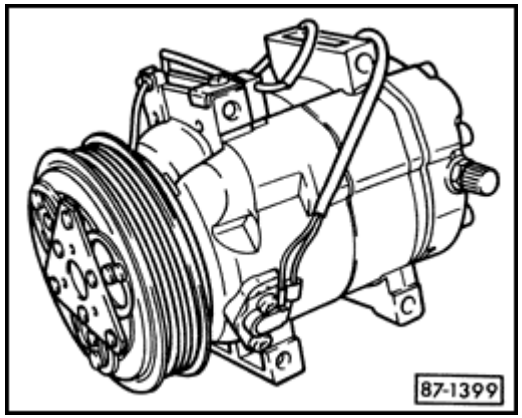
Refrigerant system (R-134a), components

A/C compressor



The compressor is driven via a belt on the engine when the A/C clutch engages (A/C ON).

Low pressure refrigerant gas from the evaporator is compressed by the compressor. After compression, the refrigerant gas (now high pressure) flows to the condenser.

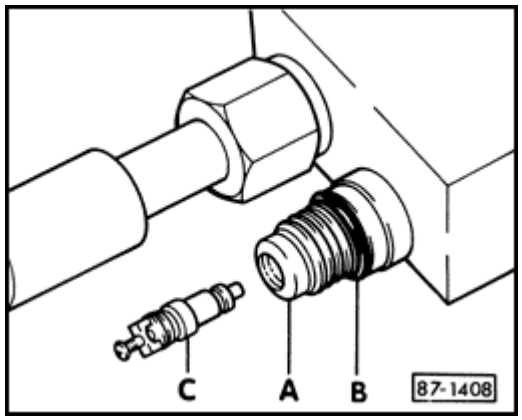
The variable displacement A/C compressor varies piston stroke and output depending on load requirements and suction pressure.

Notes:

- *Zexel A/C compressors were installed from start of production. During m.y. 1996, Nippondenso (Denso) type compressors are installed as a running change. These compressors are not equipped with A/C speed sensor G111.*
- *The compressor contains PAG type refrigerant oil that is mixable under all temperatures with refrigerant R-134a.*
- *A label on the compressor indicates that compressor is for R-134a systems only.*

87-22

Valve connections for pressure switches



A Schrader valve is installed under A/C system pressure switches to allow replacement without discharging the refrigerant system.

- A/C system low and high pressure switches use different size threads.
- Use only the correct switches and O-ring seals specified for use with R-134a refrigerant and PAG oil.

A - Switch connection (soldered)

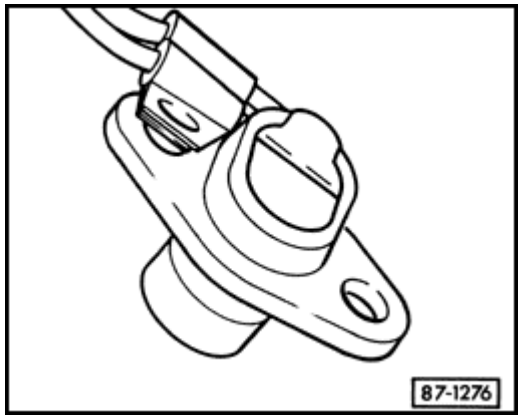
B - O-ring seal

C - Schrader valve insert

Note:

A/C system switches are available in different versions. Always refer to the latest parts information to ensure correct switch application.

87-23



A/C compressor speed sensor -G111-, (Zexel compressors only)

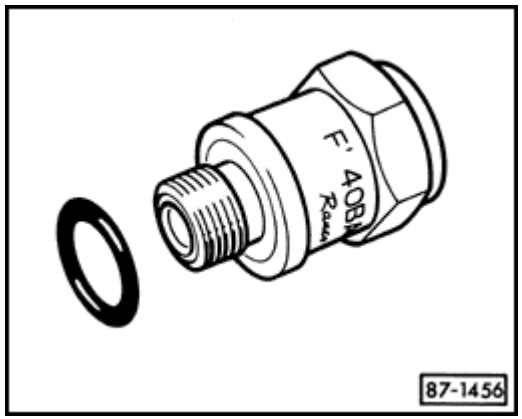
- Inductive sensor (4 pulses per compressor rotation)
- Determines A/C compressor speed; the A/C compressor clutch control module (Manual A/C) or the A/C control head (Automatic climate control) compares compressor speed to engine speed and calculates belt slippage (as a percentage) and switches compressor OFF if slippage is too large (for example, if belt is too loose.)

