voltage drops in electrical system	▪ No or insufficient refrigeration capacity	- Check alternator and voltage regulator according to current flow diagram

Value too small /SP		▪ Magnetic clutch is switched off for at least 20 seconds	- Test contact resistance in wiring to magnetic clutch according to current flow diagram
---------------------	--	---	--

Notes on fault code 00532:

- ♦ If vehicle system voltage at connector C, contact 3 to operating and display unit -E87 is less than 9.5 V, compressor is switched off for at least 20 seconds until voltage rises again to 10.8 V.
- ♦ With software version D02, continued operation of fresh air blower -V2 after ignition is switched off can result in fault "Supply voltage" and/or "Low pressure switch -F73" being stored (3... 6 bars). Erase fault memory, operation of air conditioner is not affected.
- ♦ This fault is only recognised if voltage is less than 9.5 V when compressor is switched on.
- ♦ If voltage is less than 10.8 V when compressor is switched on, no fault is recognised. Code 10 is set in "Read measured value block" as a compressor shut-off condition.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00600 Potentiometer -G92 in positioning motor -V68	- Short circuit or open circuit between potentiometer -G92 and operating and display unit -E87	▪ Temperature control faulty (position of temperature flap is not detected)	- Check wiring and connectors according to current flow diagram
Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Potentiometer -G92 defective Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.		- Replace positioning motor -V68
	Continued ▼		

- 1) One of these displays will appear in addition to relevant component.

Note on fault code 00600:

In the event of a fault at potentiometer -G92, positioning motor -V68 can be adjusted manually by actuating the "+" or "-" key for temperature selection (display range between 0 °C and 50 °C).

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00600 Potentiometer -G92 in positioning motor -V68	(Fault 00600 continued) - Temperature flap stiff	▪ Temperature control faulty (temperature flap sticking or end stops are not reached)	- Check temperature flap for ease of operation
Defective /SP 1) Adaptation limit exceeded 1)	- Potentiometer -G92 defective		- Replace positioning motor -V68

- 1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00601 Potentiometer -G112 in positioning motor -V70	- Short circuit or open circuit or wiring fault between potentiometer -G112 and operating and display unit -E87	▪ Temperature control faulty (position of central flap is not detected)	- Check wiring and connectors according to current flow diagram
Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Potentiometer -G112 defective		- Replace positioning motor -V70



Defective /SP 1) Adaptation limit exceeded 1)	- Central flap stiff	▪ Temperature control faulty (central flap sticking or end stops are not reached)	- Check central flap for ease of operation
	- Potentiometer -G112 defective		- Replace positioning motor -V70

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00602 Potentiometer -G114 in positioning motor -V85 1)	- Short circuit or open circuit or wiring fault between potentiometer -G114 and operating and display unit -E87	▪ Air flow faulty (position of footwell/defroster flap is not detected)	- Check wiring and connectors according to current flow diagram
Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Potentiometer -G114 defective		- Replace positioning motor -V85
Defective /SP 1) Adaptation limit exceeded 1)	- Footwell/defroster flap stiff	▪ Air flow faulty (footwell/defroster flap sticking or end stops are not reached)	- Check footwell/defroster flap for ease of operation
	- Potentiometer -G114 defective		- Replace positioning motor -V85

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00603 Footwell/defroster flap positioning motor -V85	- Footwell/defroster flap stiff	▪ Air flow faulty	- Check footwell/defroster flap for ease of operation
Blocked or de-energised /SP 1)	- Short circuit or open circuit or wiring fault between footwell/defroster flap positioning motor -V85 and operating and display unit -E87		- Check wiring and connectors according to current flow diagram Carry out final control diagnosis =>Page 52 onwards (test step 4.6)

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00604 Potentiometer -G113 in positioning motor -V71	- Short circuit or open circuit or wiring fault between potentiometer -G113 and operating and display unit -E87	▪ Draught at high speed	- Check wiring and connectors according to current flow diagram
Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Potentiometer -G113 defective		- Replace positioning motor -V71
		▪ Insufficient air output at high fresh air blower speed (position of air-flow flap is not detected)	

	Continued ▼		
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1) One of these displays will appear in addition to relevant component.

Note on fault code 00604:

Positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00604	(Fault 00604 continued)		
Potentiometer -G113 in positioning motor -V71	- Air-flow flap stiff	▪ Draught at high speed	- Check air-flow flap for ease of operation
Defective /SP 1) Adaptation limit exceeded 1)	- Potentiometer -G113 defective	▪ Insufficient air output at high fresh air blower speed (air-flow flap sticking or end stops are not reached)	- Replace positioning motor -V71

1) One of these displays will appear in addition to relevant component.

Note on fault code 00604:

Positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles.

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V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00624			
Air conditioner compressor cut-in	- Short circuit to positive between operating and display unit -E87 and engine control	▪ Engine speed fluctuates when compressor cuts in	- Check wiring and connectors according to current flow diagram
Short circuit to positive /SP 1)		▪ Pilot control value of idling stabilisation characteristic zero point shifted	- Carry out final control diagnosis =>Page 28 .
	- Engine control unit defective		- Check engine control unit: => Fuel injection and ignition system; Repair group 01; Self-diagnosis Self-diagnosis => Diesel direct injection and glow plug system; Repair group 01, Self-diagnosis

1) One of these displays will appear in addition to relevant component.

Note on fault code 00624:

Effect depends on type of engine control.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00625			



Speed signal	- Loose contact between speedometer -G21 and operating and display unit - E87 or another control unit which is also connected => "Current flow diagrams, Electrical fault finding and fitting locations" binder	▪ Air output changes without any change in fresh air blower speed	- Check wiring and connectors according to current flow diagram Test speedometer -G21: => "Current flow diagrams, Electrical fault finding and fitting locations" binder
Implausible signal 1)	- Speedometer sender -G22 supplies unusable signal or signal is falsified by other control unit		- Test speedometer sender -G22: => Electrical system; Repair group 90; Testing components of dash panel insert; Testing speedometer sender Testing components of dash panel insert; Testing speedometer sender

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00779 Ambient temperature sensor -G17	- Ambient temperature sensor -G17 defective	▪ Temperature control faulty ▪ Ambient temperature display incorrect	- Test temperature sensor -G17 => Page 49 onwards (test step 2.4)
Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Short circuit or open circuit between ambient temperature sensor -G17 and operating and display unit -E87		- Check wiring and connectors according to current flow diagram

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00785 Dash panel temperature sensor -G56	- Dash panel temperature sensor -G56 defective	▪ Temperature control faulty	- Test temperature sensor -G56 => Page 49 onwards (test step 2.2)
Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Short circuit or open circuit between dash panel temperature sensor -G56 and operating and display unit -E87		- Check wiring and connectors according to current flow diagram

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00786 Roof temperature sensor - G86	- Roof temperature sensor -G86 defective	▪ Temperature control faulty	- Test temperature sensor -G86 => Page 49 onwards (test step 2.1)

Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Short circuit or open circuit between roof temperature sensor - -G86 and operating and display unit -E87		- Check wiring and connectors according to current flow diagram
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1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00787 Fresh air intake duct temperature sensor -G89	- Fresh air intake duct temperature sensor -G89 defective	▪ Temperature control faulty ▪ Ambient temperature display incorrect	- Test temperature sensor -G89 => Page 49 onwards (test step 2.3)
Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Short circuit or open circuit between fresh air intake duct temperature sensor -G89 and operating and display unit -E87		- Check wiring and connectors according to current flow diagram

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00799 Refrigerant temperature sender -G110	- Air conditioner refrigerant temperature sender -G110 defective	▪ Effect only felt at very low ambient temperatures (refrigerant temperature is computed by -E87)	- Test sender -G110 => Page 49 onwards (test step 2.5)
Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Short circuit or open circuit between air conditioner refrigerant temperature sender -G110 and operating and display unit -E87		- Check wiring and connectors according to current flow diagram

1) One of these displays will appear in addition to relevant component.

Note on fault code 00799:

Air conditioner refrigerant temperature sender -G110 is fitted depending on vehicle equipment and is therefore not installed in all vehicles.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00800 Fresh air blower temperature sensor -G109	- Fresh air blower temperature sensor -G109 defective	▪ Variations in air temperature downstream of evaporator (e.g. because of higher air humidity, higher fresh air blower speed) are not detected	- Test temperature sensor -G109 => Page 49 onwards (test step 2.6)

Short to earth /SP 1) Open circuit / short to positive /SP 1)	- Short circuit or open circuit between fresh air blower temperature sensor -G109 and operating and display unit -E87	▪ Compressor not running ▪ Refrigeration capacity insufficient	- Check wiring and connectors according to current flow diagram
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1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00801 High-pressure switch for mag- netic clutch -F118 Open circuit / short to positive /SP 1)	- Open circuit between magnetic clutch high- pressure switch -F118 and operating and dis- play unit -E87 Continued ▼	▪ No refrigeration ca- pacity ▪ No refrigeration ca- pacity after driving a few kilometres ▪ Magnetic clutch -N25 does not operate (com- pressor does not run)	- Check wiring and con- nectors according to cur- rent flow diagram - Test high-pressure switch -F118 => Page 153

1) One of these displays will appear in addition to relevant component.

Notes on fault code 00801:

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- ◆ If open high-pressure switch - F118 is detected 30 times within one driving period (e.g. a loose contact), the compressor is switched off.
- ◆ Compressor can be switched on again by pressing the "Compressor on" button.
- ◆ If this fault occurs over several driving cycles, compressor cannot be switched on again until fault memory has been erased.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
00801 High-pressure switch for mag- netic clutch -F118 Open circuit / short to positive /SP 1)	(Fault 00801 continued) - Actuation of radiator fan defective - Fault in refrigerant cir- cuit	▪ No refrigeration ca- pacity ▪ No refrigeration ca- pacity after driving a few kilometres ▪ Magnetic clutch - N25 does not operate (compressor does not run)	- Test actuation of radiator fan: 1st stage => Final control diagnosis, Page 154
00802 Air conditioner low-pressure switch -F732)	- Modified software for operating and display unit -E87 with Part no. 4A0 820.043	▪ None	- Erase fault memory

1) One of these displays will appear in addition to relevant component.

2) => also notes on fault code 00532.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01270			

Air conditioner magnetic clutch - N25 2) Speed deviation too great /SP 1)	- Ribbed V-belt not correctly tensioned	▪ Compressor not running ▪ Compressor no longer runs after driving a few kilometres	- Inspect tension of ribbed V-belt => Engine mechanical components; Repair group 13
	- Operating and display unit -E87 incorrectly coded Continued ▼	▪ Magnetic clutch engages and disengages again after 2 seconds	- Check coding of operating and display unit -E87 => Page 35 onwards

- 1) One of these displays will appear in addition to relevant component.
- 2) Only vehicles with compressor driven by ribbed V-belt and air conditioner compressor speed sender - G111.

Notes on fault code 01270:

- ◆ Up to software version D04, first check cause of fault "Open circuit".
- ◆ From software version D04 if "Speed variation too great and open circuit" displayed, first check for open circuit.
- ◆ If a fault at magnetic clutch is detected on vehicles with air conditioner compressor speed sender -G111, first check wiring between -G111 and operating and display unit -E87 for loose contact.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01270 Air conditioner magnetic clutch - N25 2) Speed variation too great /SP 1)	(Fault 001270 continued) - Air conditioner magnetic clutch -N25 slipping	▪ No refrigeration capacity ▪ No refrigeration capacity after driving a few kilometres	- Service magnetic clutch => Page 180
	- Compressor stiff	▪ Magnetic clutch engages and disengages again after 2 seconds	- Check compressor for ease of operation Hand over vehicle to Audi and VW Air-conditioning Service Centre to replace compressor
	- Incorrect diameter of crankshaft vibration damper Continued ▼		- Inspect crankshaft vibration damper => Parts Catalogue

- 1) One of these displays will appear in addition to relevant component.
- 2) Only vehicles with compressor driven by ribbed V-belt and air conditioner compressor speed sender - G111.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01270 Air conditioner magnetic clutch -N25 Speed variation too great / SP 1)	(Fault 001270 continued) - Operating and display unit -E87 incorrectly coded (to 4- instead of 6-cylinder engine or Zexel instead of Nippondenso compressor)	▪ No refrigeration capacity ▪ No refrigeration capacity after driving a few kilometres	- Check coding of operating and display unit -E87 => Page 35 onwards
	Open circuit / short to positive /SP 1)	- Short circuit or open circuit between air conditioner compressor speed sender -G111 and operating and display unit -E87 ▪ Magnetic clutch does not engage or engages and disengages again after 2 seconds	- Check wiring and connectors according to current flow diagram



	Continued ▼		
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- 1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01270 Air conditioner magnetic clutch -N25	(Fault 001270 continued) - Open circuit between operating and display unit - E87 and magnetic clutch - N25	▪ No refrigeration capacity ▪ No refrigeration capacity after driving a few kilometres ▪ Magnetic clutch does not engage or engages and disengages again after 2 seconds	- Check wiring and connectors according to current flow diagram - Carry out final control diagnosis =>Page 28
Open circuit / short to positive /SP1)	- Air conditioner compressor speed sender -G111 defective Continued ▼		- Check sender -G111 => Page 53

- 1) One of these displays will appear in addition to relevant component.

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V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01270 Air conditioner magnetic clutch -N25	(Fault 001270 continued) - Air conditioner magnetic clutch -N25 defective	▪ No refrigeration capacity ▪ No refrigeration capacity after driving a few kilometres	- Service magnetic clutch -N25 => Page 180
Open circuit / short to positive /SP 1)	- Magnetic clutch relay -J44 defective	▪ Magnetic clutch does not engage or engages and disengages again after 2 seconds	- Test relay -J44 using current flow diagram
	- Compressor blocked Continued ▼		- Check compressor for ease of operation - Hand over vehicle to Audi and VW Air-conditioning Service Centre to replace compressor

- 1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01270 Air conditioner magnetic clutch - N25	(Fault 001270 continued) - Belt and clutch plate in magnetic clutch -N25 are stuck	▪ Compressor running constantly ▪ Air conditioner iced up	- Service magnetic clutch -N25 => Page 180
Mechanical fault /SP 1)	- Short circuit to positive between magnetic clutch relay -J44 and magnetic clutch -N25		- Check wiring and connectors according to current flow diagram
	- Magnetic clutch relay - J44 defective		- Replace relay -J44

- 1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01271 Temperature flap positioning motor -V68 Blocked or de-energised /SP 1)	- Temperature flap stiff - Short circuit or open circuit or wiring fault between temperature flap positioning motor -V68 and operating and display unit -E87 - Fault in actuation of operating and display unit -E87 - Temperature flap positioning motor -V68 defective	▪ Temperature control faulty	- Check temperature flap for ease of operation - Check wiring and connectors according to current flow diagram - Carry out final control diagnosis =>Page 28 - Test positioning motor -V68 => Page 52 onwards (test step 4.3)

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01272 Central flap positioning motor -V70 Blocked or de-energised /SP 1)	- Central flap stiff - Short circuit or open circuit or wiring fault between central flap positioning motor -V70 and operating and display unit -E87 - Fault in actuation of operating and display unit -E87 - Central flap positioning motor -V70 defective	▪ Air flow faulty	- Check central flap for ease of operation - Check wiring and connectors according to current flow diagram - Carry out final control diagnosis =>Page 28 - Test positioning motor -V70 => Page 52 onwards (test step 4.4)

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
01273 Fresh-air blower -V2 Control deviation /SP 1)	- Short circuit or open circuit between operating and display unit -E87 and fresh-air blower control unit -J126 or fresh-air blower -V2 - Open circuit to fresh-air blower control unit -J126 - Fresh-air blower control unit -J126 defective - Operating and display unit -E87 defective	▪ Fresh-air blower not running ▪ Fresh air blower running constantly or cannot be regulated	- Check wiring and connectors according to current flow diagram - Check wiring and connectors according to current flow diagram - Test control unit -J126 => Page 51 onwards (test steps 3.1 ... 3.4) - Replace operating and display unit -E87 =>Fig. 215

1) One of these displays will appear in addition to relevant component.

V.A.G 1551 print-out	Possible causes of fault	Possible effects	Fault remedy
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01274 Air-flow flap positioning motor -V71 Blocked or de-energised /SP 1)	- Air-flow flap stiff	▪ Draught at high speed ▪ Insufficient air output at high fresh air blower speed	- Check air-flow flap for ease of operation
	- Short circuit or open circuit or wiring fault between air-flow flap positioning motor -V71 and operating and display unit -E87		- Check wiring and connectors according to current flow diagram
	- Fault in actuation of operating and display unit -E87		- Carry out final control diagnosis =>Page 28
	- Air-flow flap positioning motor -V71 defective		- Test positioning motor -V71 => Page 52 onwards (test step 4.5)

1) One of these displays will appear in addition to relevant component.

Note on fault code 01274:

Air-flow flap positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles.

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3.6 - Performing final control diagnosis

Note:

Fitting locations of components actuated => Page 203 onwards.

Requirements:

- Fault memory retrieved => Page 34 .
- Basic setting performed => Page 32 .
- Engine still idling after basic setting.
- Air conditioner switched on.

-> When indicated on display:

Rapid data transfer HELP
Select function XX

- Press keys 0 and 3 for "Final control diagnosis" function

-> When indicated on display:

Rapid data transfer Q
03 - Final control diagnosis

- Confirm input with Q key.

-> When indicated on display:

Final control diagnosis
Air conditioner magnetic clutch -N25

- Next component can be selected by pressing the ➡key. Function and sequence =>Table of final controls actuated, Page 29 .

Notes:

- ♦ Final control diagnosis can be terminated by pressing the C-key.
- ♦ After completing the function "final control diagnosis", interrogate the fault memory => Page 17 .

Function unknown or cannot be implemented at present.

-> When indicated on display:

- Interrogate fault memory => Page **37** onwards (display group 01).

Final controls actuated

Indicated on display	Desired function	Fault remedy
Magnetic clutch -N25 At the same time the output "compressor cut-in" is actuated to compensate for higher engine load when compressor cuts in ▪ Compressor can be switched off by engine control unit through this input and output: => Fuel injection and ignition system; Repair group 24	- Magnetic clutch is engaged and disengaged in a 3-second cycle, compressor is driven with magnetic clutch engaged ▪ Output of operating and display unit -E87, connector C, contact 12 is switched in a 3-second cycle from 0 V to 12 V - Connect voltage tester V.A.G 1527 between earth and compressor intervention connection. Contact assignment at connector of engine control unit => "Current flow diagrams, Electrical fault finding and fitting locations" binder	- Test power supply for magnetic clutch -N25 using current flow diagram. - Service magnetic clutch => Page 180 Check wiring and connectors according to current flow diagram - Read measured value block => Page 215

Indicated on display	Desired function	Fault remedy
Fresh-air blower -V2	- Fresh-air blower -V2 running ▪ Fresh-air blower voltage for 2 seconds in each case: ▪ 0 V, 4 V, 8 V, 12 V	- Check fresh air blower for ease of operation (bracket for temperature sensor - G109 removed) - Use current flow diagram to check earth connection for fresh-air blower control unit -J126 Test fresh-air blower control unit -J126 => Page 51 onwards (test step 3.1 ... 3.4) Replace control unit -J126
Radiator fan at stage 1	- 1st stage of radiator fan -V7 is switched on and off in a 2-second cycle	- Test power supply for radiator fan -V7 using current flow diagram
Two-way valve for fresh-air and recirculated-air flap - N63	- Fresh-air and recirculated-air flap switches in a 5-second cycle between fresh air - and air recirculation mode	- Check vacuum supply via two-way valve -N63 => Page 189 Test power supply for two-way valve -N63 using current flow diagram Replace two-way valve -N63

Indicated on display	Desired function	Fault remedy
Temperature flap positioning motor -V68 1) - Before moving forward to next control element, wait until temperature flap is in "Heat" position	- Temperature flap moves from limit stop to limit stop ▪ Visible at lever assembly on right of heater ▪ Fresh-air blower runs ▪ Air temperature changes	- Check temperature flap for ease of operation - Use current flow diagram to check wiring and connectors between positioning motor -V68 and operating and display unit -E87 Replace positioning motor -V68
Central flap positioning motor -V70 1)	- Central flap moves from limit stop to limit stop	- Check central flap for ease of operation



Indicated on display	Desired function	Fault remedy
- Open dash panel vents Before moving forward to next control element, wait until central flap is in "Air flow to footwell/defroster flap" position	- Fresh-air blower runs - Air distribution changes from footwell/defroster to dash panel vents	- Use current flow diagram to check wiring and connectors between positioning motor -V70 and operating and display unit -E87 - Replace positioning motor -V70

1) Malfunctions of control element are stored in fault memory.

Indicated on display	Desired function	Fault remedy
Footwell/defrost flap positioning motor -V85 1) - Close all dash-panel vents	- Footwell/defroster flap moves from limit stop to limit stop - Fresh-air blower runs - Air distribution changes from footwell to defrost (to windscreen)	- Check footwell/defroster flap for ease of operation - Use current flow diagram to check wiring and connectors between positioning motor -V85 and operating and display unit -E87 - Replace positioning motor -V85
Air-flow flap positioning motor -V711) 2)	- Air-flow flap moves from limit stop to limit stop - Fresh-air blower runs - Air output changes	- Check air-flow flap for ease of operation - Use current flow diagram to check wiring and connectors between positioning motor -V71 and operating and display unit -E87 - Replace positioning motor -V71

1) Malfunctions of control element are stored in fault memory.

2) Air-flow flap positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles.

Indicated on display	Desired function	Fault remedy
Coolant shut-off valve two-way valve -N147	- Coolant shut-off valve -N147 closes and opens at 5-second cycle	- Check vacuum supply via two-way valve -N147 => Page 189 - Test power supply for two-way valve -N147 using current flow diagram
Temperature sensor blower -V42 - For testing, place e.g. a sheet of paper against intake opening in dash panel	- Blower -V42 is switched on and off in a 5-second cycle	- Test power supply for blower -V42 using current flow diagram - Inspect installation of air guide hose between blower -V42 and temperature sensor - Replace blower -V42
Segment test	- All segments of the operating and display unit -E87 are switched on and off in a 3-second cycle	- Replace operating and display unit -E87 => Fig. 215

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Indicated on display	Desired function	Fault remedy
External temperature display -G106 (in auto- check system)	- Ambient temperature display -G106 (in auto-check system) is incremented from - 45 oC or oF (approx. 3 seconds per increment)	- Use current flow diagram to check wiring and connectors between auto-check system and operating and display unit -E87 Use current flow diagram to check positive and earth connections for ambient temperature indicator -G106 Test auto- check system: => "Current flow diagrams, Electrical fault finding and fitting locations" binder Replace operating and display unit -E87 =>Fig. 215
Idling speed regulation	- Output of the operating and display unit -E87, connector A, contact 3 is switched in a 5-second cycle from 0 V to 12 V (LED in V.A.G 1527 flashes)	- Use current flow diagram to check wiring and connectors between control and display unit -E87 and engine control unit 2) Replace operating and display unit -E87 =>Fig. 215

Note on idling speed regulation:

Test idling control only if a problem exists. Measured value block of engine control unit can also be read out:

=> Fuel injection and ignition system; Repair group 01; Self-diagnosis Self-diagnosis

=> Diesel direct injection and glow plug system; Repair group 01; Self-diagnosis Self-diagnosis

Starting "Idling speed control" final control diagnosis

- Switch off ignition.
- Remove engine control unit and connect adapter cable of test box V.A.G 1598 A to connector to engine control unit (engine control unit is not connected to test box):

=> Fuel injection and ignition system; Repair group 01; Self-diagnosis Self-diagnosis

=> Diesel direct injection and glow plug system; Repair group 01; Self-diagnosis Self-diagnosis

Note:

Contact assignment of connector to engine control unit:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- Switch the ignition on.
- Switch off heated rear window.
- Connect fault reader V.A.G 1551 and enter address word 08 for "AC/heating electronics", confirm entry and move forward in programme => Page 14 .

-> When indicated on display:

Rapid data transfer	HELP
Select function XX	

- Press PRINT key to switch on printer - (indicator lamp in key lights up).
- Press keys 0 and 3 for "Final control diagnosis" function

-> When indicated on display:



Rapid data transfer Q
03 - Final control diagnosis

- Confirm input with Q key.

-> When indicated on display:

Function unknown or cannot
be implemented at present.

- Press =>key.
- Once again press keys 0 and 3.

-> When indicated on display:

Rapid data transfer Q
03 - Final control diagnosis

- Confirm input with Q key.

Note:

By re-entering function "Final control diagnosis" the magnetic clutch -N25 is no longer actuated =>Page 37 onwards; Reading measured value block, (display group 01).

- Connect V.A.G 1527 voltage tester between earth and input to be tested (to engine control unit) at test box.
- Keep pressing =>key until "Idling speed regulation" appears on display.

Indicated on display	Desired function	Fault remedy
Idling speed regulation1)	- Output of the operating and display unit -E87, connector A, contact 3 is switched in a 5-second cycle from 0 V to 12 V (LED in V.A.G 1527 flashes)	- Use current flow diagram to check wiring and connectors between control and display unit -E87 and engine control unit 2) Replace operating and display unit -E87 =>Fig. 215

1) Causes an increase in idle speed or a change in pilot control value in engine control unit.

2) Check with the engine control unit installed:

=> Fuel injection and ignition system; Repair group 01; Self-diagnosis Self-diagnosis

=> Diesel direct injection and glow plug system; Repair group 01, Self-diagnosis

3.7 - Basic setting

Requirements:

- All fuses OK:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- Fault memory retrieved => Page 34 .
- Coding checked and corrected if necessary => Page 35 .
- Air conditioner switched on.

-> When indicated on display:

Rapid data transfer HELP
Select function XX

- Press keys 0 and 4 to select function "Starting basic setting".

-> When indicated on display:

Rapid data transfer Q
 04 - Starting basic setting

- Confirm input with Q key.

-> When indicated on display:

Starting basic setting Q
 Enter display group number XXX

- Press keys 0 and 1 for "Display group number 01 or 001" (depending on software status of V.A.G 1551).
- Confirm input with Q key.

Following positioning motors are actuated consecutively and their end positions stored in operating and display unit -E87 (resistance of potentiometers installed in positioning motors).

- ◆ Temperature flap positioning motor -V68
- ◆ Central flap positioning motor -V70
- ◆ Footwell/defroster flap positioning motor -V85
- ◆ Air-flow flap positioning motor - V71
 (Air-flow flap positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles)

-> Indicated on display:

Basic setting 1
 XXX XXX XXX XXX

It is possible to track the movement of the positioning motors on the display (feedback values change).

-> Indicated on display:

Basic setting 1
 0 0 0 0

When the display zones show 0, the basic setting is finished.

- Press →key.
- Press PRINT key to switch on printer - (indicator lamp in key lights up).

-> When indicated on display:

Rapid data transfer HELP
 Select function XX

- Press keys 0 and 2 for "Interrogating fault memory" function.

-> When indicated on display:

Rapid data transfer Q
 02 - Interrogating fault memory

- Confirm input with Q key.

-> When indicated on display:

No fault detected!

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- Press →key.

or

-> When indicated on display:

X faults detected!



If printer is switched on, stored faults will be displayed and printed out in sequence.

- When the last fault has been displayed and printed out, press ➔key.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

Notes:

Depending on equipment fitted, following faults may be displayed:

- ♦ Air conditioner refrigerant temperature sensor -G110
"Open circuit / short to positive /SP"
- ♦ Potentiometer -G113 in positioning motor -V71
"Open circuit / short to positive /SP" and "Adaptation limit exceeded"
- Check whether these components are installed in the vehicle.
- If components are not fitted, erase fault memory => Page 34 . Erasure of fault memory causes an equipment-related absence of air flow flap positioning motor -V71 and air conditioner refrigerant temperature sender -G110 to be stored and no longer displayed until initiation of next basic setting
- If components are fitted or if other faults are additionally displayed, rectify faults according to fault table => Page 17 .
- Erase fault memory => Page 34 and once again initiate basic setting.

3.8 - Erasing fault memory, ending output

Prerequisite:

- Fault memory interrogated.

Erasing fault memory

-> When indicated on display:

Rapid data transfer	HELP
Select function XX	

- Press keys 0 and 5 for "Erasing fault memory" function.

-> When indicated on display:

Rapid data transfer	Q
05 - Erasing fault memory	

- Confirm input with Q key.

-> When indicated on display:

Rapid data transfer	
Fault memory is erased.	

- Press ➔key.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

Notes:

-> When indicated on display:

Warning	
Fault memory not interrogated	

- ◆ Sequence has not been correctly followed.
- Interrogate the fault memory:
- Rectify any faults.
- ◆ If, for example, the ignition is switched off between interrogating and erasing fault memory, or if engine speed exceeds 3000 rpm, the fault memory is not erased.

End of output

Note:

Fault memory has been interrogated and erased, basic setting has been performed, and coding has been checked.

-> When indicated on display:

Rapid data transfer HELP
 Select function XX

- Press keys 0 and 6 for the function "End of output".

-> When indicated on display:

Rapid data transfer Q
 06 - End of output

- Confirm input with Q key.

-> When indicated on display:

Rapid data transfer HELP
 Enter address word XX

- Switch off ignition and detach diagnostic socket.

3.9 - Coding operating and display unit -E87

Note:

After each coding, basic setting must be performed => Page 32 .

- Connect fault reader V.A.G 1551 and enter address word 08 for "AC/heating electronics", confirm entry and move forward in programme => Page 14 .

-> When indicated on display:

Rapid data transfer HELP
 Select function XX

- Press PRINT key to switch on printer - (indicator lamp in key lights up).
- Press keys 0 and 7 for "Coding control unit" function.

-> When indicated on display:

Rapid data transfer Q
 07 - Coding control unit

- Confirm input with Q key.

-> Indicated on display:

Coding control unit Q
 Enter code number XXXXX



Explanation of code (up to index H)

XXX		Filling position, no assignment
	X	No of cylinders
	X	Country (export version)

-> Indicated on display:

Coding control unit Q
Enter code number XXXXX 0-32000

Explanation of code (from index K)

XX		Filling positions, no assignment
	X	Compressor manufacturer
	X	No of cylinders
	X	Country (export version)

- Enter control unit code in accordance with coding table => Page 36 .

Examples of code

00060	6-cyl. left-hand drive with Zexel compressor
00160	6-cyl. left-hand drive with Nippondenso compressor

3.10 - Coding table

00		Filling characters, no assignment
	0	Zexel compressor
	1	Nippondenso compressor (only possible from Index K)
	4	4-cylinder engine
	5	5-cylinder engine
	6	6-cylinder engine
	8	8-cylinder engine
	0	Left-hand drive petrol engine (not 8-cyl. engine)
	1	Right-hand drive petrol engine (not 8-cyl. engine)
	2	USA petrol engine (not 8-cyl. engine)
	3	Left-hand drive TDI engine, or left-hand drive 8-cyl. petrol engine
	4	Right-hand drive TDI engine, or right-hand drive 8-cyl. petrol engine
	5	USA TDI engine, or USA 8-cyl. petrol engine
	6	Left-hand drive swirl chamber diesel engine
	7	Right-hand drive swirl chamber diesel engine
	8	USA swirl chamber diesel engine

Notes:

- ♦ On vehicles fitted with Nippondenso compressor, install only an operating and display unit -E87 with Part No. from index "K". It is only possible with effect from this index to code operating and display unit -E87 on the 6- and 8-cylinder engine for a compressor without air conditioner compressor speed sender -G111.

- ♦ If operating and display unit on vehicles fitted with Nippondenso compressor (with no air conditioner compressor speed sender -G111) is incorrectly coded for a Zexel compressor, compressor will only run briefly and then switch off again immediately as no compressor speed signals are detected.

-> Indicated on display (example):

Coding control unit	Q
Enter code number 00160	(0-32000)

- Confirm input with Q key.

-> Indicated on display (example):

4A0820043X 1) Air conditioner-fully automatic D05
Coding 00160 WSC 06744

1) Index => Part Catalogue

- Press =>key.

-> When indicated on display:

Rapid data transfer	HELP
Select function XX	

- Carry out basic setting =>Page 32

3.11 - Reading measured value block

Requirements:

- Fault memory interrogated => Page 34 .
- Engine still idling after interrogation of fault memory.
- Air conditioner switched on.

Notes:

- ♦ If displayed values are to be read out while moving, a second operator is required.
- ♦ Observe safety precautions => Page 2

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-> When indicated on display:

Rapid data transfer	HELP
Select function XX	

- Press PRINT key to switch on printer - (indicator lamp in key lights up).
- Press keys 0 and 8 for "Reading measured value block" function.

-> When indicated on display:

Rapid data transfer	Q
08 - Reading measured value block	

- Confirm input with Q key.

-> When indicated on display:

Reading measured value block	Q
Enter display group number XXX	

- Enter the display group number =>List of display group numbers available for selection, Page 38 .
- Confirm input with Q key.

-> Indicated on display (example):



Reading	measured	value	block	1
1	2	3	4	

The measured value block shows 4 display zones in 10 display groups. Explanation of readouts 1 ... 4 in individual display zones => Page **39** onwards.

Notes:

- ♦ If fault "Adaptation limit exceeded" is detected during basic setting and not rectified, -E87 sets "bottom" feedback value to 10 and "top" value to 235 (135 in case of -V71). System is then controlled within these limits.
- ♦ If printer is switched on, the current display will be printed out on the record slip.
- ♦ In case of all the measured values identified with *, values which are displayed are those which were valid when starting test.

List of available group numbers

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Display group no.	Display zone	Designation	Details on page
001	1*	Compressor shutoff criteria	39
	2*	Voltage for magnetic clutch -N25	
	3	Voltage, terminal "75"	
	4	Display zone not used	
002	1 ... 4*	Temperature flap positioning motor -V68	42
003	1 ... 4*	Central flap positioning motor -V70	42
004	1 ... 4*	Footwell/defroster flap positioning motor -V85	43
005	1 ... 4*	Air-flow flap positioning motor -V711)	43

1) Air-flow flap positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles.

Display group no.	Display zone	Designation	Details on page
006	1*	Calculated ambient temperature (for ambient temperature display -G106)	44
	2	Fresh air intake duct temperature sensor -G89	
	3	Ambient temperature sensor -G17	
	4	Fresh air blower temperature sensor -G109	
007	1	Roof temperature sensor -G86	44
	2	Dash panel temperature sensor -G56	
	3	Calculated coolant temperature	
	4	Air conditioner refrigerant temperature sensor -G110	

Display group no.	Display zone	Designation	Details on page
008	1*	Specified voltage at fresh-air blower -V2	45
	2*	Actual voltage at fresh-air blower -V2	
	3	Voltage at terminal 58d (depends on position of lighting control -E20) in volts	
	4	Side lights (terminal 58)	
009	1*	Engine speed	45
	2*	Compressor speed	
	3*	Vehicle speed	
	4	Auxiliary heater	

Display group no.	Display zone	Designation	Details on page
010	1	Kickdown switch	46
	2	Overheating warning lamp (-K28)	
	3	Air conditioner compressor cut-in	
	4	High-pressure switch for magnetic clutch -F118	

Display group 001:

Compressor shut-off criteria, voltage for the magnetic clutch and at terminal "15" or "75"

Notes:

- ♦ If compressor shut-off criterion "5" or "6" appears in addition to another compressor shut-off condition, disregard shut-off criterion "5" or "6".
- ♦ A maximum of 2 compressor shut-off conditions which were effective when initiating self-diagnosis, are displayed alternately one after the other.

Display zone	Meaning	Cause of fault/fault remedy
1*	Code	Compressor shut-off criteria
	0	Compressor on No compressor shut-off criterion detected - If compressor is not switched on, perform final control diagnosis => Page 47 onwards

Display zone	Meaning	Cause of fault/fault remedy
1*	Code	Compressor shut-off criteria
	1	Compressor off a) Belt slip greater than 60% once or greater than 30%, but less than 60%, ten times - Belt tension not OK - Compressor stiff
		b) Operating and display unit -E87 incorrectly coded - Check coding of operating and display unit - E87 => Page 35
		c) No compressor speed signal detected (vehicles with speed sender in Zexel compressor) - Air conditioner compressor speed sender - G111 defective Test sender -G111 => Page 45
		d) No compressor speed signal detected (vehicles with Nippondenso compressor or without speed sender in Zexel compressor) - Operating and display unit - E87 incorrectly coded Check coding of operating and display unit - E87 => Page 35

Display zone	Meaning	Cause of fault/fault remedy
1*	Code	Compressor shut-off criteria
	2	Compressor off Voltage at connector C, contact 2 to operating and display unit -E87 greater than 2 V - High-pressure switch for magnetic clutch -F118 open Fault remedy => Fault table, Page 17
	3	Compressor off Voltage at connector C, contact 3 to operating and display unit -E87 less than 5 V - Air conditioner low-pressure switch -F73 open Check refrigeration capacity => Page 219
	4	Compressor off



Display zone	Meaning	Cause of fault/fault remedy
	Kickdown Voltage at connector C, contact 1 to operating and display unit -E87 less than 5 V	- Short to earth in the wiring. - Kickdown switch for air conditioner -F46 and gearbox switch -F15 closed (only diesel engines with manual gearbox) - Control unit for automatic gearbox -J217 has switched input to earth => "Current flow diagrams, Electrical fault finding and fitting locations" binder => Automatic gearbox; Repair group 01; Self-diagnosis Self-diagnosis

Display zone	Meaning	Cause of fault/fault remedy
1*	Code	Compressor shut-off criteria
	5	Compressor off a) Cut-in delay approx. 3 seconds after engine start b) Engine speed less than 600 rpm c) No engine speed detected
		- => Display group 009
	6	Compressor off Compressor switched off by "ECON" button on operating and display unit -E87 - ice crystal ("compressor on" symbol) does not display
		- Open circuit between dash panel insert and connector C, contact 6 to the operating and display unit -E87 - Dash panel insert does not output a speed signal Check engine speed signal at dash panel insert: => Fuel injection and ignition system; Repair group 24
		- Switch on compressor and leave engine on

Display zone	Meaning	Cause of fault/fault remedy
1*	Code	Compressor shut-off criteria
	7	Compressor off Air conditioner switched off by "-" button of the operating and display unit -E87
	8	Compressor off Ambient temperature less than 3 °C
	9	Compressor off Temperature of air drawn in by fresh air blower of heating system less than - 3 °C
		- Switch the air conditioner on
		- Check ambient temperature sensor -G17 and fresh air intake duct temperature sensor -G89 => Display group 006, Page 47 onwards
		- Check ambient temperature sensor -G109 => Display group 006, Page 47 onwards If readout for temperature sensor is OK, there is a fault in refrigerant circuit. Send the vehicle to an VW/Audi air-conditioning service centre

Display zone	Meaning	Cause of fault/fault remedy
1*	Code	Compressor shut-off criteria
	10	Compressor off Supply voltage too small (voltage at connector C, contact 3 to operating and display unit -E87 less than 5 V) - => Fault table, Page 17
	11	Compressor off Overheating warning light - Short to earth in wiring from connector A, contact 11 to operating and display unit -E87 - "Overheating" coolant temperature switch -F14 closed - Contact R of electronic thermostat -F76 closed - Control unit for diesel direct-injection system -J248 input to earth Checking: => "Current flow diagrams, Electrical fault finding and fitting locations" binder

Display zone	Meaning	Cause of fault/fault remedy
1*	Code	Compressor shut-off criteria
	12	Compressor off Air conditioner compressor cut-in Voltage at connector C, contact 12 to operating and display unit -E87 less than 5 V - Short to earth in wiring to engine control unit Carry out final control diagnosis =>Page 28 - Engine control unit in emergency running mode: => Fuel injection and ignition system; Repair group 01; Self-diagnosis Self-diagnosis => Diesel direct injection and glow plug system; Repair group 01, Self-diagnosis
	13	Compressor off Compressor cut-in delay (approx. 10 seconds) at engine speeds above 6000 rpm Of no significance for customer service
	14	Compressor off High-pressure switch -F118 switched off 30 times during the current driving period - => Fault table, Page 17

Display zone	Meaning	Explanatory notes
2*	Supply voltage at magnetic clutch -N25 in V when initiating self-diagnosis	Connector C, contact 3 to operating and display unit -E87
3	Voltage, terminal 75 in V	Connector D, contact 9 to the operating and display unit -E87
4	Display zone not used.	



Display group 002:

Temperature flap positioning motor -V68

Display zone	Meaning	Explanatory notes
1*	Actual feedback value of potentiometer -G92 (in the positioning motor -V68)	▪ Display value greater than 5 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (only in the range greater than 30 but less than 200)
2*	Specified feedback value for potentiometer -G92 (calculated by the -E87)	▪ Display range 5 ... 250
3*	-G92 value determined during "Basic setting" and stored in the -E87 with positioning motor in setting "Heating stop" (temperature flap directs air flow through heat exchanger)	▪ Display value greater than 5 and less than 30
4*	-G92 value determined during "Basic setting" and stored in the -E87 with positioning motor in setting "Cooling stop" (temperature flap directs air flow past heat exchanger)	▪ Display value greater than 200 and less than 250

Notes:

- ♦ If display values in display zones 3 or 4 are outside permissible range => Fault table, Page 17 .
- ♦ If feedback value in display zone 1 is less than 5 (short circuit) or greater than 250 (open circuit), => perform electrical test Page 47 onwards.

Display group 003:

Central flap positioning motor -V70

Display zone	Meaning	Explanatory notes
1*	Actual feedback value for potentiometer -G112 (in the positioning motor -V70)	▪ Display value greater than 5 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (only in the range greater than 30 but less than 200)
2*	Specified feedback value for potentiometer -G112 (calculated by the -E87)	▪ Display range 5 ... 250
3*	-G112 value determined during the "Basic setting" and stored in the -E87 with the positioning motor in setting "Lower stop" (temperature flap directs air flow to footwell/defroster flap)	▪ Display value greater than 5 and less than 30
4*	-G112 value determined during "Basic setting" and stored in the -E87 with positioning motor in the setting "Upper Stop" (temperature flap directs air flow to dash panel vents)	▪ Display value greater than 200 and less than 250

Note:

In the event of deviations from specification, observe notes to Display group 002 => Page 42 .

Display group 004:

Footwell/defroster flap positioning motor -V85

Display zone	Meaning	Explanatory notes
1*	Actual feedback value for potentiometer -G114 (in the positioning motor -V85)	▪ Display value greater than 5 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (only in the range greater than 30 but less than 200)
2*	Specified feedback value for the potentiometer -G114 (calculated by the -E87)	▪ Display range 5 ... 250
3*	-G114 value determined during "Basic setting" and stored in the -E87 with positioning motor in setting "Lower stop" (footwell/defroster flap directs air flow to dash panel defroster vents)	▪ Display value greater than 5 and less than 30
4*	-G114 value determined during "Basic setting" and stored in the -E87 with positioning motor in setting "Upper stop" (footwell/defroster flap directs air flow to vents in footwell)	▪ Display value greater than 200 and less than 250

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Note:

In the event of deviations from specification, observe notes to Display group 002 => Page 42 .

Display group 005:

Air-flow flap positioning motor - V71

Display zone	Meaning	Explanatory notes
1*	Actual feedback value of potentiometer -G113 (in the positioning motor -V71)	▪ Display value greater than 5 and less than 200 ▪ Maximum permissible deviation 3 units from specified feedback value (only in range greater than 30 but less than 130).
2*	Specified feedback value for the potentiometer -G113 (calculated by the -E87)	▪ Display range 5 ... 200
3*	The -G113 value determined during "Basic setting" and stored in the -E87 with positioning motor in setting "Lower stop" (air-flow flap in evaporator closed)	▪ Display value greater than 5 and less than 30
4*	The -G113 value determined during "Basic setting" and stored in the -E87 with positioning motor in setting "Top stop" (air-flow flap in evaporator open)	▪ Display value greater than 130 and less than 200

Notes:

- ♦ In the event of deviations from specification, observe notes to Display group 002 => Page 42 .
- ♦ Air-flow flap positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles. If -V71 is not fitted, ignore readout.



Display group 006:

Calculated ambient temperature for ambient temperature display -G106, measured values for fresh air intake duct temperature sensor -G89, outside temperature sensor -G17 and fresh air blower temperature sensor -G109

Display zone	Meaning	Explanatory notes
1*	Temperature readout for ambient temperature display -G106 (in dash panel)	▪ Lower of the two ambient temperatures measured in oC
2	Measured value for fresh air intake duct temperature sensor -G89 (at evaporator) in oC	▪ Checking=> Electrical testing, Page 49 onwards; test step 1.3
3	Measured value for ambient temperature sensor -G17 (at scuttle) in oC	▪ Checking=> Electrical testing, Page 49 onwards; test step 2.4
4	Measured value for fresh air blower temperature sensor -G109 (in heating system) in oC	▪ Checking=> Electrical testing, Page 49 onwards; test step 2.6

Notes on display zone 1:

- ♦ Ambient temperature display -G106 is fitted depending on vehicle equipment and is therefore not installed in all vehicles. If -G106 is not fitted, ignore readout.
- ♦ If a loose contact exists in wiring to one of the two ambient temperature sensors -G17 or -G89, this can result in temperature displayed being too low although measured values are OK.

Display group 007:

Roof temperature sensor -G86, dash panel temperature sensor -G56, calculated coolant temperature and air conditioner refrigerant temperature sender -G110

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Display zone	Meaning	Explanatory notes
1	Measured value for roof temperature sensor -G86 (in area of interior light) in oC	▪ Checking=> Electrical testing, Page 49 onwards; test step 2.1
2	Measured value of the dash panel temperature sensor -G56 in oC	▪ Checking=> Electrical testing, Page 49 onwards; test step 2.2
3	Coolant temperature in oC calculated for fully automatic fresh air blower control	
4	Measured value of air conditioner refrigerant temperature sensor -G110 in oC	▪ Checking=> Electrical testing, Page 49 onwards; test step 2.5

Notes on display zone 3:

- ♦ If air conditioner refrigerant temperature sender -G110 is installed, readout is composed of measured temperature and temperature calculated on basis of existing engine speed and engine running time.
- ♦ If no air conditioner refrigerant temperature sender -G110 is installed, temperature readout is calculated from engine speed and engine running time.

Note on display zone 4:

Refrigerant temperature sender -G110 is fitted depending on vehicle equipment and is therefore not installed in all vehicles. If -G110 is not installed, no readout appears.

Display group 008:

Voltage at fresh-air blower -V2, voltage at terminal 58d and side lights

Display zone	Meaning	Explanatory notes
1*	Specified voltage at fresh-air blower -V2	▪ 3.5 ... 12.5 V
2*	Actual voltage at the fresh-air blower -V2	▪ 3.5 ... 12.5 V ▪ Deviation from specified voltage in vehicle voltage range: max. 0.5 V
3	Voltage of terminal 58d (depends on position of lighting control for switches and instruments - E20)	▪ 0 ... 12.5 V
4	Display 0 = Side lights off Display 1 = Side lights on	▪ Voltage at connector C, contact 7 to -E87 less than 2 V ▪ Voltage at connector C, contact 7 to -E87 greater than 2 V

Display group 009:

Engine speed, compressor speed, vehicle speed and auxiliary heater

Display zone	Meaning	Explanatory notes
1*	Engine speed in rpm	
2*	Compressor speed in rpm	

Notes on display zone 2:

- ♦ Compressor speed at 0% belt slip = transmission ratio 1.28 x engine speed.
- ♦ Only vehicles with Zexel compressor and compressor driven by ribbed V-belt feature an air conditioner compressor speed sender -G111.
- ♦ The air conditioner compressor speed sender -G111 generates 4 pulses per compressor revolution.
- ♦ Vehicles with Nippondenso compressor have no air conditioner compressor speed sender -G111. The display has no significance for these vehicles.

Display zone	Meaning	Explanatory notes
3*	Display 0 = No speed signal detected since the ignition was switched on Display 1 = Since the ignition was switched on, a vehicle speed signal has been detected at least once by speedometer -G21	

Notes on display zone 3:

- ♦ If a road speed has existed since self-diagnosis started, this is then displayed.
- ♦ As a check as to whether a road speed signal exists, move vehicle a few metres and then do not switch off ignition before starting self-diagnosis.

Display zone	Meaning	Explanatory notes
4	Display 0 = Auxiliary heater off Display 1 = Auxiliary heater on	▪ Voltage at connector D, contact 1 to -E87 less than 2 V ▪ Voltage at connector D, contact 1 to -E87 greater than 2 V

**Notes:**

- ◆ Display 1 should only be displayed if auxiliary heater switched on.

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- ◆ With auxiliary heater operating, it is possible to interrogate fault memory with V.A.G 1551; operating and display unit then operates.
- ◆ If "1" is displayed when auxiliary heater switched off on vehicles without auxiliary heater, test cable connection for short circuit to positive.

Display group 010:**Kickdown switch, overheating warning light, air conditioner compressor cut-in and high-pressure switch -F118**

Display zone	Meaning	Explanatory notes
1	Display 0 = Kickdown switch open Display 1 = Kickdown switch closed	▪ Voltage at connector C, contact 1 to - E87 greater than 5 V ▪ Voltage at connector C, contact 1 to - E87 less than 5 V
2	Display 0 = Coolant temperature warning switch (overheating) -F14 or electronic thermostat -F76 (contact R) open Display 1 = Coolant temperature warning switch (overheating) -F14 or electronic thermostat -F76 (contact R) closed	▪ Voltage at connector A, contact 11 to - E87 greater than 2 V ▪ Voltage at connector A, contact 11 to - E87 less than 2 V

Notes on display zone 1:

- ◆ => Compressor shut-off conditions; Page 39
- ◆ When switch closes, compressor is switched off for 12 seconds.

Notes on display zone 2:

- ◆ => Compressor shut-off conditions; Page 39
- ◆ Compressor is switched off if switch is closed.

Display zone	Meaning	Explanatory notes
3	Display 0 = Output, compressor cut-in open (to engine control unit) Display 1 = Output, compressor cut-in switched (to engine control unit)	▪ Voltage at connector C, contact 12 to - E87 less than 5 V ▪ Voltage at connector C, contact 12 to - E87 greater than 5 V
4	Display 0 = High-pressure switch for magnetic clutch -F118 closed Display 1 = High-pressure switch for magnetic clutch -F118 open	▪ Voltage at connector C, contact 2 to - E87 less than 2 V ▪ Voltage at connector C, contact 2 to - E87 greater than 2 V

Notes on display zone 3:

- ◆ => Compressor shut-off conditions; Page 39
- ◆ Compressor is switched off if voltage from engine control unit drops to less than 5 V when output is switched

Notes on display zone 4:

- ◆ => Compressor shut-off conditions; Page 39
- ◆ Compressor is switched off if switch is open.

4 - Air conditioner electrical check

4.1 - Air conditioner electrical check

Note:

When working with the fault reader, no adapter cable from the test box V.A.G 1598 A may be connected to the operating and display unit -E87.

Required testers and measuring equipment

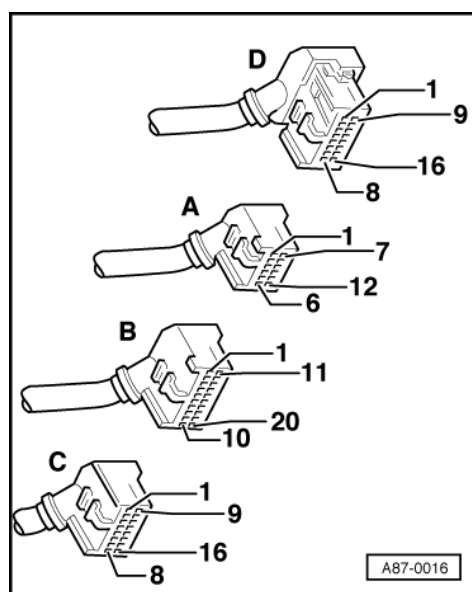
- ◆ Test box V.A.G 1598 A and the associated adapter cables V.A.G 1598/11 and V.A.G 1598/12
- ◆ Hand-held multimeter V.A.G 1526
- ◆ Adapter set V.A.G 1594
- ◆ Voltage tester V.A.G 1527
- ◆ Temperature sensor with appropriate tester

Test requirements:

- All fuses OK:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

Connecting test box V.A.G 1598 A to connector of operating and display unit -E87



- Switch off ignition.
- Remove operating and display unit -E87 =>Fig. 215.
- -> Connect adapter cables V.A.G 1598/11 and V.A.G 1598/12 to detached connectors of operating and display unit -E87.

Notes:

- ◆ Do not plug in operating and display unit -E87
- ◆ For measurement purposes, connect test box V.A.G 1598A to respective adapter cable.
- ◆ On adapter cable V.A.G 1598/12, socket assignment is identical to pin assignment of operating and display unit -E87.
- ◆ On adapter cable V.A.G 1598/11, socket assignment is not identical to pin assignment of the operating and display unit -E87. =>Pin assignment, Page 48.

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Pin assignment of test box V.A.G 1598 A with adapter cable V.A.G 1598/11

Notes:

- ♦ With adapter cable V.A.G 1598/11, contact assignment of connectors A and B is not identical to socket assignment on test box V.A.G 1598 A.
- ♦ Contact assignment of connector C with adapter cable V.A.G 1598/11 is identical to assignment of sockets on test box V.A.G 1598A.
- ♦ Contact assignment of connector D with adapter cable V.A.G 1598/12 is identical to assignment of sockets on test box V.A.G 1598A.
- ♦ Due to the use of two adapter cables for plugs for operating and display unit - E87(V.A.G 1598/11 and 12), no earth connection is possible when adapter cable V.A.G 1598/11 is connected. To perform electrical tests, it is therefore necessary in some test steps to take measurements against a suitable earthing point on vehicle body or to use a second V.A.G 1598 A (when the adapter cable 1598/12 is connected, socket 15 is earthed).

Connector A Contact	V.A.G 1598 A Socket	Connector B Contact	V.A.G 1598 A Socket	Connector B Contact	V.A.G 1598 A Socket
1	41	1	21	13	33
2	42	2	22	14	34
3	43	3	23	15	35
4	44	4	24	16	36
5	45	5	25	17	37
6	46	6	26	18	38
7	47	7	27	19	39
8	48	8	28	20	40
9	49	9	29		
10	50	10	30		
11	51	11	31		
12	52	12	32		

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Note:

Contact assignment of connectors C or D with adapter cable V.A.G 1598/11 or 1598/12 is identical to assignment of sockets on test box V.A.G 1598 A.

Overview of electrical tests on operating and display unit -E87

Test step	Component tested	Page
1	- Power supply, earth connection and lighting for operating and display unit -E87	49
2	- Temperature sensors/senders -G17, -G56, -G86, -G89, -G109, -G110	49
3	- Fresh air blower with fresh air blower control unit -V2, -J126	51
4	- Positioning motors for air conditioner and associated potentiometers -V68/-G92, -V70/-G112, -V71/-G113, -V85/-G114	52
5	- Air conditioner compressor speed sender -G111.	53
6	- Magnetic clutch relay -N25 - Actuation for radiator fan -V7	55

Test step 1:

Power supply, earth connection and lighting for operating and display unit -E87

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20V =)					
▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
1.1	9 + 15	Terminal 15 and earth connection on -E87	▪ Ignition switched on	- Approx. battery voltage	- Use current flow diagram to service power supply or earth connection
Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V=)					
▪ Adapter cable V.A.G 1598/11 connected					
1.2	7 + earth	Terminal 58 on -E87	▪ Ignition switched on ▪ Side lights on	- Approx. battery voltage	- Use current flow diagram to service power supply
1.3	7 + earth	Terminal 58 on -E87	▪ Ignition switched on ▪ Side lights off	- Less than 2 V	- Rectify short circuit to positive according to current flow diagram

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V=)					
▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
1.4	45 + earth	Terminal 58d on -E87	▪ Ignition switched on ▪ Side lights on	- 0 ... 12 V (depending on illumination control setting)	- Use current flow diagram to eliminate open circuit/short circuit
1.5	45 + earth	Terminal 58d on -E87	▪ Ignition switched on ▪ Side lights off	- 0 V	- Rectify short circuit to positive according to current flow diagram
Voltage tester V.A.G 1527					
▪ Adapter cable V.A.G 1598/11 connected					
1.6	10 + 33	Terminal 30		- Approx. battery voltage	- Use current flow diagram to service power supply

Test step 2:

Temperature sensor/sender

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 kΩ)					
▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
2.1	43 + 52	Roof temperature sensor -G86	- Measure temperature at sensor fitting location	- Depending on temperature at the sensor/sender fitting location	- Use current flow diagram to eliminate short circuit, open circuit or contact resistance

**Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k ω)**

▪ Adapter cable V.A.G 1598/11 connected

Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
2.2	50 + 52	Dash panel temperature sensor - G56	▪ Operation of temperature sensor blower -V42 checked => Final control diagnosis, Page 28 Measure temperature at sensor fitting location	=> Table, Page 50	- Replace temperature sensor/sender

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k ω)

▪ Adapter cable V.A.G 1598/11 connected

Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - additional operations	Specification	Action in event of deviation from specified value
2.3	47 + 52	Fresh air intake duct temperature sensor -G89	- Measure temperature at sensor fitting location	- Depending on temperature at the sensor/sender fitting location => Table, Page 50	- Use current flow diagram to eliminate short circuit, open circuit or contact resistance - Replace temperature sensor/sender
2.4	48 + 52	Ambient temperature sensor -G17	- Measure temperature at sensor fitting location		
2.5	27 + 52	Air conditioner refrigerant temperature sender -G110	- Measure temperature at sensor fitting location		
2.6	46 + 52	Fresh air blower temperature sensor -G109	- Measure temperature at sensor fitting location		

Temperature-dependent resistance of temperature sensors/senders in ω

At sensor/sender installation location, temperature measured in $^{\circ}\text{C}$	Temperature sensor -G17 (ambient temperature), -G89 (fresh air intake duct), -G109 (blower)	Temperature sensor -G56 (dash panel), -G86 (roof)	Sender -G110 (refrigerant temperature)
- 30	18121		
- 20	9951		14700
-10	5591	16159	9200
0	3281	9406	5600
5	2544	7273	4635
10	1991	5666	3670
15	1571	4446	3060
20	1250	3513	2450
25	998	2795	2060
30	804	2237	1670
35	652	1801	1415
40	533	1459	1160

At sensor/sender installation location, temperature measured in °C	Temperature sensor -G17 (ambient temperature), -G89 (fresh air intake duct), -G109 (blower)	Temperature sensor -G56 (dash panel), -G86 (roof),	Sender -G110 (refrigerant temperature)
45	437	1188	995
50	361	972	830
55	300	803	715
60	250	667	600
65		556	520
70		466	440
75			380
80			320
85			281
90	Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.		242
95			216
100			190
110			143

Test step 3:

Fresh-air blower -V2 and fresh-air blower control unit -J126

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V=)					
▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
3.1	16 + earth	Control unit -J126	▪ Ignition switched on	- Voltage less than 5 V - Fresh-air blower not running	- Use current flow diagram to rectify short to positive in wiring between -J126 and -E87 Replace control unit -J126
3.2	14 + earth	Power supply for fresh-air blower -V2	▪ Ignition switched on	- Approx. battery voltage	- Use current flow diagram to service power supply
3.3	11 + earth	Power supply for control unit -J126 (via fresh-air blower -V2)	▪ Ignition switched on	- Approx. battery voltage	- Use current flow diagram to service power supply



Voltage tester V.A.G 1527 ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
3.4	14 + 16	Control unit -J126	- Ignition switched on	- LED in voltage tester lights up - Fresh-air blower runs	- Use current flow diagram to rectify open circuit in wiring between -J126 and -E87 Inspect ease of operation of fresh air blower -V2 - Replace control unit -J126

Test step 4:**Positioning motors for air conditioner and associated potentiometers****Notes:**

- The resistance of potentiometers in the positioning motors (specified value: 3.6 ... 5.7 kw between contact 1 and 3) can only be measured directly on positioning motor (parallel connection).
- Resistance of potentiometers in positioning motors (between contacts 1 and 2 and contacts 3 and 2) depends on setting of positioning motor, it must only be measured with positioning motor fitted. The upper specified value is not achieved in test steps 4.1 and 4.2. (To achieve upper specified value, it would be necessary to disconnect all other positioning motors during the measurement - parallel connection).
- If the -E87 detects fault "potentiometer short to earth" or "open circuit/short to positive", check all potentiometers (in the 4 positioning motors) and associated wiring.
- If fault memory indicates that several of the positioning motors are defective simultaneously but no faults are found in test step 4, check wiring to positioning motors for short circuit between individual positioning motors (e.g. between -V85 and -V70). Readout between contacts 3 and 4 should be $\infty \Omega$.

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 kw) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
4.1	52 + 28 52 + 29 52 + 37 52 + 30	Potentiometer (in the positioning motor) -G 92 (-V68) -G112 (-V70) -G113 (-V71) 1) -G114 (-V85)		- Greater than 0.1 kw and less than 5.7kw (depending on setting of positioning motor)	- Use current flow diagram to eliminate open circuit, contact resistance or short circuit Replace positioning motor
4.2	8 + 28 8 + 29 8 + 37 8 + 30	Potentiometer (in positioning motor) -G 92 (-V68) -G112 (-V70) -G113 (-V71) 1) -G114 (-V85)		- Greater than 0.1 kw and less than 5.7kw (depending on setting of positioning motor)	- Use current flow diagram to eliminate open circuit, contact resistance or short circuit Replace positioning motor

- 1) Positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles.

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (200 ω) ▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
4.3	2 + 10	Temperature flap positioning motor -V68		- 20 ...100 ω	- Use current flow diagram to eliminate open circuit, contact resistance or short circuit
4.4	4 + 12	Central flap positioning motor -V70		- 20 ...100 ω	- Replace positioning motor
4.5	5 + 13	Air-flow flap positioning motor -V711)		- 20 ...100 ω	
4.6	3 + 11	Footwell/defroster flap positioning motor -V85		- 20 ...100 ω	

1) Positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles.

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k ω) - Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
4.7	14 + 2 14 + 3 14 + 4 14 + 5	Wiring to positioning motors -V68 -V85 -V70 -V71 1) for short to earth	▪ Ignition switched off	- $\infty \omega$	- Rectify short circuit to earth according to current flow diagram
Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V=)					
▪ Adapter cable V.A.G 1598/12 connected					
4.8	14 + 2 14 + 3 14 + 4 14 + 5	Wiring to positioning motors -V68 -V85 -V70 -V71 1) for short to positive	▪ Ignition switched on	- Less than 1 V	- Rectify short circuit to positive according to current flow diagram

1) Positioning motor -V71 is fitted depending on vehicle equipment and is therefore not installed in all vehicles.

Test step 5:

Air conditioner compressor speed sender -G111

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k ω) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value



5.1	5 + 49	Air conditioner compressor speed sender -G111		- 0.8 ... 1.5 kW	- Use current flow diagram to eliminate open circuit, contact resistance or short circuit Sender -G111 defective. Send the vehicle to an VW/Audi air-conditioning service centre
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Notes:

- ♦ Only vehicles with Zexel compressor and compressor driven by ribbed V-belt which, in addition to compressor also drives other ancillaries, feature an air conditioner compressor speed sender -G111.
- ♦ Vehicles with Nippondenso compressor have no air conditioner compressor speed sender -G111.

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 kW)

▪ Adapter cable V.A.G 1598/11 connected.

Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
5.2	5 + earth	Air conditioner compressor speed sender -G111		- greater than 2 kW	- Rectify short circuit according to current flow diagram Sender -G111 defective. Send the vehicle to an VW/Audi air-conditioning service centre

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V=)

▪ Adapter cable V.A.G 1598/11 connected

5.3	5 + earth	Air conditioner compressor speed sender -G111	▪ Engine running ▪ Compressor not running	- Less than 1 V	- Rectify short circuit according to current flow diagram
-----	-----------	---	--	-----------------	---

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (2 V font=symbol charset=fontspecific code=64 descr="[ap]")

▪ Adapter cable V.A.G 1598/11 connected

Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
5.4	5 + earth	Air conditioner compressor speed sender -G111	▪ Magnetic clutch relay removed ▪ Jumper between terminals 30 and 87 at relay panel (magnetic clutch engaged) ▪ Engine running ▪ Compressor running	- greater than 0.05 V (depends on engine speed)	- Sender -G111 defective. Send the vehicle to an VW/Audi air-conditioning service centre

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Test step 6:

Magnetic clutch relay -J44, actuation of radiator fan -V7

Select measuring range on hand-held multimeter V.A.G 1526: Current measurement (20 A =) ▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
6.1	8 + 14	Magnetic clutch relay -J44	▪ Engine running	- Less than 1 A - Compressor is driven	- Use current flow diagram to rectify open circuit or short in wiring between - N25, -J44 and -E87 Test low pressure switch -F73 => Page 155 Replace relay -J44 Service magnetic clutch -N25

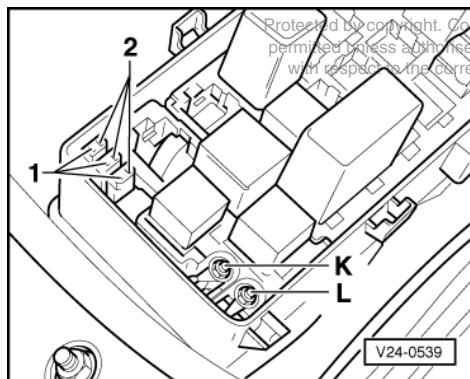
Select measuring range on hand-held multimeter V.A.G 1526: Current measurement (20 A =) ▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
6.2	14 + 16	Actuation of 1st stage for radiator fan -V7	▪ Engine running	- Less than 1 A - Fan running at stage 1	- Use current flow diagram to rectify open circuit or short in wiring between -N25, -J44 and -E87 Test actuation of fan -V7 => "Current flow diagrams, Electrical fault finding and fitting locations" binder

4.2 - Checking wiring of diagnostic sockets

Notes:

- ◆ Use hand-held multimeter V.A.G 1526 A, adapter set V.A.G 1594 A and test box V.A.G 1598 A for test
- ◆ Switch off ignition before checking wiring.

Testing power supply for "black" diagnostic socket





-> Installation position of diagnostic sockets: in additional relay carrier I

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

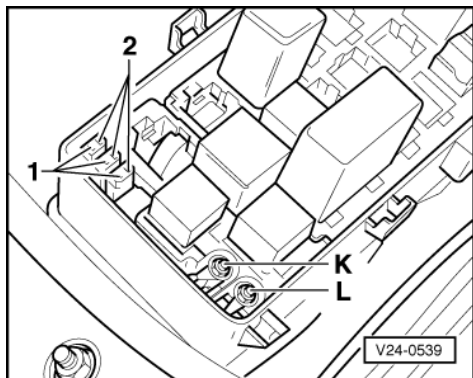
Contact assignment for "black" diagnostic socket:

- 1 - Earth
- 2 - Terminal 30

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V=)				
Contact Diagnosis socket	Measure to	Testing of	Specification	Action in event of deviation from specified value
1 1)	Battery positive	Wiring to car body earth point	Approx. battery voltage	- Check wiring using current flow diagram
2 1)	Car body earth point	Wiring to continuous positive (terminal 30)	Approx. battery voltage	- Check wiring using current flow diagram

1) Earth connection and power supply for black diagnostic socket => Fig., Page 56 .

Testing wiring between "white" diagnostic socket and magnetic clutch control unit -J153 and operating and display unit -E87, respectively



-> Installation position of diagnostic sockets and of cable junction K: in additional relay carrier I

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

Contact assignment for "white" diagnostic socket:

- 1 - L-line (is not required here)
- 2 - K-line

Note:

Wiring between "white" diagnostic socket (contact 2) and gearbox control unit runs through junction K:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- If fully automatic air conditioner is fitted, remove operating and display unit -E87 => Fig. 215 and connect test box V.A.G 1598 A with adapter cable V.A.G 1598/11.

Magnetic clutch control unit - J153

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k Ω) ▪ Adapter cable V.A.G 1598/11 connected.				
Control unit -J153	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
Pin D + K 1) Pin D + 2 2)	Wiring	▪ Ignition switched off	Less than 1.5 Ω	- Check wiring using current flow diagram
Pin D + car body earth point			$\infty \Omega$	- Measures in the event of short circuit => Page 57

Operating and display unit -E87

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k Ω) ▪ Adapter cable V.A.G 1598/11 connected.				
V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specification	Action in event of deviation from specified value
41 + K 1) 41 + 2 2)	Wiring	▪ Ignition switched off	Less than 1.5 Ω	- Check wiring using current flow diagram
41 + car body earth point			$\infty \Omega$	- Measures in the event of short circuit => Page 57

- 1) Corresponding contact at auxiliary relay carrier I => Fig., Page 56 .
- 2) Corresponding contact at "white" diagnostic socket => Fig., Page 56 .

Testing cable connection of white diagnostic socket for short circuit to positive or to earth

Note:

This check has to be performed if one of the following displays appears on connected fault reader V.A.G 1551.

-> Indicated on display:

Rapid data transfer
 Communication fault

or

Rapid data transfer HELP
 K-line not switching to earth

or

Rapid data transfer HELP
 K-line not switching to positive

-> When indicated on display:

Control unit does not answer! HELP

Open circuit in wiring to magnetic clutch control unit -J153 and operating and display unit -E87, respectively.

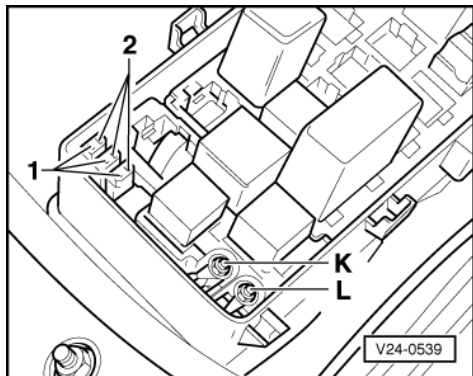
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Note:

Switch off ignition before unplugging wiring.

- Switch off ignition.



- -> Unplug all wiring connections of other vehicle systems with self-diagnosis "Rapid data transfer" one after the other from junction K.

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- After each wiring connection to a vehicle system has been disconnected, switch on ignition or run engine at idling speed, respectively, and once again enter address word 08 for "AC/heating electronics" => Page 14 .
- If control unit identification and coding then appears in display, check wiring to control unit which was last disconnected according to current flow diagram
- If no fault in wiring is found, replace control unit last disconnected, if necessary, and re-connect all wiring to junction K.

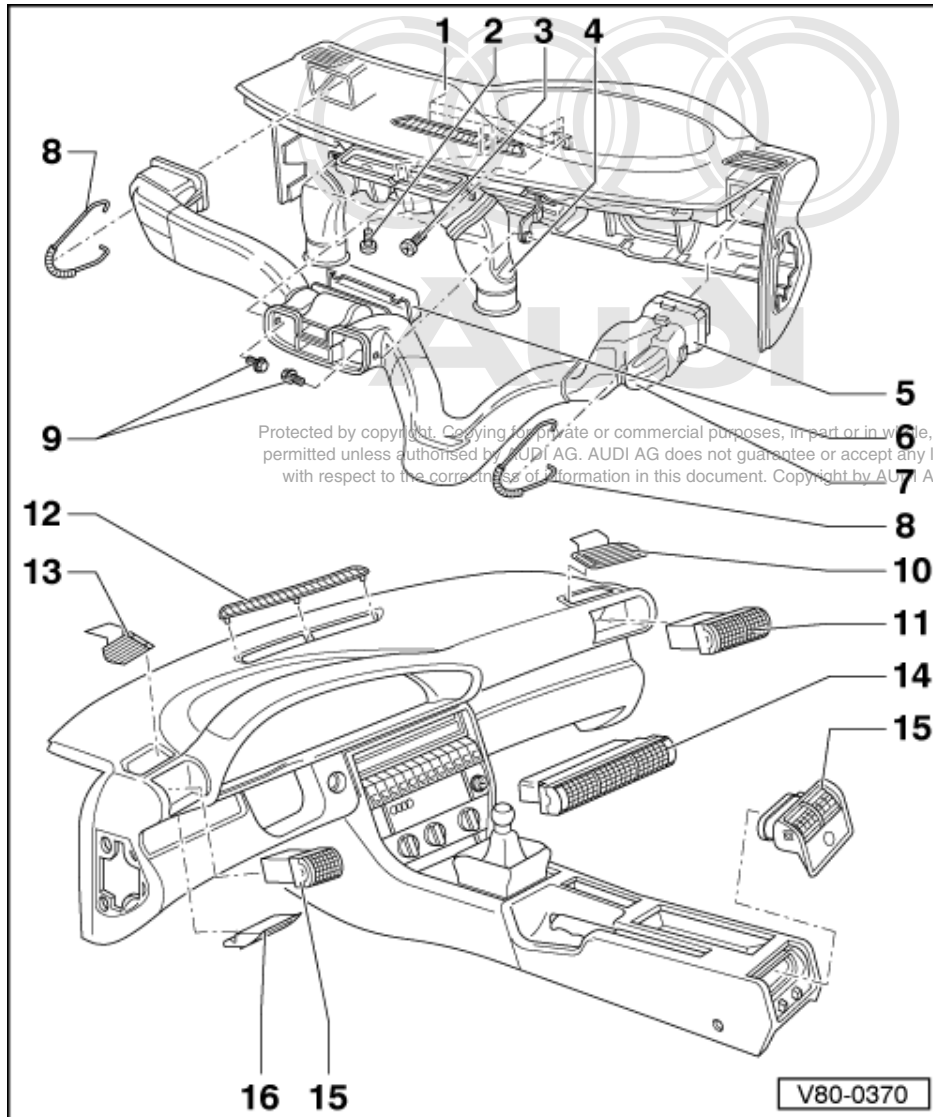


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80 - Heating

1 - Servicing heating

1.1 - Servicing heating



1.2 - Dash panel vents and air ducts

Note:

The passenger compartment is ventilated by two venting frames (in the boot, on the left and right in the area of the bumper) =>Page 65.

1 Dash panel

♦ Removing and installing

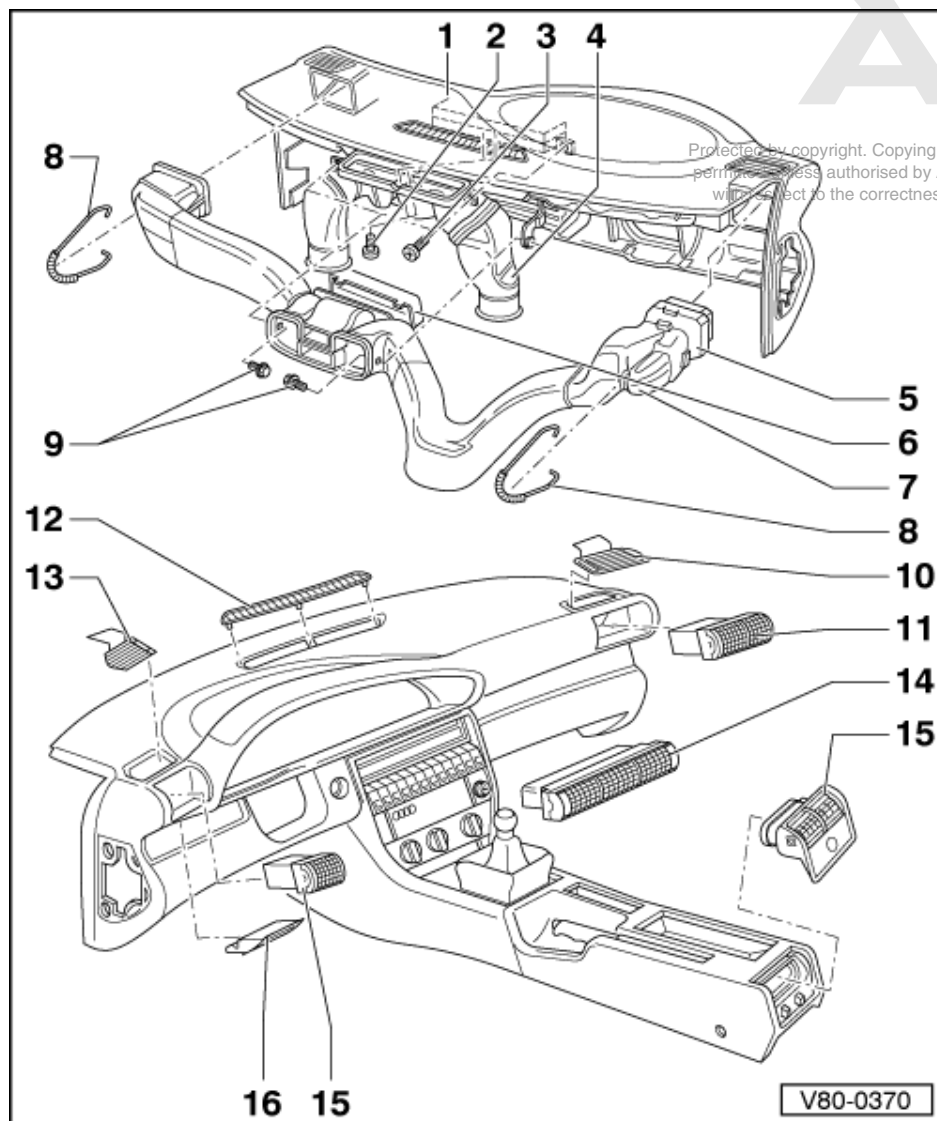
=> General body repairs; Repair group 70; Dash panel; Removing and installing dash panel Dash panel Re-

moving and installing dash panel

2 Bolt

3 Bolt

4 Defroster hose (intermediate section)



5 Seal mount

6 Seal mount

7 Air duct/vent

8 Bracket

9 Bolts

10 Defroster vent

♦ For side window on passenger's side

♦ Removing and installing => Fig. 1

11 Dash panel vent

♦ Passenger's side

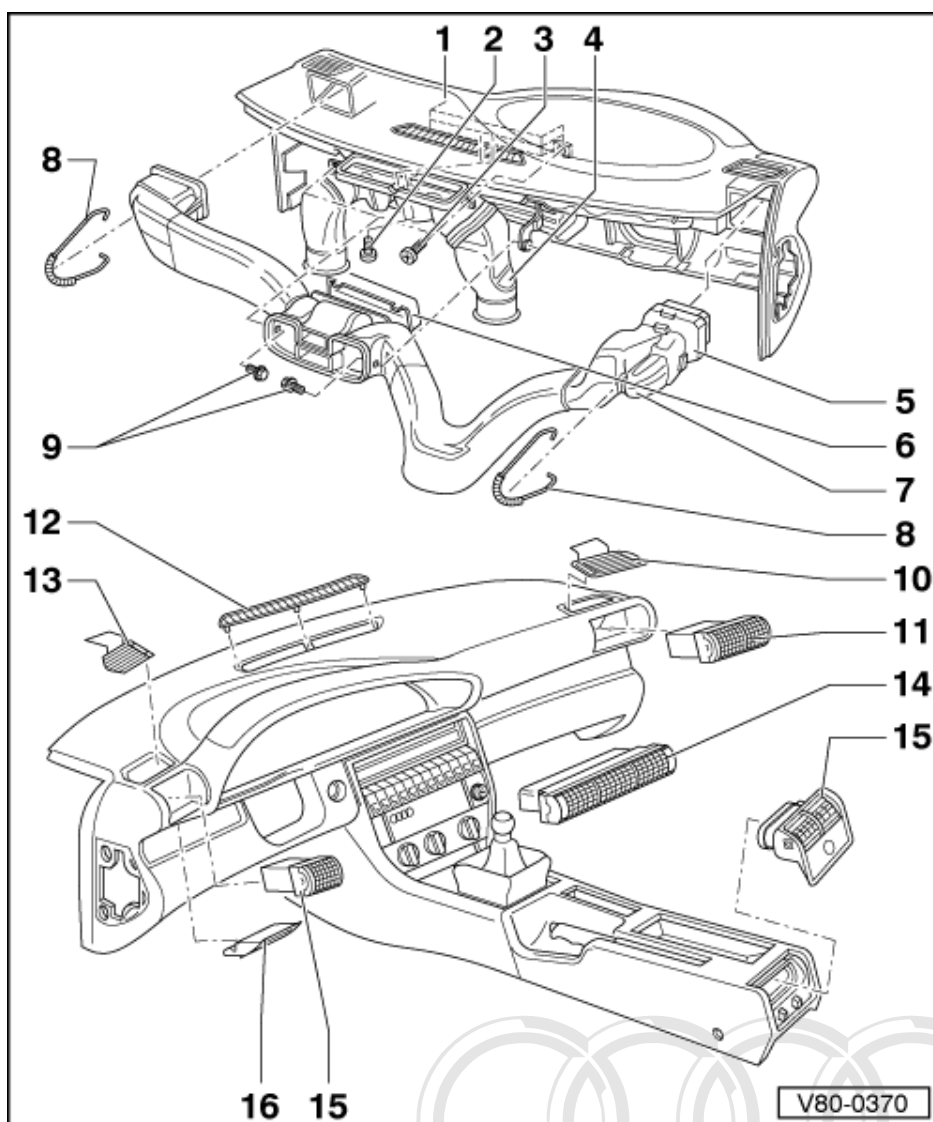
♦ Removing and installing => Fig. 2

♦ Removing and installing swivelling inserts => Fig. 7

12 Defroster vent

♦ For windscreen

- ♦ Removing and installing => Fig. 3



13 Defroster vent

- ♦ For side window on driver's side
- ♦ Removing and installing => Fig. 1

14 Dash panel vent

- ♦ Centre
- ♦ Removing and installing => Fig. 4

15 Rear compartment vent

- ♦ Rear centre
- ♦ Removing and installing => Fig. 5

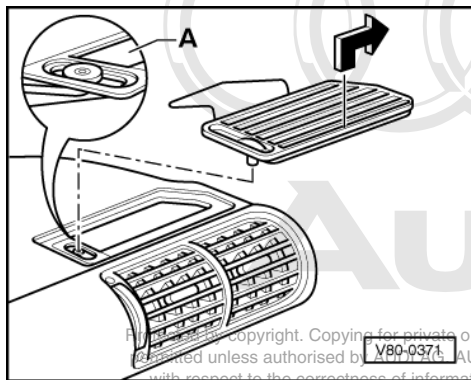
16 Dash panel vent

- ♦ At bottom on driver's side
- ♦ Removing and installing => Fig. 6

17 Dash panel vent

- ♦ At top on driver's side
- ♦ Removing and installing => Fig. 6
- ♦ Removing and installing swivelling insert => Fig. 7

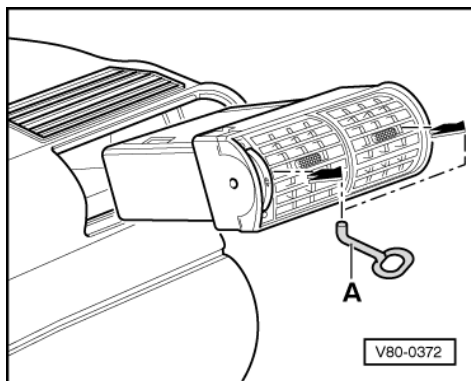
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-> Fig.1 Removing and installing front side window defroster vent

Note:

Ensure that lockable defroster vent is correctly installed in attachment in slide -A-.

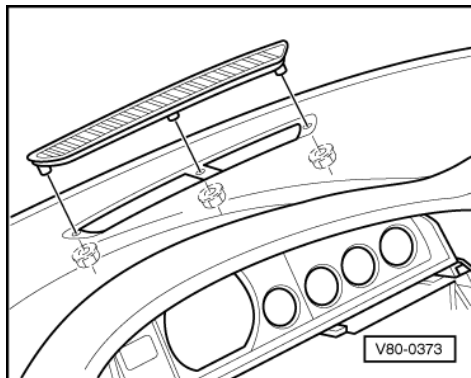


-> Fig.2 Removing and installing dash panel vent on passenger's side

- Use 2 auxiliary tools -A- to pull dash-panel vents out of dash panel.

Notes:

- ♦ Making auxiliary tool -A- => Fig. 8 .
- ♦ Removing and installing swivelling insert => Fig. 7

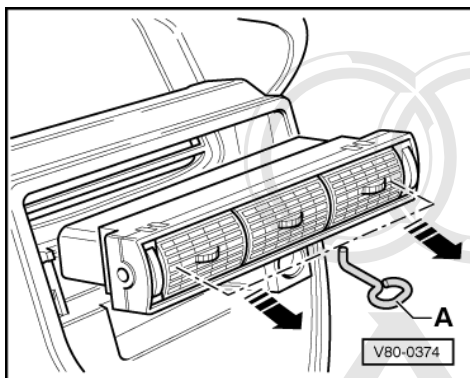


-> Fig.3 Removing and installing windscreen defroster vent

- Remove the dash panel:

=> General body repairs; Repair group 70; Dash panel; Removing and installing dash panel Dash panel Removing and installing dash panel

- Screw out three nuts.

