Repair Manual

Audi 100 1991 ➤ , Audi 80 1992 ➤ ,
Audi A1 2011 ➤ ,
Audi A1 Sportback 2018 ➤ ,
Audi A2 2001 ➤ , Audi A3 1997 ➤ ,
Audi A3 2004 ➤ , Audi A3 2013 ➤ ,
Audi A3 2021 ➤ ,
Audi A3 Cabriolet 2015 ➤ ,
Audi A3 Limousine 2014 ➤ ,
Audi A3 Limousine China 2014 ➤ ,
Audi A3 Sportback 2013 ➤ ,
Audi A3 Sportback China 2014 ➤ ,
Audi A4 1995 ➤ , Audi A4 2001 ➤ ,
Audi A4 2008 ➤ , Audi A4 2015 ➤ ,
Audi A4 Avant 2015 ➤ ,
Audi A4 Cabriolet 2003 ➤ ,
Audi A4 China 2016 ➤ ,
Audi A4 allroad quattro 2016 ➤ ,
Audi A5 2016 ➤ ,
Audi A5 Cabriolet 2009 ➤ ,
Audi A5 Coupé 2008 ➤ ,
Audi A5 Sportback 2010 ➤ ,
Audi A6 1995 ➤ , Audi A6 1998 ➤ ,
Audi A6 2005 ➤ , Audi A6 2011 ➤ ,
Audi A6 2019 ➤ , Audi A6 China 2012 ➤ ,
Audi A6 China 2019 ➤ ,
Audi A7 Sportback 2011 ➤ ,
Audi A7 Sportback 2018 ➤ ,
Audi A8 1994 ➤ , Audi A8 2003 ➤ ,
Audi A8 2010 ➤ , Audi A8 2018 ➤ ,
Audi Cabriolet 1991 ➤ , Audi Q2 2016 ➤ ,

Audi Q2 China 2019 ➤, Audi Q3 2012 ➤, Audi Q3 2019 ➤, Audi Q3 China 2013 ➤, Audi Q3 China 2019 ➤, Audi Q5 2008 ➤, Audi Q5 2017 ➤, Audi Q5 China 2010 ➤, Audi Q5 China 2019 ➤, Audi Q7 2007 ➤, Audi Q7 2016 ➤, Audi Q8 2018 ➤, Audi R8 2007 ➤, Audi R8 2015 ➤, Audi TT 1999 ➤, Audi TT 2007 ➤, Audi TT 2015 ➤, Audi e-tron 2019 ➤

Refrigerant R134a Servicing

Edition 03.2020

List of Workshop Manual Repair Groups

Repair Group

87 - Air Conditioning

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.

Contents

87 – Air Conditioning

1 Safety Precautions

(Edition 03.2020)

1.1 Safety Precautions when Working on A/C Systems

WARNING

Ignition sources are extremely dangerous and increase the risk of explosion and fatal injury

Ignition sources near the A/C system and refrigerant containers are extremely dangerous and pose a risk of explosion. Leaking refrigerant can ignite and lead to an explosion. Death or serious bodily injury by explosion.

– Never bring ignition sources near A/C systems and refrigerant containers.

– Discharge any static electricity and prevent any sparks from striking tools and hot surfaces.

CAUTION

There is risk of destroying the refrigerant lines.

The refrigerant lines can be destroyed by cracks in the inner foil.

– Never bend the refrigerant lines to a radius smaller than r = 100 mm.

1.2 Safety Precautions when Handling Refrigerant

WARNING

Risk of asphyxiation and poisoning from the refrigerant

Dry coughing and nausea due to suffocation and poisoning is possible due to refrigerant fumes.

– Never breathe in refrigerant fumes.

– Only perform procedures on the refrigerant circuit in well ventilated areas and store in refrigerant container.

– Never perform procedures in and near basement staircases or other below ground areas.
– Switch on the exhaust extracting system.

WARNING

There is a risk of getting frostbite from the refrigerant.

Refrigerant can come out under pressure when working on the A/C system. Frostbite on the skin and other parts of the body is possible.

– Wear safety gloves.
– Wear protective eyewear.
– Evacuate or drain refrigerant and open the refrigerant circuit immediately.
– If more than 10 minutes elapse after extracting or draining the refrigerant and the refrigerant circuit was not opened, extract or drain the refrigerant again. Pressure develops in the refrigerant circuit due to evaporation.

1.3 Safety Precautions when Working on Vehicles with Start/Stop System

WARNING

There is a risk of injury from the engine starting unexpectedly.

The engine can start unexpectedly on vehicles with an activated Start/Stop System. A message in the instrument cluster indicates whether the Start/Stop System is activated.

– Deactivate the Start/Stop System: switch off the ignition.

1.4 Safety Precautions when Working on Vehicles with High-Voltage System

DANGER

High voltage is extremely dangerous.

The high-voltage system is under high voltage. Severe bodily injury or death by electrocution or arcing is possible.

– When working on the high-voltage system, de-energize the high-voltage system.
– If procedures do not affect the high-voltage system directly, the high-voltage system should still be de-energized in some cases.
– For known procedures that require the high-voltage system to be de-energized, refer to ⇒ Rep. Gr. 00 ; High-Voltage System Danger Classification .
– Have an Audi high-voltage technician or an Audi high-voltage expert de-energize the high-voltage system.

WARNING

There is a risk of injury from the engine starting unexpectedly.

On electric and hybrid vehicles an active ready mode is difficult to identify. Parts of the body can be pinched or pulled.

– Switch off the ignition.

– Place the ignition key outside of the vehicle interior.

WARNING

Risk of injury due to an activated parking heater and A/C

The parking heater and A/C can switch on unintentionally on electric and hybrid vehicles with an activated parking heater and A/C. Parts of the body can be pinched or pulled by self-actuating radiator fans.

– Deactivate the parking heater and A/C.

1.5 Safety Precautions when Working near High-Voltage Components

DANGER

High voltage is extremely dangerous.

The high-voltage system is under high voltage. Severe bodily injury or death by electrocution or arcing is possible if the high-voltage components and high-voltage cables are damaged.

– Perform a visual inspection of the high-voltage components and the high-voltage cables.

– Never use cutting, shaping, or sharp-edged tools near high-voltage components and high-voltage cables.

– Never weld, solder, use thermal bonding or hot air near high-voltage components and high-voltage cables.

CAUTION

Risk of damaging the high-voltage cables.

Misuse can damage the insulation of high-voltage cables or high-voltage connectors.

– Never support objects on the high-voltage cables and the high-voltage connectors.

– Never support tools on the high-voltage cables and the high-voltage connectors.

– Never sharply bend or kink the high-voltage cables.

– When connecting pay attention to the coding of the high-voltage connectors.

1.6 Safety Precautions during Road Test with Testing Equipment

WARNING

There is a risk of personal injury if testing equipment is not secured properly.

If the front passenger airbag deploys during an accident, then testing equipment that is not secured properly can become a dangerous projectile.

– Secure the testing equipment to the rear seat with a strap.

or

– Have a second technician operate the testing equipment from the rear seat.

2 A/C System, General Information

2.1 Introduction

The purpose of this repair manual is to provide service advisors and technicians with the basic knowledge needed to ensure professional and competent procedures.

Note

Only the careful study of this documentation, practical implementation of the information contained, training on A/C systems and expert knowledge (with or without certificate) can guarantee expertise in the field of motor vehicle A/C systems.

This document is a compact reference work which should be kept at the workplace. It should also be available to the current supervising authority upon request.

2.2 Additional Information Sources

- Repair manual for model-specific repair work. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual) and ⇒ Wiring diagrams, Troubleshooting & Component locations.
- Technical Service Handbook outlining actions to be taken to rectify current problems
- Self-Study Program, for example, ⇒ Self Study Program No. 208 ; Vehicle A/C Systems
- Video programs for in-dealership training
- Special tools and workshop equipment needed to service the A/C system. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- Service Organization Volume “1” “Additional Equipment”.
- A/C System with Refrigerant R12 repair manuals (only hard-copies of this manual are available for vehicles through MY 1993).

2.3 A/C Technology Basic Principles

2.3.1 Physical Principles

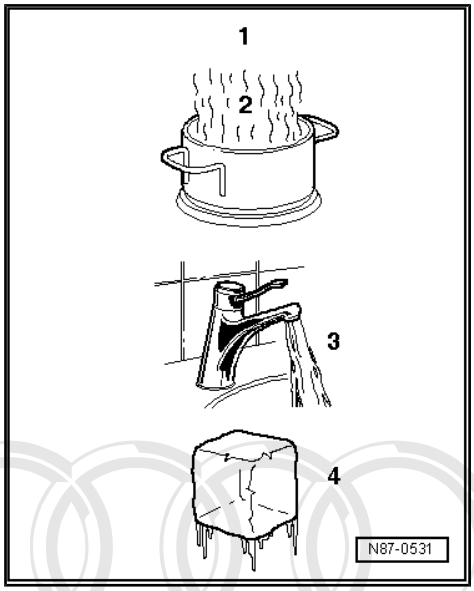
The four known states of water also apply to air conditioning system refrigerants.

1 - Gaseous (invisible)

2 - Vapor

3 - Liquid

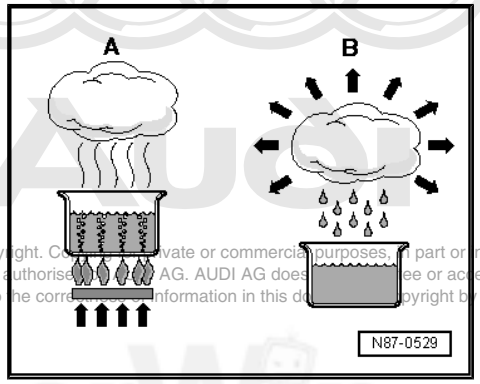
4 - Solid



When water is heated in a container (heat absorption), water vapor can be seen to rise. If the vapor is further heated through heat absorption, the visible vapor turns into invisible gas. The process is reversible. If heat is extracted from water in gaseous form -A-, it changes first to vapor -B-, then to water and finally to ice.

A - Heat absorption

B - Heat emission



Heat Transfer

Every substance consists of a mass of moving molecules. The fast moving molecules of a warmer substance give off some of their energy to the cooler and thus slower molecules. As a result, the molecular motion of the warmer substance slows down and that of the colder substance is accelerated. This process continues until the molecules of both substances are moving at the same speed. They are then at the same temperature and no further heat exchange takes place.

2.3.2 Pressure and Boiling Point

The boiling point given in tables for a liquid is always referenced to an atmospheric pressure of 1 bar (14.5 psi). If the pressure acting on a fluid changes, its boiling point also changes.

Note

Pressure is measured in different units: 1 MPa (145 psi) corresponds to 10 bar (145 psi) positive pressure. 1 bar (14.5 psi) absolute pressure corresponds to 0 bar/psi positive pressure and thus to the ambient pressure (atmospheric pressure).

Water boils at a lower temperature the lower the pressure.

The vapor pressure curves for water and refrigerant R134a show that, at constant pressure, reducing the temperature changes vapor to liquid (in the condenser) or that reducing the pressure causes the refrigerant to change from liquid to vapor (inside the evaporator).

Vapor pressure curve of water

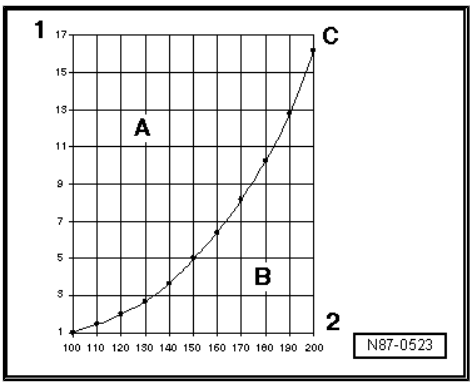
A - Liquid

B - Gas

C - Vapor pressure curve of water

1 - Pressure acting on liquid in bar (psi)

2 - Temperature in °C (°F)



Vapor pressure curve of refrigerant R134a

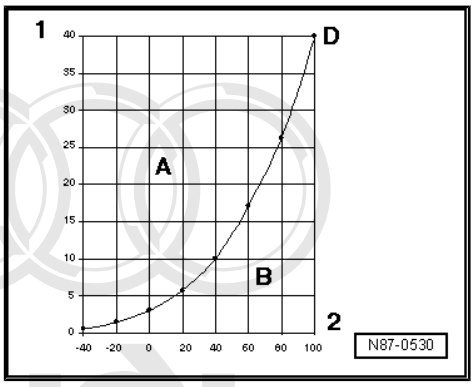
A - Liquid

B - Gas

D - Vapor pressure curve of refrigerant R134a

1 - Pressure acting on liquid in bar (psi)

2 - Temperature in °C (°F)



2.3.3 Refrigerant R134a Vapor Pressure Table

The vapor pressure table for every refrigerant is published in literature for the refrigeration system engineers. This table makes it possible to determine the vapor pressure acting on the column of liquid in a container if the temperature of the container is known.

Because each refrigerant has its own characteristic vapor pressure table, refrigerant can be identified by measuring the pressure and temperature.

Note

- *At absolute pressure, "0 bar/psi" corresponds to absolute vacuum. Normal ambient pressure (positive pressure) equals approximately "1 bar (1.5 psi)" absolute pressure. "0 bar/psi" pressure corresponds to an absolute pressure of 1 bar (14.5 psi) on most pressure gauges (indicated by "-1 bar (-14.5 psi)" below "0 bar/psi").*
- *Pressure is measured in different units: 1 MPa (145 psi) corresponds to 10 bar (145 psi) positive pressure. 1 bar (14.5 psi) absolute pressure corresponds to 0 bar/psi positive pressure and thus to the ambient pressure (atmospheric pressure).*

Temperature in °C (°F)	Pressure in bar (psi) of R134a
-45 (-49)	-0.61 (-8.85)
-40 (-40)	-0.49 (-7.11)

Temperature in °C (°F)	Pressure in bar (psi) of R134a
-35 (-31)	-0.34 (-4.93)
-30 (-22)	-0.16 (-2.32)
-25 (-13)	0.06 (0.87)
-20 (-4)	0.32 (4.64)
-15 (-5)	0.63 (9.14)
-10 (14)	1.00 (14.50)
-5 (23)	1.43 (20.74)
0 (32)	1.92 (27.85)
5 (41)	2.49 (36.11)
10 (50)	3.13 (45.40)
15 (59)	3.90 (56.57)
20 (68)	4.70 (68.17)
25 (77)	5.63 (81.66)
30 (86)	6.70 (97.18)
35 (95)	7.83 (113.57)
40 (104)	9.10 (131.98)
45 (113)	10.54 (152.87)
50 (122)	12.11 (175.64)
55 (131)	13.83 (200.59)
60 (140)	15.72 (228.00)
65 (149)	17.79 (258.02)
70 (158)	20.05 (290.80)
75 (167)	22.52 (326.63)
80 (176)	25.21 (362.59)
85 (185)	28.14 (408.14)
90 (194)	31.34 (454.55)

2.4 Refrigerant R134a

⇒ “2.4.1 Refrigerant R134a Physical Data”, page 8

⇒ “2.4.2 Critical Point”, page 9

⇒ “2.4.3 Refrigerant R134a Environmental Information”, page 9

2.4.1 Refrigerant R134a Physical Data

Vehicle air conditioning systems make use of the vaporization and condensation process. In this case, one works with a substance which boils easily, designated as refrigerant.

The refrigerant used is tetrafluoroethane R134a, which boils at -26.5 °C (-15.7 °F) at a vapor pressure of “1 bar (14.5 psi)” (absolute pressure corresponds slightly to the ambient pressure).

Chemical formula	CH2F–CF3 or CF3–CH2F
Chemical designation	Tetrafluoroethane
Boiling point at 1.0 bar (14.5 psi)	26.5 °C (79.7 °F)
Solidification point	101.6 °C (214.88 °F)
Critical temperature	100.6 °C (213.08 °F)
Critical pressure	40.56 bar (588.27 psi)

2.4.2 Critical Point

The critical point (critical temperature and critical pressure) is that above which there is no longer a boundary between liquid and gas.

A substance above its critical point is always in the gaseous state.

At temperatures below the critical point, all types of refrigerant in pressure containers exhibit both a liquid and a gas phase, for example there is a layer of gas above the liquid.

As long as both liquid and gas are present in the container, the pressure is governed by ambient temperature. Refer to ⇒ “2.3.3 Refrigerant R134a Vapor Pressure Table”, page 7 “vapor pressure table”.

Note

Different types of refrigerant are never to be mixed. Only the refrigerant designated for the corresponding A/C system may be used.

2.4.3 Refrigerant R134a Environmental Information

- R134a is a fluorocarbon and contains no chlorine.
- R134a has a shorter atmospheric life span than refrigerant R12.
- R134a does not damage the ozone layer. The ozone depletion potential is zero.
- The greenhouse potential of R134a (Global Warming Potential = GWP) is approximately 1430 (the GWP of carbon dioxide = 1). To reduce the influence of the greenhouse effect of the refrigerant R134a, the European commission has committed that a vehicle from the 01/01/2017 with refrigerant in the vehicle A/C system with a GWP greater than 150 can no longer be placed on the market. A/C system in vehicles which were brought into the market through 12/31/2016 can until further notice be filled with refrigerant R134a and driven.
- The global warming effect of R134a is “10” times less than that of refrigerant R12.

2.5 Refrigerant R134a Characteristics

2.5.1 Commercial Names and Designations

Refrigerant R134a is currently available under the following trade names:

- H-FKW 134a
- SUVA 134a
- KLEA 134a

Note

- *Different trade names may be used in other countries.*
- *Of the wide range of refrigerants available, this is the only one which may be used for vehicles. The designations Frigen and Freon are trade names. They also apply to refrigerants which may not be used in automotive vehicles.*

2.5.2 Color

Like water, refrigerants are colorless in both vapor and liquid form. Gas is invisible. Only the boundary layer between gas and liquid is visible. (Liquid level in tube of charging cylinder or bubbles in sight glass). Refrigerant R134a fluid may appear colored (milky) in a sight glass. This cloudiness is caused by partially dissolved refrigerant oil and does not indicate a malfunction.

2.5.3 Vapor Pressure

In a partially filled, closed container, the quantity of refrigerant evaporating from the surface equals the quantity returning to the liquid state as vapor particles condense. This state of equilibrium occurs under the influence of pressure and is often called vapor pressure. The vapor pressure is dependent on the temperature. Refer to
⇒ “2.3.3 Refrigerant R134a Vapor Pressure Table”, page 7 “vapor pressure table”.

2.5.4 R134a Physical Characteristics

The vapor pressure curves of R134a and other refrigerants are sometimes very similar, therefore it is not possible to make a certain distinction solely by pressure.