Note:

- *A/C compressor speed sensor -G111- is not installed on Nippondenso compressors.*
- *A thermo-fuse is incorporated into the clutch coil of Nippondenso compressors. Current to the clutch coil is interrupted in the event of compressor overheating.*

87-24

Pressure relief valve

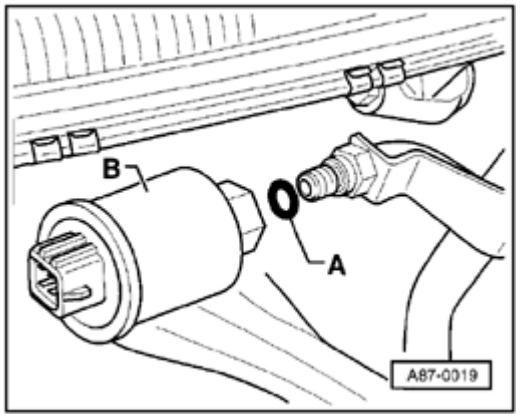


The pressure relief valve is mounted on the compressor. At approx. 38 bar (551 psi), the valve opens to vent excessive pressure. When system pressure is reduced to approx. 30-35 bar (435-508 psi), the valve closes to prevent total refrigerant loss.

A/C refrigerant high pressure switch - F23- and A/C clutch switch -F118-

Note:

Beginning with m.y. 1997, A/C pressure switch - F129- replaces pressure switches -F23-, and - F118- ⇒ *page 87-67* .



Both switches are incorporated into a single housing.

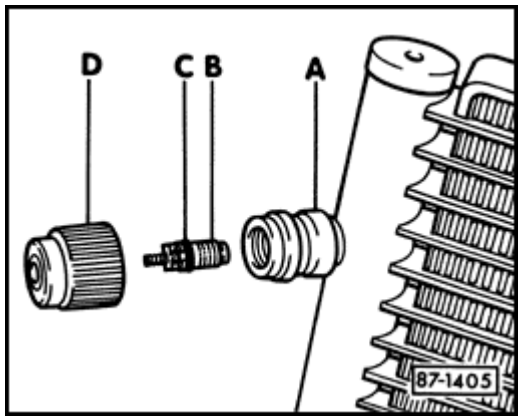
F23 function

- Switches coolant fan (V7) to second speed when A/C system pressure increases.

F 118 function

- Switches A/C clutch -N25- OFF if system pressure is too high.

87-26



High pressure service valve assembly

A - Service valve connection (located on condenser inlet line)

B - Schrader valve insert

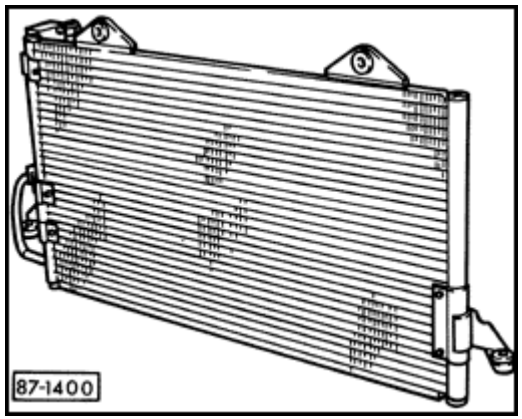
C - O-ring seal

D - Cap with seal

Notes:

- *Only a high pressure service valve is used for A/C system servicing. A low pressure service valve is not installed in the A/C system. Perform all A/C system service operations (i.e discharging, evacuating, and charging) through the high pressure service valve only.*
- *Use only the specified R-134a quick coupling connectors when servicing the refrigerant system.*
- *Before removing the valve insert from the high pressure service valve, discharge refrigerant system ⇒ page 87-201 .*
- *Always reinstall cap -D- over service valve.*
- *Illustration shows the condenser from an Audi 100 model.*

87-27



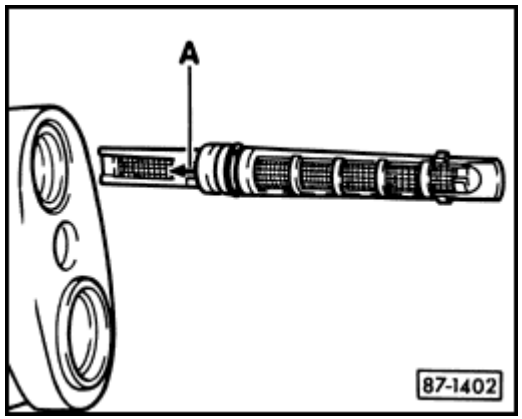
Condenser

The condenser transfers heat from the compressed refrigerant gas to the outside air which causes the refrigerant to change state from a gas to a liquid.

Note:

Illustration shows the condenser from an Audi 100 model.

87-28



Restrictor

The restrictor restricts and controls refrigerant flow to the evaporator thus lowering refrigerant temperature and pressure.

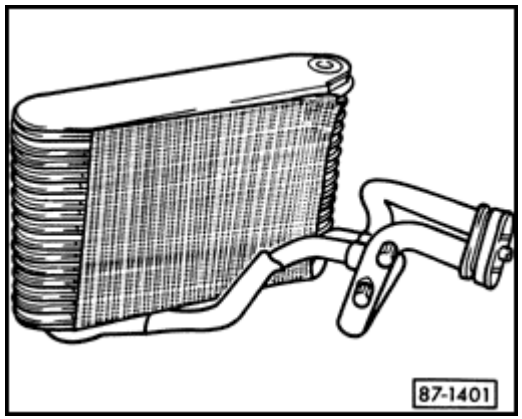
Upstream of the restrictor, the refrigerant is hot and under high pressure. Downstream of the restrictor, the refrigerant is cold and under low pressure.