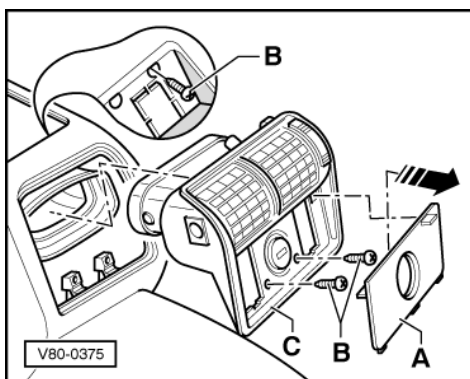


-> Fig.4 Removing and installing centre dash panel vent

- Use 2 auxiliary tools -A- to pull dash-panel vents out of dash panel.

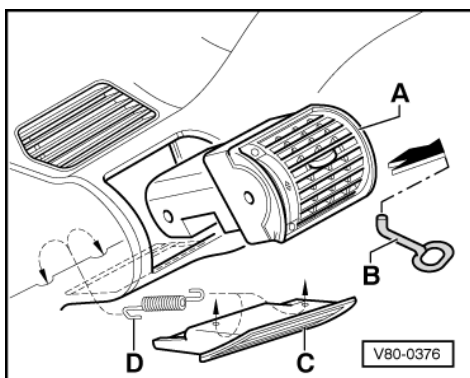
Note:

Making auxiliary tool -A- =>Fig. 8 .



-> Fig.5 Removing and installing centre rear footwell vent

- Lever out trim plate -A- at top using a screwdriver.
- Fold up felt inlet of storage compartment.
- Remove screws -B-.
- Pull out rear footwell vent -C-.

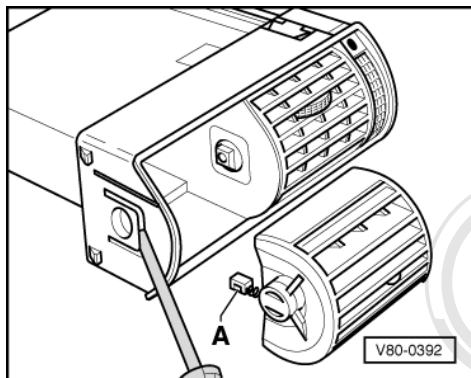


-> Fig.6 Removing and installing dash panel vent at top and bottom on driver's side

- Use auxiliary tool -B- to pull dash panel vent at top -A- out of dash panel.
- Release springs -D- and then pull dash panel vent at bottom -C- out of dash panel.

Notes:

- ♦ Making auxiliary tool -B- =>Fig. 8 .
- ♦ Removing and installing swivelling insert => Fig. 7



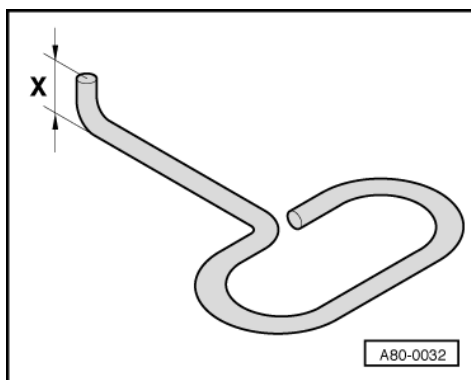
-> Fig.7 Removing and installing swivelling inserts for dash panel

Removal:

- Remove dash panel vents.
- Carefully raise securing plate using a screwdriver.
- Use auxiliary tool to pull out swivelling insert.

Installation:

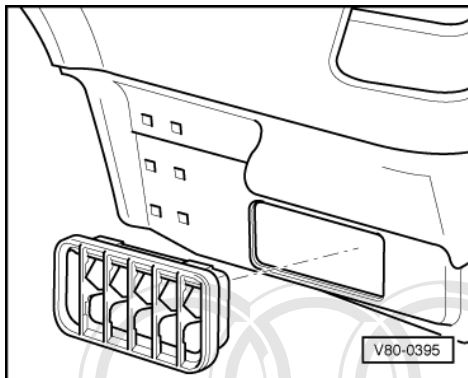
- Install swivelling insert correct way round.
- Check that spring-loaded catch -A- is correctly installed.



-> Fig.8 Making auxiliary tool for dismantling dash panel vents

- Bend a 3 mm dia wire into the shape illustrated.
- Dimension x = 6 mm

Checking vent frame

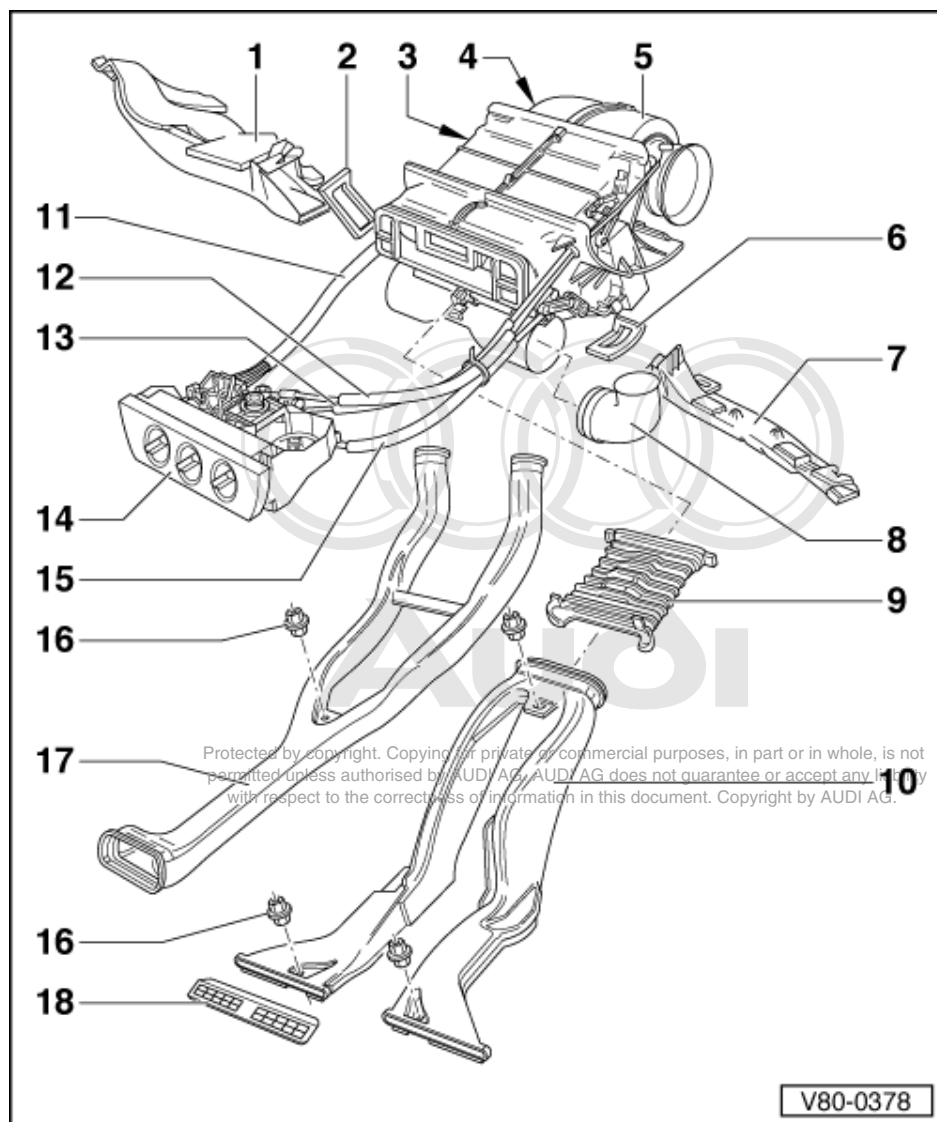


Notes:

- ◆ Diagram shows vent frame with rear bumper removed
- ◆ For proper venting of passenger compartment, air ducts must not be blocked.
- -> Check that air ducts are not blocked.
 - Blocked ducts could cause windows to mist up
 - Sealing lips in vent frame must move freely and close automatically

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1.3 - Heating, heater controls and air ducts



Note:

Fresh air is drawn in through a dust and pollen filter; removing and installing =>Page 86 onwards.

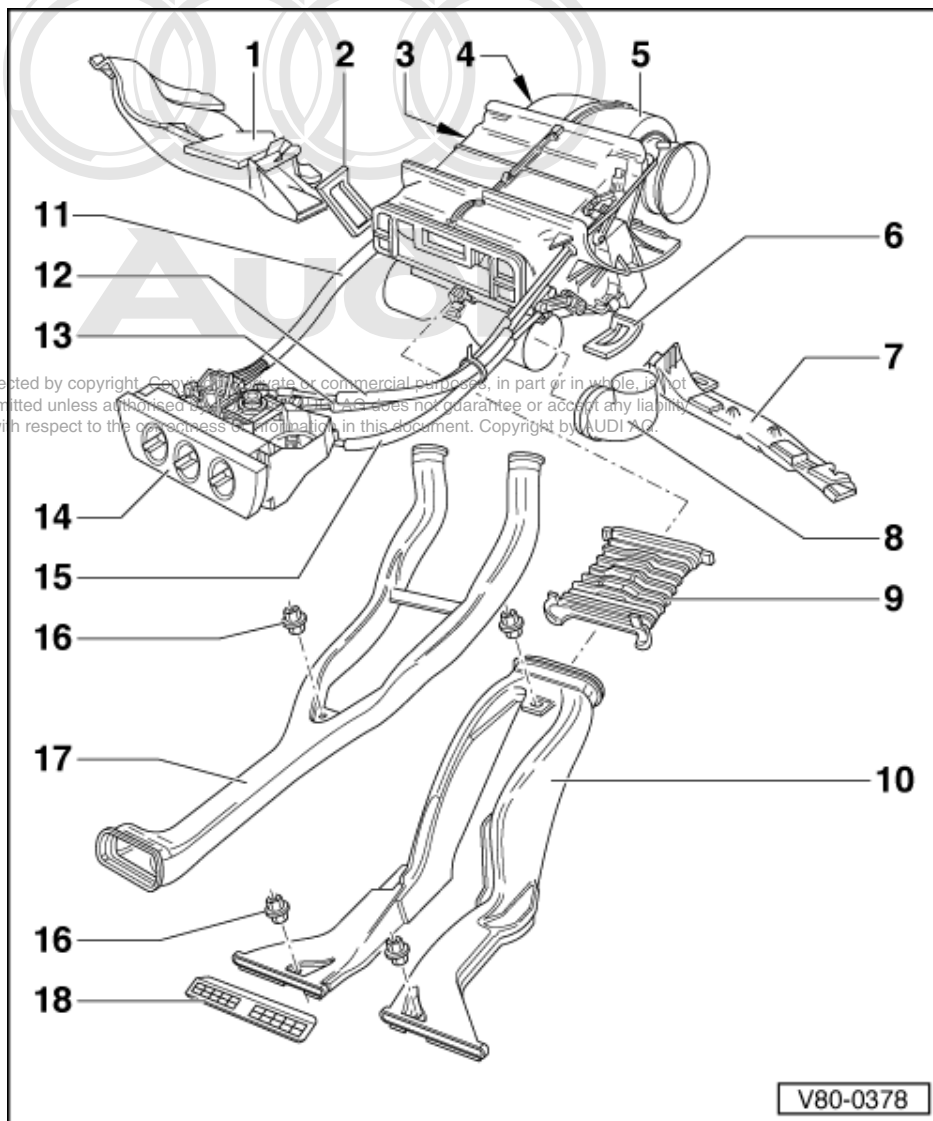
1 Vent

- ♦ For driver's footwell

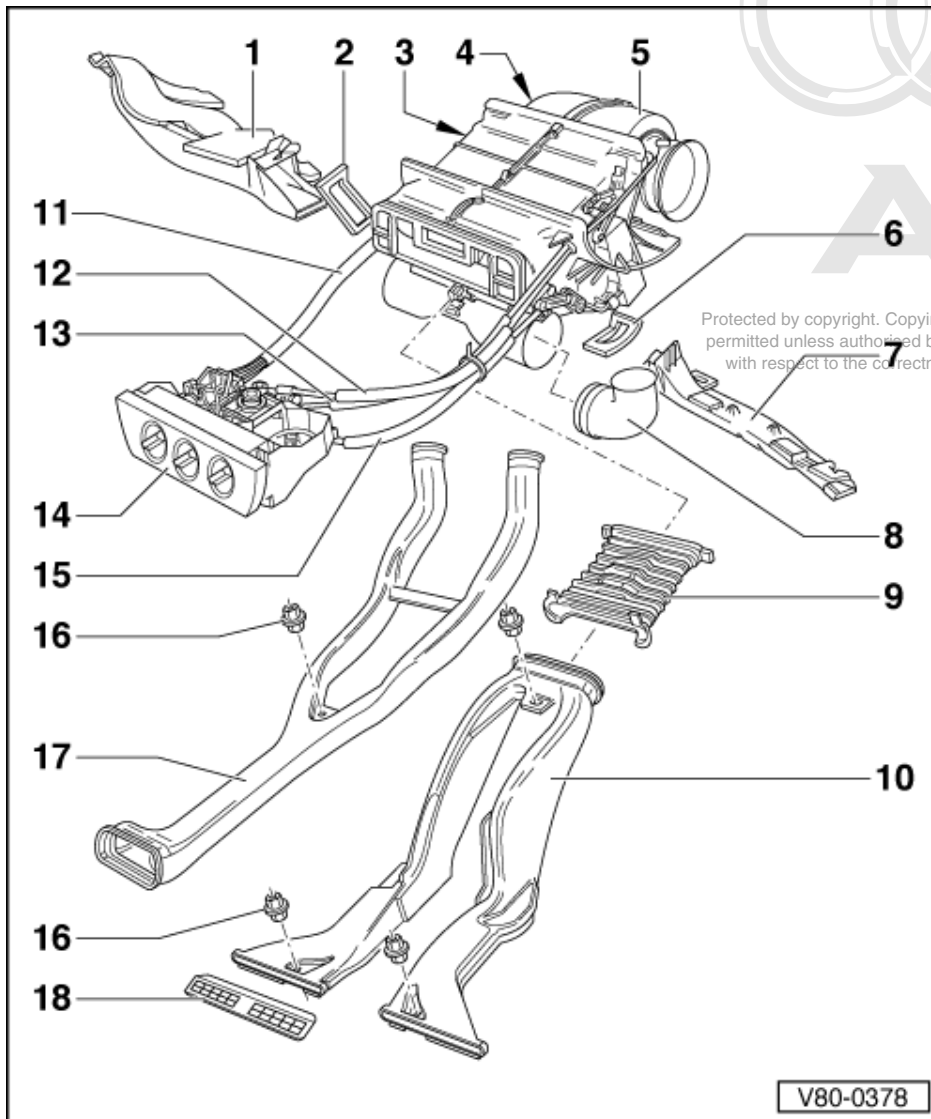
2 Seal

3 Fresh-air blower series resistor -N24

- ♦ Colour of housing: red for vehicles without air conditioner
- ♦ Colour of housing: orange for vehicles with manually controlled air conditioner



- 4 Fresh-air blower -V2**
 - ♦ Removing and installing => Fig. 8
- 5 Heater**
 - ♦ Removing and installing => Page 72
 - ♦ Dismantling and assembling =>Page 77
- 6 Seal**
- 7 Vent**
 - ♦ For passenger's footwell
- 8 Defroster hose**
- 9 Connecting bellows**
- 10 Air duct**
 - ♦ For rear footwell
- 11 Wiring harness**

**12 Bowden cable**

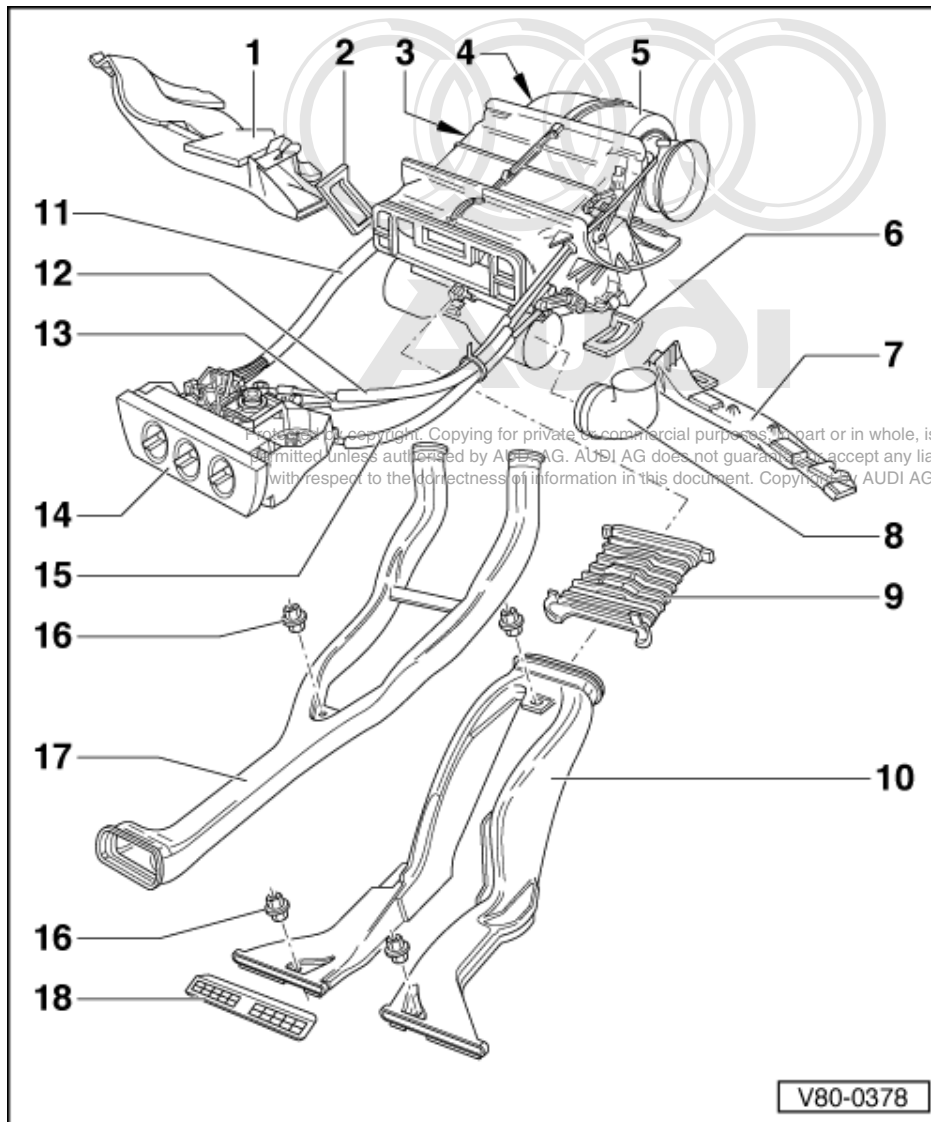
- ◆ To fresh air shut-off flap
- ◆ not on vehicles with manually controlled air conditioner
- ◆ Removing and installing => Fig. 1

13 Bowden cable

- ◆ To temperature flap
- ◆ Removing and installing => Fig. 2

14 Heater controls

- ◆ Removing and installing => Fig. 3
- ◆ Removing and installing Bowden cables => Fig. 4 and Fig. 5
- ◆ Removing and installing Bowden cables if lug broken off => Fig. 6
- ◆ Rectifying complaint of "fresh air heated although temperature controller in 'cold stop' position" (vehicles without air conditioner ä 05.92) => Page 74



15 Bowden cable

- ♦ To control flap of footwell/defroster and dash panel vents
- ♦ Removing and installing => Fig. 7

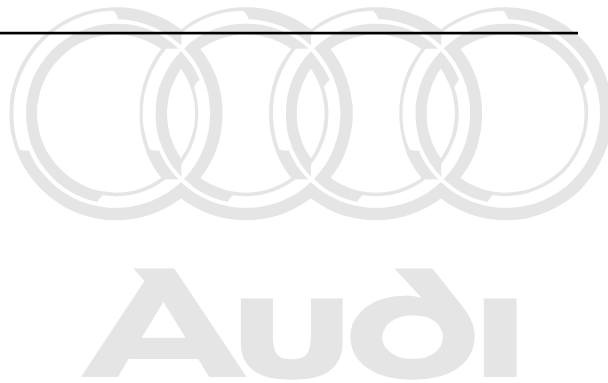
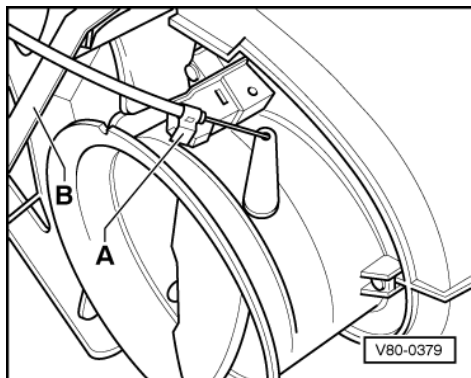
16 Clip nut

17 Air duct

- ♦ For rear centre footwell

18 Vent

- ♦ For rear footwell



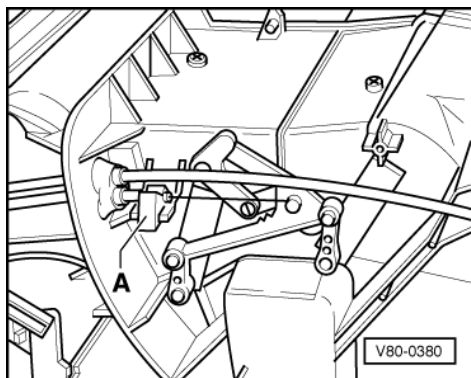
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-> Fig.1 Removing and installing Bowden cable to fresh air shut-off flap

- Remove plenum chamber cover.
- Prise off securing clip -A-.

Note:

Do not route Bowden cable between heating system and tensioning strap -B-.

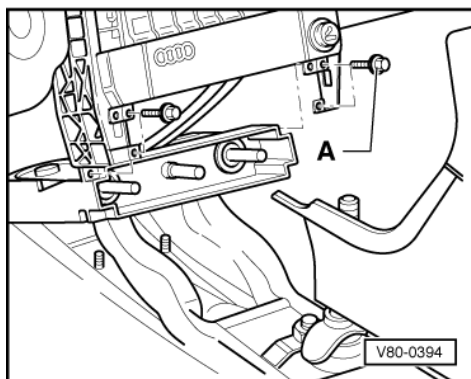


-> Fig.2 Removing and installing Bowden cable to temperature flap

- Remove plenum chamber cover.
- Prise off securing clip -A-.

Note:

For removing and installing, move temperature flap to "cold stop".



-> Fig.3 Removing and installing heater controls

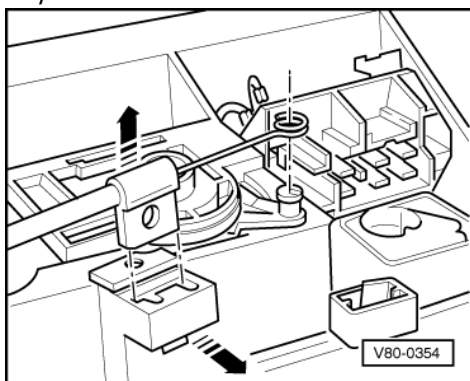
- Pull rotary knobs off heater controls.
- Remove trim panel.
- Remove central section of dash panel:

=> General body repairs; Repair group 70; Dash panel; Removing central section of dash panel Dash panel
Removing central section of dash panel

- Screw out 4 screws -A-.

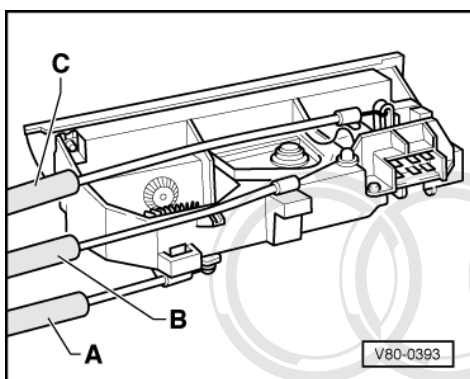
Note:

Replace stiff Bowden cables.



-> Fig.4 Removing Bowden cables for heater controls

- Carefully remove Bowden cable from lever arm.
- Carefully disengage lug -bottom arrow- and remove Bowden cable holder from heater controls -top arrow-.

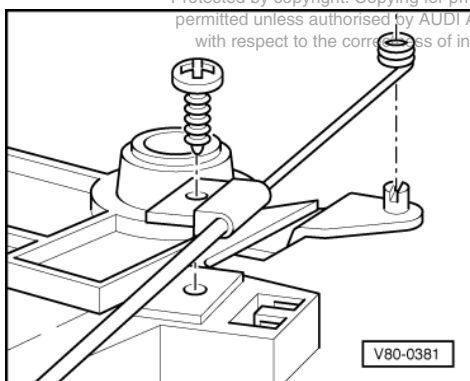


-> Fig.5 Installing Bowden cables for heater controls

Note:

Not on vehicles with manually controlled air conditioner.

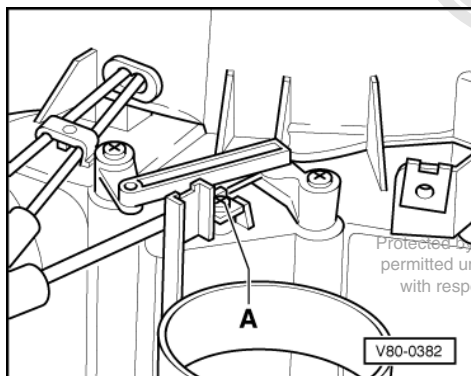
- A - Bowden cable to control flaps for footwell/defroster and dash panel vent
- B - Bowden cable to temperature flap
- C - Bowden cable to fresh air shut-off flap



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-> Fig.6 Installing Bowden cable for heater controls if lug broken off

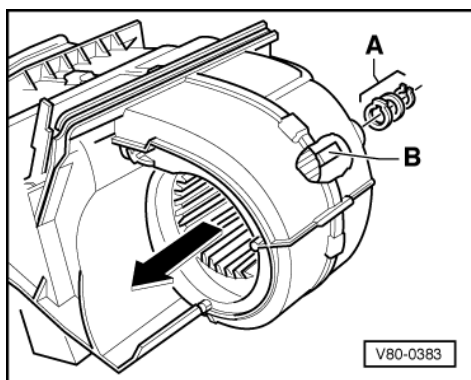
- Turn Bowden cable holder through 90° and attach it to heater control with a 4.2 x 16 mm screw.

**-> Fig.7 Removing and installing Bowden cable to control flaps for footwell/defroster and dash panel vent**

- Remove the glove compartment:

=> General body repairs; Repair group 70; Dash panel; Removing and installing storage compartment and glove compartment Dash panel Removing and installing storage compartment and glove compartment

- Remove screw -A-.

**-> Fig.8 Removing and installing fresh air blower -V2****Note:**

Remove heating system on a vehicle with air conditioner => Page 72

- Remove plenum chamber cover.
- Remove intake duct with fresh air shut-off flap
- Remove circlip, retaining washer and grommet -A-.
- Before installing, grease bearings for fresh air blower -B- with Vaseline.

2 - Removing and installing heater

2.1 - Removing and installing heater

- Note or obtain radio code on vehicles with coded radio.

Note:

In vehicles with electrically adjustable seats, move them back as far as possible before disconnecting the battery.

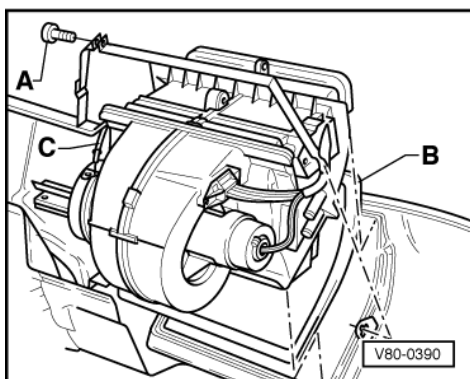
- Detach battery earth strap.
- Removing and installing dust and pollen filter => Page 86 onwards.
- Remove windscreen wiper motor together with windscreen wiper frame

=> Electrical system; Repair group 92; Servicing windscreen wiper system, Removing windscreen wiper frame
Servicing windscreen wiper system, Removing windscreen wiper frame

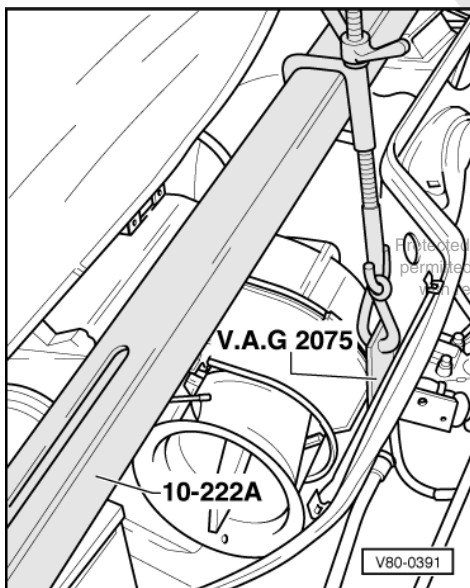
- Remove central section of dash panel and storage compartment and glove compartment

=> General body repairs; Repair group 70; Central section of dash panel, central section; Removing and installing storage compartment and glove compartment Central section of dash panel, central section Removing and installing storage compartment and glove compartment

- Remove heater controls => Fig. 71 .
- Remove footwell vent on driver's and front passenger's side.



- Remove defroster hoses and connecting bellows to air duct for rear passenger compartment in centre rear.
- Remove cap from coolant expansion tank.
- Pinch off coolant pipes to heat exchanger with hose clamps V.A.G 3093 and detach pipes.
- -> Remove screw -A-.
- Remove tensioning strap:

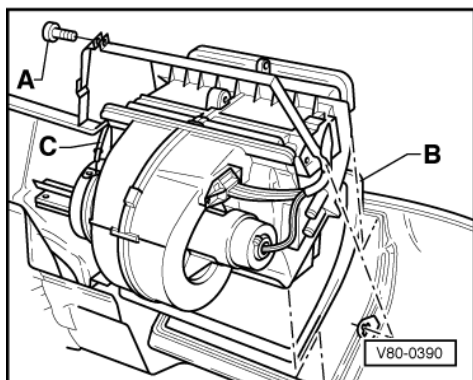


- Separate all connections between vehicle and heater.

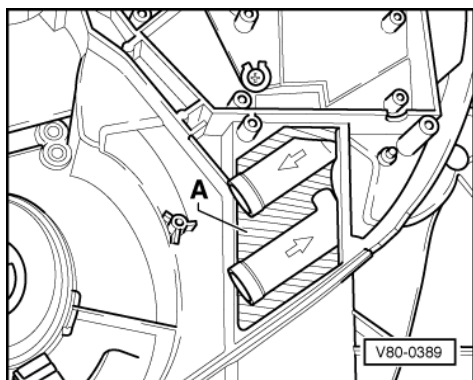
Notes:

- ♦ On vehicles with manually regulated air conditioner, remove connection fitting between heater and evaporator.
 - ♦ On vehicles with fully automatic air conditioner and air-flow flap, remove positioning motor for air-flow flap - V71=>Fig. 211 and turn air-flow flap into evaporator.
- -> Lift out heater complete.

Installing



- -> Replace adhesive sealing strap -B-.
 - Start and end of adhesive sealing strap: at top of heater
- Route Bowden cable to fresh air shut-off -C- outside of tensioning strap.
 - Installed on vehicles without air conditioner
- On vehicles with air conditioner, inspect connection fitting between heater and evaporator for leaks.



- -> Note direction of flow of coolant:
 - Feed at bottom (from engine)
 - Return flow at top (to water pump)

2.2 - Rectifying fault: fresh air heated, although temperature controller in "cold stop" position

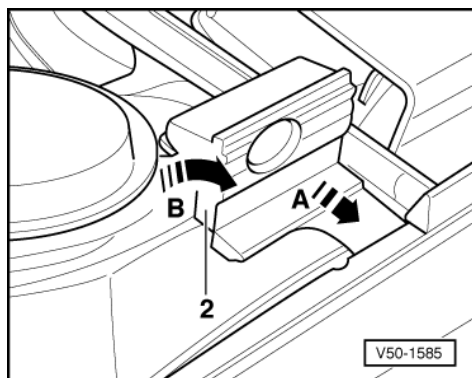
Vehicles without air conditioner ä 05.92

- If temperature of air flowing out of dash panel vents is more than app. 5 °C above ambient temperature (temperature controller is in "cold stop" position):
 - Operation of heater controls and relevant Bowden cables
 - Condition and installation position of all covers and seals between plenum chamber and engine compartment
- Pay particular attention to following:
 - Contact of seal between plenum chamber and engine compartment to front flap. Align flange if necessary

- If no fault can be found, install appropriate seals depending on engine fitted to vehicle. Part numbers
 => Parts Catalogue

Installing seal of wing and bonnet to plenum chamber

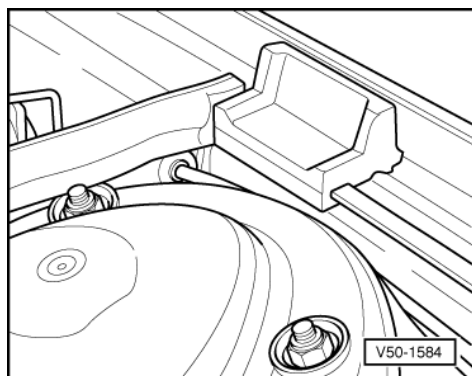
- Vehicles with petrol engine



- Carefully clean left and right corner area (connection of wing, plenum chamber and engine compartment).
- Remove any excess sealing compound.
- -> Push bottom part -A- of seal section -2- sufficiently far between wing and wheel housing so that beads of wing edge fit into recesses after folding down top part -B-.

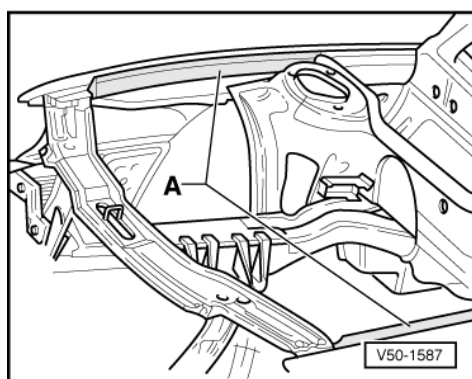
Note:

Seal section and plenum chamber seal should overlap in corner area.



- -> Pull off protective sheet and firmly press top part onto wing edge.

Installing seal of wing and bonnet to plenum chamber

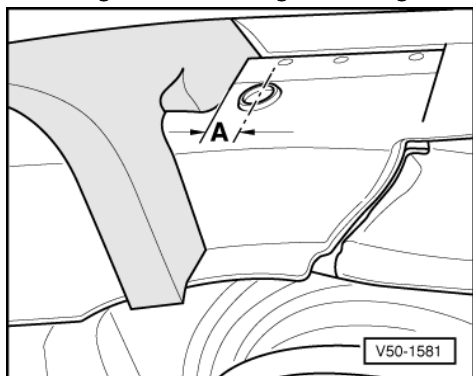


- Vehicles with diesel engine

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- -> Remove existing seals -A- on left and right at edge of wing.
- When installing new seals, ensure that small chamber of seal section is properly inserted into gap between wing and wheel housing.

Installing wheel housing liner/wing seal



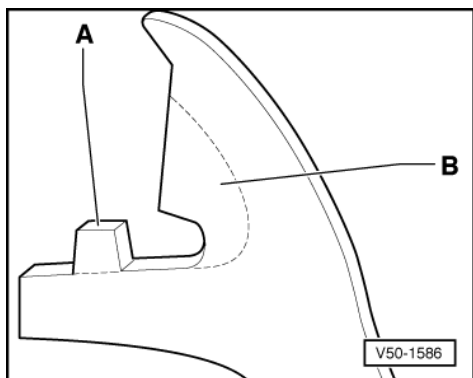
- Remove front wheel housing liner:

=> General body repairs; Repair group 66; Wheel housing liners; Removing and installing front wheel housing liner Wheel housing liners Removing and installing front wheel housing liner

Note:

-> It is essential to maintain dimension -A- to ensure that seal section -1- and seals of wing and bonnet overlap at plenum chamber level.

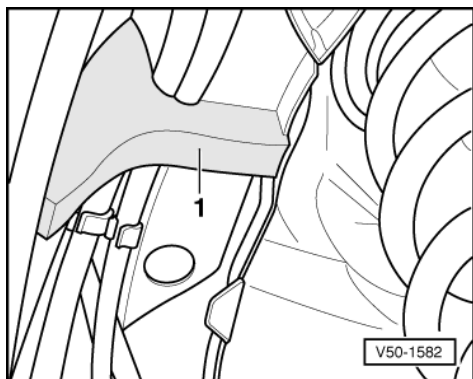
- ♦ Dimension A = 25 mm



- -> Cut off area -A-.
- On vehicles with ACF, you may have to enlarge radius area at seal section, because of different routing of pipes, cables.

Note:

On parts with Part-No. 4A0 821 197 the area to be enlarge -B- is already visible on section of seal and can be broken out.

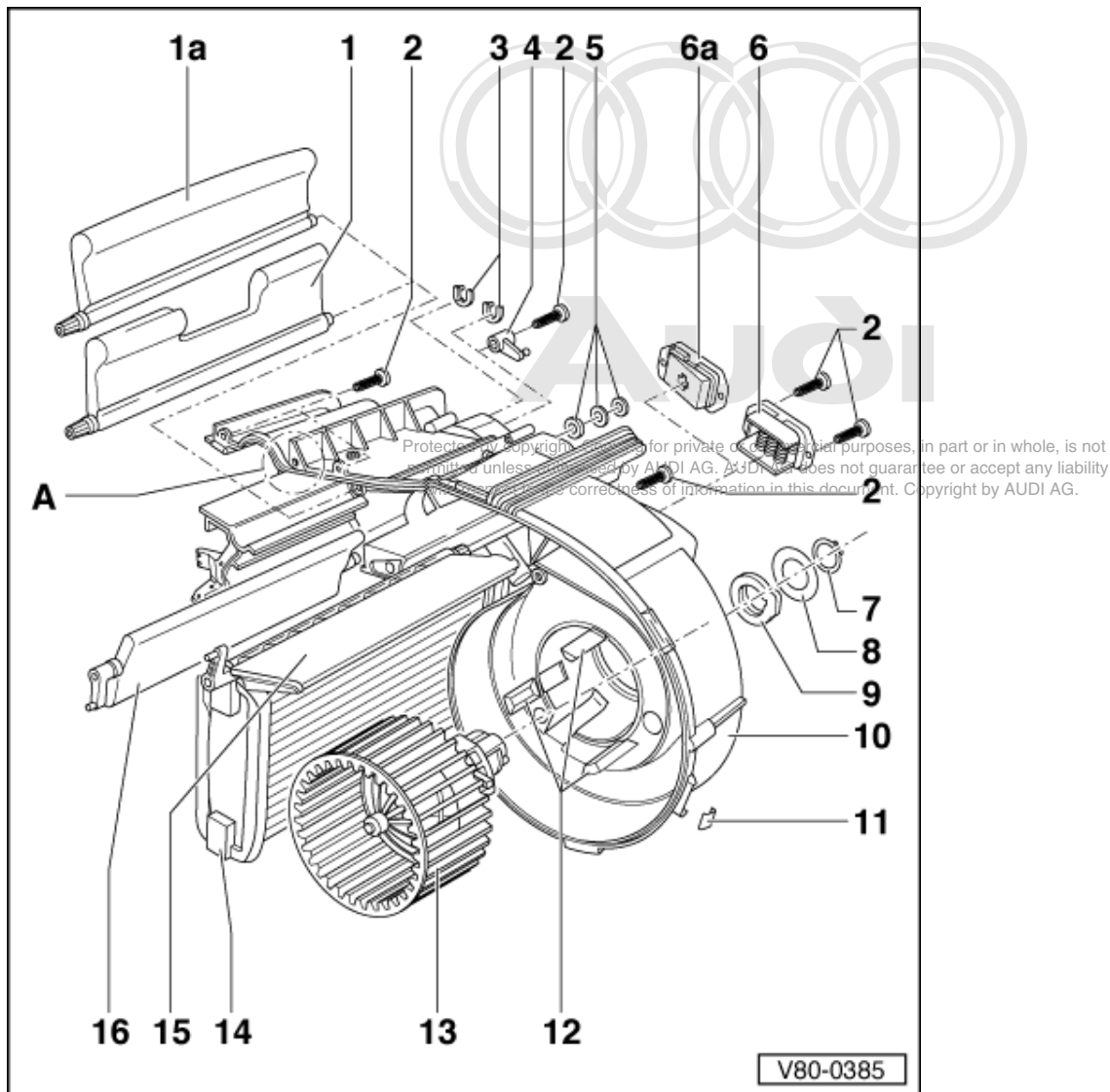


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- -> Push cable set and pipes to/from ACF into radius area of seal section -1-.
- Install seal sections so that bottom end fits into flange of wing.

3 - Dismantling and assembling heater

3.1 - Dismantling and assembling heater



Notes:

- ♦ When assembling, the two housing halves have to be sealed in area -A- with silicone adhesive sealant D 176 001 A3.
- ♦ Differences exist in heater depending on vehicle equipment.

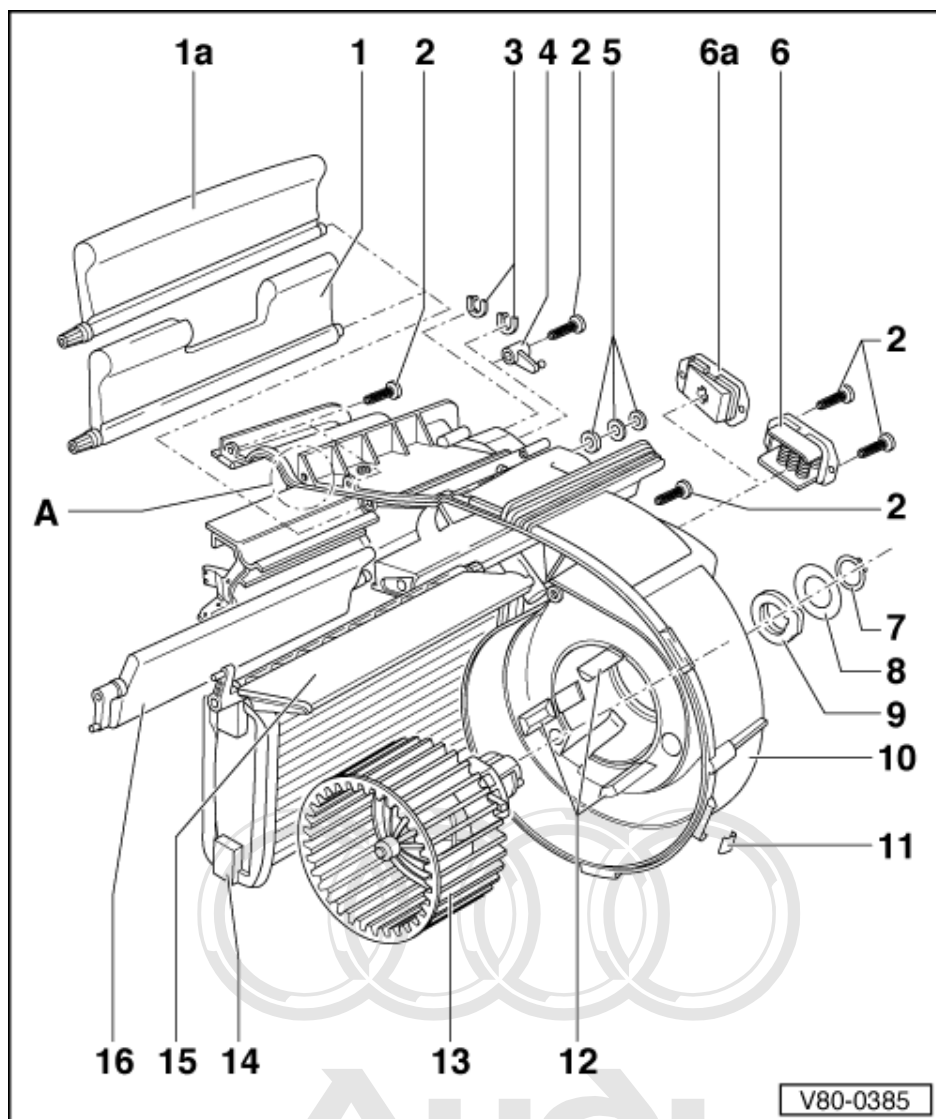
1 Control flap for dash panel vent

- ♦ Vehicles without air conditioner

1a - Control flap for dash panel vent

- ♦ Vehicles with air conditioner

2 Bolt



3 Circlip

4 Lever for footwell/defroster control flap

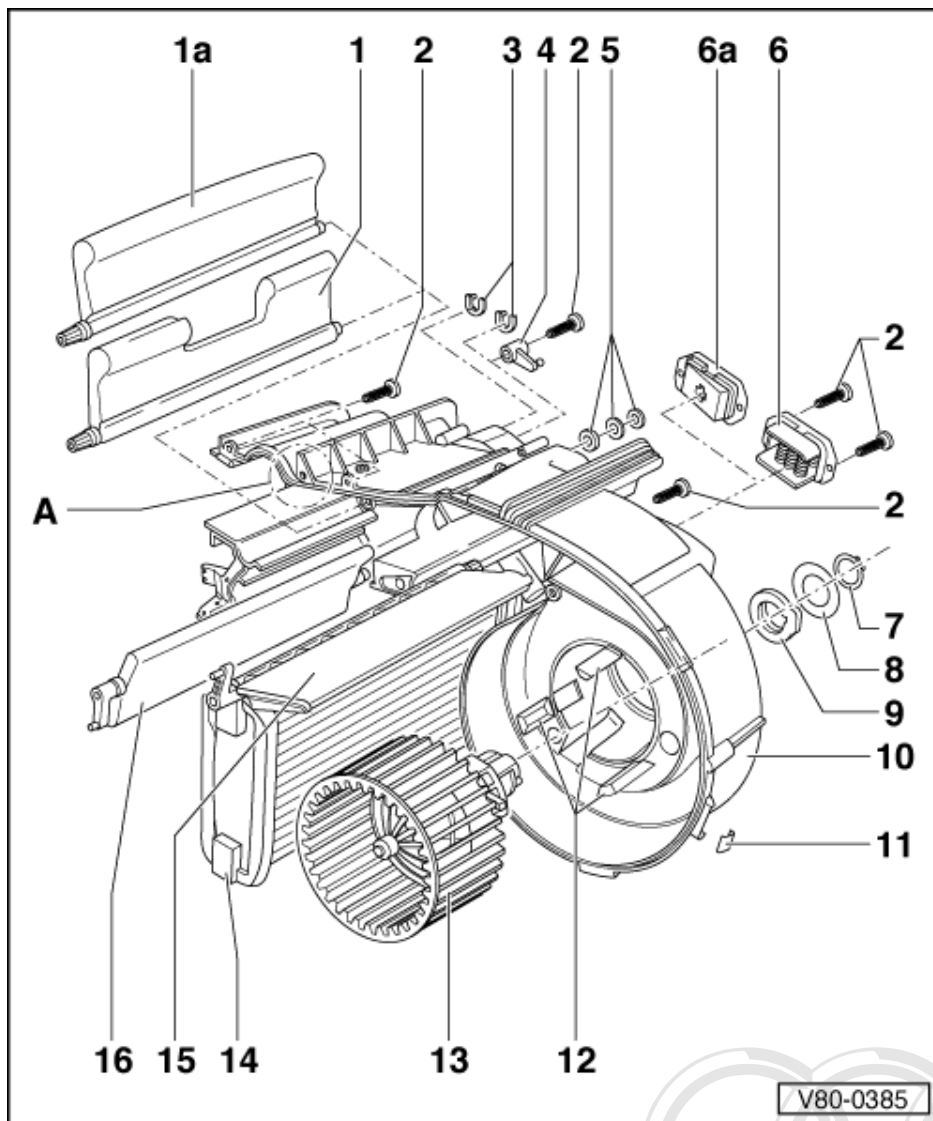
- ♦ For vehicles with fully automatic air conditioner
- ♦ Colour: red

5 Attachment for turbulence flap

- ♦ Install correct way round =>Fig. 1

6 Fresh-air blower series resistor -N24

- ♦ Not for vehicles with fully automatic air conditioner
- ♦ Colour of housing: red (vehicles without air conditioner)
- ♦ Colour of housing: orange (vehicles with manually controlled air conditioner)



6a - Bracket for temperature sensor

- ♦ For vehicles with fully automatic air conditioner

7 Circlip

8 Washer

9 Grommet

10 Left half of housing

- ♦ Align flaps => Fig. 2

11 Clip

- ♦ 7 in total around circumference

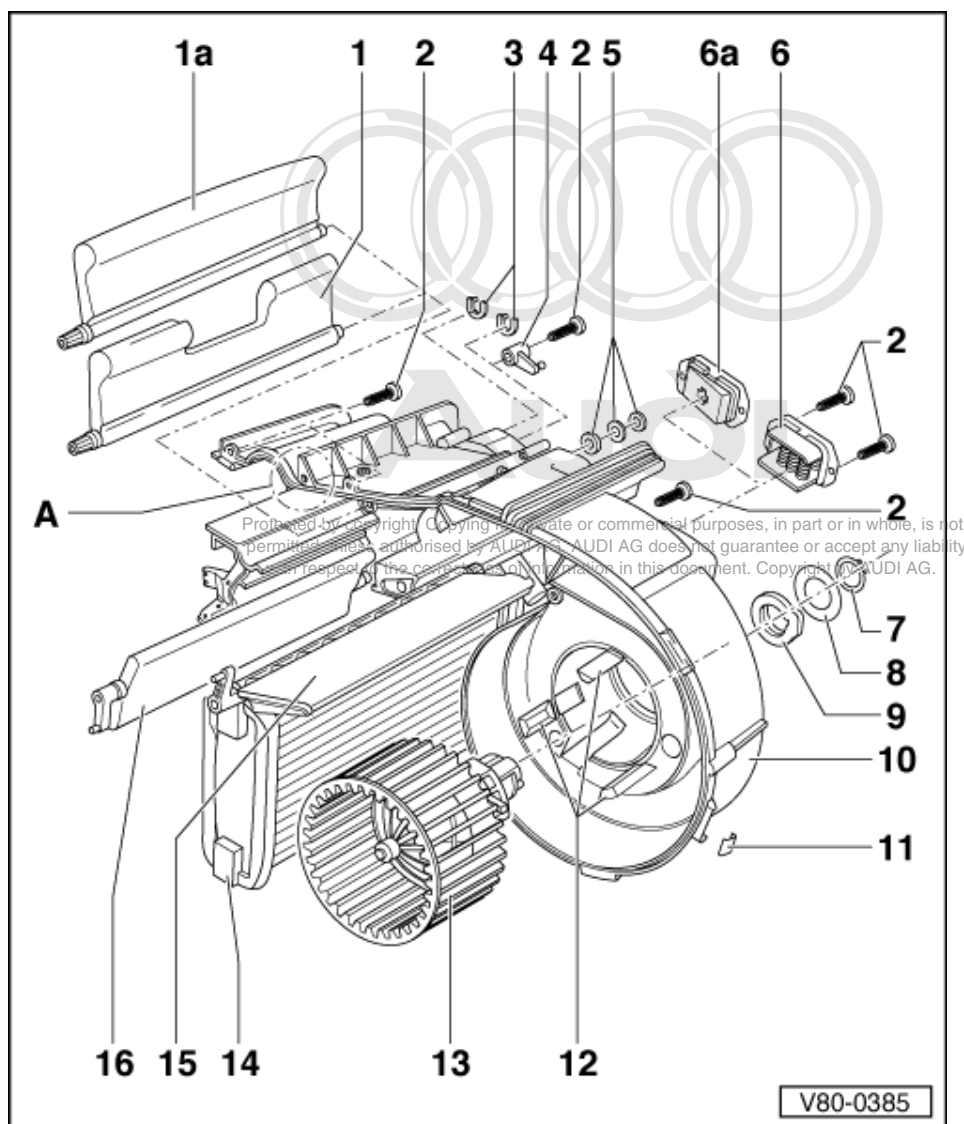
12 Bearings for fresh-air blower

- ♦ Grease lightly with Vaseline

13 Fresh-air blower -V2

- ♦ Removing and installing => Fig. 72

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14 Heat exchanger

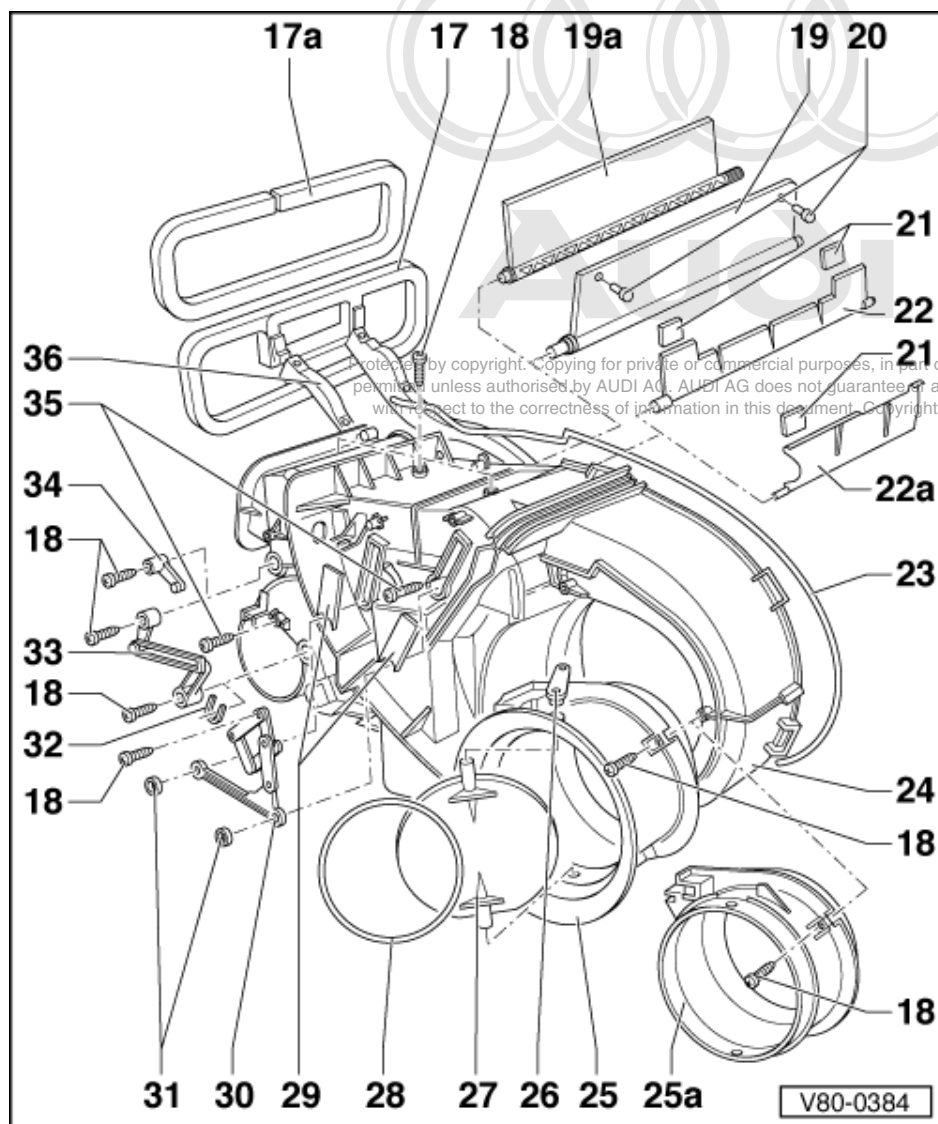
- ♦ Attaching self-adhesive seal => Fig. 3
- ♦ Seal outlet at left half of housing => Fig. 4

15 Temperature flap

- ♦ Upstream of heat exchanger

16 Temperature flap

- ♦ Downstream of heat exchanger



17 Gasket

- ♦ Vehicles without air conditioner

17a- Gasket

- ♦ Vehicles with air conditioner

18 Screw

19 Footwell/defroster control flap

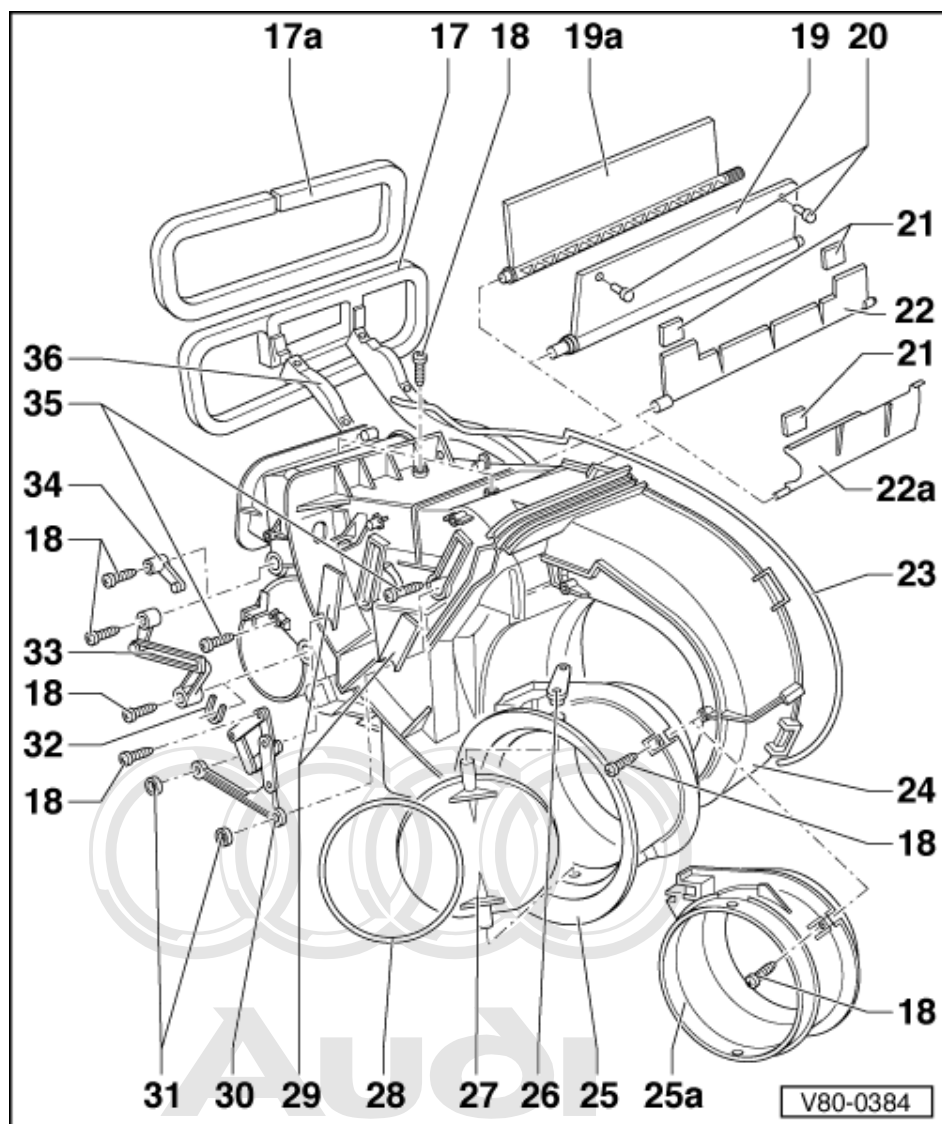
- ♦ Not for vehicles with fully automatic air conditioner

19a- Footwell/defroster control flap

- ♦ For vehicles with fully automatic air conditioner

20 Stops

- ♦ Not for vehicles with fully automatic air conditioner



21 Adhesive piece

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22 Turbulence flap

- ♦ Vehicles without air conditioner

22a- Turbulence flap

- ♦ Vehicles with air conditioner

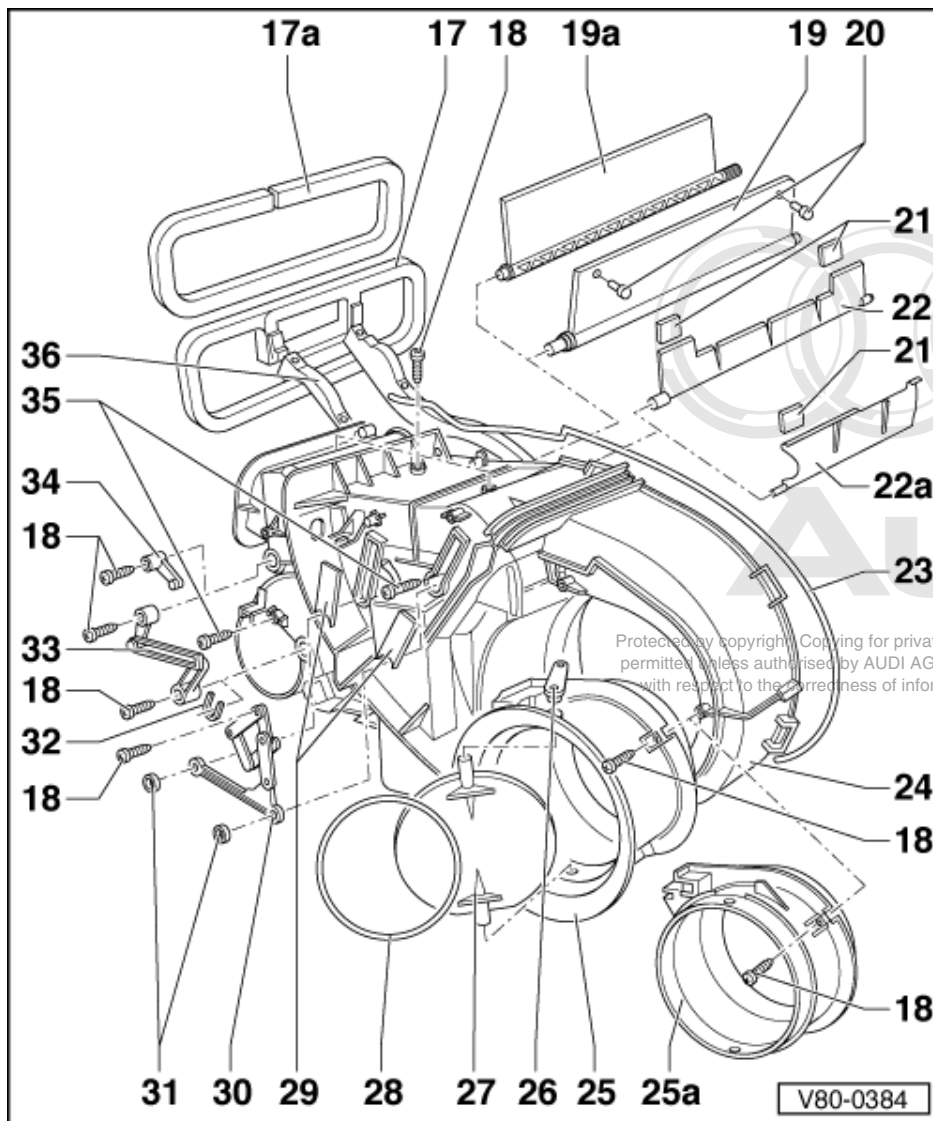
23 Sealing cord

- ♦ Insert all round into left half of housing

24 Right half of housing

25 Intake duct

- ♦ Vehicles without air conditioner
- ♦ Removing and installing dust and pollen filter.
 - Vehicles ä 05.94 => Page 87
 - Vehicles 06.94 ä (phased-in) => Page 87



25a- Intake duct

- ♦ Vehicles with air conditioner
- ♦ Removing and installing dust and pollen filter => Page 88 .

26 Lever

- ♦ Vehicles without air conditioner

27 Fresh air shut-off flap

- ♦ Vehicles without air conditioner

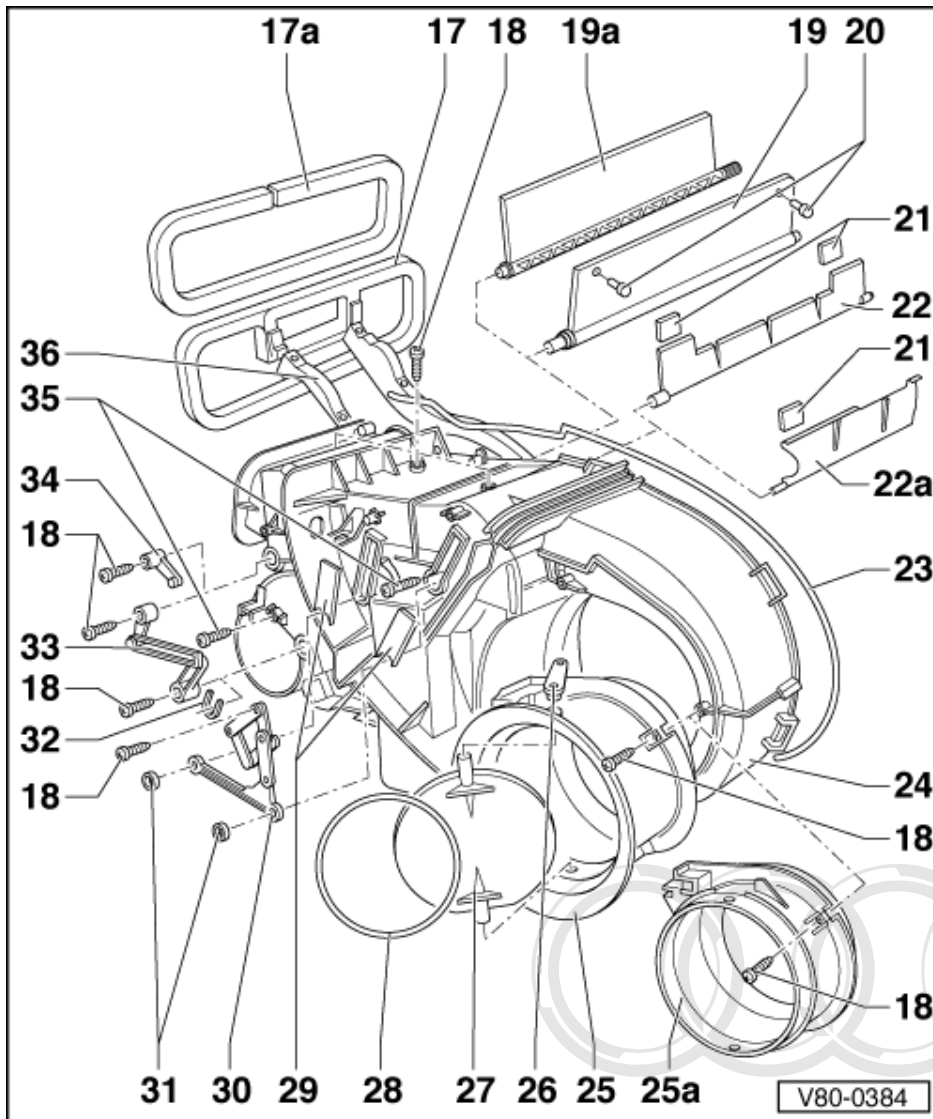
28 Oil seal

- ♦ Vehicles without air conditioner
- ♦ Insert all round into groove of fresh air shut-off flap

29 Bearings

30 Lever for temperature flap

- ♦ Assembling => Fig.5



31 Clamping washers

32 Circlip

- ♦ For vehicles with fully automatic air conditioner

33 Lever for footwell/defroster and dash panel vent control flaps

- ♦ Not for vehicles with fully automatic air conditioner

34 Lever for dash panel vent control flap

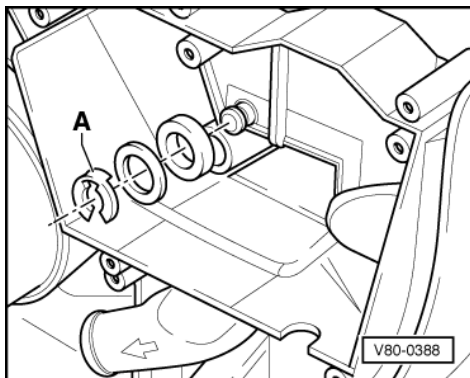
- ♦ For vehicles with fully automatic air conditioner
- ♦ Colour: blue

35 Screw

36 Cold air duct

- ♦ Vehicles without air conditioner

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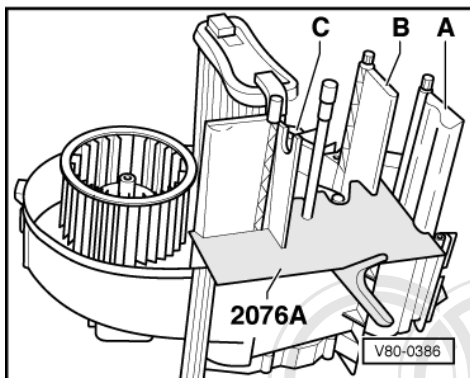


-> Fig.1 Attaching turbulence flap

- Secure washer and felt ring on turbulence flap with circlip -A-.

Note:

Install circlip correct way round.



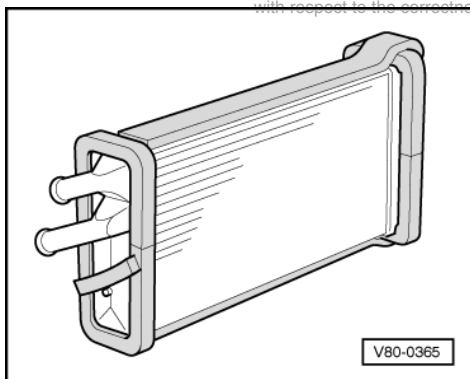
-> Fig.2 Aligning flaps in left half of housing

Note:

Flaps -A-, -B- and -C- in heater differ according to vehicle equipment.

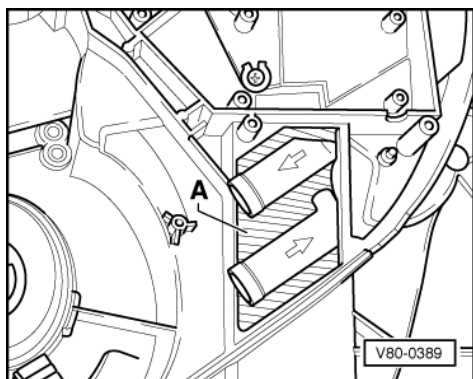
Vehicles with fully automatic air conditioner:

- Install flap -B- rotated through 180°.



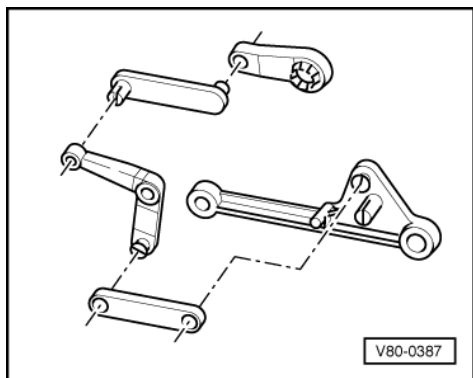
-> Fig.3 Attaching self-adhesive seal to heat exchanger

- Attach seal to heat exchanger all round and free of gaps.



-> Fig.4 Sealing heat exchanger outlet at left half of housing

- After installing, seal cut-out -A- completely with silicone adhesive sealant D 176 001 A3.



-> Fig.5 Assembling lever for temperature flap

4 - Removing and installing dust and pollen filter

4.1 - Removing and installing dust and pollen filter

Notes:

- ♦ Replacement interval for dust and pollen filter

=> Maintenance manual; Description of work; Replacing dust and pollen filter

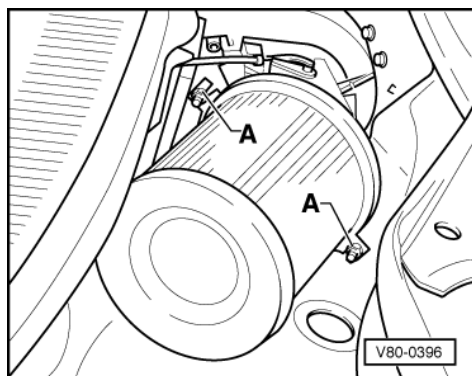
- ♦ Ensure that plenum chamber cover is undamaged and installed properly so that no water can get onto filter.
- ♦ Inspect water drain holes in plenum chamber and clean these, if necessary.



Vehicles without air conditioner ä 05.94

Note:

Fitting location of battery as on vehicles with air conditioner.



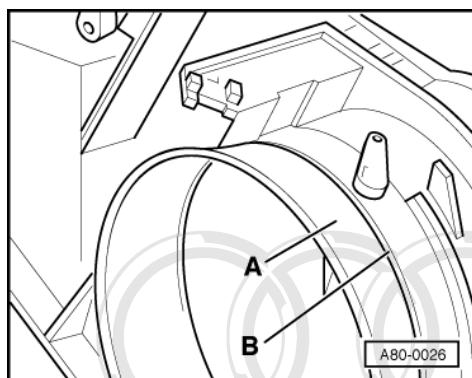
- Remove plenum chamber cover.
- -> Loosen nuts -A-.
- Turn filter cartridge and remove from mount.

Note:

Removing mount for dust and pollen filter => -item 82.

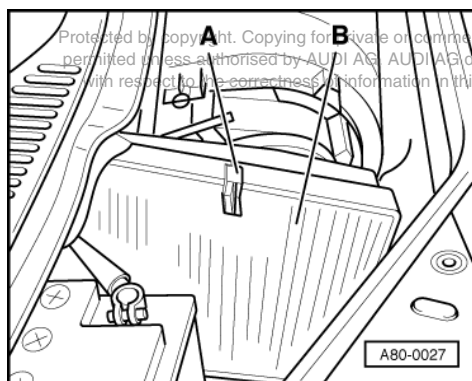
Vehicles without air conditioner 06.94 ä

- Gradual introduction



Notes:

- ♦ Dust and pollen filter can be retrofitted to vehicles with petrol engine. Retrofitting to vehicles with diesel engine is not possible because of large battery (battery would have to be replaced by a smaller version => Parts Catalogue).
- ♦ -> To retrofit dust and pollen filter, replace intake duct -B- with an intake duct without funnel -A-.
- ♦ Position of battery holder has been altered with introduction of new dust and pollen filter.

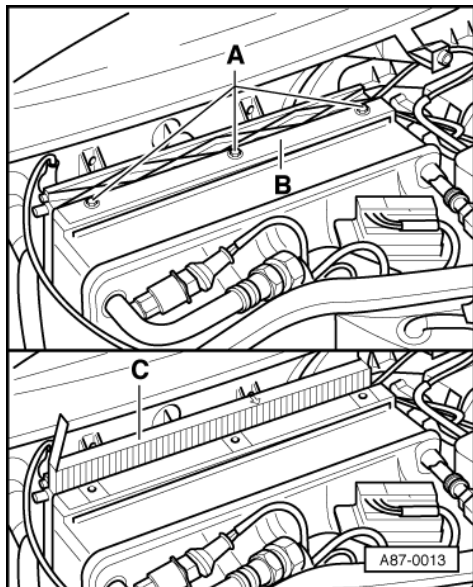


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- Remove plenum chamber cover.
- Depending on size of battery, either loosen battery retainer and push battery towards wing panel, or remove battery completely.
- -> Push clamp -A- upwards and take dust and pollen filter -B- out of filter holder.

Vehicles with air conditioner 06.94 ä

- Gradual introduction
- Not installed in all vehicles (specific countries)
- Remove plenum chamber cover.
- Remove scuttle panel trim.



- -> Loosen 3 screws -A-.
- Remove cover -B- and pull dust and pollen filter -C- out of evaporator.
- Before installing dust and pollen filter, check evaporator for dirt and clean if necessary.
- Insert dust and pollen filter (check that filter is correct way round).
 - Arrow points towards evaporator

Note:

Removing and installing evaporator =>Page 248 .

5 - Servicing electrical additional heater - Vehicles with TDI engine 06.94 ä

5.1 - Servicing electrical additional heater - Vehicles with TDI engine 06.94 ä

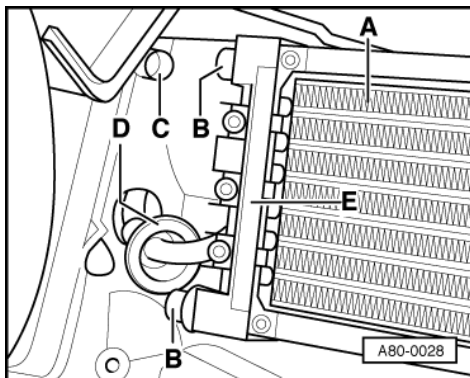
- Gradual introduction

5.2 - Removing and installing heater element for additional heater -Z35

Removal

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- Remove heater => Page 72 .
- Disassemble heater => Page 77 .



- -> Remove heater element -A-.

Installing

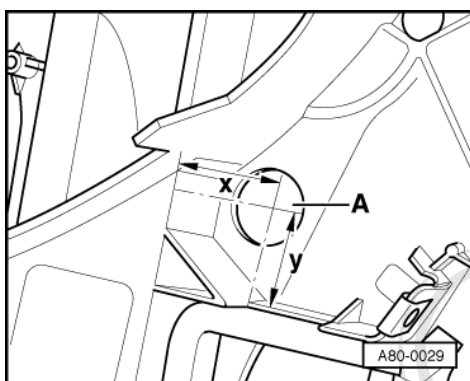
- Insert heater element -A- only with rubber bushes -B- into mounts -C-.

Note:

2 rubber elements -E- must be fitted to heater element -A- as spacers to heat exchanger.

- Inspect rubber grommet -D- to ensure it is correctly installed in heater housing.

Housing halves have been modified with introduction of electrical additional heater. They can, however, be installed in all vehicles manufactured prior to this date.



- -> If right housing half is replaced, produce a hole -A- as a leadthrough for wiring harness. Centre point of hole is already pre-stamped on housing half:
 - Dimension x = 17.5 mm
 - Dimension y = 27.5 mm
- Drill hole vertically and remove any burrs.

5.3 - Checking function of electrical additional heater

- Testing actuation of heating elements:

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=> "Current flow diagrams, Electrical fault finding and fitting locations" binder; Model Year 1995 ä

Electrical additional heater is activated by control unit for diesel direct injection system -J248 when following conditions occur at the same time:

- ◆ Load on alternator is less than 60%.
- ◆ Ambient or intake manifold air temperature measured (at start of engine) less than 5 °C
- ◆ Engine speed greater than 800 rpm
- ◆ Coolant temperature less than 70 °C



- ♦ Other activation conditions:

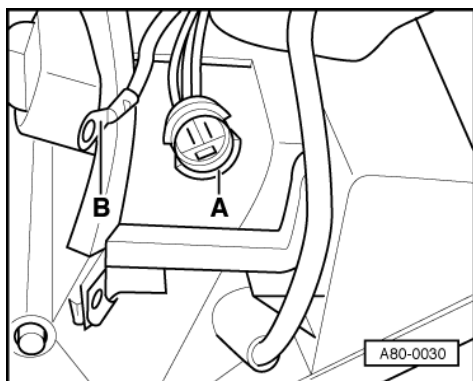
=> Diesel direct injection and glow plug system; Repair group 01; Self-diagnosis; Reading measured value block Self-diagnosis Reading measured value block

Test sequence

- Remove driver's storage compartment:

=> General body repairs; Repair group 70; Dash panel; Removing and installing storage compartment and glove compartment Dash panel Removing and installing storage compartment and glove compartment

- Remove footwell vents => -item **66** .



- -> Unplug connector -A- to heater element and measure resistance to earth of each individual connection - B-.
- Specification (depending on temperature): 0.2 ... 5 ω

Notes:

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- ♦ Heater element of additional heater consist of 3 resistance heater elements with a positive temperature coefficient (PTC resistors, current consumption reduces as they heat up).
- ♦ 3 resistance heater elements are individually wired to connector -A-.
- ♦ Current consumption of each heater element must not exceed 22A when heater is switched on.

82 - Auxiliary heating

1 - Servicing auxiliary heater

1.1 - Servicing auxiliary heater

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1.2 - Safety precautions when working on auxiliary heater

- ◆ Auxiliary heater must not be on or be switched on (also not using preselected switch-on time) in areas in which there is no exhaust gas extraction system.
- ◆ Always observe the relevant safety precautions when working on the fuel system.
- ◆ Do not start engine of vehicle when metering pump is removed or fuel lines are disconnected.
- ◆ Carry out following measure before commencing work on auxiliary heater:
 - Interrupt power and fuel supply by removing auxiliary heater fuse -S62 at additional relay and fuse carrier => -item 95.
 - Release pressure in coolant circuit by opening cap at coolant expansion reservoir.
- ◆ After completing work on auxiliary heater, check that it operates properly

=> Binder "Fault finding heater, air conditioner"

1.3 - Notes on general repairs to vehicles with auxiliary heaters

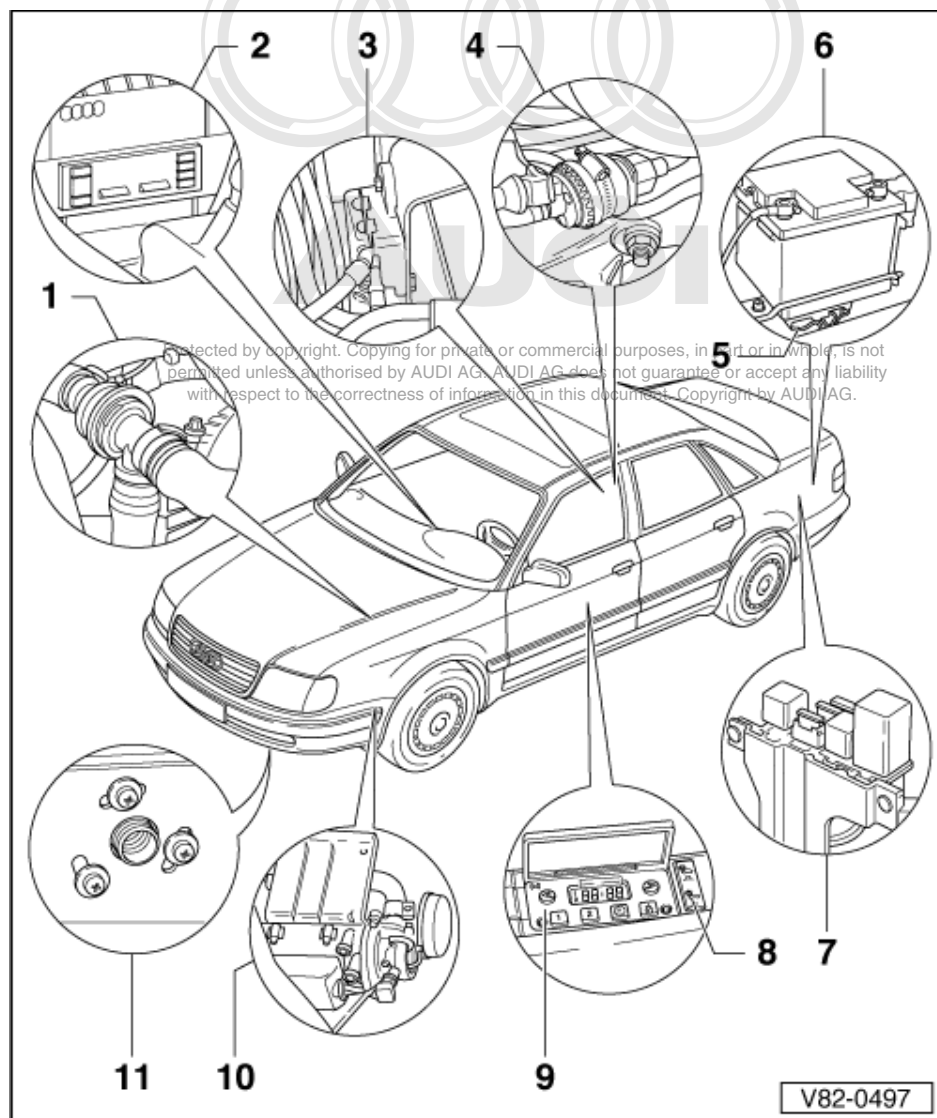
- First disconnect negative and then positive terminal at battery (first and second batteries) before commencing any electric welding work on vehicle.
- Insulate disconnected positive terminal of second battery (risk of short circuit).
- If replacing fuel tank or fuel gauge sender, ensure that all components for extracting fuel are properly installed.
- Carry out the following checks in area of fuel lines after completing work on auxiliary heater:
 - Fuel lines should be flush with floor of vehicle, and routed so as to protect them from mechanical damage.
 - Fuel lines to auxiliary heater must be protected from heat generation that could impair operation.
 - Fuel lines must not touch hot vehicle components.