With R134a, the A/C compressor is lubricated with special synthetic refrigerant oils, for example, PAG oils (polyalkylene glycol oils).

2.5.5 Affect on Metal

In its pure state, refrigerant R134a is chemically stable and does not corrode iron or aluminum.

Refrigerant impurities such as chlorine compounds however cause corrosion of certain metals and plastics. This can lead to blockage, leaks or deposits on the A/C compressor piston.

2.5.6 Critical Temperature/Pressure

⇒ “2.5.7 General Information”, page 11

⇒ “2.5.8 Water Content”, page 11

⇒ “2.5.9 Combustibility”, page 11

⇒ “2.5.10 Charge Factor”, page 11

⇒ “2.5.11 Evidence of Leaks”, page 12

2.5.7 General Information

The refrigerant R134a remains chemically stable up to a gas pressure of 39.5 bar (573 psi) (absolute pressure of 40.56 bar (588 psi), which corresponds to a temperature of 101 °C (214 ° F)). Above this temperature, the refrigerant decomposes. Refer to ⇒ “2.5.9 Combustibility”, page 11 .

2.5.8 Water Content

Only very small amounts of water are soluble in liquid refrigerant. On the other hand, refrigerant vapor and water vapor mix in any ratio.

Any water in the refrigerant circuit will be entrained in droplet form once the dryer in the receiver or reservoir has absorbed as little as approximately 7g of water. This water flows as far as the nozzle of the expansion valve or restrictor and turns to ice, the A/C system no longer has a cooling effect.

Water destroys the air conditioner as it combines with other impurities at high pressures and temperatures to form acids.

2.5.9 Combustibility

Refrigerant is non-flammable. It actually has a fire-resistant or fire extinguishing effect. Refrigerant decomposes when exposed to flames or red-hot surfaces. UV light (occurring for example during electric welding) also causes refrigerant decomposition. The resultant decomposition products are toxic and are not to be inhaled. However, irritation of the mucous membranes provides an adequate and timely warning.

2.5.10 Charge Factor

A container must have space for vapor as well as liquid. As the temperature rises, the liquid expands. The space filled with vapor decreases. At a certain point, there will only be liquid in the container. Beyond this, even a slight increase in temperature causes high pressure to build up in the container as the liquid tries to continue expanding even though there is not enough space for it. The forces that result are strong enough to rupture the container. To prevent a container from being overfilled, the regulations regarding compresses gasses specify how many kilograms of refrigerant that may be added to a container per liter of interior volume. The product of multiplying this charge factor by the internal volume of the container is the permissible capacity. The figure for refrigerant used in vehicles is 1.15 kg/liter.

2.5.11 Evidence of Leaks

External damage, for example, can cause a leak in the refrigerant circuit. The small quantity of refrigerant escaping from minor leaks can be detected, for example, by using an electronic leak detector or by introducing a UV-leak detection additive into the refrigerant circuit. Electronic leak detectors are capable of registering leaks with refrigerant losses of less than 5g per year.

Note

Use leak detectors designed for the type of refrigerant. For example, a leak detector for R12 refrigerant will not work with R134a because R134a refrigerant has no chlorine atoms so the leak detector will not respond to it.

2.6 Refrigerant Oil

⇒ “2.6.1 General Information”, page 12

⇒ “2.6.2 Refrigerant Oil Characteristics”, page 12

2.6.1 General Information

Caution

- *When handling refrigerant oil, pay attention to local regulations.*

Refrigerant oil mixes with the refrigerant (about 20-40%, depending on compressor type and amount of refrigerant) and circulates constantly in the system, lubricating the moving parts.

Special synthetic refrigerant oils, for example polyalkylene glycol (PAG) oil, are used in conjunction with R134a air conditioning systems. This is necessary as mineral oil, for example, does not mix with R134a. In addition, the materials of the R134a air conditioning system could be corroded as a result of mixture flowing through the refrigerant circuit under pressure at high temperatures or breakdown of the lubricating film in the compressor. Using non-approved oils can cause the HVAC system to malfunction. Only use approved oils.

Refer to the Parts Catalog.

Type of oil for R134a in motor vehicles: PAG. (Polyalkyleneglycol)

Note

- *Do not store open containers of refrigerant oil because it attracts moisture.*
- *Always keep oil containers sealed.*
- *Do not use old refrigerant oil over again. For disposing refrigerant oil of unknown origin pay attention to local regulations.*
- *Ester-based oils are only intended for use in large systems at this time, not in passenger vehicle systems.*

2.6.2 Refrigerant Oil Characteristics

The most important properties are a high degree of solubility with refrigerant, good lubricity, absence of acid and minimal water content. Only certain oils are permitted. For a list of approved refrigerant oils and capacities. Refer to

⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .

PAG oils, which are appropriate for refrigerant R134a, are highly hygroscopic and do not mix with other oils. Opened containers should therefore be closed again immediately to prevent ingress of moisture. Moisture and acids promote aging of refrigerant oil, causing it to become dark and viscous as well as corrosive towards metals.

Note

- *Refrigerant oil, because of its chemical properties, must not be disposed of with engine oils or transmission oils. For disposing refrigerant oil of unknown origin pay attention to local regulations.*
- *Only the oil approved for the A/C compressor may be used in refrigerant circuits with refrigerant R134a. For the correct oil. Refer to the Parts Catalog. For the correct capacities. Refer to ⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .*

Important Information

Refrigerant oil attracts moisture. Close any opened containers immediately after use to prevent moisture from entering.

2.7 A/C System Operation

⇒ “2.7.1 General Information”, page 13

⇒ “2.7.2 Comfort”, page 13

⇒ “2.7.3 Environmental Information”, page 14

2.7.1 General Information

The temperature in the passenger compartment depends on the amount of heat radiated through the windows and conducted by the metal parts of the body. In hot weather it is possible to achieve a more comfortable temperature for the passengers by pumping off some of the heat.

As heat spreads into cooler areas, the passenger compartment is equipped with a unit for generating low temperatures. In the unit, refrigerant is constantly evaporated. The heat required for this is extracted from the air flowing through the evaporator.

After absorbing heat, the refrigerant is pumped off through the compressor. The action of the A/C compressor increases the heat content and temperature of the refrigerant. Its temperature is then substantially higher than that of the surrounding air.

The warm refrigerant flows to the condenser. There, the refrigerant dissipates its heat through the condenser to the surrounding air due to the temperature difference between the refrigerant and air.

The refrigerant thus acts as a heat transfer medium. As it is to be reused, the refrigerant is returned to the evaporator.

For this reason all air conditioning systems are based on the refrigerant circulation principle. There are however differences in the combination of aggregates.

2.7.2 Comfort

Being comfortable while driving leads to better concentration and safe driving. Air conditioning makes drivers and passengers more comfortable when temperatures or humidity are high. While opening the windows or sunroof or increasing the air flow can make

vehicle occupants more comfortable, it also exposes them to more noise, draughts, exhaust, pollen and dust.

A well-designed heating and air conditioning system can increase comfort by controlling the temperature, humidity and air flow inside the vehicle. This is done both when the vehicle is moving and when it is stationary.

Air conditioning also offers these advantages:

- It cleans the air that enters the vehicle interior. The damp fins on the evaporator collect dust and pollen, which is then removed by condensation.
- Temperatures in a mid-size vehicle (for example: after a short drive, outside temperature 30 °C (86 °F) in the shade and the vehicle exposed to sunlight).

	With A/C System	Without A/C System
Head area	23 °C (73.4 °F)	42 °C (107.6 °F)
Upper body area	24 °C (75.2 °F)	40 °C (104 °F)
Foot area	30 °C (86 °F)	35 °C (95 °F)

2.7.3 Environmental Information

Since roughly 1992, the air conditioning systems of newly manufactured cars have been successively converted to refrigerant R134a. This refrigerant does not contain chlorine and does not deplete the ozone layer.

Until roughly 1992, refrigerant R12 was used for air conditioning systems. Due to its chlorine atoms, this CFC has a high potential for depleting the ozone layer as well as a tendency to increase the greenhouse effect.

Conversion programs are available for old existing systems filled with the ozone-depleting substance R12. Refer to Repair Manual for A/C Systems with Refrigerant R12 (this repair manual is only available in hard copy).

The greenhouse potential of R134a (Global Warming Potential = GWP) is approximately 1400, for this reason the European commission has committed that from 01/01/2017 no vehicles with this can newly be brought into the market. Refer to ⇒ “2.4.3 Refrigerant R134a Environmental Information”, page 9 . For this reason from 2016 for new vehicles a refrigerant with a GWP smaller than 150 in introduced (for example the refrigerant R1234yf with a GWP less than 5).

For environmental protection reasons, refrigerants must not be released into the atmosphere. For laws and regulations. Refer to ⇒ “4 Laws and Regulations”, page 67 .

2.8 General Safety Precautions

- As per VBG 20, German industrial liability insurance association.
- Pay attention to the workshop-specific instructions. It should be kept in the workshop.

2.9 Product Characteristics

Refrigerants used in motor vehicle air conditioning systems belong to the new generation of refrigerants based on chlorine-free, partially fluorinated hydrocarbons (H-FKW, R134a).

With regard to their physical properties, these are refrigerants which have been liquefied under pressure. They are subject to the regulations governing pressure containers and use is only to be made of approved and appropriately marked containers.

Compliance with specific conditions is required to ensure safe and proper use.

2.10 Handling Refrigerant

If refrigerant containers are opened, the contents may escape in liquid or vapor form. This process is intensified the higher the pressure in the container.

The pressure level is governed by two factors:

- The type of refrigerant in the container. “The lower the boiling point, the higher the pressure.”
- The temperature level. “The higher the temperature, the higher the pressure.”

WARNING

- *There is a danger of ice-up.*
- *The refrigerant can then escape as a fluid or vapor.*
- *Do not open containers which store refrigerant.*

Protective Eyewear

Put on protective goggles. They prevent refrigerant getting into the eyes, as this could cause severe injury from exposure to cold.

Protective Gloves and Clothing

Greases and oils dissolve readily in refrigerants. They would therefore destroy the protective layer of grease if allowed to come into contact with the skin. Degreased skin is however sensitive to the cold and germs.

Fluid Refrigerant and Skin Precaution

The refrigerant draws heat for evaporation from the surrounding area. Even if this is the skin. This may cause extremely low temperatures. Local frost bite may result (boiling point of R134a: -26.5 °C (-15.7 °F) at ambient pressure).

Refrigerant Vapor Precaution

If highly concentrated refrigerant vapor escapes, it mixes with the surrounding air and displaces the oxygen necessary for breathing.

Smoking Hazard

A burning cigarette can cause refrigerant to decompose. The resultant substances are toxic and must not be inhaled.

Welding and Soldering on Refrigeration Systems

Before performing welding or soldering work on vehicles near A/C system components, extract the refrigerant and remove remnants by blowing them out with nitrogen.

The products of refrigerant decomposition due to the effect of heat are not only toxic, but may also have a highly corrosive effect on lines and system components. They mainly take the form of hydrogen fluoride.

Pungent Odor

A pungent odor indicates that the products of decomposition mentioned above have already formed. Avoid inhaling these substances under all circumstances, as otherwise the respiratory system, lungs and other organs could be damaged.

First Aid

- Following contact with eyes or mucous membranes, immediately rinse with copious amounts of running water and consult an eye specialist.
- Following contact with the skin, immediately remove affected clothing and rinse skin with copious amounts of water.
- Following inhalation of highly concentrated refrigerant vapors, immediately take the affected person into the open air. Call a doctor. Administer oxygen in the event of breathing difficulties. If the affected person has difficulty breathing or cannot breathe, tip head back and perform mouth to mouth respiration.

Also refer to ⇒ “2.11 Handling Pressure Containers”, page 16

2.11 Handling Pressure Containers

Secure containers to prevent them falling over!

Secure upright cylinders to stop them falling over and cylinders lying flat to stop them rolling away.

Do not throw containers!

If dropped, the containers could be so severely deformed that they rupture. The refrigerant evaporates immediately, liberating considerable force. Flying fragments of cylinders can cause severe injuries.

To protect the valves, cylinders are only to be transported with protective cap screwed on.

Valves may break off if cylinders are not properly transported.

Never store in the vicinity of radiators.

High temperatures may occur next to radiators. High temperatures are also accompanied by high pressures and the maximum permissible container pressure may be exceeded.

Not Warming Above 50 °C (122 °F)

To avoid possible risk, pressure container regulations specify that containers are not to be heated to in excess of 50 °C (122 °F).

Heating Warning

Do not heat with a naked flame under any circumstances. Localized overheating can cause structural changes in the container material, which then reduce its ability to withstand pressure. There is also a danger of refrigerant decomposition due to localized overheating.

Empty Containers

Empty refrigerant containers must always be sealed to prevent the ingress of moisture. Moisture causes steel containers to corrode. This weakens the containers walls. In addition, rust particles entering into refrigeration systems from containers will cause malfunctioning.

2.12 Refrigerant Circuit, General Precautions

2.12.1 General Information

- Workshop-specific instructions.
- Ensure absolute cleanliness when working.
- Wear protective eyewear and safety gloves when working with refrigerant and nitrogen.
- Workshop ventilation systems must be switched on.
- Only use the A/C service station to discharge the refrigerant circuit, and then open the threaded connections and replace any faulty components.
- Use a cap to seal off any opened assemblies and hoses to prevent moisture and dirt from getting in.
- Only use tools and materials designated for refrigerant R134a.
- Seal opened refrigerant oil containers to guard against moisture.

Note

- *After completing repair work, install closure caps (with seals) on all connections with valve and service connections.*
- *Before operating the A/C system. Observe vehicle-specific filling capacities. Refer to ⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .*
- *Do not add refrigerant, extract the refrigerant present and refill the system.*

2.12.2 Refrigerant Circuit, Cleaning

Clean the refrigerant circuit with refrigerant R134a (flush with refrigerant R134a) (refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93) or blow out with compressed air and nitrogen (refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89) if:

- Moisture or dirt has gotten into the refrigerant circuit (after a collision for example).
- Refrigerant oil is dark and viscous.
- There is too much refrigerant oil in the refrigerant circuit after replacing the compressor.
- The A/C compressor had to be replaced due to “internal” damage (for example, noises or no output).

Note

When cleaning components with compressed air and nitrogen, always extract the gas mixture escaping from the components through a suitable exhaust extracting system (workshop extraction system).

2.12.3 Additional Information for Vehicles with A/C Compressor without A/C Clutch, (only with A/C Compressor Regulator Valve - N280-)

- The engine can be started only after the refrigerant circuit has been completely assembled (the A/C compressor runs continuously).
- If the engine has to be run when the refrigerant circuit is empty, only do so for as long as absolutely necessary and avoid high engine speeds.

2.12.4 Additional Information for Vehicles with High-Voltage System

Vehicles with a High-Voltage System (Hybrid Vehicles)

- For additional information about the high-voltage system, refer to ⇒ Rep. Gr. 00 ; Safety Precautions or ⇒ Electrical Equipment; Rep. Gr. 93 ; General Warnings for Working on High-Voltage System .
- If procedures on high-voltage system components are required, de-energize the high-voltage system. Refer to ⇒ Rep. Gr. 00 ; Safety Precautions or ⇒ Electrical Equipment; Rep. Gr. 93 ; General Warnings for Working on High-Voltage System .
- The engine may only be started if the refrigerant circuit is completely assembled.
- Hybrid drive on vehicles with battery cooling is only possible with a charged A/C system in which there are no stored errors. Refer to Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C system and the Battery Regulation.
- After the installing the electrically-driven A/C compressor and the subsequent charging the refrigerant circuit, first start the A/C compressor using the “compressor cut-in” function of the basic setting. If refrigerant oil has accumulated in the A/C compressor compression chamber before installation due to improper storage, this could cause damage to the A/C compressor. Refer to Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for A/C System and Battery Regulator.
- Only activate the electrically-driven A/C compressor when the refrigerant circuit is filled. The A/C compressor may become damaged if the A/C compressor is run when the refrigerant circuit is empty. Refer to Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for A/C System and Battery Regulation.
- So that the refrigerant circuit can be discharged, evacuated and charged, different electrically-controlled valves must be opened depending on the design of the refrigerant circuit (for example on the Audi Q7 e-tron). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

- To check the A/C system function, certain electrically-controlled valves must be opened or closed (for example on the Audi Q7 e-tron). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.
- Depending on the vehicle, there is not actually high pressure present at the high pressure side service connection during every A/C system operating condition (for example, on the Audi Q7 e-tron). Therefore the sensors installed in the refrigerant circuit must be used to check the A/C system function in these vehicles. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .

– Charge the vehicle batteries, for example, using the Battery Charger - VAS 5904- in the battery support mode to minimize the number of automatic starts during the test- and measuring procedures while the ready mode is active. Refer to ⇒ Electrical Equipment General Information; Rep. Gr. 27 ; Battery, Charging and ⇒ Electrical Equipment; Rep. Gr. 93 ; General Warnings for Working on High-Voltage System .

– For testing and measurement procedures that require the ready mode to be active or the ignition to be switched on, the selector lever must be in the “P” position and the parking brake must be activated. The required tools must be placed so that they do not come into contact with any rotating components in the engine and they must also not go into the vicinity of the rotating components when the engine is running.

2.12.5 O-Rings

- Only use seals that are resistant to refrigerant R134a and the related refrigerant oils. Color coding of O-rings is no longer offered. Colored and black O-rings are used.
- Be sure to use seals with the correct inner diameter. Refer to Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- The seals may be used only one time.
- Coat the seals lightly with refrigerant oil (PAG oil) before installing.

2.13 After Charging A/C System

Mechanically Driven A/C Compressor

After installing the A/C Compressor to the engine (before positioning the belt or installing the driveshaft) Refer to
⇒ “5.3.7 A/C System, Operating after Charging”, page 86 and
⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor .

– Turn the A/C compressor by hand via the clutch plate or belt pulley on the A/C clutch approximately 10 turns.

After charging. Refer to
⇒ “5.3.7 A/C System, Operating after Charging”, page 86 .

– Start the engine with the A/C turned off (A/C Clutch - N25- and A/C Compressor Regulator Valve - N280- are not actuated).

– Following engine idling speed stabilization, switch on A/C compressor and run it for at least 10 minutes at idling speed with maximum cooling output.

Electrically Driven A/C Compressor

– First start the electrically driven A/C compressor after filling the refrigerant circuit via the “Compressor Cut-In” function from the basic setting. Refer to
⇒ “5.3.7 A/C System, Operating after Charging”, page 86
and Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System and the Battery Regulation.