A strainer located upstream of the restrictor filters out any dirt or particles. Another strainer located downstream of the restrictor atomizes the refrigerant before it enters the evaporator.

Notes:

- *Insert restrictor so that Arrow -A- points to evaporator.*
- *Illustration shows the evaporator from an Audi 90 model.*

87-29



Evaporator

Liquid refrigerant entering the evaporator absorbs heat from air passing through the evaporator fins and cools the air. As the refrigerant absorbs heat it turns to vapor and then is suctioned by the compressor.

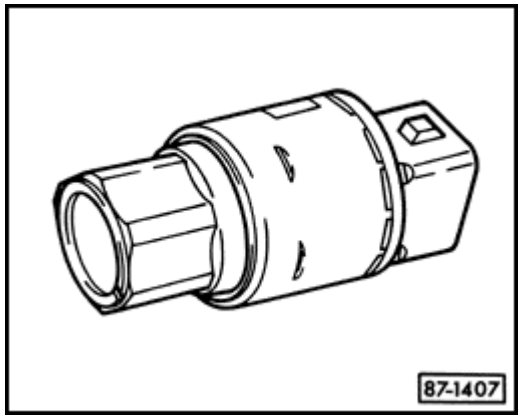
Note:

Illustration shows the evaporator from an Audi 90 model.

87-30

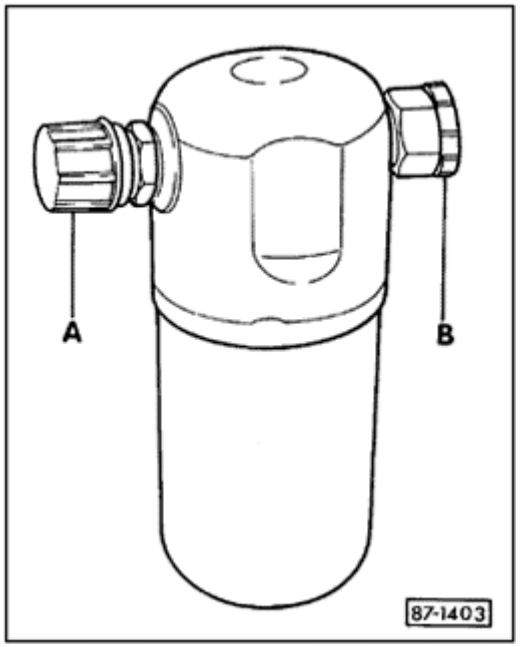
A/C refrigerant low pressure switch - F73-

Function



Switches A/C Clutch -N25- OFF if system suction pressure is too low (low refrigerant charge). This switch protects the compressor if the refrigerant system is empty.

87-31



Accumulator

The accumulator traps the mixture of refrigerant vapor and gas coming from the evaporator. While in the accumulator, the refrigerant vapor turns to gas and, along with the refrigerant oil, is then suctioned by the compressor.

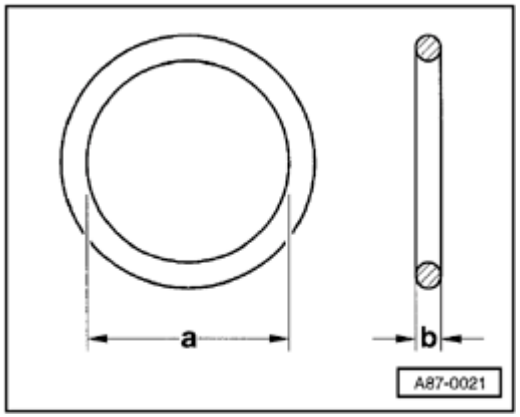
An oil extraction passage is incorporated into the accumulator to ensure that refrigerant oil flowing with the refrigerant does not remain in the accumulator.

Any moisture in the system is absorbed by the desiccant in the accumulator.

Note:

Do not remove caps -A- and -B- until ready to install new accumulator. If caps are removed too soon, the dessicant becomes saturated with moisture after a very short time. If this occurs, the accumulator must be replaced.

87-32



O-rings

O-rings seal the connections between components of the A/C system.

Use only O-rings which are compatible with R-134a refrigerant and refrigerant (PAG) oil. Refer to the most recent parts information when obtaining new O-rings.

Notes:

- *Handle O-rings only in a clean working environment.*
- *Do not reuse O-rings, always replace.*
- *Always use correct size O-rings (dimensions -a- and -b-).*
- *Lubricate O-rings with refrigerant (PAG) oil before installing.*
- *Always ensure O-rings are properly installed on pipe/component mounting flanges/grooves.*
- *O-ring and torque specifications also apply to threaded connections in the A/C lines.*

Hoses and lines

The mixture of refrigerant oil (PAG oil) and refrigerant R-134a attacks some metals and alloys (for example, copper) and breaks down certain hose material. Use only hoses and lines which are identified with the lettering "R-134a."

Hoses and lines are secured with threaded connections. Always properly torque hose and line connections.