1.4 - Rules for cleanliness

When working on auxiliary heater and on fuel system, pay careful attention to the following 6 cleanliness rules:

- ◆ Thoroughly clean all connections and the surrounding areas before disconnecting.
- ◆ Place removed parts on a clean surface and cover. Use lint-free cloths.
- ◆ Carefully cover or seal open components if repairs cannot be carried out immediately.
- ◆ Only install clean components:
 - Only remove replacement parts from packaging immediately prior to installation.
 - Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- ◆ When the fuel system is open:
 - Do not work with compressed air if this can be avoided.
 - Do not move vehicle unless absolutely necessary.
 - Do not start the engine.
- ◆ Separated electrical connectors:
 - Protect from dirt and moisture.
 - Make sure connectors are dry when attaching.

1.5 - Auxiliary heater components



Notes:

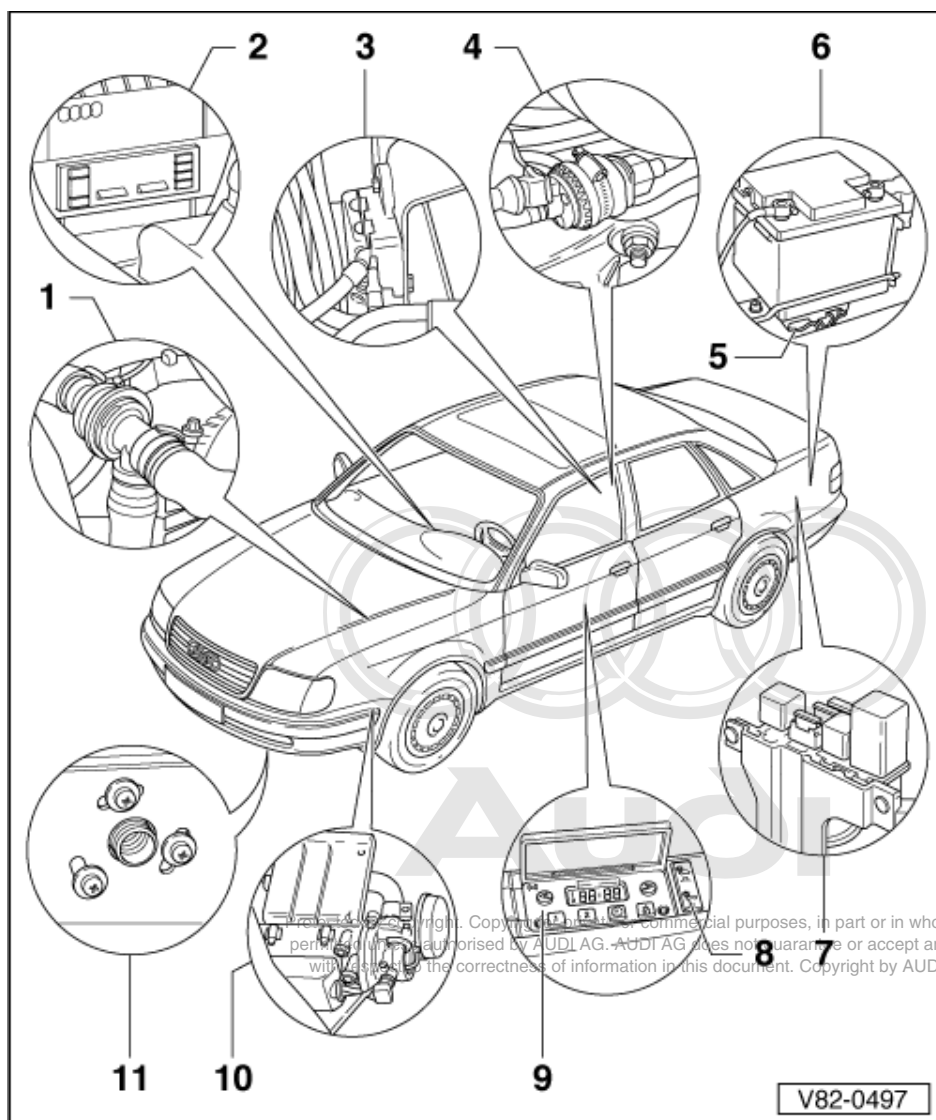
- ◆ Check function.

=> Binder "Fault finding heater, air conditioner"

- ◆ Illustration shows a vehicle with 6-cylinder engine and air conditioner. Installation point and view of individual components may differ on vehicles with different equipment.

1 Coolant non-return valve

- ◆ Controls flow direction of coolant when auxiliary heater operating => Page 103



2 Operating and display unit -E87

- ♦ For vehicles with fully automatic air conditioner
- ♦ Regulates fresh air blower speed and air distribution
- ♦ Is switched on by auxiliary heater control unit -J162:

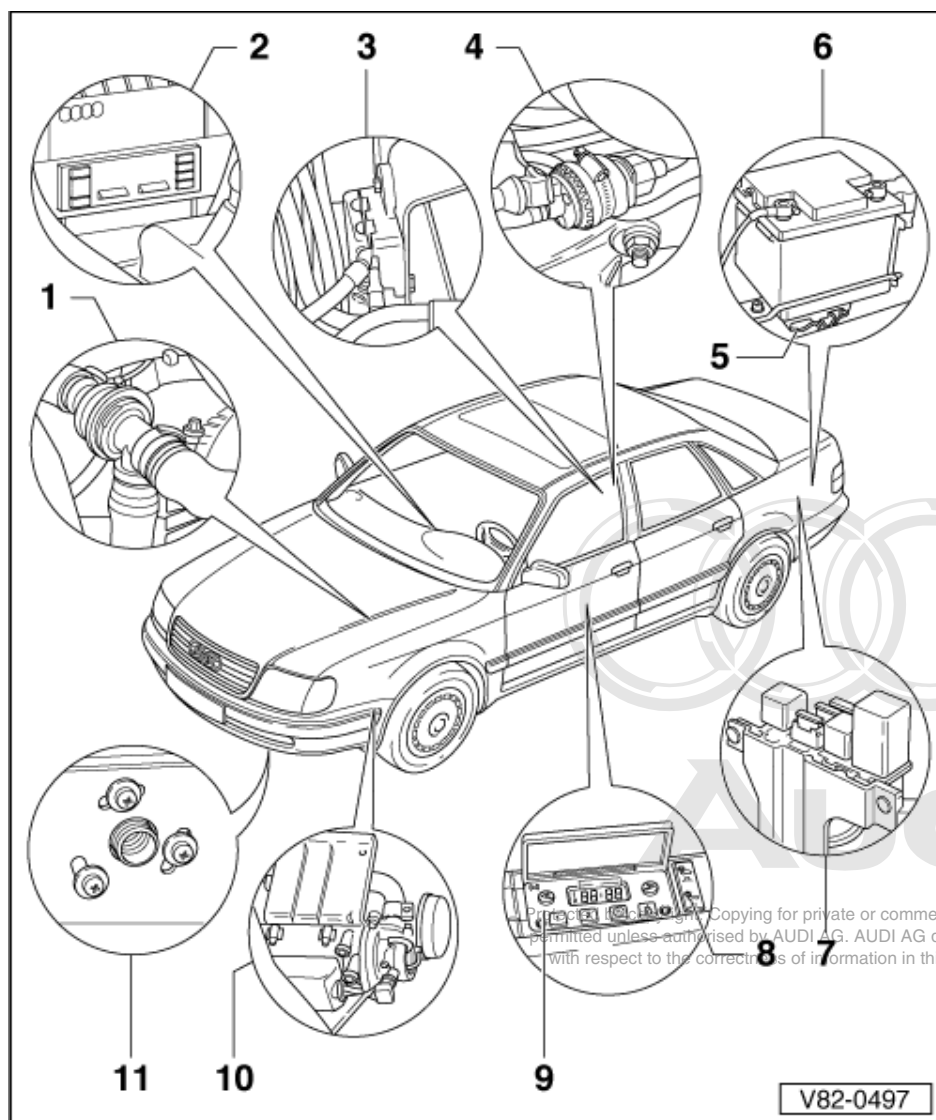
=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- ♦ Fresh air blower for vehicles without or with manually regulated air conditioner actuated through fresh air blower switch -E9:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

3 Second battery fuse -S65

- ♦ Fitting location for vehicles without air conditioner or without dust and pollen filter: in left of plenum chamber



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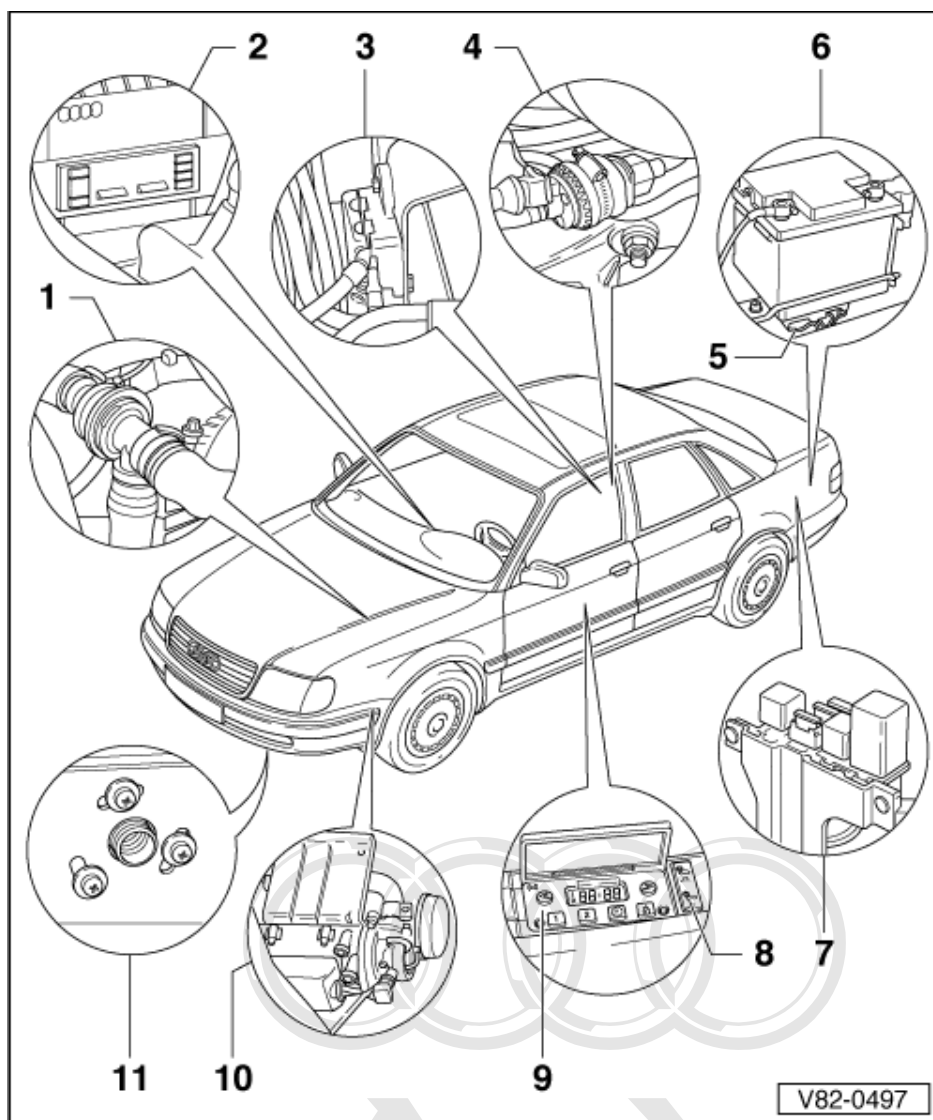
V82-0497

4 Metering pump -V54

- ♦ Removing and installing on front-wheel drive vehicles => Page 104
- ♦ Removing and installing on four-wheel drive vehicles => Page 104
- ♦ Fuel supply for auxiliary heater:
Vehicles with petrol engine => Page 106
- ♦ Check fuel delivery => Page 106

5 Auxiliary heater control unit -J162

- ♦ Removing and installing => Page 100



6 Second battery -A1

- ◆ Route battery vent hose free of kinks
- ◆ Insulate disconnected positive terminal (risk of short circuit)
- ◆ If battery voltage drops below 10 V when auxiliary heater operating, heater is switched off by control unit
- ◆ Testing:

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=> Binder "Fault finding heater, air conditioner"

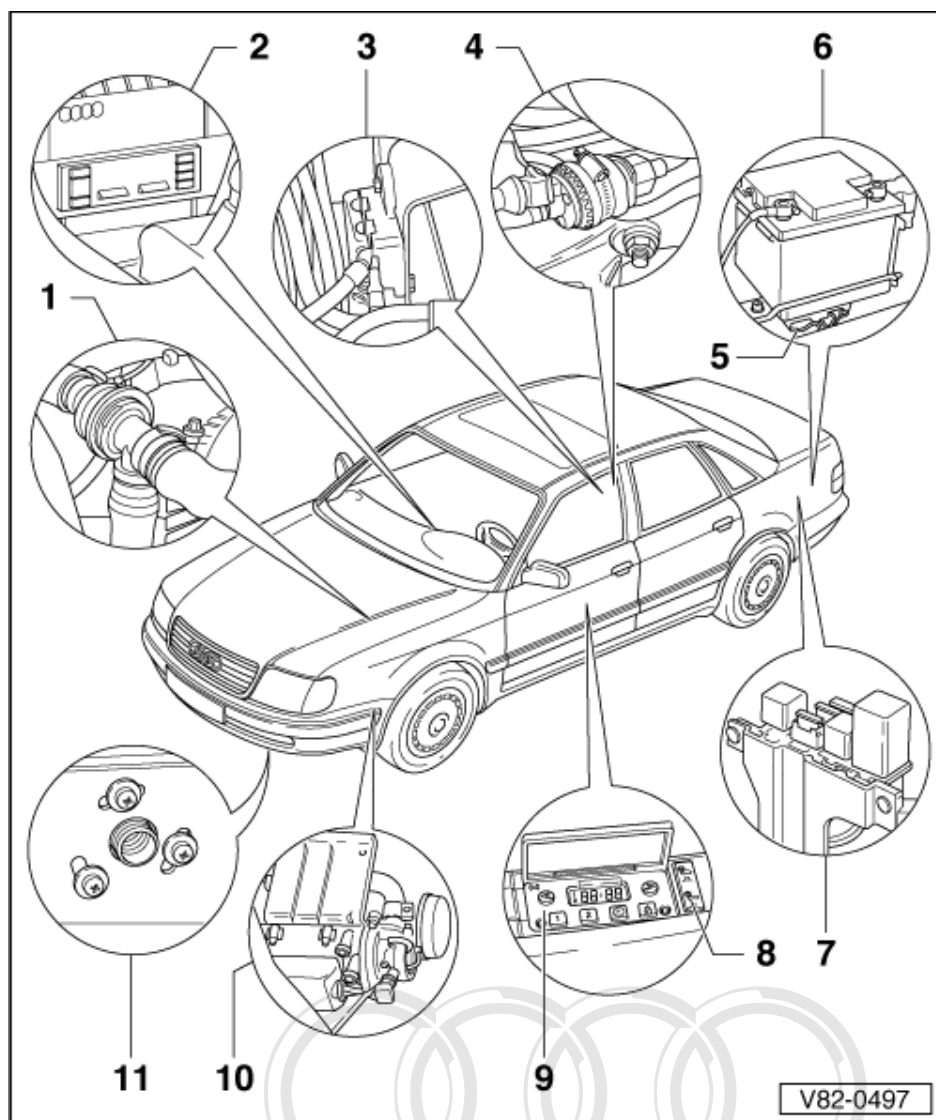
7 Auxiliary relay and fuse carrier

- ◆ Relay position and fuse assignment:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

8 Heater/heater output switch -E16

- ◆ Function => Page 98

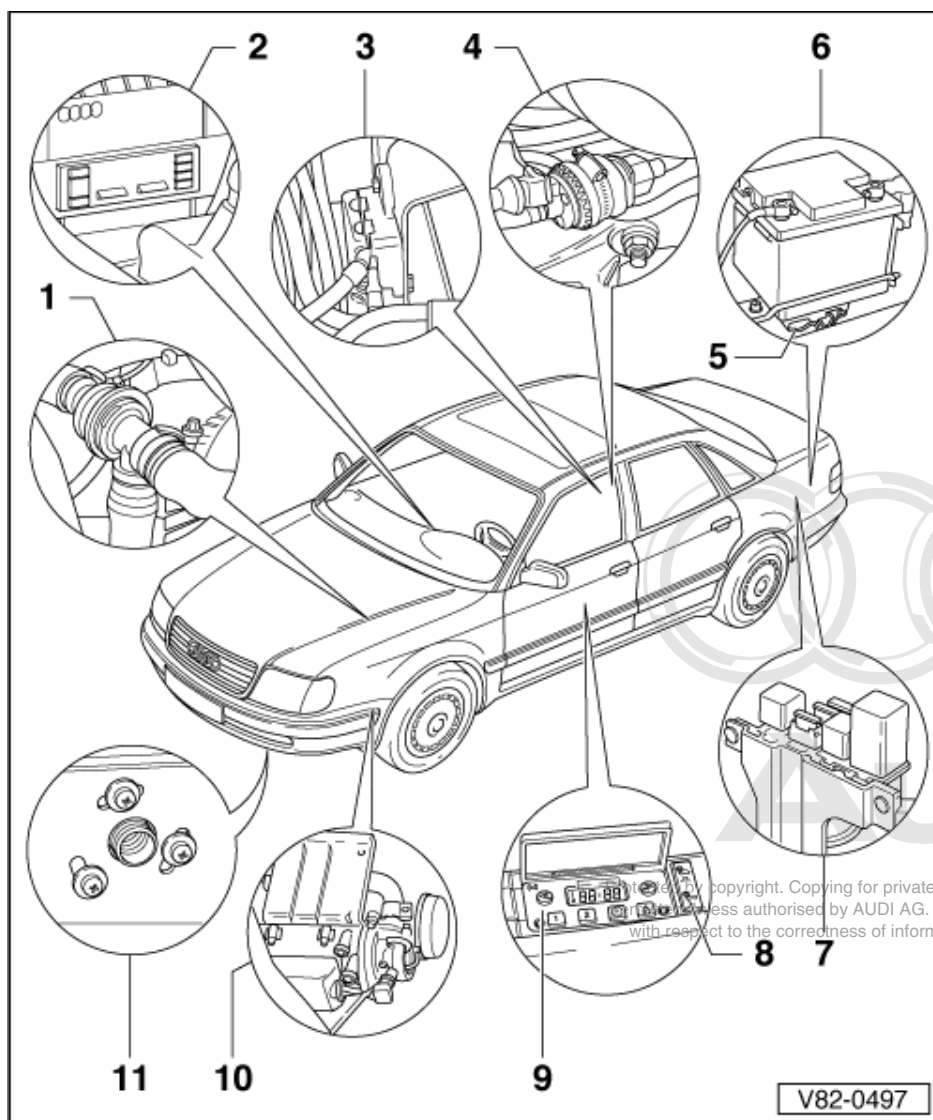
**9 Preselector/timer -E111**

- ◆ Function => Page 98
- ◆ Removing and installing => Page 98
- ◆ Testing:

=> Binder "Fault finding heater, air conditioner"

10 Auxiliary heater with attached parts

- ◆ Fitting location (not Audi S4): at front left
- ◆ Removing and installing (not Audi S4) => Page 100
- ◆ Fitting location Audi S4: at front right
- ◆ Removing and installing Audi S4 => Page 102
- ◆ Incorporating auxiliary heater into coolant circuit => Page 103
- ◆ Bleeding coolant circuit => Page 103

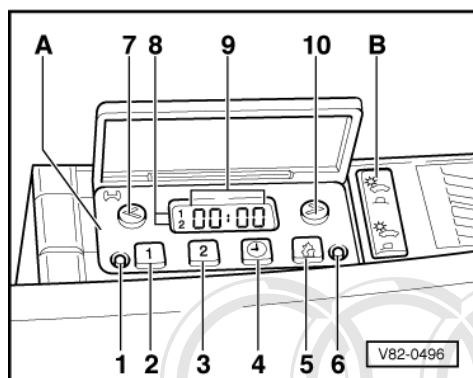


- ♦ Detaching and attaching exhaust system and bracket:
not Audi S4 => Page **116**
- ♦ Removing and installing components =>Page **122**
- ♦ Dismantling and assembling auxiliary heater =>Page **133**
- ♦ Removing and installing individual plug contacts from 12-pin connector housing => Fig. **127**
- ♦ Connection diagram for 12-pin connector housing => Fig. **127**

11 Exhaust end piece

- ♦ An insulating sheet has to be stuck on as heat insulator to contact surface for noise insulation

Display panel and operating buttons of preselector/timer -E111 and heater/heater output switch -E16



-> A - Operation of preselector/timer

- 1 - "Yellow" indicator light for preselected switch-on time (standby display)
- 2, 3- Buttons for displaying, setting and activating on time 1 and 2 (auxiliary heater or fresh air operation)
- 4 - Button for displaying clock (time of day)
- 5 - Button for switching on and off (instant heat)
- 6 - "Green" indicator light for auxiliary heater switched on (operating display)
Does not come on if switch -B- pressed
- 7 - Button for moving clock "back"
- 8 - Digits for preselected switch-on time
- 9 - Display panel for time of day and preselected time
- 10 - Button for moving clock "forward"

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B - Operation of heater/heater output switch

Switch pressed (heater)	Auxiliary ventilation mode, auxiliary heater does not start, fresh air blower runs, "Green" indicator light (of preselector/timer) does not come on
Switch not pressed (heater output)	Auxiliary heater mode, auxiliary heater operates

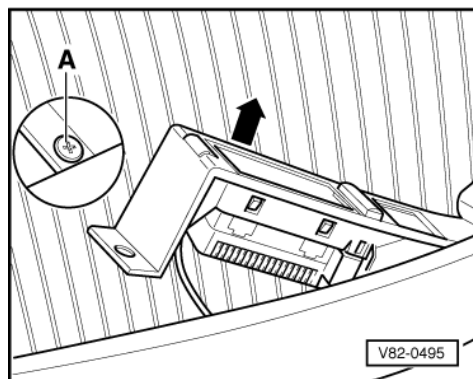
Removing and installing preselector/timer -E111

- Auxiliary heater off

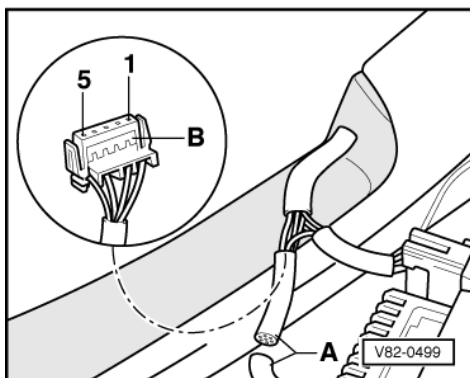
Note:

A bulb is installed on rear of preselector/timer to illuminate display panel. It can be replaced after tilting preselector/timer forward out of door trim panel (door trim does not need to be removed to replace bulb).

- Remove door trim:
- Detach all connectors to preselector/timer (behind door trim).



- -> Remove screw -A-.
- Remove bracket for preselector/timer -arrow-.



- -> Separate wiring harness -A- to preselector/timer.

Note:

Power supply has to be interrupted (risk of short circuit).

- Attach connector -B-
 - Use connector housing 893 971 635 and relevant plug contacts

Contact assignment

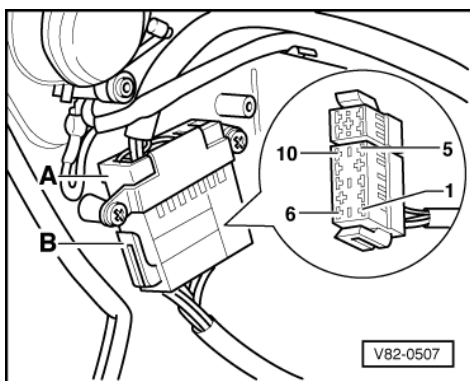
=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

Contact	Assignment
1	Positive
2	To switch -E16
3	Positive of control unit -J162 (if auxiliary heater switched on)
4	Earth
5	Lighting (terminal 58d)

Note:

If preselector/timer removed is to be re-installed, use connector housing 893 971 995 and relevant plug contacts.

- If door trim is replaced in addition, carry out following work:
 - Drill a hole $\varnothing$ 12 mm, in bottom area of door pocket => Fig., Page 99 .
 - After installing wiring harness, seal hole (e.g. with sealing cord).
 - Match up wiring harness to rear of door trim (it should be possible to install speaker housing free of stress) and secure it to prevent it rattling.



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- -> Insert plug contact into connector housing -A-.
- Check operation of preselector/timer:

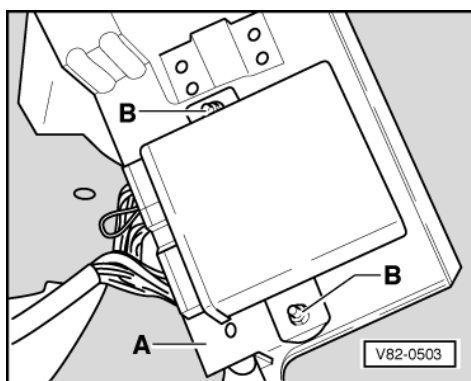
=> Binder "Fault finding heater, air conditioner"

Removing and installing auxiliary heater control unit -J162

- Ignition switched off
- Remove second battery.

Note:

Insulate positive terminal (risk of short circuit).



- -> Remove bracket for second battery -A-.
- Loosen 2 nuts -B-.

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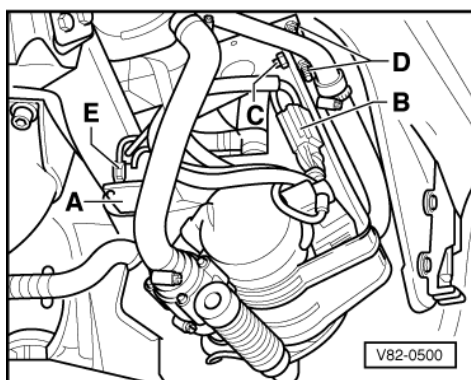


2 - Removing and installing auxiliary heater

2.1 - Removing and installing auxiliary heater

not Audi S4

- Auxiliary heater and ignition switched off



Removal

- -> Interrupt power supply to series resistor -A- of radiator fan -N39 (risk of short circuit); for example, remove fuse for this purpose:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

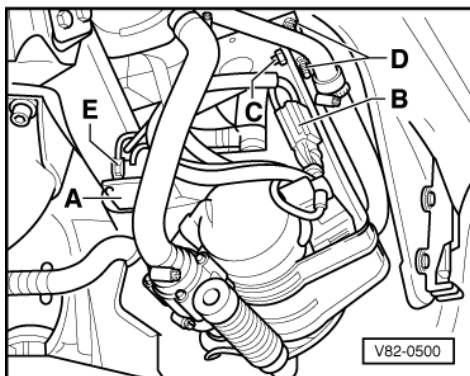
- Disconnect negative terminal of second battery.
- Release pressure in coolant circuit by opening cap at coolant expansion tank.
- Slacken 3 bolts for exhaust pipe of auxiliary heater at noise insulation.
- Remove noise insulation.

=> General body repairs; Repair group 50; Front body; Removing and installing noise insulation Front body
 Removing and installing noise insulation

- Remove front bumper:

=> General body repairs; Repair group 63; Front bumper Front bumper

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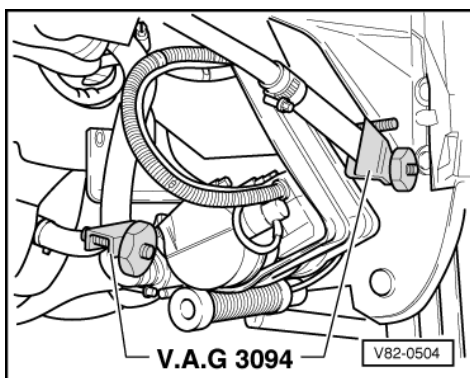


- -> Remove series resistor -A- for radiator fan from bracket of auxiliary heater.
- Detach plug connectors -B- to auxiliary heater.

Note:

Protect separated electrical connection from dirt and moisture.

- Detach fuel line to auxiliary heater and seal it.
- Loosen nut -C-.
- Loosen bolts -D- and -E- (10 Nm).



- -> Use hose clamps V.A.G 3094 to pinch off coolant supply pipe to auxiliary heater and coolant return pipe.
- Detach coolant pipes.

Installing

Install in reverse order, paying attention to the following:

- Route exhaust pipes, coolant pipes and fuel line so that they do not come into contact with any other components.
- Inspect fuel line: A plastic wire has to be inserted in order to reduce volume.
- Route and fix cable guide (flexible corrugated tube) in place with cable ties to auxiliary heater, so that it cannot come into contact with exhaust pipe.



- Bleed coolant circuit before starting up auxiliary heater => Page 103 .

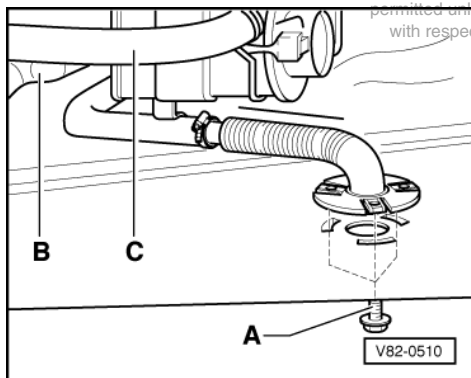
2.2 - Removing and installing auxiliary heater - Audi S4

- Auxiliary heater and ignition switched off

Removal

- Disconnect negative terminal of second battery.
- Release pressure in coolant circuit by opening cap at coolant expansion tank.
- Remove air filter housing.

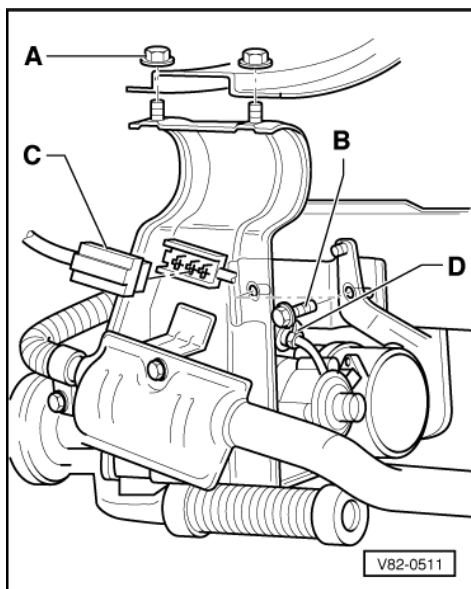
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- -> Slacken 3 bolts for exhaust pipe of auxiliary heater at noise insulation.
- Remove noise insulation.

=> General body repairs; Repair group 50; Front body; Removing and installing noise insulation Front body
Removing and installing noise insulation

- -> Use hose clamps V.A.G 3094 to pinch off coolant supply pipe -C- to auxiliary heater and coolant return pipe -B-.
- Detach coolant pipes.



- -> Detach plug connectors -C- and -D- to auxiliary heater.

Note:

Protect separated electrical connection from dirt and moisture.

- Detach fuel line to auxiliary heater and seal it.
- Loosen nuts -A- and bolts -B- (10 Nm).

Installing

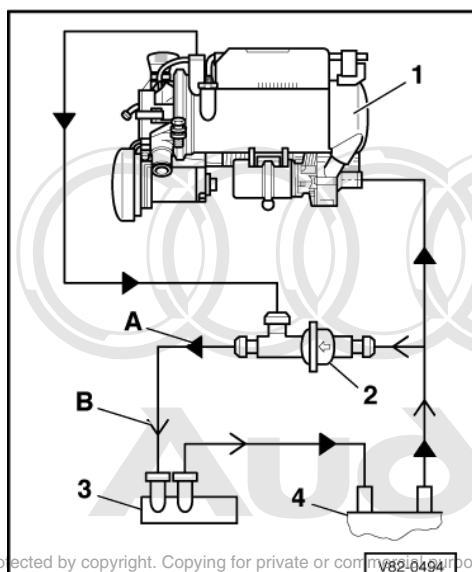
Install in reverse order, paying attention to the following:

- Route exhaust pipes, coolant pipes and fuel line so that they do not come into contact with any other components.
- Inspect fuel line: A plastic wire has to be inserted in order to reduce volume.
- Route and fix cable guide (flexible corrugated tube) in place with cable ties to auxiliary heater, so that it cannot come into contact with exhaust pipe.
- Bleed coolant circuit before starting up auxiliary heater => Page 103 .

3 - Coolant circuit

3.1 - Coolant circuit

3.2 - Incorporation of auxiliary heater into coolant circuit



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- A - Direction of flow of coolant when auxiliary heater switched on
- B - Direction of flow of coolant when engine running
- 1 - Auxiliary heater
- 2 - Coolant non-return valve
- 3 - Heat exchanger of heater
- 4 - Engine

Bleeding coolant circuit

- Pour coolant into coolant expansion tank.
- Bleed cooling system as specified:

=> Engine mechanical components; Repair group 19



- Run engine and after it has reached operating temperature, switch on auxiliary heater and let it run for 5 minutes.

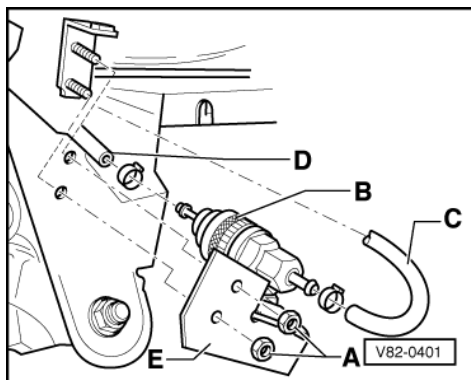
Note:

It is sufficient if recirculation pump of auxiliary heater runs.

- Top up a little coolant, if necessary.

3.3 - Removing and installing metering pump -V54

Vehicles with front-wheel drive



Removal:

- -> Detach fuel lines -C- (from fuel tank) and -D- (to auxiliary heater) at metering pump.
- Seal the two fuel lines.
- Unplug connector.
- Unscrew nuts -A-.

Installation:

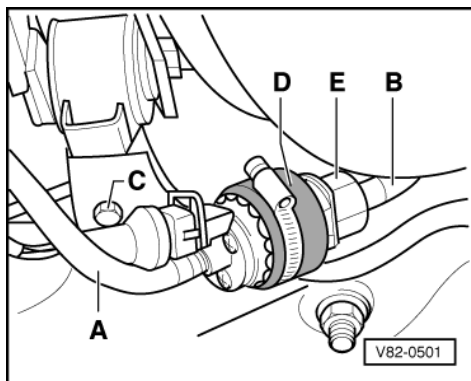
Install in reverse order, paying attention to the following:

- Always attach metering pump to bracket -E- with intermediate layer -B- to insulate noise of pump.

Vehicles with four-wheel drive

Removal:

- Take off fuel tank guard.



- -> Detach fuel lines -B- (from fuel tank) and -A- (to auxiliary heater) at metering pump.
- Seal the two fuel lines.
- Unplug connector.
- Screw out bolt -C-.

Installation:

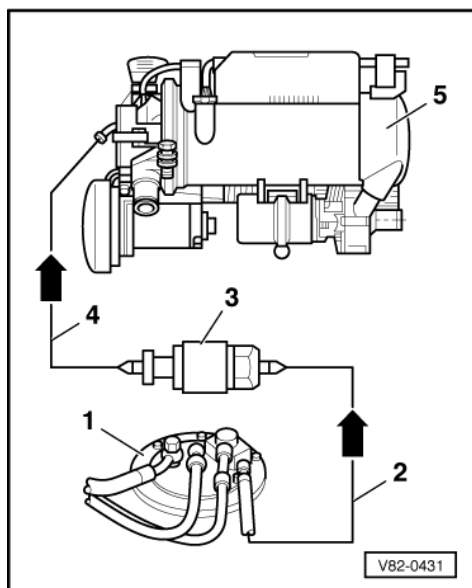
Install in reverse order, paying attention to the following:

- Always attach metering pump -E- to bracket with intermediate layer -D- to insulate noise of pump.

4 - Fuel system

4.1 - Fuel system

4.2 - Auxiliary heater fuel diversion



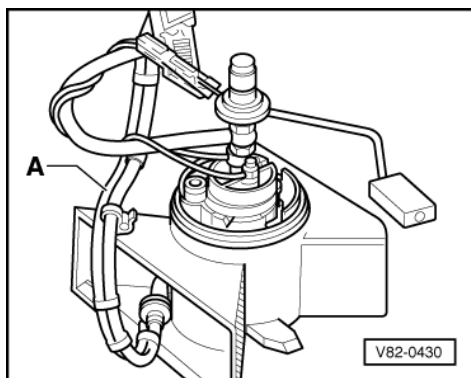
-> Vehicles with petrol engine

- 1 - Fuel gauge sender -G with additional connection for auxiliary heater
- 2 - Fuel line from fuel tank
- 3 - Metering pump
- 4 - Fuel line to auxiliary heater
- 5 - Auxiliary heater

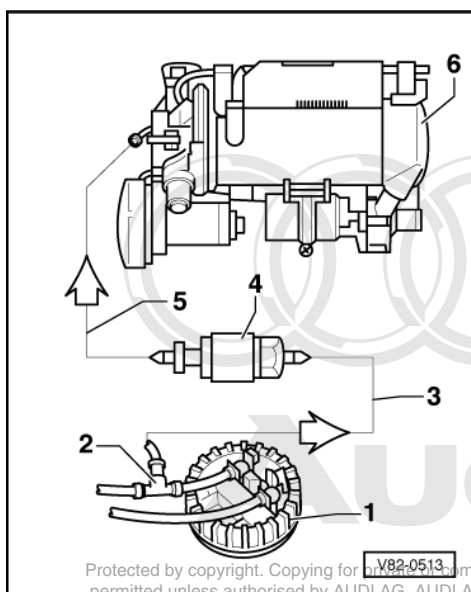
Notes:

- ♦ A plastic wire is inserted into fuel line to reduce volume

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- ♦ -> An additional supply pipe -A- is routed in fuel tank for fuel supply.



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-> Vehicles with diesel engine

- 1 - Fuel gauge sender -G
- 2 - T-connector for fuel supply of auxiliary heater
- 3 - Fuel line from fuel tank
- 4 - Metering pump
- 5 - Fuel line to auxiliary heater
- 6 - Auxiliary heater

Notes:

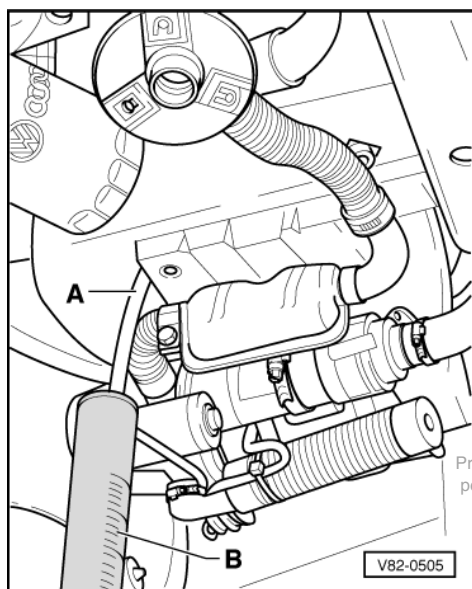
- ♦ A plastic wire is inserted into fuel line to reduce volume.
- ♦ This plastic wire is discontinued as a phase measure from model year 1996.
- ♦ If auxiliary heater does not start readily at low outside temperatures, remove plastic wire from fuel line or replace fuel line.

4.3 - Checking fuel delivery

Test requirements:

- Coolant temperature less than 50 °C (check at coolant temperature gauge in dash panel insert)
- Ambient temperature less than 20 °C

- Voltage of second battery at least 11 V



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- Sufficient fuel in tank (fuel gauge in dash panel insert must not be in red zone).
- Switch off ignition.
- Remove noise insulation.

=> General body repairs; Repair group 50; Front body; Removing and installing noise insulation Front body
Removing and installing noise insulation

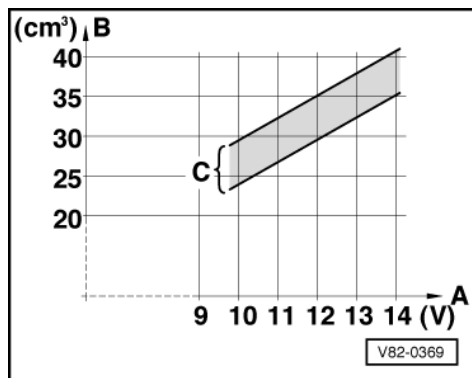
- -> Disconnect fuel line -A- at auxiliary heater.
- Hold fuel line into measuring vessel -B-.
- Switch on auxiliary heater.
- Switch off auxiliary heater as soon as fuel flows out of fuel line into measuring vessel and wait until fuel has stopped flowing.
- Empty measuring vessel and once again hold fuel line into vessel.
- Switch on auxiliary heater (Start of measurement).

Notes:

- ◆ If ambient temperature is more than 20 °C, this can result in an incorrect measurement because of fuel evaporation.
- ◆ Bubbles of vapour should not be present.
- ◆ If metering pump does not start pumping 30 seconds after switching on auxiliary heater:

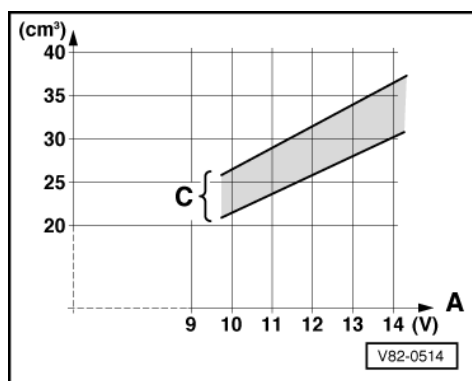
=> Binder "Fault finding heater, air conditioner"

- Measure voltage of second battery.
- Measure fuel delivery of metering pump after completion of repeat start (green indicator light in preselector/timer is no longer illuminated about 5 minutes after switching on auxiliary heater).
- Compare quantity delivered with specified quantity in diagram:



-> Vehicles with petrol engine

- A - Battery voltage
- B - Delivery in cm³(millilitres)
- C - Tolerance range for specified delivery



-> Vehicles with diesel engine

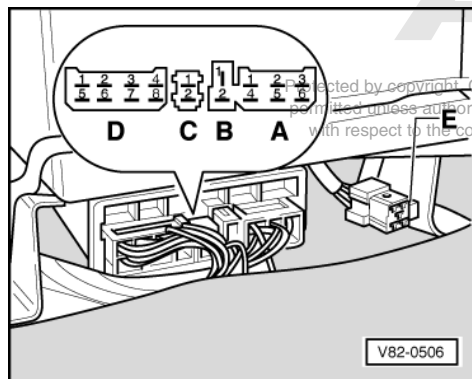
- A - Battery voltage
- B - Delivery in cm³(millilitres)
- C - Tolerance range for specified delivery

Note:

A smaller quantity of diesel fuel is adequate for operating auxiliary heater as a result of the higher heating value.

- If the fuel delivery rate is outside the tolerance range:
 - Measure delivery directly at metering pump.
 - Check that fuel line is not blocked.
 - Check wiring between auxiliary heater control unit -J162 and metering pump -V54:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder



- -> Check wiring to auxiliary heater control unit -J162:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

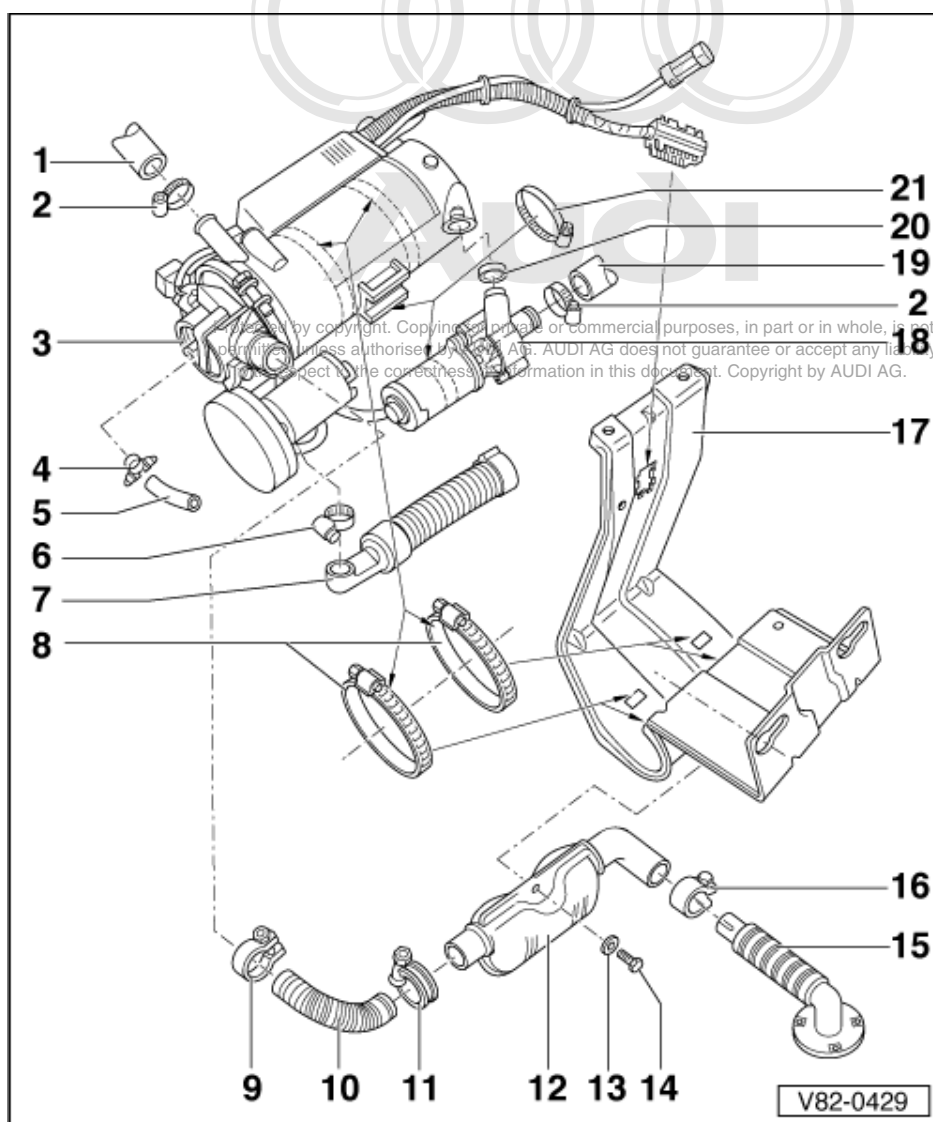
Note:

Contact 6 in connector -D- must not be assigned except on models with diesel engine.

- If auxiliary heater does not start easily at low ambient temperatures (heater does not start until after repeat start) and if quantity of fuel pumped is in lower range of diagram:
- Test CO₂-concentration in exhaust => Page 121 .
- Test fuel delivery of fuel line and wiring, as described above.
- If no fault is found, replace metering pump.
- Observe notes on Page 106 for vehicles with diesel engine.

5 - Exhaust system

5.1 - Exhaust system



5.2 - Detaching and attaching exhaust system and bracket at auxiliary heater

not Audi S4

Notes:

- Secure all hose and pipe connections with the correct clips (same as original equipment):

=> Parts Catalogue

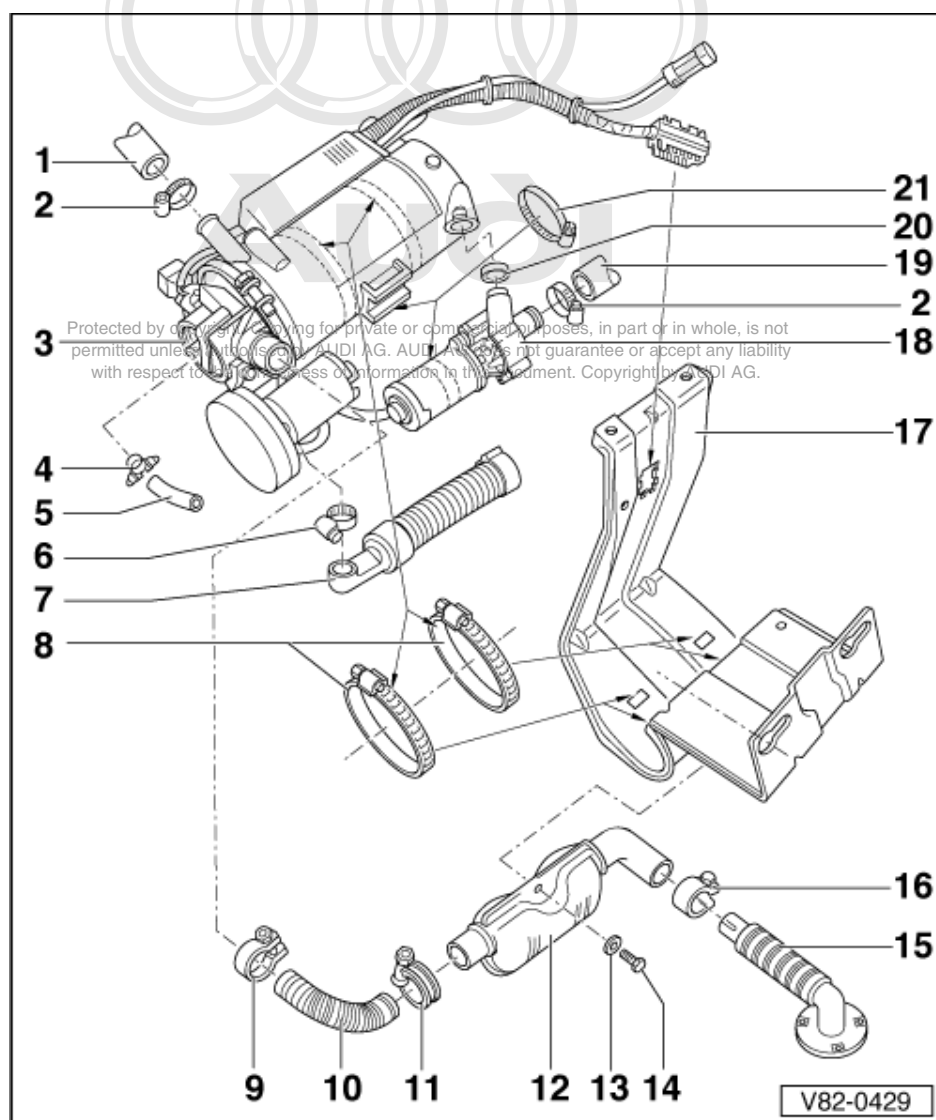
- Testing and setting CO₂-concentration in exhaust => Page 121 .

1 Coolant supply pipe

- Remains in vehicle

2 Clip

- For coolant pipe



3 Auxiliary heater

- Removing and installing components =>Page 122
- Dismantling and assembling =>Page 133

4 Clip

- For fuel line

5 Fuel line

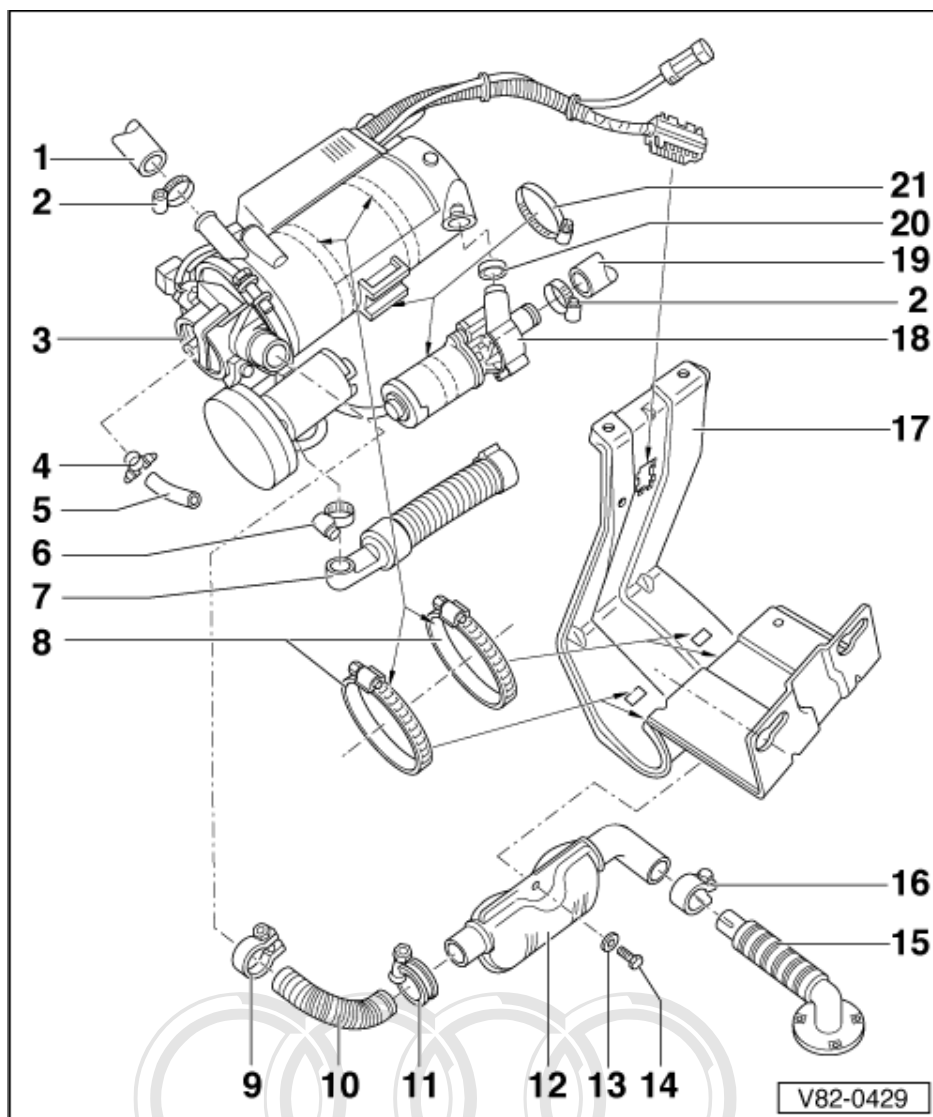
- ◆ Remains in vehicle
- ◆ A plastic wire has to be inserted in order to reduce volume

6 Clip

- ◆ For intake noise suppresser

7 Intake noise suppresser

- ◆ Attached to bracket -item 17 -
- ◆ Installation position on vehicles 06.94 ä => Fig. 1
- ◆ When servicing vehicles ä 05.94, change installation position => Fig. 1



8 Clips

- ◆ For attaching auxiliary heater
- ◆ Inspect correct position of bracket by inserting recirculation pump before tightening => Page 132

9 Clip

- ◆ For corrugated pipe

10 Corrugated pipe

11 Clip

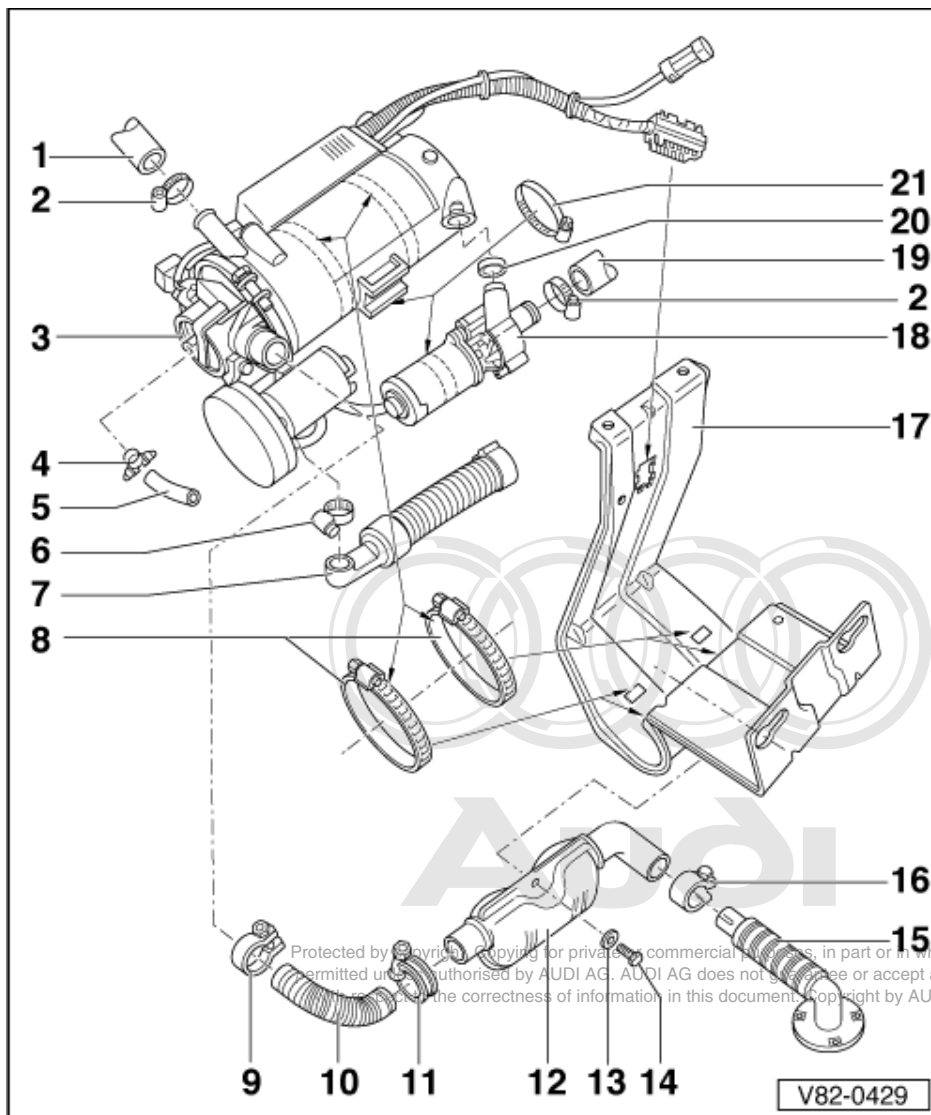
- ◆ For corrugated pipe

12 Silencer

13 Washer

14 Bolt

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15 Exhaust end piece

- ♦ Must not make contact with any other components
- ♦ Attached to noise suppresser with 3 bolts
- ♦ An insulating sheet has to be stuck on as heat insulator to contact surface for noise insulation

16 Clip

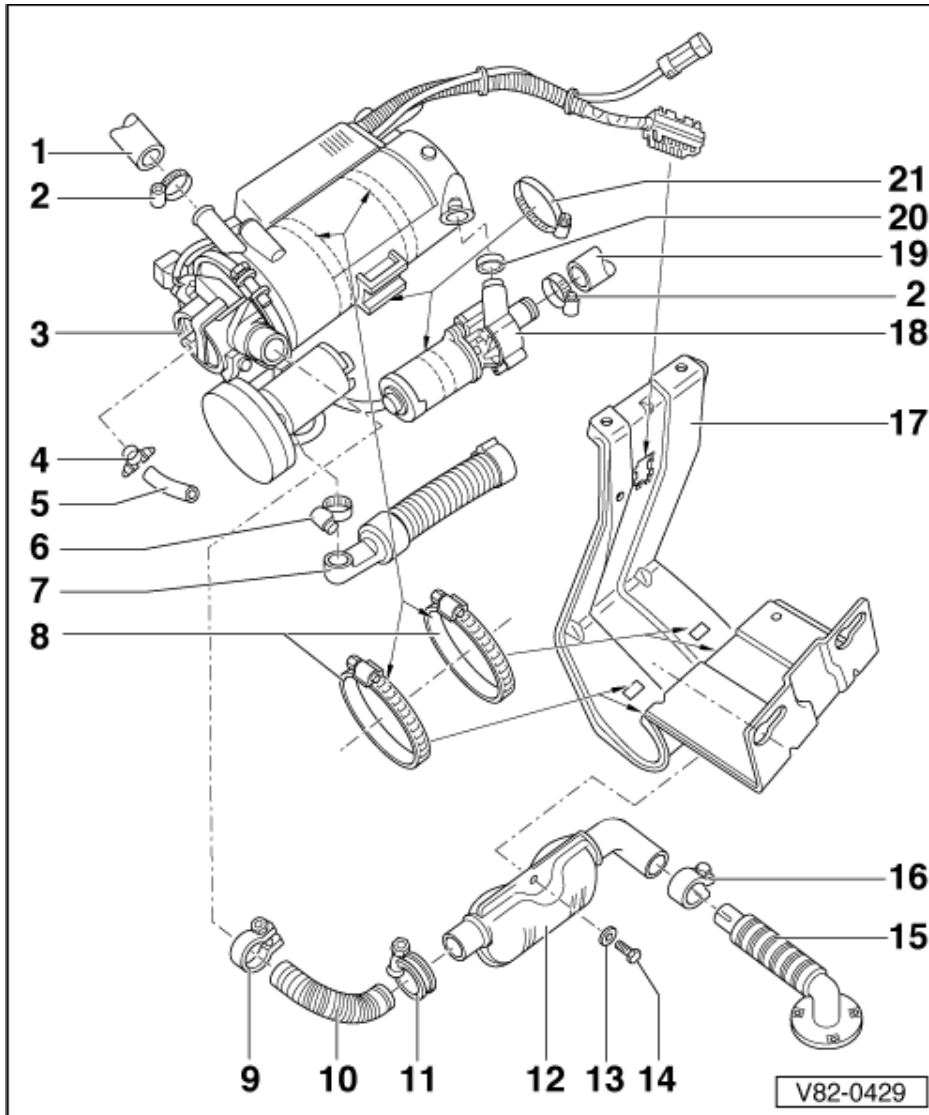
- ♦ For exhaust end piece

17 Bracket

- ♦ For auxiliary heater

18 Recirculation pump -V55

- ♦ Attach to bracket only after installing auxiliary heater => Page **132**



19 Coolant return pipe

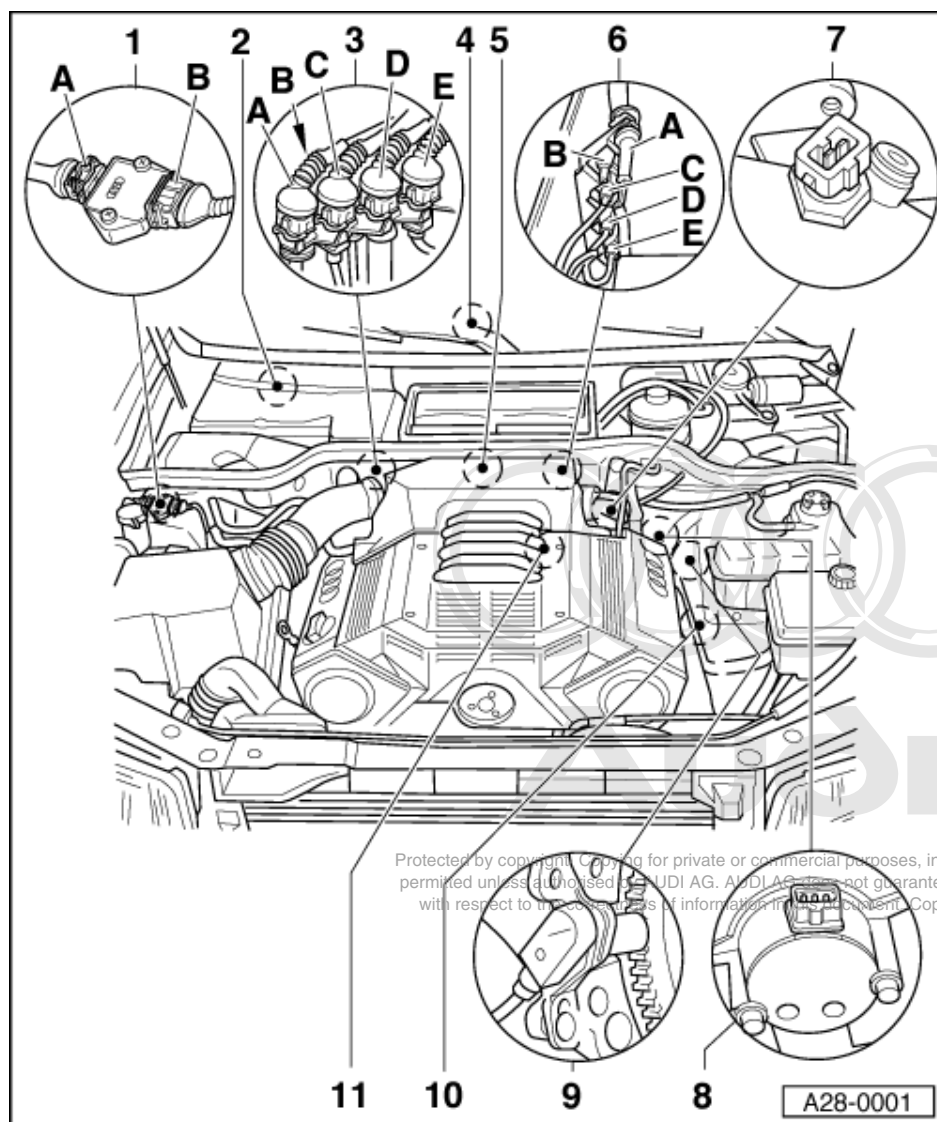
- ◆ Remains in vehicle

20 Shaped seal

- ◆ Replace
- ◆ Install correct way round => Page 132

21 Clip

- ◆ For attaching recirculation pump



-> Fig.1 Installation position of intake noise suppresser

Installation position of intake noise suppresser -A- has been modified in order to prevent splash water getting into auxiliary heater.

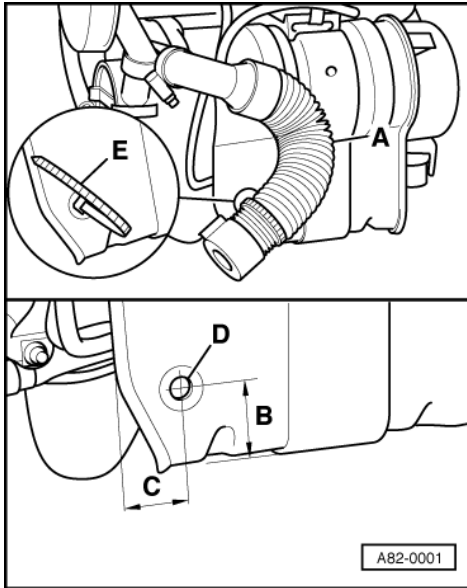
- When servicing auxiliary heater on vehicles ä 05.94, also change installation position of intake noise suppresser, as shown in illustration.
- If hole -D- is not provided on a bracket supplied as a replacement part, this hole then has to be produced.
- Remove intake noise suppresser -6-.
- Mark the dimensions on bracket:
 - Dimension B = 24 mm
 - Dimension C = 26 mm
- Drill hole -D- $\varnothing$ 6.5 mm.

Note:

Use a depth stop on drill to avoid damaging any parts of auxiliary heater when drilling hole.

- Remove burrs of hole and carry out corrosion protection measures:

=> "Surface treatment/chemical materials" binder

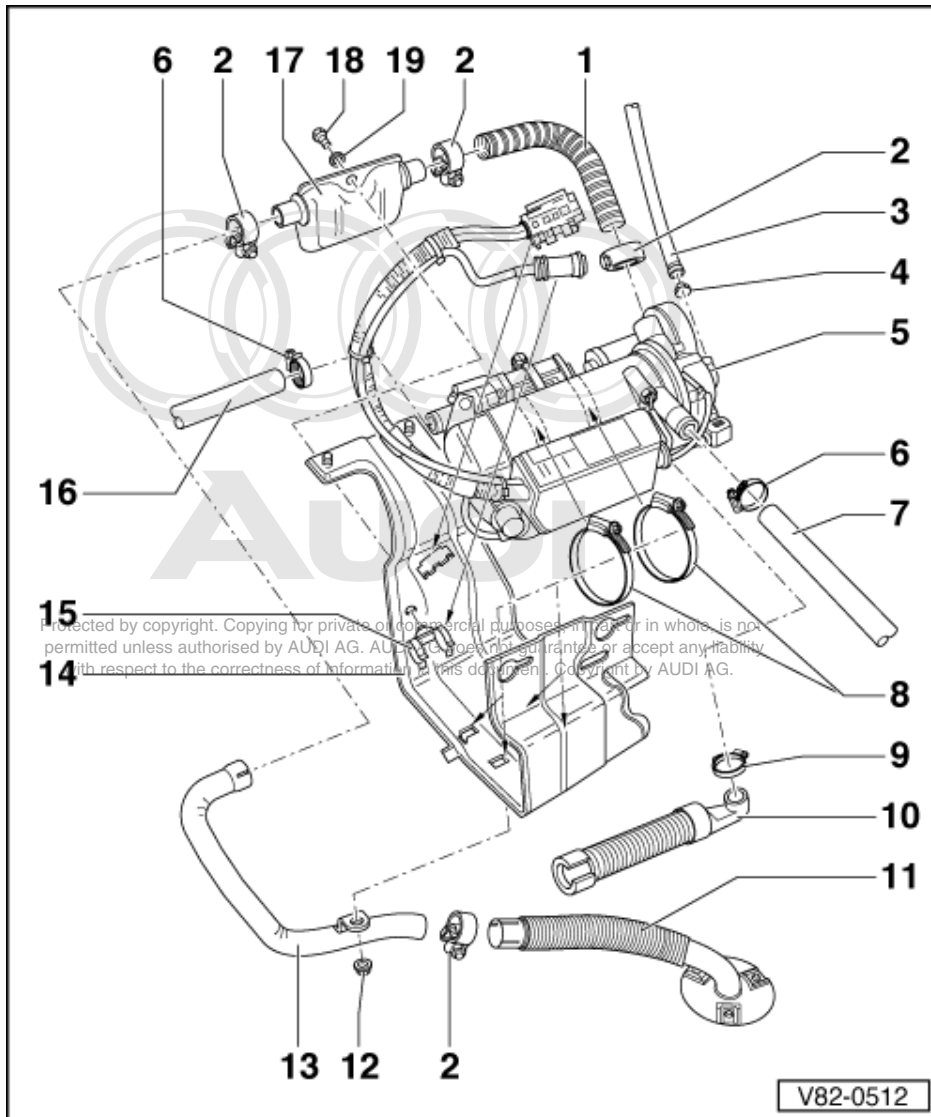


- -> Insert cable tie -E- as shown in enlarge detail.
- Install intake noise suppresser and attach it with cable tie, as shown in illustration.



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5.3 - Detaching and attaching exhaust system and bracket at auxiliary heater - Audi S4



Notes:

- ♦ Secure all hose and pipe connections with the correct clips (same as original equipment):

=> Parts Catalogue

- ♦ Testing and setting CO₂-concentration in exhaust => Page 121 .

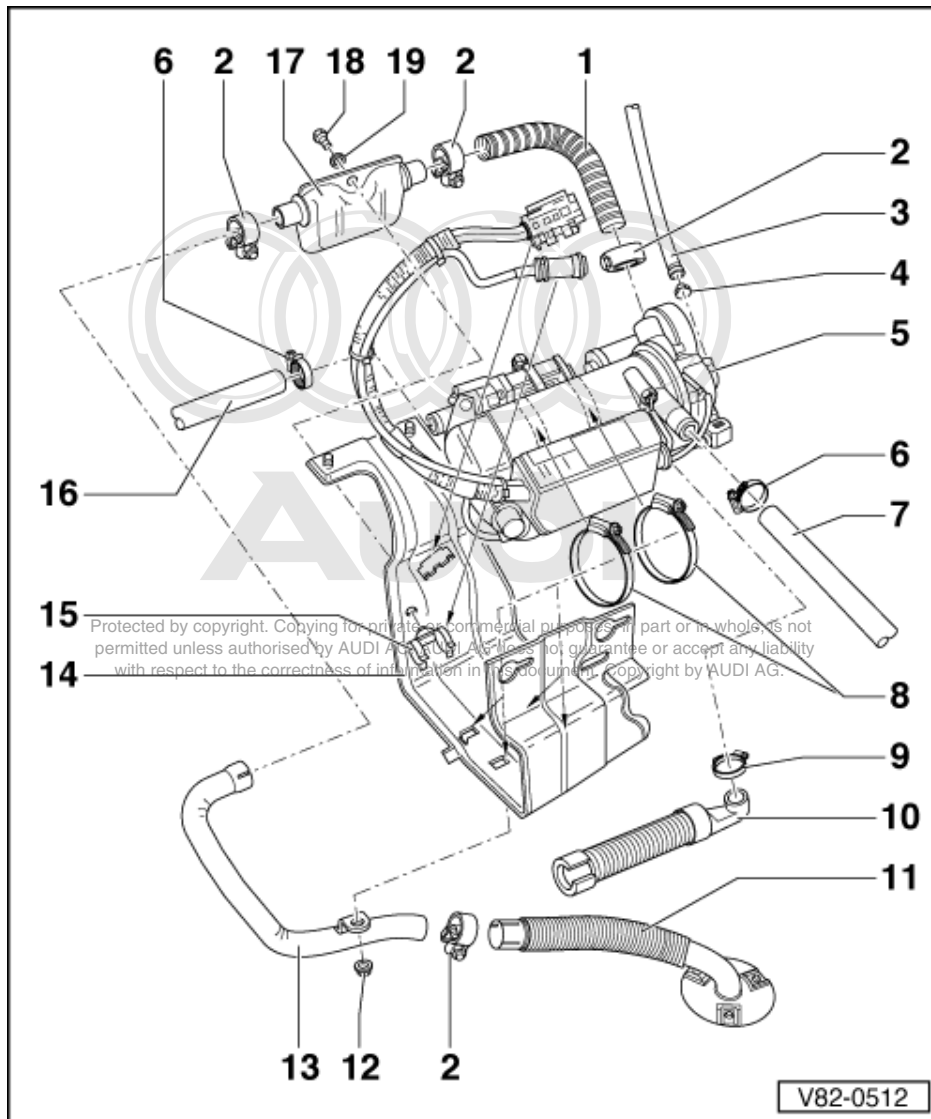
1 Corrugated pipe

2 Clip

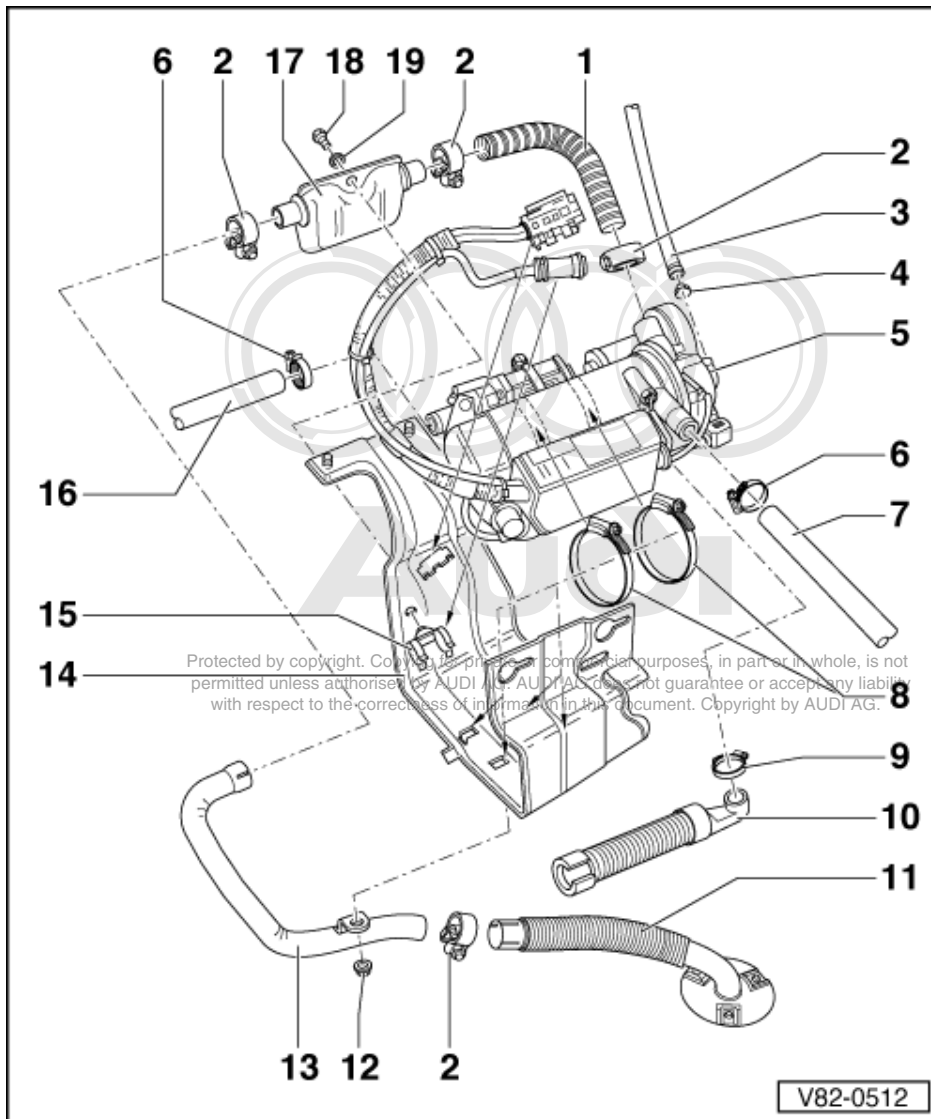
- ♦ For corrugated pipe
- ♦ For exhaust pipe
- ♦ For exhaust end piece

3 Fuel line

- ♦ Remains in vehicle
- ♦ A plastic wire has to be inserted in order to reduce volume



- 4 Clip
 - ◆ For fuel line
- 5 Auxiliary heater
 - ◆ Removing and installing components =>Page 122
 - ◆ Dismantling and assembling =>Page 133
- 6 Clip
 - ◆ For coolant pipe
- 7 Coolant supply pipe
 - ◆ Remains in vehicle
- 8 Clips
 - ◆ For attaching auxiliary heater
- 9 Clip
 - ◆ For intake noise suppresser



10 Intake noise suppresser

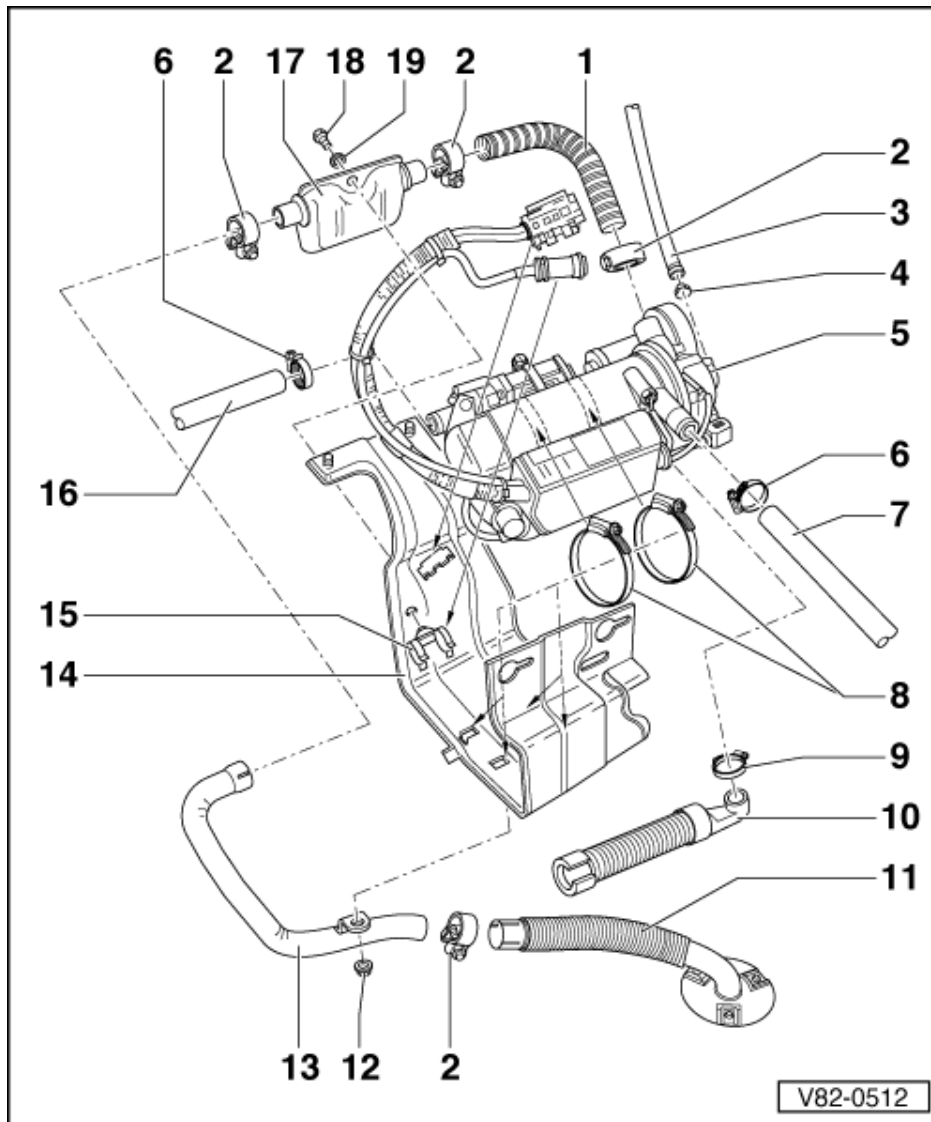
- ◆ Attached to bracket -item **14** -
- ◆ Installation position on vehicles 06.94 ä => Fig. **1**
- ◆ When servicing vehicles ä 05.94, change installation position => Fig. **1**

11 Exhaust end piece

- ◆ Must not make contact with any other components
- ◆ Attached to noise suppresser with 3 bolts
- ◆ An insulating sheet has to be stuck on as heat insulator to contact surface for noise insulation

12 Hexagon nut

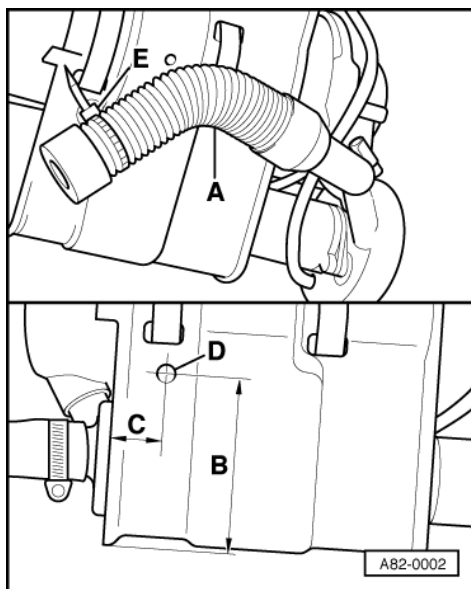
13 Exhaust pipe



- 14 Bracket**
 ♦ For auxiliary heater
- 15 Bracket**
- 16 Coolant return pipe**
 ♦ Remains in vehicle
- 17 Silencer**
- 18 Bolt**
- 19 Washer**



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-> Fig.1 Installation position on intake noise suppresser Audi S4 with 169 kW

Installation position of intake noise suppresser -A- has been modified in order to prevent splash water entering auxiliary heater.