3 Refrigerant Circuit General Information

3.1 Refrigerant Circuit Components

Caution

Non-approved tools or materials such as leak sealing additives can cause damage or malfunctions in the system.

Only use tools and materials approved by the manufacturer.

The warranty is voided if non-approved tools or materials are used.

- Any refrigerant circuit components submitted for quality observation must be sealed (use the caps that come with the replacement part).
- Replace damaged or leaking components of the refrigerant circuit. Refer to ⇒ “9 Refrigerant Circuit Components, Replacing”, page 283 .

Note

To date, the following replacement parts (A/C compressor, reservoir, evaporator and condenser) are filled with nitrogen gas. This charge is being gradually discontinued. Little or no pressure equalization is therefore noticeable on unscrewing sealing plugs from replacement parts.

3.2 Refrigerant Circuit Components Allocation, High and Low Pressure Sides

3.2.1 General Information

High pressure side are the condenser, receiver/dryer and restrictor or expansion valve to separate the high and low pressure liquid ends.

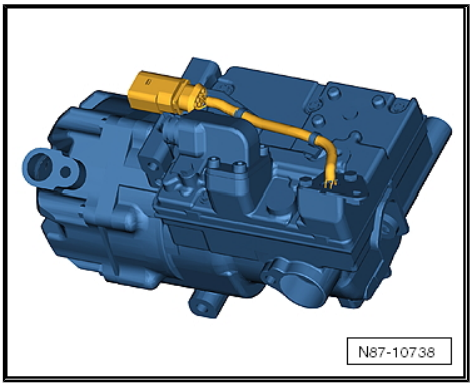
High pressure results from the restrictor or expansion valve forming a constriction and causing the refrigerant to accumulate, thus leading to an increase in pressure and temperature.

Excess pressure occurs if too much refrigerant or refrigerant oil is used, the condenser is contaminated, the radiator fan is malfunctioning, the system is blocked or there is moisture in the refrigerant circuit (icing-up of restrictor or expansion valve).

Low pressure side are the evaporator, reservoir, evaporator temperature sensor and A/C compressor to separate high and low pressure gas ends.

A drop in system pressure can be caused by loss of refrigerant, the restrictor or expansion valve (no constriction), a malfunctioning A/C compressor or an iced-up evaporator.

3.2.2 Mechanically Driven A/C Compressor



WARNING

Risk of short circuit

The A/C compressor works with up to 288 volts at 800 to 8,600 RPM.

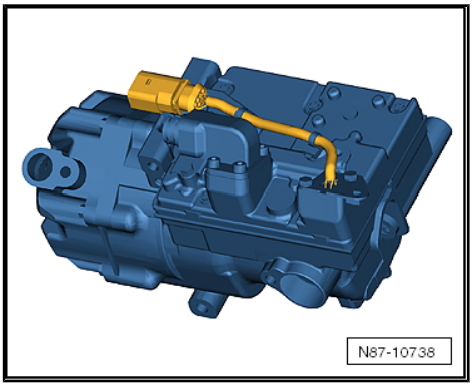
Do not touch the A/C compressor when turning on the ignition or when activating the drive machines because of the short circuit risk.

- The A/C compressor extracts the refrigerant gas from the evaporator, compresses it and sends it to the condenser.
- The electric motor for the A/C compressor is supplied with voltage by the Electric Drive Power and Control Electronics - JX1- .
- The A/C Compressor Control Module - J842- integrated in the A/C compressor controls the speed and thereby the output of the A/C compressor (Electrical A/C Compressor - V470-) according to the request received by the data bus. Refer to Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System and the Battery Regulation.
- There is no A/C Compressor Regulator Valve - N280- installed in the electrically-driven A/C compressor.
- Check the attachment points on the A/C compressor and the bracket prior to installation. The contact surfaces must be clean and free of rust and grease. Otherwise, repair the contact surfaces with the Contact Surface Cleaning Set - VAS 6410- . Refer to ⇒ Electrical Equipment General Information; Rep. Gr. 97 ; Wire and Connector Repair .

Note

- *Check the amount of refrigerant oil in the new A/C compressor if the A/C Compressor Control Module - J842- is faulty. Do not flush the refrigerant circuit with R134a.*
- *The A/C Compressor Control Module - J842- and the Electrical A/C Compressor - V470- are one component and are currently not able to be separated.*
- *There is no A/C Compressor Regulator Valve - N280- installed in the electrically-driven A/C compressor. The A/C compressor output is regulated externally by the A/C compressor speed. Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations and the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System and the Battery Regulation.*
- *The electrically-driven A/C compressor currently functions according to the principle of a spiral charger (similar to a G-charger).*
- *The A/C compressor contains refrigerant oil, which can be mixed with refrigerant R134a under any temperature.*
- *The type plate lists the type of refrigerant required for the A/C compressor.*
- *The installed electronics regulate the A/C compressor power output (and the pressure on the low pressure side as a result) within the specified range (control characteristic) via the speed.*
- *The engine should only be started if the refrigerant circuit is completely assembled.*
- *The A/C compressor is supplied with a specific amount of oil that prevents the A/C compressor from becoming damaged when the refrigerant circuit is empty. This means that approximately 40 to 50 cm^3 of refrigerant oil remains in the A/C compressor.*
- *The electrically-driven A/C compressor has a pressure relief valve like the mechanically-driven A/C compressor.*
- *Hybrid drive on vehicles with battery cooling is only possible with a fully charged A/C system in which there are no stored errors for the A/C system. Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C system and the Battery Regulation.*
- *After the installing the electrically-driven A/C compressor and the subsequent charging the refrigerant circuit, first start the A/C compressor using the "compressor cut-in" function of the basic setting. If refrigerant oil has accumulated in the A/C compressor compression chamber before installation due to improper storage, this could cause damage to the A/C compressor. Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/C System and Battery Regulation.*
- *Only activate the electrically-driven A/C compressor when the refrigerant circuit is filled. The A/C compressor may become damaged if the A/C compressor is run when the refrigerant circuit is empty. Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/C System and Battery Regulation.*

3.2.3 Electrically Driven A/C Compressor for Vehicles with High Voltage System



WARNING

Risk of short circuit

The A/C compressor works with up to 288 volts at 800 to 8,600 RPM.

Do not touch the A/C compressor when turning on the ignition or when activating the drive machines because of the short circuit risk.

- The A/C compressor extracts the refrigerant gas from the evaporator, compresses it and sends it to the condenser.
- The electric motor for the A/C compressor is supplied with voltage by the Electric Drive Power and Control Electronics - JX1- .
- The A/C Compressor Control Module - J842- integrated in the A/C compressor controls the speed and thereby the output of the A/C compressor (Electrical A/C Compressor - V470-) according to the request received by the data bus. Refer to Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System and the Battery Regulation.
- There is no A/C Compressor Regulator Valve - N280- installed in the electrically-driven A/C compressor.
- Check the attachment points on the A/C compressor and the bracket prior to installation. The contact surfaces must be clean and free of rust and grease. Otherwise, repair the contact surfaces with the Contact Surface Cleaning Set - VAS 6410- . Refer to ⇒ Electrical Equipment General Information; Rep. Gr. 97 ; Wire and Connector Repair .

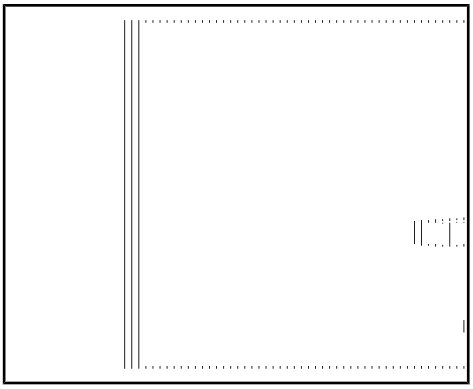
Note

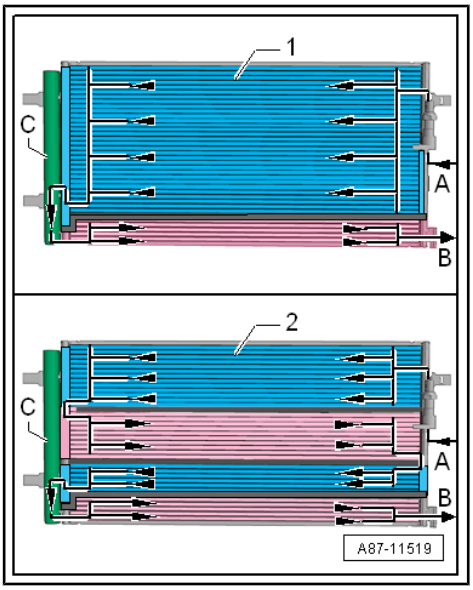
- *Check the amount of refrigerant oil in the new A/C compressor if the A/C Compressor Control Module - J842- is faulty. Do not flush the refrigerant circuit with R134a.*
- *The A/C Compressor Control Module - J842- and the Electrical A/C Compressor - V470- are one component and are currently not able to be separated.*
- *There is no A/C Compressor Regulator Valve - N280- installed in the electrically-driven A/C compressor. The A/C compressor output is regulated externally by the A/C compressor speed. Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations and the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System and the Battery Regulation.*
- *The electrically-driven A/C compressor currently functions according to the principle of a spiral charger (similar to a G-charger).*
- *The A/C compressor contains refrigerant oil, which can be mixed with refrigerant R134a under any temperature.*
- *The type plate lists the type of refrigerant required for the A/C compressor.*
- *The installed electronics regulate the A/C compressor power output (and the pressure on the low pressure side as a result) within the specified range (control characteristic) via the speed.*
- *The engine should only be started if the refrigerant circuit is completely assembled.*
- *The A/C compressor is supplied with a specific amount of oil that prevents the A/C compressor from becoming damaged when the refrigerant circuit is empty. This means that approximately 40 to 50 cm^3 of refrigerant oil remains in the A/C compressor.*
- *The electrically-driven A/C compressor has a pressure relief valve like the mechanically-driven A/C compressor.*
- *Hybrid drive on vehicles with battery cooling is only possible with a fully charged A/C system in which there are no stored errors for the A/C system. Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C system and the Battery Regulation.*
- *After the installing the electrically-driven A/C compressor and the subsequent charging the refrigerant circuit, first start the A/C compressor using the "compressor cut-in" function of the basic setting. If refrigerant oil has accumulated in the A/C compressor compression chamber before installation due to improper storage, this could cause damage to the A/C compressor. Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/C System and Battery Regulation.*
- *Only activate the electrically-driven A/C compressor when the refrigerant circuit is filled. The A/C compressor may become damaged if the A/C compressor is run when the refrigerant circuit is empty. Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/C System and Battery Regulation.*

3.2.4 Condenser

The condenser conducts heat from compressed refrigerant gas to the ambient air.

This condenses the refrigerant gas to fluid.





Note

- *Depending on the version of the refrigerant circuit, the receiver/dryer is installed (integrated) either on the condenser or inside the condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog).*
- *The condenser is available in different versions and can be differentiated only by the part number on the outside. For version -1-, the condenser is divided into two areas "2 way condenser". For version -2-, the condenser is divided into four areas "4 way condenser".*
- *This illustration shows a condenser with the receiver/dryer -C- installed.*
- *The gaseous refrigerant enters at the connection -A- into the condenser. The refrigerant is then cooled inside the condenser and becomes fluid.*
- *The liquid refrigerant collects in the receiver/dryer -C- (with dryer) and flows through the lower cooling area towards the connection -B-.*
- *Depending on the design of the condenser (interior volumes, delivery flow, etc.), the amount of the refrigerant that is needed to fill the refrigerant circuit may vary. Therefore always be sure of the correct version and allocation for the condenser. Refer to ⇒ "10.2 Refrigerant R134a Capacities", page 301 and the Parts Catalog.*

3.2.5 Evaporator

The evaporator is available in different versions. Depending on the version and the function, the necessary heat energy of the air flow (for example, an evaporator in the A/C unit or in the battery cooling module) or flowing coolant (for example near the high voltage battery heat exchanger) is extracted for refrigerant evaporation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

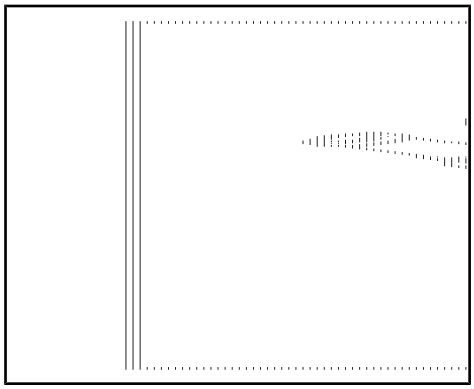
Note

Two versions of evaporator are described.

Evaporator in A/C Unit (or in Battery Cooling Module)

The fluid refrigerant evaporates in the evaporator line coils. The heat required for this is extracted from the air flowing on the evaporator ribbing. The air cools off. Refrigerant evaporates and is extracted with the absorbed heat by the A/C compressor.

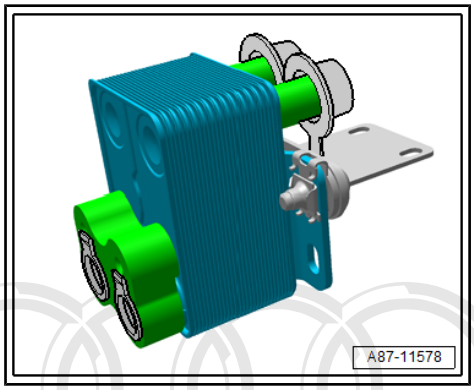
A defined amount of refrigerant is supplied to the evaporator by a restrictor or expansion valve. In systems with expansion valve, the throughput is regulated so that only gaseous refrigerant escapes the evaporator outlet.



Evaporator/High Voltage Battery Heat Exchanger (Chiller)

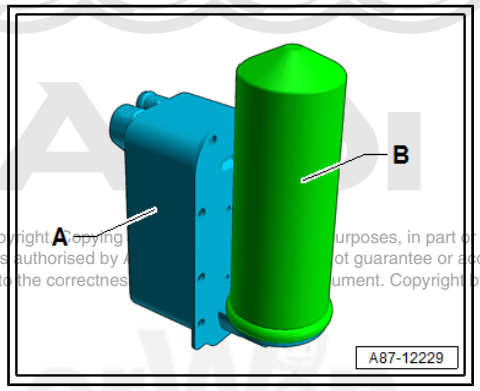
The liquid refrigerant evaporates in evaporator (heat exchanger). The heat required for this is extracted from the flowing refrigerant. The coolant cools, the refrigerant evaporates and is extracted with the absorbed heat by the A/C compressor.

A defined amount of refrigerant is supplied to the evaporator by a restrictor (or expansion valve) and a shut off valve. The throughput of the refrigerant (for example the coolant) is regulated so that only gaseous refrigerant escapes the evaporator outlet. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).



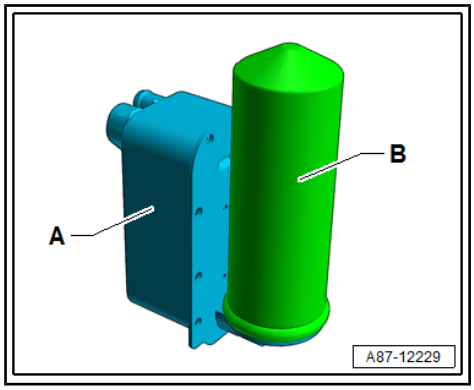
3.2.6 Heat Pump Operation Heater Core

The gaseous or vaporous refrigerant that is compressed by the A/C compressor is liquefied in the A/C compressor -A- and at the same time released heat is transferred to the coolant flowing by. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit; System Overview - Refrigerant Circuit .

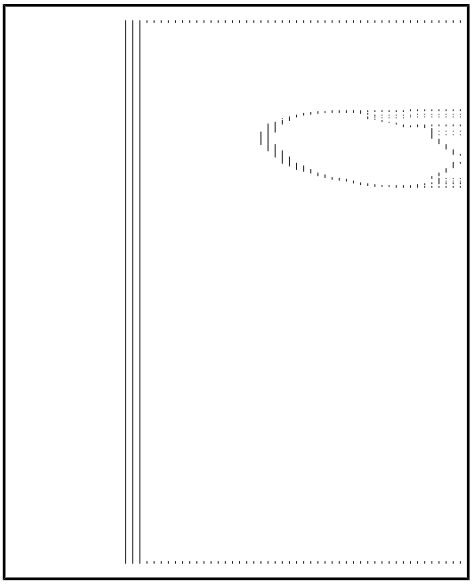


3.2.7 Fluid Collector

In some operating conditions (for example heat pump operation) the receiver/dryer (for example on the condenser) is not incorporated in the refrigerant circuit. The fluid collector -B- collects the refrigerant, and saves it if a specific quantity of refrigerant is not needed and directs it in an uninterrupted stream to the expansion valve (in front of the evaporator in the heater and A/C unit) or to the heat exchanger in the refrigerant circuit of the high-voltage system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).



3.2.8 Reservoir



The reservoir collects the vaporized and gaseous mixture coming from the evaporator to ensure the compressor only receives gaseous refrigerant. Gaseous refrigerant is formed from the vapor.

The refrigerant oil flowing in the circuit is not retained in the reservoir as it has an oil drilling.

Moisture which has entered the refrigerant circuit during repairs will be collected by a filter (desiccant bag) in the reservoir.

Gaseous refrigerant is extracted with oil by the A/C compressor.

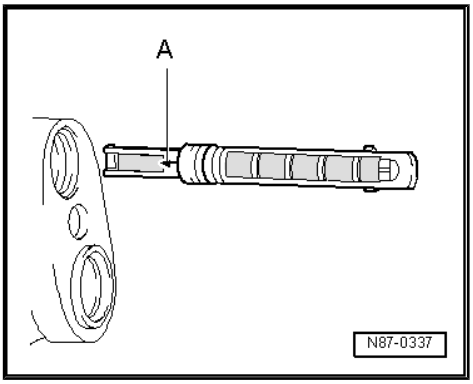
Note

- *Replace the reservoir if refrigerant circuit has been open for a long time (beyond the normal repair time) and moisture has penetrated inside, or if required due to a specific complaint. Refer to*
  ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .
- *Remove the sealing plugs -A and B- only immediately before installing.*
- *A desiccant bag in an unsealed reservoir is saturated with moisture after a short period of time and unusable.*
- *When installing, note arrow for direction of flow if necessary.*

3.2.9 Restrictor

Restrictor in Front of the Evaporator

The restrictor creates a constriction. This restriction reduces the flow and creates high and low pressure sides in the refrigerant circuit. Before the restrictor the refrigerant which is under a higher pressure is warm. After the restrictor the refrigerant which is under a low pressure is cold. Before the restriction there is a strainer for contaminants and after the restriction there is a strainer, to atomize the refrigerant before it reaches the evaporator.