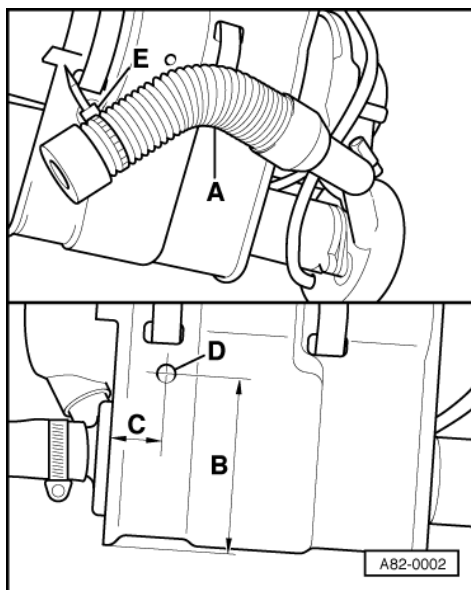
- When servicing auxiliary heater on vehicles ä 05.94, also change installation position of intake noise suppresser, as shown in illustration.
- If hole -D- is not provided on a bracket supplied as a replacement part, this hole then has to be made.
- Remove intake noise suppresser -6-.
- Mark the dimensions on bracket:
 - Dimension B = 73 mm
 - Dimension C = 20 mm
- Drill hole -D- ø 6.5 mm.

Note:

Use a depth stop on drill to avoid damaging any parts of auxiliary heater when drilling hole.

- Remove burrs of hole and carry out corrosion protection measures:

=> "Surface treatment/chemical materials" binder



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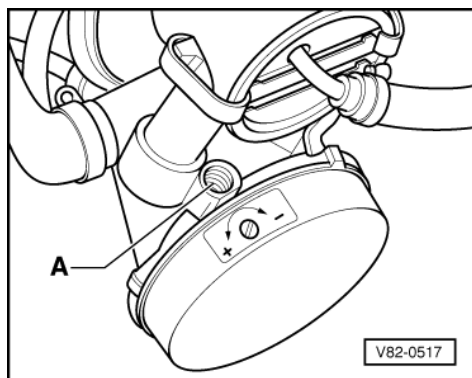
- -> Install intake noise suppresser and attach it with cable tie -E-, as shown in illustration.

5.4 - Checking and setting CO₂-content of exhaust gas

Notes:

- ♦ Test requirements => Page 106 .
- ♦ Checking fuel delivery => Page 106 .
- Switch off ignition.
- Switch on exhaust tester V.A.G 1788 and insert hose of exhaust probe into exhaust end piece.
- Switch on auxiliary heater.
- Leave auxiliary heater running for 10 minutes and then read CO₂-concentration (carbon dioxide) indicated on the tester (auxiliary heater has been operating at full load for about 5 minutes).
- Specification: 10 to 11.5% by vol. CO₂
- If CO₂-concentration is not within permissible tolerance range, remove noise insulation:

=> General body repairs; Repair group 50; Front body; Removing and installing noise insulation Front body
Removing and installing noise insulation



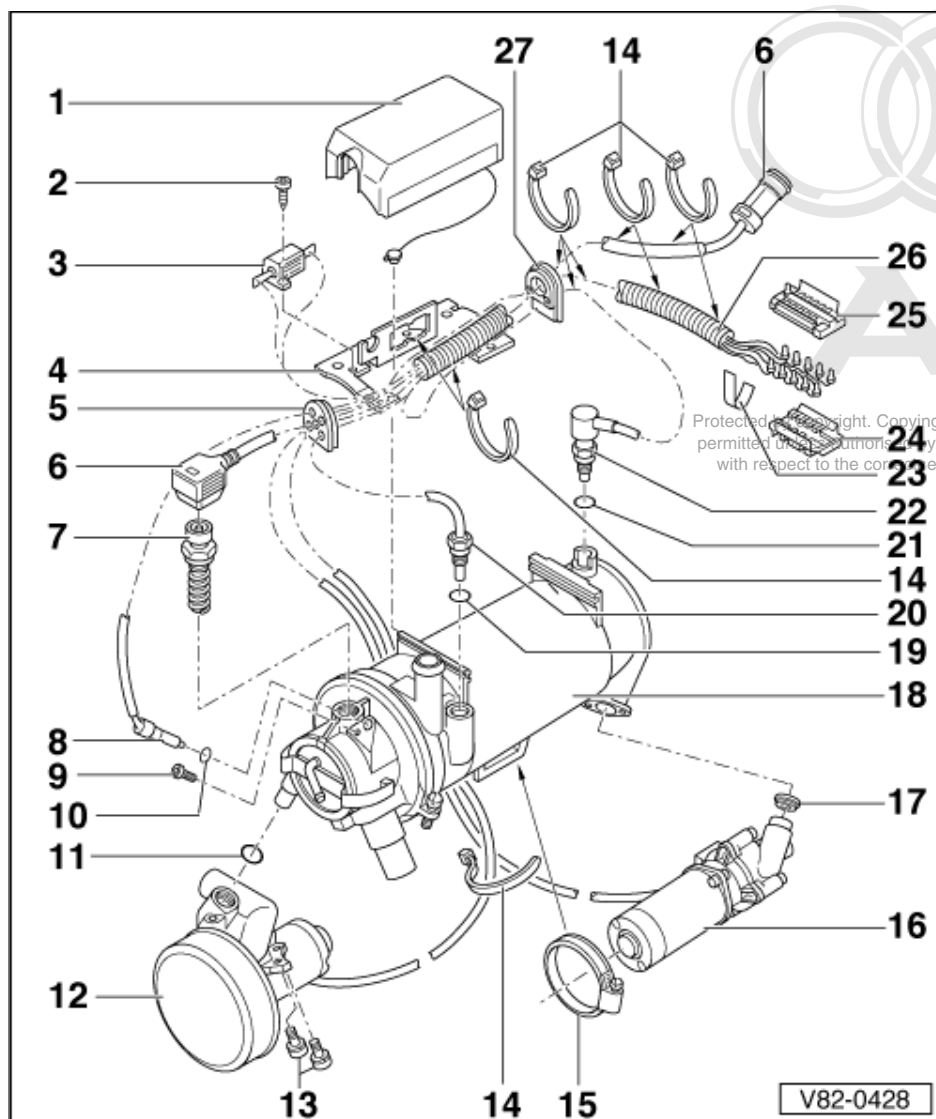
- -> Set CO₂-concentration by turning adjusting screw -A-.

Notes:

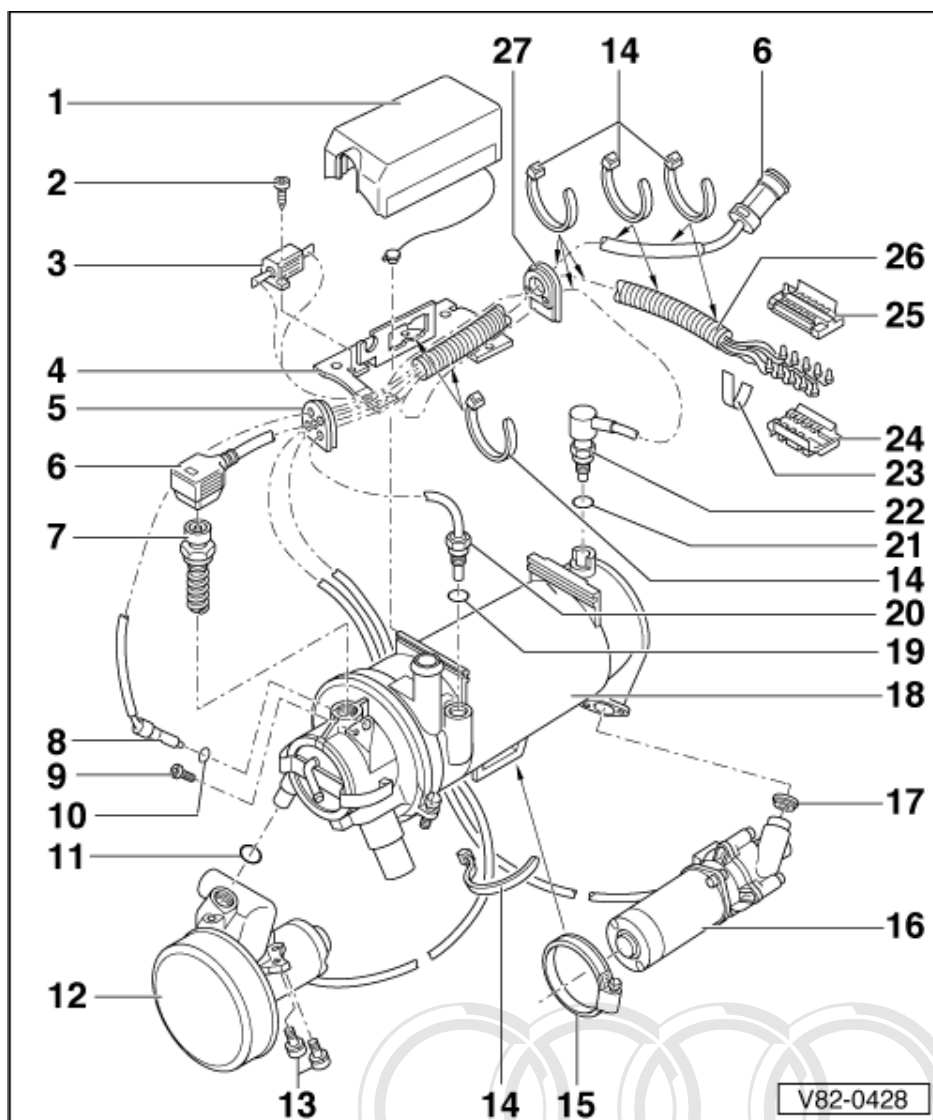
- ♦ If starting problems are encountered at low outside temperatures (auxiliary heater does not start until after a repeat start) although quantity of fuel pumped is OK., set CO₂- concentration in exhaust toward top specified limit.
- ♦ In the course of operating life of auxiliary heater, it is possible that metering pump is no longer able to overcome resistance which the plastic non-woven material (in auxiliary heater) exerts on fuel flow. Check whether this is the case if fuel delivery measured is OK and if it is not possible to correctly set CO₂concentration:
- Disconnect suction hose upstream of metering pump.
- Fill fuel into measuring beaker.
- Switch on auxiliary heater.
- After 210 seconds, metering pump should have extracted from measuring beaker the quantity of fuel indicated for the test of fuel delivery (pump delivery period 180 seconds).

6 - Removing and installing auxiliary heater components

6.1 - Removing and installing auxiliary heater components



- 1 Cap
- 2 Bolt
- 3 Series resistor -N6
 - ♦ Removing and installing => Page 128
- 4 Bracket
- 5 Rubber grommet
- 6 Connection cable
 - ♦ For glow plug
- 7 Glow plug -Q6
 - ♦ Removing and installing => Page 129



8 Flame detector -G64

- ♦ Removing and installing => Page **129**

9 Screw

10 O-ring seal

- ♦ Replace

11 O-ring seal

- ♦ Replace

12 Combustion air blower -V6

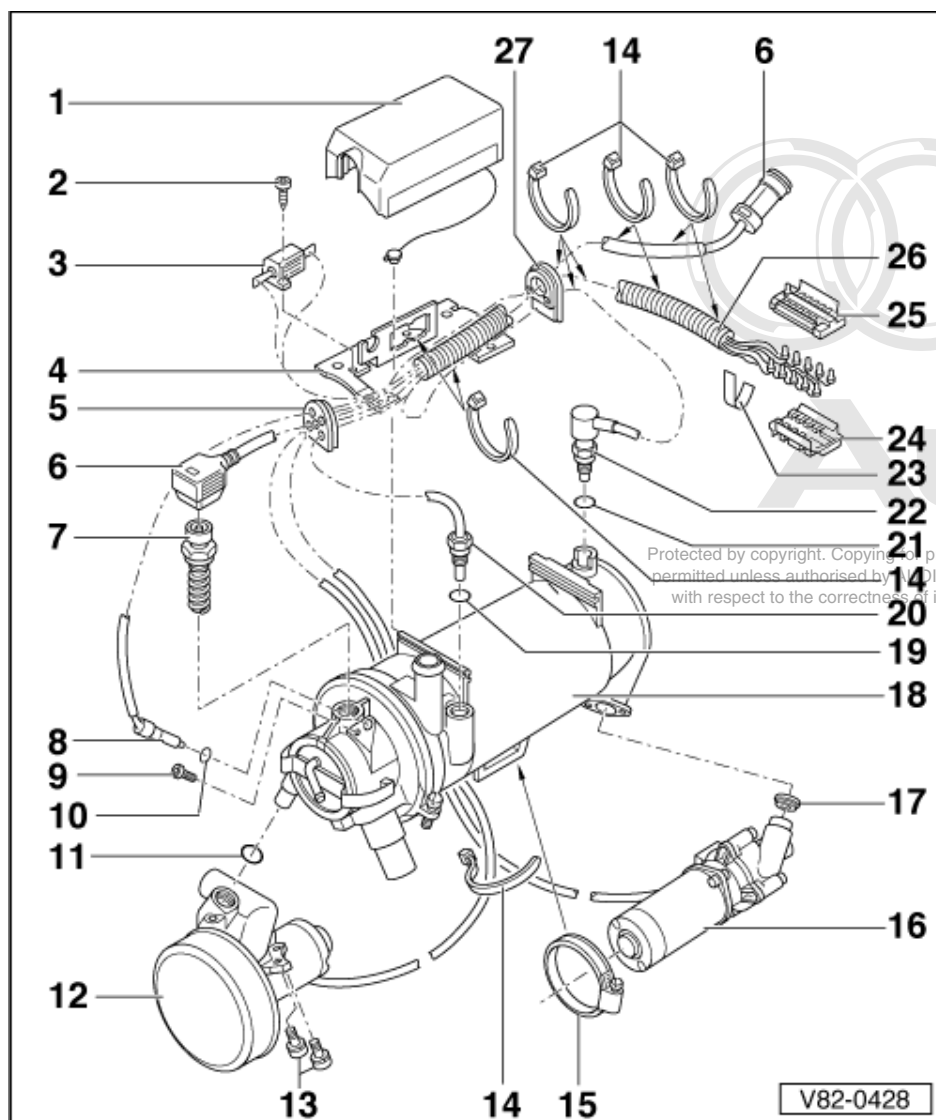
- ♦ Removing and installing => Page **128**

13 Screws

14 Cable tie

15 Clip

- ♦ For attaching recirculation pump


16 Recirculation pump -V55

- ♦ Removing and installing => Page 132
- ♦ Attach to bracket only after installing auxiliary heater

17 Shaped seal

- ♦ Replace
- ♦ Install with open side facing auxiliary heater => Page 132

18 Auxiliary heater

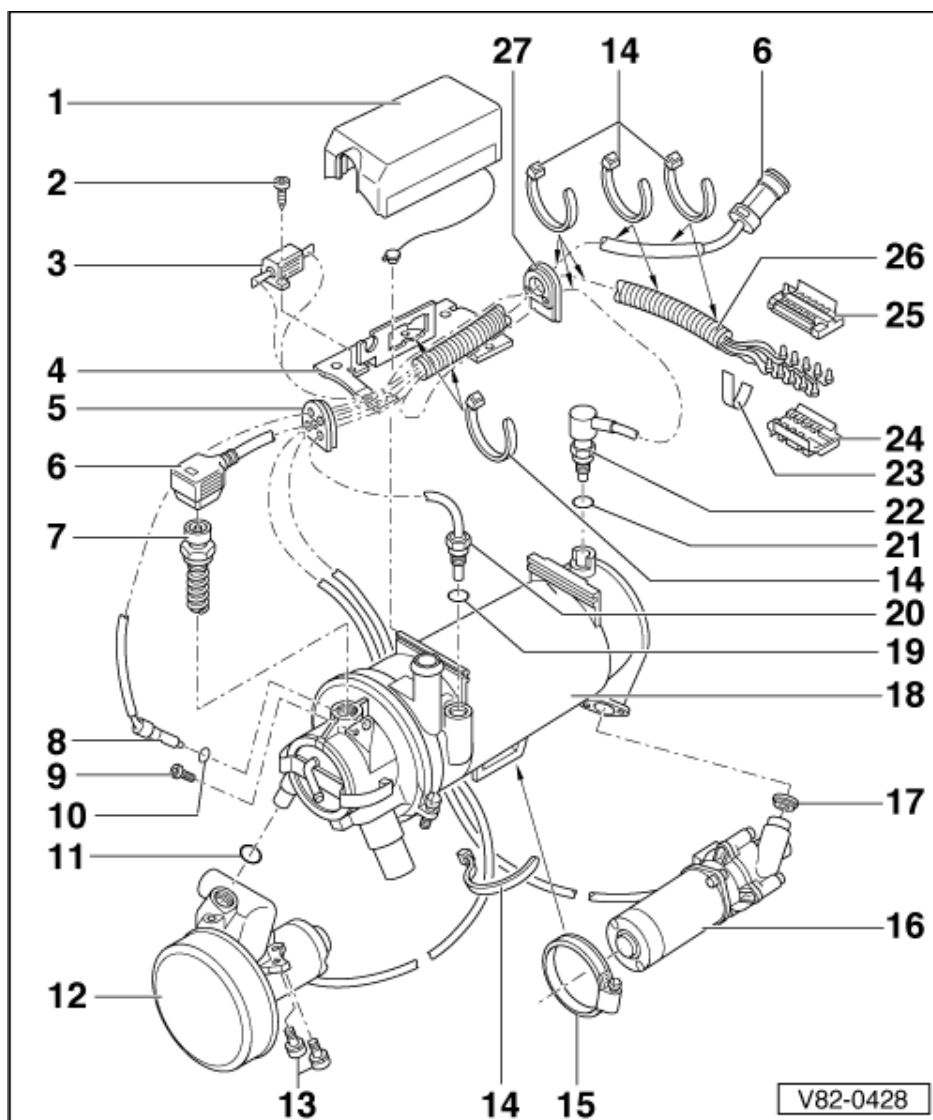
- ♦ Dismantling and assembling =>Page 133

19 O-ring seal

- ♦ Replace

20 Temperature sensor -G18

- ♦ Removing and installing => Page 130
- ♦ Testing resistance => Page 131



21 O- ring seal

- ♦ Replace

22 Overheating cut-out -S24

- ♦ Removing and installing => Page 131
- ♦ Switching on => Page 132
- ♦ If fuse has tripped:

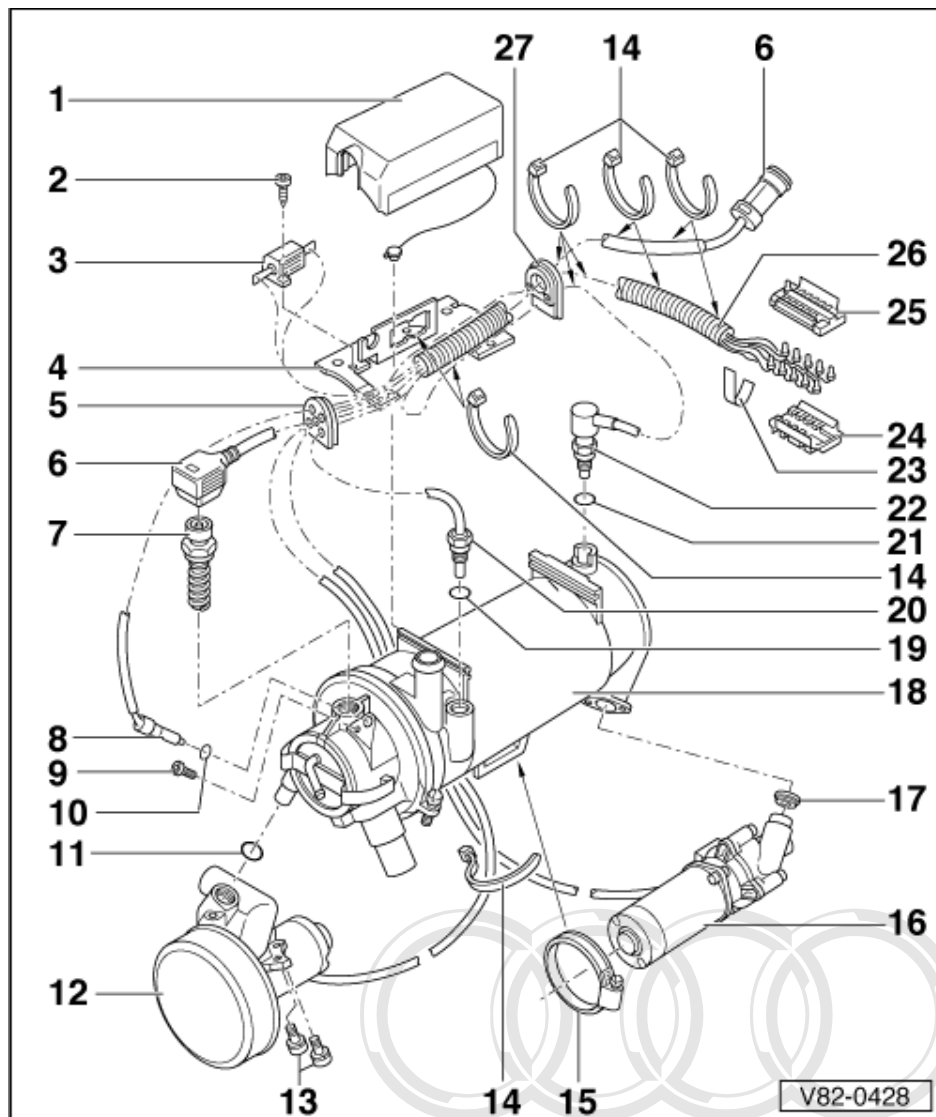
=> Binder "Fault finding heater, air conditioner"

23 Adhesive strap

- ♦ For wrapping around cables between flexible corrugated tube and 12-pin connector housing

24 Top part of 12-pin connector housing

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25 Bottom part of 12-pin connector housing

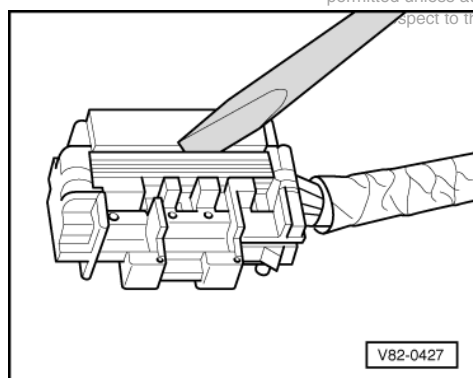
- ♦ Removing and installing individual contacts => Fig. 1
- ♦ Connection diagram => Fig. 2

26 Flexible corrugated tube

- ♦ Slotted

27 Rubber grommet

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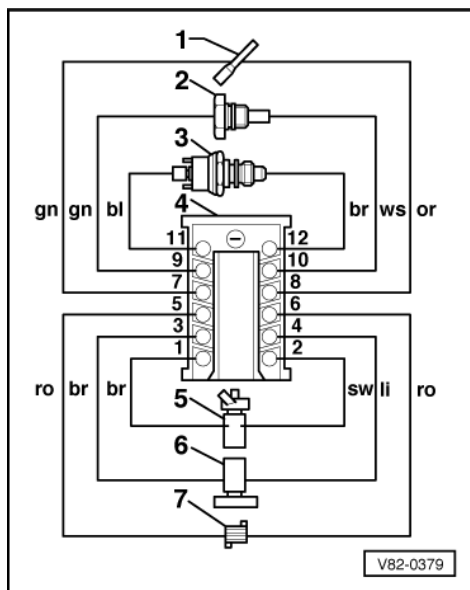
➔ Fig.1 Removing and installing individual plug contacts from 12-pin connector housing

Removal:

- Remove auxiliary heater => Page 102 .
- Unwrap adhesive tape from end of flexible corrugated tube up to connector housing.
- Carefully lever off 12-pin connector housing using a screwdriver.

Installation:

- Wrap adhesive tape around cables between 12-pin connector housing and flexible corrugated tube after assembling.



➔ Fig.2 Connection diagram for 12-pin

connector housing

- 1 - Flame detector -G64
- 2 - Temperature sensor -G18
- 3 - Overheating cut-out -S24 (with on switch)
- 4 - 12-pin connector housing
- 5 - Recirculation pump -V55
- 6 - Combustion air blower -V6
- 7 - Series resistor -N6

Cable colours		
bl = blue	li = lilac	ws = white
br = brown	or = orange	
gn = green	ro = red	

Notes:

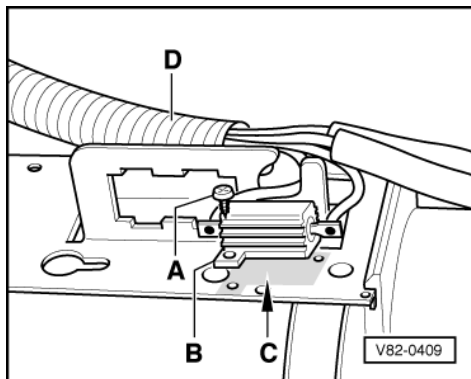
- ◆ If contacts are inserted incorrectly, this will cause operational problems.
- ◆ If overheating cut-out has tripped:
 - Check whether coolant circuit is bled => Page 103 .
 - Check operation of auxiliary heater:

=> Binder "Fault finding heater, air conditioner"

Removing and installing series resistor -N6

Removal:

- Remove auxiliary heater => Page 102 .
- Remove corresponding electrical connections from 12-pin connector housing => Fig. 127 .



- -> Remove 2 screws -A-.
- Remove old heat conducting paste on contact surface -C- between resistor and bracket after removing series resistor -B-.
- Coat contact surface with new heat conducting paste (available through electronics trade).
 - Resistance $3.9 \pm 0.1 \Omega$

Installation:

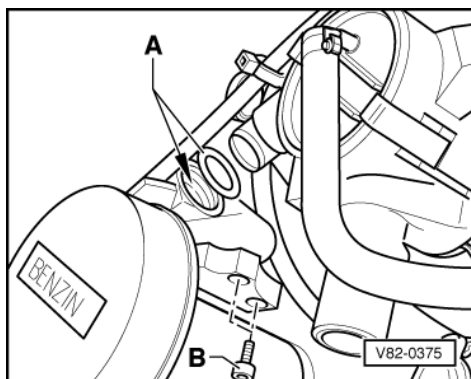
Install in reverse order, paying attention to the following:

- If a resistor with short connection cable is supplied as a replacement part, unsolder this cable at series resistor and solder on the long connection cable of faulty series resistor.

Removing and installing combustion air blower -V6

Removal:

- Remove auxiliary heater => Page 102 .
- Remove corresponding electrical connections from 12-pin connector housing => Fig. 127 .



- -> Remove 2 screws -B-.

Installation:

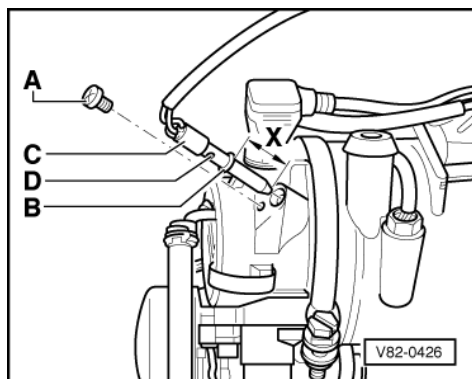
- Insert O-ring seal -A-into groove.

- Note correct contact assignment in 12-pin connector housing => Fig. 127 .

Removing and installing flame detector -G64

Removal:

- Remove auxiliary heater => Page 102 .
- Remove corresponding electrical connections from 12-pin connector housing => Fig. 127 .



- -> Remove screw -A-.
- Pull flame detector -C- out of auxiliary heater at clamp.

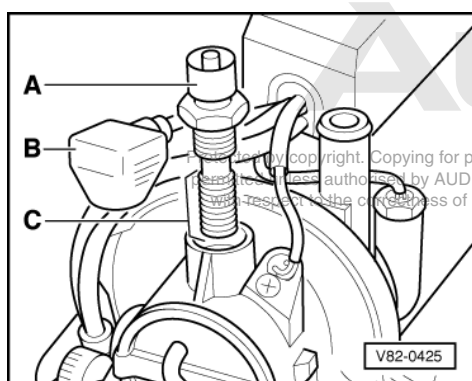
Installation:

- Insert O-ring -B- onto flame detector.
 - Dimension x = 10 mm
- Note correct contact assignment in 12-pin connector housing => Fig. 127 .
- Ensure that pressure compensating hole -D- is not blocked.

Removing and installing glow plug -Q6

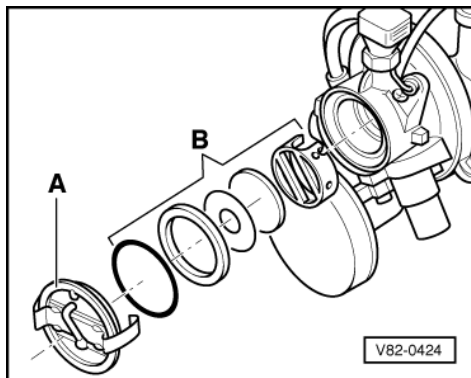
Removal:

- Remove auxiliary heater => Page 102 .



- -> Unplug glow plug connector -B-.
- Remove glow plug -A- (30 Nm).
- Remove any coke deposits on glow plug coil -C- by cleaning carefully.
- Inspect glow plug:
 - Windings of glow plug coil -C- must not be touched (risk of short circuit)
 - Current consumption at a voltage of 12 V is 18... 22 A
- Inspect glow plug connector -B- for signs of damage and tight fitting.

If glow plug is faulty or coked:



- -> Take off cover -A-.
- Install a new set of seals -B- (fuel non-woven disc, spacer and seals) => Page 136 .

Note:

If starting problems are encountered at low outside temperatures (auxiliary heater does not start until after a repeat start) although quantity of fuel pumped and CO₂- concentration in exhaust is OK, check wiring between second batter -A1, auxiliary heater control unit -J162 and glow plug -Q6 for contact resistance:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

Installation:

- Screw in glow plug to 30 Nm.

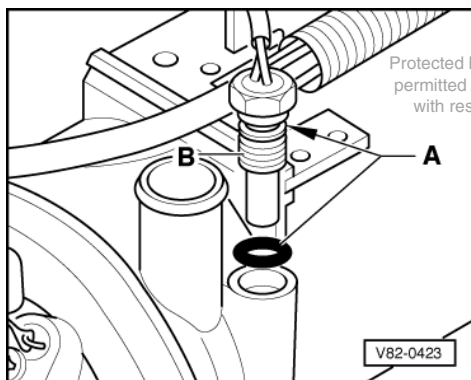
Note:

When installing, pay particular attention to ensuring that glow coils do not touch any other components (risk of short circuit).

Removing and installing temperature sensor -G18

Removal:

- Remove auxiliary heater => Page 102 .
- Remove corresponding electrical connections from 12-pin connector housing => Fig. 127 .



- -> Unscrew temperature sensor -B-.

Installation:

- Insert O-ring seal -A-into groove.

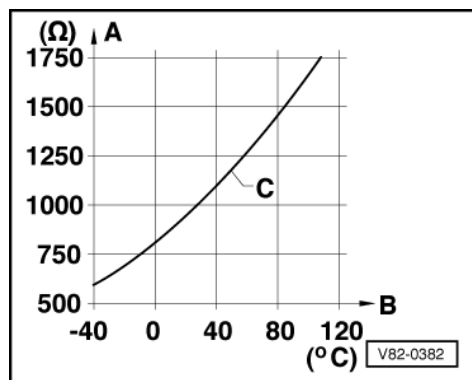
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Note:

Moisten O-ring seal with coolant.

- Screw in temperature sensor to 0.5 Nm.
- Note correct contact assignment in 12-pin connector housing => Fig. 127 .

Testing resistance of temperature sensor -G18



- > A - Resistance (Ω)
B - Coolant temperature (°C)
C - Resistance of temperature sensor

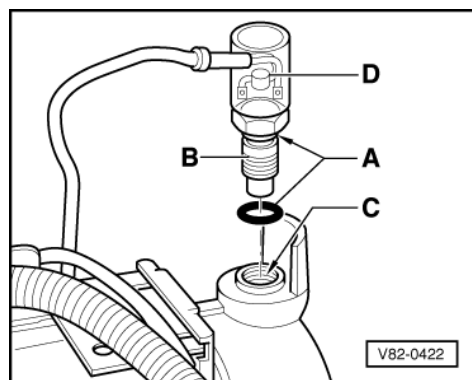
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Notes:

- ♦ Test current when measuring resistance should not be more than 1mA
- ♦ Connection diagram for 12-pin connector housing => Fig. 127 .

Removing and installing overheating cut-out -S24

Removal:



- Remove auxiliary heater => Page 102 .
- Remove corresponding electrical connections from 12-pin connector housing => Fig. 127 .
- Pull off rubber grommet.
- -> Unscrew overheating cut-out -B-.

Installation:

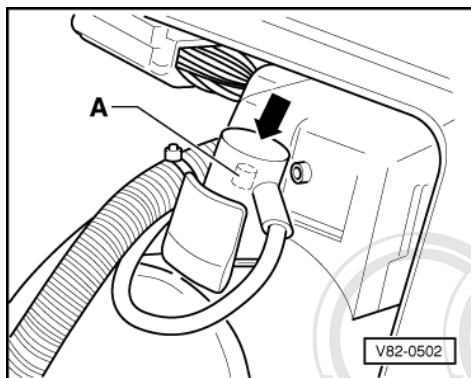
- Clean contact surface -C- on heat exchanger in housing.
- Overheating cut-out should make proper contact all round.
- Insert O-ring seal -A- into groove and moisten with coolant.
- Screw in overheating cut-out -B- to 1.5 Nm.
- Carefully pull rubber grommet over overheating cut-out.
- Fit rubber grommet so that cables do not prevent overheating cut-out from tripping.
- Button -D- should not be obstructed

- Note correct contact assignment in 12-pin connector housing => Fig. 127 .

Switching on overheating cut-out

- Remove air inlet grille and front bumper:

=> General body repairs; Repair group 63; Front bumper Front bumper



- Remove left fog light:

=> Electrical system; Repair group 94; Servicing headlights; Servicing headlights Audi 100 ä 05.94 Servicing headlights Servicing headlights Audi 100 ä 05.94

- -> To switch on overheating cut-out, insert hand through bumper and press vertically down on button -A-.

Note:

Carry out operational check if overheating cut-out has tripped.

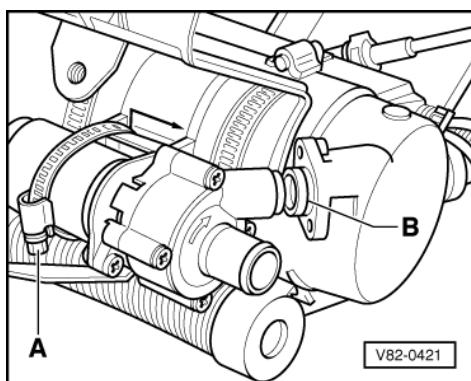
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=> Binder "Fault finding heater, air conditioner"

Removing and installing circulation pump -V55

Removal:

- Remove auxiliary heater => Page 102 .
- Remove corresponding electrical connections from 12-pin connector housing => Fig. 127 .



- -> Slacken clip -A-.

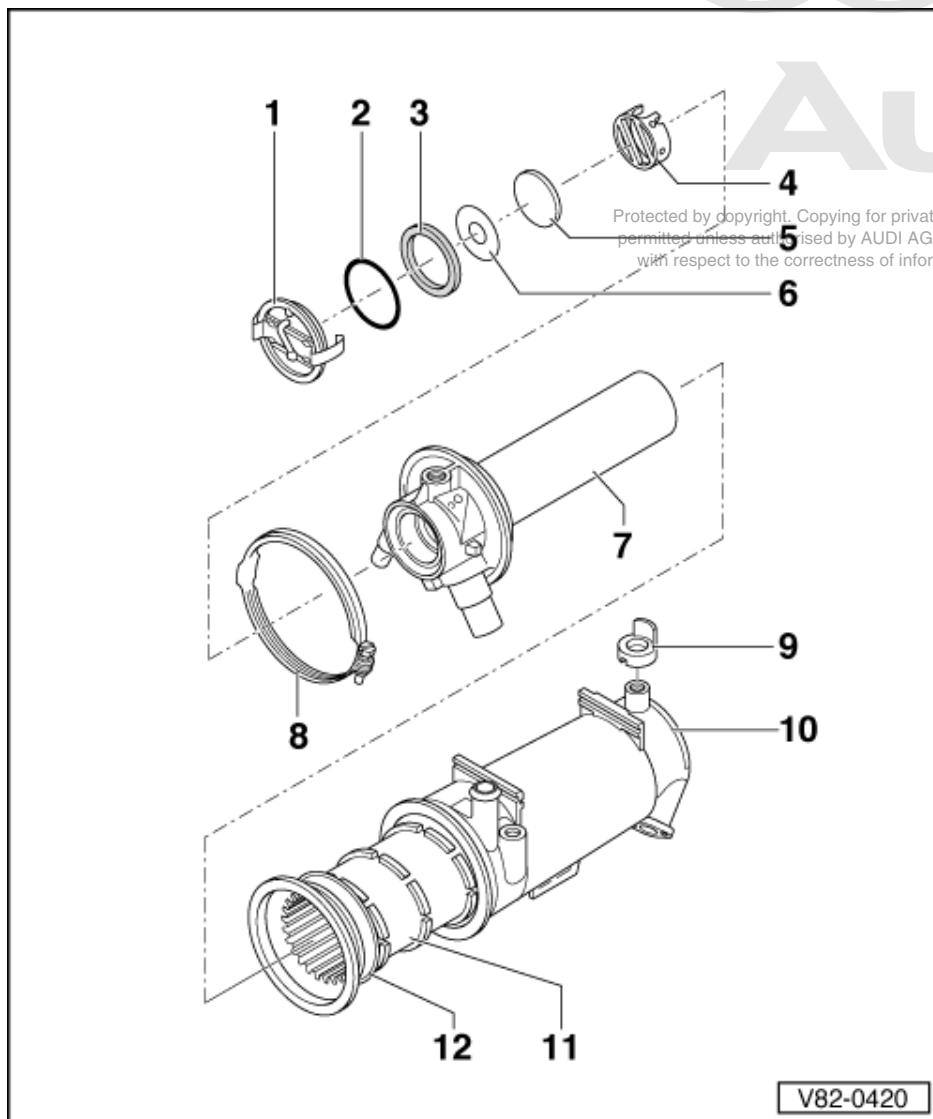
Installation:

- Fit shaped seal -B- onto circulation pump.
- Installation position: open side faces auxiliary heater
- Push on clip -A- in direction of arrow as far as stop.
- Note correct contact assignment in 12-pin connector housing => Fig. 127 .
- Inspect installation position of circulation pump:

- Circulation pump must not be touching bracket, align bracket, if necessary

7 - Dismantling and assembling auxiliary heater

7.1 - Dismantling and assembling auxiliary heater

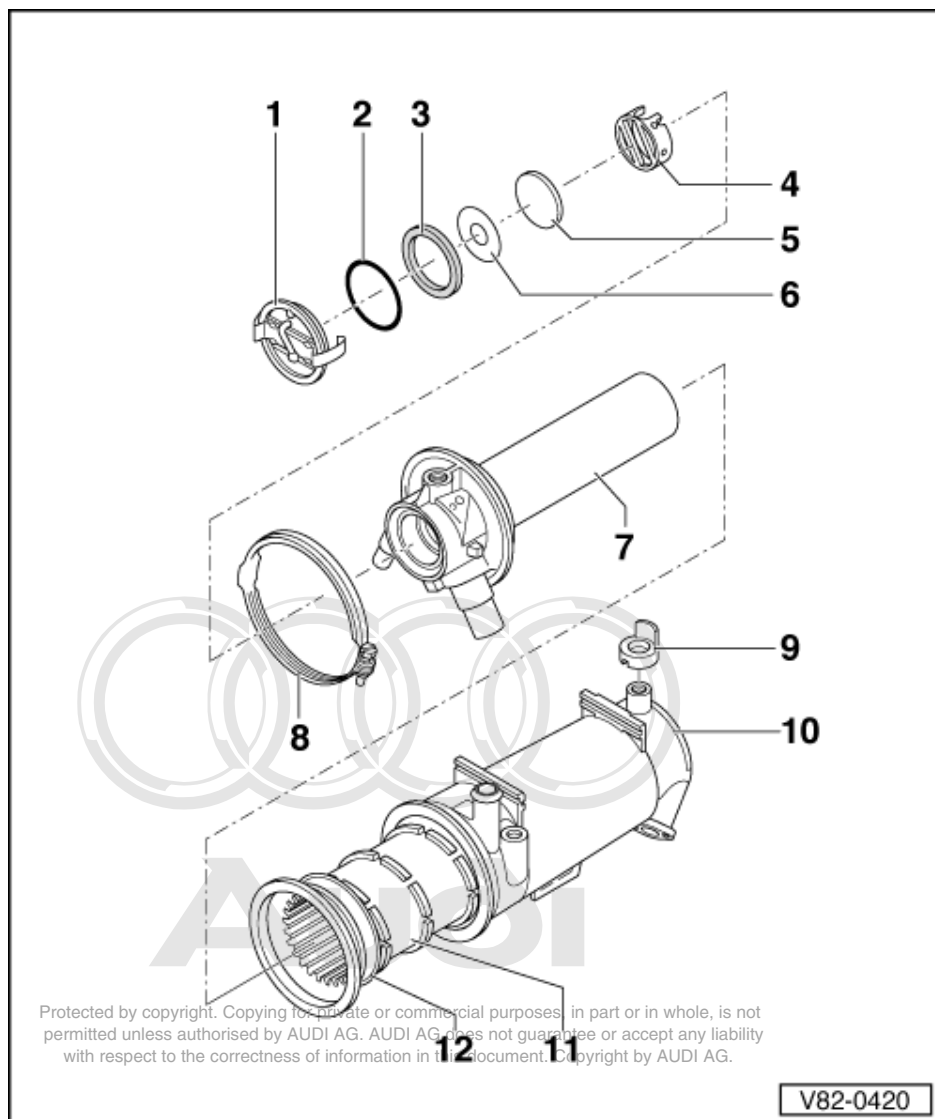


Removing auxiliary heater => Page 102 .

- 1 **Cover**
 - ♦ Removing and installing => Page 135
- 2 **O- ring seal**
 - ♦ Replacing => Page 136
- 3 **Oil seal**
 - ♦ Replacing => Page 136
- 4 **Spacer**
 - ♦ Replacing => Page 136
 - ♦ Cutting open and installing => Page 136 .
- 5 **Fuel non-woven disc**
 - ♦ For vehicles with petrol engine



- ♦ Replacing => Page 136



6 Fuel non-woven ring

- ♦ For vehicles with diesel engine
- ♦ Replacing => Page 136

7 Burner head

- ♦ Removing and installing => Page 135

8 Clip

9 End cap

- ♦ Bonded to housing (e.g. with two-component adhesive D 001 500)

10 Housing

11 Heat exchanger

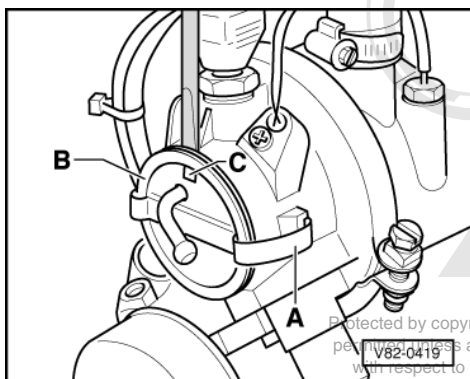
- ♦ Removing and installing => Page 136

12 Sealing ring

- ♦ Replacing => Page 136

Removing and installing cover

Removal:



- -> Release tensioning spring -A-.
- Carefully lever off cover -B- using a screwdriver.

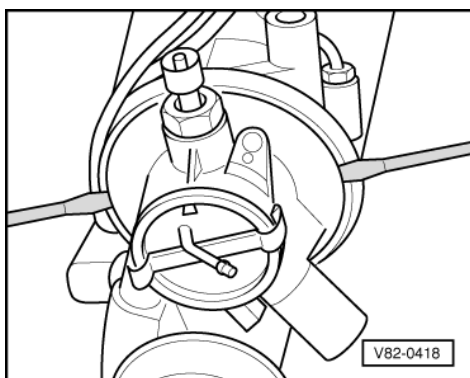
Installation:

- Insert O-ring seal and sealing ring into grooves of cover.
- Insert cover.
 - Installation position: arrow -C- faces towards glow plug

Removing and installing burner head

Removal:

- Take out flame detector=> Page 129 .



- Release tensioning clip.
- -> Use 2 screwdrivers to carefully lever off burner head.

Installation:

- Clean burner head and heat exchanger.
- Coat sealing surface between burner head and heat exchanger with sealing paste (e.g. AKD 456 000 02).
- Insert burner head and attach it with tensioning clip.

Note:

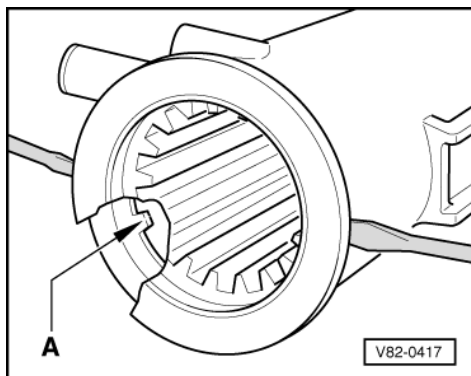
Align burner head before tightening tensioning clip (pay attention to connections for intake noise suppresser and exhaust pipe)



Removing and installing heat exchanger

Removal:

- Remove overheating cut-out => Page 131 .
- Remove burner head=> Page 135 .



- -> Use 2 screwdrivers to lever off heat exchanger.

Installation:

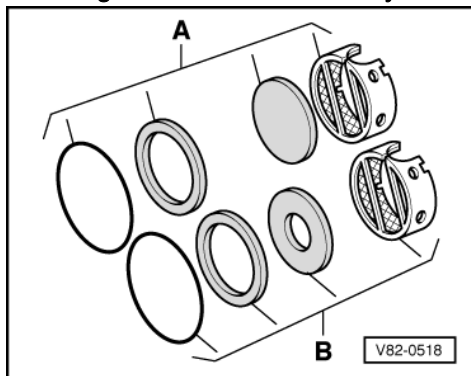
- Clean any combustion residues on heat exchanger with water and a brush.
- Insert O-ring seal into groove of heat exchanger.

Note:

Moisten O-ring seal with coolant.

- Insert heat exchanger so that its catch engages in recess -A- in housing.

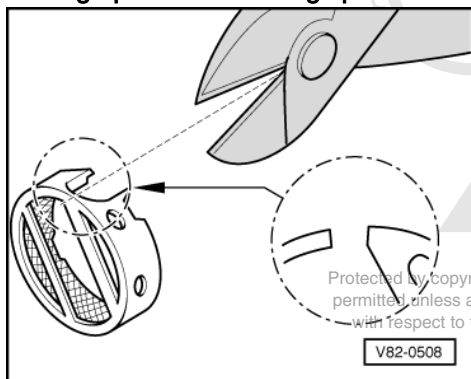
Installing set of seals for auxiliary heater



Set of seals differs for auxiliary heater operated with petrol or diesel fuel:

- > A - For petrol with fuel non-woven disc
- B - For diesel fuel with fuel non-woven ring

Cutting open and installing spacer



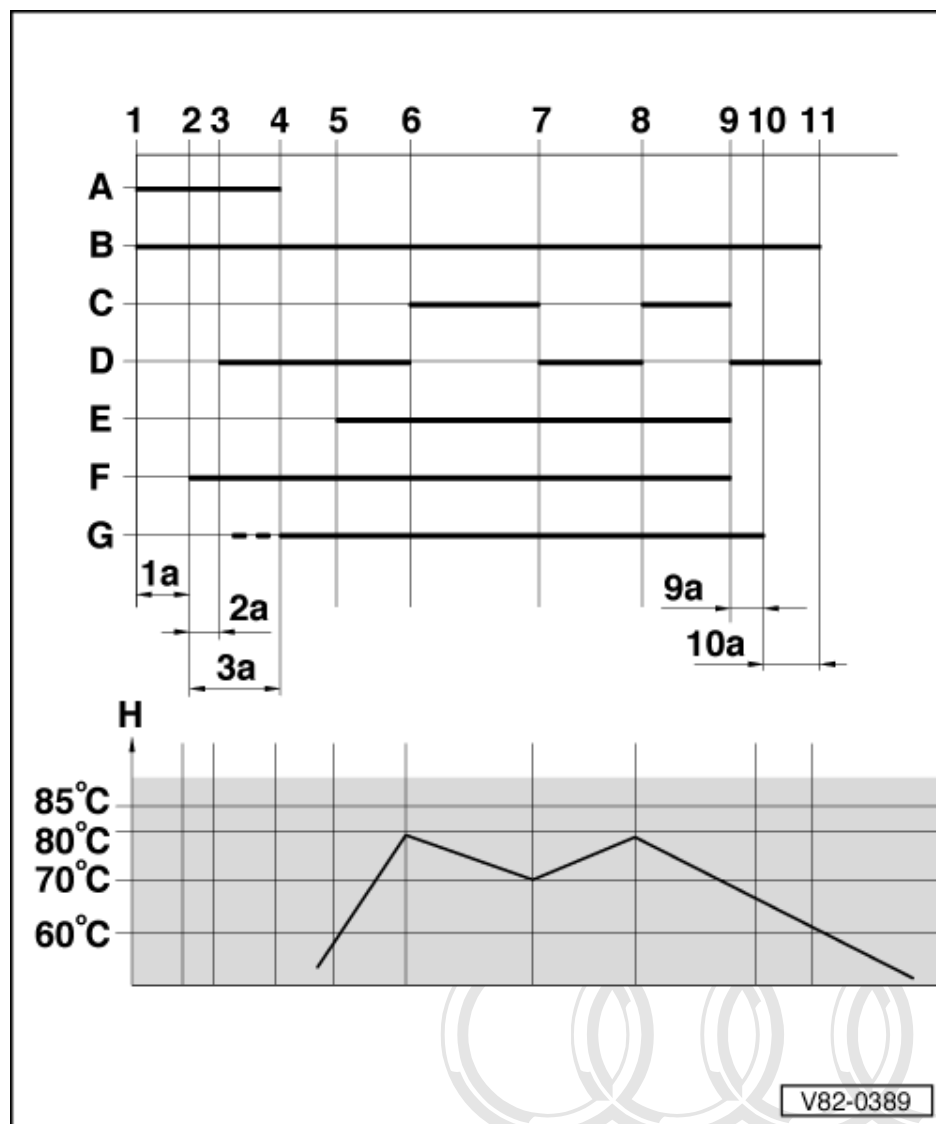
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- -> Cut open spacer supplied as a replacement part, as shown in illustration, in order to increase operating life of glow plug..
- When installing, make sure that recess in spacer is opposite glow plug.

Note:

When installing spacer, pay particular attention to ensuring that it does not make contact with glow coils of glow plug (risk of short circuit).

7.2 - Function diagrams



Heat demand 50 ... 100% heating capacity

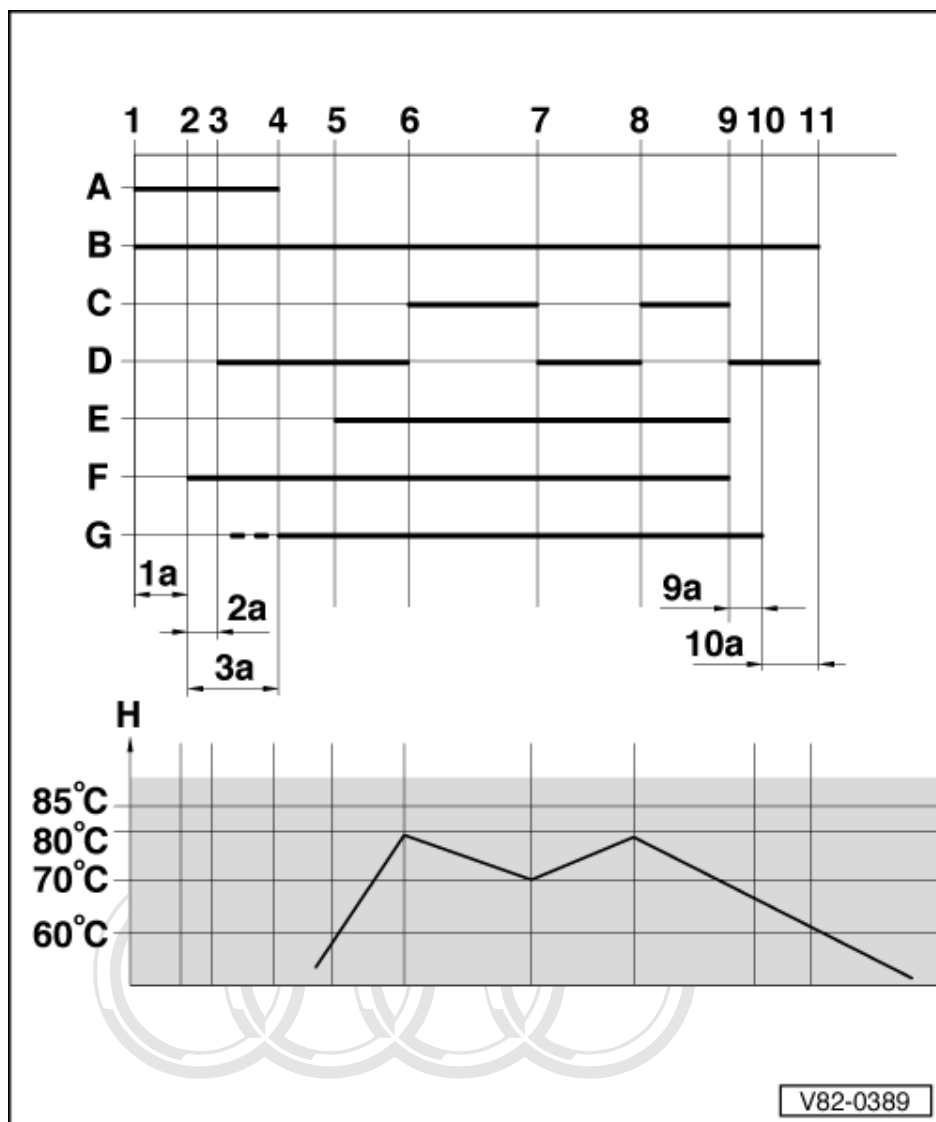
Notes:

- ♦ Auxiliary heater always starts in full load mode.
- ♦ In part load mode, combustion air blower operates at a reduced speed and metering pump supplies only about 50% of fuel quantity (lower cycle frequency).

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- ♦ Auxiliary heater can remain for a lengthy period in part or full load operating states once an equilibrium has been established between heat generated and heat demand.

A - Glow plug -Q6



B - Recirculation pump -V55

C - Combustion air blower -V6

- ♦ In part load mode

D - Combustion air blower -V6

- ♦ In full load mode

E - Fresh air blower -V2

- ♦ Of car heater

F - Metering pump -V54

G - Flame detector -G64

- ♦ Signals "bright"

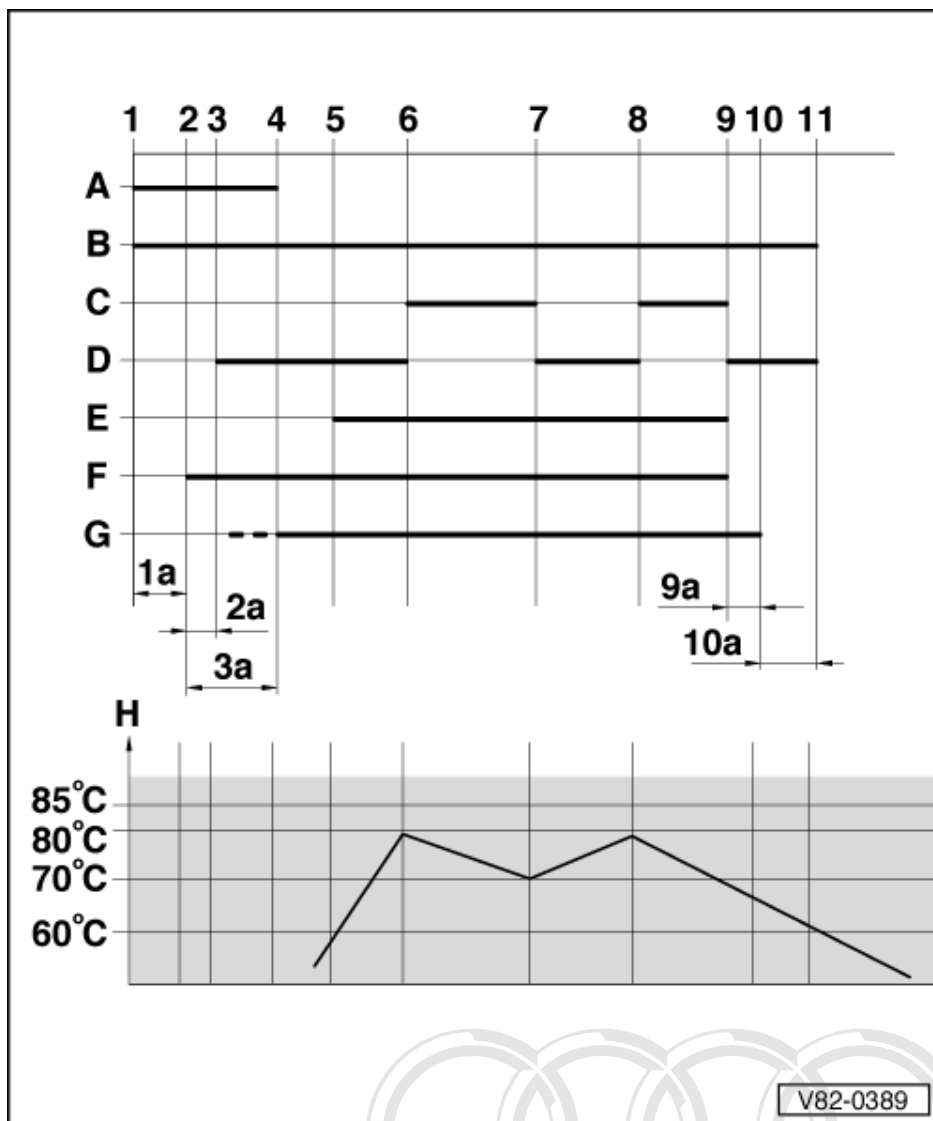
H - Coolant temperature

1 Switch on

- ♦ By preselector/timer

1a - Preheating

- ♦ 30 seconds



2 Start of fuel delivery

2a - Initial fuel supply

- ♦ 5 seconds

3 Combustion air blower "on"

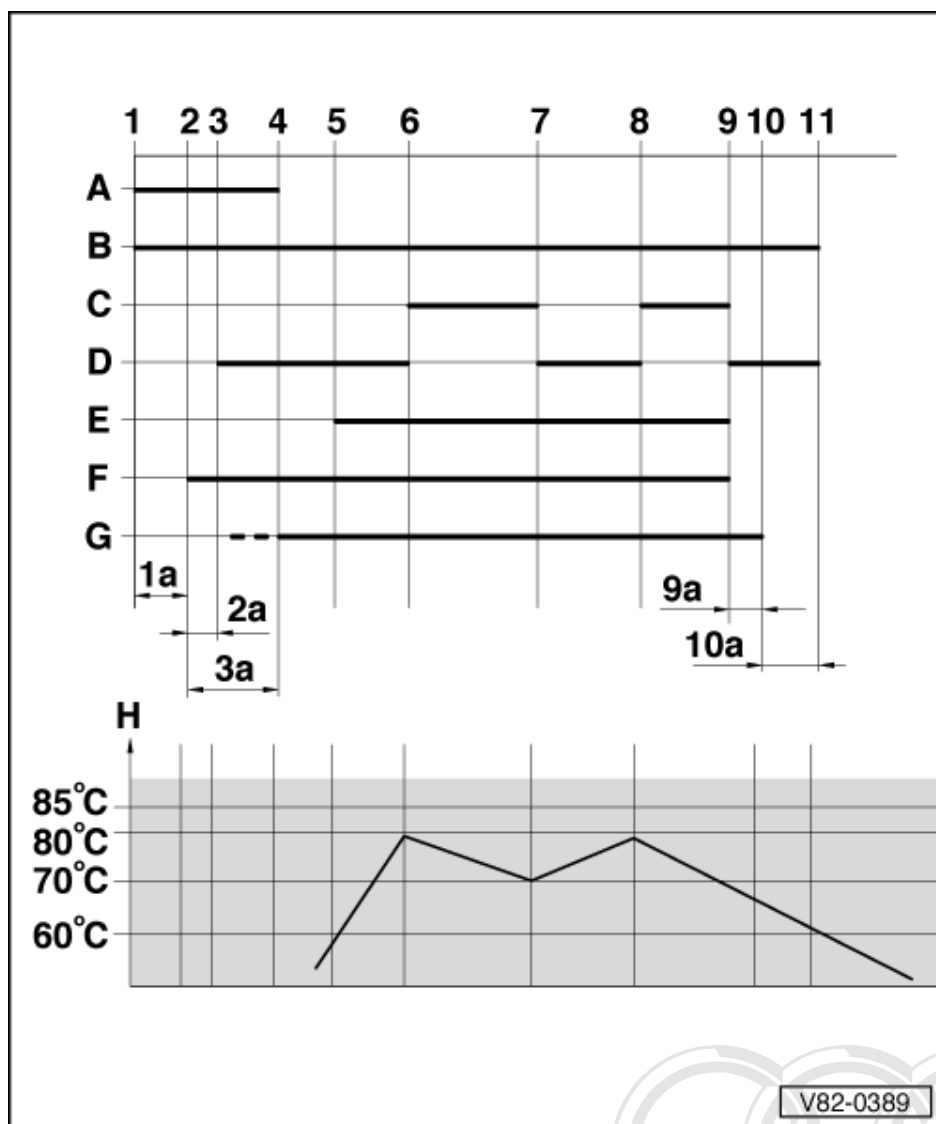
3a - Safety time

- ♦ 90 seconds
- ♦ For reliable commencement of combustion

4 Start of full load operation

5 Fresh-air blower "on"

- ♦ For vehicles with manually regulated air conditioner through series resistor -N24
- ♦ For vehicles with fully automatic air conditioner through operating and display unit -E87



6 Switching from full load to part load operation

7 Switching from part load to full load operation

8 Switching from full load to part load operation

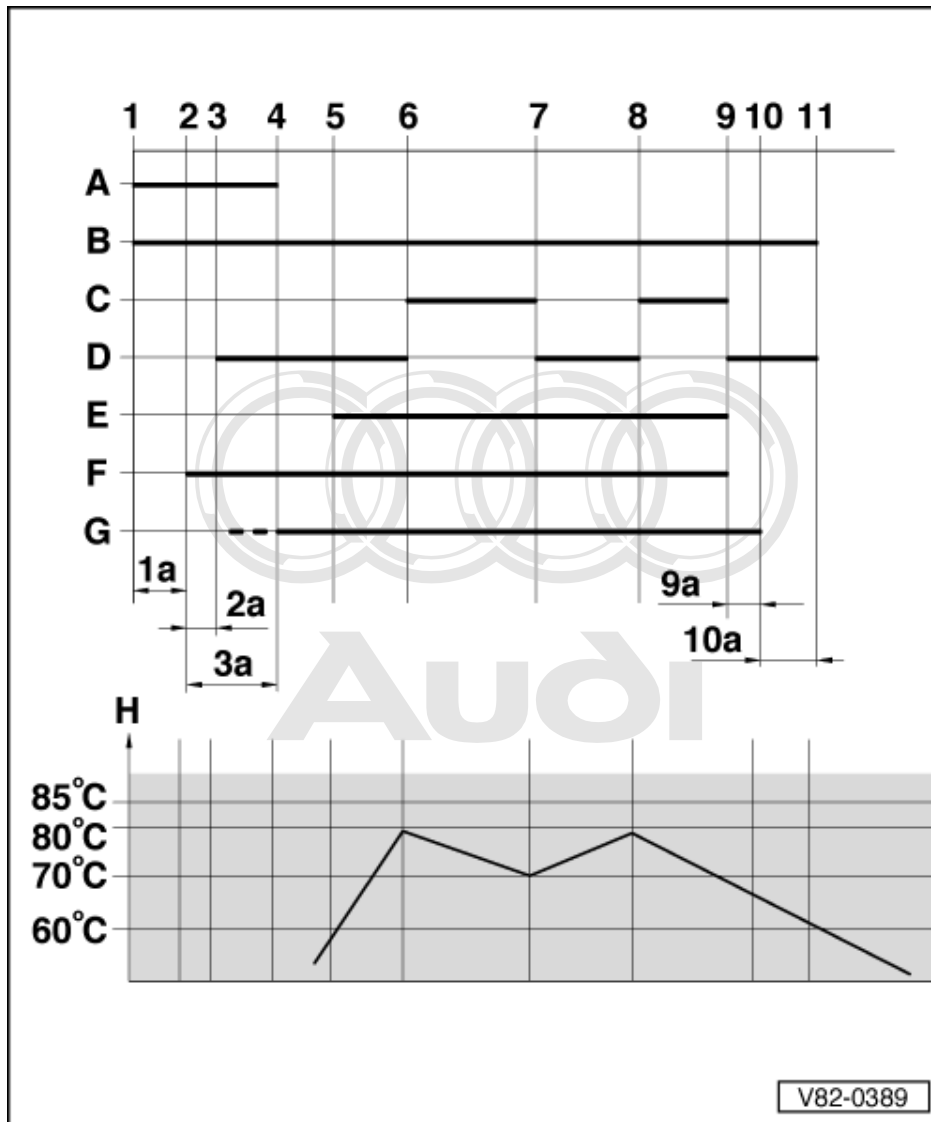
9 Switch-off/start of visual cool down phase

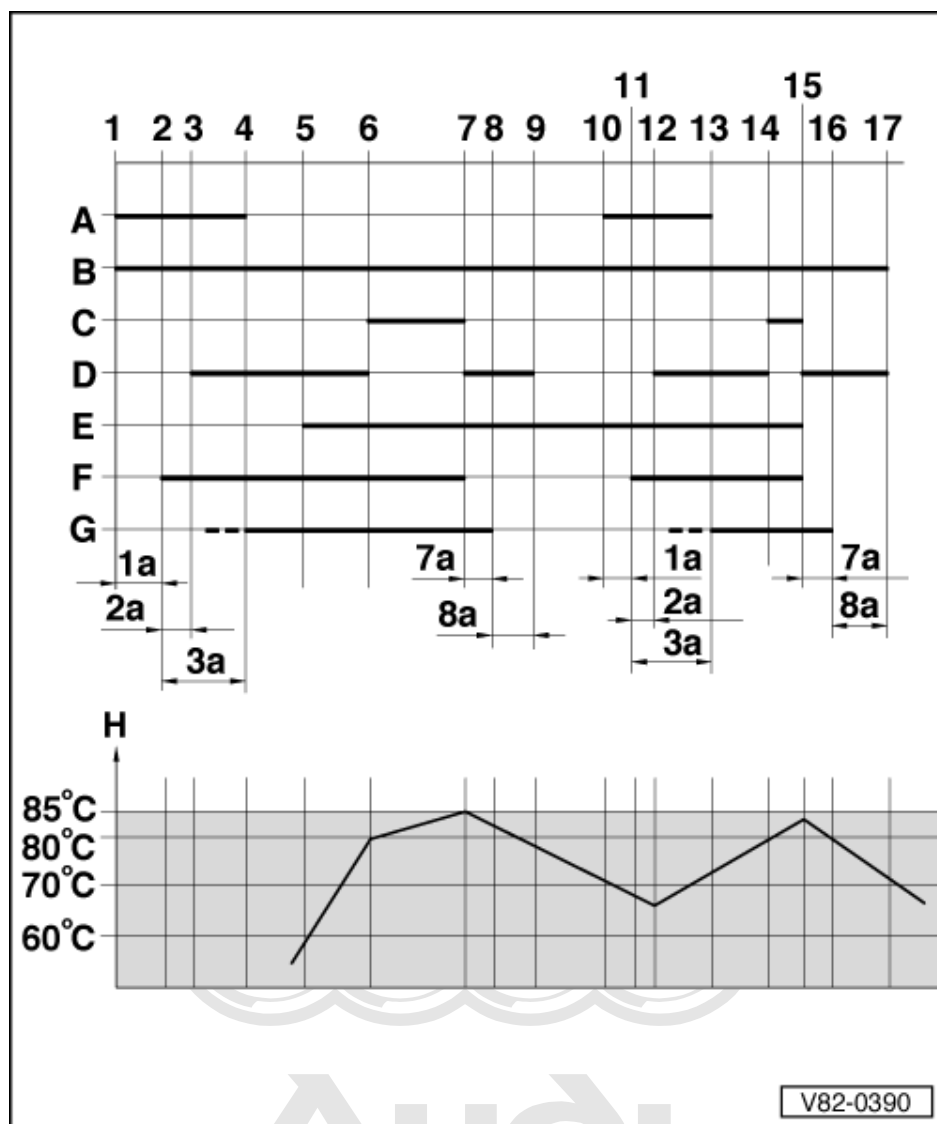
- ♦ By operating "instant heat" button on preselector/timer
- ♦ After 60 minutes operating time have elapsed, by preselector/timer

9a - Visual cool down phase

- ♦ 80 seconds

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Heat demand less than 50% heating capacity

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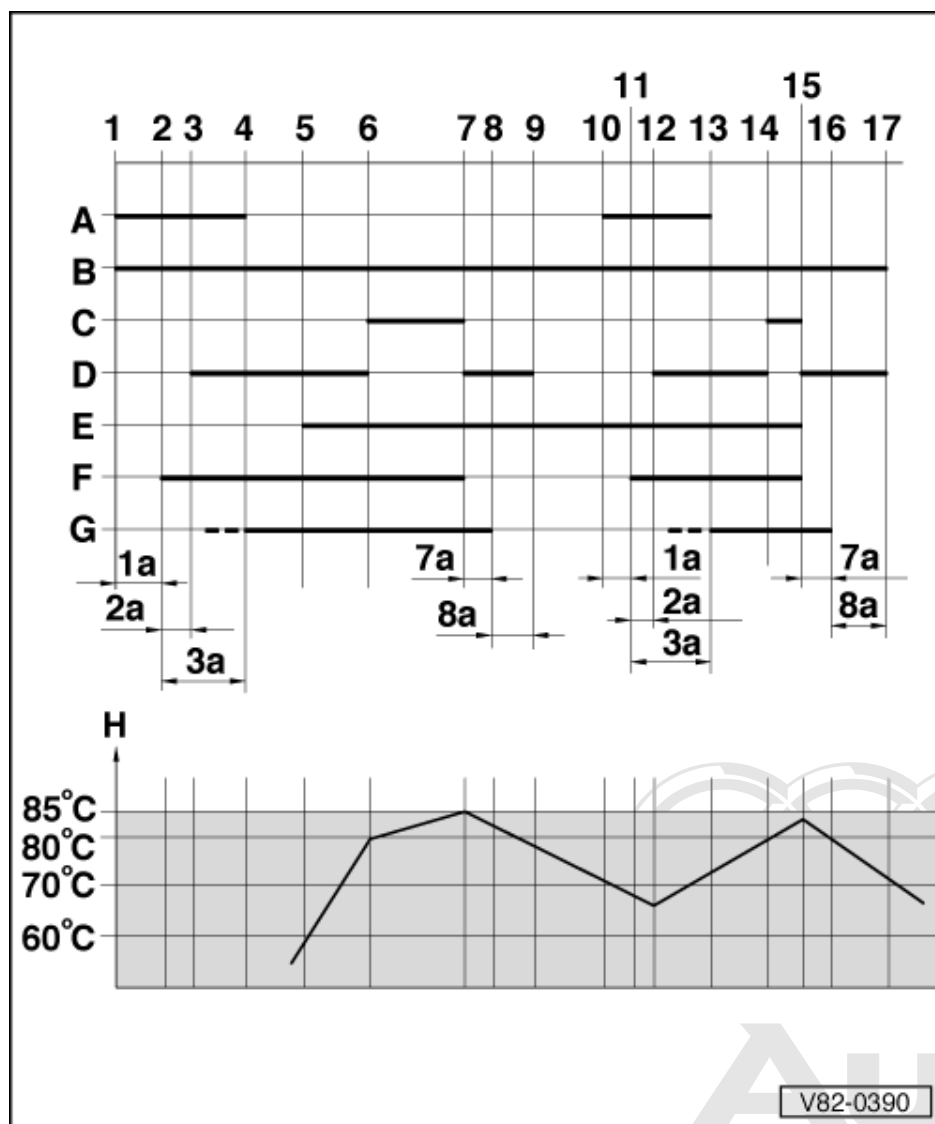
- ♦ Auxiliary heater always starts in full load mode.
- ♦ In part load mode, combustion air blower operates at a reduced speed and metering pump supplies only about 50% of fuel quantity (lower cycle frequency).
- ♦ Auxiliary heater can remain for a lengthy period in part load, full load or control interval operating states once an equilibrium has been established between heat generated and heat demand.

A - Glow plug -Q6

B - Recirculation pump -V55

C - Combustion air blower -V6

- ♦ In part load mode



- D - Combustion air blower -V6
- ♦ In full load mode
- E - Fresh air blower -V2
- ♦ Of car heater
- F - Metering pump -V54
- G - Flame detector -G64
- ♦ Signals "bright"
- H - Coolant temperature

1 Switch on by preselector/timer

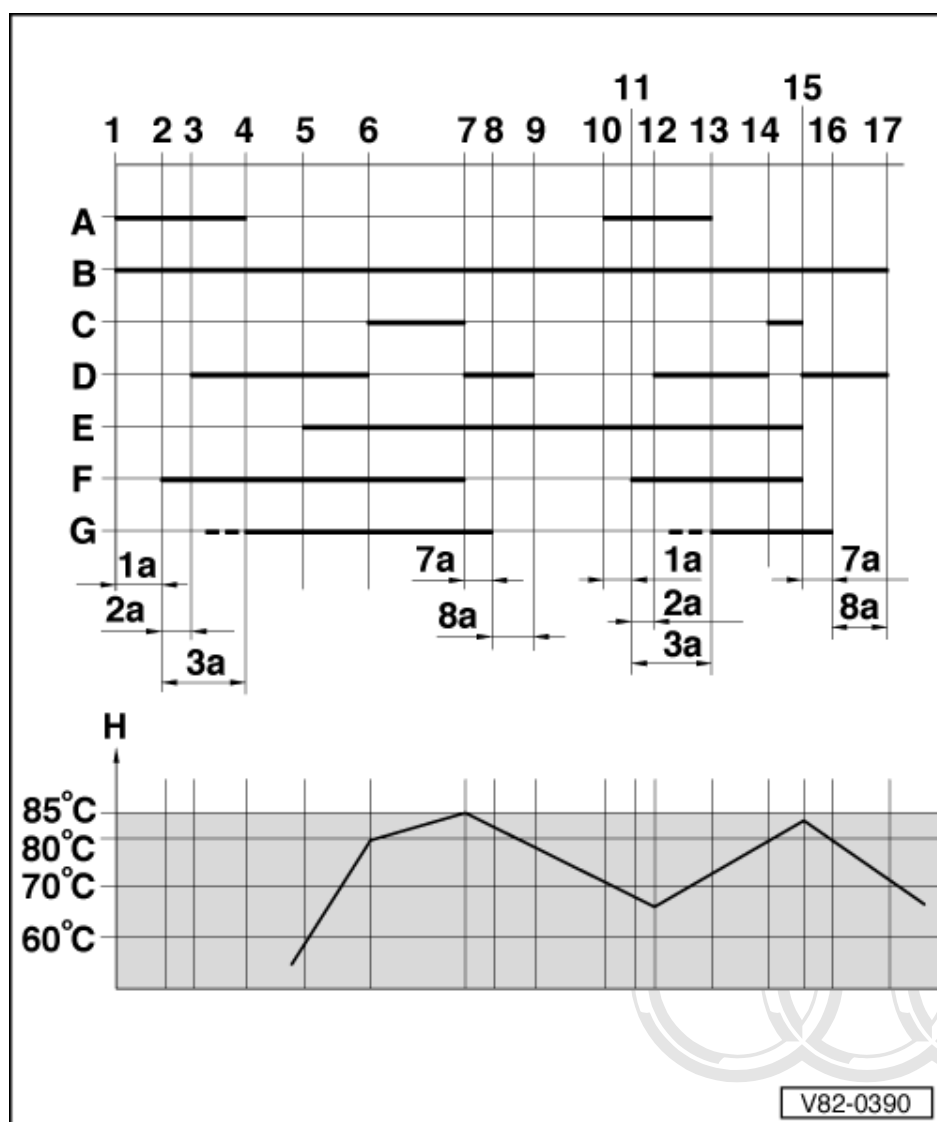
- 1a - Preheating
- ♦ 30 seconds

2 Start of fuel delivery

- 2a - Initial fuel supply
- ♦ 5 seconds

3 Combustion air blower "on"

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3a - Safety time

- ♦ 90 seconds
- ♦ For reliable commencement of combustion

4 Start of full load operation

5 Fresh-air blower "on"

- ♦ For vehicles with manually regulated air conditioner through series resistor -N24
- ♦ For vehicles with fully automatic air conditioner through operating and display unit -E87

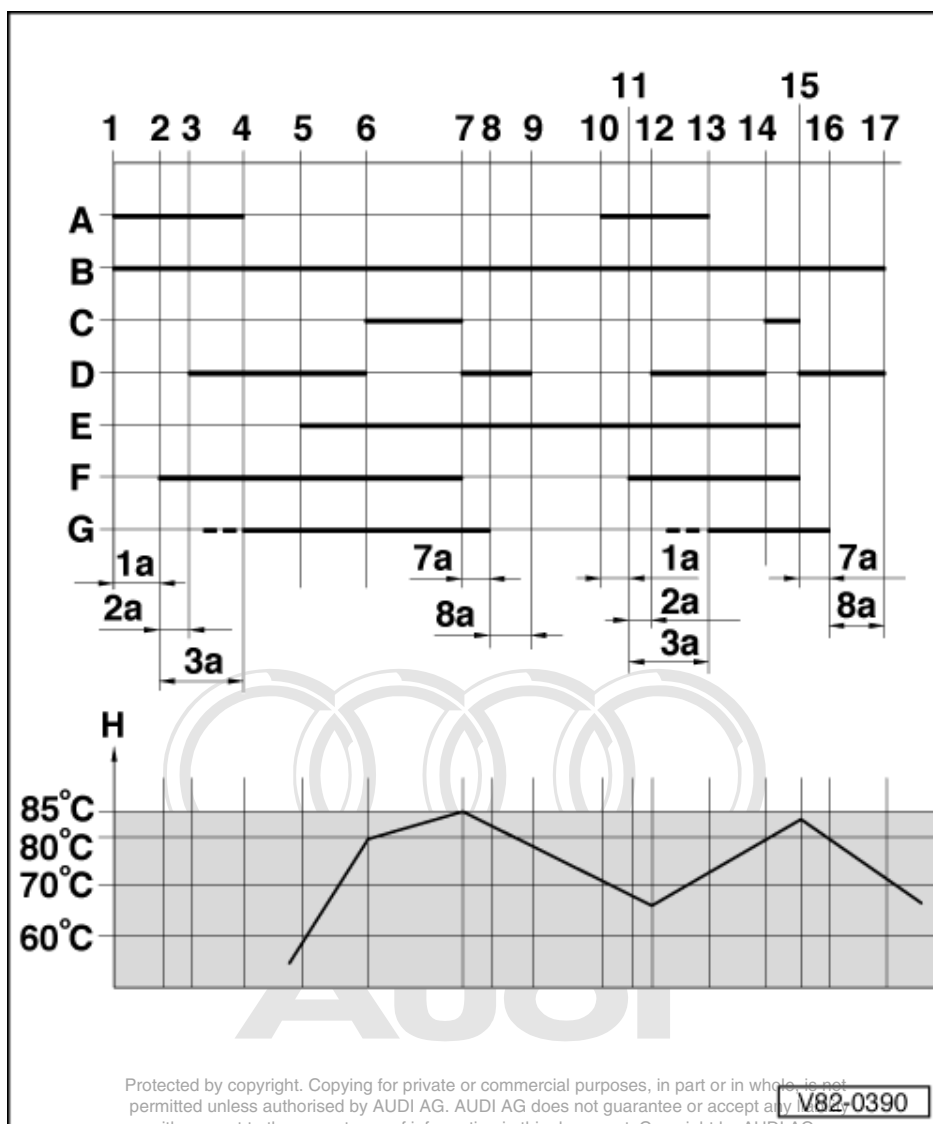
6 Switching from full load to part load operation

7 Switching from partial load operation to control interval/commencement of visual cool down phase

7a - Visual cool down phase

- ♦ 80 seconds

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8 End of visual cool down phase/start of electric cool down phase

- ♦ Flame detector signals "dark"

8a- Electric cool down phase

- ♦ 60 seconds

9 End of cool down phase/start of control interval

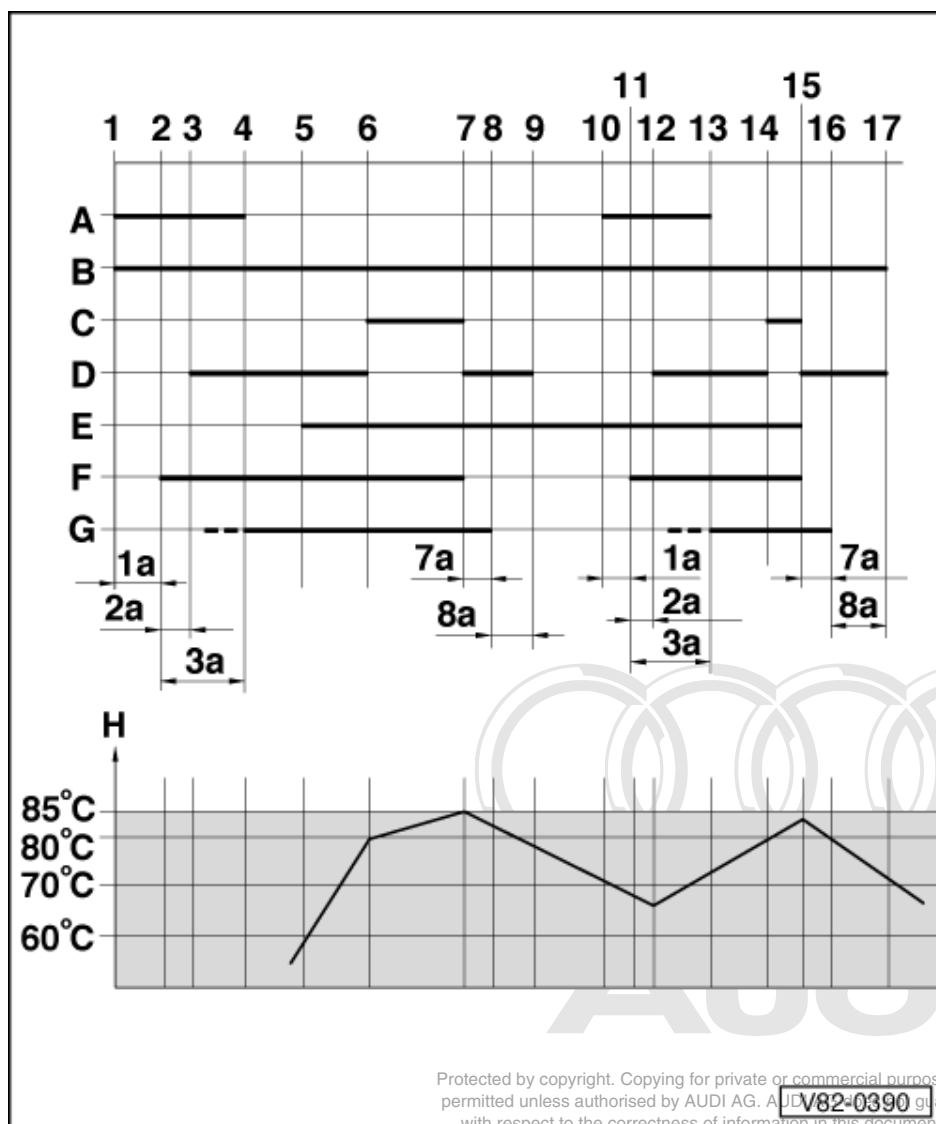
10 End of control interval/start start of restart

11 Start of fuel delivery

12 Combustion air blower "on"

13 Start of full load operation

14 Switching from full load to part load operation



15 Switch-off/start of visual cool down phase

- ♦ By operating "instant heat" button on preselector/timer
- ♦ After 60 minutes operating time have elapsed, by preselector/timer

16 End of visual cool down phase/start of electric cool down phase

- ♦ Flame detector signals "dark"

17 End of cool down phase

87 - Air conditioning

1 - Safety precautions when working on cars with air-conditioners and when handling refrigerant

1.1 - Safety precautions when working on cars with air-conditioners and when handling refrigerant

The assemblies and pipes in the air conditioner are filled with the following refrigerants:

ä 09.92: difluorochloromethane (CF_2CL_2) or
dichlorodifluoromethane (CCL_2F_2)

This refrigerant is known by trade names Frigen R12 or Freon R12

Vehicles on which the refrigerant circuit has been converted from refrigerant R12 to refrigerant R134a as part of a retrofit measure, are recognisable from the following:

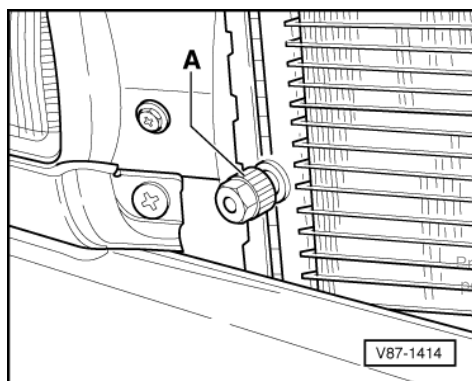
- A - Sticker in engine compartment or in plenum chamber
- B - Tag in area of condenser

=> Air conditioner - with refrigerant R12

Always check which refrigerant is filled in circuit before commencing repair work.

10.92 ä: tetrafluoroethane ($\text{CF}_3\text{-CH}_2\text{F}$ or
 $\text{CH}_2\text{F-CF}_3$)

This refrigerant is currently known in Germany by the trade names R134a, H-FKW 134a, SUVA 134a and KLEA 134a (other trade names may be used in other countries).



Vehicles on which refrigerant circuit of air conditioner has already been factory-filled with refrigerant R134a, are recognisable from the following:

- A - Sticker in engine compartment or on evaporator with the inscription "FCKW-free refrigerant"
- B - -> Service connection -A- at condenser



Safety precautions

The following precautions should be observed with these refrigerants in Germany (additional regulations may be applicable in other countries).

In view of their chemical composition, different refrigerants must not be intermixed (not even in small quantities).

Components which have been developed for a particular refrigerant (R12 or R134a), must on no account be installed in refrigerant circuits filled with a different refrigerant. In order to prevent this, components which have been developed for air conditioners with refrigerant R134a, are so designed to make it impossible to confuse them with components for air conditioners filled with refrigerant R12 (different threads, colour-coded).

Air conditioners which have been developed for refrigerant R12, can be converted to refrigerant R134a (retrofit):

=> Air conditioner - with refrigerant R12

If it is necessary to open the refrigerant circuit during repair work, first drain the refrigerant circuit (=> Page 148). All contact with liquid refrigerant or refrigerant vapours should be avoided. If, despite the observance of the safety precautions, refrigerant should escape, the refrigerant/air mixture must not be inhaled.

For this reason, always switch on the extractor systems, and protect hands with gloves and eyes with safety goggles.

Reason:

The intensive action of refrigerants will cause frostbite on unprotected parts of the body.

Important

It is recommended that an eye bath be kept to hand.

If liquid refrigerant comes into contact with the eyes, the eyes should be thoroughly rinsed for about 15 minutes. Then apply eye drops and consult a doctor immediately, even if the eyes are not painful.

The doctor should be informed of the type of refrigerant which caused the frostbite.

If, despite observance of all the security precautions, refrigerant should come into contact with other parts of the body, they should also be thoroughly rinsed immediately for at least 15 minutes in cold water.

Although refrigerants do not represent a fire hazard, smoking, welding, soldering and brazing are not permitted in areas exposed to refrigerant.

Reason:

The high temperature of a naked flame or hot objects causes refrigerant gas to undergo chemical decomposition. The inhalation of the toxic decomposition products results in dry coughing and nausea.

Draining the refrigerant circuit

Refrigerant must not be allowed to escape into the environment, it should be extracted from the refrigerant circuit by means of a suction unit or service station. The extracted refrigerant is then reprocessed on site or returned to the manufacturer for environmentally friendly disposal (in other countries, different or additional regulations may apply). For these reasons, vehicles should be sent to VW/Audi air-conditioning servicing centres (these workshops have the relevant equipment and tools)

Reason:

Escaped refrigerants R12 and R134a in the earth's atmosphere aggravates the greenhouse effect. In addition, refrigerant R12 attacks the ozone layer of the earth's atmosphere.

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- ♦ The greenhouse effect of refrigerant R134a is much less than that of refrigerant R12.

- ♦ The refrigerant R134a does not effect the ozone layer in the earth's atmosphere (R134a is an H-FC with no chlorine atoms). The depletion of the ozone in the upper atmosphere is only caused by the splitting of carbon-chlorine bonds (as is the case, for example, with the refrigerant R12).

When air conditioner has been drained, disconnect power supply to air conditioner magnetic clutch -N25 (e.g. pull the connector off low-pressure switch for the air conditioner circuit -F73).

Reason:

Disconnecting power supply ensures that the compressor cannot be activated by mistake while refrigerant circuit is empty.

Working on refrigerant circuit

Work on refrigerant circuit must only be performed in well ventilated rooms. Care should be taken to ensure that there are no inspection pits, shafts or cellar entrances within a radius of 5 metres. Switch on the extraction systems.

Reason:

The refrigerant is not only colourless and odourless, but also heavier than air and therefore displaces oxygen. If, despite the observance of all safety precautions, refrigerant gas does escape, an almost negligible risk of asphyxiation may occur in poorly ventilated rooms and inspection pits.

Note:

The mixture of gas and air which forms when refrigerant gas escapes must not be inhaled - it must be extracted using suitable extraction systems (workshop extractor).

Welding, brazing and soldering must not be performed on parts of the filled air conditioner. The same applies to welding and soldering work on the vehicle if there is a risk that parts of the air conditioner could become warm.

Reason:

The application of heat creates a severe build-up of pressure in the system which could cause it to burst.

Remedy:

Drain refrigerant circuit (=>Page 148).

Note:

Damaged or leaking parts of air conditioner may not be repaired by welding or soldering - they should be replaced.

During repair work on air conditioner, all open components and pipe connections in air conditioner should be re-sealed immediately.

Reason:

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Moisture penetrates air conditioner components left open for a lengthy period. Air conditioners which have been left open for a lengthy period cannot, therefore, be re-filled without replacing parts of the system.

Painting work on vehicles with air-conditioner

When carrying out paintwork repairs, ensure that the vehicle is not exposed to temperatures of more than 80 °C in the drying ovens or their preheating zones.

Reason:

The application of heat creates a severe build-up of pressure in the system which could cause it to burst.

2 - Notes on general repairs

2.1 - Notes on general repairs

The air conditioner refrigerant circuit may only be emptied and opened (=> Page 149) or if it is necessary to replace parts of the air conditioner refrigerant circuit.

Air-conditioner refrigerant circuit must remain closed during all other normal repair operations.

Repair work which may be performed on heater and air conditioner without opening refrigerant circuit is described in this workshop manual => Page 150 onwards.

Note:

Connections for switches described in this workshop manual are fitted with a valve which closes automatically when switches are unscrewed. These switches may therefore be replaced in any VW/Audi workshop without draining the refrigerant circuit.

Repair work on air conditioner that requires refrigerant circuit to be drained and hence cannot be performed in every VW/Audi workshop, is described on => Page 222 onwards (vehicles should be sent to an VW/Audi air-conditioning service centre for the refrigerant circuit to be drained).

Repair work on the air-conditioner involving the refrigerant circuit can be performed in a VW and Audi air-conditioning service centre only.

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Note:

VW and Audi air-conditioning service centres have the requisite equipment, tools and information material for performing repair work on the refrigerant circuit.

=> Air conditioner - with refrigerant R12

=> Air conditioner - with refrigerant R134a

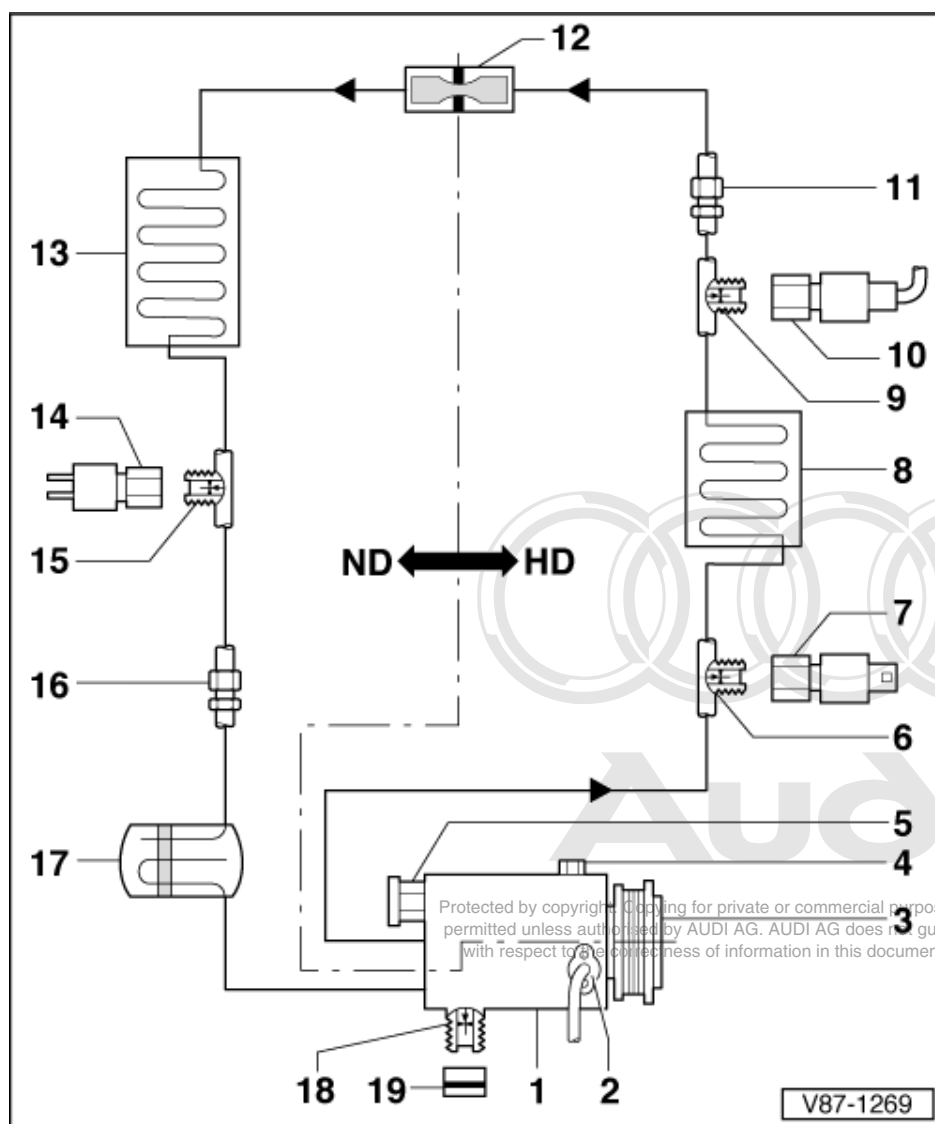
3 - Servicing of refrigerant circuit

3.1 - Servicing of refrigerant circuit

Notes:

- ♦ If dealing with the complaint of "Smell from air conditioner" => Page 166 .
- ♦ Servicing of refrigerant circuit => Page 222 onwards.
- ♦ All parts/operations marked 1) may be repaired, replaced or performed in any VW/Audi workshop (work which does not affect the refrigerant circuit).
- ♦ All parts of the refrigerant circuit not marked with 1) and all refrigerant hoses and pipes may only be repaired or replaced in an VW/Audi air-conditioning service centre.

3.2 - Refrigerant circuit with refrigerant R12 > 09.92



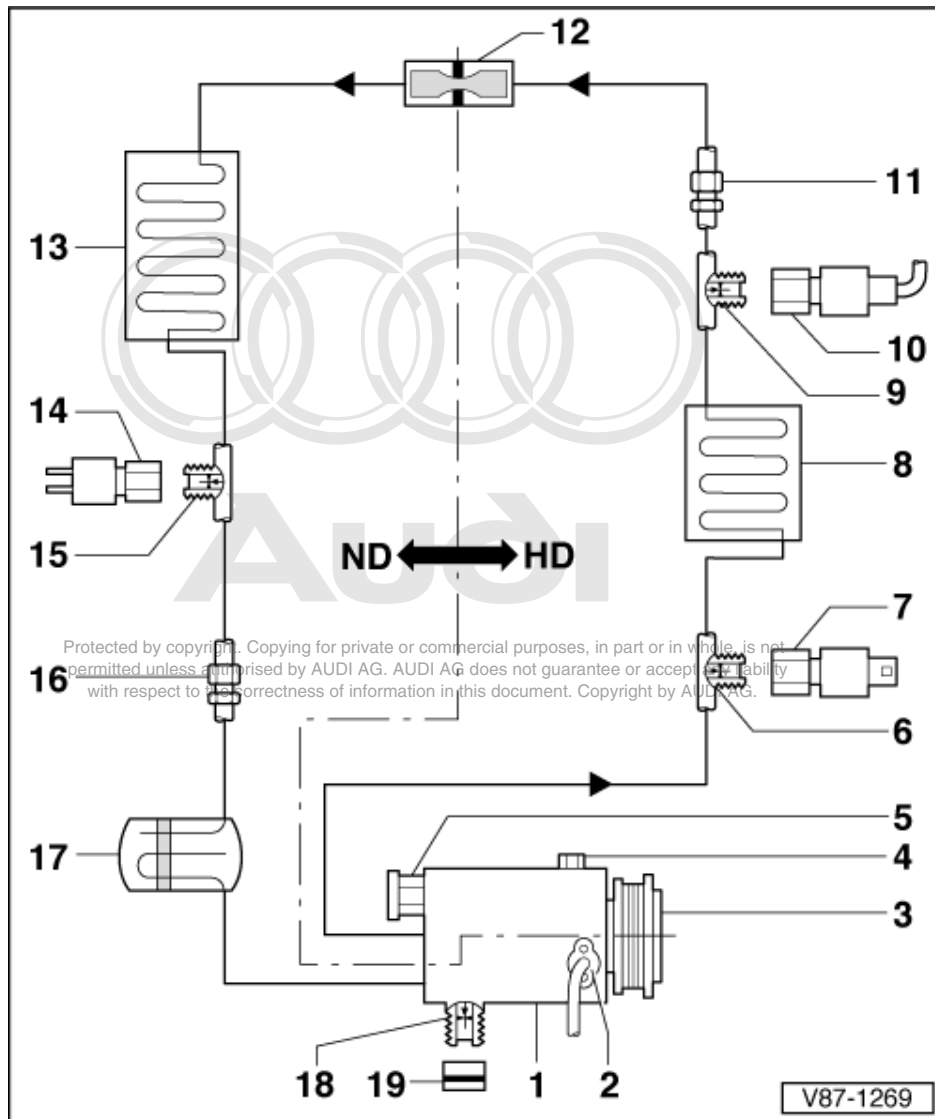
HD = High-pressure end

ND = Low-pressure end

1 Compressor

- ◆ Removing compressor from and attaching it to bracket/removing and installing compressor bracket 1):
 - 4-cyl. engine with V-belt => Page 168 onwards
 - 4-cyl. engine with ribbed V-belt => Page 168 onwards
 - 6-cyl. engines => Page 174
- ◆ Removing compressor from/attaching it to bracket 1):
 - 5-cyl. engine => Page 173
- ◆ A heat protection mat must be fitted to refrigerant pipes on vehicles with 6-cyl. engine to protect O-ring-seals. Part number:

=> Parts Catalogue



2 Air conditioner compressor speed sender -G111.

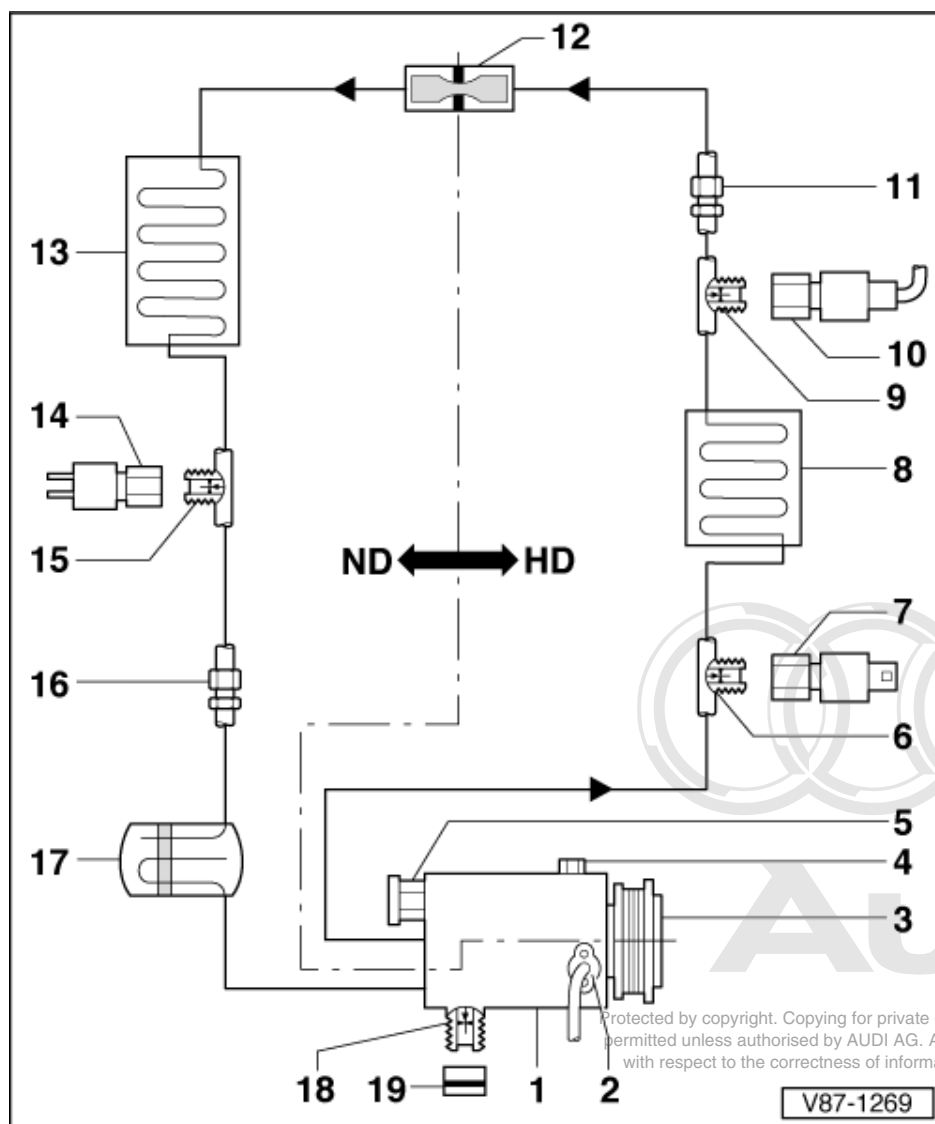
- ♦ Only on vehicles with compressor driven by ribbed V-belt on which ribbed V-belt also drives other ancillaries.
- ♦ Testing 1) => Page 53
- ♦ May only be removed if refrigerant circuit is empty; send vehicle to an VW/Audi air-conditioning service centre

3 Magnetic clutch -N25 1)

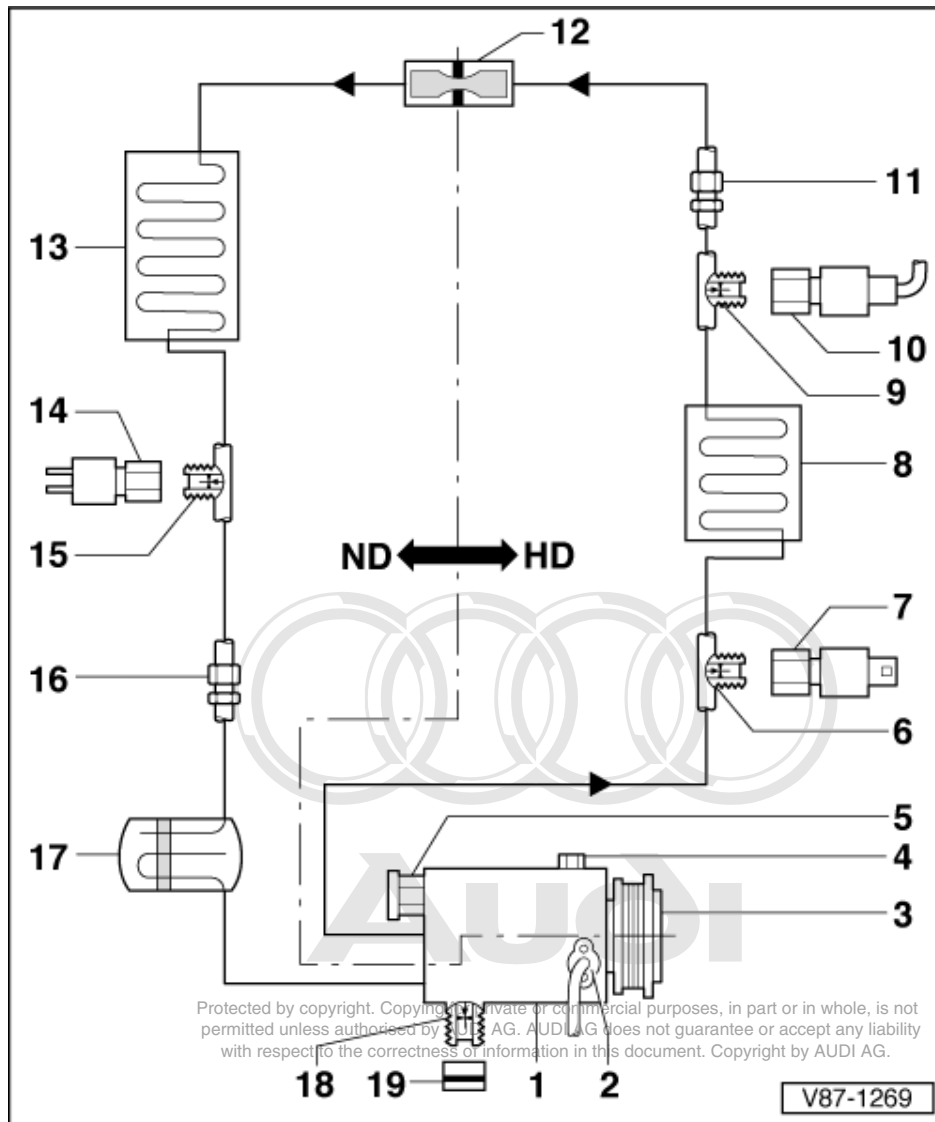
- ♦ Cannot be switched on when engine not running
- ♦ Kickdown deactivation through kickdown switch -F46 or through engine control unit or automatic gearbox control unit

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- ♦ Servicing => Page 180 onwards.



- 4 Oil drain plug
- 5 Pressure relief valve
- 6 Connection with valve
- 7 High-pressure switch for magnetic clutch -F118 1)
 - ◆ Switches magnetic clutch off in event of excessive pressure in refrigerant circuit
 - ◆ Switches off at pressure of 28.2 ... 31.0 bar (switch opens)
 - ◆ Switches on at pressure of 10.3 ... 17.2 bar
 - ◆ Location: On left at condenser
 - ◆ Red connector housing; with welded connection cables
 - ◆ Removing and installing => Page 1

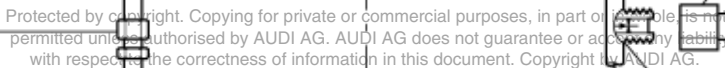
**8 Condenser**

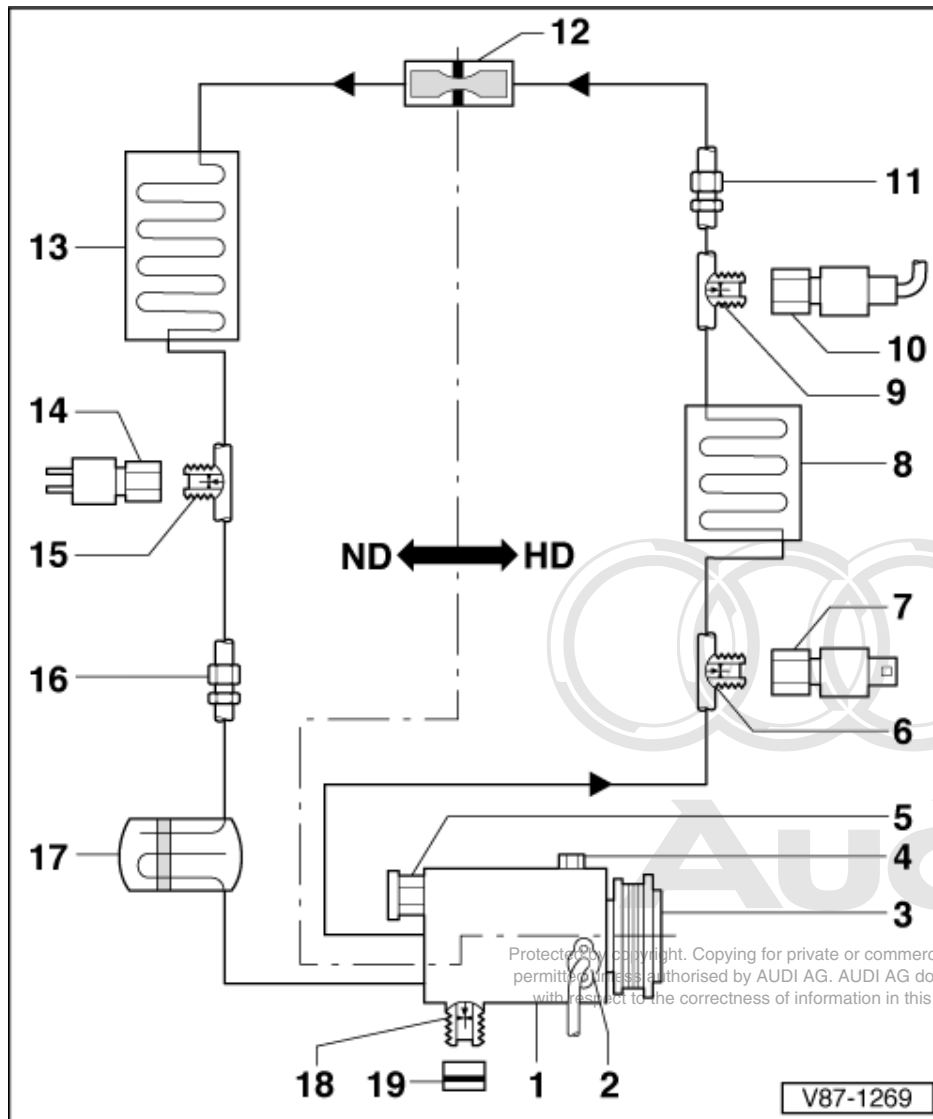
- ♦ Can be tilted forward with radiator to achieve better access

=> Engine mechanical components; Repair group 19

9 Connection with valve**10 High-pressure switch for air conditioner -F23 1)**

- ♦ Switches radiator fan -V7 to stage 2
- ♦ Switches on at pressure of 13.1 ... 17.5 bar (switch closes)
- ♦ Switches off at pressure of 10.6 ... 15.0 bar
- ♦ Difference in pressure between the switching points: at least 2 bar
- ♦ Location: On left at condenser
- ♦ Green connector housing; with welded connection cables.
- ♦ Removing and installing => Page 4





15 Connection with valve

16 Union

- ◆ In refrigerant pipe
- ◆ Only on vehicles with 5-cyl. engine

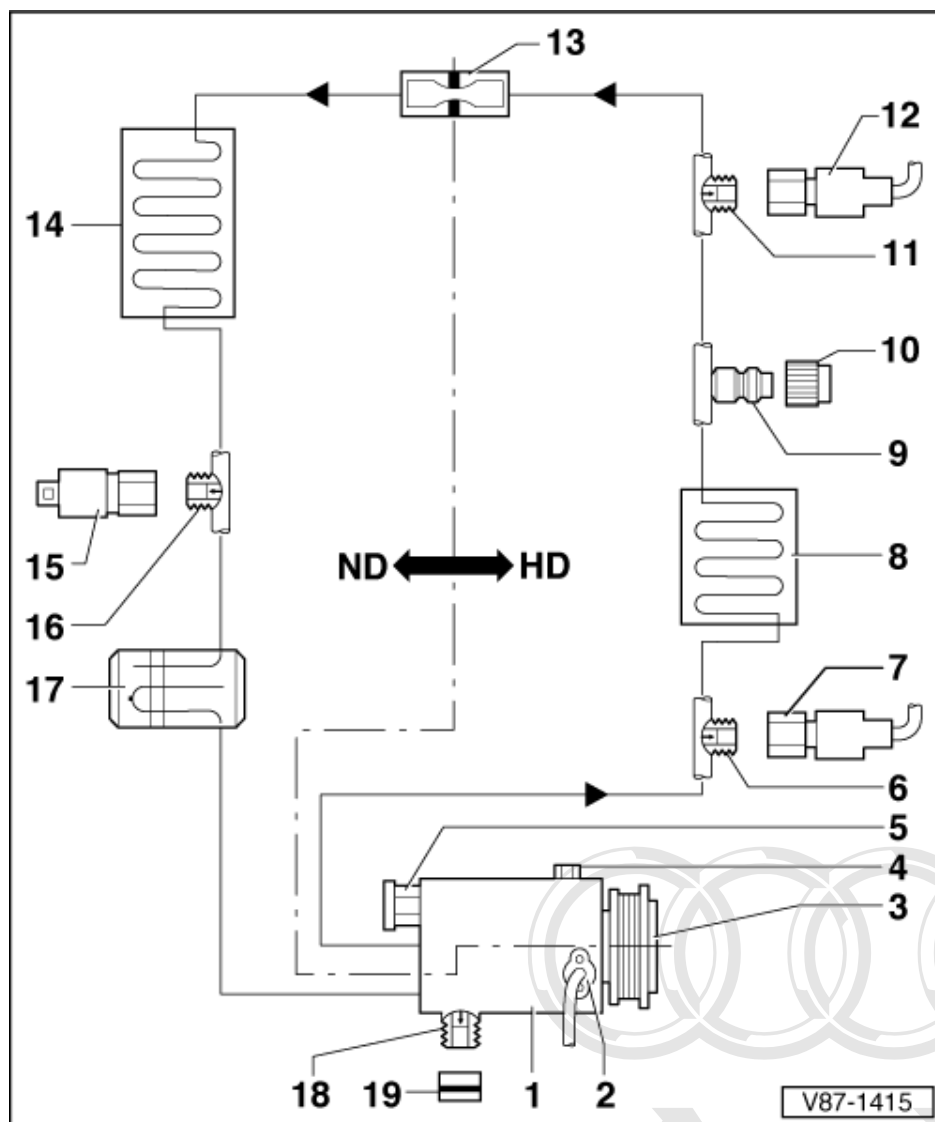
17 Receiver

18 Connection with valve

19 Cap

- ◆ With seal
- ◆ Must be fitted

3.3 - Refrigerant circuit with refrigerant R134a 10.92 ä



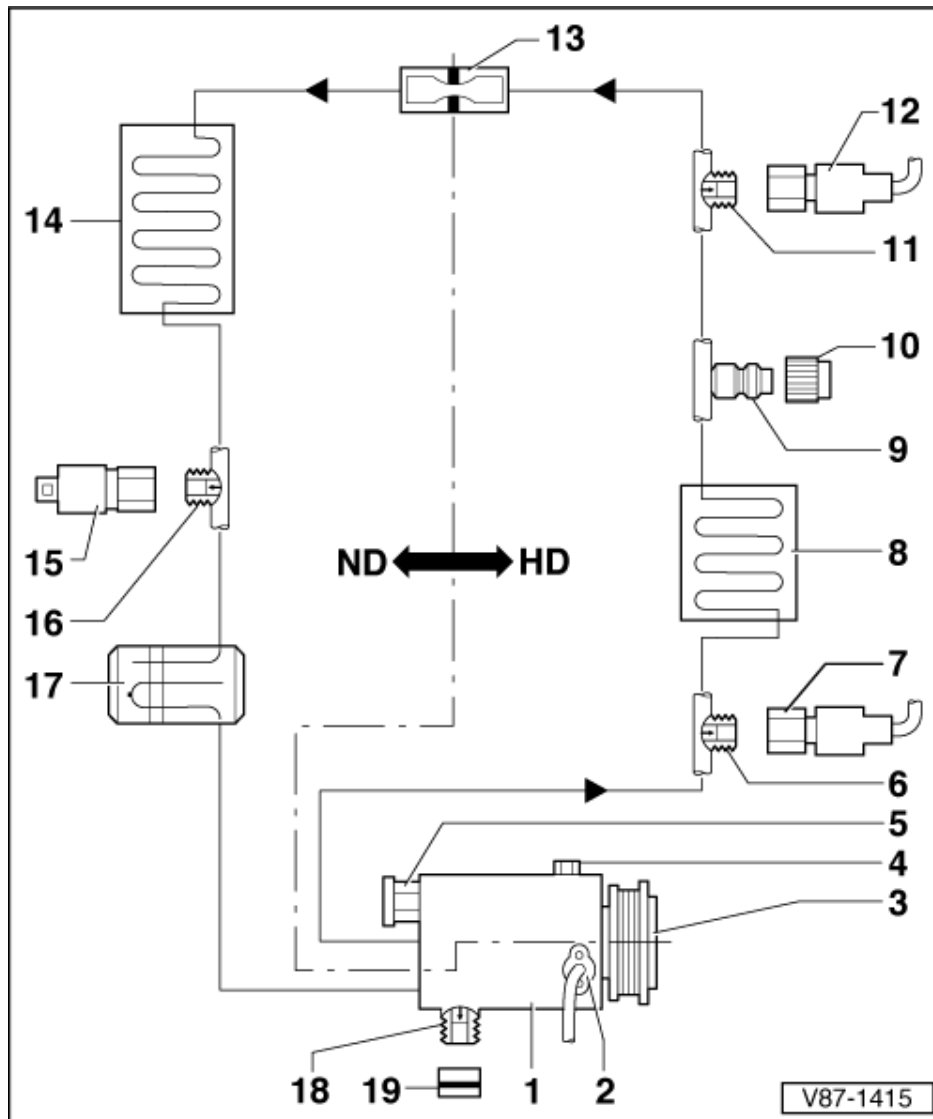
HD = High-pressure end

ND = Low-pressure end

1 Compressor

- ♦ Manufacturer Zexel or Nippondenso (only vehicles with 6- and 8-cyl engine 06.95 ä; gradual introduction)
- ♦ Removing compressor from and attaching it to bracket/removing and installing compressor bracket 1):
 - 4-cyl. engine with V-belt => Page 168 onwards
 - 4-cyl. engine with ribbed V-belt => Page 168 onwards
 - 6-cyl. engines => Page 174 onwards

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- ♦ A heat protection mat must be fitted to refrigerant pipes on vehicles with 6-cyl. engine to protect O-ring-seals. Part number:

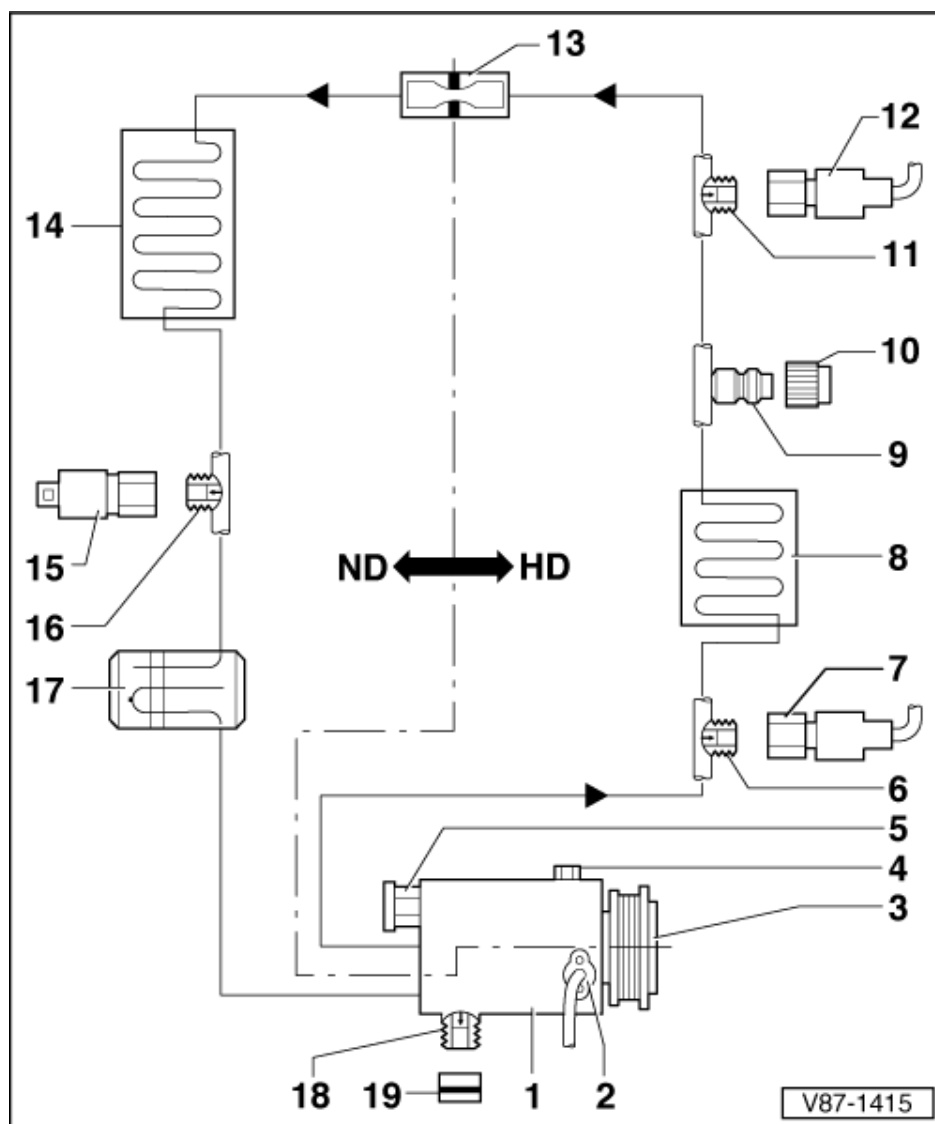
=> Parts Catalogue

- ♦ Removing compressor from/attaching it to bracket 1):
- 5-cyl. engine => Page 173
- 8-cyl. engine => Page 179

2 Air conditioner compressor speed sender -G111.

- ♦ Only on Zexel compressor with ribbed V-belt where ribbed V-belt also drives other ancillaries.
- ♦ Testing 1) => Page 53
- ♦ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air-conditioning service centre

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3 Magnetic clutch -N25 1)

- ♦ Cannot be switched on when engine not running
- ♦ Kickdown deactivation through kickdown switch -F46 or through engine control unit or automatic gearbox control unit

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

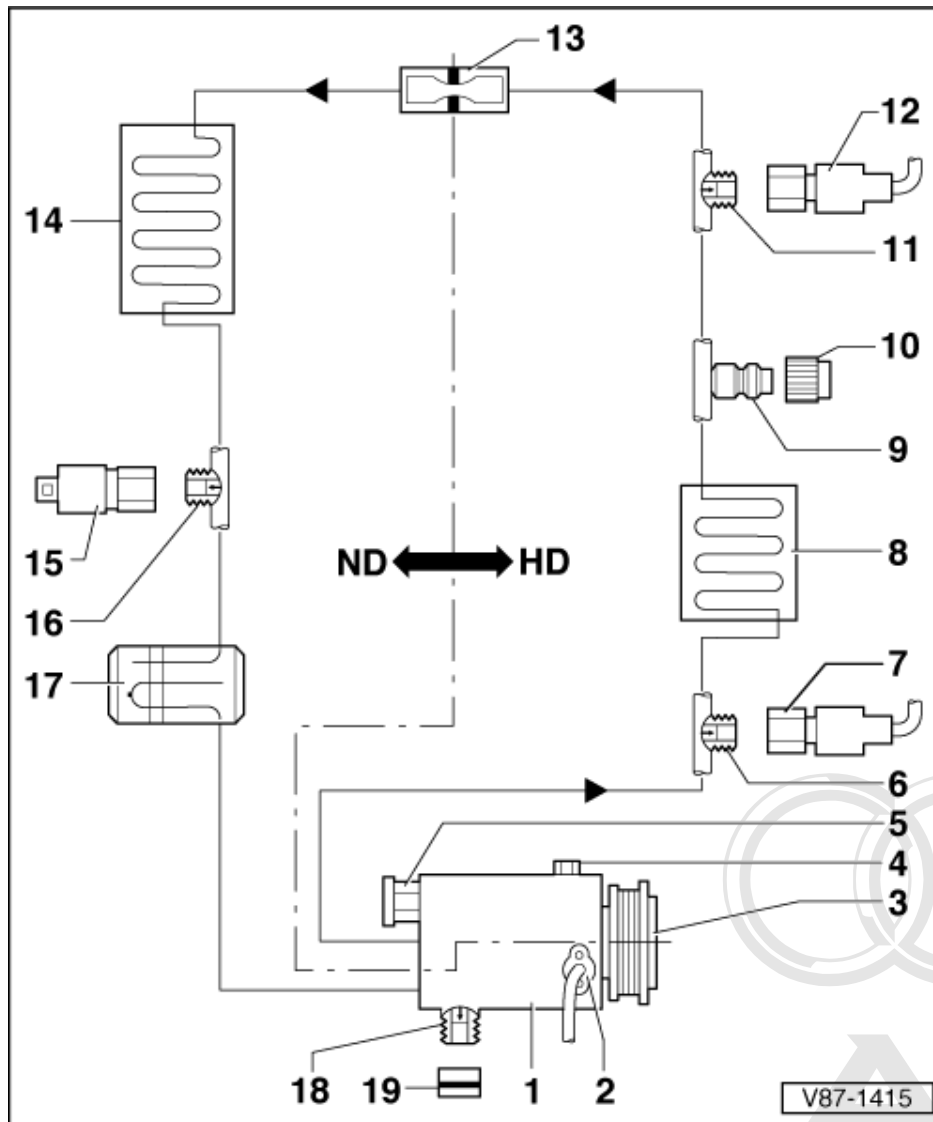
- ♦ Servicing => Page 180 onwards.

4 Oil drain plug

5 Pressure relief valve

6 Connection with valve

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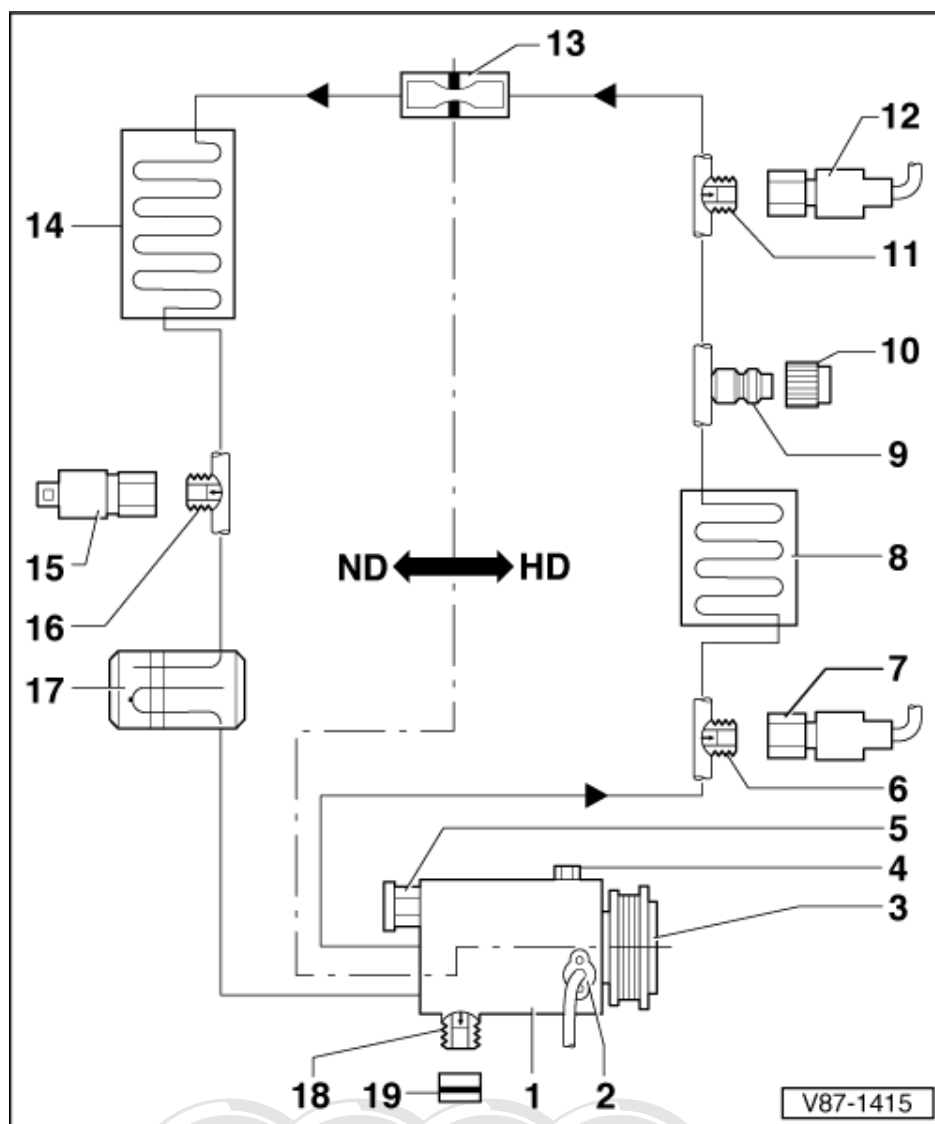
7 High-pressure switch for magnetic clutch -F118 1)

- ◆ Switches magnetic clutch off in event of excessive pressure in refrigerant circuit
- ◆ Switches off at pressure of 28.2 ... 31.0 bar (switch opens)
- ◆ Switches on at pressure of 10.3 ... 17.2 bar
- ◆ Red housing colour; with welded connection cables
- ◆ Location: On left at condenser
- ◆ Removing and installing => Fig. 1

8 Condenser

- ◆ Can be tilted forward with radiator to achieve better access

=> Engine mechanical components; Repair group 19



9 Service connection

- ♦ For measurement, drainage and filling at VW/Audi air-conditioning service centres
- ♦ Fitting location => Fig. 5

10 Cap

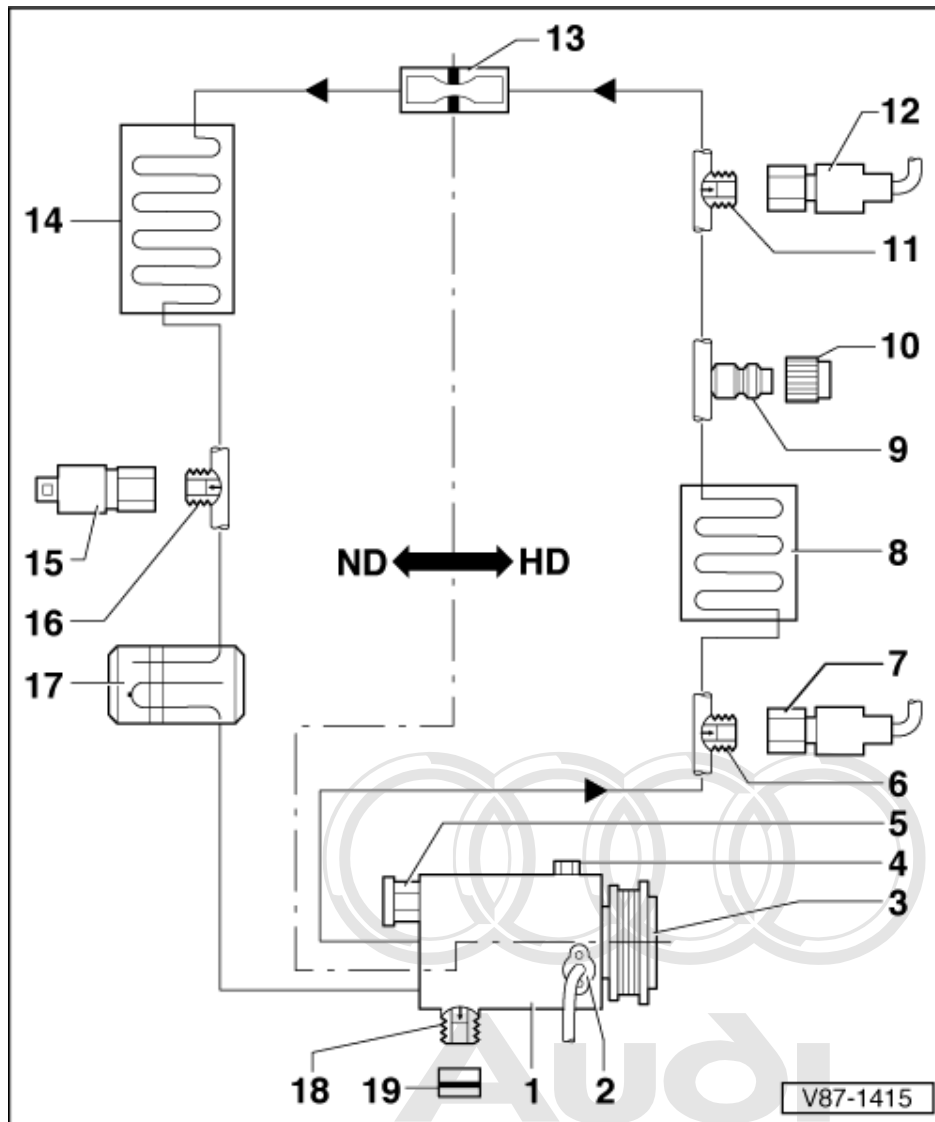
- ♦ With seal
- ♦ Must be fitted

11 Connection with valve

12 High-pressure switch for air conditioner -F23 1)

- ♦ Switches on at pressure of 14.2 ... 17.4 bar (switch closes)
- ♦ Switches off at pressure of 11.7 ... 15.0 bar
- ♦ Difference in pressure between the switching points: at least 2 bar
- ♦ Removing and installing => Fig. 4

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**13 Restrictor****14 Evaporator**

- ♦ Cleaning => Page 167

15 Low-pressure switch for air conditioner -F731)

- ♦ Removing and installing => Fig. 3

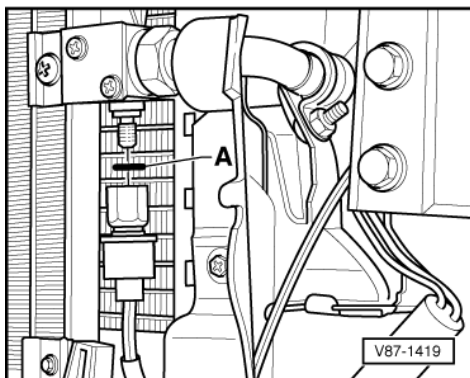
16 Connection with valve**17 Receiver****18 Connection with valve**

- ♦ On vehicles with Zexel compressor only

19 Cap

- ♦ With seal
- ♦ Must be fitted

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-> Fig.1 Removing and installing magnetic clutch high-pressure switch -F118

Removal:

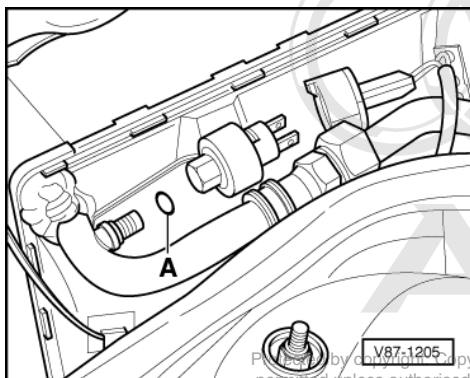
- Remove switch, refrigerant circuit remains closed (valve)

Installation:

- Replace O-ring seal -A- => Page 165 .
- Tighten switch to 5 Nm.

Note:

Different thread on version for refrigerant R12 and refrigerant R134a.



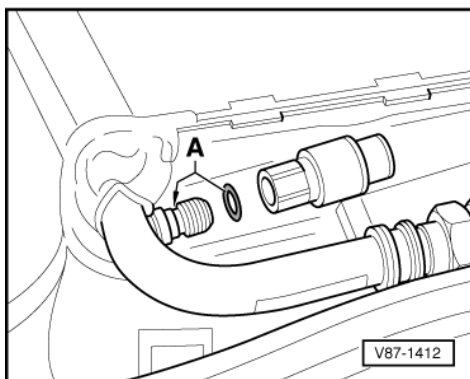
-> Fig.2 Removing and installing low-pressure switch for air conditioner -F73 (refrigerant R12)

Removal:

- Remove water deflector.
- Remove switch, refrigerant circuit remains closed (valve)

Installation:

- Replace O-ring seal -A- => Page 165 .
- Tighten switch to 5 Nm.





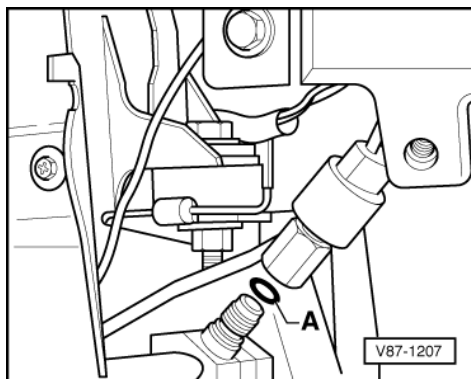
-> Fig.3 Removing and installing low-pressure switch for air conditioner -F73 (refrigerant R134a)

Removal:

- Remove water deflector.
- Remove switch, refrigerant circuit remains closed (valve)

Installation:

- Replace O-ring seal -A- => Page 165 .
- Tighten switch to 5 Nm.



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-> Fig.4 Removing and installing high-pressure switch for air conditioner -F23

Removal:

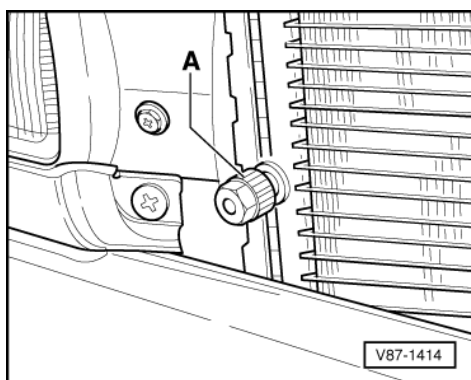
- Remove switch, refrigerant circuit remains closed (valve)

Installation:

- Replace O-ring seal -A- => Page 165 .
- Tighten switch to 5 Nm.

Note:

Different thread on version for refrigerant R12 and refrigerant R134a.



➔ Fig.5 Service connection

Notes:

- ◆ It is important to always screw on cap -A- (with seal).
- ◆ Identifies a refrigerant circuit which has been developed for refrigerant R134a.

O-ring seals for refrigerant circuit

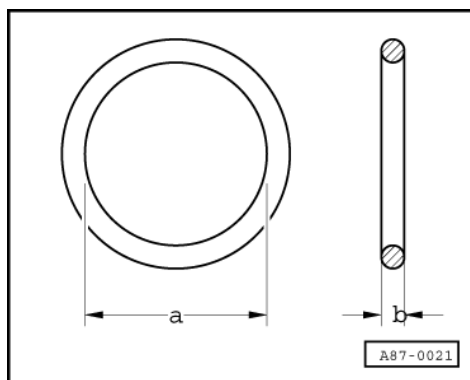
- ◆ Only use once and then replace.
- ◆ Moisten with refrigerant oil before use.
- ◆ Ensure that they are positioned correctly on the pipe or in the groove.
- ◆ Take care to avoid dirt.

Notes:

- ◆ Only O-ring seals which are resistant to the refrigerant R12 and R134a and the associated refrigerant oil (mineral oil or PAG oil) may be installed. These O-ring seals are colour-coded to prevent confusion:
Black, for refrigerant R12;
Red, lilac or violet, for refrigerant R134a. Part numbers:

⇒ Parts Catalogue

- ◆ In addition to coloured O-ring seals for refrigerant circuit filled with refrigerant R134a, , black O-rings are also used during production for certain connections.



➔ Assignment of O-ring seals

O-ring seal for	Dim. a mm	Dim. b mm
Refrigerant R12		
High-pressure switch for air conditioner -F23	9.3	1.8
High-pressure switch for magnetic clutch - F118	9.3	1.8
Low-pressure switch for air conditioner -F73	9.3	1.8
Refrigerant R134a		
High-pressure switch for air conditioner -F23	7.6	1.8
High-pressure switch for magnetic clutch -F118	7.6	1.8
Low-pressure switch for air conditioner -F73	8.9	1.8

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3.4 - Complaint of "smell from air conditioner"

Determining cause of smell

The cause of the smell problem from air conditioner may be:

- ♦ Smell of combusted oil as a result of leaks at engine or gearbox
- ♦ Smell of sulphur as a result of leaks at exhaust system
- ♦ Fishy smell as a result of leaks at cooling system
- ♦ Smell of scorched clutch
- ♦ Fogging from foot mats, seat covers etc.
- ♦ Rotting, musty smell caused by accumulation of impurities in plenum chamber (leaves) or on evaporator fins

Determining location of smell

Test requirements:

- Condensation drain hose should always be routed descending and free of kinks; the connections between individual components must not be sticking together.
- Condensate drain valve must not be gummed up with wax or underseal; it must close properly.
- Plenum chamber should be clean, remove any impurities if necessary.
- Water drain in plenum chamber must not be blocked, clean or repair, as necessary.
- Take the vehicle for a test drive.
- Operate air conditioner alternately in fresh air and recirculated air mode.
- If a musty, rotting smell is present in fresh and recirculated air mode, clean evaporator => Page 167 .

Note:

If a fishy smell is present both in fresh air as well as in recirculated air mode, inspect cooling system (heat exchanger) for leaks.

Special tools, testers and auxiliary equipment required

- ♦ Pressure gun with cup V.A.G 1538 with flexible hook probe V.A.G 1538/1
- ♦ 50 ml cleaning solution for evaporator of air conditioner D 100 110 A2

Precautionary measures when handling pressure gun with cup V.A.G 1538 and cleaning solution D 100 110 A2

- Operate pressure gun with cup as specified in operating instructions and observe safety precautions.

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Cleaning solution must only be sprayed with a pressure gun with cup in which there are no residues of any other substances (use a new pressure gun with cup).

- When handling the cleaning solution, protect your hands by wearing rubber gloves and your eyes by wearing eye protection.
- Thin the cleaning solution before use with water => , Page 167 , Preparing solution for use.
- Store the cleaning solution in original container in a cool place.

Warning

- ♦ If any cleaning solution gets into your eyes, rinse your eyes thoroughly with water and then contact a doctor without delay.
- ♦ The doctor should be informed of the fact that the injury has been caused by a cleaning solution (present original container).
- ♦ If, despite observing all the safety precautions, cleaning solution gets onto your skin or clothes, rinse these thoroughly and immediately with water.

Preparing solution for use

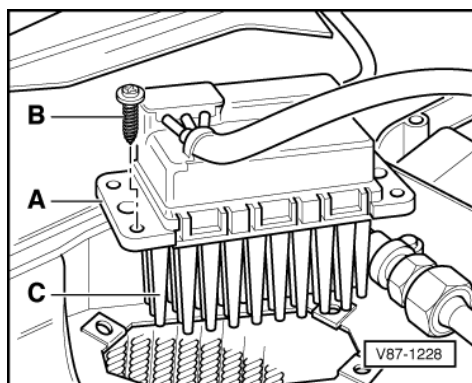
- Fill 50 ml of the cleaning solution for evaporator of air conditioner D 100 110 A2 into pressure gun with cup V.A.G 1538 (capacity of cup 1 l).
- Fill pressure gun and cup with drinking water.

Notes:

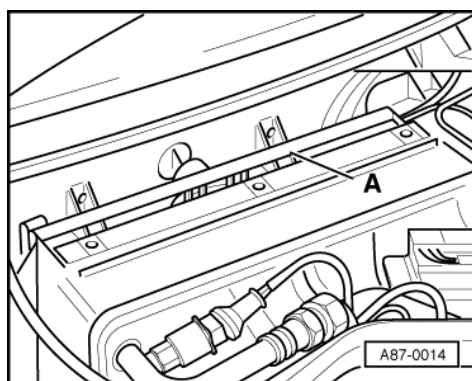
- ♦ A 5% solution is adequate for cleaning evaporator fins. Do not use a solution with a higher concentration.
- ♦ There must not be any residues of any other substances in cup of pressure gun when it is used for cleaning evaporator fins.

Cleaning evaporator

Vehicles without dust and pollen filter:



- Switch off ignition.
- Remove water deflector.
- Remove cover for evaporator (vehicles with manual air conditioner).
- -> Or, remove fresh-air blower control unit -A- (vehicles with fully automatic air conditioner).
- Remove recirculated-air flap => Fig. 199 .
- Inspect evaporator for foreign bodies.



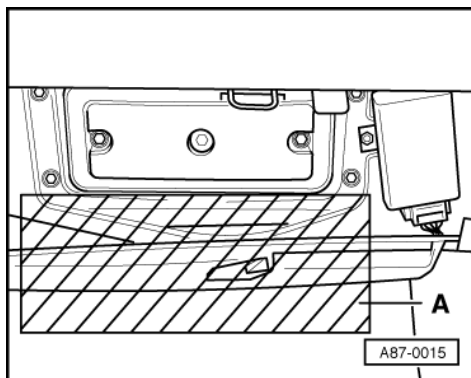
Vehicles with dust and pollen filter 06.94 ä:

- Remove dust and pollen filter and replace if it is dirty => Page 86 onwards.
- -> Evaporator can be cleaned through insertion slot for dust and pollen filter -A-.
- Switch off ignition.



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All vehicles:



- -> Cover over footwell outlet on passenger side and carpeting in area -A- (below recirculated-air flap) with sheeting impermeable to liquids and absorbent paper.
- Place collecting tray VW 1306 below car in area of condensate drain valve.
- Prepare solution for use => Page 167 .
- Connect pressure gun with cup V.A.G 1538 to workshop compressed air system by means of a pressure reducer.
 - Working pressure: max. 6 bar
- Thoroughly and fully spray evaporator fins through recirculated-air opening and opening for control unit.

Notes:

- ◆ Use hook probe V.A.G 1538/1.
- ◆ Spray the entire contents of the cup.
- ◆ Do not spray toward heater.
- ◆ Do not spray any other components.
- ◆ Clean carpeting immediately and thoroughly if it has been moistened with cleaning solution.
- Leave solution for 15 minutes to allow it to have an effect.
- Wash out pressure gun and cup.
- Fill pressure gun and cup with drinking water and flush out evaporator with at least 2 l of drinking water
- Re-install removed parts.
- Start the engine.
- Operate air conditioner for 5 minutes at maximum fresh-air blower speed in fresh air mode.
- Before removing sheeting and paper, continue running air conditioner for a short time in recirculated-air mode so that any fluid which may have gathered at recirculated-air flap, runs off.

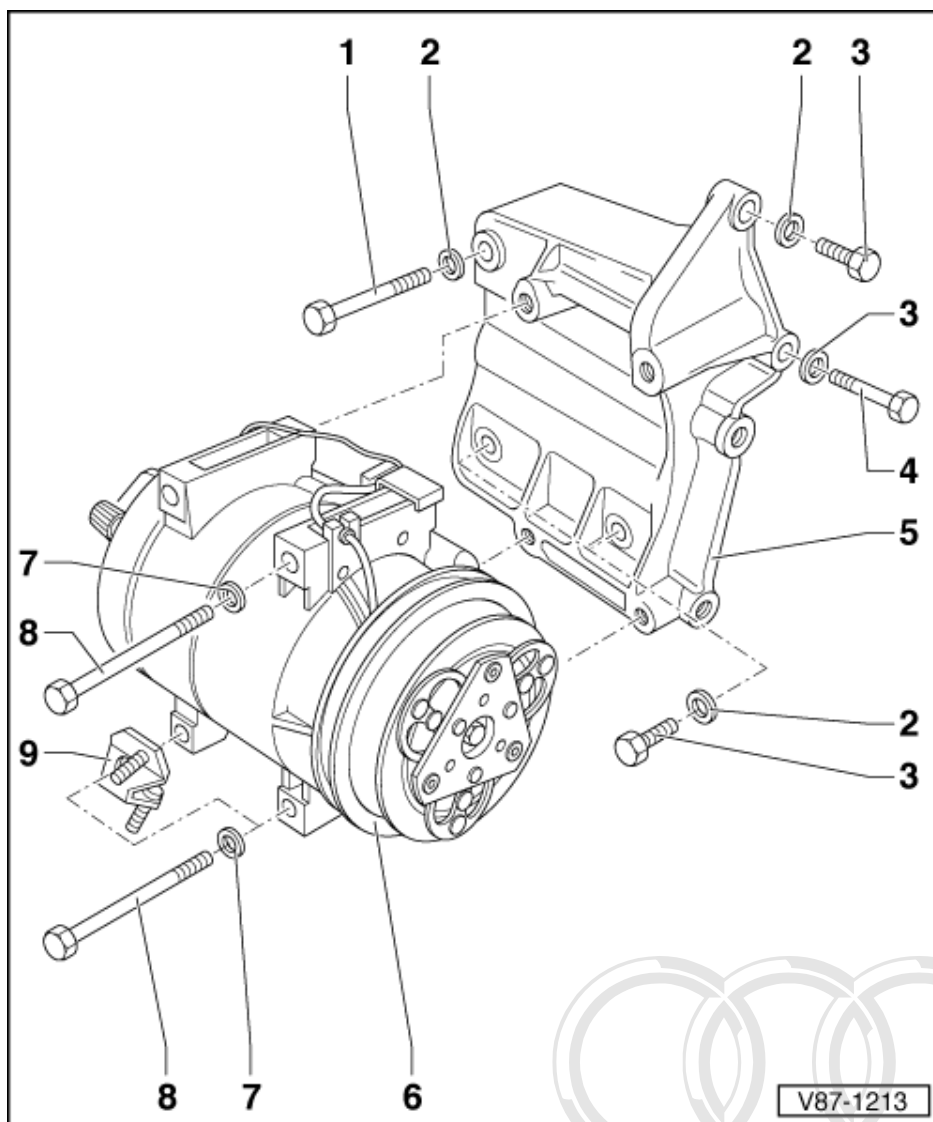
4 - Removing compressor from and attaching it to bracket; removing and installing compressor bracket

4.1 - Removing compressor from and attaching it to bracket; removing and installing compressor bracket

Notes:

- ◆ You may remove and install compressor bracket without opening refrigerant pipes.
- ◆ Do not drain refrigerant circuit, do not detach refrigerant hoses and lines at compressor.
- ◆ After removal, secure compressor with a wire, for example, to side member. Do not leave compressor hanging from the refrigerant pipes.
- ◆ Mark direction of rotation with chalk or felt pen before removing ribbed belt. If belt rotates in the wrong direction when it is refitted, this can cause breakage.

4.2 - 4-cylinder engine with V-belt



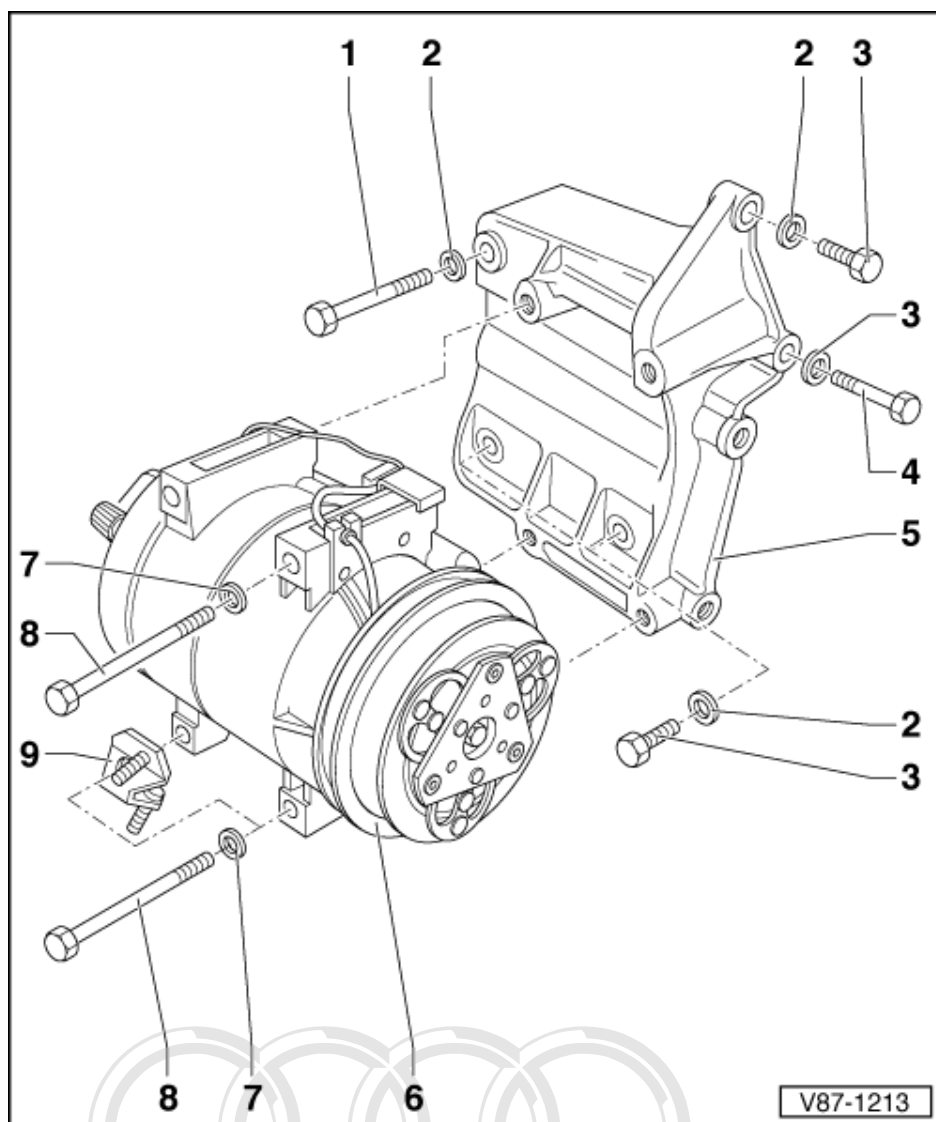
- Pay attention to notes => Page 168 .
- Remove noise insulation.

=> General body repairs; Repair group 50; Front body; Removing and installing noise insulation Front body
 Removing and installing noise insulation

- Tension V-belt for compressor => Page 170 .

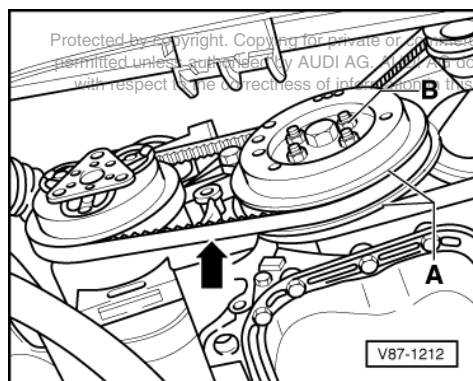
- 1 Bolt - 25 Nm
- 2 Washer
- 3 Bolt - 25 Nm
- 4 Bolt - 25 Nm

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- 5 Compressor bracket
- 6 Compressor with magnetic clutch
- 7 Washer
- 8 Bolt - 25 Nm
- 9 Bracket
 - ♦ For refrigerant hoses

Tensioning V-belt for compressor



Notes:

- ♦ -> The belt pulley of crankshaft is split. The belt is tensioned and slackened by inserting more or fewer shims between the halves of the belt pulley -A-.
- ♦ The compressor is attached rigidly to the engine.

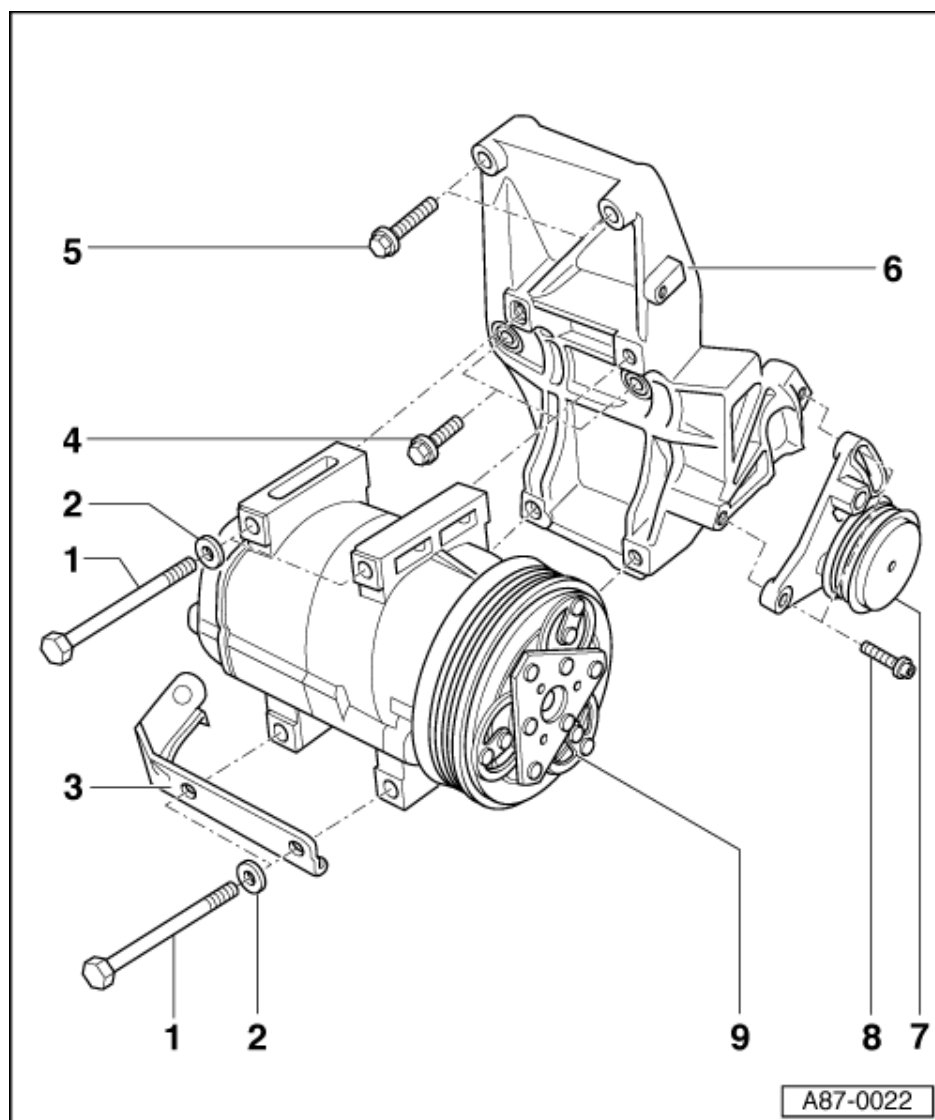
- Remove noise insulation.

=> General body repairs; Repair group 50; Front body; Removing and installing noise insulation Front body
Removing and installing noise insulation

- Inspect tension of V-belt:
 - Specification: If a pressure of about 50 N is applied, belt should deflect 5 mm.
- Take off excess shims in front of and behind halves of belt pulley.
- Tighten the 4 nuts -B- of the two pulley sections in stages while rotating crankshaft.
 - As the bolts are tightened, the V-belt should gradually move outwards until seated on the contact surface.
- Tighten nuts to 20 Nm.

4.3 - 4-cylinder engine with ribbed V-belt

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- Pay attention to notes => Page 168 .



- Remove noise insulation.

=> General body repairs; Repair group 50; Front body; Removing and installing noise insulation Front body
Removing and installing noise insulation

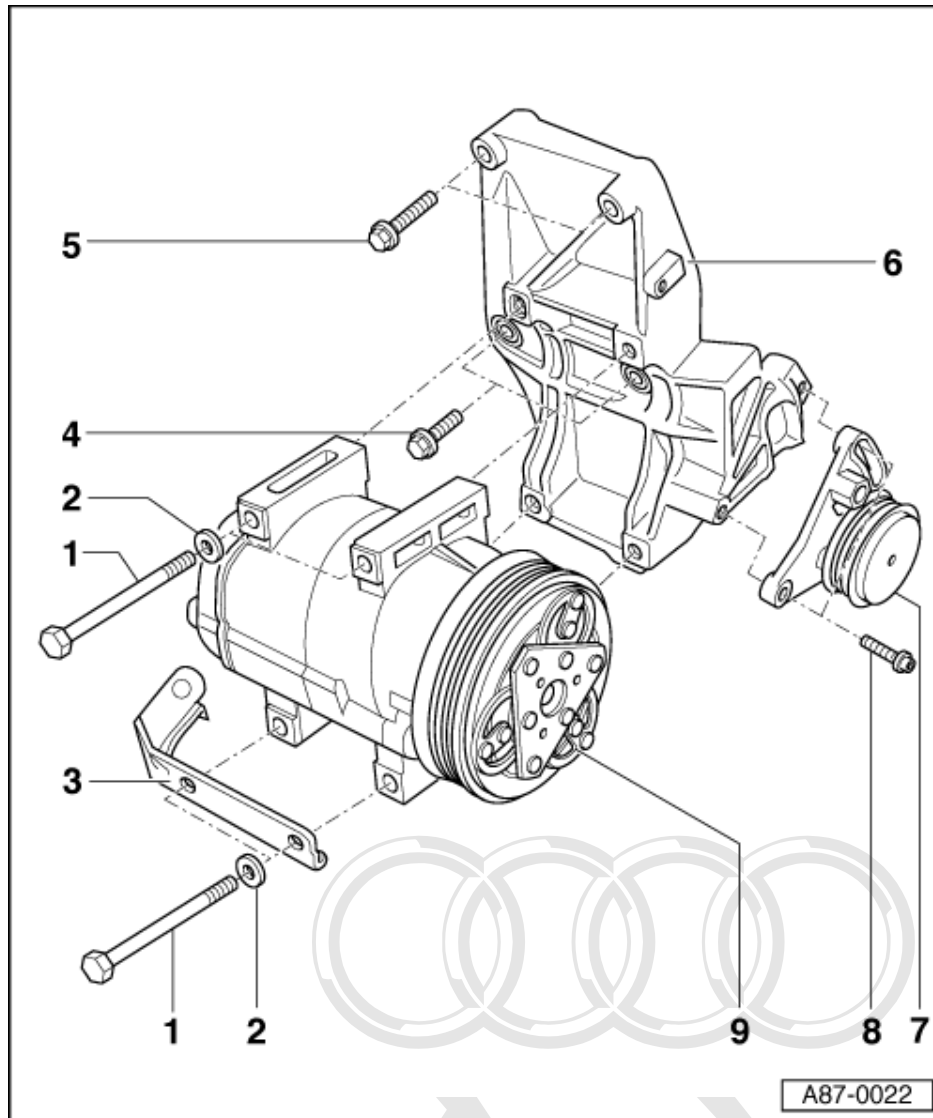
- Removing and installing ribbed belt => Page **173** .

1 Bolt - 25 Nm

2 Washer

3 Bracket

- ♦ For refrigerant hoses
- ♦ First attach to the clip of the refrigerant hoses



4 Combi screw - 25 Nm

5 Combi screw - 25 Nm

6 Compressor bracket

- ♦ Check that the locating sleeve for the compressor is seated correctly
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7 Tensioning roller

- ♦ For ribbed belt

**8 Hexagon socket-head bolt
- 20Nm**

9 Compressor with magnetic clutch

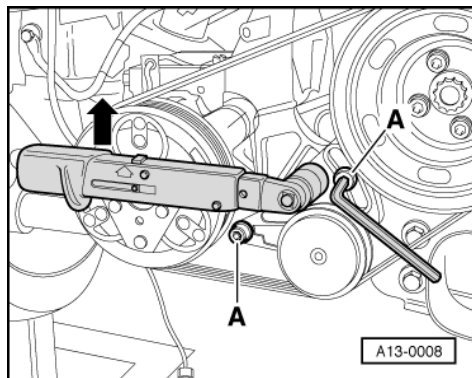
Removing and installing ribbed belt for compressor

Removal:

- Remove noise insulation.

=> General body repairs, Repair group 50; Front body; Removing and installing noise insulation

- Mark direction of rotation of ribbed V-belt with chalk or felt pen.



- -> Loosen screws -A-.

Installation:

- Fit on ribbed V-belt and ensure it is correctly located in pulleys.
- Attach torque wrench at tensioning pulley, as shown in illustration.
- Pre-tension ribbed V-belt by turning in direction of arrow with a torque of 25 Nm using a torque wrench.
- Tighten screws -A- to 20 Nm with ribbed V-belt tensioned.

4.4 - 5-cylinder engine

Removing compressor from/attaching it to bracket

Removal:

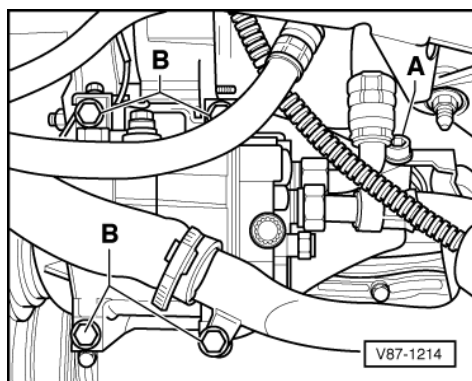
- Pay attention to notes => Page 168 .
- Remove noise insulation.

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=> General body repairs, Repair group 50; Front body; Removing and installing noise insulation

- Mark direction of rotation of ribbed V-belt with chalk or felt pen.
- Slacken off the ribbed belt:

=> Engine mechanical components; Repair group 13





- -> Remove screw -A- at bracket for coolant pipe.
- Unplug connector between magnetic clutch, air conditioner compressor speed sender and vehicle.
- Remove bolts -B-.

Installation:

- Centre compressor in slots before tightening bolts -B- (25 Nm).
- Tighten screw -A- to 40 Nm.

4.5 - 6-cylinder engines

Notes:

- ♦ Zexel and Nippondenso compressors have different ribbed belts. Assignment:

=> Parts Catalogue

- ♦ A mat must be attached to the refrigerant pipes to protect the O-ring- seals from the radiant heat of the exhaust manifold. Part number:

=> Parts Catalogue

- Pay attention to notes => Page 168 .
- Remove radiator fan.
- Detach bracket for refrigerant pipe => item -A-, Fig. 1 .
- Remove the oil filter and oil cooler. Protect the sealing surfaces from damage

=> Engine mechanical components; Repair group 17

- Mark direction of rotation of ribbed V-belt with chalk or felt pen.
- Slacken off the ribbed belt:

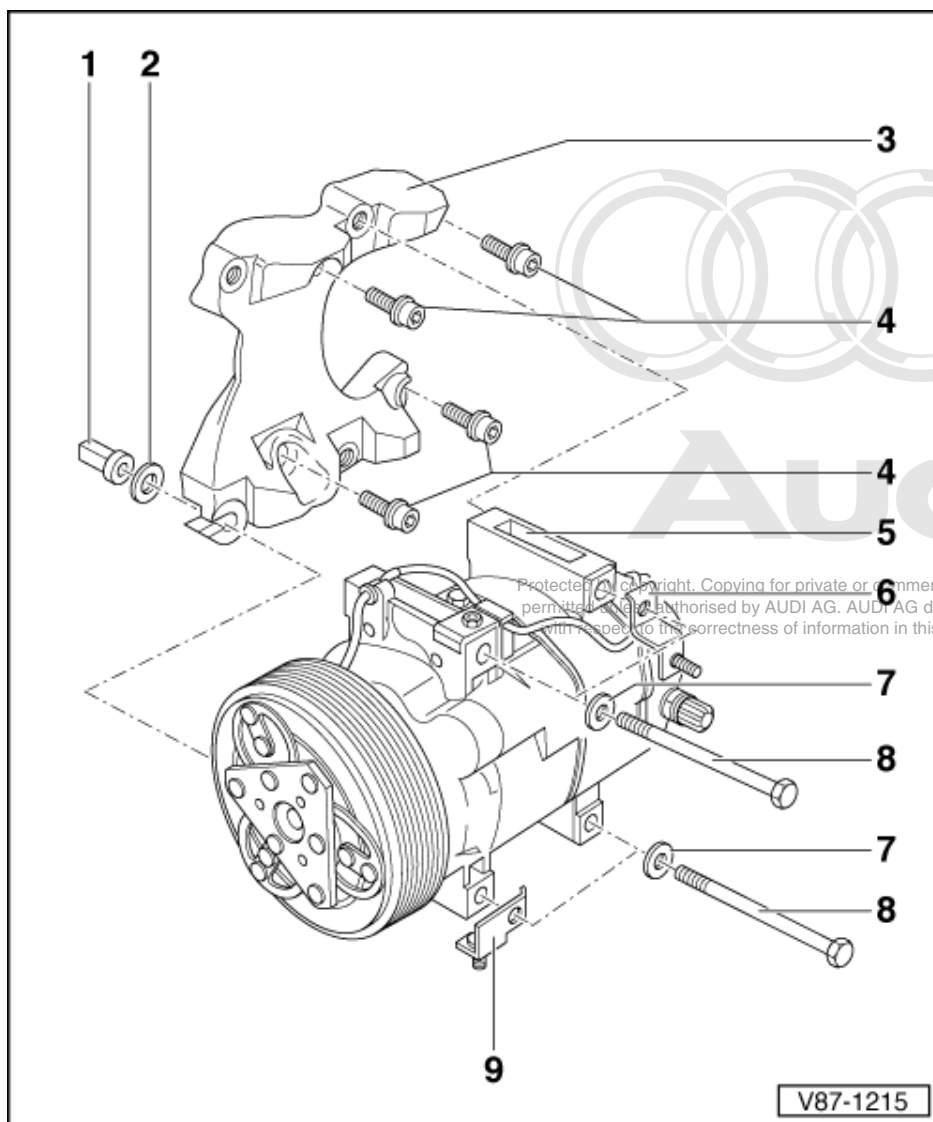
=> Engine mechanical components; Repair group 13

- Before installing ribbed V-belt, inspect alignment of pulleys=>Fig. 2 .