Note

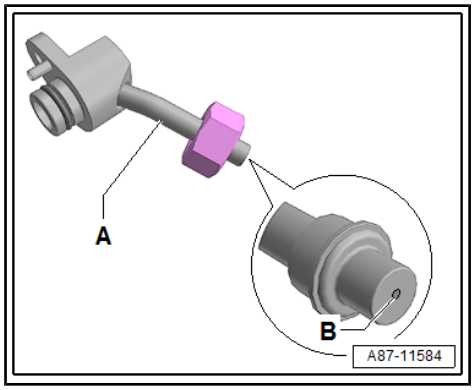
- *Arrow -A- on restrictor points to the evaporator.*
- *Replace after each opening of the circuit.*
- *There are different versions, therefore pay attention to the different customer service information sources. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). and (vehicle-specific repair manual) and to the Parts Catalog .*

Restrictor in Front of the High Voltage Battery Heat Exchanger (Chiller)

The restrictor creates a constriction. This restriction reduces the flow and creates high and low pressure sides in the refrigerant circuit. Before the restrictor the refrigerant which is under a higher pressure is warm. After the restrictor the refrigerant which is under a low pressure is cold.

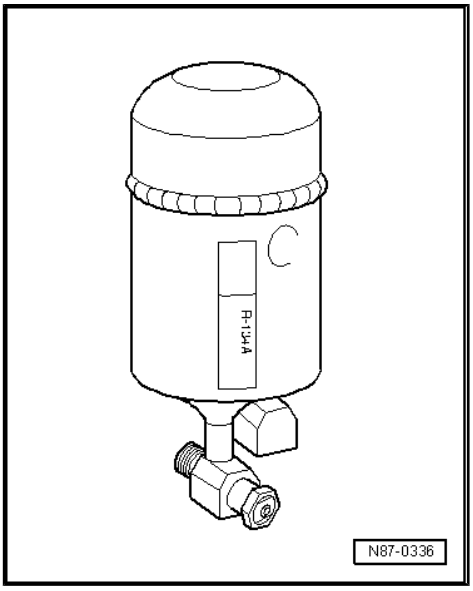
Note

- *The illustration shows a refrigerant line -A- with a fixed installed restrictor -B- (without a strainer)*
- *The diameter of the illustrated variable orifice -B- is approximately 0.7 mm. Depending on the version of the refrigerant line this constriction is either installed fixed in the refrigerant line or only inserted. For the inserted version a strainer for flowing deposits may be installed, which can be blocked by the variable orifice.*
- *Before installing check for debris and if necessary clean or replace.*
- *There are different versions, therefore pay attention to the different customer service information sources. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). and (vehicle-specific repair manual) and to the Parts Catalog.*



3.2.10 Receiver/Dryer

The receiver/dryer collects the fluid drops and then directs them in an uninterrupted stream to the expansion valve. Moisture which has entered the refrigerant circuit during repairs will be collected by the desiccant bag in the receiver/dryer.

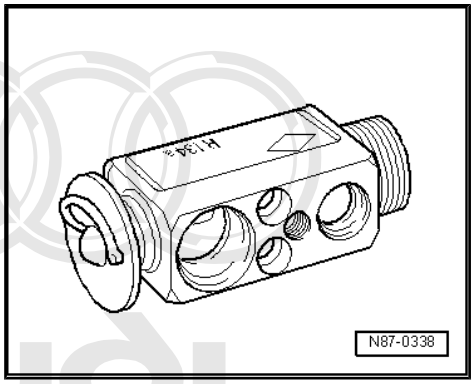


Note

- *Replace the receiver/dryer if refrigerant circuit has been open for a long time (beyond the normal repair time) and moisture has penetrated inside, or if required due to a specific complaint. Refer to*
  ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .
- *Only remove sealing plugs shortly before installation.*
- *A desiccant bag in an unsealed receiver/dryer becomes saturated with moisture after a short period of time and unusable.*
- *When installing, note arrow for direction of flow if necessary.*
- *Depending on the version of the refrigerant circuit, the receiver/dryer is also installed (integrated) either on the condenser or inside the condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (vehicle-specific repair manual) and the Parts Catalog.*
- *The procedure is different for each complaint depending on the version of the receiver/dryer and the dryer cartridge. If the receiver/dryer, for example, is attached to the condenser, then it can be replaced complete with the drying cartridge. If the receiver/dryer, for example, is inside the condenser, then the dryer cartridge, and any possible additional filters, can be replaced separately, on most versions. If the receiver/dryer is inside the condenser and there is absolutely no way to replace the reservoir or the dry cartridge individually, then the entire condenser must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 (vehicle-specific repair manual) and Parts Catalog.*
- *Depending on the construction of the refrigerant circuit, the receiver can also be secured onto the condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (vehicle-specific repair manual) and the Parts Catalog.*

3.2.11 Expansion Valve

The expansion valve atomizes the streaming refrigerant and controls the flow quantity so that the vapor is gaseous only at the evaporator outlet, depending on the heat transmission.



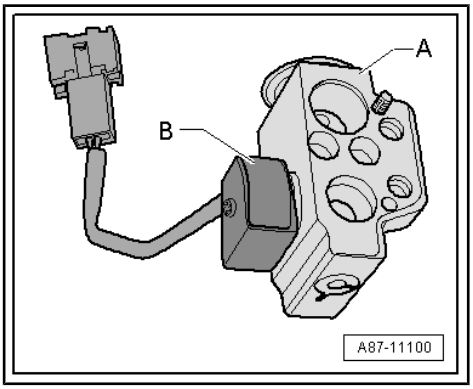
Note

- *Be sure to use the correct part number when replacing the expansion valve. Refer to the Parts Catalog.*
- *Different characteristic curves matched to the appropriate circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (vehicle-specific repair manual) and the Parts Catalog.*
- *Depending on the A/C compressor version, there may be a valve installed on the high pressure side of the A/C compressor, which prevents the liquid refrigerant from flowing back into the compressor once the A/C is turned off. If an A/C compressor with this valve is installed in a vehicle with a refrigerant circuit having an expansion valve, then it may take some time until the pressure in the high pressure side decreases (the expansion is cold and the pressure in the low pressure side quickly increases after it is turned off, the expansion valve closes and the refrigerant flows slowly into the low pressure side). If the A/C compressor is switched on, the pressure on the low pressure side goes down, the expansion valve open and the refrigerant can flow of the low pressure side.*

3.2.12 Expansion Valve with Shut-Off Valve

Note

There are different versions of the shut-off valve with different functions and with different names. The following illustrated Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- is for example installed on an Audi Q7 hybrid in the battery cooling module. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).



- The expansion valve -A- with the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- -B- atomizes the streaming refrigerant and regulates the refrigerant flow rate to the evaporator in the battery cooling module for the Hybrid Battery Unit - AX1- so that the vapor becomes gaseous only at the evaporator output, depending on the heat transmission.
- If the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- -B- is activated by the electronics and is open, it lets refrigerant flow through the expansion valve -A- to the evaporator in the battery cooling module.
- The expansion valve -A- with the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- -B- is installed on vehicles with a battery cooling module. It is activated when the A/C system is in operation, if it is necessary to cool the Hybrid Battery Unit - AX1- .
- If the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- -B- is activated by the electronics (for example, by the Battery Regulation Control Module - J840-), it is open and lets the refrigerant flow according to its control characteristic toward the evaporator in the battery cooling module.
- The Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- -B- attached to the expansion valve -A- is activated, for example, by the Battery Regulation Control Module - J840- . Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System and the Battery Regulation.
- If, for a vehicle with two evaporators (one in the A/C unit and one in the battery cooling module, for example on the Q5 Hybrid), the measured temperature on one of the evaporators corresponds to the specified value or the specified value falls short, but does not reach the required specified value on the other evaporator, the following adjustment is performed: the Battery Regulation Control Module - J840- activates the electric A/C compressor with increased speed (thereby increasing the A/C system cooling output and decreasing the pressure on the low pressure side as well as the evaporator temperature) via the Electric Drive Power and Control Electronics - JX1- and the A/C Compressor Control Module - J842- . If the specified value for the temperature falls short at one of the evaporators, the Battery Regulation Control Module - J840- activates the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , so that the evaporator which is too cold is no longer supplied with refrigerant. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System.

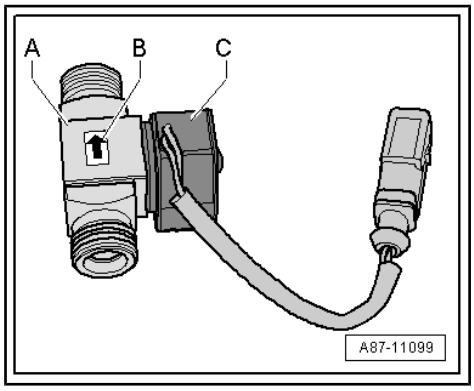
3.2.13 Refrigerant Cut-Off Valve

Note

- *There are different versions of the shut-off valve with different functions and with different names. The following illustrated Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- is for example installed on an Audi Q7 hybrid. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *There are various designations, depending on the function and the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Shut-Off Valve with Two Switching States (Open Or Closed)

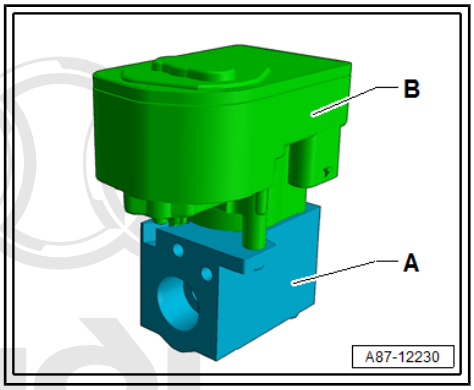
- Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- (for example the Audi Q5 Hybrid)
- Heater and A/C Unit Refrigerant Shut-Off Valve - N541- (for example on Audi A3 e-tron)
- High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- (for example on Audi A3 e-tron)
- Refrigerant Shut-Off Valve - V424- (for example on Audi Q7 e-tron)
- If the shut-off -A- is not activated by the electronics, it is open and lets the refrigerant flow through to the evaporator in the A/C unit.
- The shut-off valve -A- is installed on vehicles with the battery cooling module. It is activated in hybrid mode when no A/C system operation is desired for the passenger compartment or for the Hybrid Battery Unit - AX1- , but is necessary for battery cooling.
- Observe the arrow -B- attached to the shut-off valve -A-, which shows the flow direction of the refrigerant (from the condenser to the evaporator in the A/C unit)
- The solenoid coil -C- attached to the shut-off valve is activated for example from the Battery Regulation Control Module - J840- ⇒ Wiring diagrams, Troubleshooting & Component locations. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System and the Battery Regulation.
- On a vehicle with two evaporators (one in the A/C unit and one for example on the Audi Q5 Hybrid) in the battery cooling module, if the measured temperature on one of the evaporators corresponds to the target value or the target value falls short, but does not reach the required target value on the other evaporator, the following adjustment is performed: the relevant control module (for example the Battery Regulation Control Module - J840- on the Audi Q5 hybrid) activates the electric A/C compressor with increased speed (thereby increasing the A/C cooling output and decreasing the pressure on the low pressure side as well as the evaporator temperature) via the A/C Compressor Control Module - J842- . If the target value falls short for the temperature of one of the evaporators, the relevant control module (for example the Battery Regulation Control Module - J840- on the Audi Q5 Hybrid the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517-) activates so that the evaporator which is too cold is no longer supplied with refrigerant. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (for the specific vehicle).



Shut-Off Valve, which is Regulated via the Characteristic Curve

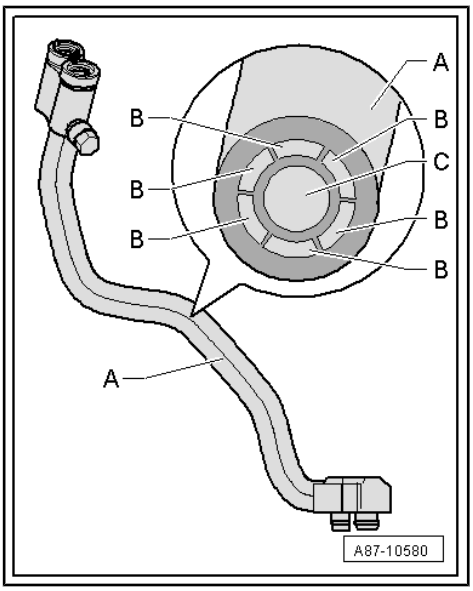
- Refrigerant Shut-Off Valve 2 - N640- through Refrigerant Shut-Off Valve 5 - N643- (for example on Audi Q7 e-tron)
- Refrigerant Expansion Valve 1 - N636- (for example on Audi Q7 e-tron)

- The shut-off valve -A- is activated via a step motor -B- from the respective control module via the characteristic curve (opened or closed).
- If the shut-off valve works as a regulator valve (for example on the Audi Q7 as Refrigerant Expansion Valve 1 - N636-) it is only open until the temperature for the heat exchanger is reached. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- Shut-off valves activated via the step motor do not have a specified resting position. For this reason before performing procedures on the refrigerant circuit it must be set to a specified position (open or closed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- Depending on the design of the refrigerant circuit multiple shut-off valves can be combined in one valve block (for example on the Audi Q7 e-tron). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- The step motor is adapted and activated via the data wires (LIN Bus) from the respective control module according to its component location. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.



3.2.14 Refrigerant Line with Inner Heat Exchanger

In this refrigerant line, the flowing fluid warm refrigerant on the high pressure side is delivered into the low pressure side as flowing, vapor, cold refrigerant to increase the efficiency of the A/C system.



Note

This illustration shows a refrigerant line with an inner heat exchanger that is installed in the Audi A4 from MY 2008 and on the Audi A5 Coupe from MY 2008. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (vehicle-specific repair manual).

A - Refrigerant line with inner heat exchanger

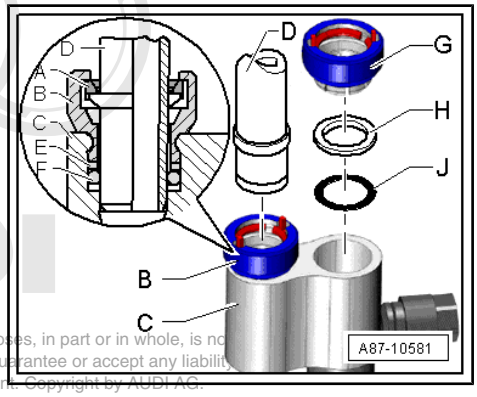
B - Channel inside the refrigerant line through with the warm fluid refrigerant flows to the evaporator (refrigerant circuit high pressure side)

C - Channel inside the refrigerant line in which the vapor of cold refrigerant flow to the A/C compressor (refrigerant circuit low pressure side)

3.2.15 Quick-Release Connections on Refrigerant Lines

WARNING

The quick-release coupling connectors may be unlocked and opened only if the refrigerant circuit is empty.



Note

- *This illustration shows the quick-coupling connection with a refrigerant line with an inner heat exchanger that is installed in the Audi A4 from MY 2008 and on the Audi A5 Coupe from MY 2008. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (vehicle-specific repair manual).*
- *The retaining ring -A- must be opened using, for example, the Air Conditioner Couplings Release Tool - T40149- in order to remove the refrigerant line -D-. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (vehicle-specific repair manual).*
- *The quick-release coupling connectors -B and G- are to be replaced after removing the refrigerant line with the respective support ring -E- or -H- and O-ring -F or J-. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (vehicle-specific repair manual) and the Parts Catalog).*

A - Retaining ring (inside the quick-release coupling connector, high pressure side)

B - Quick-release coupling connector with retaining ring “high pressure side”

C - Refrigerant line with an inner heat exchanger

D - Refrigerant line “high pressure side”

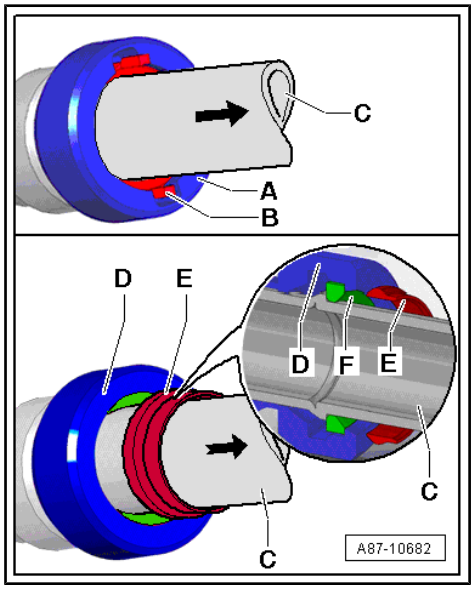
E - Support ring “high pressure side”

F - O-ring “high pressure side”

G - Quick-release coupling connector with retaining ring “low pressure side”

H - Support ring “low pressure side”

J - O-ring “low pressure side”



Note

- *There are different quick-release coupling versions -A and D-. The refrigerant lines -C-, for example, can unlocked and removed using the Air Conditioner Couplings Release Tool - T40149/1- in the same manner for both versions of the quick-release couplings.*
- *The check pins on the -B- quick-release couplings -A- installed at SOP are visible -C-, when the locked refrigerant line -C- is pulled in the direction of arrow.*
- *Beginning with MY 2010, as a running change, the quick-release coupling -D- and the refrigerant line -C- are being installed in the same manner as the quick-release coupling -A-. If the refrigerant line -C- is pulled in the direction of arrow after assembling, the ring -E- will come out of the quick-release coupling -D- installed and will show that the retaining ring -F- is completely latched to the refrigerant line -C-. Then the ring -E- can be removed from the refrigerant line -C-.*

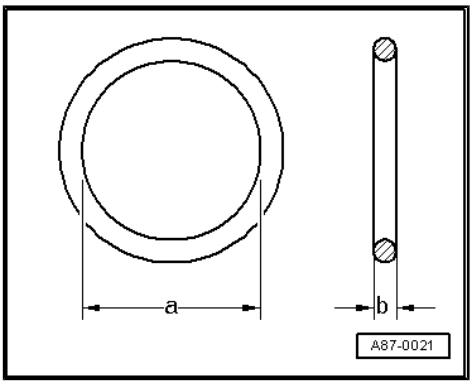
3.2.16 O-Ring Seals

These rings seal off the connection points between individual components of the refrigerant circuit.

Only O-rings that are resistant to refrigerant R134a and refrigerant oil must be installed. Make sure they are original replacement parts.

O-ring seals:

- Always use only once.
- Make sure diameters -a and b- are correct.
- Coat with refrigerant oil before installing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (vehicle-specific repair manual) and the Parts Catalog.



Note

The color coding of refrigerant circuit O-rings with R134a has been discontinued. Black and colored O-rings are used. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). (vehicle-specific repair manual).

3.2.17 Refrigerant Circuit Lines and Hoses

The mixture of refrigerant oil and refrigerant R134a corrodes certain metals (such as copper) and alloys and dissolves some hose materials. Therefore use original replacement parts only.

Lines and hoses are joined by threaded connections or special plug connectors.

Note

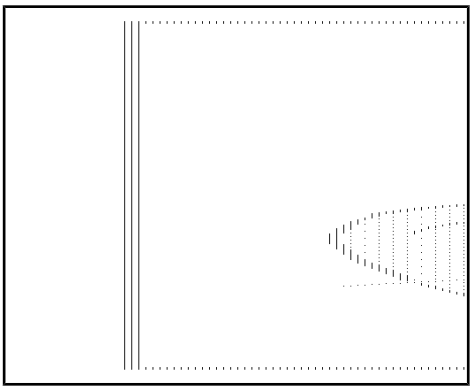
Observe specified torque for threaded connections, use appropriate release tools for plug connectors.

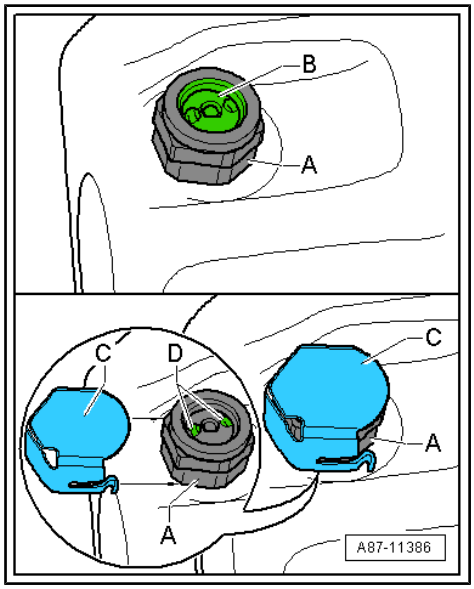
3.2.18 Pressure Relief Valve

The pressure relief valve is installed on the A/C compressor or receiver/dryer.

At a pressure of approximately 38 bar (551 psi) positive pressure, the valve opens and closes again once pressure has dissipated (approximately 30 bar (435 psi)).

Refrigerant does not escape completely.



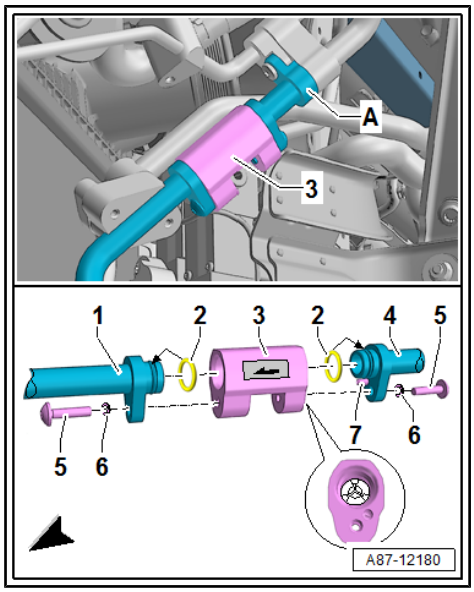


Note

- *Depending on the version, a transparent plastic washer -B- may be installed on the pressure relief valve -A-, which breaks off as soon as the valve is activated.*
- *Depending on the pressure relief valve version -A-, an additional cover -C- can be slid onto the pressure relief valve -A-. If the pressure in the refrigerant circuit does rise above the pressure relief valve -A- opening pressure and the pressure relief valve opens, the refrigerant does not escape in one direction, but rather it is distributed through the openings -D- under the cover -C-.*
- *If it is necessary to replace a pressure relief valve -A- pay attention to the tightening specification when installing (depending on the manufacturer of the A/C compressor and the version). On "Denso" (or "Nippondenso"), "Sanden" and "Zexel/Valeo" A/C compressors, an O-ring is installed (tightening specification currently 10 Nm on "Denso" and "Zexel/Valeo" as well as 15 Nm on "Sanden" A/C compressors). On a "Delphi" A/C compressor, for example, a seal is installed (tightening specification is currently 15 Nm).*
- *Replace the seals (seal or O-ring). Refer to the Parts Catalog.*
- *If the seals (seal or O-ring) that are installed on the pressure relief valve are not available as a replacement part, the removed seals may be used as an exception (check for damage before installing). If the removed seal is damaged or deformed if necessary replace with a commercially available component. Refer to the Parts Catalog.*
- *After charging the refrigerant circuit, check the installed pressure relief valve for leaks using an electronic leak detector, for example.*

3.2.19 Check Valves

The check valves disconnect in different areas of the refrigerant circuit.



Note

- *For example, the illustrated check valve -3- is installed on an Audi Q7 e-tron.*
- *The check valves in the refrigerant circuit in the flow direction have a specified residual pressure, approximately 0.1 bar or 100 mbar (1.5 psi). So that the refrigerant circuit can be completely evacuates (residual pressure less than 5 mbar (0.10 psi)) all electrically activated valves must be opened.*
- *Depending on the version the flow direction can be marked using a sticker.*

3.3 Refrigerant Circuit

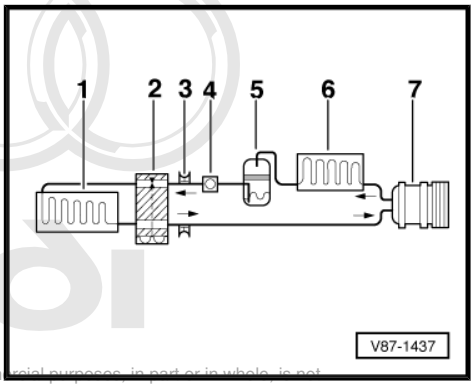
⇒ "3.3.1 Refrigerant Circuit with Expansion Valve and Evaporator", page 39

⇒ "3.3.2 Refrigerant Circuit with Restrictor and Reservoir", page 39

⇒ "3.4 Refrigerant Circuit with an Electrically Driven A/C Compressor (with and without Battery Cooling Module)", page 40

3.3.1 Refrigerant Circuit with Expansion Valve and Evaporator

The following illustration shows only the principle of a refrigerant circuit, the design of the refrigerant circuit in the respective vehicle can be found in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).



1 - Evaporator

2 - Expansion Valve

3 - Valve for extracting, filling and measuring

4 - Sight glass (not installed in R134a circuits)

5 - Receiver/dryer with dryer

6 - Condenser

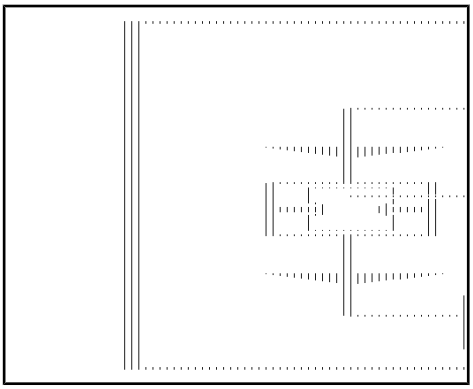
7 - A/C Compressor

Note

Arrows point in direction of refrigerant flow.

3.3.2 Refrigerant Circuit with Restrictor and Reservoir

The following illustration shows only the principle of a refrigerant circuit, the design of the refrigerant circuit in the respective vehicle can be found in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).



1 - A/C Compressor

2 - Condenser

3 - Restrictor

4 - Evaporator

5 - Reservoir

Note

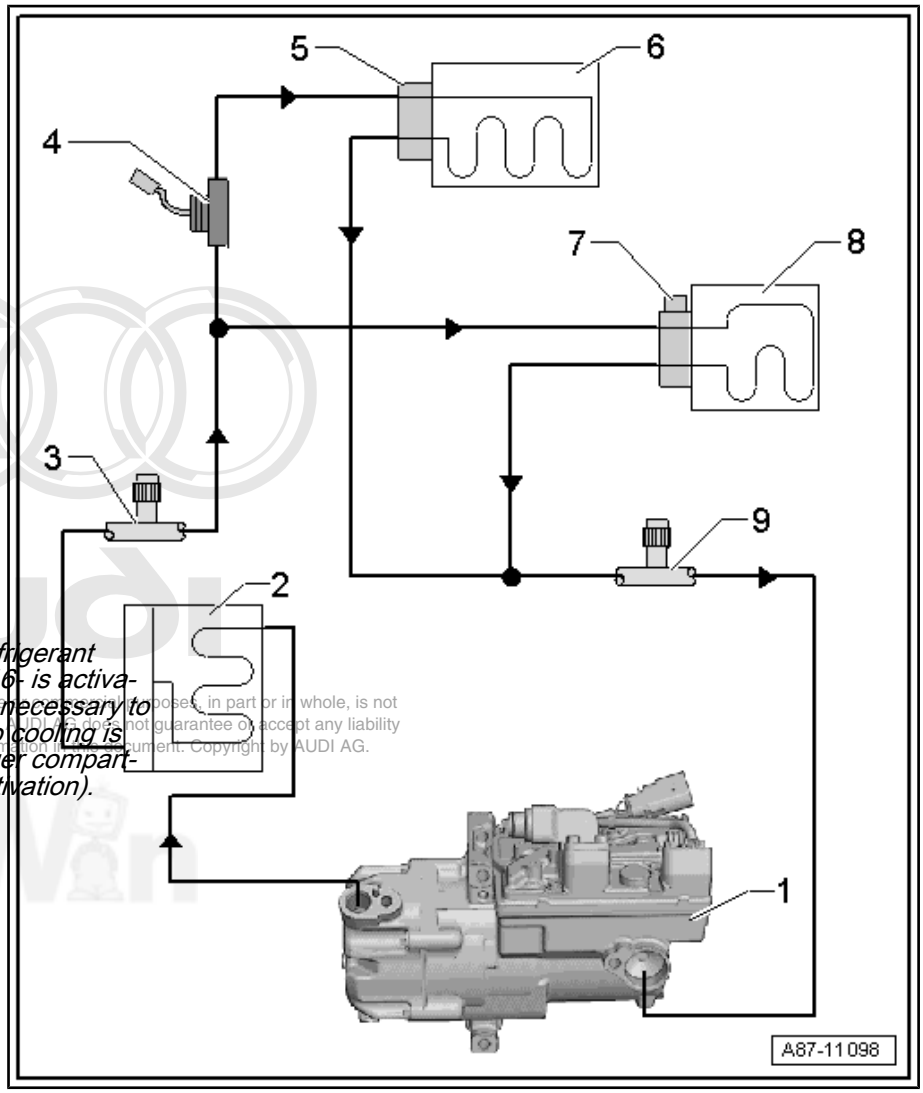
Arrows point in direction of refrigerant flow.

3.4 Refrigerant Circuit with an Electrically Driven A/C Compressor (with and without Battery Cooling Module)

Note

The following illustration shows a refrigerant circuit as an example, as it is installed in an Audi Q5 hybrid, for the design of the refrigerant circuit in the respective vehicle refer to the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

-Arrows- Point in Direction of Refrigerant Flow.



1 - Electrically-Driven A/C Compressor

- With A/C Compressor Control Module - J842- and Electrical A/C Compressor - V470-

2 - Condenser

- With receiver/dryer and dryer cartridge

3 - Service Connection, HP Side

4 - Hybrid Battery Refrigerant Shut-Off Valve 1 - N516-

- Only for vehicles with a battery cooling module for the Hybrid Battery Unit - AX1- .

Note

The Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- is activated, for example, if it is necessary to cool the battery and no cooling is desired in the passenger compartment (open without activation).

5 - Expansion Valve

- On the evaporator in the A/C system

6 - Evaporator

- Evaporator in the A/C System

7 - Expansion Valve with Hybrid Battery Refrigerant Shut-Off Valve 2 - N517-

- On the evaporator in the battery cooling module
- Only for vehicles with a battery cooling module for the Hybrid Battery Unit - AX1- .

Note

The Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- is activated if it is necessary to cool the battery (closed without activation).

8 - Evaporator

- ❑ Evaporator in the battery cooling module
- ❑ Only for vehicles with a battery cooling module for the Hybrid Battery Unit - AX1- .

9 - Service Connection, LP Side

3.5 Connections for Quick-Release Coupling on Refrigerant Circuit

⇒ "3.5.1 General Information", page 41

⇒ "3.5.2 Connections with Schrader Valve (Needle Valve)", page 42

⇒ "3.5.3 Connections with Primary Sealing Valve (Ball Valve)", page 42

⇒ "3.5.4 Service Connection Differences, Depending on Refrigerant (R134a or R1234yf)", page 45

3.5.1 General Information

- Only valves and connections that are resistant to refrigerant R134a and refrigerant oil must be installed.
- Different connections (outer diameter) for high pressure and low pressure side.
- Discharge the refrigerant circuit before removing valves or valve inserts.
- Always screw on sealing caps.

Allocation in the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

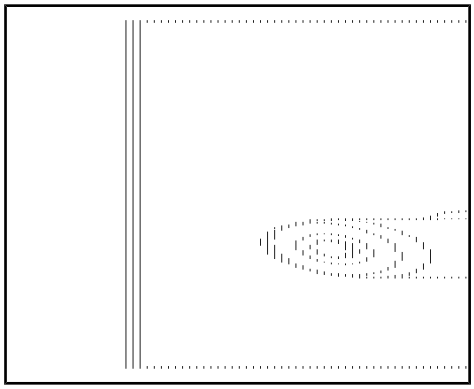
WARNING

There is a danger of ice-up.

Refrigerant will leak out if refrigerant circuit is not discharged.

Refrigerant must be extracted before opening refrigerant circuit. If refrigerant circuit is not opened within 10 minutes of extraction, pressure may form in refrigerant circuit due to evaporation. Extract the refrigerant once more.

3.5.2 Connections with Schrader Valve (Needle Valve)



- -A- Service connection (soldered in)
- -B- Valve insert (Schrader valve or needle valve)
- -C- O-ring (belonging to the valve)
- -D- Cap with seal

Note

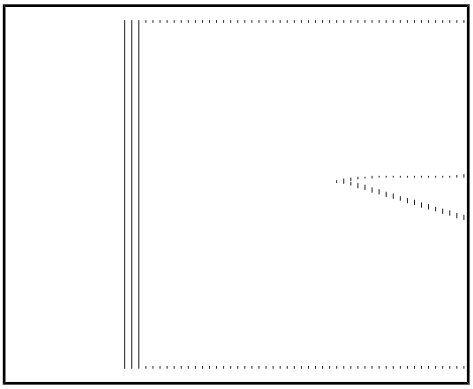
- *After connecting, install the hand wheel for the service coupling just far enough into the quick-release coupling adapter until the valve is securely opened inside the service connection (pay attention to the pressure gauge, do not put too much pressure on the valve).*
- *For removing and installing the valve set -B- when the refrigerant circuit is evacuated, for example, use an adapter from the Refrigerant Sockets - T10364- .*
- *Tighten the valve insert -B- very carefully because the tightening specification is very small.*
- *There are different versions of these valves and therefore there are different tightening specifications. Valve insert -B- with a VG5 (5.2 x 0.7 mm, tire valve) thread has a tightening specification of 0.4 Nm ± 0.1 Nm; a valve insert with a M6 x 0.75 mm thread has a tightening specification of 0.9 Nm ± 0.1 Nm, and a valve insert with a M8 x 1.0 mm thread has a tightening specification of 2.0 Nm ± 0.2 Nm.*
- *There are different versions of these valves, valve inserts and their respective sealing caps. Be sure to use the correct valve version and the correct sealing cap allocation. Refer to the Parts Catalog.*

3.5.3 Connections with Primary Sealing Valve (Ball Valve)

WARNING

Before unscrewing the connection, connect the service station and extract the refrigerant. Refrigerant circuit must be empty to avoid possible injury.

Connection with High-Pressure Valve



1 - Socket with internal thread (soldered in)

2 - O-ring (version and identification: black or colored. Refer to the Parts Catalog)

3 - Valve with an external thread and groove for the O-ring (identification: ball valve)

4 - Cap seal

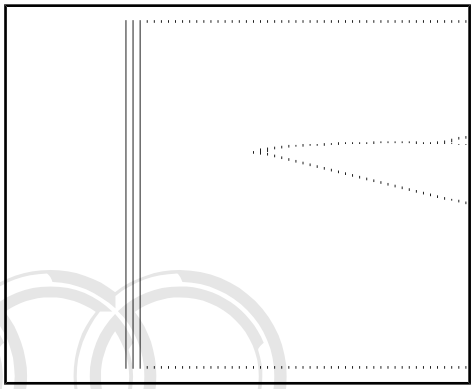
5 - Sealing cap

The service connection on the high pressure side depends on the vehicle, not all operating conditions of the A/C system are on high pressure (for example on the Audi Q7 e-tron). For this reason to check the A/C function in these vehicles the sensor installed in the refrigerant circuit must be used. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

Note

- *After connecting, install the hand wheel for the service coupling just far enough into the quick-release coupling adapter until the valve is securely opened inside the service connection (pay attention to the pressure gauge, do not put too much pressure on the valve).*
- *For removing and installing the valve -3- when the refrigerant circuit is evacuated, for example, use an adapter from the Refrigerant Sockets - T10364- .*
- *There are different versions of these valves (with internal or external threads). Therefore the tightening specifications can also differ. The valves -3- with an M12 x 1.5 mm external thread have a tightening specification of 9 Nm ±1 Nm.*
- *There are different versions of these valves and their respective caps. Be sure to use the correct valve version and the correct sealing cap allocation. Refer to the Parts Catalog.*

Connection with Low-Pressure Valve



1 - Socket with an external thread and groove for the O-ring (soldered in)

2 - O-ring (version and identification: black or colored. Refer to the Parts Catalog)

3 - Valve with an internal thread

4 - Cap seal

5 - Sealing cap

Note

- *Install the hand wheel for the service coupling just far enough into the quick-release coupling adapter until the valve is securely opened inside the service connection (pay attention to the pressure gauge, do not put too much pressure on the valve).*
- *For removing and installing the valve -3- when the refrigerant circuit is evacuated, for example, use an adapter from the Refrigerant Sockets - T10364- .*
- *There are different versions of these valves (with internal or external threads). Therefore the tightening specifications can also differ. The currently used valves -3- with an M10 x 1.25 mm internal thread have a tightening specification of 9 Nm ± 1 Nm.*
- *There are different versions of these valves and their respective caps. Be sure to use the correct valve version and the correct sealing cap allocation. Refer to the Parts Catalog.*

3.5.4 Service Connection Differences, Depending on Refrigerant (R134a or R1234yf)

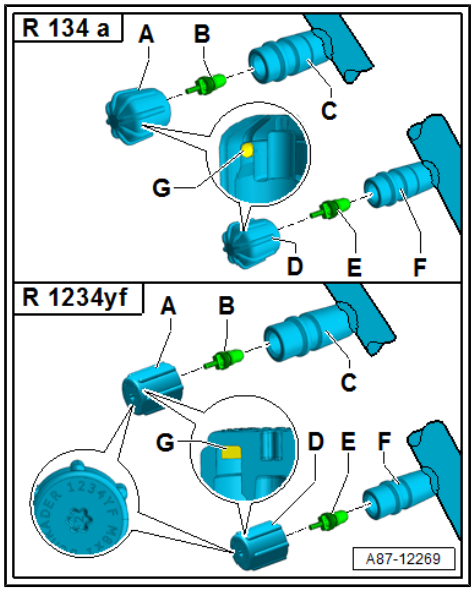
Note

- *Only use valves and connections that are resistant to the respective refrigerant (R134a and/or R1234yf) and the corresponding refrigerant oil. Refer to the Parts Catalog.*
- *The service connections on the refrigerant circuits are designed so that only the service couplings provided for the intended refrigerant (R134a or R1234yf) can be connected.*
- *These illustrations show service connections that have a Schrader valve (needle valve or push pin) installed in them. Depending on the vehicle version, the refrigerant, etc., service connections with a primary sealing valve (ball valve) may also be installed (other technology). Refer to ⇒ "3.5.3 Connections with Primary Sealing Valve (Ball Valve)", page 42 .*
- *Allocation in the vehicle and on refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Different connections (outer diameter) for high pressure and low pressure side.*
- *Discharge the refrigerant circuit before removing valves or valve inserts. Refer to ⇒ "5.3.4 Refrigerant Circuit, Discharging with A/C Service Station", page 77 .*
- *Valve, removing and installing at service connection on low and high pressure side. Refer to ⇒ "3.5.2 Connections with Schrader Valve (Needle Valve)", page 42 .*
- *Always install the closure caps with a seal.*

Service Connections (Refrigerant R134a and R1234yf)

WARNING

First connect the A/C service station and evacuate the refrigerant before removing the valves -B and E-. Refrigerant circuit must be empty to avoid possible injury. Refer to ⇒ "5.3.4 Refrigerant Circuit, Discharging with A/C Service Station", page 77 .