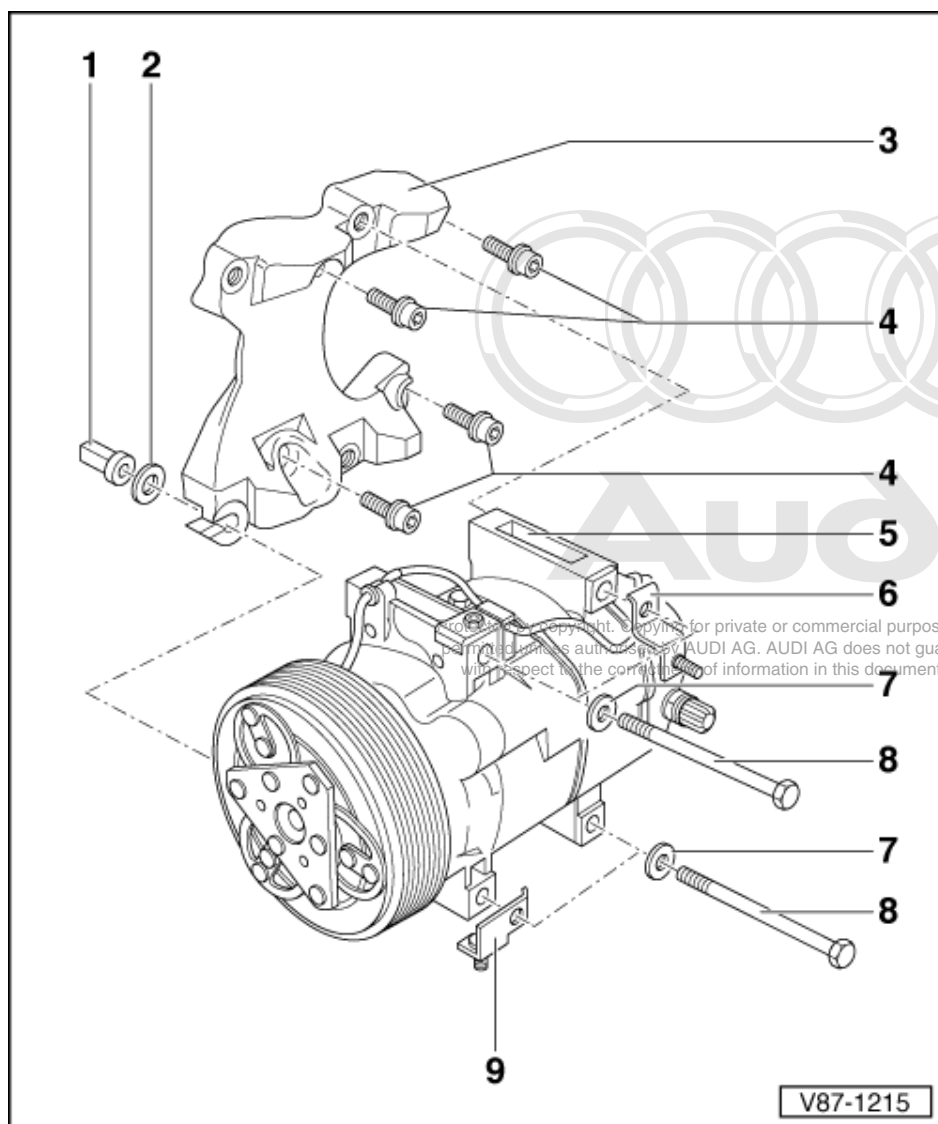


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4.6 - Zexel compressor



- 1 Nut
- 2 Washer
- 3 Compressor bracket
- 4 Hexagon socket-head bolt
- 25 Nm
 - ♦ With washer
- 5 Compressor with magnetic clutch
 - ♦ Detaching from bracket => Fig. 1
- 6 Bracket
 - ♦ For refrigerant hoses
- 7 Washer

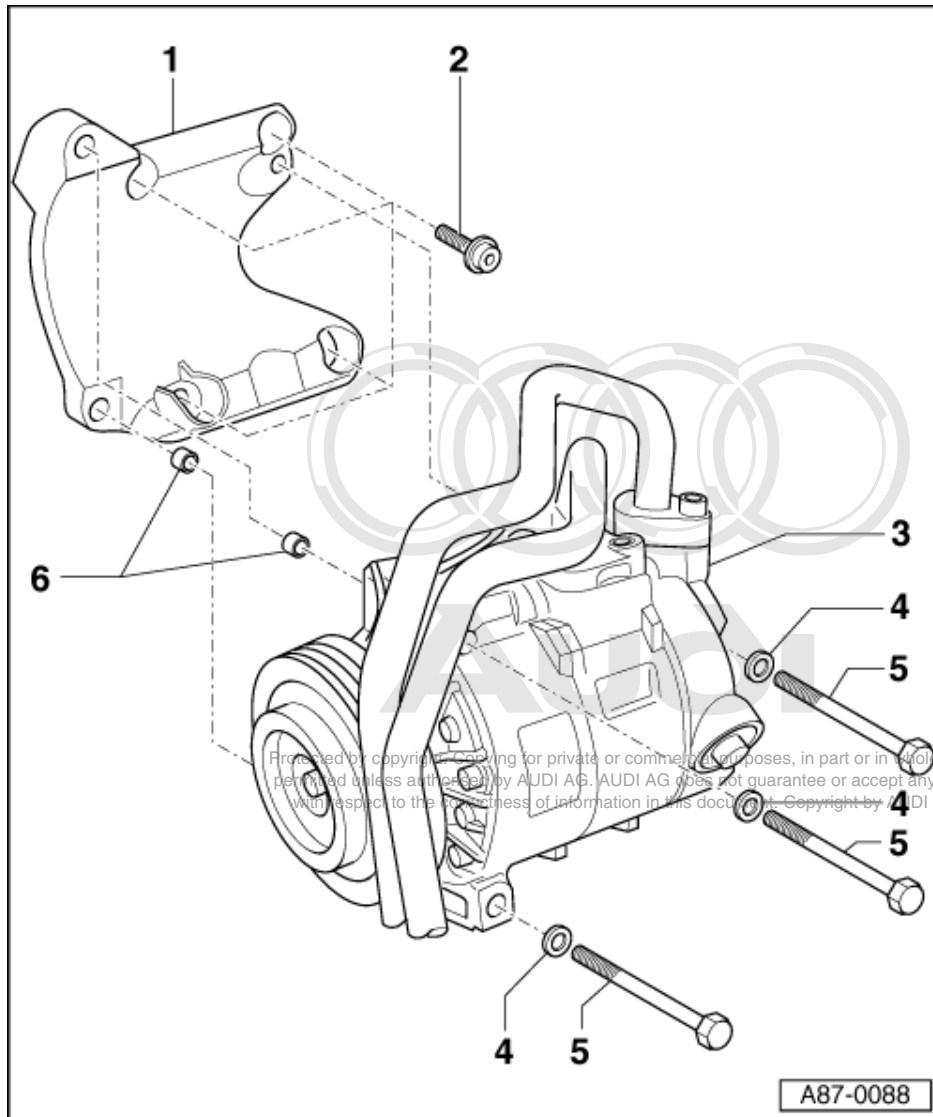

8 Hexagon bolt -25 Nm

- ◆ Before tightening, set alignment of pulley => Fig. 2

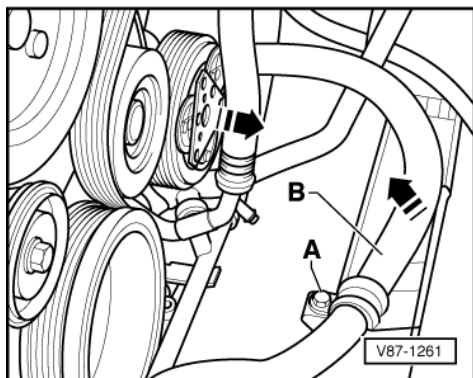
9 Bracket

- ◆ For refrigerant hoses

4.7 - Nippondenso compressor

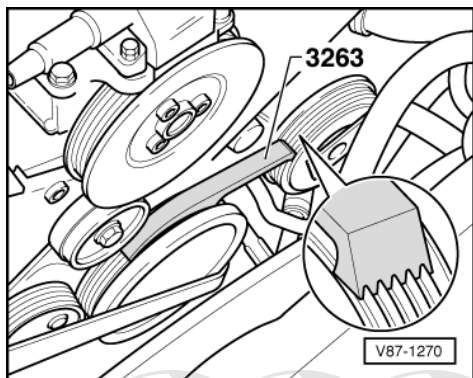


- 1 Compressor bracket
- 2 Hexagon socket-head bolt
- 25 Nm
 - ♦ With washer
- 3 Compressor with magnetic clutch
 - ♦ Detaching from bracket => Fig. 1
- 4 Washer
- 5 Bolt - 25 Nm
- 6 Locating sleeve



-> Fig.1 Detaching compressor from bracket

- Detach bracket -A- for refrigerant hoses.
- Pull refrigerant hoses -B- up.
- Remove compressor from the front.



-> Fig.2 Setting alignment of pulleys

Note:

It is only necessary to set alignment of belt pulleys on vehicles up to Vehicle Ident No. 4A NN 023 927 (approx. 08.91). Misalignment of more than 0.4 mm on such vehicles causes noise and belt wear problems.

- Remove noise insulation.

=> General body repairs; Repair group 50; Front body; Removing and installing noise insulation Front body
Removing and installing noise insulation

- Mark direction of rotation of ribbed V-belt with chalk or felt pen.
- Slacken ribbed belt and remove pulley.

=> Engine mechanical components; Repair group 13

- Slacken 4 bolts => -item **176**.
- Place alignment gauge 3263 onto pulley of vibration damper.
- Move compressor sufficiently far to allow alignment gauge to be inserted free of stress into grooves of pulley of compressor

=> Engine mechanical components; Repair group 13

4.8 - 8-cylinder engine

Removing compressor from/attaching it to bracket

- Pay attention to notes => Page **168**.
- Remove noise insulation.

=> General body repairs, Repair group 50; Front body; Removing and installing noise insulation

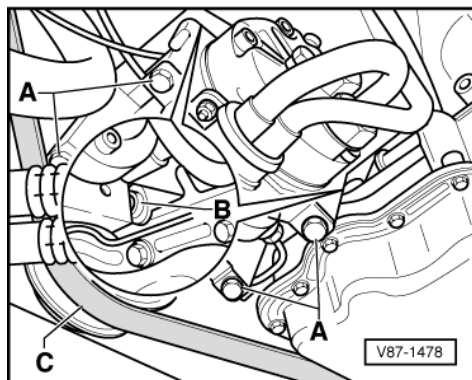
- Mark direction of rotation of ribbed V-belt with chalk or felt pen.

Note:

Zexel and Nippondenso compressors have different ribbed belts. Assignment:

=> Parts Catalogue

Zexel compressor:

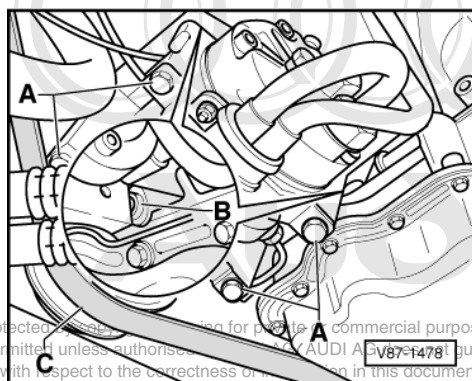


- -> Slacken off ribbed V-belt -C-:

=> Engine mechanical components; Repair group 15

- Screw out the bolts -A-.
- Remove bracket for compressor and servo pump

Note:



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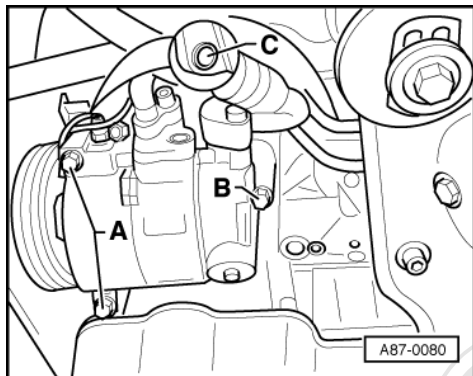
Bracket for compressor for air conditioner and servo pump can be removed and installed without opening refrigerant circuit.

- -> When installing compressor, note correct positioning of locating sleeves -B-.
- Tighten bolts -A- to 20 Nm.

- Before installing ribbed V-belt, inspect alignment of pulleys:

=> Engine, Mechanical components; Repair group 15

Nippondenso compressor:



- Slacken off ribbed V-belt:

=> Engine mechanical components; Repair group 15

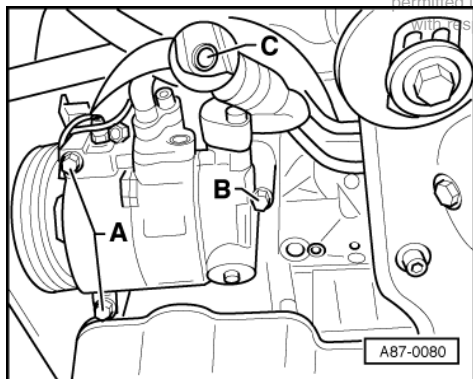
- -> Screw out bolts -A- and -B-.

Notes:

- ♦ Illustration shows compressor on the Audi A8
- ♦ In addition to bracket, other components in area of compressor have been modified (e.g. locating sleeves -C-, coolant pipes etc.; gradual introduction 06.95 ➤). Part numbers

=> Parts Catalogue

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- -> When installing compressor, note correct positioning of locating sleeves -C-.
- Tighten bolts -A- and -B- to 25 Nm.
- Before installing ribbed V-belt, inspect alignment of pulleys:

=> Engine, Mechanical components; Repair group 15

5 - Servicing magnetic clutch -N25

5.1 - Servicing magnetic clutch -N25

Notes:

- ♦ The magnetic clutch can be serviced without opening the refrigerant circuit.

- ♦ Mark direction of rotation with chalk or felt pen before removing ribbed belt. If belt rotates in the wrong direction when it is refitted, this can cause breakage.
- ♦ On vehicles with 6-cylinder engine, inspect alignment of pulleys, before installing ribbed V-belt => Fig. 178.
- ♦ On vehicles with 8-cylinder engine, inspect alignment of pulleys, before installing ribbed V-belt:

=> Engine, Mechanical components; Repair group 15

- Remove noise insulation.

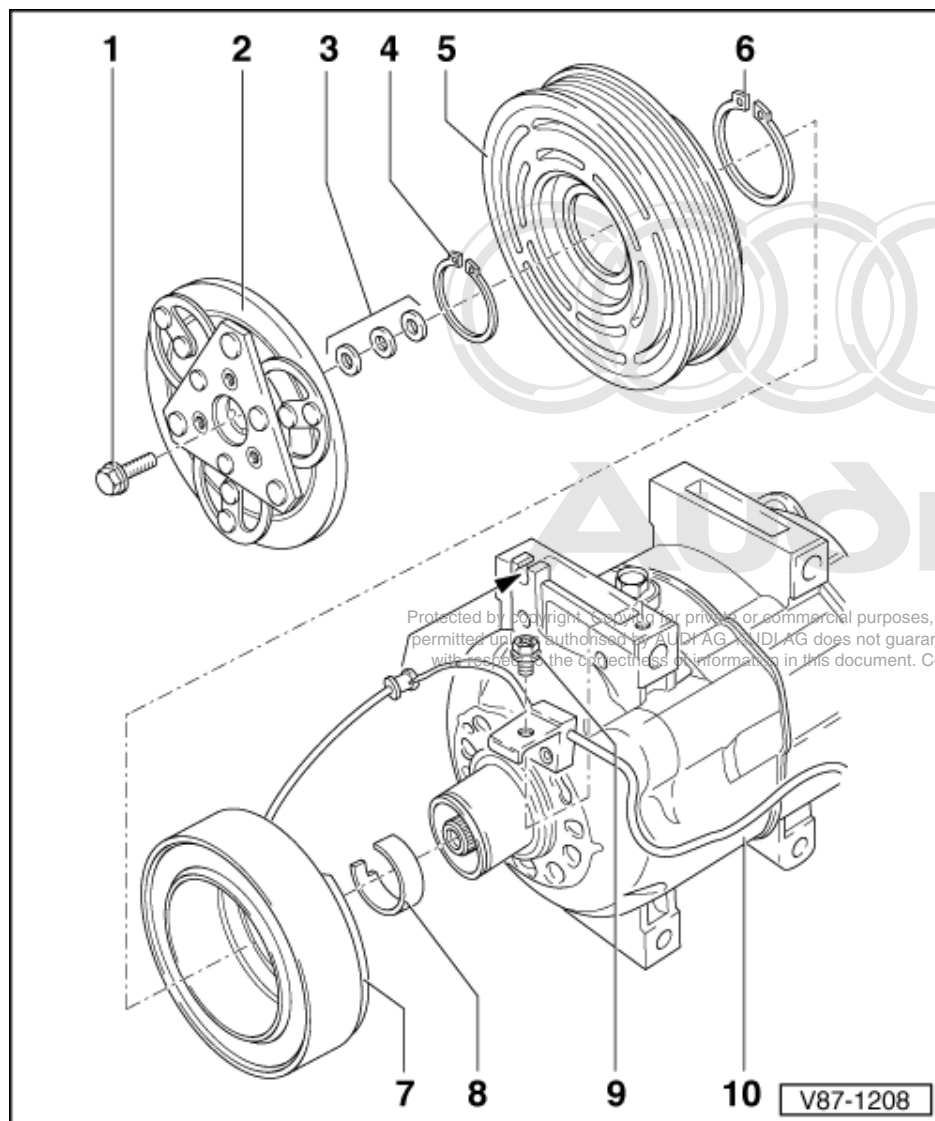
=> General body repairs, Repair group 50; Front body; Removing and installing noise insulation

- Remove V-belt or ribbed V-belt respectively:

=> Engine Mechanical components; Repair group 13 or Repair group 15 respectively

- Detach compressor from bracket => Page 168 onwards

5.2 - Zexel compressor



1 Bolt - 15 Nm

- ♦ Unfastening and tightening => Fig. 1

2 Clutch plate

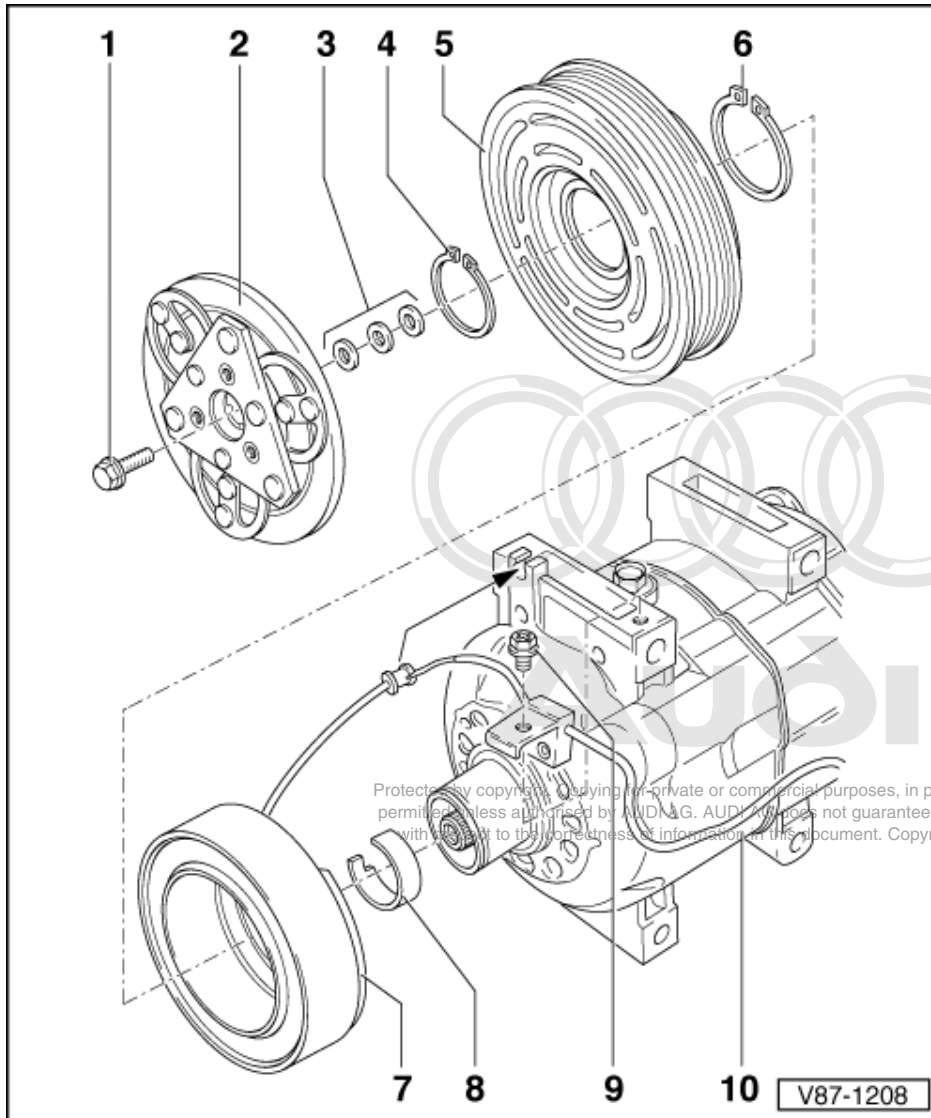
- ♦ Pulling off => Fig. 2

3 Spacer

- ♦ For adjusting the gap width
- ♦ Checking gap size => Fig. 6

4 Circlip

- ♦ Replace
- ♦ Install on correct side (flat side facing compressor)
- ♦ Ensure correct seating in groove



5 Pulley

- ♦ Pulling off => Fig. 3
- ♦ Installing => Fig. 4 ,

6 Circlip

- ♦ Replace
- ♦ Install on correct side (flat side facing compressor)
- ♦ Ensure correct seating in groove

7 Magnetic coil

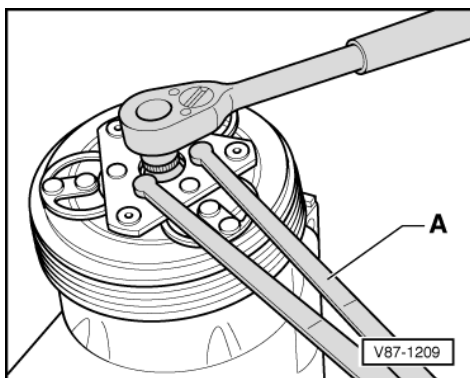
- ♦ Installing => Fig. 5 ,

8 Felt ring

- ♦ Replace

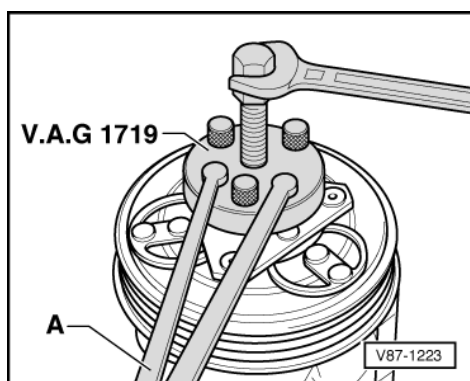
9 Screw

10 Compressor



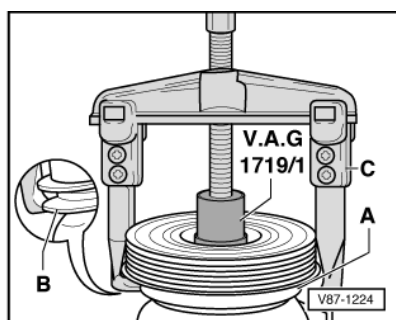
-> Fig.1 Loosening and tightening hexagon bolt

- Use a commercially available pin-type face spanner -A- (pin- $\varnothing$ 4 mm).
- Tighten bolt to 15 Nm.



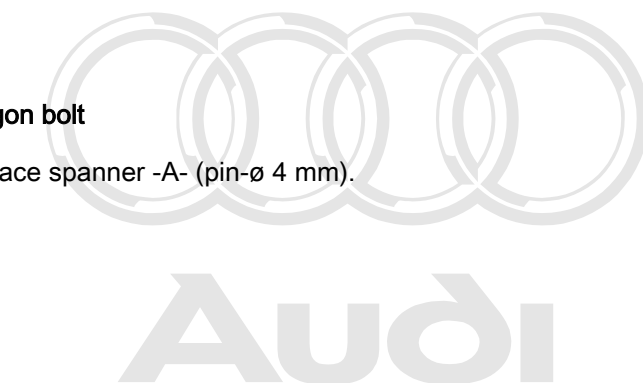
-> Fig.2 Pulling off clutch plate

- Counterhold with a commercially available pin-type face spanner -A-.

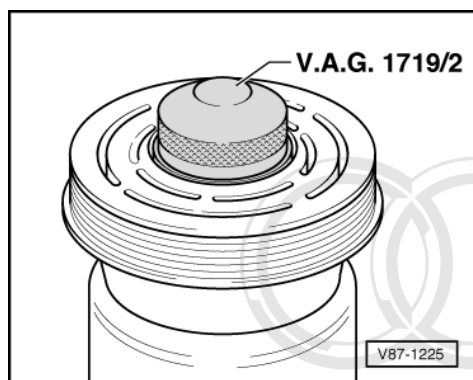


-> Fig.3 Removing pulley

- Remove the felt ring.
- Position two-arm puller -C- as described below, to prevent any damage to pulley.
 - At shoulder -A- on case of pulley for ribbed V-belt
 - Behind pulley groove -B- in case of pulley for V-belt

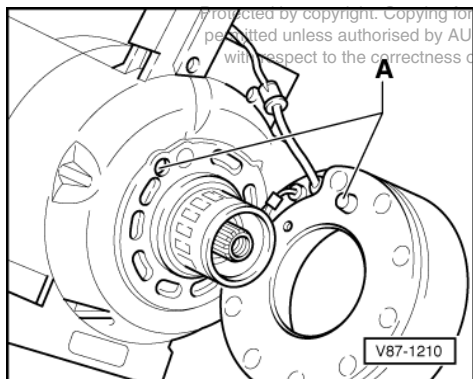


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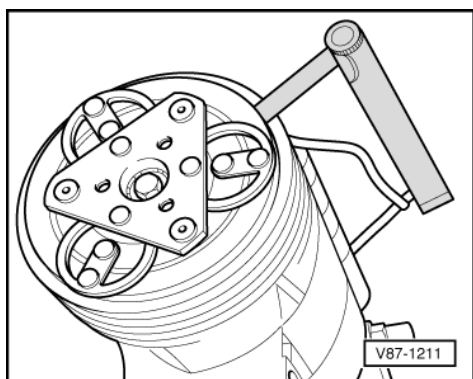
-> Fig.4 Installing pulley

- Clean the contact surface
- Install the belt pulley with the special tool V.A.G 1719/2 and a plastic-headed hammer.



-> Fig.5 Installing magnetic coil

- Place lug - A- in recess.



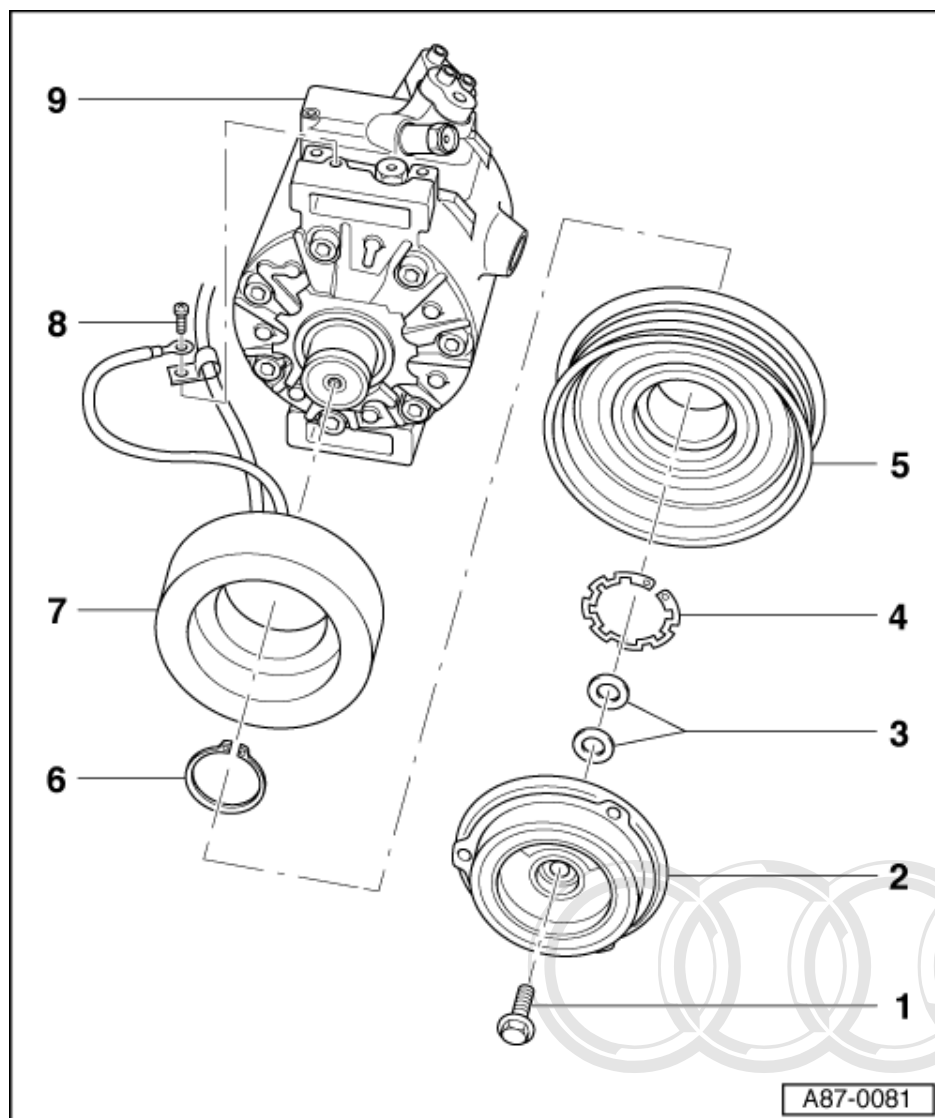
-> Fig.6 Checking gap width

- Check gap width between pulley and clutch plate:
 - Gap width = 0.3 - 0.6 mm

Note:

The gap width must be within the tolerance over the entire periphery.

5.3 - Nippondenso compressor

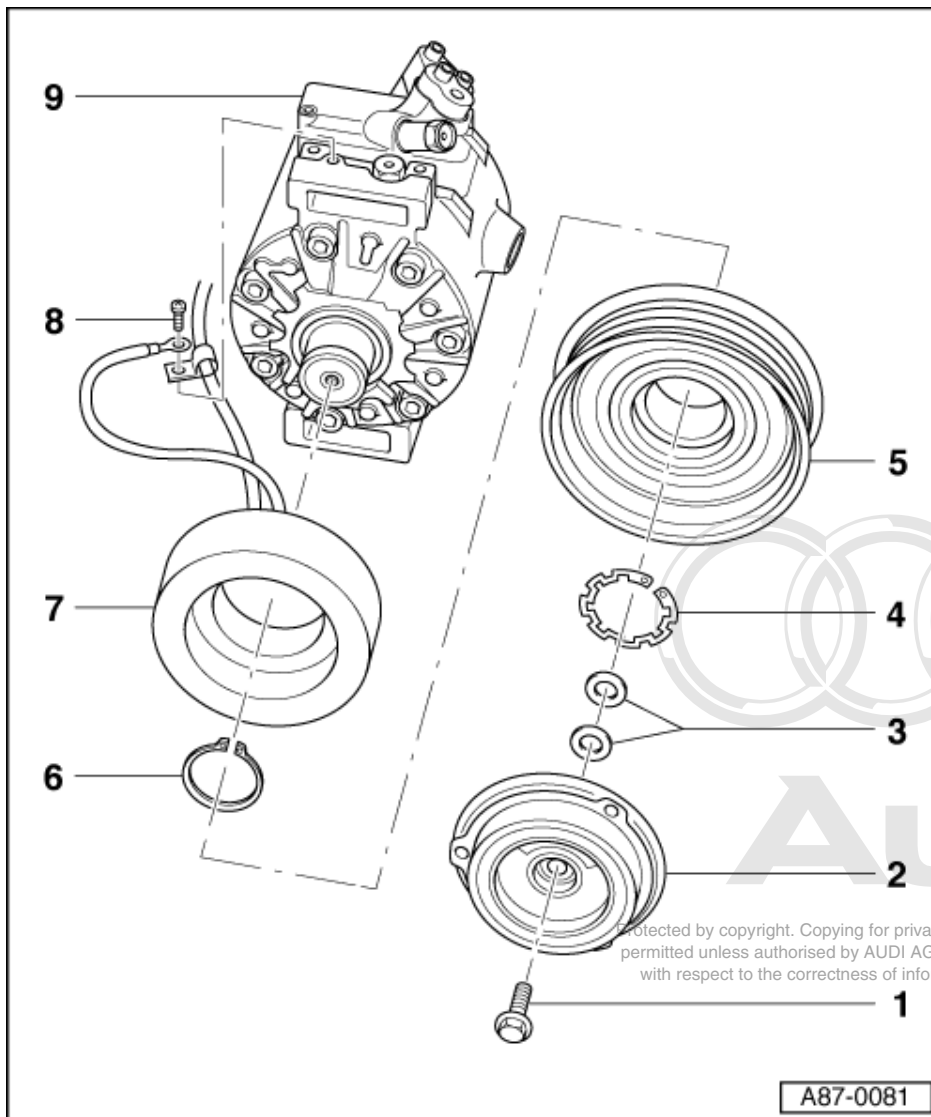


- 1 Bolt - 15 Nm
 - ♦ Unfastening and tightening => Fig. 1
- 2 Clutch plate
 - ♦ Pulling off => Fig. 2
- 3 Spacer
 - ♦ For adjusting the gap width
 - ♦ Checking and adjusting gap width => Fig. 4
- 4 Circlip
 - ♦ Replace
 - ♦ Install on correct side (flat side facing compressor)
 - ♦ Ensure correct seating in groove
- 5 Pulley

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- ♦ Pull off seized pulley, for example with a two- and three-arm puller. Do not damage pulley.



6 Circlip

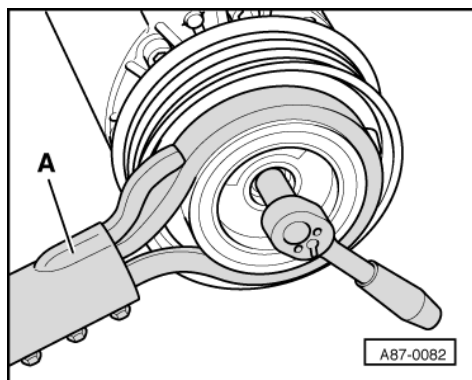
- ♦ Replace
- ♦ Install on correct side (flat side facing compressor)
- ♦ Ensure correct seating in groove

7 Magnetic coil

- ♦ With overheating cut-out fitted. It interrupts the magnetic coil as soon as the magnetic clutch becomes too hot (for example, if the compressor is stiff)
- ♦ Protective diode -J201 previously used is fitted (reduces the voltage peaks which may occur when magnetic clutch is disengaged)
- ♦ Installing => Fig. 3

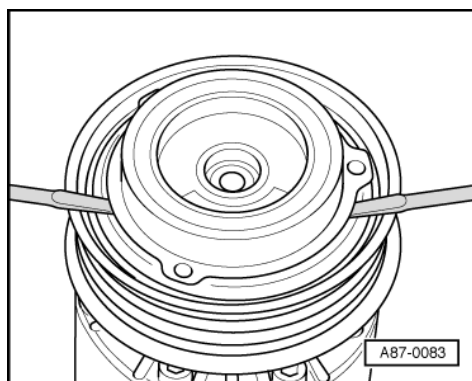
8 Screw

9 Compressor



-> Fig.1 Loosening and tightening hexagon bolt

- Use a commercially available fabric strap wrench -A- to counterhold at the clutch plate.
- Tighten bolt to 15 Nm.

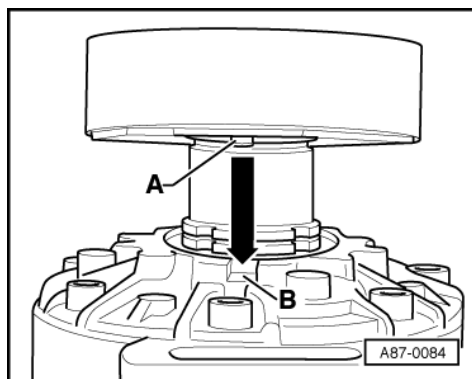


-> Fig.2 Pulling off clutch plate

- Carefully prise off clutch plate using two screwdrivers.

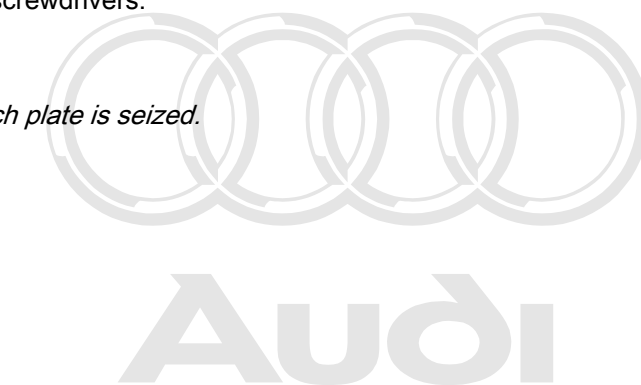
Note:

Use a two-arm or three-arm puller if the clutch plate is seized.

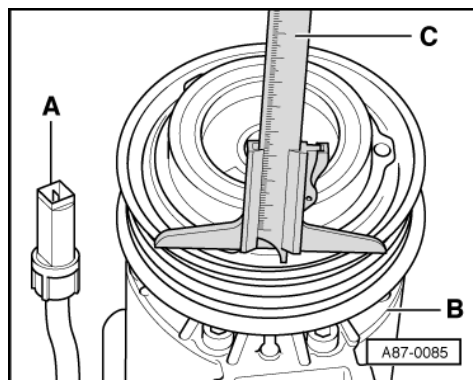


-> Fig.3 Installing magnetic coil

- Install lug -A- in recess -B-.



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➔ Fig.4 Checking and adjusting gap width

- Use a depth gauge -C- to measure dimension "1" between pulley and clutch plate at 3 points.
- Apply a voltage of 12 V to magnetic coil.

A - Positive at 1-way connector
B - Earth at compressor housing

- Use a depth gauge -C- to measure dimension "2" between pulley and clutch plate at 3 points.
- Calculate gap width from the difference between measurements "1" and "2".
 - Specification: 0.4 ... 0.6 mm

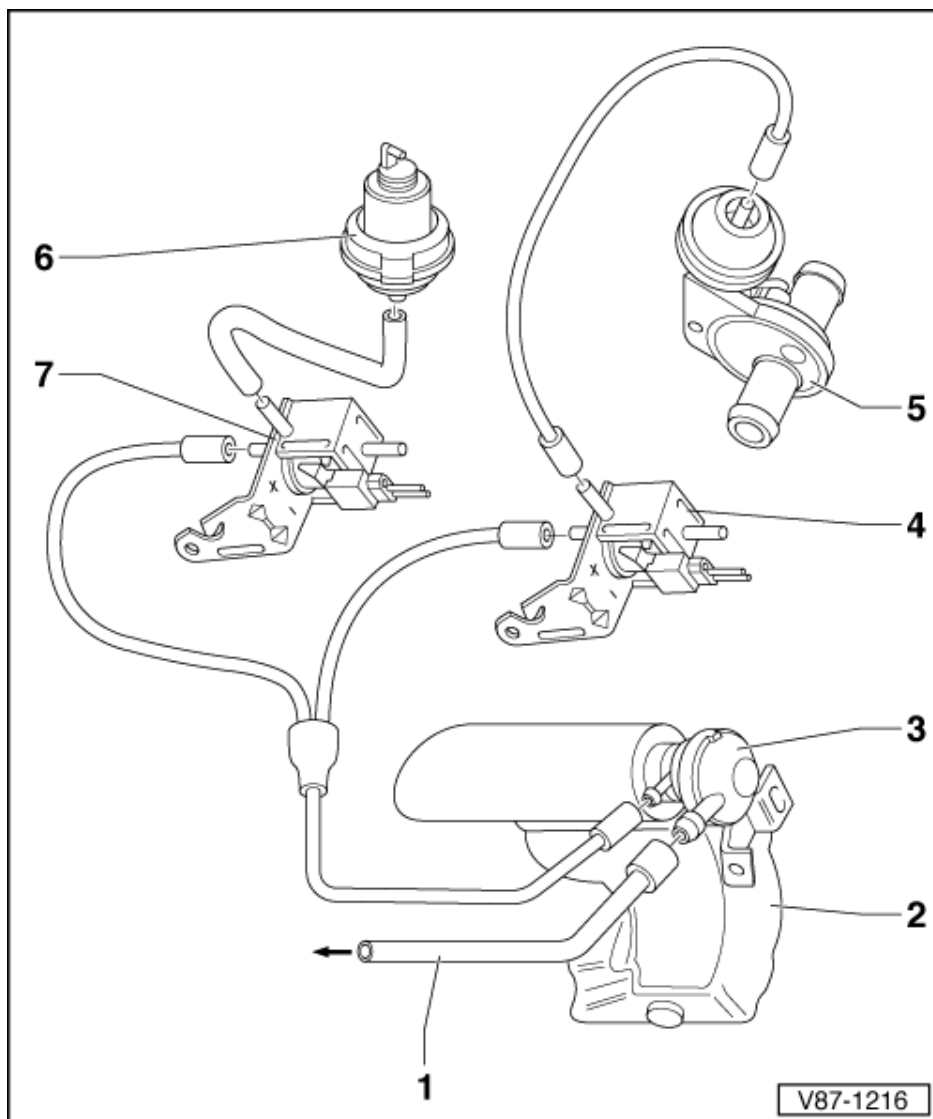
Notes:

- ◆ Gap width must be within the tolerance over the entire periphery.
- ◆ Gap width can also be measured with compressor fitted.
- ◆ If gap width is not within the tolerance, remove clutch plate and set gap width by removing or inserting spacers.

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6 - Connection diagram for vacuum hoses

6.1 - Connection diagram for vacuum hoses



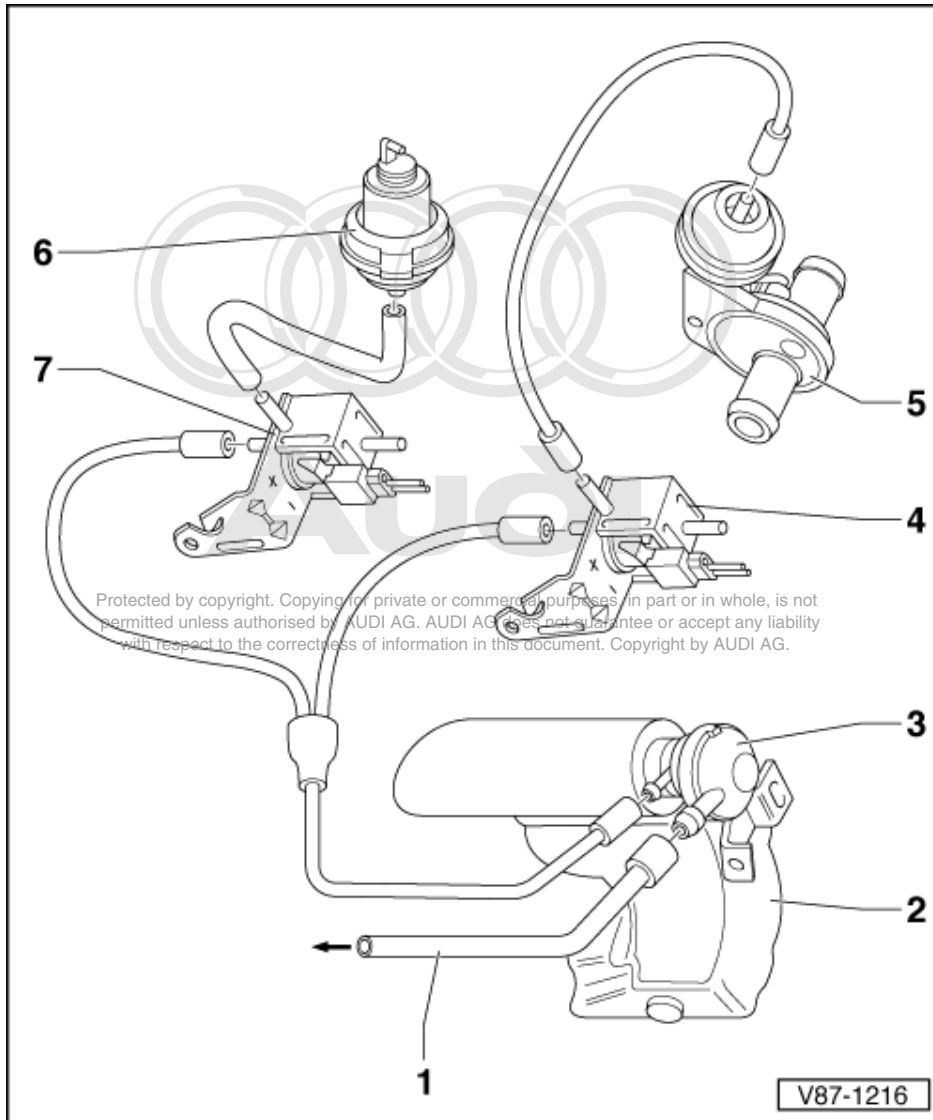
1 Vacuum line

- ◆ To engine on vehicles with petrol engine
- ◆ To vacuum pump on vehicles with diesel engine

2 Vacuum reservoir

- ◆ Location: at left of heater
- ◆ On vehicles with diesel engine 07.93 ä discontinued (phased measure).
- ◆ Testing:
 - Detach vacuum line to two-way valves.
 - Connect vacuum tester V.A.G 1368.
 - Start engine and run for 1 minute.
 - Pressure may rise by not more than 100 mbar within 2 minutes after switching off engine.
- ◆ Removing and installing => Fig. 1

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3 Non-return valve

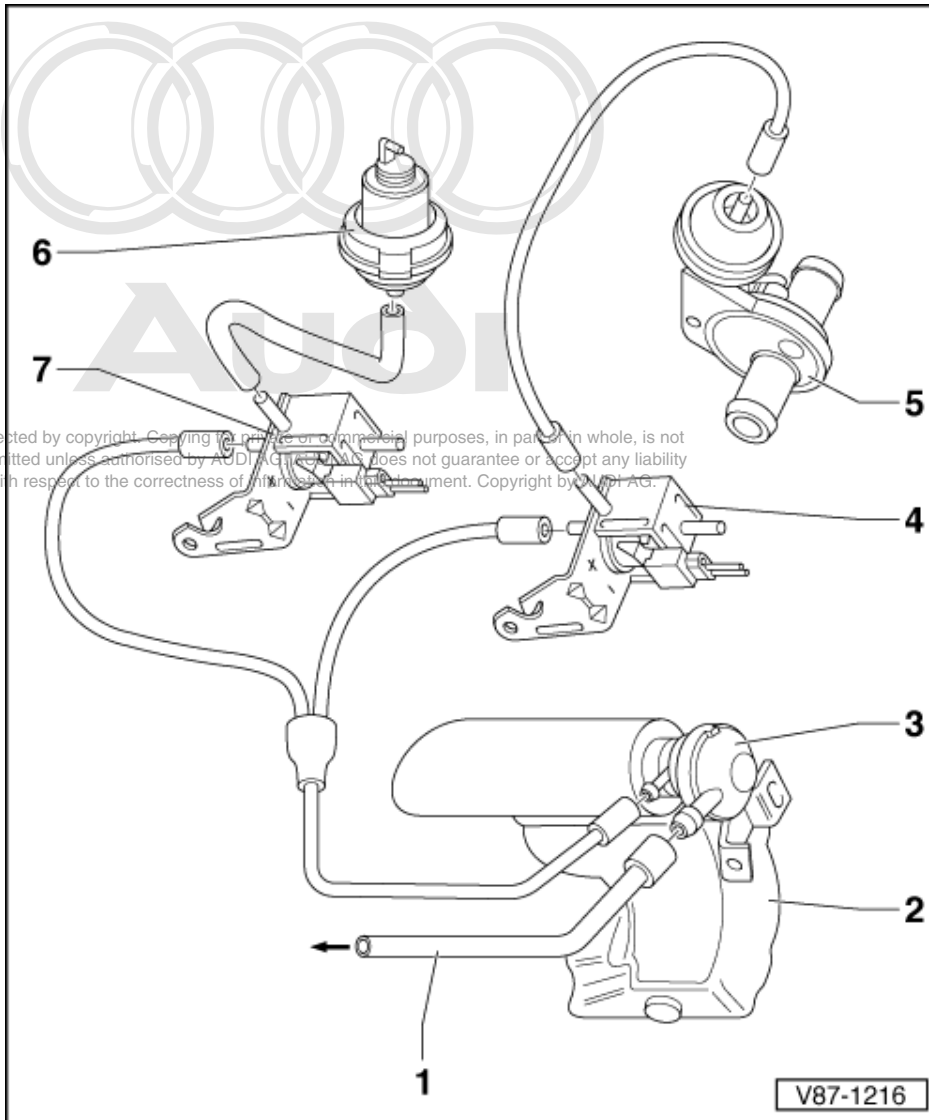
- ♦ On vehicles with diesel engine 07.93 ä discontinued (phased measure)
- ♦ Testing => vacuum reservoir

4 Coolant shut-off valve two-way valve -N147

- ♦ Location: at right of heater

5 Coolant shut-off valve

- ♦ Location: at left of heater
- ♦ Closed if vacuum exists
- ♦ Inspect for leaks and ease of operation
- ♦ Removing and installing => Fig. 2

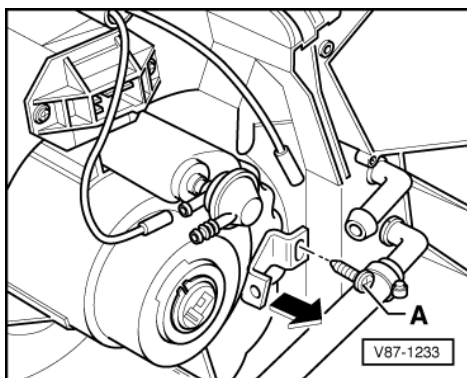


6 Vacuum unit for fresh-air and recirculated-air flap

- ◆ Location: in evaporator housing
- ◆ Recirculated-air mode if vacuum exists
- ◆ Checking for leaks
- ◆ Removing and installing => Fig. 3

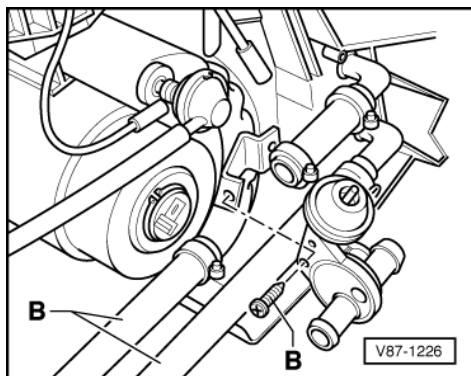
7 Two-way valve for fresh-air and recirculated-air flap -N63

- ◆ Location: on left at evaporator housing



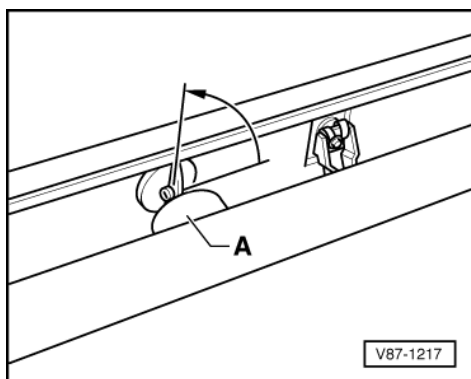
-> Fig.1 Removing and installing vacuum reservoir

- Remove plenum chamber cover.
- Remove coolant shut-off valve => Page 2 .
- Remove screw -A-.
- Pull vacuum reservoir out of mounting.



-> Fig.2 Removing and installing coolant shut-off valve

- Remove plenum chamber cover.
- Open cover of coolant expansion tank.
- Use hose clamps V.A.G 3093 to pinch off coolant pipes -B- to heat exchanger.
- Slacken clips of coolant pipes.
- Remove screw -A-.



-> Fig.3 Removing and installing vacuum unit for fresh and recirculated-air flap

- Remove plenum chamber cover.
- Turn vacuum unit-A- through 90° and take it out.
- Detach vacuum pipe and secure it to prevent it slipping back into evaporator.

7 - Servicing components of manually controlled air conditioner

7.1 - Servicing components of manually controlled air conditioner

Notes:

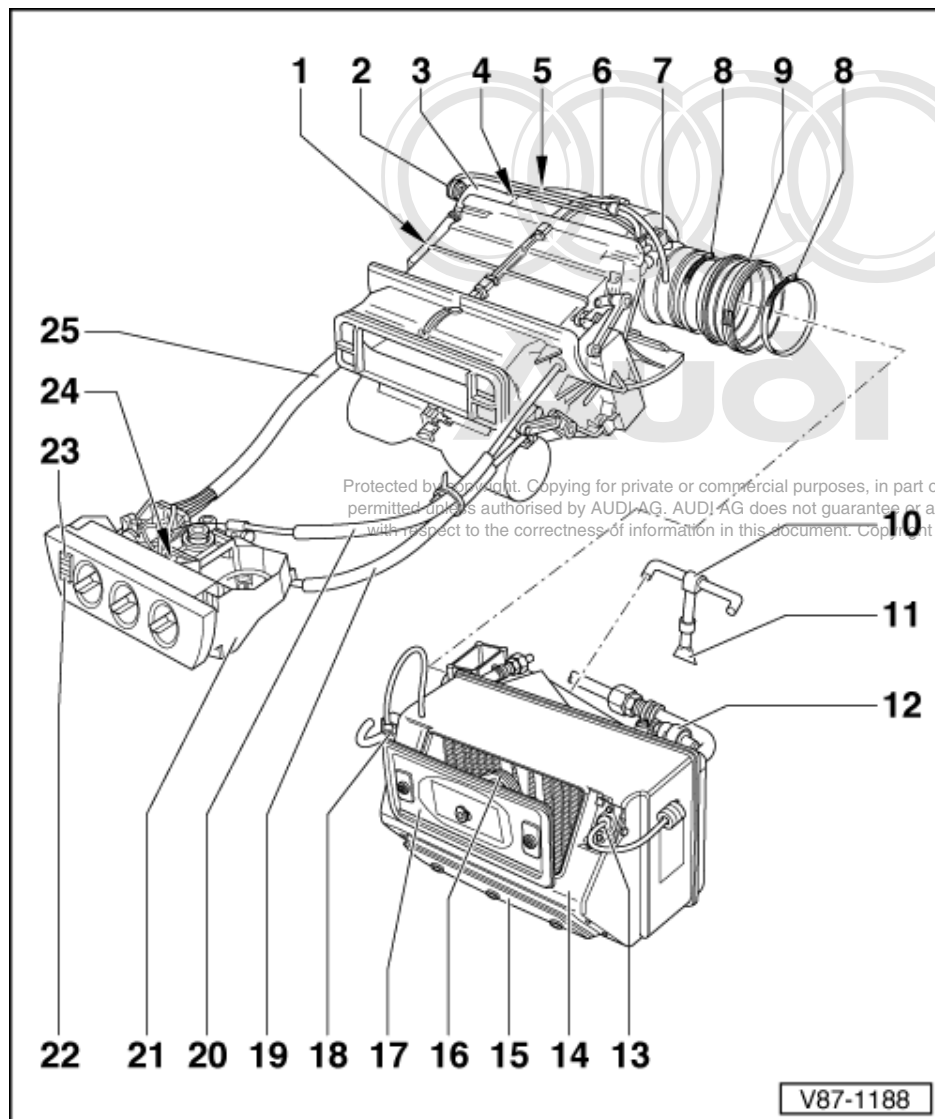
- ♦ Servicing heater => Page 59 .
- ♦ Repair work on refrigerant circuit with refrigerant R12 ► 09.92 => Page 222 .
- ♦ Repair work on refrigerant circuit with refrigerant R134a 10.92 ► => Page 234 .

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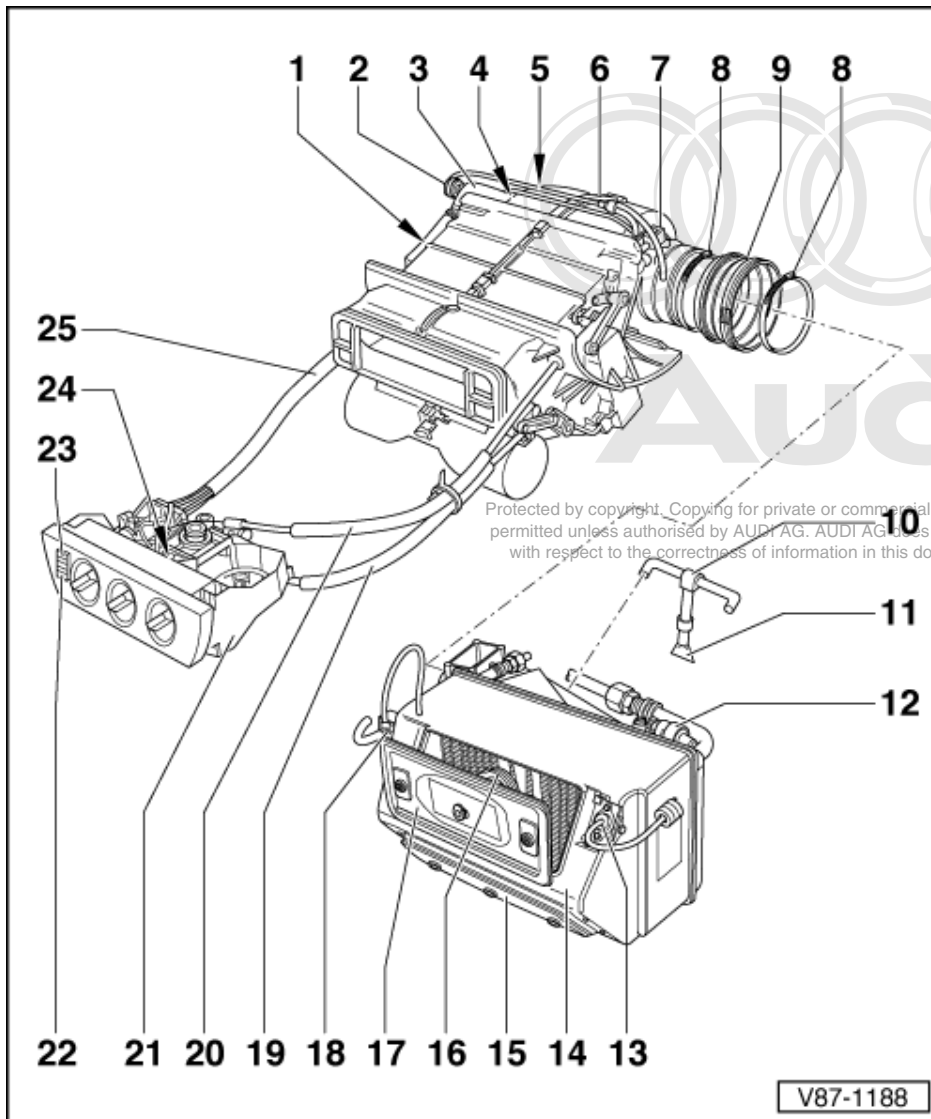
♦ Electrical components:

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- ♦ Interrogating fault memory => Page 6 .
- ♦ Erasing fault memory => Page 6 .
- ♦ Checking refrigeration capacity=> Page 199 .



- 1 Coolant shut-off valve
 - ♦ Closed if vacuum exists
 - ♦ Removing and installing => Fig. 192
- 2 Non-return valve
- 3 Vacuum reservoir
 - ♦ Checking => Page 189
 - ♦ Removing and installing => Fig. 192
- 4 Fresh-air blower series resistor -N24
 - ♦ Colour of housing: amber colour
- 5 Fresh-air blower -V2
 - ♦ Removing and installing => Fig. 72
 - ♦ Removing heater => Page 72



6 Heater

- ♦ Removing and installing => Page 72
- ♦ Dismantling and assembling =>Page 77

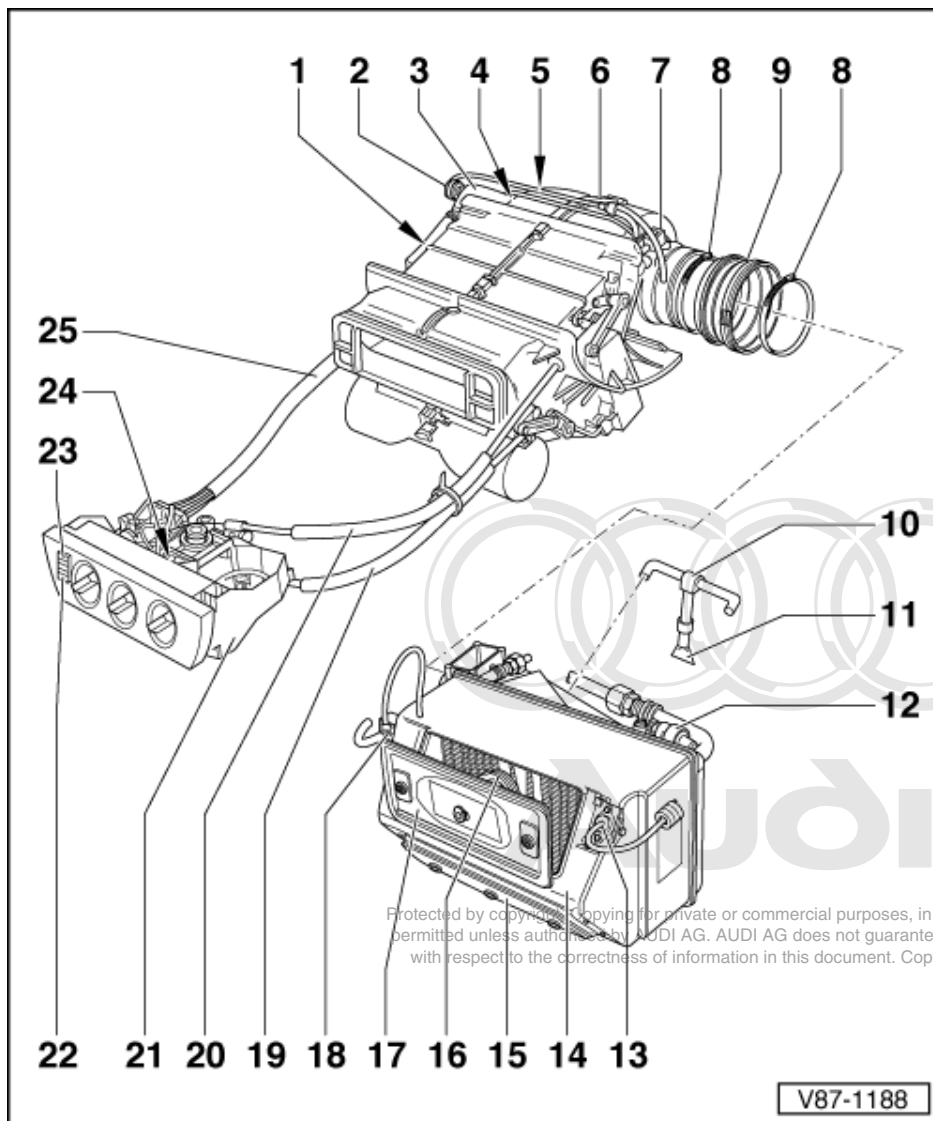
7 Coolant shut-off valve two-way valve -N147

8 Clip

9 Connection

10 Condensation drain hose

- ♦ Always routed downhill and free of kinks
- ♦ Bond connections between individual elements



11 Condensation drain valve

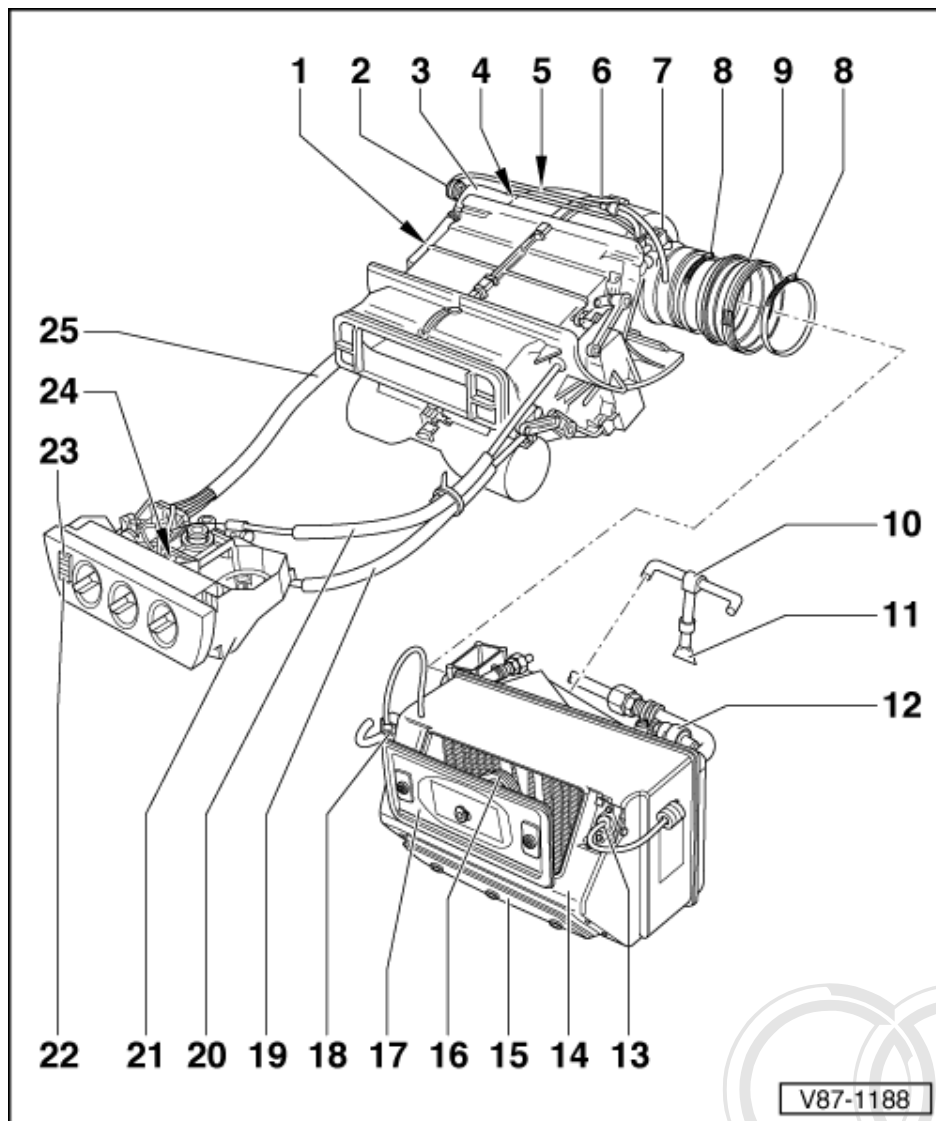
- ♦ Must not be gummed up with wax or underseal; it must close properly.
- ♦ Connection to drain hose bonded

12 Low-pressure switch for air conditioner - F73

- ♦ Removing and installing => Fig. 164 respectively

13 Ambient temperature switch -F38

- ♦ Switches magnetic clutch off at low ambient temperatures
- ♦ Testing operation => Fig. 1

**14 Evaporator**

- ♦ May only be removed if refrigerant circuit is empty; send vehicle to an VW/Audi air-conditioning service centre

15 Recirculated-air flap

- ♦ Removing and installing => Fig. 2

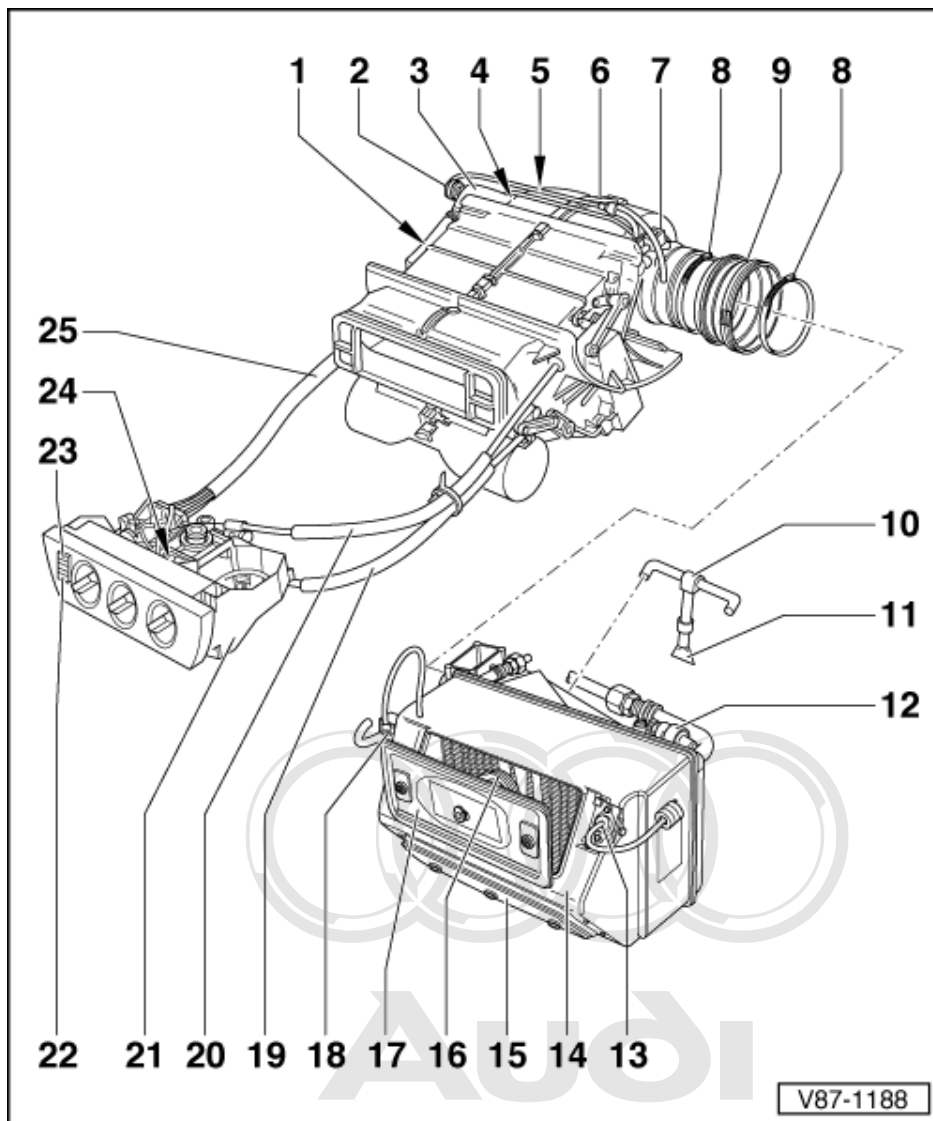
16 Vacuum unit

- ♦ for fresh-air and recirculated-air flap.
- ♦ Removing and installing => Fig. 192

17 Fresh-air flap**18 Two-way valve for fresh-air and recirculated-air flap -N63****19 Bowden cable**

- ♦ To control flap of footwell/defroster and dash panel vents
- ♦ Removing and installing => Fig. 72

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20 Bowden cable

- ♦ To temperature flap
- ♦ Removing and installing => Fig. 70

21 Heater controls

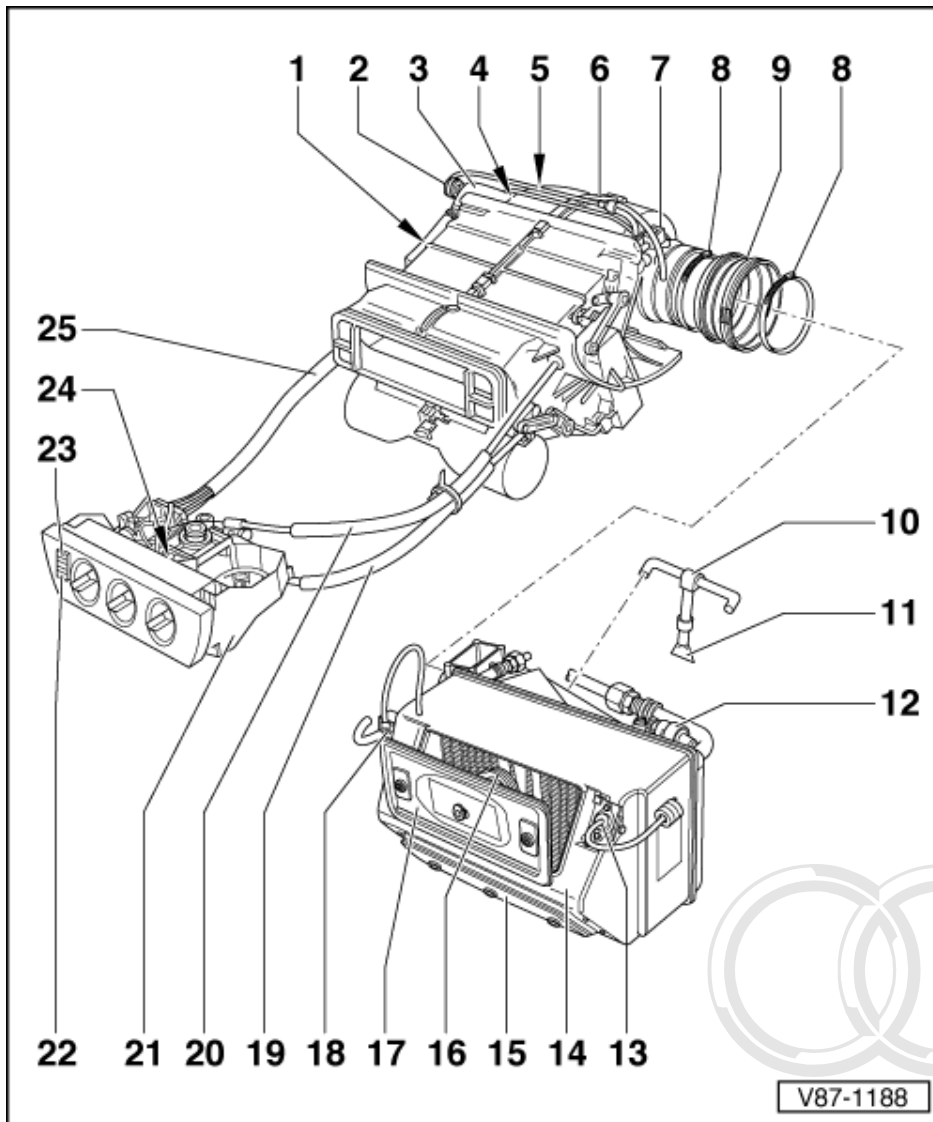
- ♦ Removing and installing => Fig. 71
- ♦ Removing and installing Bowden cables => Fig. 71

22 recirculated-air mode button

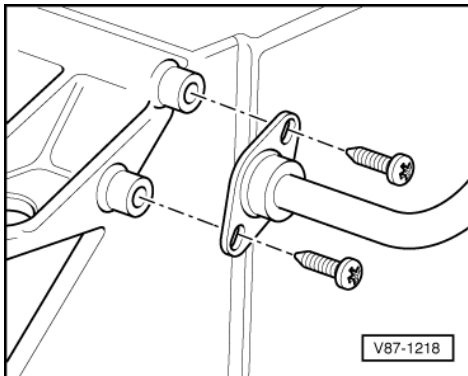
- ♦ In air conditioner switch -E30

23 Air conditioner button

- ♦ In air conditioner switch -E30
- ♦ Switches compressor on and off

**24 Coolant shut-off valve switch -E151**

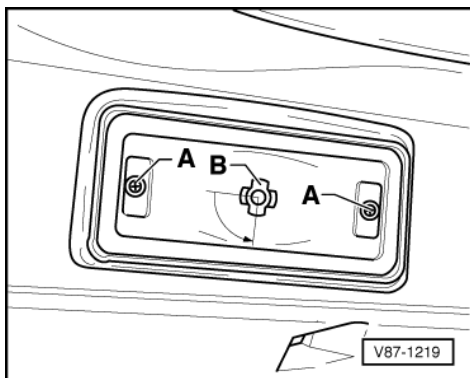
- ◆ Closes coolant shut-off valve through two-way valve for coolant shut-off valve -N147 when rotary temperature control in "cold stop" position.

25 "Heater" wiring harness**-> Fig.1 Testing ambient temperature switch -F38**

- Spray switch, e.g. with refrigerant spray.
 - Shut-off temperature: -1 °C or colder (switch open)
 - Cut-in temperature: +7 °C or warmer

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(switch closed)



➔ Fig.2 Removing and installing recirculated-air flap

- Remove glove compartment:

⇒ General body repairs; Repair group 70; Dash panel; Removing and installing storage compartment and glove compartment Dash panel Removing and installing storage compartment and glove compartment

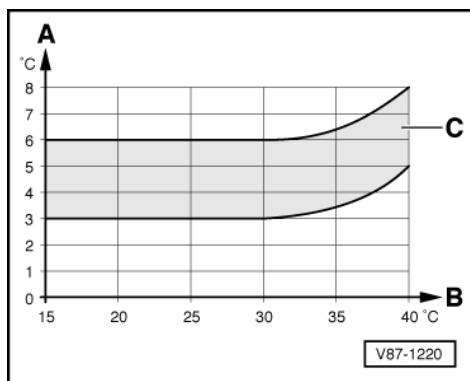
- Remove 2 screws -A-.
- Turn catch -B- through 90°.
- Take off recirculated-air flap.

7.2 - Checking refrigeration capacity of manually controlled air-conditioner

Test requirements:

- Cooler and condenser clean; clean if necessary
- V-belt or ribbed V-belt for compressor drive OK and correctly tensioned.
- All air ducts, covers and seals are OK and properly fitted.
- Vehicle is not exposed to sunlight.
- Engine at operating temperature.
- Connection between evaporator and heating does not draw in any secondary air at fresh-air blower stage 4.
- Operation when engine running and "AC" pushbutton for air conditioner and also "REC" pushbutton for fresh- and recirculated-air flap pressed (both warning lights come on):
 Compressor is driven or switches on;
 Fresh-air blower runs;
 Radiator fan runs;
 Fresh- and recirculated-air flap moves into "recirculated-air" position.
- Coolant shut-off valve closed when engine is running and rotary temperature control in "cold stop" position.

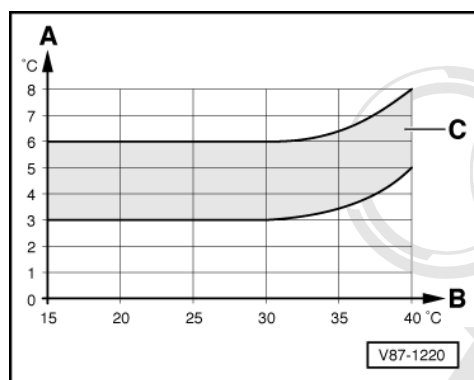
Testing



- A - -> Air temperature from the "centre" dash panel vents
- B - Ambient temperature
- C - Permissible tolerance range

Depending upon the ambient temperature, the air temperature from the "centre" dash panel vents must be within the stated tolerance range within 5 minutes.

- Close bonnet.
- Measure ambient temperature.
- Switch the ignition on.
- Close the doors, windows and sunroof.
- Press "AC" pushbutton for air conditioner and "REC" pushbutton for fresh- and recirculated-air flap (both warning lights come on).
- Turn rotary temperature control to "cold stop" position.
- Open all dash-panel vents.
- Turn rotary switch for control flap of footwell/defrost and dash panel vents to "dash panel vents" position.
- Start engine (start of time measurement)
- Increase the engine speed to 2000 rpm
- Measure the temperature of the air flowing from the "centre" dash panel vents, e.g. with a Minitester V.A.G 1362.



- -> Compare the measured values with the values in the diagram.
- If required values are not attained:
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- Test actuation of radiator fan V7 (stage 2) through air conditioner high-pressure switch -F23 (switching pressures => item 161 respectively):

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

- Check position of temperature flap (levers at heater should have reached end position).

Was compressor switched off by magnetic clutch control unit -J153 during refrigeration capacity test?	
↓ yes	↓ no
- Vehicles with compressor driven by V-belt: VW/Audi air-conditioning Continue with test => Page 201 . service centre (fault in refrigerant circuit).	
- Vehicles with compressor driven by ribbed V-belt: Continue with test => Page 201 .	