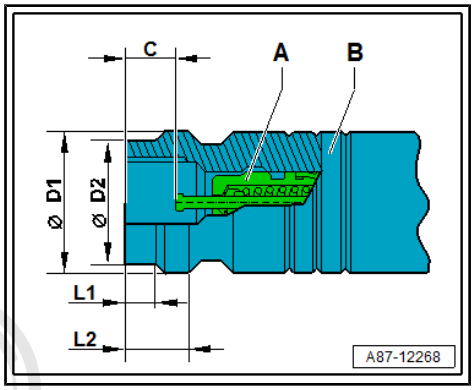
- High pressure side service connection closure cap -A- with seal -G-
- High pressure side valve insert (version: Schrader or needle valve) -B-
- High pressure side service connection -C-
- Low pressure side service connection closure cap -D- with seal -G-
- Low pressure side valve insert (version: Schrader or needle valve) -E-
- Low pressure side service connection -F-

Note

- *Depending on the manufacturer, there are different versions of the service connections -C and F- for refrigerant R134a and refrigerant R1234yf with different closure caps -A and D- and valves -B and E-. Pay attention to the correct allocation. Refer to the Parts Catalog .*
- *The closure caps -A and D- for the service connections on the R134a refrigerant circuit are currently black. The closure caps for the service connections on the R1234yf refrigerant circuit are currently gray. The type of refrigerant (such as "R1234yf") may also be imprinted on the closure caps.*
- *After connecting, carefully install the service coupling hand wheel just far enough into the quick-release coupling adapter until the valve -B and E- is securely opened in the service connection (pay attention to the pressure gauge, do not put too much pressure on the valve -B and E-).*
- *The service connections -C and F- on an R134a and R134yf refrigerant circuit are designed so that only certain service couplings can be connected for each of the refrigerants (different dimensions. Refer to ⇒ page 47).*
- *For example, the service connections -C and F- are soldered into a refrigerant line and therefore cannot be replaced separately.*
- *To remove and install the valves -B and E- (when the refrigerant circuit is discharged), use, for example, an adapter from the Refrigerant Sockets - T10364- .*
- *Due to the low tightening specification, only tighten the valves -B and E- carefully.*
- *There are different versions of these valves, which means there are different tightening specifications. Valve insert -C- with a VG5 (5.2 x 0.7 mm, tire valve) thread has a tightening specification of 0.4 Nm +- 0.1 Nm; a valve insert with a M6 x 0.75 mm thread has a tightening specification of 0.9 Nm +- 0.1 Nm and a valve insert with a M8 x 1.0 mm thread has a tightening specification of 2.0 Nm +- 0.2 Nm.*
- *There are different versions of these valve caps -A and D-, which means there are different tightening specifications. A valve cap with an M8 x 1mm or M10 x 1mm thread has a tightening specification of 0.4 Nm +- 0.1 Nm.*

Service Connection Dimensions

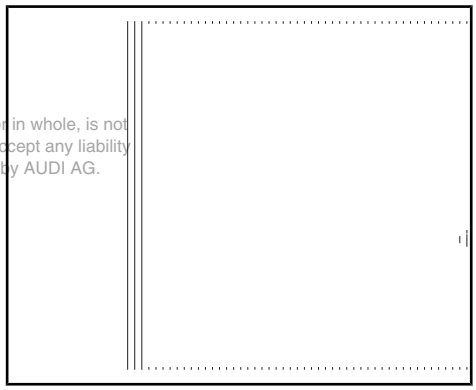
- Valve insert -A- (there are different versions. Refer to the Parts Catalog).
- Service connection -B- (depending on the refrigerant, there are different versions on the high and low pressure side)



Service Connection Dimensions -B-	Refrigerant R134a Service Connection		Refrigerant R1234yf Service Connection	
	High Pressure Side	**Low Pressure Side**	**High Pressure Side**	**Low Pressure Side**
Outer diameter -D1-	16.0 mm	13.0 mm	17.0 mm	14.0 mm
Outer diameter -D2-	14.0 mm	11.0 mm	13.0 mm	12.0 mm
Section -L1-	4.6 mm	6.15 mm	9.0 mm	4.75 mm
Section -L2-	8.16 mm	9.16 mm	12.5 mm	7.2 mm
Valve installation position (not actuated) -C-	6.1 - 7.1 mm	6.1 - 7.1 mm	8.3- 9.3 mm	8.3- 9.3 mm

3.6 Switches and Sensors on Refrigerant Circuit and Connections

3.6.1 A/C Refrigerant High Pressure Switch - F23-



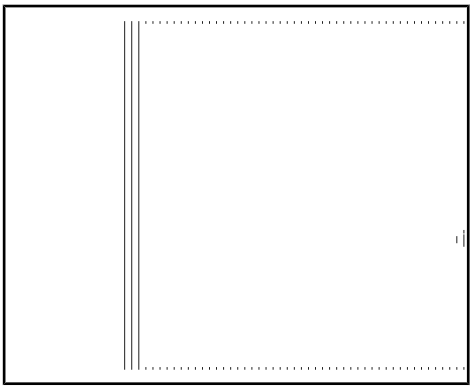
Note

Switch pressures, removing and installing switches as well as switch arrangement and version. Refer to vehicle specific refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Function:

Switches the coolant fan to the next higher level when the pressure in the refrigerant circuit increases (approximately 16 bar (232 psi)).

3.6.2 Magnetic Clutch High Pressure Switch - F118-



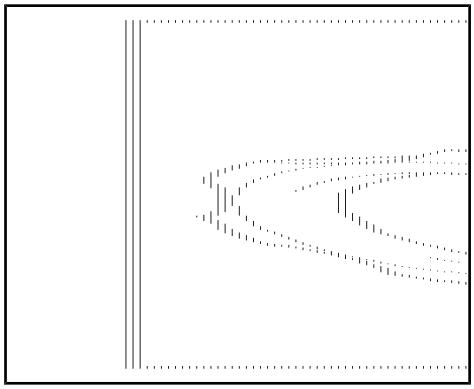
Note

Switch pressures, removing and installing switches as well as switch arrangement and version. Refer to vehicle specific refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Function:

Switches off A/C compressor when there is excessive pressure in the refrigerant circuit (approximately 32 bar (464 psi)).

3.6.3 A/C Refrigerant Low Pressure Switch - F73-



Note

Switch pressures, removing and installing switches as well as switch arrangement and version. Refer to vehicle specific refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

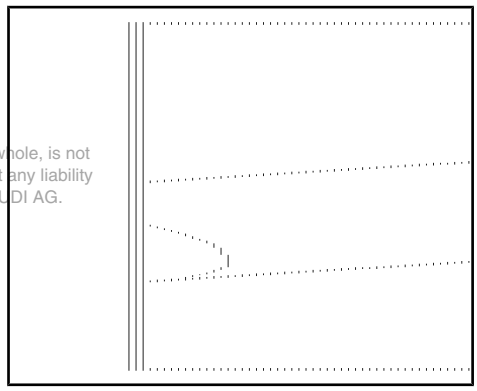
Function:

Switches off A/C compressor when there is excessive pressure in the refrigerant circuit (approximately 2 bar (29 psi)).

3.6.4 Refrigerant Circuit Connections with Valve for Switches

Note

Switch pressures, removing and installing switches as well as switch arrangement and version. Refer to vehicle specific refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).



- Different threads for switch on high pressure and low pressure sides.
- Only valves and O-ring seals that are resistant to refrigerant R134a and refrigerant oil must be installed.

A - Connection (soldered in)

B - O-ring seal

C - Valve (with O-ring seal)

Note

To remove and install the valve insert -C- when the refrigerant circuit is discharged, use, for example, an adapter from the Refrigerant Sockets - T10364- (for the tightening specification. Refer to ⇒ "3.5.2 Connections with Schrader Valve (Needle Valve)", page 42).

3.6.5 A/C Pressure Switch - F129-

Note

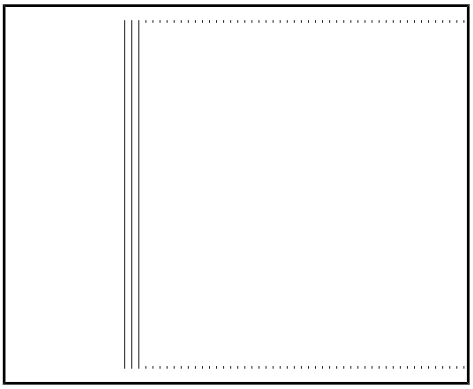
Switch pressures, removing and installing switches as well as switch arrangement and version. Refer to vehicle specific refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

This pressure switch has 3 functions:

1. Switches the coolant fan to the next higher level when the pressure in the refrigerant circuit increases (approximately 16 bar (232 psi)).

2. Switches off A/C system if pressure is excessive (approximately 32 bar (464 psi)), for example because of insufficient engine cooling.

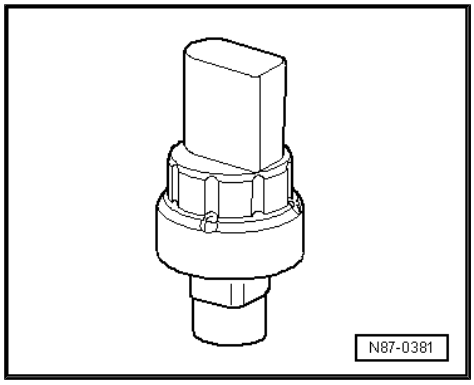
3. Switches off A/C system if pressure is insufficient (approximately 2 bar (29 psi)), for example loss of refrigerant.



Note

A/C Pressure Switch - F129- replaces the A/C Refrigerant High Pressure Switch - F23- , A/C Refrigerant Low Pressure Switch - F73- and the Magnetic Clutch High Pressure Switch - F118- .

3.6.6 High Pressure Sensor - G65- , Refrigerant Circuit Pressure Sensor - G805-



- This High Pressure Sensor - G65- is installed instead of the A/C Pressure Switch - F129- or the A/C Pressure/Temperature Sensor - G395- .
- The Refrigerant Circuit Pressure Sensor - G805- replaces the High Pressure Sensor - G65- on specific vehicles from a specific version and from a specific date of manufacture.
- When a voltage is applied, a version of the High Pressure Sensor - G65- generates a square wave signal and the others a data telegram. This signal changes along with pressure in the system. When voltage is applied, the other versions and the Refrigerant Circuit Pressure Sensor - G805- exchange information with the Data Bus (i.e. via the “LIN-Bus”) with the corresponding control module. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- On Audi A3 from MY 2005 and Audi Q3. a High Pressure Sensor - G65- is installed, for example, which emits its measured values to the corresponding control module (for example to the A/C Control Module - J301- or the Climatronic Control Module - J255-). On Audi Q7 from MY 2016, a High Pressure Sensor - G65- is installed, for example, which sends its measured values via a “LIN Bus”. Use the Vehicle Diagnostic Tester (“OBD” function or A/C system “Guided Fault Finding”) and ⇒ Wiring diagrams, Troubleshooting & Component locations.
- The Refrigerant Circuit Pressure Sensor - G805- is installed on the Audi A3 from MY 2013, for example. It exchanges information with the corresponding control module (on Audi A3, the A/C Control Module - J301- or the Climatronic Control Module - J255-) via a Data Bus cable. Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations
- The A/C Pressure/Temperature Sensor - G395- , the Refrigerant Circuit Pressure Sensor - G805- and the High Pressure Sensor - G65- are available in different versions. Currently the sensor's only exterior difference is the parts number. Therefore, make sure that the part numbers are correctly allocated when replacing them (part number Parts Catalog). Reason: These sensors produce different signals that can only be evaluated by the respective control modules using the Vehicle Diagnostic Tester (function “OBD” or “Guided Fault Finding” for the A/C system). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- The High Pressure Sensor - G65- and the Refrigerant Circuit Pressure Sensor - G805- only transmits the measured value for the refrigerant circuit pressure to the connected control module. The A/C Pressure/Temperature Sensor - G395- transmits the measured value for the refrigerant circuit pressure and the measured temperature to the connected control module. Even though only the pressure signal is evaluated on a vehicle, an A/C Pressure/Temperature Sensor - G395- is not and must not be installed on a vehicle for which a High Pressure Sensor - G65- or a Refrigerant Circuit Pressure Sensor - G805- is designed. Refer to Parts Catalog.

- The downstream control modules (Radiator Fan Control Module, Engine Control Module, Front A/C Display Control Head - E87- or Climatronic Control Module - J255- , etc.) use this signal to calculate the refrigerant circuit pressure and activate the radiator fans, the motor, and the A/C Clutch - N25- if necessary, or to change the activation of the A/C Compressor Regulator Valve - N280- . Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding” function). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

3.6.7 A/C Pressure/Temperature Sensor

There are different versions of this sensor with different functions and with different names. For exact name, allocation and notes doe the respective function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

WARNING

There is a risk of freezing.

Refrigerant may leak out if refrigerant circuit is not discharged.

There are different versions of this sensor (sensor for a connection to the refrigerant circuit with or without the valves). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

- *Before loosening the threaded connection of the sensor check the version. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*
- *On a sensor for the connection on the refrigerant circuit without a valve. The refrigerant must be extracted before loosening the threaded connection. If sensor is not removed within 10 minutes after extraction, pressure may build up in refrigerant circuit by renewed evaporation. Extract the refrigerant again.*

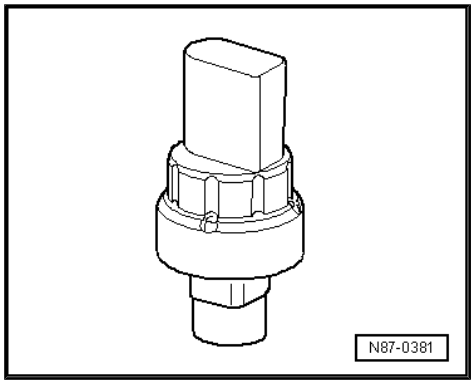
Sensor for a Connection with the Valve on the Refrigerant Circuit

Note

- *There are different versions of this sensor with different functions and with different names. The following illustrated A/C Pressure/Temperature Sensor - G395- is for example installed on an Audi A4, Audi Q5, and Audi Q5 hybrid. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*
- *There are various designations, depending on the function and the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*

Possible names for this sensor

- A/C Pressure/Temperature Sensor - G395- (for example on Audi Q5 hybrid)
- High Pressure Sensor - G65- (for example on Audi A4)
- Refrigerant Circuit Pressure Sensor - G805- (for example on Audi A3 e-tron)



Note

The Refrigerant Circuit Pressure Sensor - G805- is installed instead of for example the High Pressure Sensor - G65- or the A/C Pressure/Temperature Sensor - G395- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .

- The A/C Pressure/Temperature Sensor - G395- , the Refrigerant Circuit Pressure Sensor - G805- and the High Pressure Sensor - G65- are available in different versions. Currently the sensor's only exterior difference is the parts number. Therefore, make sure that the part numbers are correctly allocated when replacing them (part number from the Parts Catalog). Reason: These sensors produce different signals that can only be evaluated by the respective control modules using the Vehicle Diagnostic Tester (function “OBD” or “Guided Fault Finding” for the A/C system). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- When voltage is applied, the A/C Pressure/Temperature Sensor - G395- (and the Refrigerant Circuit Pressure Sensor - G805- exchange information via the Data Bus (for example via the “LIN-Bus”) with the corresponding control module. The relevant control module uses this information to calculate the pressure (and temperature) in the refrigerant circuit and any faults detected are signaled to the control module.
- The A/C Pressure/Temperature Sensor - G395- transmits the measured value for the refrigerant circuit pressure and the measured temperature to the connected control module. The Refrigerant Circuit Pressure Sensor - G805- only transmits the measured value for the refrigerant circuit pressure to the connected control module. Even if only the pressure signal is evaluated on most vehicles, no Refrigerant Circuit Pressure Sensor - G805- is or will be installed in a vehicle in which a A/C Pressure/Temperature Sensor - G395- is designed. Refer to the Parts Catalog.
- The temperature measured by the A/C Pressure/Temperature Sensor - G395- differs from the actual refrigerant temperature in the refrigerant circuit because of the A/C Pressure/Temperature Sensor - G395- design and its component location. Because of this, it is not currently evaluated and is not used to regulate the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- This information is used for example by the Climatronic Control Module - J255- control head or the Vehicle Electrical System Control Module - J519- to calculate the pressure in the refrigerant circuit and to actuate the downstream control modules (radiator fan control module, Engine Control Module etc.) via the Data Bus system. These control modules then actuate, for example, the A/C Clutch - N25- , the radiator fan and the motor. Use the Vehicle Diagnostic Tester (function “OBD” or “Guided Fault Finding” and, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

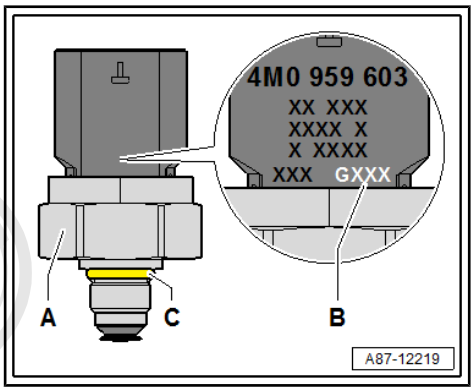
Sensor for a Connection without the Valve on the Refrigerant Circuit

Note

- *There are different versions of this sensor with different functions and with different names. The following illustrated A/C Pressure/Temperature Sensor - G395- is for example installed on an Audi Q7 e-tron. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*
- *There are various designations, depending on the function and the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*

Possible names for this sensor

- A/C Pressure/Temperature Sensor - G395- (for example on Audi Q7 e-tron)
- A/C Pressure/Temperature Sensor 2 - G826- (for example on Audi Q7 e-tron)
- A/C Pressure/Temperature Sensor 3 - G827- (for example on Audi Q7 e-tron)



There are different versions of this sensor -A-, currently the sensor's only exterior difference is the part number or if the part number is the same the imprinted designation -B-. For this reason pay attention to the correct allocation (part number and designation). Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

This sensor exchanges the information with the respective control module via the Data Bus (for example via the “LIN Bus”) when creating tension. The relevant control module uses this information to calculate the pressure (and temperature) in the refrigerant circuit and any faults detected are signaled to the control module. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

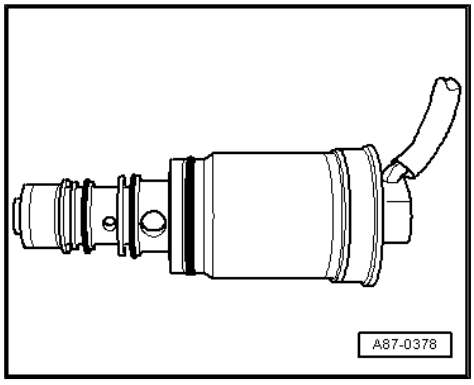
With this information the respective control module calculates the refrigerant circuit pressure and activates the downstream control module or components (radiator fan control module, pumps, valves etc.) via the Data Bus according to the specifications. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

3.6.8 A/C Compressor Regulator Valve - N280-

Note

Switch pressures, removing and installing switches as well as switch arrangement and version. Refer to vehicle specific refrigerant circuit ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Heating, Ventilation and Air Conditioning; System Overview - Refrigerant Circuit (vehicle-specific repair manual).

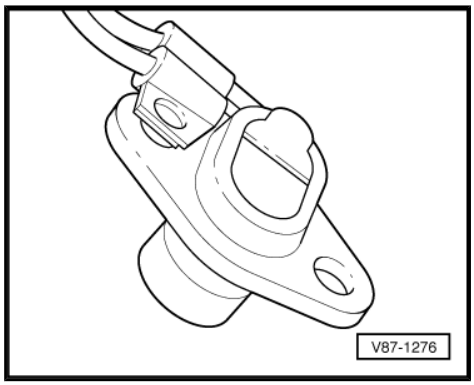
The regulator valve is implemented into the compressor. It is controlled by the Front A/C Display Control Head - E87- , the A/C control Module - J301- or the Climatronic Control Module - J255- (depending on the vehicle, possibly via the Data Bus of the an additional control module). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). Pressure on the low pressure side is influenced via the regulator valve and thus regulates the temperature in the evaporator.



Note

The A/C Compressor Regulator Valve - N280- is a component of the A/C compressor and cannot be replaced separately on all A/C compressors. Refer to the Parts Catalog and
⇒ "9.1.9 A/C Compressor Regulator Valve N280 , Removing and Installing", page 293 .

3.6.9 A/C Compressor - G111-



Note

Switch pressures, removing and installing switches as well as switch arrangement and version. Refer to vehicle specific refrigerant circuit ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Inductive sensor

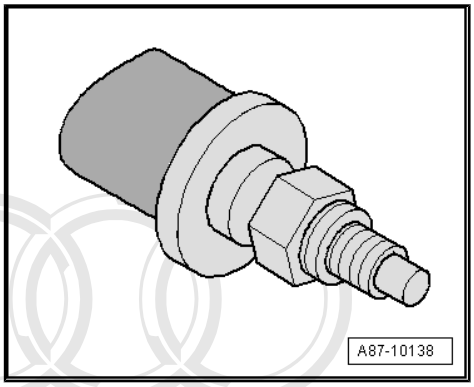
The sensor pulses (4 per compressor revolution) and the engine speed enable the Front A/C Display Control Head - E87- or the Climatronic Control Module - J255- to calculate belt slip.

If the belt slip exceeds a specified value, the compressor is switched off by the control module via the A/C clutch.

Note

- *Installed in Audi vehicles with an A/C compressor driven the a ribbed belt and with Zexel compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

3.6.10 Refrigerant Temperature Sensor - G454-



The refrigerant temperature sensor (with temperature-dependent resistance) is installed in the high pressure line near the A/C compressor, for example (only for certain vehicles that were built within a certain time frame, for example Audi Q7 from MY 2007).

In the refrigerant circuit, there is a direct correlation between temperature and pressure. Should there be too little refrigerant in the refrigerant circuit, the temperature in the refrigerant circuit rises more strongly than intended for this pressure when A/C system is operating.

Note

Switch pressures, removing and installing switches as well as switch arrangement and version. Refer to vehicle specific refrigerant circuit ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

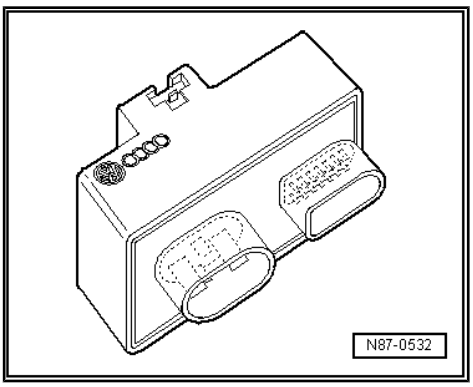
Note

- *Installed for example on the Audi Q7 with specific engines. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Wiring diagrams, Troubleshooting & Component locations.*
- *The Climatronic Control Module - J255- evaluates pressure and temperature in the refrigerant circuit and switches off the compressor in the event the temperature increases above the value stored for this pressure. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and Vehicle Diagnostic Tester ("OBD" or "Guided Fault Finding for the A/C system").*

3.7 Electrical Components not on Refrigerant Circuit

⇒ "3.7.1 Coolant Fan Control Module J293 ", page 57

3.7.1 Coolant Fan Control Module - J293-



This control module switches on and off the A/C clutch and therefore the A/C compressor. It turns on the radiator fan and calculates the refrigerant circuit pressure in vehicles with a High Pressure Sensor - G65- . Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

3.8 Refrigerant Circuit Pressures and Temperatures

3.8.1 General Information

Caution

- *When performing work on refrigerant circuit, observe all generally applicable safety precautions and pressure container regulations.*

The pressures and temperatures in the refrigerant circuit depend on the current operating conditions (such as engine RPM, coolant fan level 1, 2 or 3, engine temperature, A/C compressor on or off) as well as on the effects of outside influences (such as outside temperature, humidity, desired cooling output).

In vehicles with A/C Compressor Regulator Valve - N280- , the pressure is modified on the low pressure side by the -N280- .

On vehicles with an Electrical A/C Compressor - V470- the refrigerant circuit pressure (high and low-pressure sides) is regulated via the A/C compressor speed sensor.

On vehicles with an Electrical A/C Compressor - V470- on which the A/C system does not only cool the vehicle interior but also cools the components of the high-voltage system and is used as a heat pump to heat the vehicle interior, other conditions, pressures and temperatures in the refrigerant circuit apply (for example in the Audi Q7 e-tron). Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

For this reason, values indicated in the following table are valid only as reference points. They are attained at an engine speed of 1500 to 2000 RPM and an ambient temperature of 20 °C (68 °F) after approximately 20 minutes.

The connections for the pressure gauge set intended for the pressure measurement are indicated on the vehicle specific refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit or (vehicle-specific repair manual).

At 20 °C (68 °F) with the engine not running, the pressure in the refrigerant circuit is 4.7 bar (68 psi). Refer to ⇒ “2.3.3 Refrigerant R134a Vapor Pressure Table”, page 7 (vapor pressure table).

Note

Pressure is measured in different units: 1 MPa (145 psi) corresponds to 10 bar (145 psi) positive pressure. 1 bar (14.5 psi) absolute pressure corresponds to 0 bar/psi positive pressure and thus to the ambient pressure (atmospheric pressure).

3.8.2 Refrigerant Circuit with Expansion Valve

Note

Applies to vehicles with an Electrical A/C Compressor - V470- only with restrictions.

HP- High pressure side of refrigerant circuit.

LP- Low pressure side of refrigerant circuit.

Component	Aggregate State of Refrigerant	Pressure (positive pressure)	Temperature
-1- Evaporator, from input to output	Vapor	approximately 1.2 bar (17 psi)[1)]1	approximately -7 °C (-19.4 °F)[2)]2
-2- Expansion valve	Fluid, released as vapor	approximately 14 bar (203 psi)	approximately 55 °C (131 °F) HP- side, reduces to -7 °C (-19.4 °F) LP-side
-3- High pressure switch/ high pressure sensor	Fluid	approximately 14 bar (203 psi)	approximately 55 °C (131 °F)
-4- HP-side service connection and -5- Receiver/dryer	Fluid	approximately 14 bar (203 psi)	approximately 55 °C (131 °F)
-6- Condenser	From gas (at input) via vapor to fluid (at outlet)	approximately 14 bar (203 psi)	From approximately 65 °C (149 °F) at input to approximately 55 °C (131 °F) at outlet
-7- Pressure relief valve and -8- A/C compressor, HP-side	Gas	approximately 14 bar (203 psi)	approximately 65 °C (149 °F)
-9- A/C compressor low pressure side	Gas	approximately 1.2 bar (17 psi)[1)]1	approximately -1 °C (30 °F)[2)]2
-10- Pre-volume (not present in all vehicles) and -11- LP-side service connection	Gas	approximately 1.2 bar (17 psi)[1)]1	approximately -1 °C (30 °F)[2)]2

1) 1- Pressure in refrigerant circuits is maintained at approximately 2 bar (29 psi) absolute pressure (corresponds to approximately 1 bar (14.5 psi) positive pressure), regulated by A/C compressor, even though heat transfer changes and engine speeds vary. However, this applies only within the performance range of the A/C compressor; if the performance limits of the A/C compressor are exceeded, the pressure increases. Refer to ⇒ “8 Pressures, Checking”, page 195 .

2) 2 - Within the control range of the A/C compressor, temperature in the refrigerant circuits is maintained, regulated by A/C compressor, even though heat transfer changes and engine speeds vary. However, this applies only within the performance range of the A/C compressor; if the performance limits of the A/C compressor are exceeded, the temperature increases
⇒ “8 Pressures, Checking”, page 195 .

Note

- *A/C compressors which do not regulate their performance are switched off by the respective control module via the A/C Compressor Regulator Valve - N280- at an evaporator temperature below 0 °C (32 °F).*
- *In vehicles with A/C Compressor Regulator Valve - N280- , the pressure is modified on the low pressure side by the valve.*
- *Temperature and pressure in the refrigerant circuit in vehicles with two evaporators and two expansion valves correspond to those in vehicles with only one evaporator and one expansion valve (parallel switching).*
- *Depending on the version of the refrigerant circuit, a component with an inner heat exchanger may be installed (for example, on the Audi A4 from MY 2008 and on the Audi A5 Coupe from MY 2008, a refrigerant line with an inner heat exchanger). Inside the inner heat exchanger, the flowing fluid warm refrigerant on the high pressure side is delivered into the low pressure side as flowing, vapor, cold refrigerant to increase the efficiency of the A/C system. Refer to* ⇒ *"3.2.14 Refrigerant Line with Inner Heat Exchanger", page 35* .

Arrows point in direction of refrigerant flow.

HP- High pressure side of refrigerant circuit.

LP- Low pressure side of refrigerant circuit.

1 - Evaporator

2 - Expansion Valve

3 - High Pressure Switch/High Pressure Sensor

- ❑ Different versions depending on vehicle

4 - Service Connection, HP Side

5 - Receiver/Dryer

- ❑ Different versions depending on vehicle

6 - Condenser

7 - Pressure Relief Valve

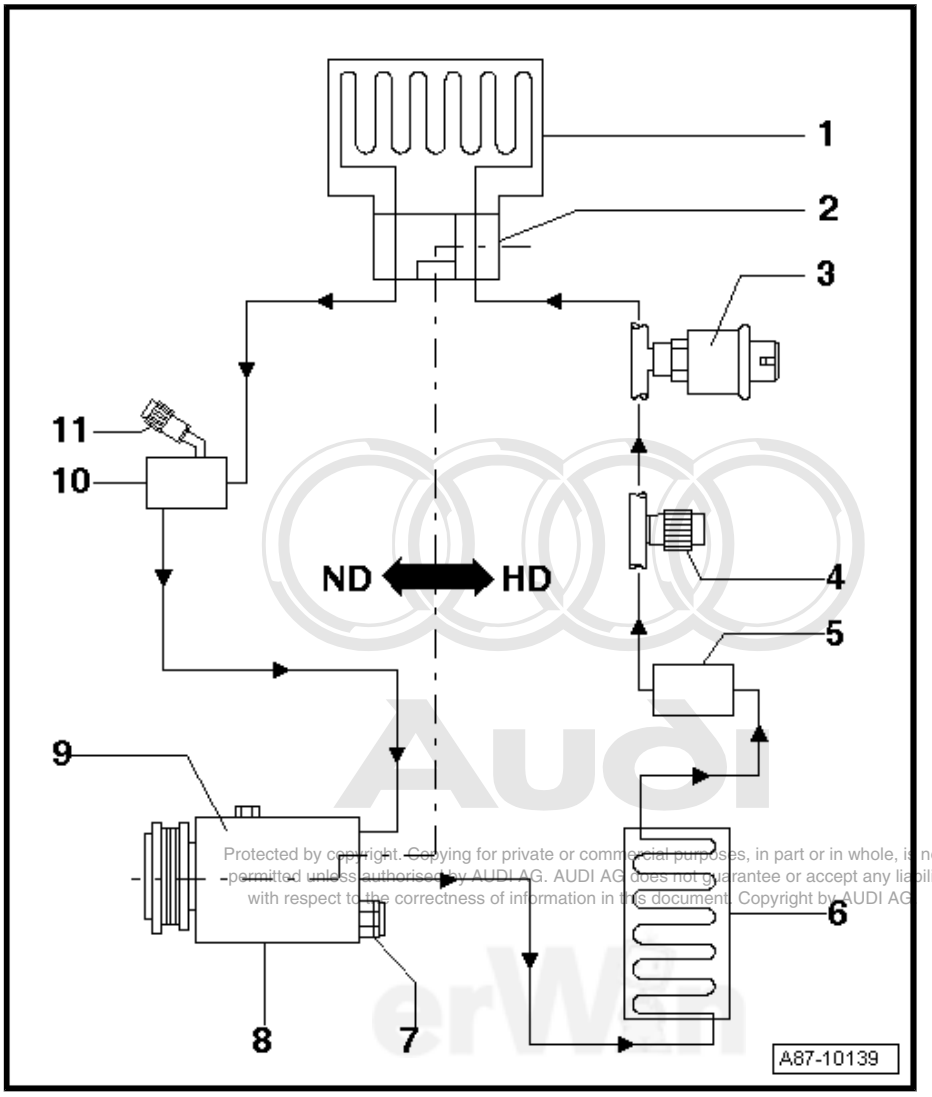
8 - A/C Compressor, HP side

9 - A/C Compressor, LP side

10 - Pre-Volumes

- ❑ Not present on all vehicles

11 - Service Connection, LP Side



3.8.3 Refrigerant Circuit with Restrictor and Reservoir

HP- High pressure side of refrigerant circuit.

LP- Low pressure side of refrigerant circuit.

Component	Aggregate State of Refrigerant	Pressure (positive pressure)	Temperature
-1- A/C compressor, HP side	Gas	up to 20 bar (290 psi)	up to 70 °C (158 °F)
-2- Condenser	From gas to vapor to fluid	up to 20 bar (290 psi)	up to 70 °C (158 °F)
-3- Restrictor	From fluid to vapor	HP side up to 20 bar (290 psi) LP side greater than 1.0 bar (14.5 psi)	HP side up to + 60 °C (140 °F) LP side warmer than -4 °C (25 °F)
-4- Evaporator	From vapor to gas	greater than 1.0 bar (14.5 psi)	Warmer than -4 °C (25 °F)
-5- Reservoir	Gas		
-6- A/C compressor low pressure side	Gas		

Pressures on A-side are maintained at approximately 2 bar (29 psi) absolute pressure (corresponds to approximately 1 bar (14.5 psi) positive pressure) by “regulating” A/C compressor also at

various engine speeds. However, this applies only within the performance range of the A/C compressor; if the performance limits of the A/C compressor are exceeded. Refer to
⇒ “8 Pressures, Checking”, page 195 .

Note

In vehicles with A/C Compressor Regulator Valve - N280- , the pressure is modified on the low pressure side by the valve.

Arrows point in direction of refrigerant flow.

HP- High pressure side of refrigerant circuit.

LP- Low pressure side of refrigerant circuit.