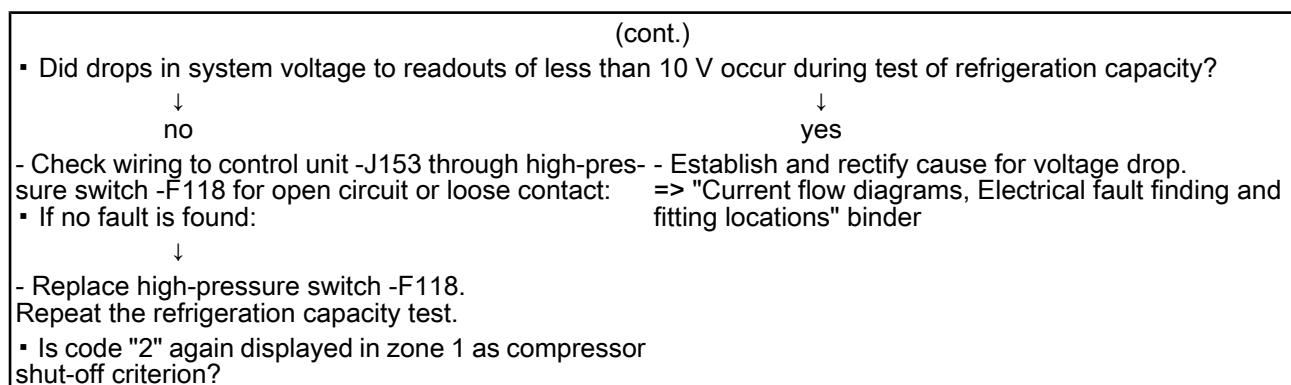
```

graph TD
    Start([Start]) --> Q1{Are required values attained?}
    Q1 -- yes --> End1([End])
    Q1 -- no --> R1[Replace low-pressure switch -F73.  
Repeat the refrigeration capacity test.]
    R1 --> Q2{Are required values attained?}
    Q2 -- yes --> End1
    Q2 -- no --> Q3{Was compressor switched off during refrigeration capacity test?}
    Q3 -- yes --> R2[Establish and rectify cause for compressor shutting off.  
=> "Current flow diagrams, Electrical fault finding and fitting locations" binder]
    R2 --> End2([End])
    Q3 -- no --> End2
    
```

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```

graph TD
    Start([Start]) --> Q1{Connect fault reader V.A.G 551, select function "Reading measured value block" =>Page 12 onwards?}
    Q1 -- yes --> A1[- Bridge refrigerant circuit low-pressure switch -F73 electrically.  
Repeat the refrigeration capacity test.  
▪ Are required values attained?]
    Q1 -- no --> A2[- Further codes =>Page 12 onwards.  
If code "2" appears alternately with "5", first of all rectify cause of fault for code "2".]
    A1 -- yes --> A3[- Replace low-pressure switch -F73.  
Repeat the refrigeration capacity test.  
▪ Are required values attained?]
    A1 -- no --> A4[- Further codes =>Page 12 onwards.  
If code "2" appears alternately with "5", first of all rectify cause of fault for code "2".]
    A3 -- yes --> End1([End])
    A3 -- no --> A5[- Re-install old low-pressure switch -F73]
    A5 --> A6[- Send the vehicle to an VW/Audi air-conditioning service centre.]
    A2 --> End2([cont.])
  
```





- Re-install old high-pressure switch -F118



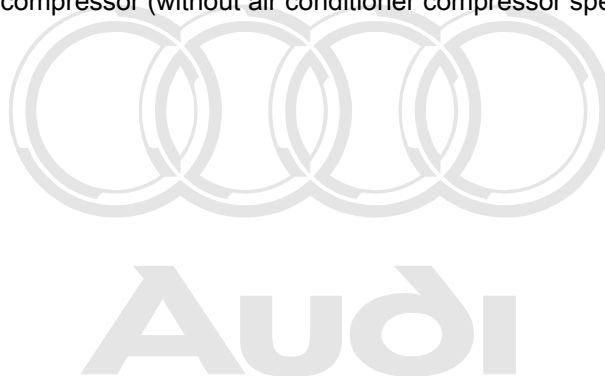
- Send the vehicle to an VW/Audi air-conditioning service centre.

8 - Servicing components for control and regulation of fully automatic air-conditioner

8.1 - Servicing components for control and regulation of fully automatic air-conditioner

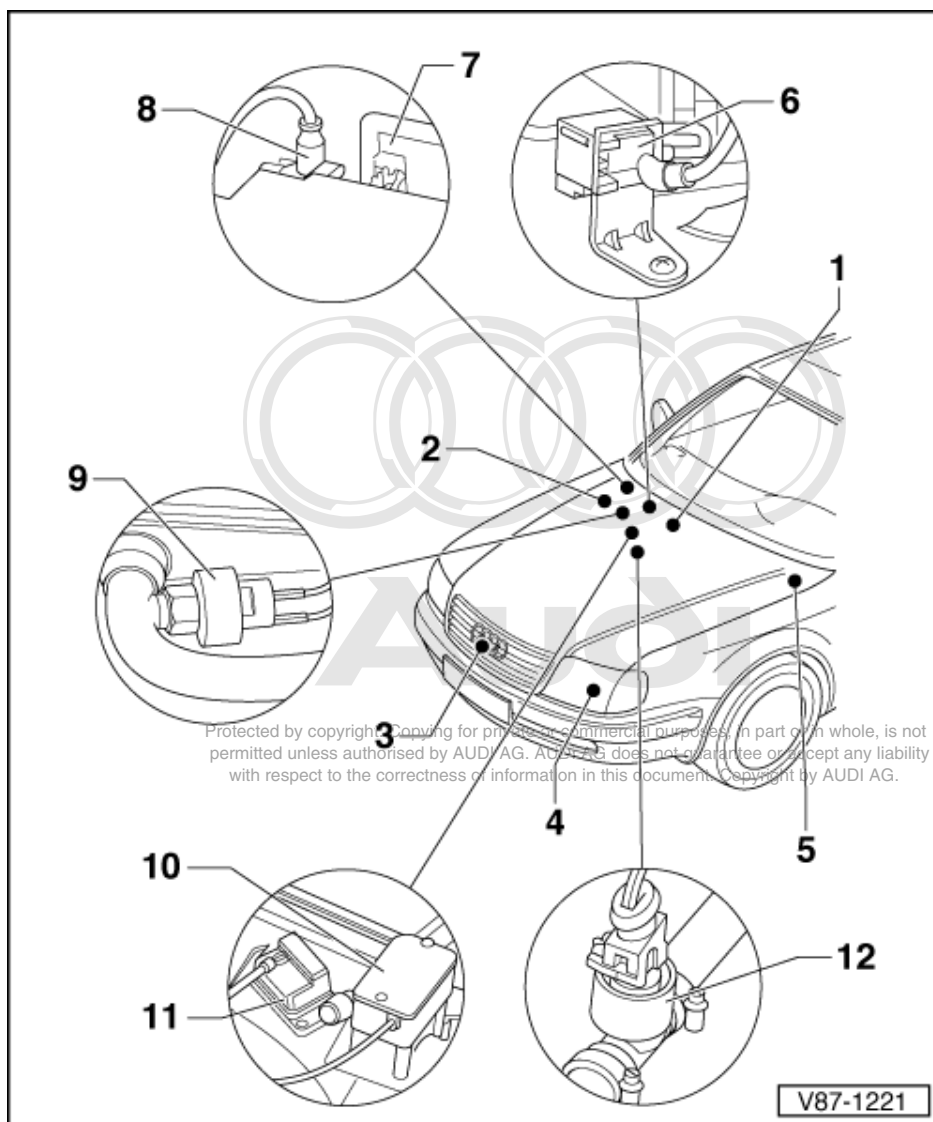
Notes:

- ♦ Repair work on refrigerant circuit with refrigerant R12 ▶ 09.92 => Page 222 .
- ♦ Repair work on refrigerant circuit with refrigerant R134a 10.92 ▶ => Page 234 .
- ♦ Perform the following operations after completing the repair work:
 - Interrogate fault memory => Page 32 .
- ♦ Checking refrigeration capacity => Page 219 .
- ♦ Electrical testing on all components marked 1) => Page 48 onwards.
- ♦ All components marked 2) are actuated in the final control diagnosis => Page 28 .
- ♦ Note different coding of operating and display unit -E87 for Zexel compressor (with air conditioner compressor speed sender -G111) and Nippondenso compressor (without air conditioner compressor speed sender -G111) => Page 35 .



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8.2 - Components in engine compartment



1 Heater

- ♦ Removing and installing => Page 72
- ♦ Dismantling and assembling => Page 77

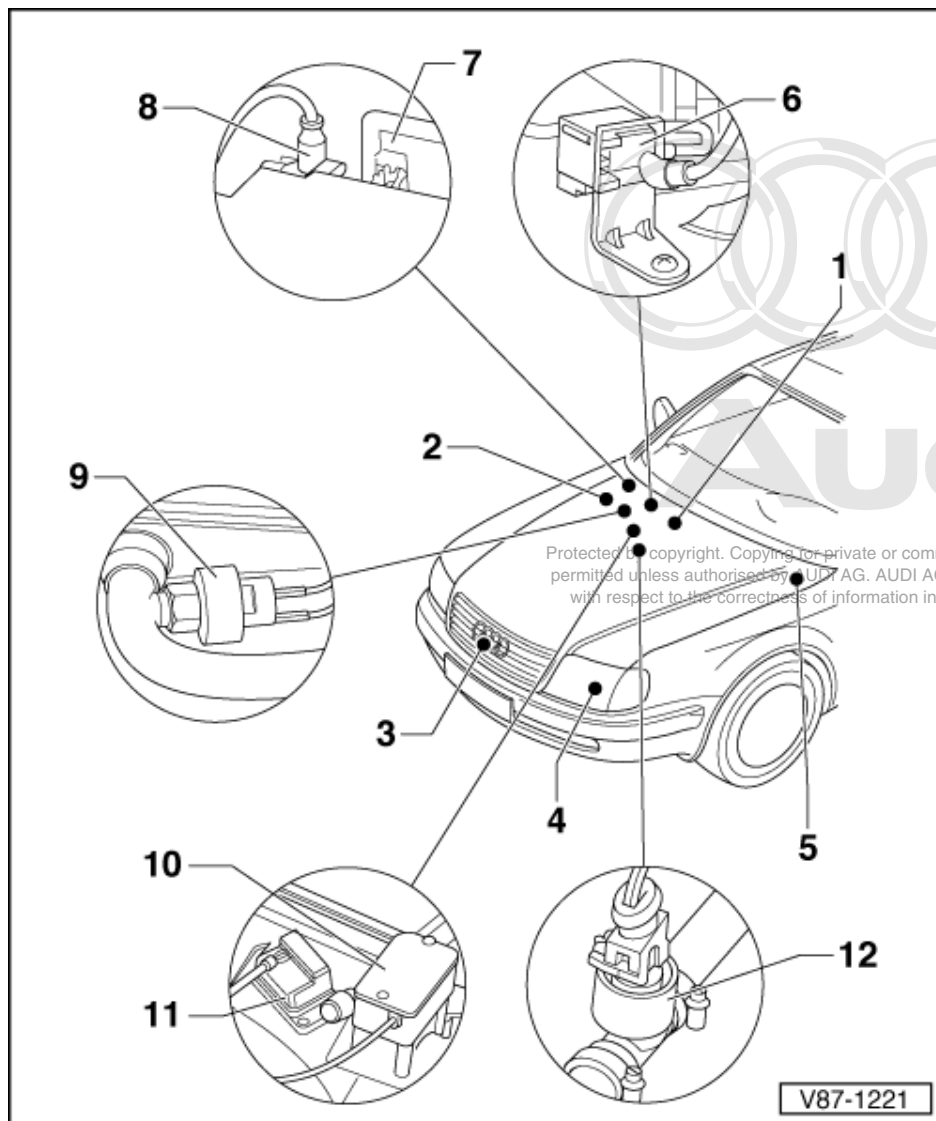
2 Evaporator

- ♦ May only be removed if refrigerant circuit is empty; send vehicle to an VW/Audi air-conditioning service centre

3 Condenser

- ♦ May only be removed if refrigerant circuit is empty; send vehicle to an VW/Audi air-conditioning service centre
- ♦ Can be tilted forward with radiator to achieve better access

=> Engine mechanical components; Repair group 19



4 Compressor

- ♦ Work on V-belt or ribbed V-belt for compressor => Page 169 onwards
- ♦ Removing compressor from and attaching it to bracket; removing and installing compressor bracket => Page 168 onwards

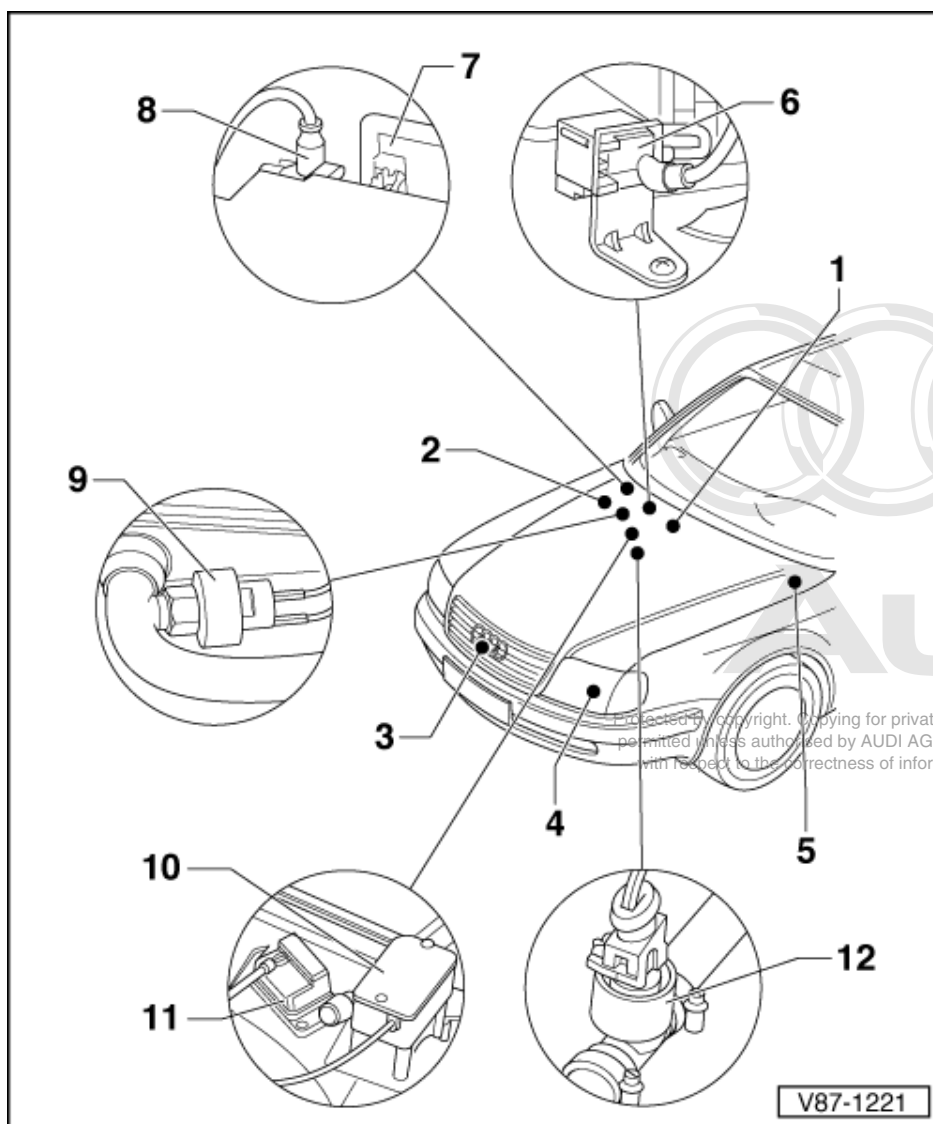
5 Relay carrier

- ♦ with connector for fault reader V.A.G 1551
- ♦ Self-diagnosis => Page 14

6 Two-way valve for fresh-air and recirculated-air flap -N632)

7 Fresh-air flap 2)

- ♦ Removing and installing vacuum unit => Fig. 192



8 Fresh air intake duct temperature sensor -G89 1)

9 Low-pressure switch for air conditioner - F73

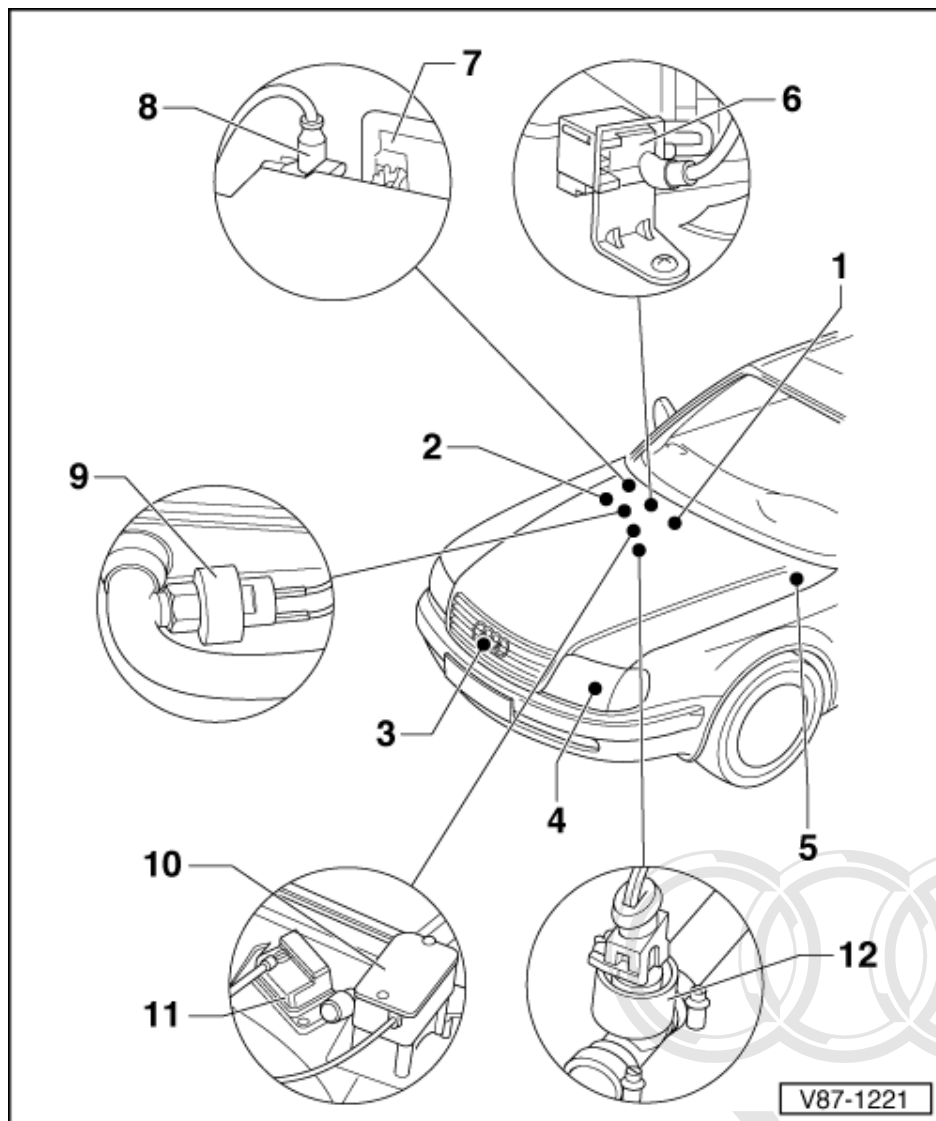
- ♦ Removing and installing => Fig. 164 respectively

10 Air-flow flap positioning motor-V71 2)

- ♦ With air-flow flap positioning motor potentiometer -G113
- ♦ Positioning motor depends on equipment; not fitted to all vehicles
- ♦ Removing and installing => Fig. 1

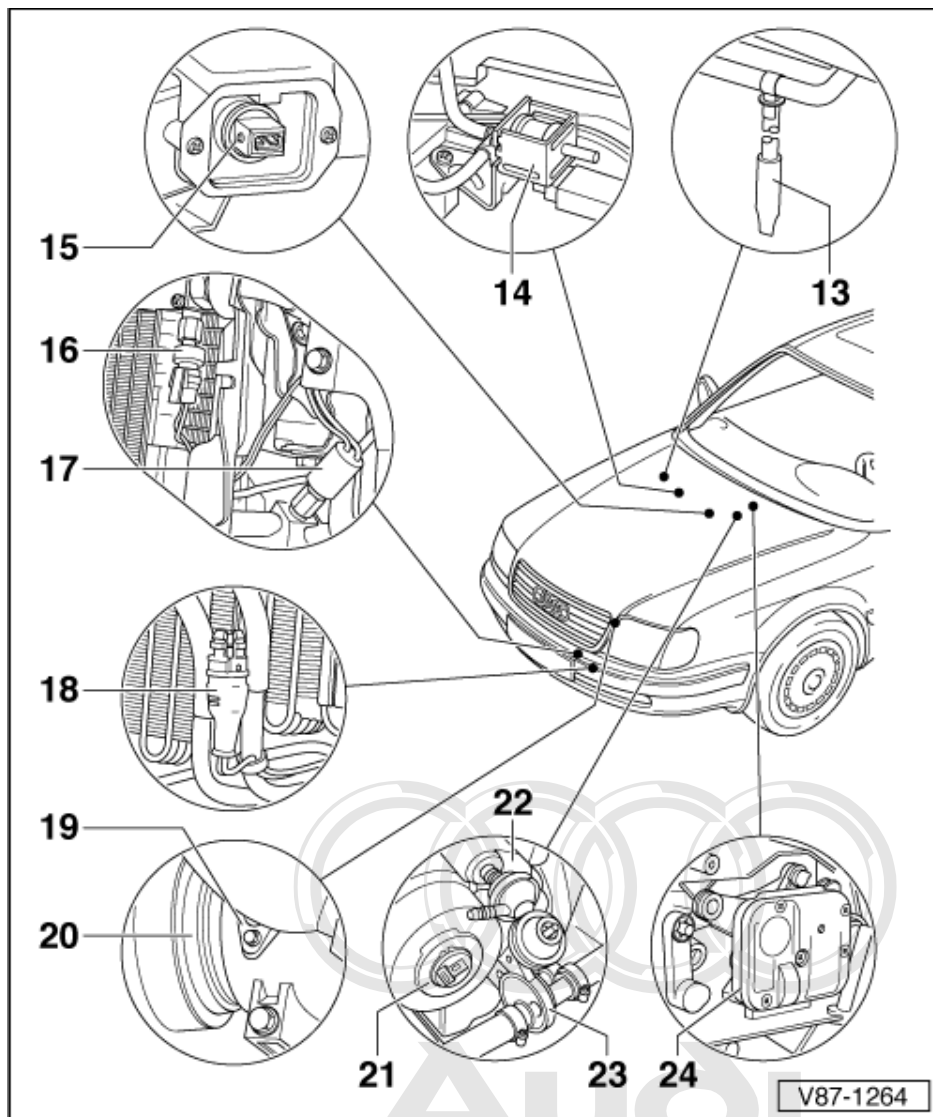
11 Fresh-air blower control unit -J126 2)

- ♦ Removing and installing => Fig. 2


12 Air conditioner refrigerant temperature sender -G110 1)

- ◆ Sender depends on equipment; not fitted to all vehicles
- ◆ Before removing, release pressure in cooling system by opening cap at coolant expansion tank

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13 Condensate drain hose with condensate drain valve

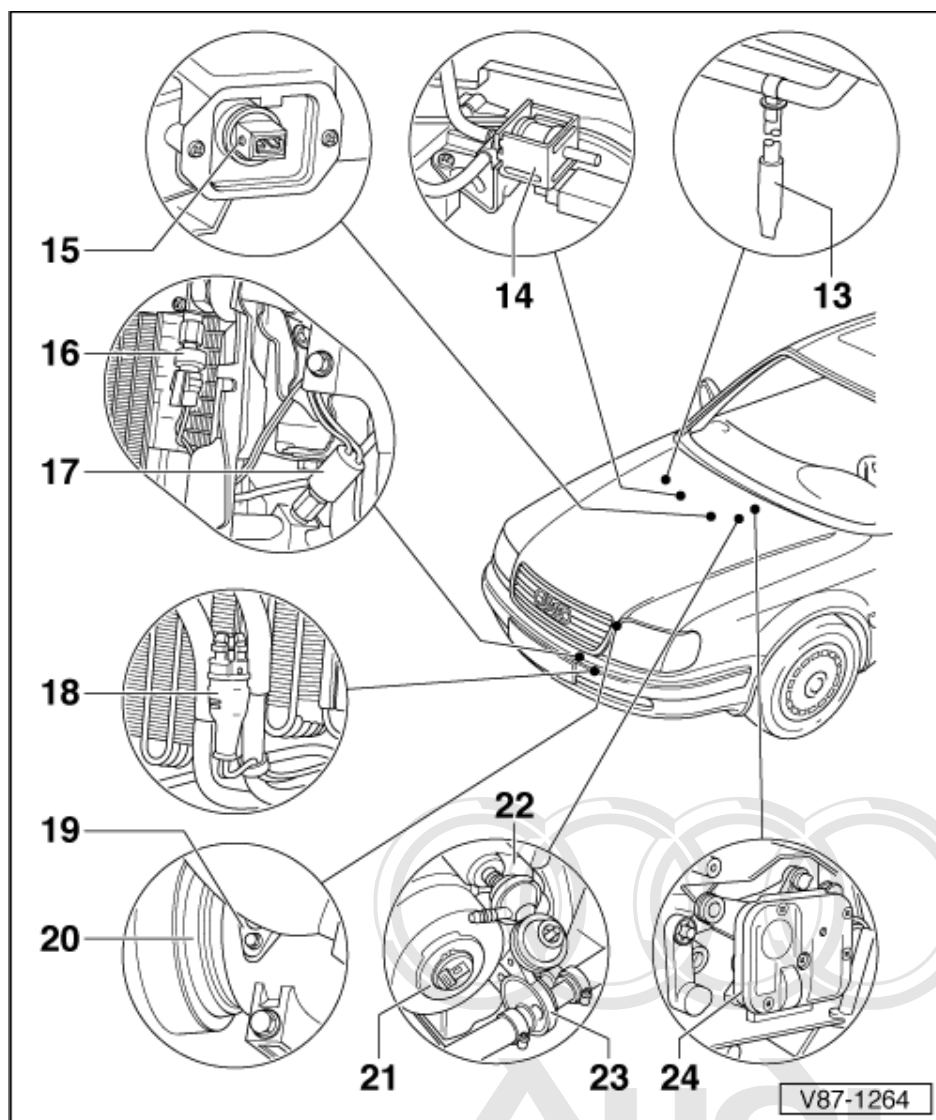
- ◆ Hose always routed downhill and free of kinks
- ◆ Bond connections between individual elements
- ◆ Valve must not be gummed up with wax or underseal; it must close properly.

14 Coolant shut-off valve two-way valve -N147 2)

15 Fresh-air blower temperature sensor -G109 1)

16 High-pressure switch for magnetic clutch - F118

- ◆ Removing and installing => Fig. 163



17 High-pressure switch for air conditioner -F23

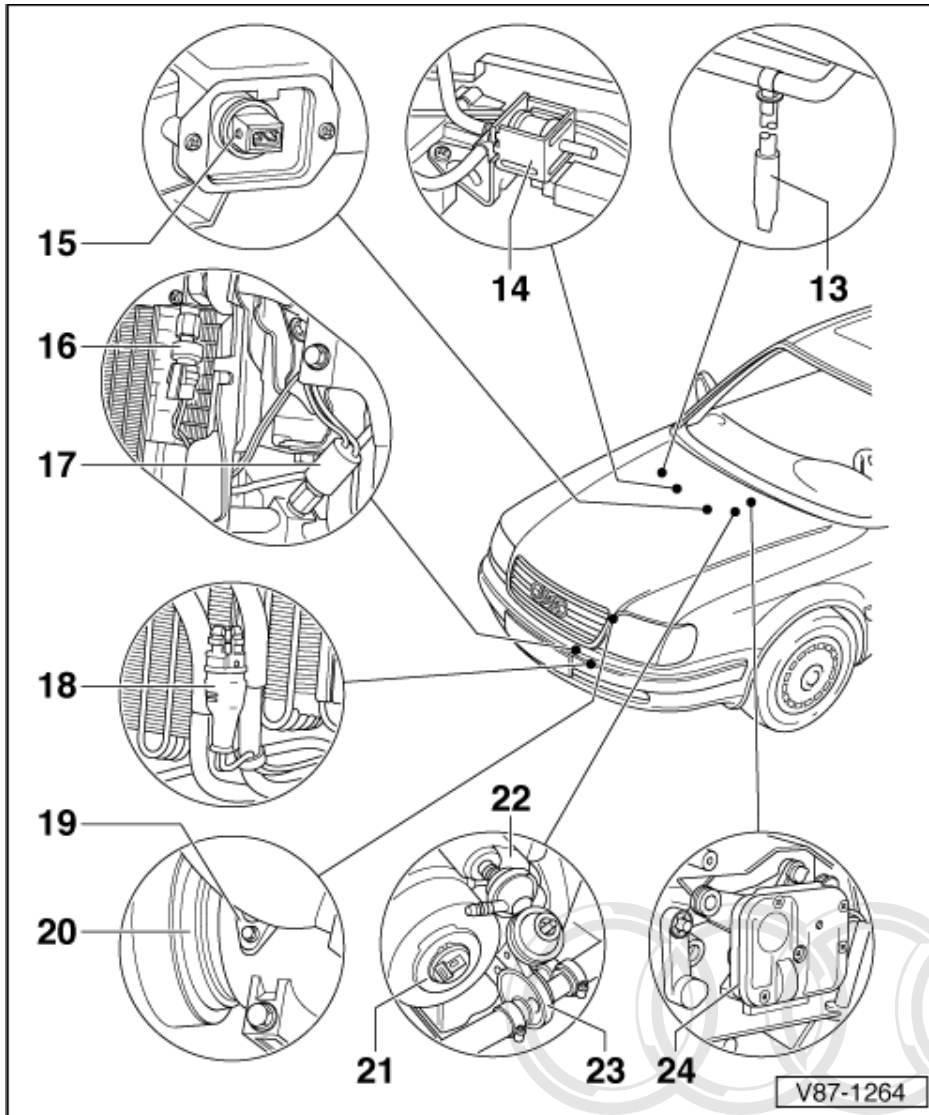
- ♦ Removing and installing => Fig. 164

18 Ambient temperature sensor -G171

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19 Air conditioner compressor speed sender -G111

- ♦ Checking => Page 53
- ♦ May only be removed if refrigerant circuit is empty; send vehicle to an VW/Audi air-conditioning service centre
- ♦ Only for compressor driven by ribbed V-belt
- ♦ Not on vehicles with Nippondenso compressor



20 AC magnetic clutch -N25 2)

- ♦ Servicing => Page 180 onwards

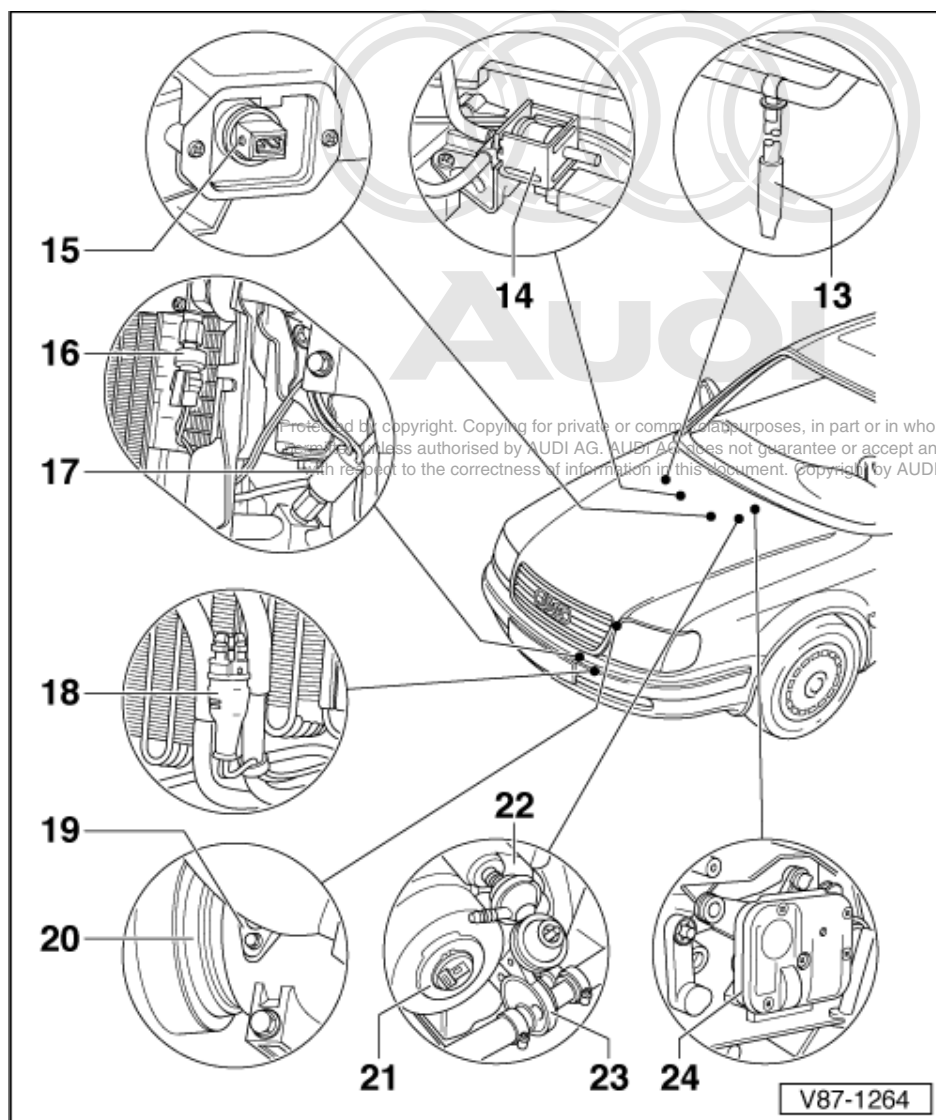
21 Fresh-air blower-V2 2)

- ♦ Removing and installing => Fig. 72
- ♦ Removing heater => Page 72

22 Non-return valve

- ♦ Removing and installing vacuum reservoir => Fig. 192

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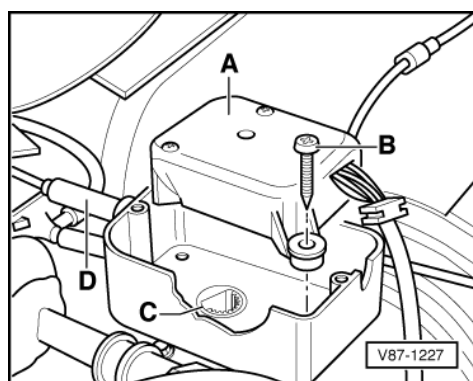


23 Coolant shut-off valve 2)

- ◆ Closed if vacuum exists
- ◆ Removing and installing => Fig. 192

24 Temperature flap positioning motor -V68 2)

- ◆ With temperature flap positioning motor potentiometer -G92
- ◆ Removing and installing => Fig. 3
- ◆ Install attachment for turbulence flap correct way round => Fig. 85



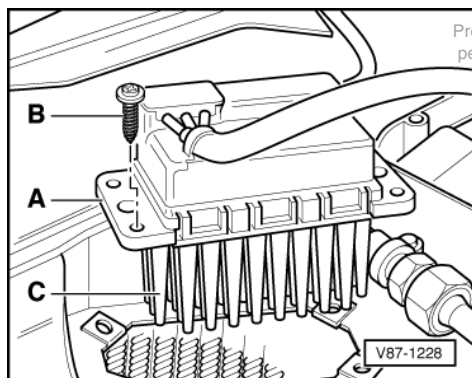
-> Fig.1 Removing and installing air-flow flap positioning motor -V71 with potentiometer -G113

Removal:

- Remove plenum chamber cover.
- Remove cover.
- Remove bolts -B-.

Installation:

- Ensure it is correctly installed in air-flow flap -C-.
- Ensure air admission hose -D- is correctly installed (it prevents ingress of moisture).



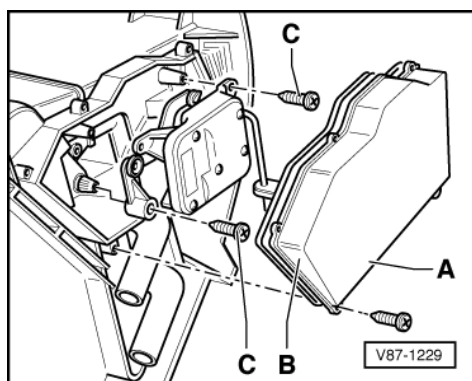
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-> Fig.2 Removing and installing fresh-air blower control unit -J126

- Remove plenum chamber cover.
- Remove bolts -B-.
- Remove fresh air-blower control unit -A-.

Note:

Heat sink -C- may be hot.



-> Fig.3 Removing and installing temperature flap positioning motor -V68 with potentiometer -G92

Removal:

- Remove plenum chamber cover.
- Remove windscreen wiper:



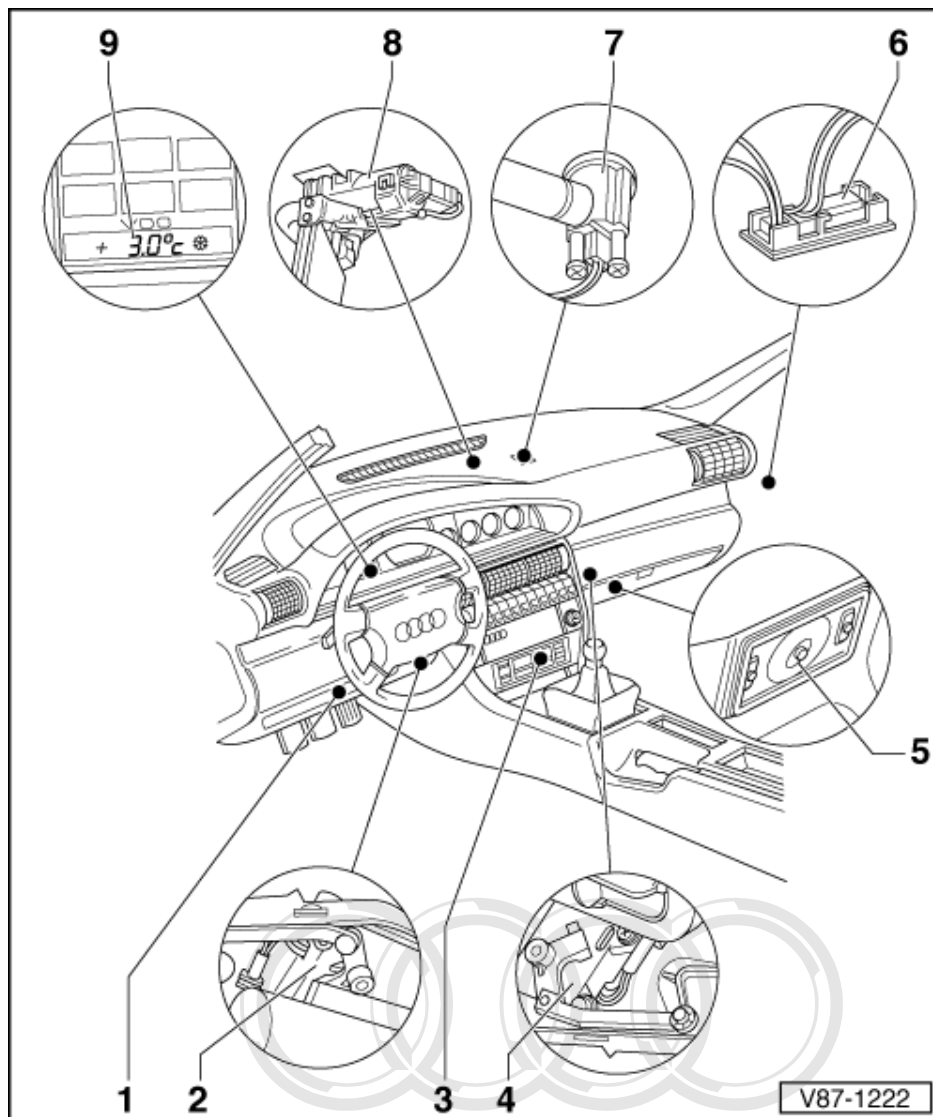
=> Electrical system, Repair group 92; Windscreen wiper and washer system; Servicing windscreen wiper system

- Take off cover -A-.
- Remove screws -C-.
- Remove temperature flap positioning motor.

Installation:

- When installing, make sure gasket -B- is correctly fitted in cover.
- Before installing, check freedom of movement of temperature flap.

8.3 - Components in passenger compartment



1 Kickdown switch for air conditioner -F46

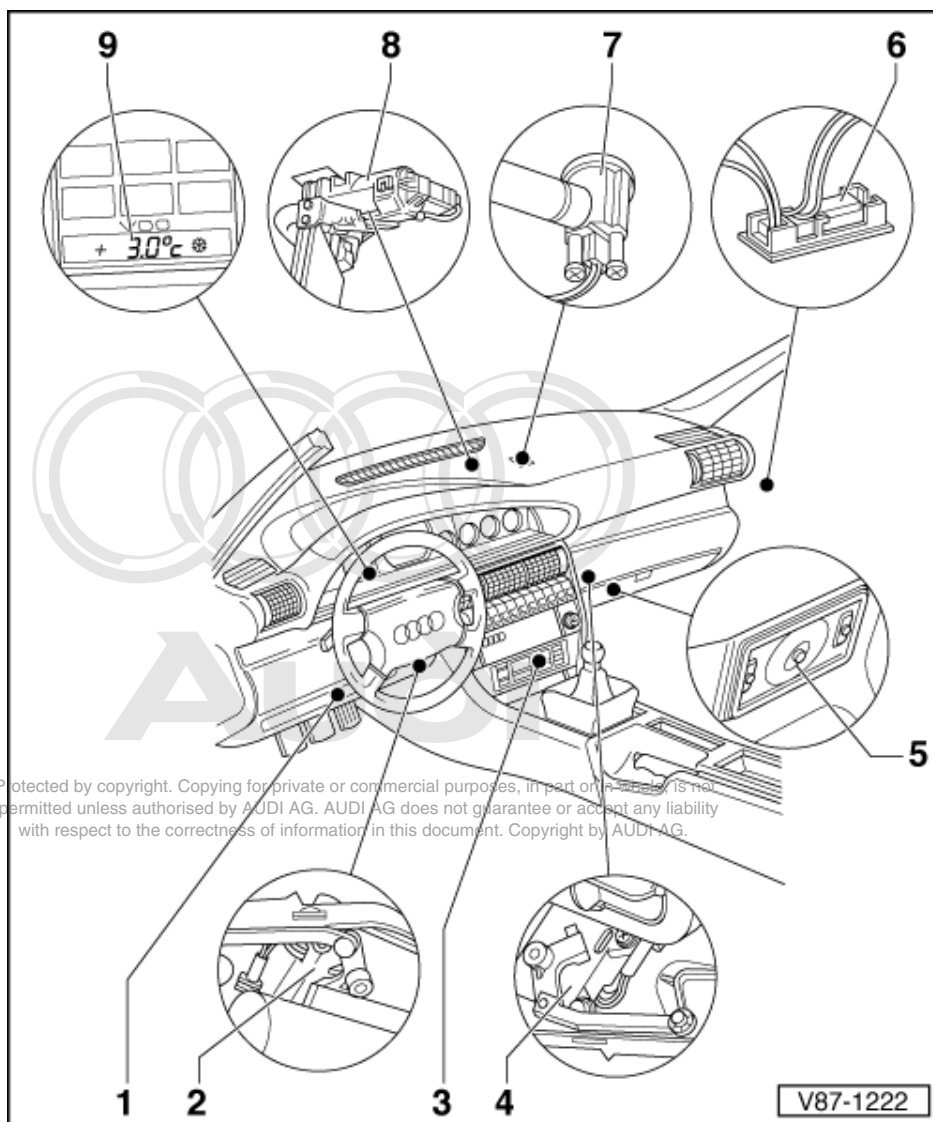
- ◆ Not installed in all vehicles
- ◆ Kickdown deactivation without kickdown switch -F46 via the engine control unit or the automatic gearbox control unit

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

2 Footwell/defrost flap positioning motor -V85 2)

- ◆ With footwell/defrost flap positioning motor potentiometer -G114

- ♦ Removing and installing mounting bracket => Fig. 5
- ♦ Detaching and attaching footwell/defroster flap positioning motor at mounting bracket => Page 218

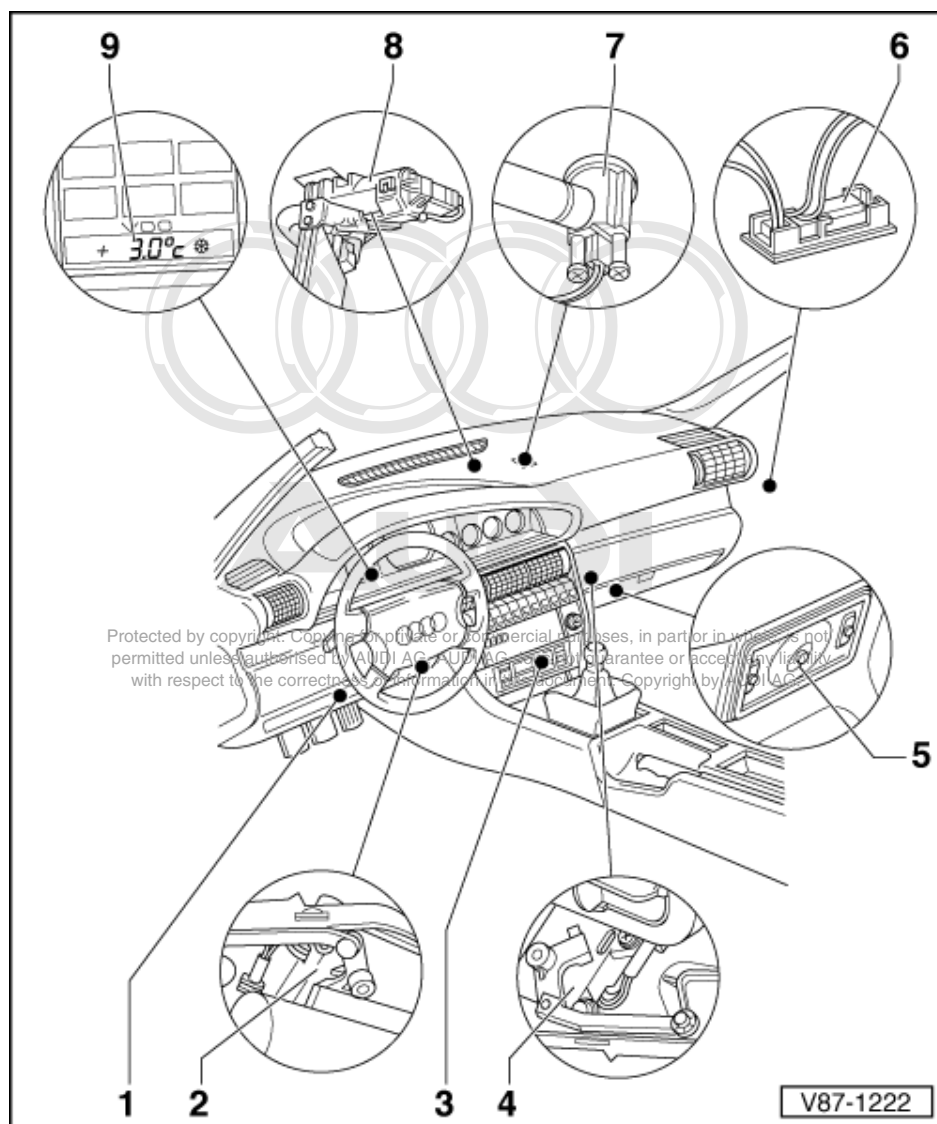


3 Operating and display unit for fully automatic air conditioner -E87

- ♦ Removing and installing => Fig. 1
- ♦ Checking code and coding => Page 35
- ♦ On vehicles fitted with Nippondenso compressor, install only an operating and display unit -E87 with Part No. from index "K"
- ♦ Replacing bulbs => Fig. 2

4 Central flap positioning motor -V70 2)

- ♦ With central flap positioning motor potentiometer -G112
- ♦ Removing and installing mounting bracket => Fig. 5
- ♦ Detaching and attaching central flap positioning motor at mounting bracket => Page 218

**5 Recirculated-air flap 2)**

- ♦ Removing and installing => Fig. 199

6 Roof temperature - sensor -G86 1)**7 Dash panel temperature sensor -G561)**

- ♦ Removing and installing => Fig. 4

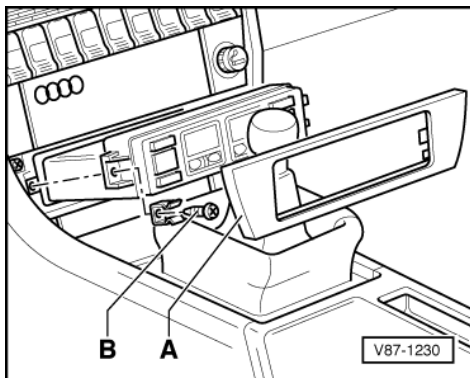
8 Temperature sensor blower -V42 2)

- ♦ Removing and installing => Fig. 3

9 Ambient temperature display -G1062)

- ♦ Depends on equipment; not fitted to all vehicles
- ♦ Removing and installing

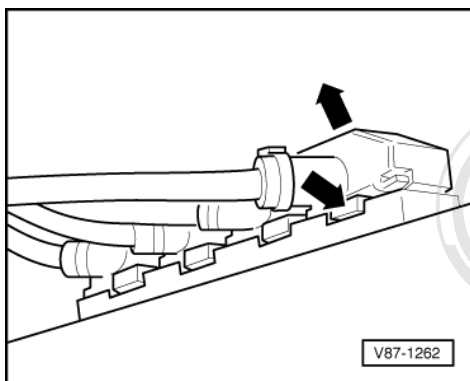
=> Electrical system; Repair group 90; Testing components of dash panel insert; Removing and installing ambient temperature indicator Testing components of dash panel insert Removing and installing ambient temperature indicator



-> Fig.1 Removing and installing operating and display unit -E87

Removal:

- Interrogate fault memory => Page 17 .
- Switch off ignition.
- Carefully lever off trim panel -A-.
- Remove 2 screws -B-.
- Pull the operating and display unit out of the centre section of the dash panel.



- -> Press back plug catch - bottom arrow- and pull off plug.

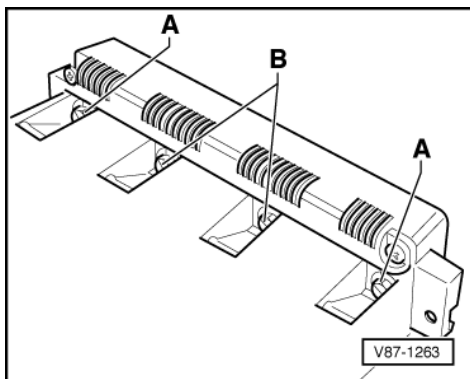
Installation:

Install in reverse order, paying attention to the following:

- Check coding and correct if necessary => Page 35 .
- Perform basic setting => Page 32 .

Note:

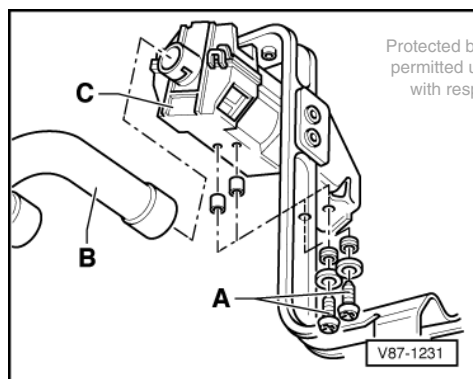
On vehicles fitted with Nippondenso compressor, install only an operating and display unit -E87 with Part No. from index "K".



-> Fig.2 Replacing the bulbs in the operating and display unit -E87

- Remove operating and display unit -E87 => Fig. 1.
- Turn bulb through 90°.

- A - Bulb for illumination of control buttons
- B - Bulb for the illumination of the display zones

**-> Fig.3 Removing and installing temperature sensor blower -V42**

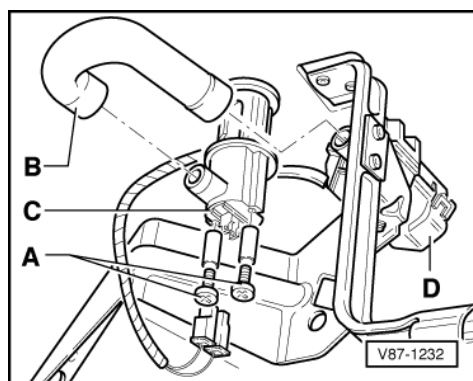
- Remove dash panel insert:

=> Electrical system; Repair group 90; Dash panel insert; Removing and installing dash panel insert Dash panel insert Removing and installing dash panel insert

- Remove 2 screws -A-.
- Detach the connector.
- Pull off hose -B-.
- Remove blower -C-.

Note:

After installing ensure hose -B- is correctly located on temperature sensor.

**-> Fig.4 Removing and installing dash panel temperature sensor -G56**

- Remove glove compartment:

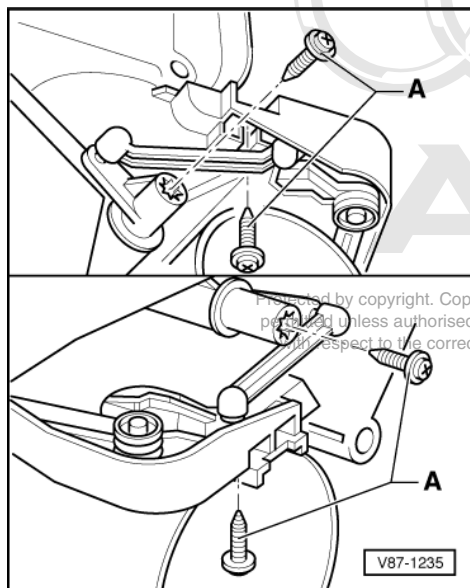
=> General body repairs; Repair group 70; Dash panel; Removing and installing storage compartment and glove compartment Dash panel Removing and installing storage compartment and glove compartment

- Remove 2 screws -A-.
- Pull off hose -B-.
- Detach the connector.

- Remove temperature sensor -C-.

Note:

After installing ensure hose -B- is correctly located on blower -D- for temperature sensor.



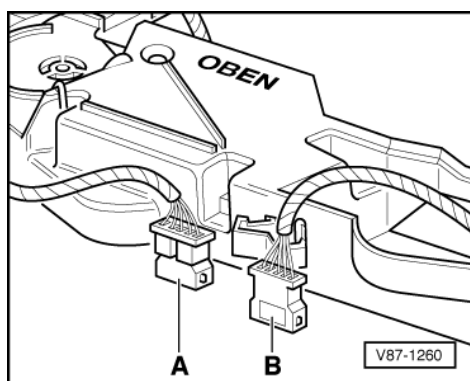
-> Fig.5 Removing and installing mounting bracket for footwell/defroster flap positioning motor -V85 and central flap positioning motor -V70

- Remove centre part of the dash panel, glove compartment and storage compartment on driver's side:

=> General body repairs; Repair group 70; Dash panel; Removing central section of dash panel Dash panel Removing central section of dash panel

=> General body repairs; Repair group 70; Dash panel; Removing and installing storage compartment and glove compartment Dash panel Removing and installing storage compartment and glove compartment

- Disconnect defroster hoses on left and right of heater.
- Remove 2 screws -A- on left of heater and 2 screws -B- on right of heater.
- Remove levers from heater.



- -> Unplug connectors -A- and -B-.

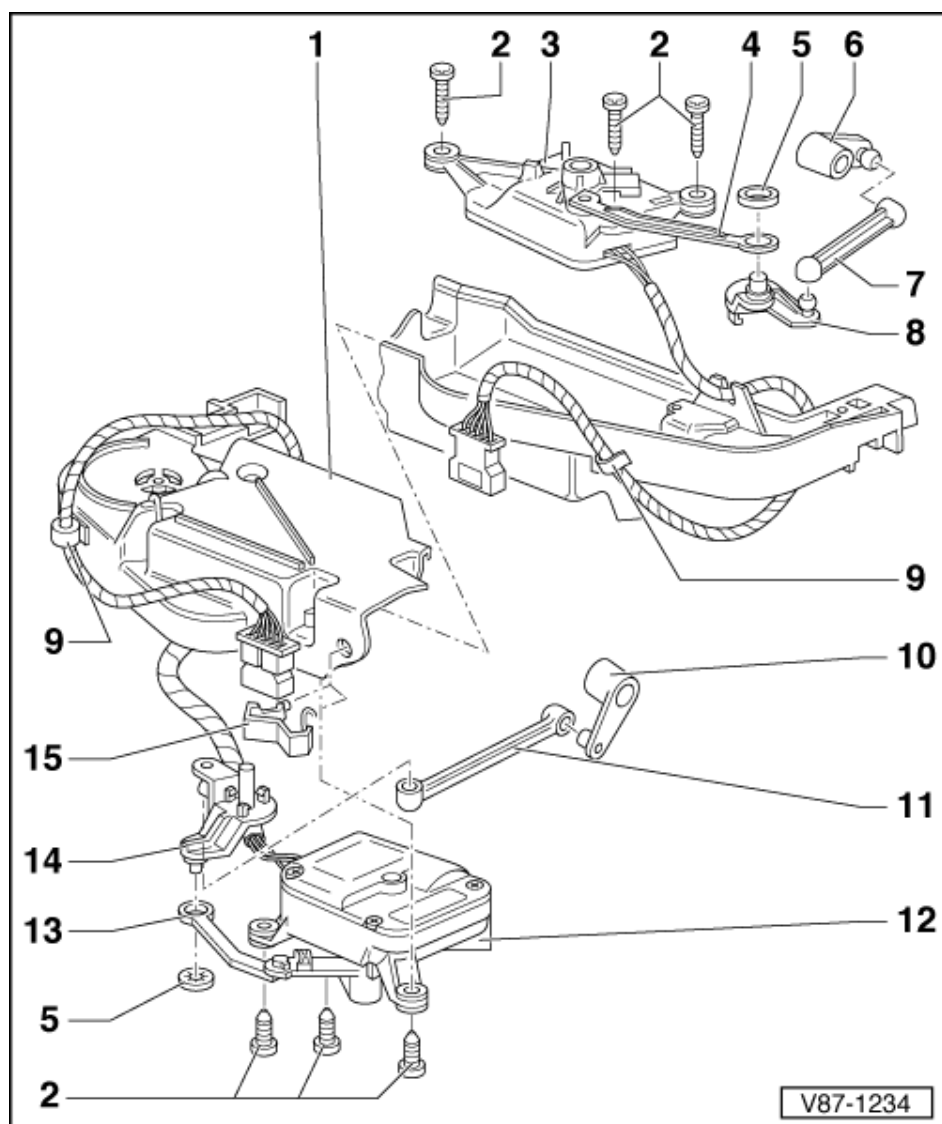
Connectors are colour-coded.

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder

A - Red connector to footwell/defroster flap positioning motor -V85

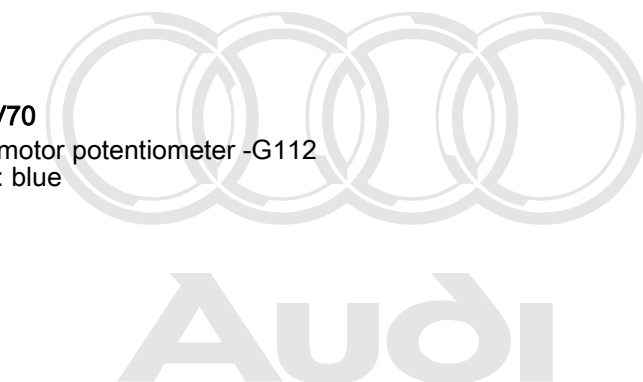


B - Blue connector to central flap positioning motor -V70

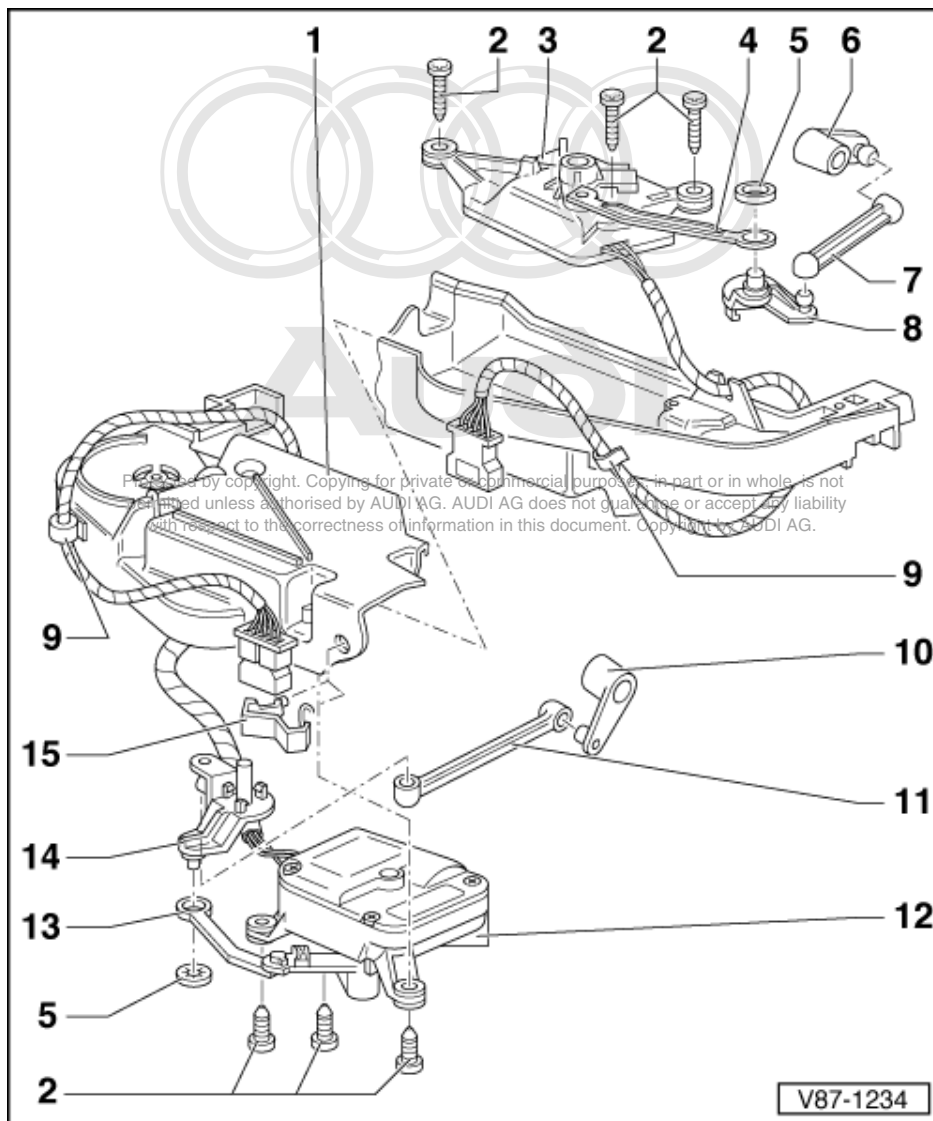


Detaching and attaching footwell/defroster flap positioning motor -V85 and central flap positioning motor -V70 at mounting bracket

- 1 Mount
- 2 Screw
- 3 Central flap positioning motor -V70
 - ♦ With central flap positioning motor potentiometer -G112
 - ♦ Colour of connector housing: blue
- 4 Connecting rod
- 5 Clamping washer
- 6 Blue lever
- 7 Connecting rod
- 8 Relay lever



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- 9 Clip
- 10 Red lever
- 11 Connecting rod
- 12 Footwell/defroster flap positioning motor -V85
 - ♦ With footwell/defrost flap positioning motor potentiometer -G114
 - ♦ Colour of connector housing: red
- 13 Connecting rod
- 14 Relay lever
- 15 Securing clip

8.4 - Checking refrigeration capacity of fully automatic air-conditioner

Test requirements:

- Cooler and condenser clean; clean if necessary
- V-belt or ribbed V-belt for compressor drive OK and correctly tensioned.
- All air ducts, covers and seals are OK and properly fitted.
- Vehicle is not exposed to sunlight.
- Engine at operating temperature.



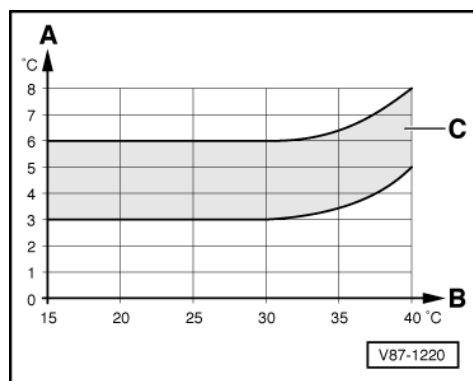
- Connection between evaporator and heating does not draw in any secondary air at maximum fresh-air blower speed.
- Operations when engine running, "Auto" mode, "LO" temperature selection, dash panel vents opened, re-circulated-air pushbutton pressed (recirculated-air symbol in display comes on) and compressor switched on (ice crystal symbol comes on in display):
 - Compressor running (magnetic clutch has closed);
 - Fresh-air blower running at maximum speed;
 - Electric radiator fan runs;
 - Fresh-air and recirculated-air flap in "recirculated-air" position;
 - Coolant shut-off valve has closed;
 - Temperature flap is in the position "cooling".

Note:

If one of these test requirements is not met, interrogate fault memory and perform final control diagnosis => Page 28.

- Interrogate fault memory => Page 17, and rectify any faults stored.
- Erase fault memory => Page 34.
- Carry out basic setting => Page 32

Testing



- A - -> Air temperature from "centre" dash panel vents
- B - Ambient temperature
- C - Permissible tolerance range

Depending upon ambient temperature, air temperature from "centre" dash panel vents must be within stated tolerance range within 5 minutes.

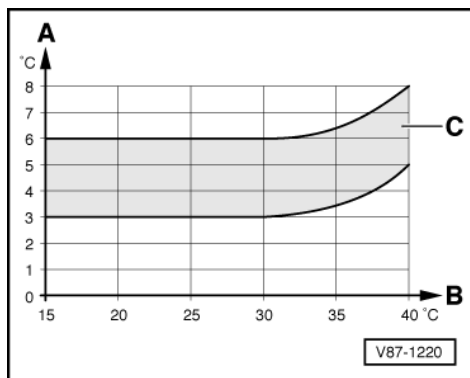
- Close front flap.
- Measure ambient temperature.
- Switch the ignition on.
- Close doors, windows and sunroof.
- Set "auto" mode.
- Preselect temperature "LO".

Note:

Do not preselect any blower speed and do not select any vents.

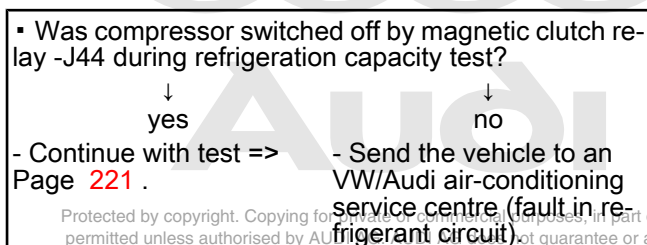
- Open all dash-panel vents.
- Start engine (start of time measurement)
- Increase the engine speed to 2000 rpm
- Measure the temperature of the air flowing from the "centre" dash panel vents, e.g. with a Minitester V.A.G 1362.

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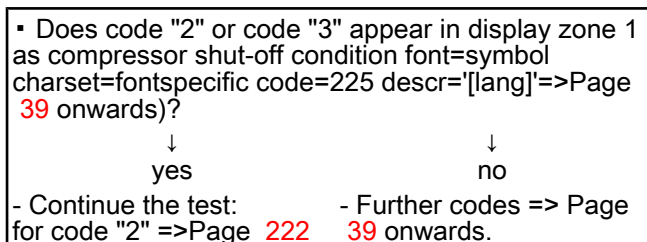
- -> Compare measured values with values in the diagram.
- If required values are not attained:
- Test actuation of radiator fan -V7 (stage 2) through air conditioner high-pressure switch -F23 (switching pressures => item 161 respectively):

=> "Current flow diagrams, Electrical fault finding and fitting locations" binder



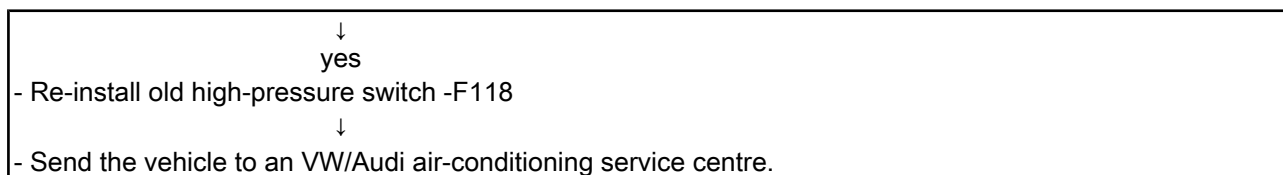
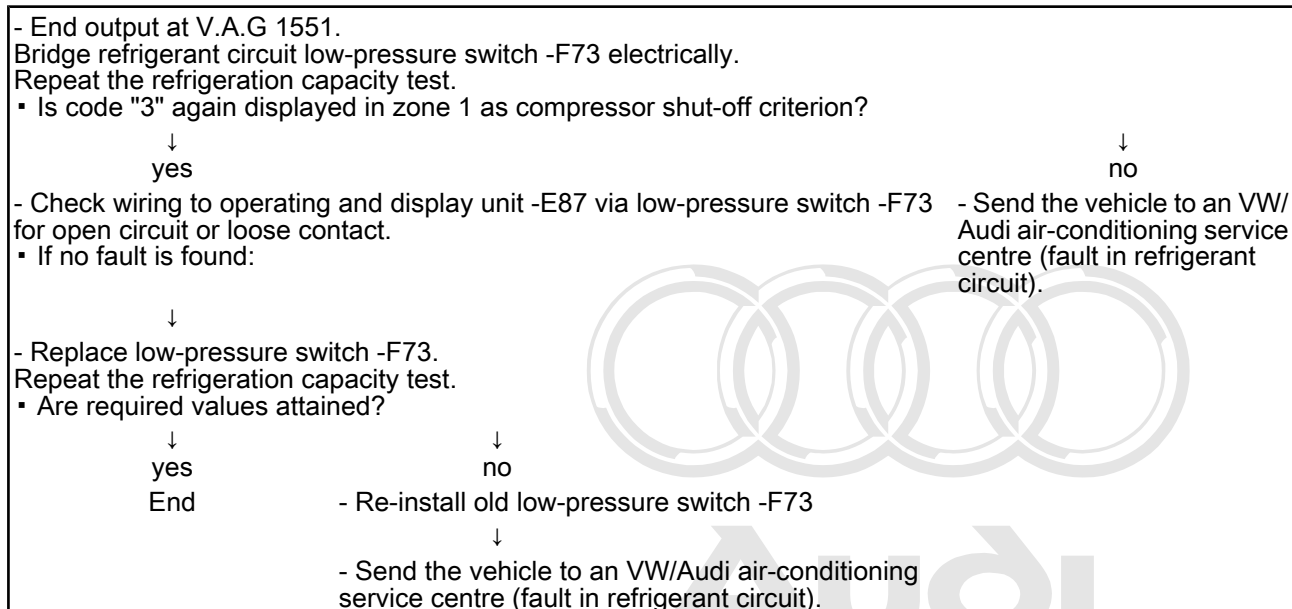
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- Interrogate fault memory => Page 17 , and rectify any faults stored.
- Erase fault memory => Page 35 . Fault reader V.A.G 1551 remains connected.
- Repeat the refrigeration capacity test.
- As soon as compressor is switched off, enter address word 08 for "AC/heating electronics", confirm entry and move forward in programme => Page 14 .
- Select the function "Read measured value block" and enter display group number 01
- Rectify cause for compressor shut-off.



Continuation of test in case of compressor shut-off criterion code "3"

- End output at V.A.G 1551.
- Check wiring between operating and display unit -E87 and high-pressure switch -F118 for open circuit or loose contact:
- => "Current flow diagrams, Electrical fault finding and fitting locations" binder
- If no fault is found:
- ↓
- Replace high-pressure switch -F118.
- Repeat the refrigeration capacity test.
- Is code "2" again displayed in zone 1 as compressor shut-off criterion?

**Continuation of test in case of compressor shut-off criterion code "3"****9 - Servicing of refrigerant circuit**

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9.1 - Servicing of refrigerant circuit**9.2 - Refrigerant R12 > 09.92****Notes:**

- ♦ Basic information on working on refrigerant circuit R12:

=> Air conditioner - with refrigerant R12; Part 1; Basic information on working on refrigerant circuit

- ♦ Observe additional safety precautions:

=> Air conditioner - with refrigerant R12; Part 1; Safety precautions when working on vehicle with air conditioner and when handling refrigerant and flushing agent

- ♦ Converting air conditioner from refrigerant R12 to refrigerant R134a:

=> Air conditioner - with refrigerant R12; Part 2; Converting refrigerant circuit with Nippondenso or Zexel compressor from refrigerant R12 to refrigerant R134a (retrofit)

- ♦ Testing refrigeration capacity:
Manually controlled air conditioner => Page 219 ;
- ♦ Refrigerant circuit does not have a sight glass; do not add any refrigerant to circuit.

- ◆ Replacement compressors contain all the refrigerant oil to be used to fill refrigerant circuit (300 cm³).

- ◆ Possible problems at refrigerant circuit:

=> Air conditioner - with refrigerant R12; Part 2; Possible problems at refrigerant circuit

- ◆ Testing pressures in refrigerant circuit with pressure gauge battery:

=> Air conditioner - with refrigerant R12; Part 2; Testing pressures in refrigerant circuit with pressure gauge battery

- ◆ Replacing components of refrigerant circuit:

=> Air conditioner - with refrigerant R12; Part 2; Replacing components of refrigerant circuit

- ◆ Capacities:

=> Air conditioner - with refrigerant R12; Part 2; Filling quantities; Capacity for refrigerant R12

=> Air conditioner - with refrigerant R12; Part 2; Filling quantities; Capacity for refrigerant R134a (retrofit)

=> Air conditioner - with refrigerant R12; Part 2; Filling quantities; Capacity for refrigerant oil and approved oils (for circuit with refrigerant R12)

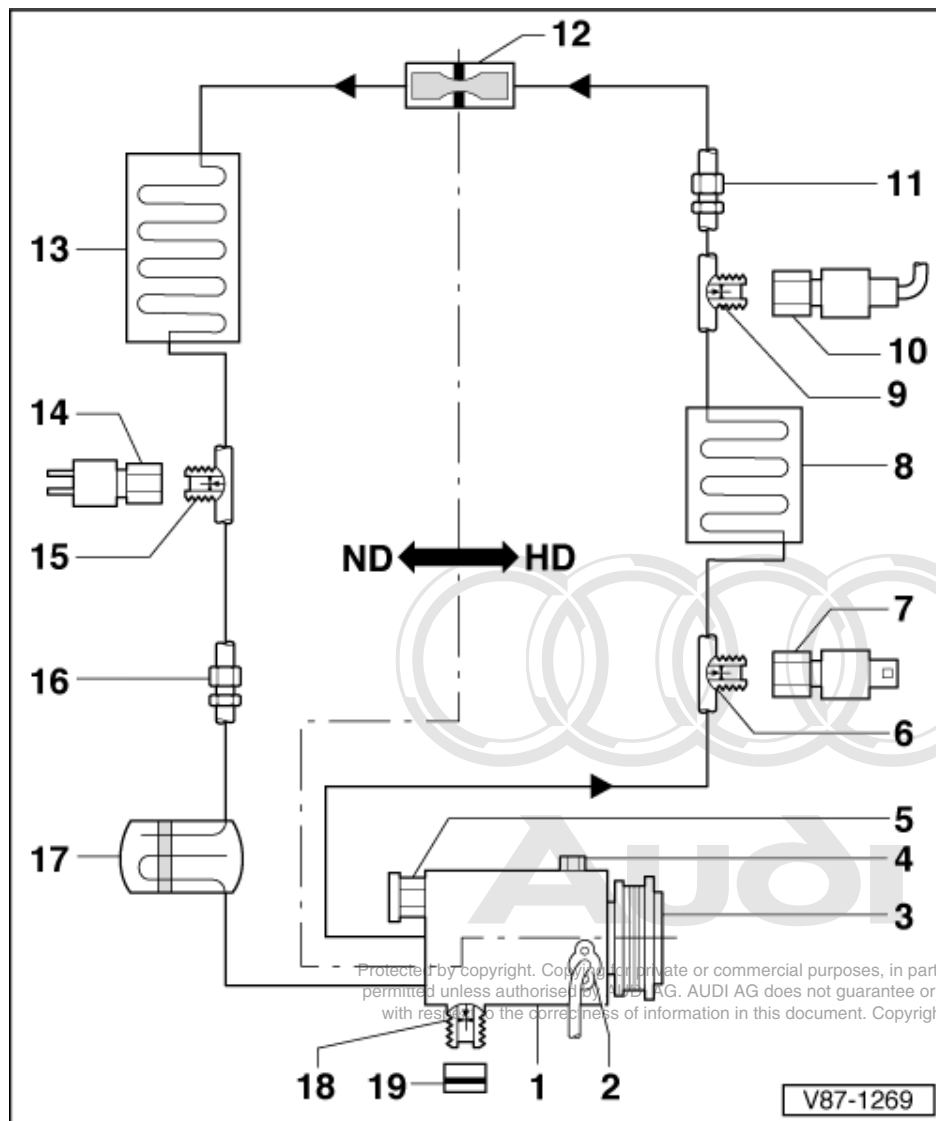
=> Air conditioner - with refrigerant R12; Part 2; Filling quantities; Capacity for refrigerant oil and approved oils (for circuit with refrigerant R1334a; retrofit)

- ◆ Cleaning refrigerant circuit:

=> Air conditioner - with refrigerant R12; Part 2; Blowing through refrigerant circuit with compressed air and nitrogen



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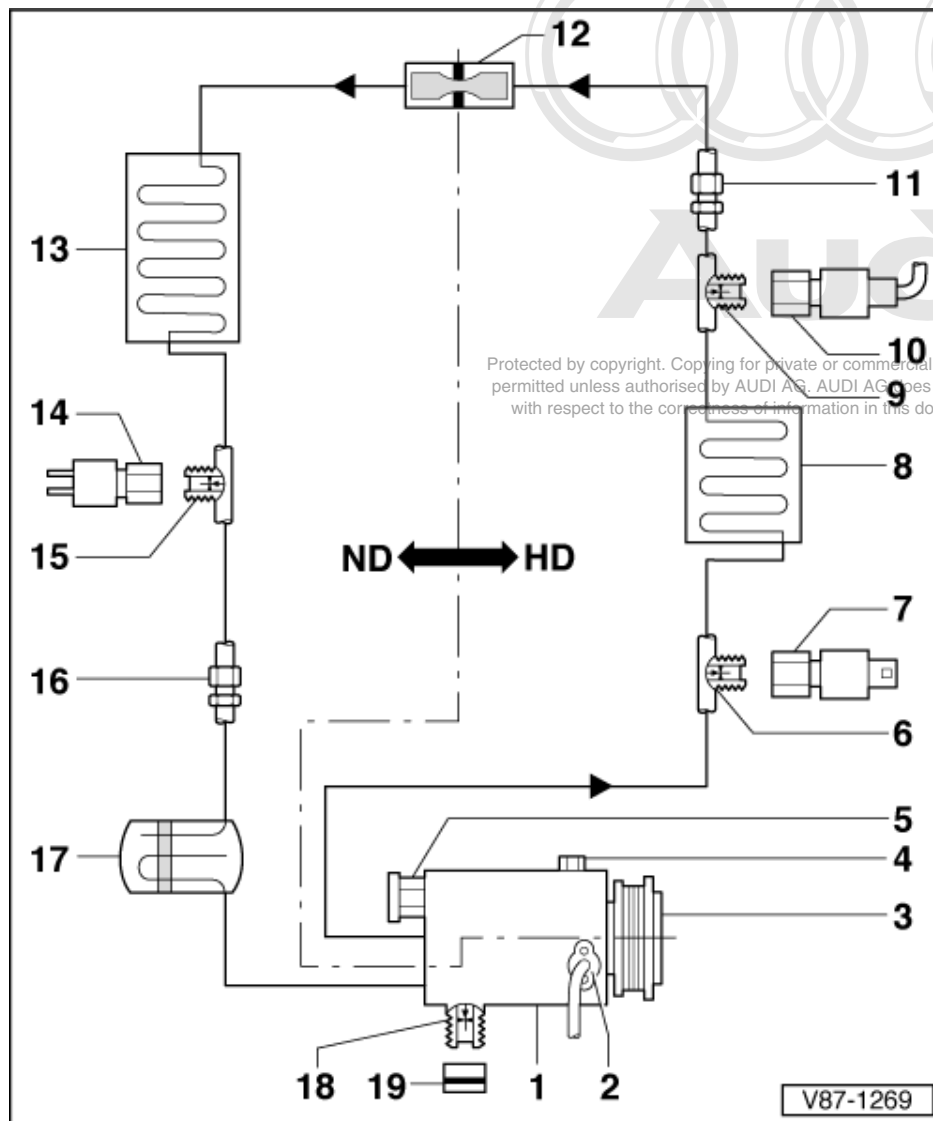


HD = High-pressure end

ND = Low-pressure end

1 Compressor

- ♦ With variable piston stroke; it is set by means of pressure on low-pressure end in line with requested refrigeration capacity
- ♦ Zexel compressor
- ♦ O-ring seal
 - for low-pressure connection:
17.2 mm/1.8 mm
 - for high-pressure connection:
14.0 mm/1.8 mm
- ♦ Tightening torque:
 - Low-pressure connection: 40 Nm
 - High-pressure connection: 30 Nm

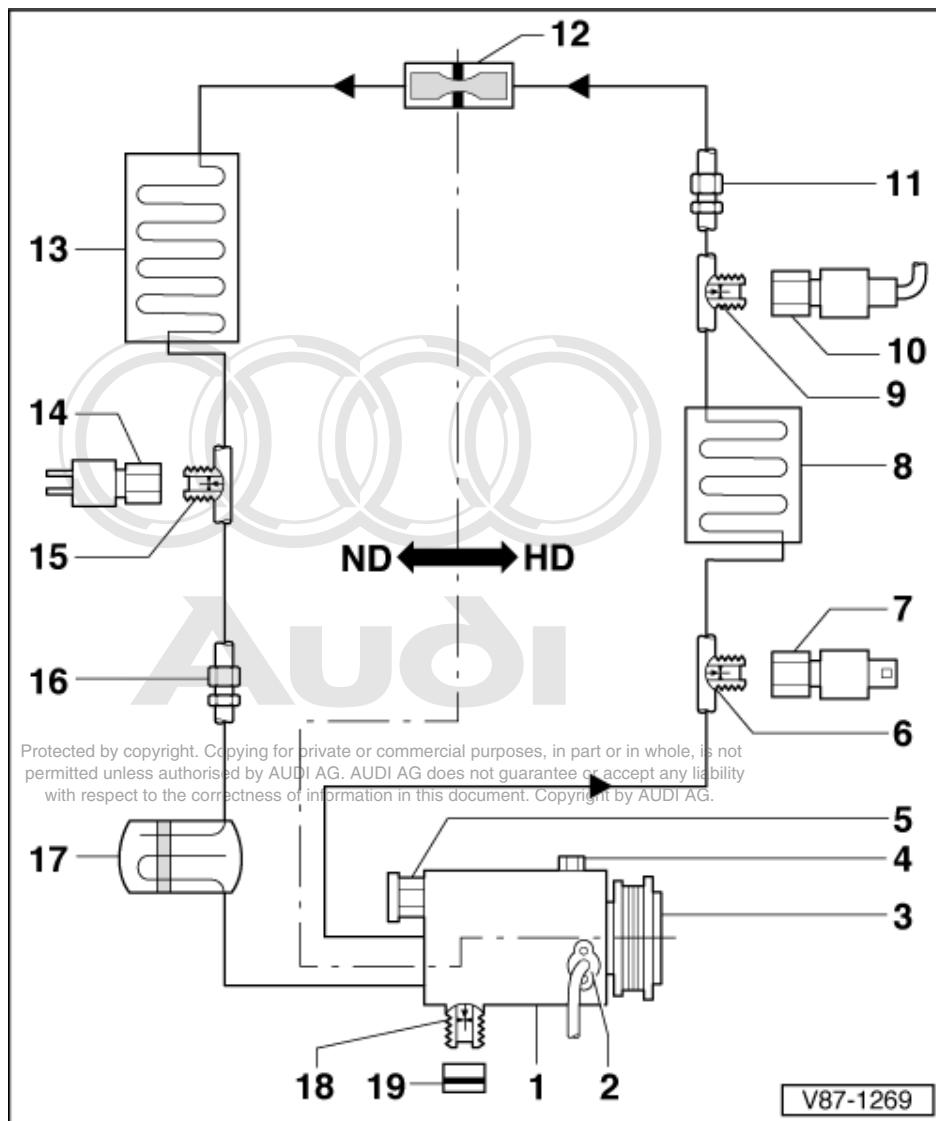


- ♦ Take off V-belt or ribbed V-belt respectively => Page 168 onwards, or

=> Engine mechanical components; Repair group 13

- ♦ On vehicles with 6-cylinder engine, after replacing compressor, set alignment of pulleys for tightening, => Fig. 178.
- ♦ After the installation of a new compressor or filling with fresh refrigerant oil (e.g. after blowing out the refrigerant circuit), turn the compressor 10 revolutions by hand before the first start to avoid damage to the compressor.
- ♦ A mat must be fitted to the refrigerant pipes on 6-cyl. engines, to protect O-ring- seals from radiant heat of the exhaust manifold. Part number:

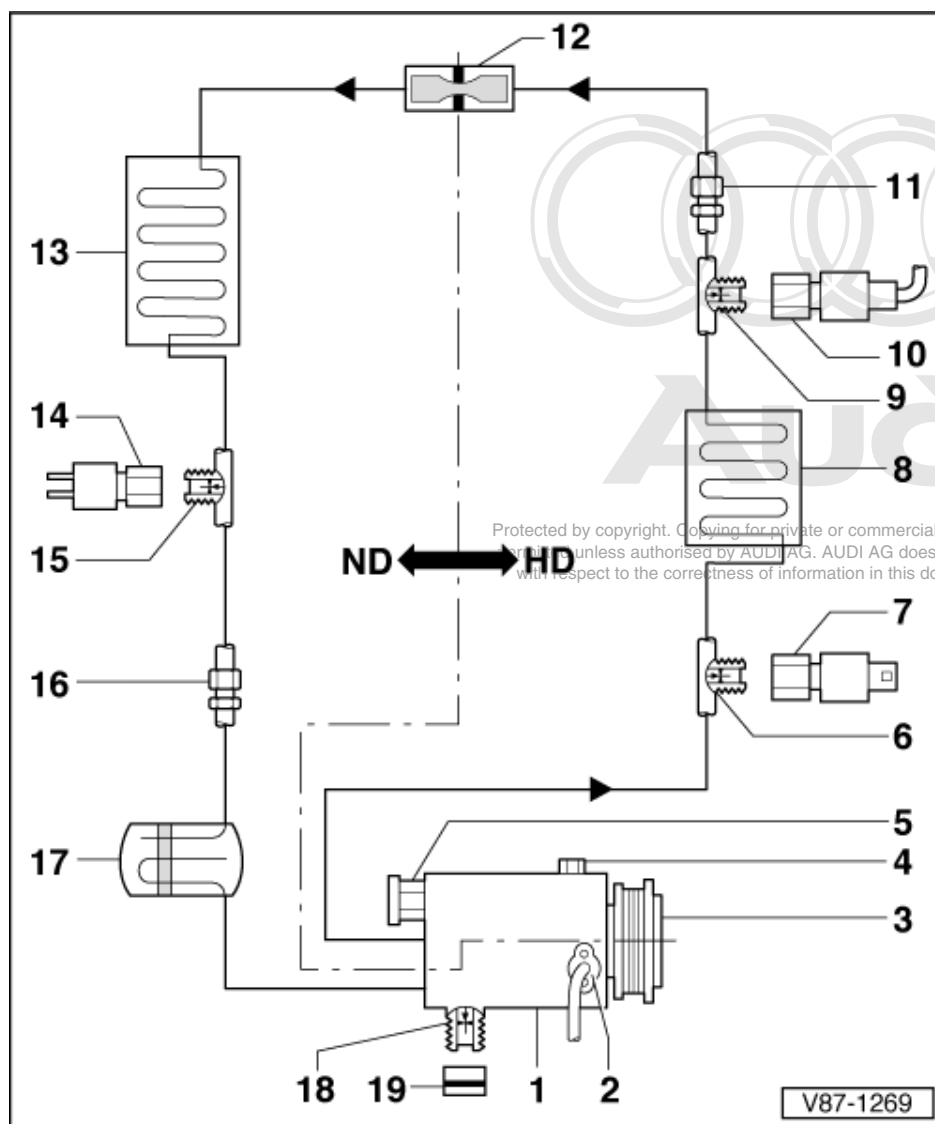
=> Parts Catalogue

**2 AC compressor speed sender -G111.**

- ♦ Only on vehicles with compressor driven by ribbed V-belt on which ribbed V-belt also drives other ancillaries.
- ♦ O-ring seal
15.6 mm/1.5 mm
- ♦ Checking=> Page 53
- ♦ Removing and installing => Fig. 247
- ♦ May only be unscrewed if the refrigerant circuit is empty.

3 AC magnetic clutch -N25

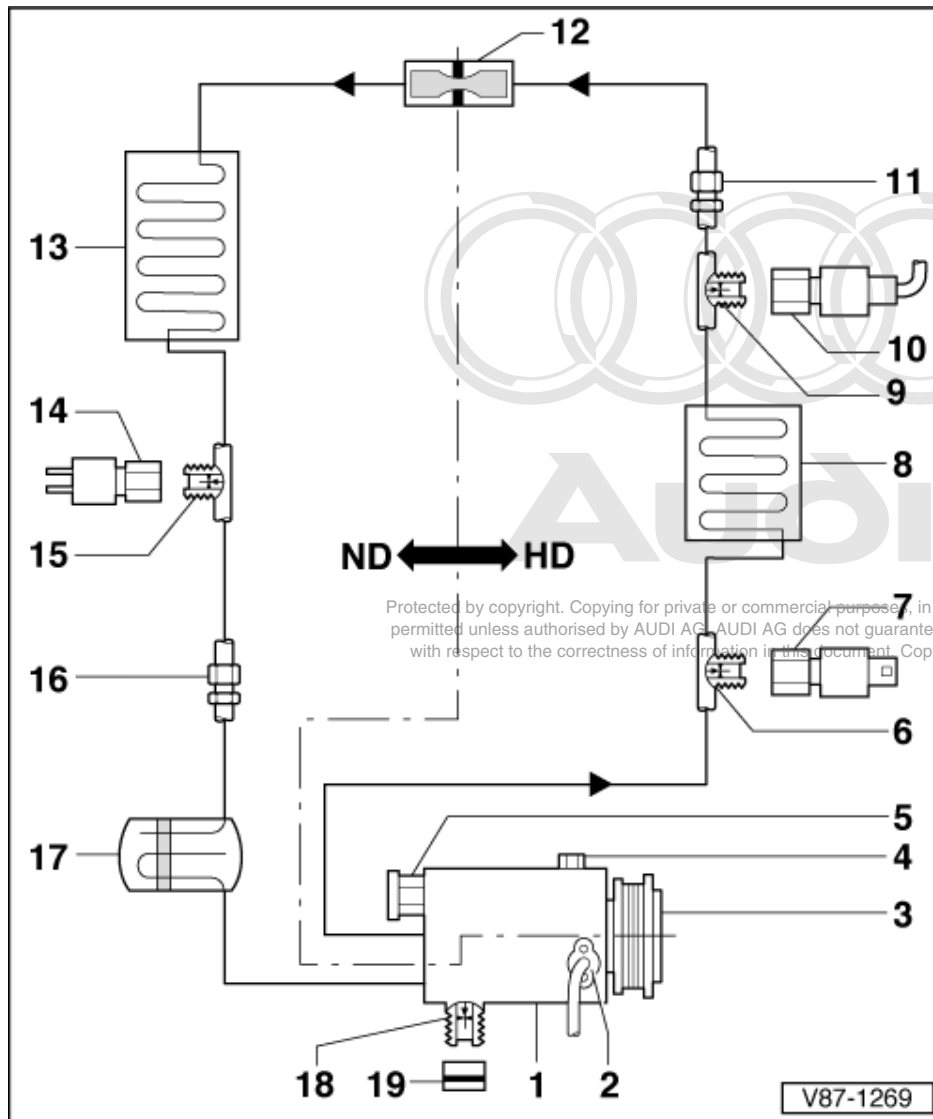
- ♦ Servicing => Page 180 onwards.



4 Oil drain plug - 10 Nm

- ♦ O-ring seal
7.6 mm/1.9 mm
- ♦ May only be unscrewed to drain refrigerant oil if compressor is removed
 - a) if refrigerant circuit cleaned in order to drain old refrigerant oil and to pour fresh refrigerant oil into old compressor
 - b) if compressor damaged and it is not necessary to clean refrigerant circuit in order to adjust quantity of refrigerant oil in replacement compressor

=> Air conditioner - with refrigerant R12; Part 2; Replacing components of refrigerant circuit

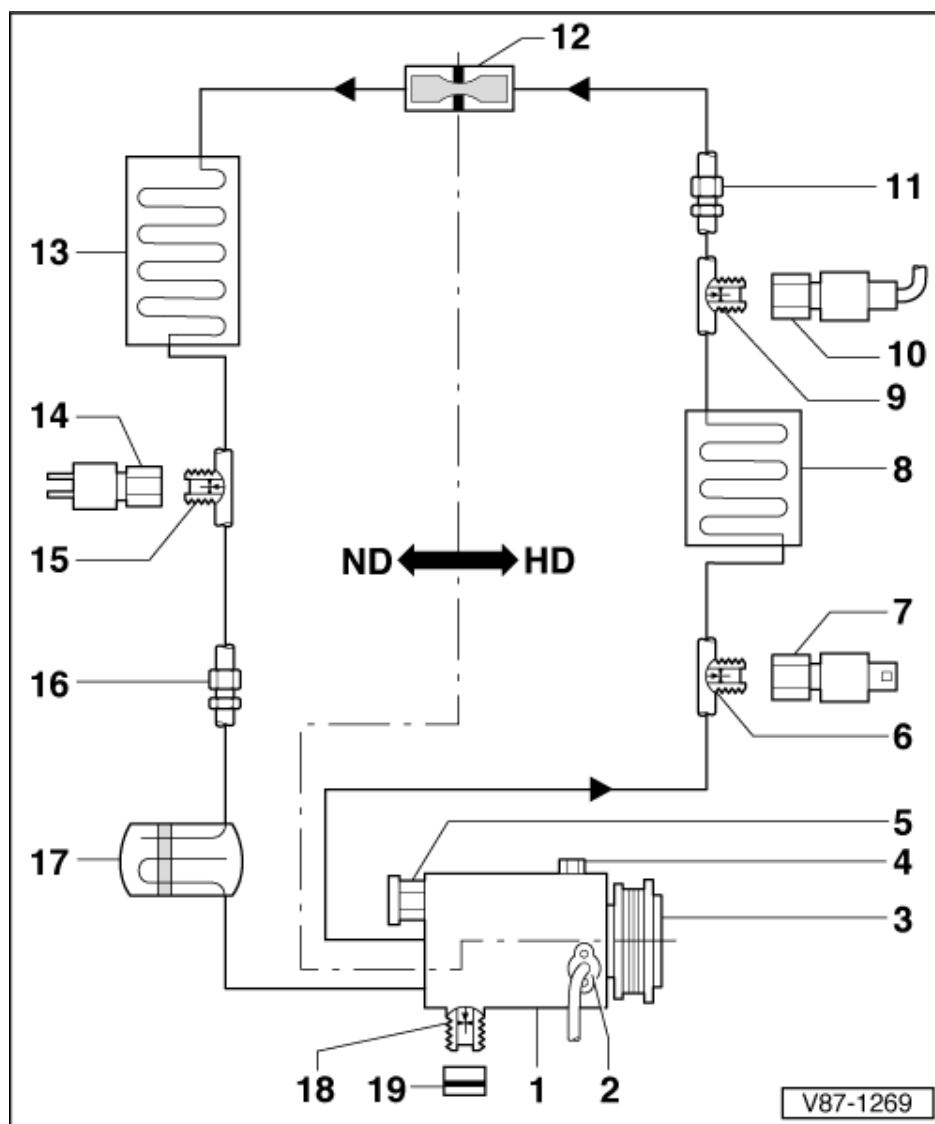


5 Pressure relief valve

- ◆ Tighten to 10 Nm
- ◆ O-ring seal
8.9 mm/1.9 mm
- ◆ Connection without valve. May only be unscrewed if refrigerant circuit is empty

6 Connection with valve

- ◆ For high-pressure switch for magnetic clutch -F118
- ◆ For pressure gauge battery, for measuring, and draining and filling refrigerant circuit
- ◆ Plug in at connector for measuring removed high-pressure switch for magnetic clutch -F118



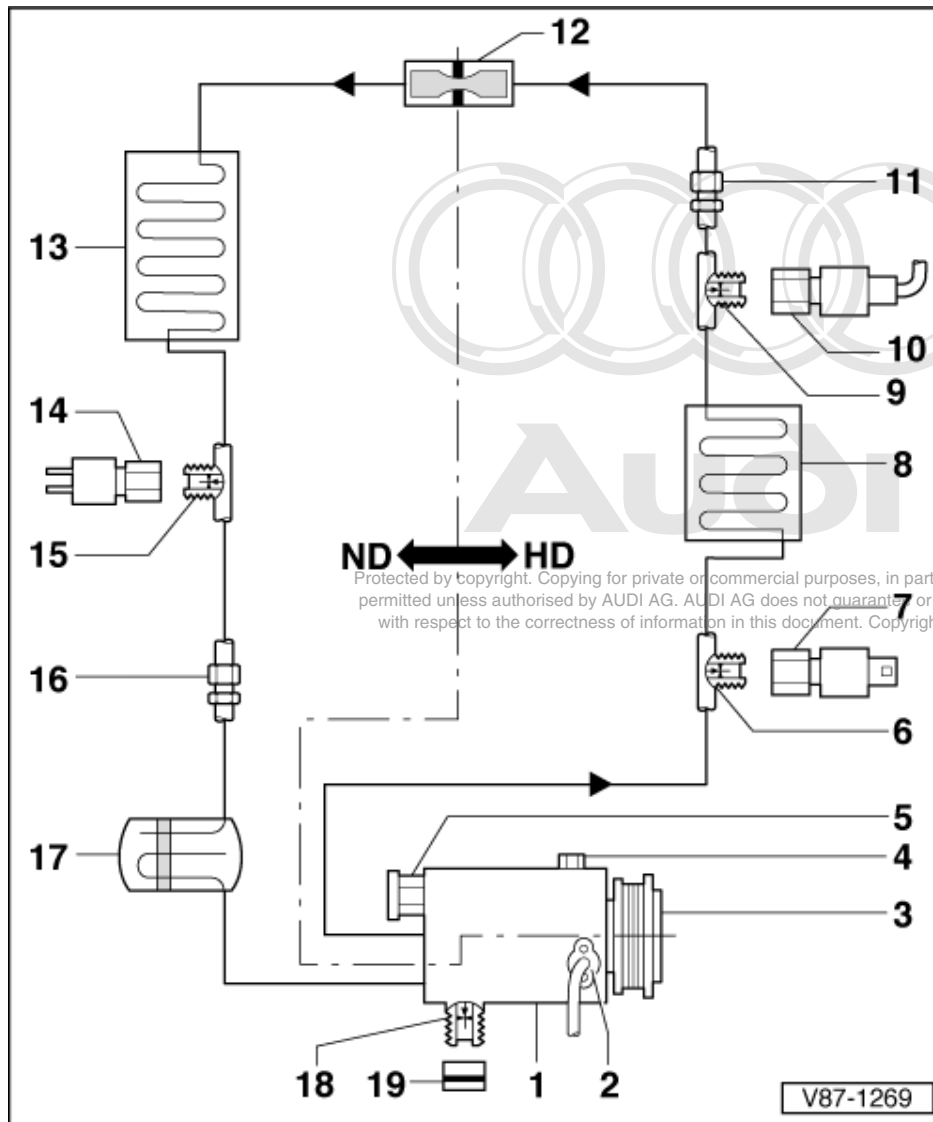
7 High-pressure switch for magnetic clutch -F118

- ◆ Switches off at pressure of 28.2 ... 31.0 bar (switch opens)
- ◆ Switches on at pressure of 10.3 ... 17.2 bar
- ◆ Red housing colour; with welded connection cables
- ◆ O-ring seal
- ◆ 9.3 mm/1.8 mm
- ◆ Tighten to 5 Nm

8 Condenser

- ◆ O-ring seal
- ◆ Inlet: 14.0 mm/1.8 mm
- ◆ Outlet: 10.8 mm/1.8 mm
- ◆ Tightening torque:
- ◆ Inlet: 30 Nm
- ◆ Outlet: 15 Nm

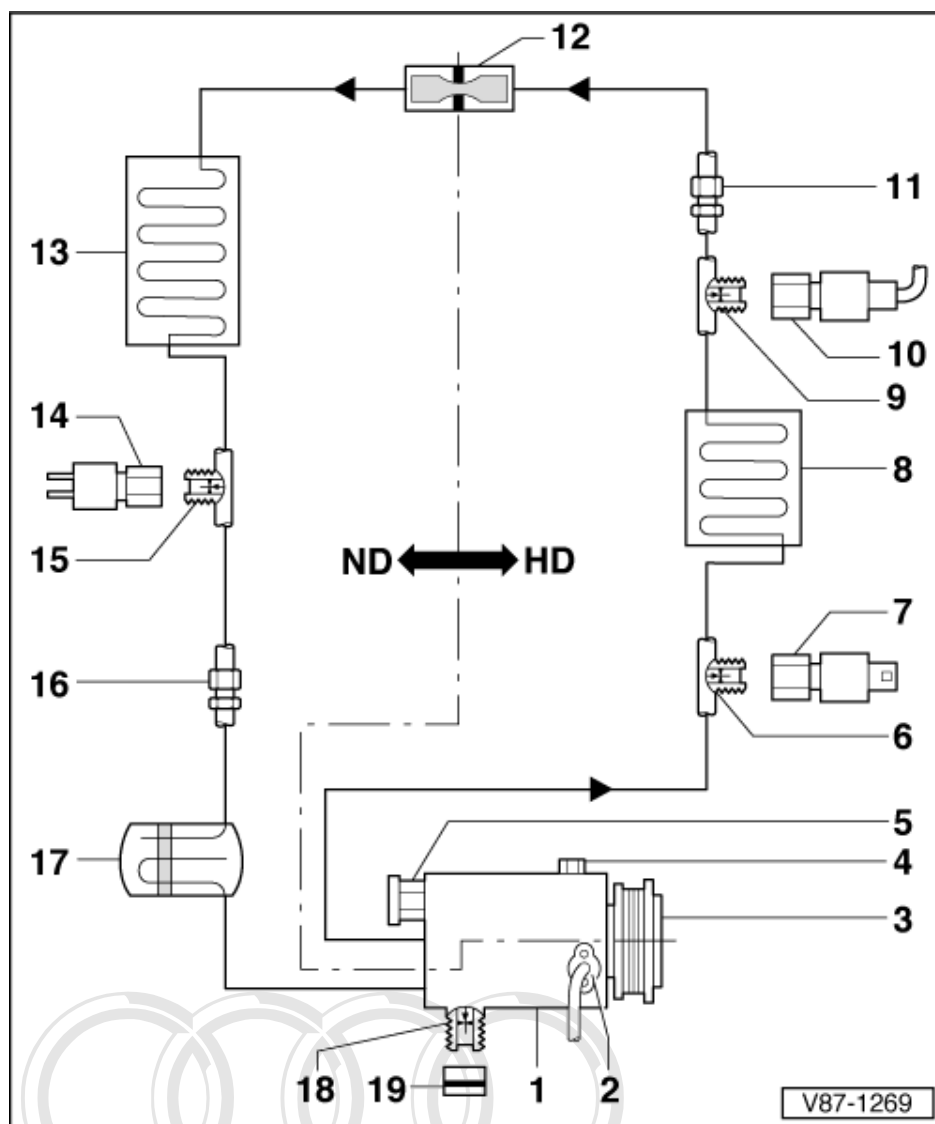
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**9 Connection with valve**

- ♦ For high-pressure switch for air conditioner -F23
- ♦ For pressure gauge battery, for measuring, and draining and filling refrigerant circuit

10 High-pressure switch for air conditioner -F23

- ♦ Switches on at pressure of 13.1 ... 17.5 bar (switch closes)
- ♦ Switches off at pressure of 10.6 ... 15.0 bar
- ♦ Difference in pressure between the switching points: at least 2 bar
- ♦ Colour housing green; with welded connection cables.
- ♦ O-ring seal
9.3 mm/1.8 mm
- ♦ Tighten to 5 Nm



11 Union

- ◆ In refrigerant pipe
- ◆ Only on vehicles with 5- and 6-cyl. engine
- ◆ O-ring seal
10.8 mm/1.8 mm
- ◆ Tighten to 15 Nm

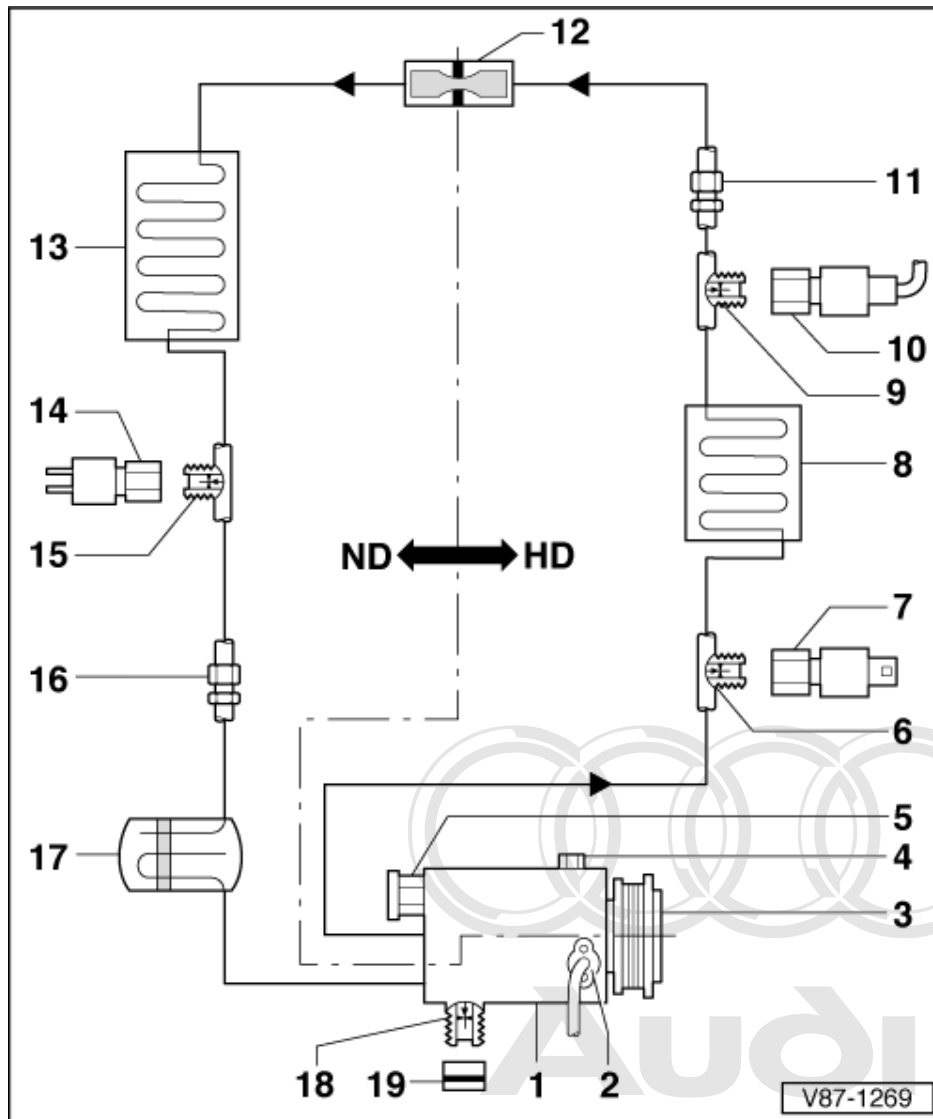
12 Restrictor

- ◆ O-ring seal
7.5 mm/1.5 mm

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13 Evaporator

- ◆ Cannot be dismantled
- ◆ O-ring seal
Inlet: 10.8 mm/1.8 mm
Outlet: 17.2 mm/1.8 mm
- ◆ Tightening torque:
Inlet: 15 Nm
Outlet: 40 Nm
- ◆ Removing and installing => Page 248
- ◆ Before installing, make holes for air-flow flap => Page 250

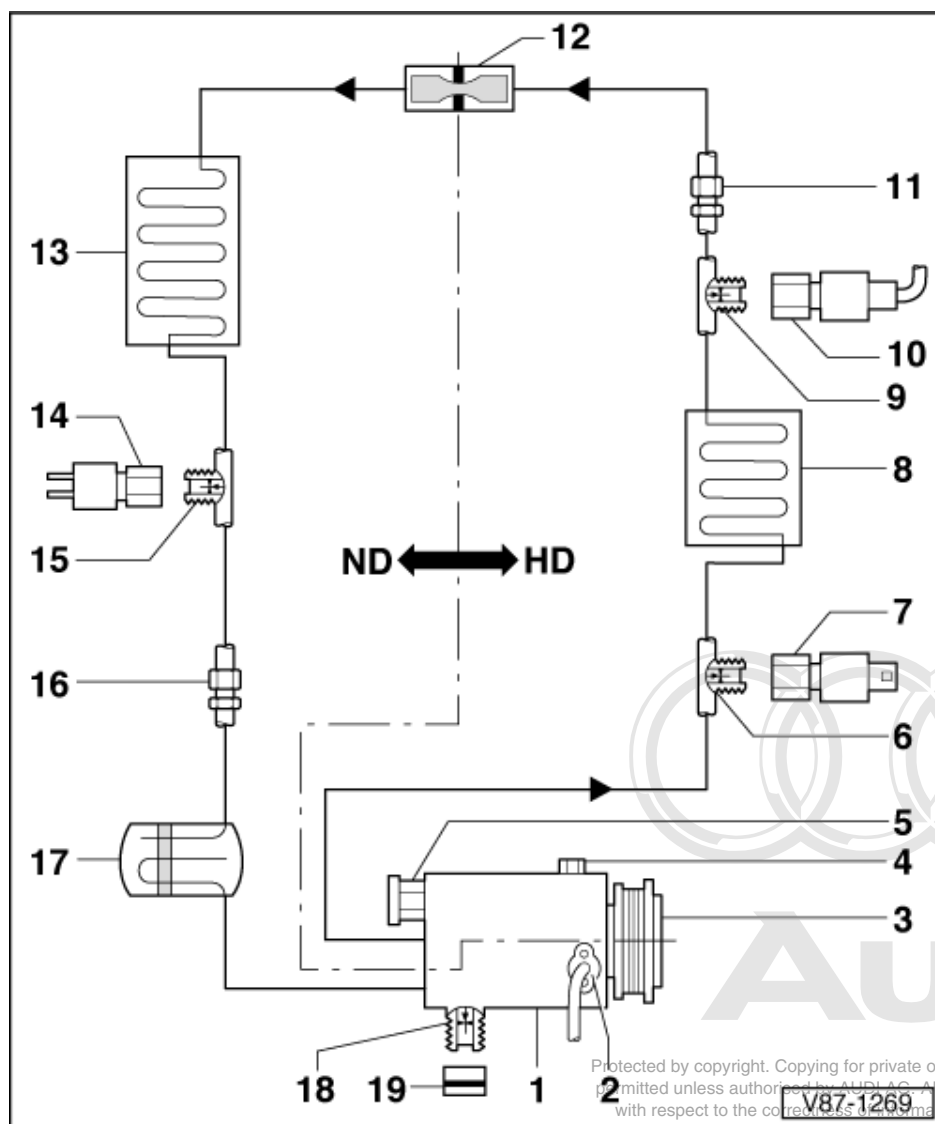


14 Low-pressure switch for air conditioner -F73

- ◆ Switches off at pressure of 1.6 ... 1.7 bar (switch opens)
- ◆ Switches on at pressure of 3.1 ... 3.6 bar
- ◆ O-ring seal
9.3 mm/1.8 mm
- ◆ Tighten to 5 Nm

15 Connection with valve

- ◆ For low pressure switch for refrigerant circuit -F73
- ◆ For pressure gauge battery, for measuring, and draining and filling refrigerant circuit
- ◆ Bridge removed low-pressure switch for refrigerant circuit electrically for measuring and filling circuit



16 Union

- ◆ In refrigerant pipe
- ◆ Only on vehicles with 5-cyl. engine
- ◆ O-ring seal
17.2 mm/1.8 mm
- ◆ Tighten to 20 Nm

17 Receiver

- ◆ O-ring seal
Inlet: 17.2 mm; 1.8 mm
Outlet: 17.2 mm; 1.8 mm
- ◆ Tightening torque:
Inlet: 40 Nm
Outlet: 40 Nm

18 Connection with valve

- ◆ For pressure gauge battery, for measuring, and draining and filling refrigerant circuit

19 Cap

- ◆ With seal
- ◆ Must be fitted



9.3 - Refrigerant R134a 10.92 ä

Notes:

- ♦ Basic information on working on refrigerant circuit R134a:

=> Air conditioner - with refrigerant R134a; Part 1; Basic information on working on refrigerant circuit

- ♦ Observe additional safety precautions:

=> Air conditioner - with refrigerant R134a; Part 1; Safety precautions when working on vehicle with air conditioner and when handling refrigerant R134a

- ♦ Testing refrigeration capacity:
Manually controlled air conditioner => Page 219 ;
- ♦ Never top up refrigerant in refrigerant circuit (empty circuit, evacuate and re-fill).
- ♦ Replacement compressors contain all the refrigerant oil to be used to fill refrigerant circuit (250 cm3).
- ♦ Different types of refrigerant oils are specified for Zexel and Nippondenso compressors:

=> Air conditioner - with refrigerant R134a; Part 2; Filling Quantities; Approved refrigerant oils

- ♦ Only install O-ring seals which are approved for the refrigerant R134a:

=> Air conditioner - with refrigerant R134a; Part 1; Components of the refrigerant circuit

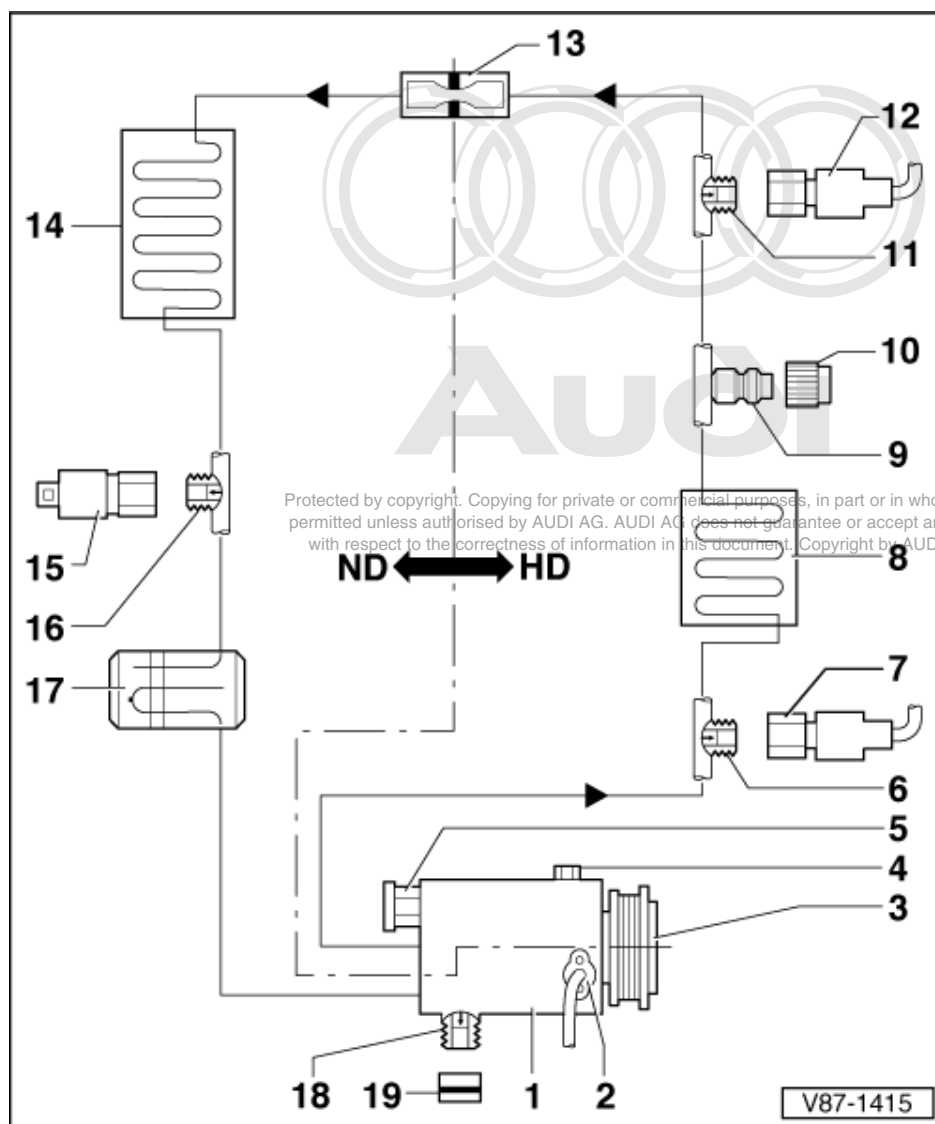
- ♦ On Zexel compressor, O ring seals are not colour coded (for air conditioner compressor speed sender-G111, oil drain screw and pressure-relief valve) They are supplied as a set:

=> Parts Catalogue

- ♦ The specified diameter for O-ring seals and tightening torque also apply to screwed connections in the refrigerant pipes or hoses between individual components.



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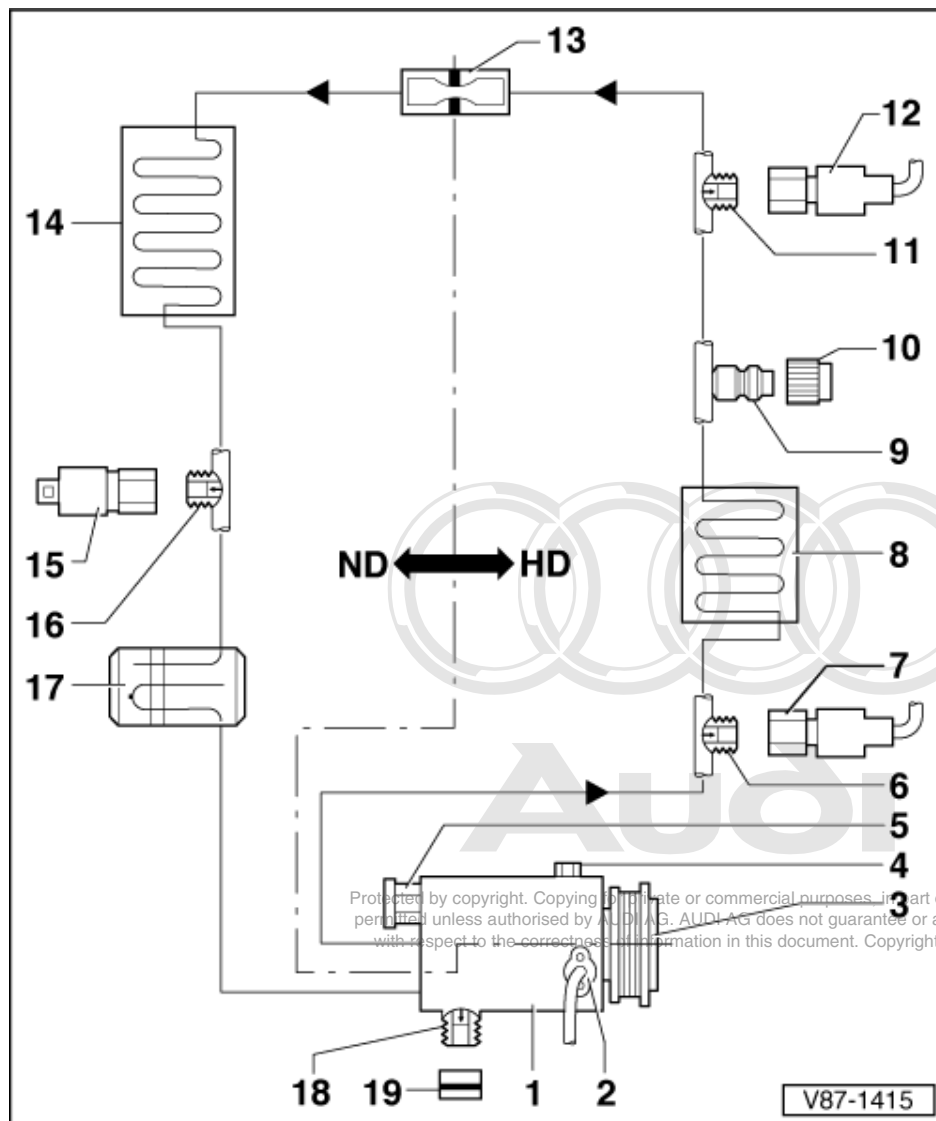


HD = High-pressure end

ND = Low-pressure end

1 Compressor

- ◆ With variable piston stroke; it is set by means of pressure on low-pressure end depending on required refrigeration capacity
- ◆ Manufacturer Zexel or Nippondenso (for vehicles with 6- and 8-cyl engine 06.95 ä; gradual introduction)
- ◆ O-ring seal for Zexel compressor):
for low-pressure connection:
17.2 mm/1.8 mm
for high-pressure connection:
14.0 mm/1.8 mm
- ◆ Tightening torque for Zexel compressor):
Low-pressure connection: 40 Nm
High-pressure connection: 30 Nm



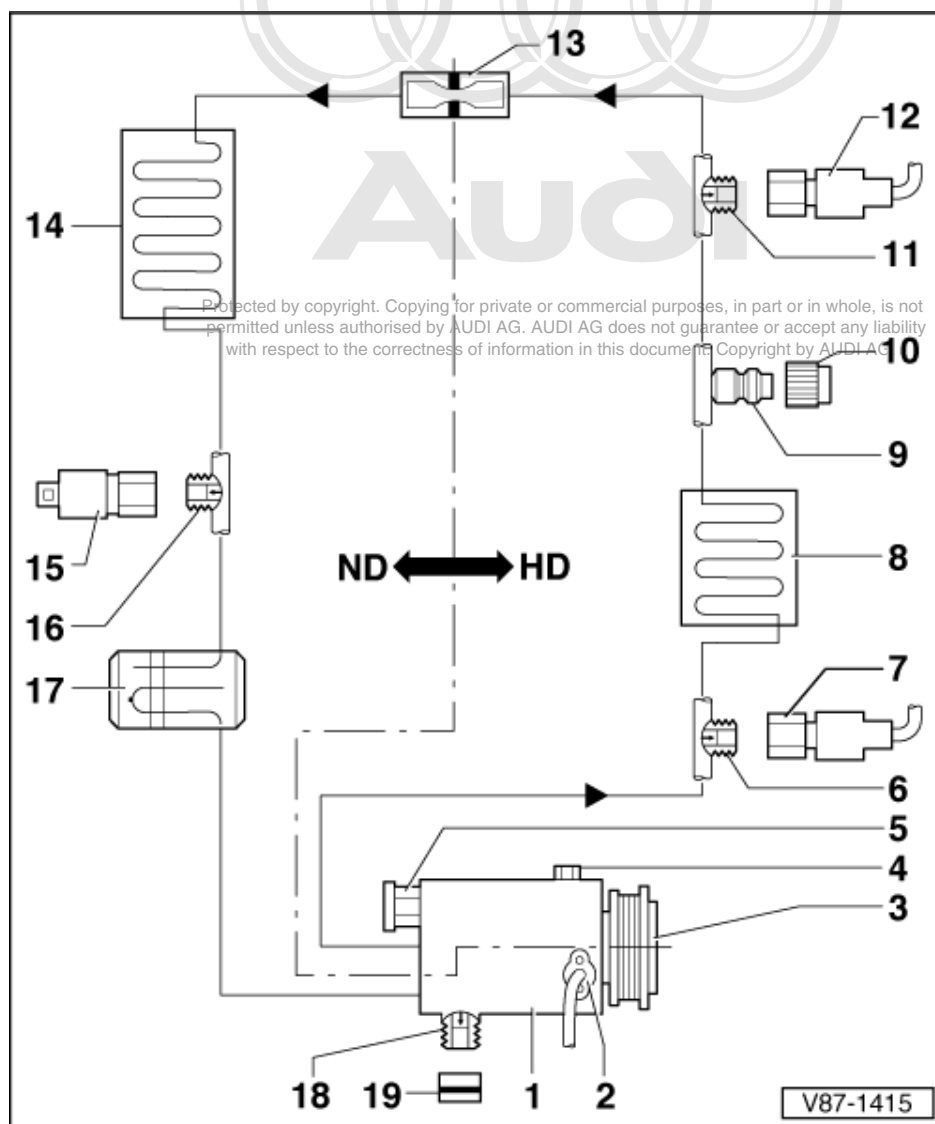
- ♦ Removing and installing refrigerant pipes on Nippondenso compressor => Fig. 248
- ♦ Take off V-belt or ribbed V-belt respectively => Page 168 onwards, or

=> Engine mechanical components; Repair group 13

=> 8-cylinder engine, Mechanical components; Repair group 15

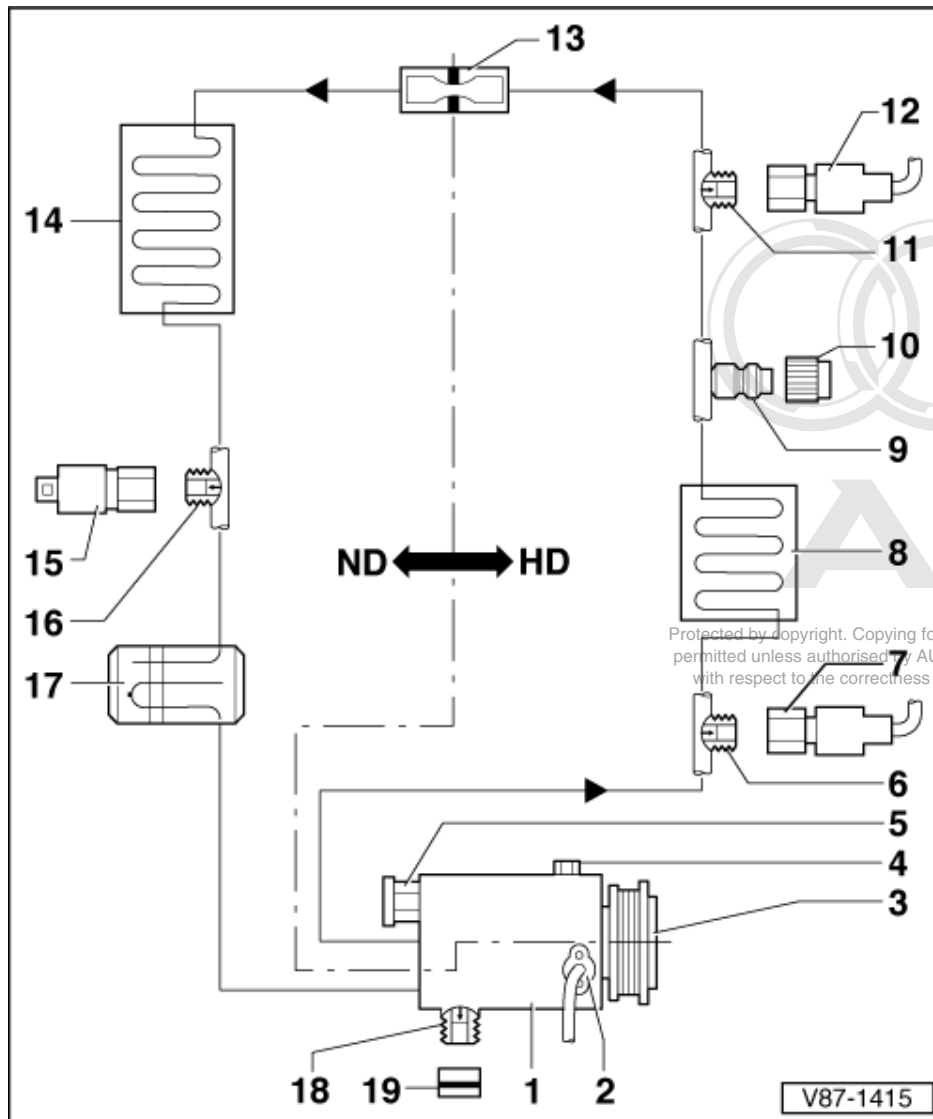
- ♦ After replacing compressor, inspect alignment of pulleys before tightening:
Vehicles with 6-cyl.-engine => Fig. 178 ;
Vehicles with 8-cyl. engine:

=> Engine, Mechanical components; Repair group 15



- ♦ After the installation of a new compressor or filling with fresh refrigerant oil (e.g. after blowing out the refrigerant circuit), turn the compressor 10 revolutions by hand before the first start to avoid damage to the compressor.
- ♦ A mat must be fitted to the refrigerant pipes on 6-cyl. engines, to protect O-ring- seals from radiant heat of the exhaust manifold. Part number:

=> Parts Catalogue

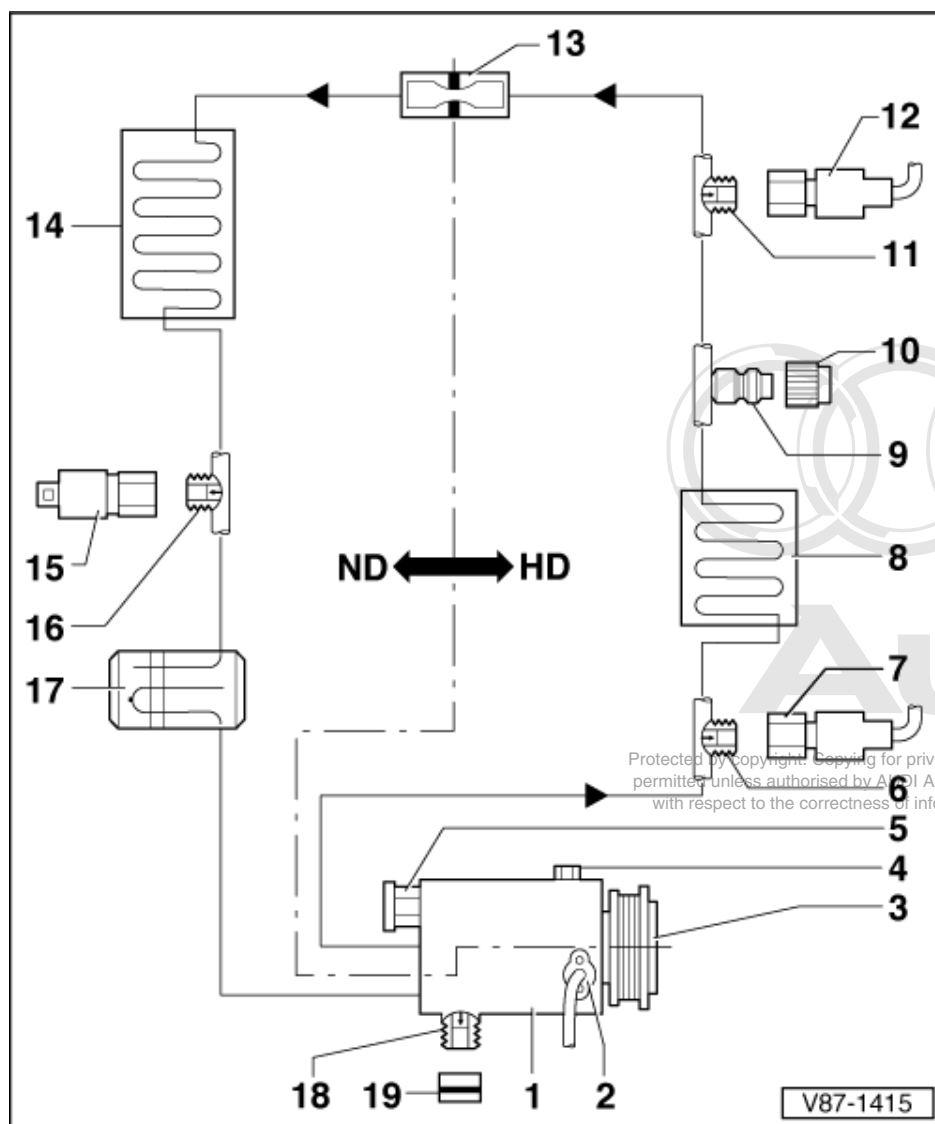


2 AC compressor speed sender -G111

- ♦ Only on vehicles with compressor driven by ribbed V-belt on which ribbed V-belt also drives other ancillaries.
- ♦ O-ring seal 15.5 mm; 1.8 mm
- ♦ Checking => Page 53
- ♦ Removing and installing => Fig. 247
- ♦ May only be unscrewed if the refrigerant circuit is empty.
- ♦ May only be replaced when compressor has been removed.

3 AC magnetic clutch -N25

- ♦ Servicing:
Zexel-compressor => Page 185



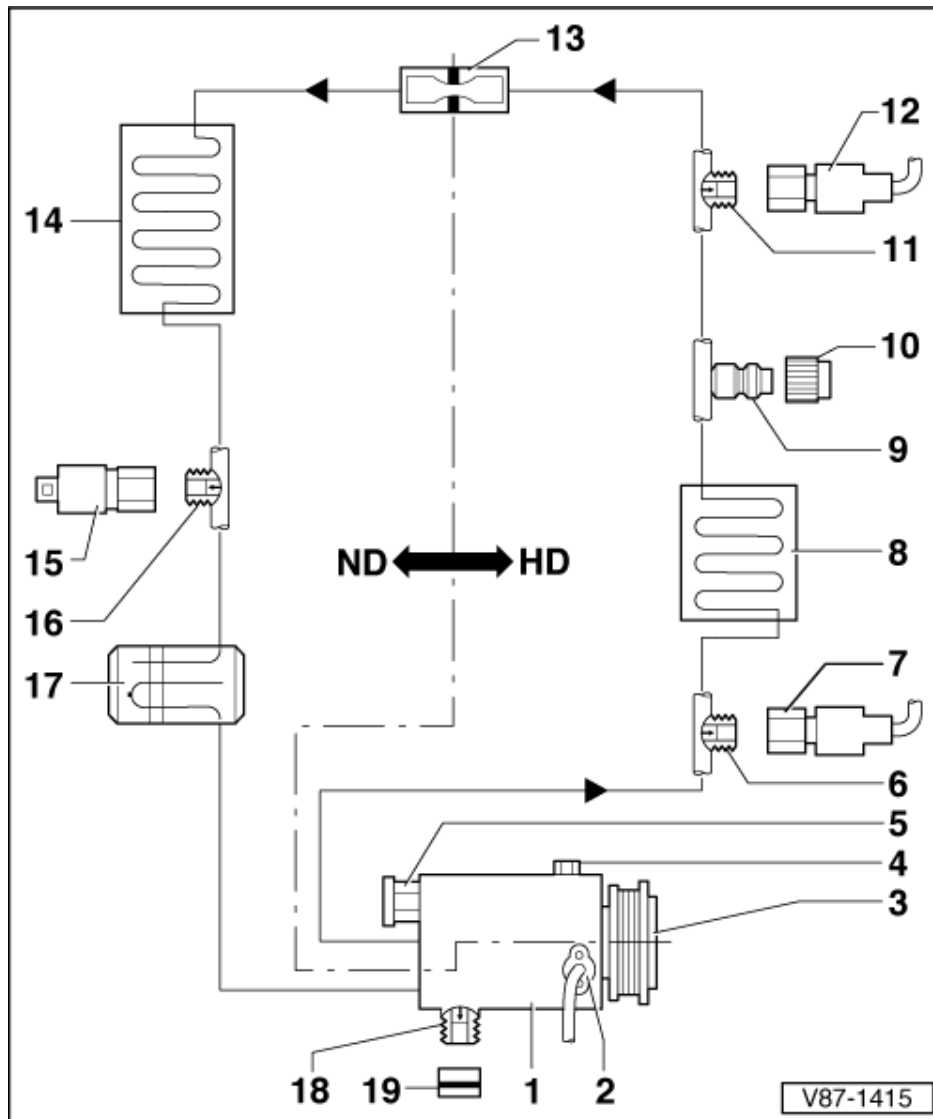
4 Oil drain plug

- ♦ O-ring seal (for Zexel compressor):
7.8 mm/1.9 mm
- ♦ Tightening torque:
Zexel compressor: 10 Nm
Nippondenso compressor: 30 Nm
- ♦ Seal for Nippondenso compressor:

=> Parts Catalogue

- ♦ May only be unscrewed to drain refrigerant oil if compressor is removed
 - a) if refrigerant circuit cleaned in order to drain old refrigerant oil and to pour fresh refrigerant oil into old compressor
 - b) if compressor damaged and it is not necessary to clean refrigerant circuit in order to adjust quantity of refrigerant oil in replacement compressor

=> Air conditioner - with refrigerant R134a; Part 2; Replacing components of the refrigerant circuit



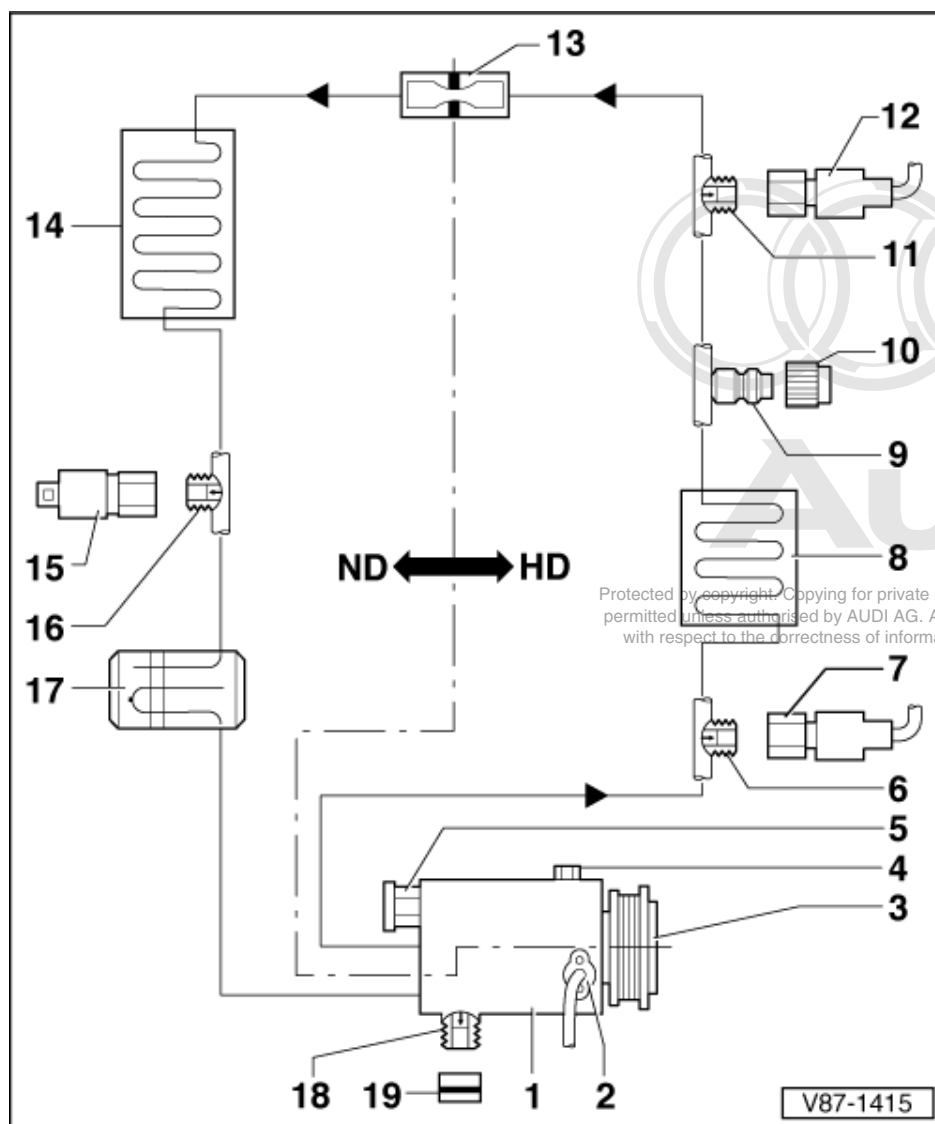
- ◆ Zexel and Nippondenso compressors have different refrigerant oils.

=> Air conditioner - with refrigerant R134a; Part 2; Filling quantities for refrigerant R134a and refrigerant oil, and also approved refrigerant oils

5 Pressure relief valve, 10 Nm

- ◆ O-ring seal:
8.8 mm/1.9 mm
- ◆ Tighten to 10 Nm
- ◆ Connection without valve May only be unscrewed if refrigerant circuit is empty

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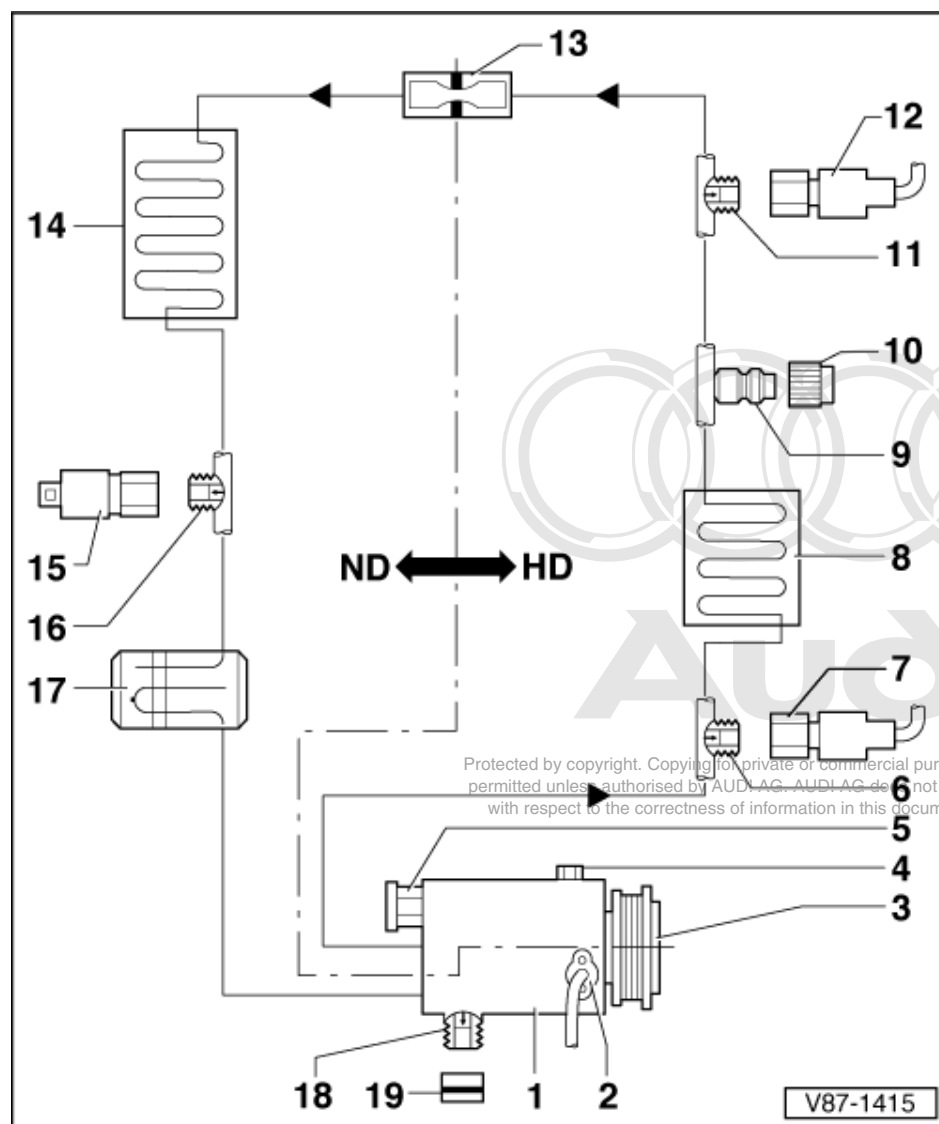
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6 Connection with valve

- ♦ For high-pressure switch for magnetic clutch -F118
- ♦ For measuring pressure in refrigerant circuit, plug in removed high-pressure switch for magnetic clutch -F118 at connector and use adapter V.A.G 1785/9

7 High-pressure switch for magnetic clutch -F118

- ♦ Switches off at pressure of 28.2 ... 31.0 bar (switch opens)
- ♦ Switches on at pressure of 10.3 ... 17.2 bar
- ♦ Red housing colour; with welded connection cables
- ♦ O-ring seal:
7.6 mm/1.8 mm
- ♦ Tighten to 5 Nm

**8 Condenser**

- ♦ O-ring seal:
Inlet: 14.0 mm/1.8 mm
Outlet: 10.8 mm/1.8 mm
- ♦ Tightening torque:
Inlet: 30 Nm
Outlet: 15 Nm

9 Service connection

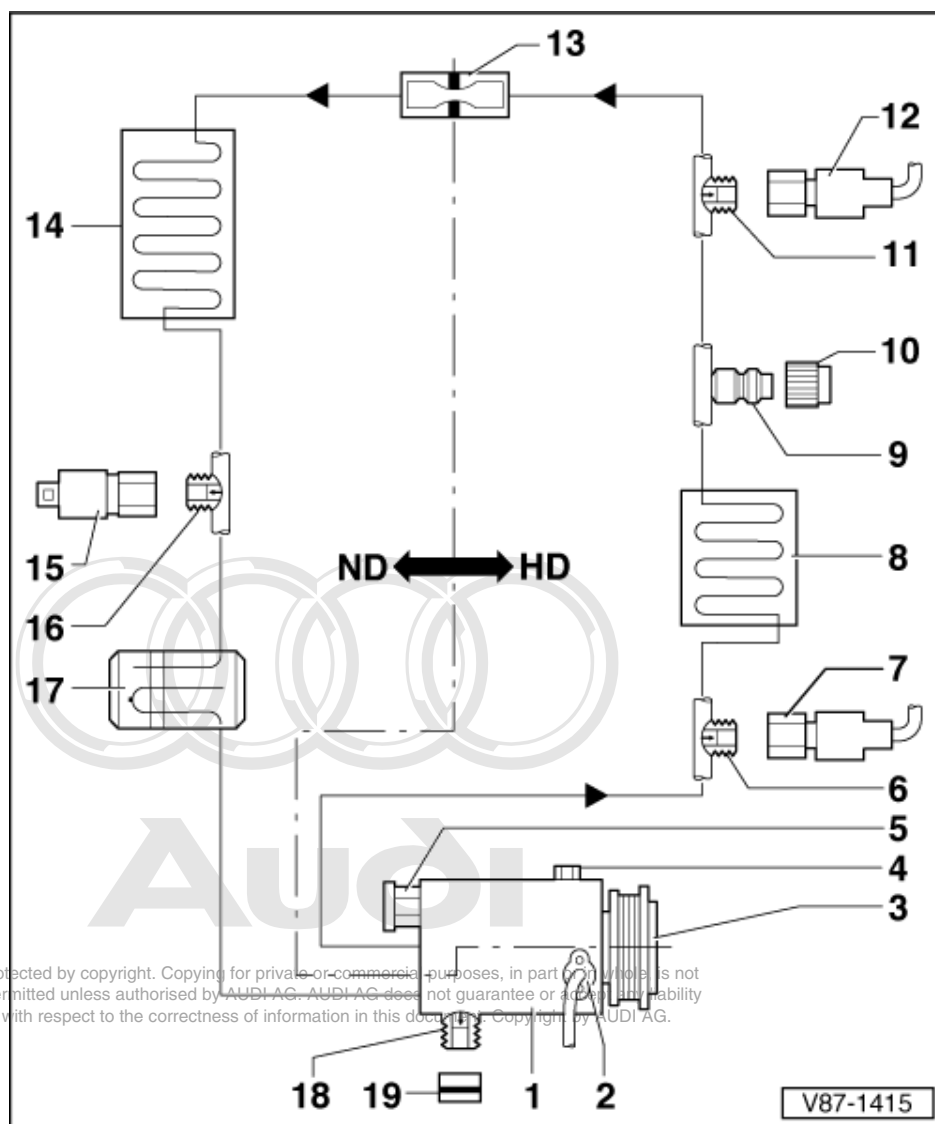
- ♦ For measuring pressure and draining/filling refrigerant circuit with service unit

10 Cap

- ♦ With seal
- ♦ Must be fitted

11 Connection with valve

- ♦ For high-pressure switch for air conditioner -F23



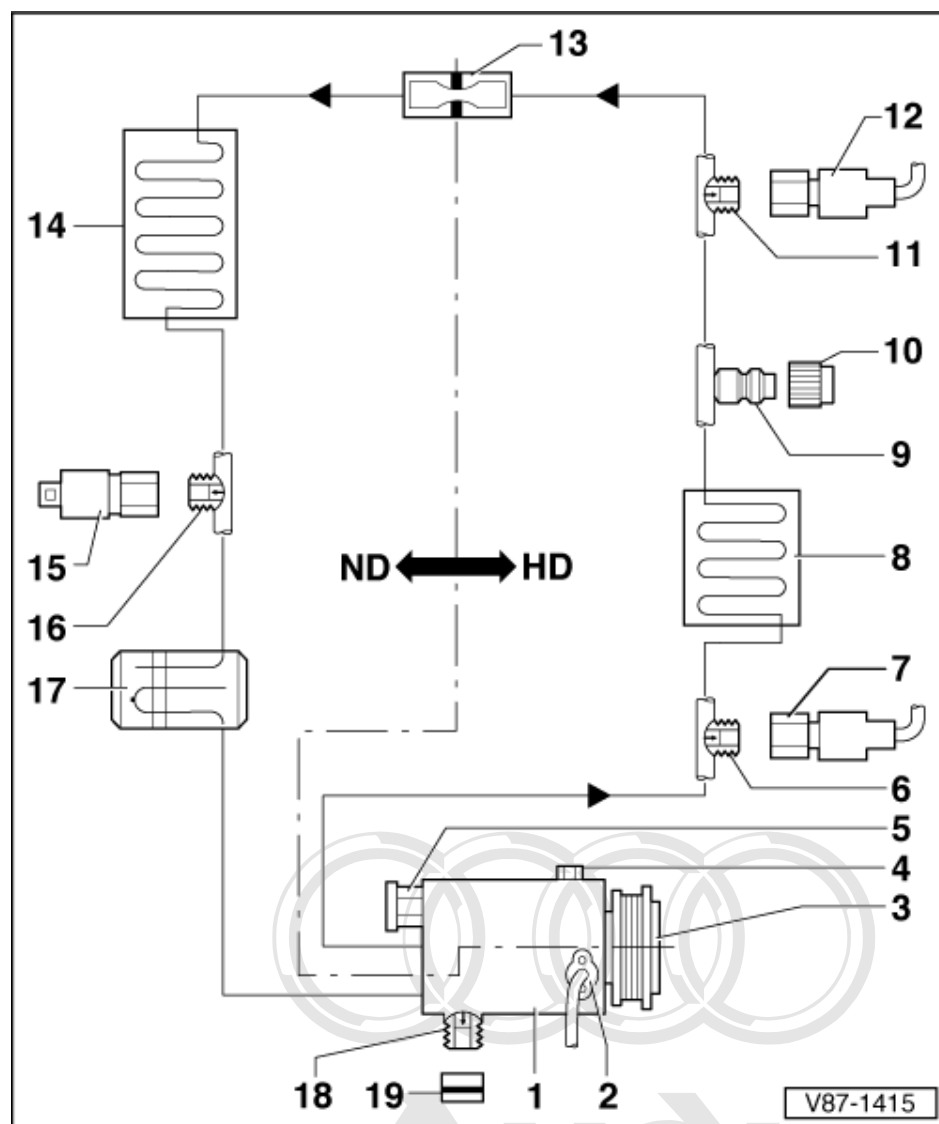
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12 High-pressure switch for air conditioner -F23

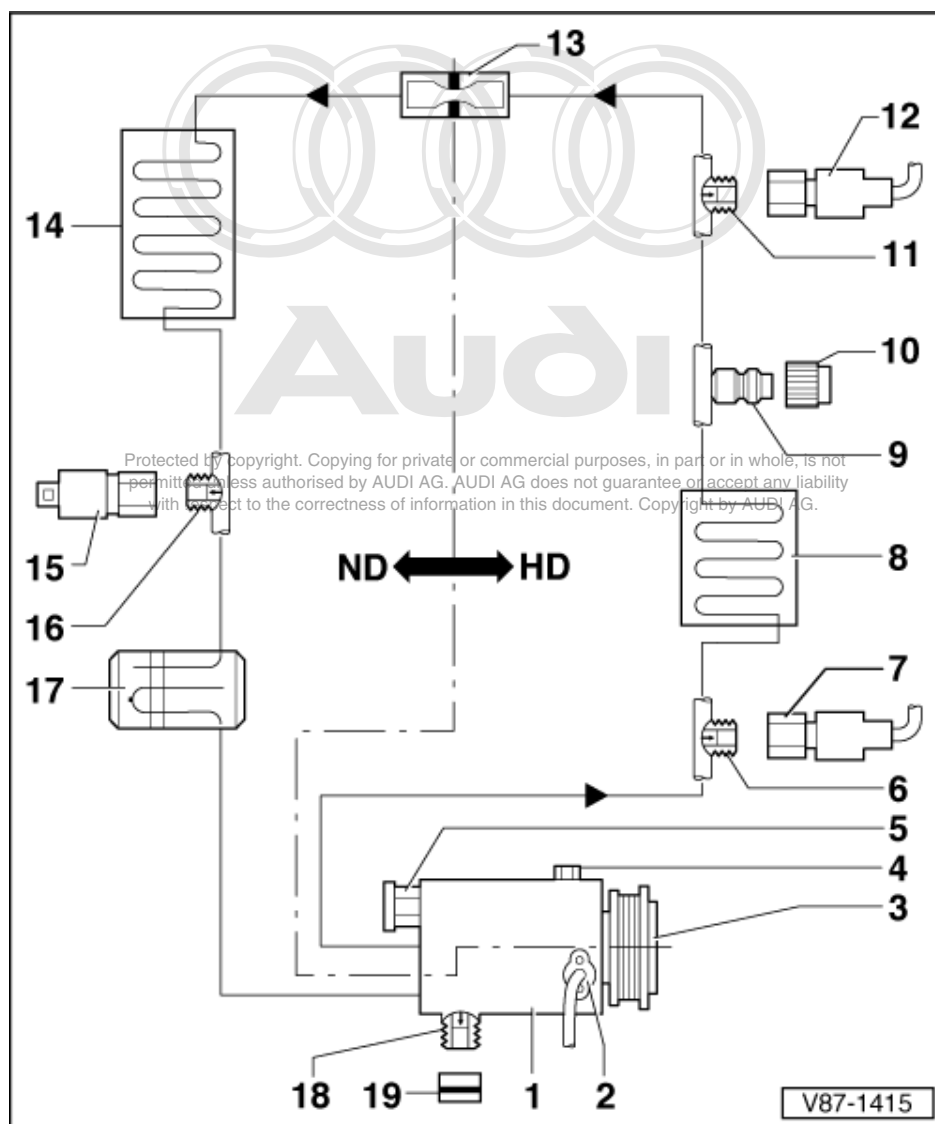
- ◆ Switches on at pressure of 14.2 ... 17.4 bar (switch closes)
- ◆ Switches off at pressure of 15.7 ... 15.0 bar
- ◆ Difference in pressure between the switching points: at least 2 bar
- ◆ Colour housing green; with welded connection cables.
- ◆ Tighten to 5 Nm
- ◆ O-ring seal:
7.6 mm/1.8 mm

13 Restrictor

- ◆ Removing and installing => Fig. 247
- ◆ Replace O-ring seal
- ◆ From introduction of evaporator with dust and pollen filter: high-pressure pipe about 10 mm shorter, low-pressure pipe unchanged



- ◆ Tighten to 5 Nm



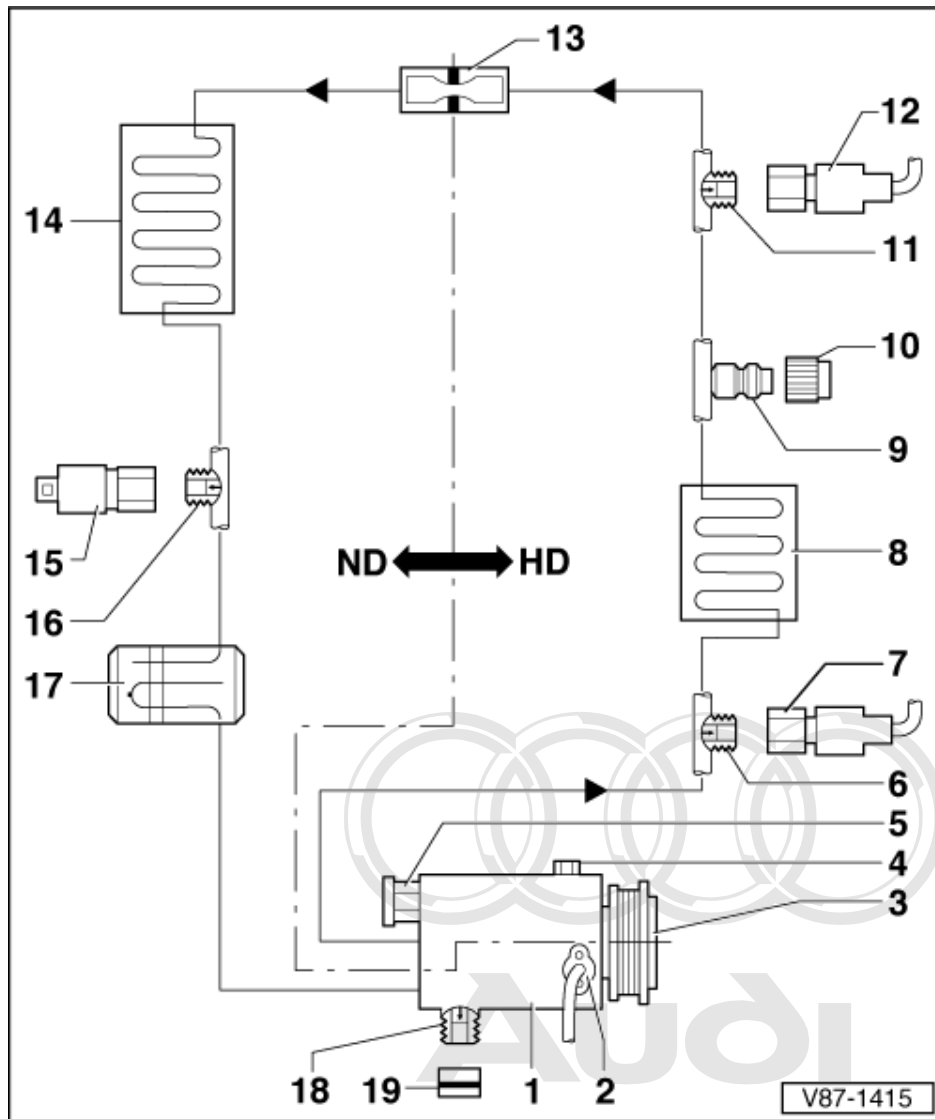
16 Connection with valve

- ♦ For low-pressure switch for refrigerant circuit -F73
- ♦ For measurement and drainage with service station or manometer battery
- ♦ For measuring, bridge removed low-pressure switch for refrigerant circuit -F73 electrically => Fig. 164
- ♦ Use the valve adapter V.A.G 1785/10 or adapter set V.A.G 1786 (with filler hose) for the measurement

=> Air conditioner- with refrigerant R134a; Part 2; Connect service station for measuring and testing

17 Receiver

- ♦ O-ring seal:
 Inlet: 17.2 mm; 1.8 mm
 Outlet: 17.2 mm; 1.8 mm
- ♦ Tightening torque:
 Inlet: 40 Nm
 Outlet: 40 Nm

**18 Connection with valve**

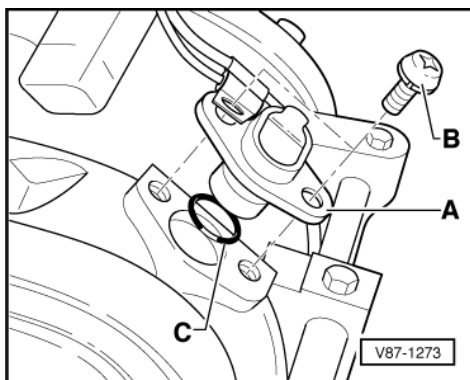
- ◆ With Zexel compressor only
- ◆ For measuring pressure and draining/filling refrigerant circuit with service unit
- ◆ Use valve adapter V.A.G 1785/10, O-ring deal (8.9 mm/1.8 mm), adapter V.A.G 1786/2 and filler hose

=> Air conditioner - with refrigerant R134a; Part 2; Connect service station for measuring and testing

- ◆ On vehicles without this connection, measure pressures on the low-pressure side by way of connection with valve-item **16** -

19 Cap

- ◆ With seal
- ◆ Must be fitted



-> Fig.1 Removing and installing air conditioner compressor speed sender

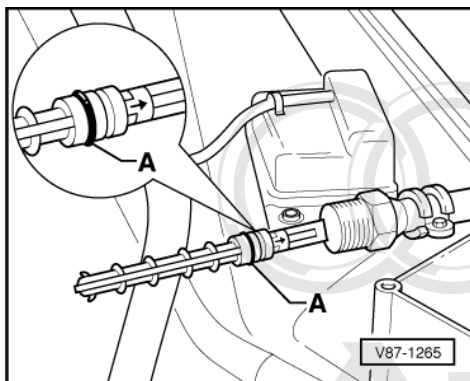
-G111

Removal:

- Drain the refrigerant circuit:
- => Air conditioner - with refrigerant R12; Part 1
- => Air conditioner - with refrigerant R134a; Part 1
- Detach the connector.
- Remove screws -B- (5 Nm).
- Pull sender -A- out of compressor.

Installation:

- Replace O-ring seal -C-.
- With sender removed, perform a visual inspection of lugs on the pulse wheel (4x around the periphery).



-> Fig.2 Removing and installing restrictor

Removal:

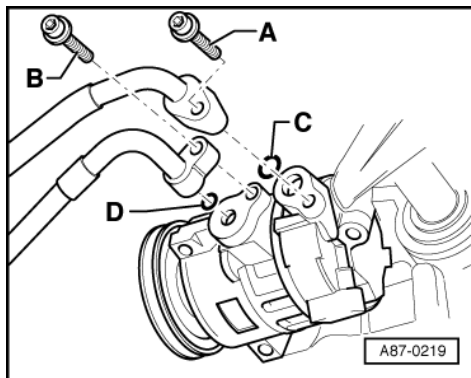
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- Drain the refrigerant circuit:
- => Air conditioner - with refrigerant R12; Part 1
- => Air conditioner - with refrigerant R134a; Part 1
- Detach refrigerant pipe to "high-pressure side" of evaporator.

- Use e.g. long-nose pliers to pull restrictor out of evaporator.

Installation:

- Always replace restrictor and O-ring seal.
- Ensure that O-ring seal -A- is correctly located in groove of restrictor.
- Apply thin film of refrigerant oil to O-ring seal before installing restrictor.
- Insert restrictor correct way round into evaporator.
 - Arrow on restrictor faces toward evaporator
 - Restrictor should be installed in evaporator free of play



-> Fig.3 Detaching and attaching refrigerant pipes on Nippondenso compressor

Removal:

- Drain the refrigerant circuit:

=> Air conditioner - with refrigerant R134a; Part 1

- Remove screws -A- and -B-.

Installation:

- Replace O-ring seals -C- (23.8 mm/1.8 mm) and -D- (11.1 mm/1.8 mm).
- Tighten screws -A- and -B- to 25 Nm.

9.4 - Removing and installing evaporator

Removal

- Drain the refrigerant circuit:

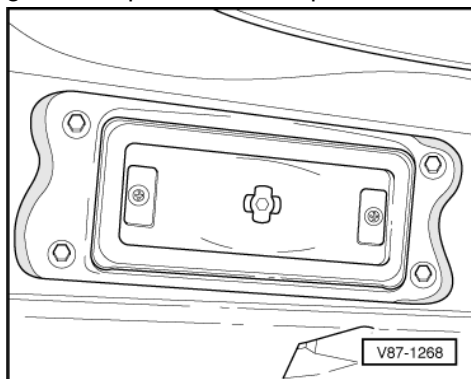
=> Air conditioner - with refrigerant R12; Part 1

=> Air conditioner - with refrigerant R134a; Part 1

- Remove glove compartment:

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=> General body repairs; Repair group 70; Dash panel; Removing and installing storage compartment and glove compartment Dash panel Removing and installing storage compartment and glove compartment

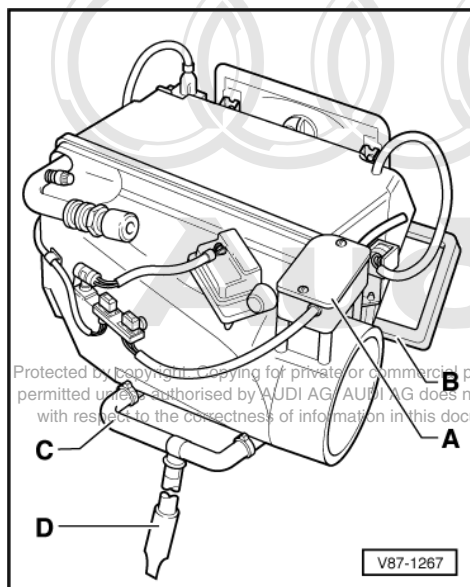


- -> Remove 4 screws at recirculated-air opening..
- Remove plenum chamber cover.
- Detach the refrigerant pipes

Note:

Close the open pipe connections.

- Separate all connections between evaporator and vehicle.

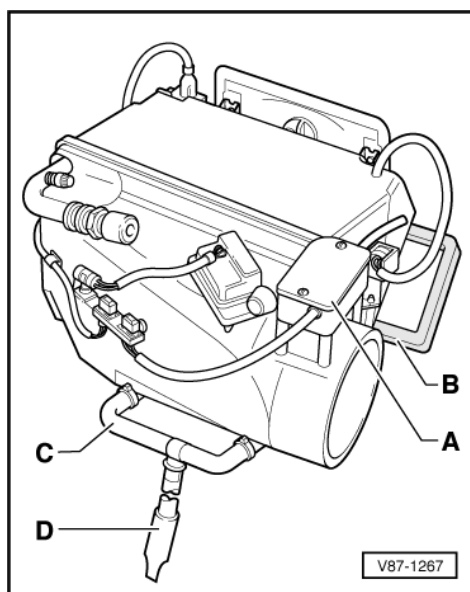


- -> On vehicles with air-flow flap, remove air-flow flap positioning motor -V71 -A-.
- Turn air-flow flap into evaporator.
- Remove evaporator.

Installation:

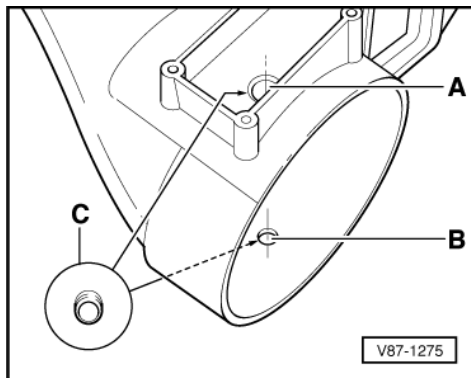
- Replace gasket -B- between vehicle and evaporator at recirculated-air opening.
 - Tightening torques for refrigerant pipes:
 for refrigerant R12 => Page 234 onwards.
 - Matching O-ring seals:
 for refrigerant R12 => Page 234 onwards.

Notes:



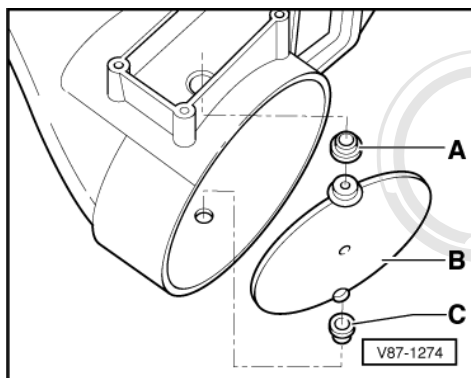
- ◆ -> Condensate drain hose -C- must always be routed downhill and free of kinks.
- ◆ Connections between individual elements have to be bonded.
- ◆ Condensate drain valve must not be gummed up with wax or underseal; it must close properly.
- Ensure that it is properly sealed to prevent ingress of unmetered air.
- Before installing new evaporator, produce holes if necessary, in evaporator => Page 250 .
- Install air-flow flap => Page 250

Producing holes for air-flow flap in evaporator



- -> Produce holes -A- and -B- at prestamped points -C- of evaporator.
- A = $\varnothing$ 16.0 mm
- B = $\varnothing$ 8.0 mm

Installing air-flow flap



- A - -> Top pivot
- B - Air-flow flap
- C - Bottom pivot

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