1 - A/C Compressor, HP Side

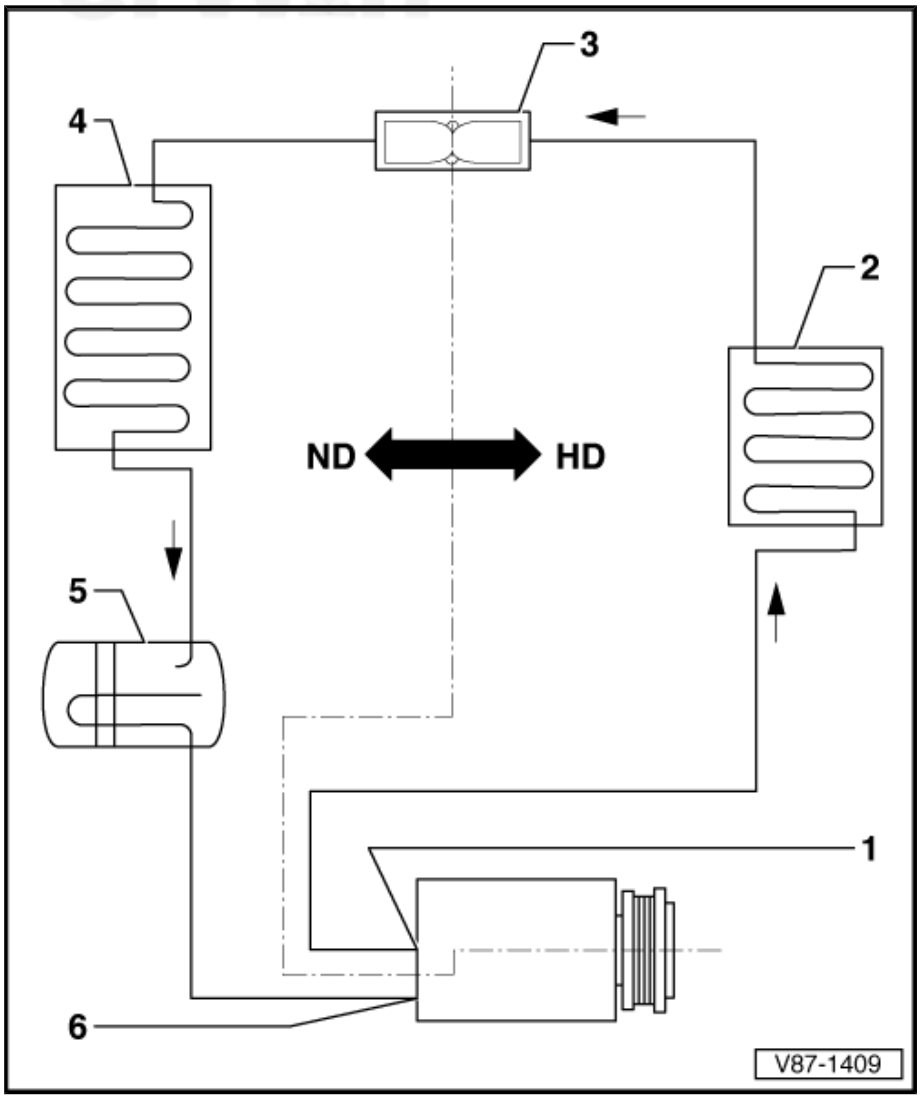
2 - Condenser

3 - Restrictor

4 - Evaporator

5 - Reservoir

6 - A/C Compressor, LP Side

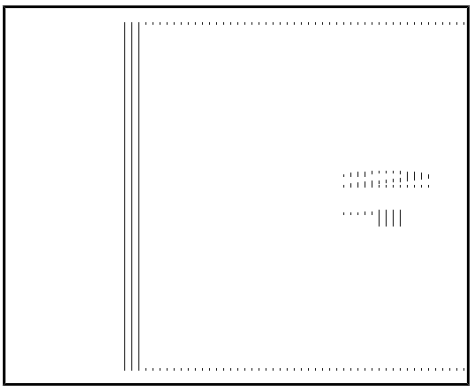


3.9 Pressure Gauge, Tests and Measurements

⇒ “3.9.1 General Information”, page 63

⇒ “3.9.2 Pressure Gauge Uses”, page 63

3.9.1 General Information



Indicators on pressure gauge

1 - Temperature scale for refrigerant R134a CF3–CH2F or CH2F–CF3.

2 - Pressure scale

Note

Pressure is measured in different units: 1 MPa (145 psi) corresponds to 10 bar (145 psi) positive pressure. 1 bar (14.5 psi) absolute pressure corresponds to 0 bar/psi positive pressure and thus to the ambient pressure (atmospheric pressure).

The pressure gauge may have one or more temperature scales next to the pressure scale. The R134a scale values are allocated respectively in the vapor pressure table. Since various refrigerants create different vapor pressures at the same temperature, each temperature scale is identified for the respective refrigerant.

3.9.2 Pressure Gauge Uses

Pressure and Temperature Measurement at Refrigerant Circuit

- High pressure gauge measures pressure and temperature, which expand uniformly from outlet of A/C compressor via the condenser up to constriction (restrictor, or expansion valve) with A/C system switched on.
- Low pressure gauge measures pressure and temperature, which expand uniformly from constriction (restrictor, or expansion valve) via evaporator up to input of A/C compressor with A/C system switched on.

Note

The relationship between pressure and temperature indicated on the gauges only exists in a refrigerant circuit that contains liquid or vapor, but not gas. In a gaseous state, the temperature is approximately 10 °C to 30 °C (50 °F to 86 °F) higher than indicated on the gauge.

Verification of Refrigerant in a Closed Container

Refrigerant R134a is present in a closed container or in a refrigerant circuit when temperature indicator on the pressure gauge matches the refrigerant temperature (standing fluid adopts the ambient temperature).

A closed container or a refrigerant circuit which has been switched off is empty when temperature indication on the pressure gauge is below the temperature of the refrigerant.

Note

The relationship between pressure and temperature indicated on the gauges no longer applies if no liquid is present and the pressure is built up solely by gas.

3.10 Service and Recycling Units

⇒ “3.10.1 Extraction System Group Classifications”, page 64

⇒ “3.10.2 Charging Systems not Requiring a Permit”, page 65

3.10.1 Extraction System Group Classifications

At this time, service units for extracting, cleaning and filling refrigerant for motor vehicle A/C systems are available on the market from various manufacturers.

Only certain service stations (with appropriate auxiliary device and different adapters if necessary) can be used for cleaning (flushing with refrigerant R134a) the refrigerant circuit. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 .

WARNING

When performing work on refrigerant circuit or when handling refrigerant observe all generally applicable safety precautions and pressure container regulations.

Note

- *The service and recycling units used in motor vehicle workshops are extraction and charging systems not requiring a permit (Group “3”) but which are only to be operated by qualified personnel. Instructions for unit operation and maintenance can be found in the relevant manufacturer's documentation.*
- *Extraction and charging systems of groups “1” and “2” are not used in motor vehicle workshops.*

Extraction and Charging Systems of Group “3”:

Mobile extraction and charging systems for filling compressed-gas containers permanently connected to the system.

The refrigerant or refrigerant/oil mixture is transferred to compressed gas containers which are permanently connected to the mobile systems. In accordance with § 3 Para. 5 No. 3 of pressure container regulations, compressed-gas containers are classified as pressure containers in this case.

The charging systems require:

– No permit

– no expert testing as the gas is transferred to compressed-gas containers which are classed as being pressure containers. (Systems used for transfer from these pressure containers to compressed-gas containers for supplying to third parties do however require a permit and are subject to mandatory testing).

3.10.2 Charging Systems not Requiring a Permit

At this time, service units for extracting, cleaning and filling refrigerant for motor vehicle A/C systems are available on the market from various manufacturers.

Only certain service stations (with appropriate auxiliary device and different adapters if necessary) can be used for cleaning (flushing with refrigerant R134a) the refrigerant circuit. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 .

WARNING

When performing work on refrigerant circuit or when handling refrigerant observe all generally applicable safety precautions and pressure container regulations.

Charging systems not requiring a permit are ones used for transferring compressed gases to mobile compressed-gas containers for internal use only.

Note

Some service units are charging systems not requiring a permit. When working with such equipment, the refrigerant is not transferred to mobile compressed-gas containers, but rather into a permanently installed charging cylinder with visible level gauge and float switch.

Recommendation:

It is advisable to use a portable cylinder with visible level gauge and pressure relief valve for surplus refrigerant for internal use.

Attention must be paid to technical regulations for compressed gases (for example TRGS 400, TRGS 402, TRGS 407 TRGS 510 TRGS 725/TRBS3145) when transferring compressed gases to other compressed-gas containers.

3.11 Refrigerant Circuit Repair Information

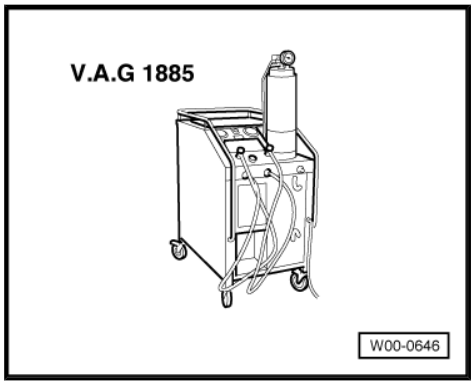
WARNING

- ***When performing work on refrigerant circuit, observe all generally applicable safety precautions and pressure container regulations.***

Special Tools and Accessories:

The performance of proper workmanlike repairs on an air conditioning system:

- Requires the use of special tools and materials as listed. Refer to ⇒ “11 Tools and Equipment”, page 376 .
- Requires compliance with the basic instructions for use of leak detectors. Refer to ⇒ “5.6 Refrigerant Circuit, Determining Leaks ”, page 174 .
- Requires expert knowledge.



Note

Environmentally hazardous draining of refrigerant is an offense punishable by law. For laws and regulations. Refer to ⇒ “4 Laws and Regulations”, page 67 .

4 Laws and Regulations

4.1 General Information

Note

The laws and regulations listed below are applicable in Germany. Different or additional laws and regulations may apply in other countries.

The effects of climate change can be seen worldwide. Protecting the climate is one of the most important responsibilities. However, this responsibility presents enormous challenges to all involved.

The Kyoto Protocol outlines worldwide goals regarding climate protection, among other things. In addition to target reductions of carbon dioxide, this protocol also outlines target reductions for fluorinated greenhouse gases such as refrigerant R134a due to their high potential of contributing to the greenhouse effect.

Numerous laws have been created for the automotive industry, for example at the European level. For example, chemical-climate protection regulations were put into effect on August 1, 2008 in Germany in order to define the European legislation in more detail.

- Provision (EU) number 1005/2009
- Provision (EU) number 2037/2000
- Provision (EU) number 842/2006 (from 01/01/2015: EU no. 517/2014)
- Provision (EU) number 706/2007
- Provision (EU) number 307/2008
- Guideline 2006/40/EU
- Chemical-climate protection provision, recycling management and disposal regulations (for Germany).

Maintenance and Repair Work on the A/C System Refrigerant Circuit

All individuals performing maintenance and repair work on vehicle A/C systems must have completed a training program and be competent in the work required. Other regulations may apply in addition to those of the European Union.

The Following General Points Apply:

Operation, repair, decommissioning, take-back obligation

- When operating, repairing and decommissioning items that contain refrigerant, allowing the refrigerant to vent into the air is prohibited.
- Keep records on the quantities used during operation and maintenance so they can be presented to the authorities upon request. A record sheet no longer needs to be kept in the EU due to a provision by the European Parliament in 2005. Other provisions may apply in countries that are not members of the EU.

- Distributors of the substances and preparations discussed above are obligated to accept these items back after use or to ensure they are accepted by a third party of their choosing.
- Maintenance and decommissioning of items containing refrigerant that are named in the legislation Substances and preparations named in this legislation may only be accepted by those with the necessary expertise and technical equipment.

Criminal offenses and infringements of the law

- Infringement of the law in regard to the laws mentioned above. Willfully or negligently venting refrigerant into the air when operating, repairing or decommissioning items That contain refrigerant constitutes a violation of the laws and legislation described above.

Observe the different technical regulations for handling and filling compressed gases (for example TRGS 400, TRGS 402, TRGS 407 TRGS 510 TRGS 725/TRBS3145).

Note

The TRGS (technical regulations for compressed gases) are listed (concerning vehicle manufacturers and workshops) below.

- TRGS 400 (hazard assessment for activities with hazardous substances)
- TRGS 402 (determining and evaluating the danger of activities with hazardous substances: exposure)
- TRGS 407 (activities with gasses - hazard assessment)
- TRGS 510 (storage of hazardous substances in transportable tanks)
- TRBS 3145/TRGS 725 (transportable tanks - filling, keeping ready, internal transportation, emptying)

Note

- *The technical regulations for compressed gases (TRG), technical regulations for hazardous substances (TRGS) and the technical regulations for operational safety (TRBS) provide the laws and regulations, the safety precautions and work hygiene as well as the protected industrial science knowledge for the provision and use of work equipment such as the system use subject to special supervision or for the activities with hazardous substances.*
- *The provided technical regulations apply to Germany, in other countries specifications and rules may apply.*

Observe the different technical regulations for handling and filling compressed gases (for example TRGS 400, TRGS 402, TRGS 407 TRGS 510 TRGS 725/TRBS3145).

- General regulations for charging systems
- Definition of terms and explanatory notes
- Build and operation of charging systems

Charging Systems:

- Does not apply to vehicle manufacturers or workshops.

- Charging systems are systems for filling mobile compressed-gas containers. The charging system includes the premises and facilities concerned.
- Charging systems requiring a permit are ones used to transfer compressed gases to mobile compressed-gas containers for supplying to third parties.
- Charging systems not requiring a permit are ones used for transferring compressed gases to mobile compressed-gas containers for internal use only.

Employees and employee instruction

– Employees are to be given instruction on the following topics before beginning work and at regular, appropriate intervals, however at least once a year

- Hazards specifically associated with handling compressed gases
- The safety regulations, especially the present TRGS and TRBS.
- Procedures in the event of malfunction, damage and accidents
- The use of fire-extinguishing and protective equipment
- Operation and maintenance of the charging system on the basis of the instructions for use

Charging systems are only to be operated and maintained by personnel.

- Aged 18 and above
- Possessing the necessary technical knowledge.
- Who can be relied on to work diligently.

Note

Supervised work may also be performed by personnel that do not meet the requirements stipulated.

Filling of pressure containers (separate technical regulations apply to containers from other countries and their charging, that are not mentioned here).

- A compressed-gas container is only to be filled with the compressed gas declared on it and the quantity must comply with the stipulated pressure, weight or volume data. Refer to pressure container regulations.
- In the case of containers approved for use with several types of compressed gas, the compressed gas with which it is to be filled and - if the compressed gas has a critical temperature greater than or equal to -10 °C (-14 °F) - the maximum permissible charging weight in line with TRGS must be marked on the container prior to connection for filling.
- Compressed-gas containers marked with the maximum permissible charge pressure in bar (psi) at 15 °C (59 °F) must be filled manometrically. If, at the time of filling, the temperature is not 15 °C (59 °F), the pressure corresponding to the prevailing temperature must be established; it must be ensured that the permissible charge pressure at 15 °C (59 °F) is not exceeded in the compressed- gas container. The charged containers are to be checked by way of random pressure measurements to determine possible overfilling.
- Compressed-gas containers on which the maximum permissible capacity is indicated by the net weight (filling weight,

permissible weight of fill) in kilograms must be filled gravimetrically. The containers are to be weighed during filling and subsequently subjected to a weight check on special scales to establish possible overfilling. Scales used for this purpose must be calibrated.

- Under certain conditions, gases with a critical temperature greater than or equal to 70 °C (158 °F) may be transferred volumetrically from compressed-gas containers with a maximum volume of 150 l to compressed-gas containers with a volume of maximum 1000 ccm. The stipulations of the TRGS apply to the transfer of liquefied gas to cylinders used by workmen.
- Different TRGS applies to containers in vehicles:

– For gas with critical temperature ≥ 70 °C (158 °F).

– For industrial gas with critical temperature ≥ 70 °C (158 °F).

– Liquefied extremely low-temperature compressed gases may be filled differently according to volume (volumetrically) if the charging system and/or the containers is/are equipped with devices for measuring or limiting the volume of the charge and for measuring the temperature of the charge. When filling volumetrically, it must be ensured that the permissible charge weight indicated on the container is not exceeded. To determine possible overfilling, the filled containers are to be checked gravimetrically on a calibrated scale or, provided that the pressurized gases are not highly toxic, volumetrically. Volumetric checking requires the use of appropriate equipment. The charging and checking devices must be independent of each other.

- Charging and check measurements are to be performed by different people. Check measurements must be performed immediately upon completion of the filling process.
- Overfilled containers must be drained immediately and in a safe manner until the permissible fill is attained. The compressed-gas fill is then to be determined again.
- Specific TRGS 407 components do not or only partially apply to containers for liquefied, extremely low-temperature compressed gases which are neither flammable nor toxic; this does not affect the provisions of road traffic legislation.
- When filling compressed gas containers with liquefied gases at charging temperatures less than or equal to -20 °C (-4 °F), the compressed gas container (if the container material has not been tested for temperatures less than or equal to -20 °C (-4 °F)) is not to be released from the charging system for transportation until the container wall temperature is greater than or equal to 20 °C (68 °F).

Recycling and Disposal Regulations:

- Specifications and rules for handling and disposing of refrigerants and refrigerant oils can be found in the chemical-climate protection provision and recycling and disposal regulations. These are valid in Germany. Different specifications and rules may apply in other countries.

Disposal of Refrigerant:

Refrigerants intended for disposal are to be transferred to marked recycling containers, observing the permissible filling quantity. Refer to the chemical-climate protection provision and the recycling and disposal regulations in Germany. Different specifications and rules may apply in other countries.

Disposal of refrigerant oil

Used refrigerant oils from systems employing halogenated hydrocarbons are to be disposed of as waste subject to special

supervision. They are not to be mixed with other oils or substances. Proper storage and disposal must be ensured in line with local regulations. Note the chemical-climate protection provision and the recycling and disposal regulations, for example, in Germany. Different specifications and rules may apply in other countries.

4.2 Laws and Regulations

⇒ "4.2.1 Refrigerant Circuit, Converting R12 to R134a and Servicing", page 71

⇒ "4.2.2 Refrigerant, Keeping Records", page 71

4.2.1 Refrigerant Circuit, Converting R12 to R134a and Servicing

Note

- *For environmental reasons and on account of the corresponding legislation, refrigerant R12 can no longer be manufactured or supplied. Refrigerant R134a has been developed as a replacement for R12.*
- *A/C systems developed and designed for refrigerant R12 cannot however simply be charged with refrigerant R134a. To ensure trouble-free operation of the air conditioning system even after conversion, various components of the refrigerant circuit must be replaced.*
- *A precise description of the conversion procedure and information on the servicing of converted refrigerant circuits can be found in Repair Manual: Air Conditioner with Refrigerant R12 Parts 2 and 3. (This repair manual is only available in hard copy).*

4.2.2 Refrigerant, Keeping Records

The environmental statistics law requires records to be kept on the use of refrigerants.

Consequently, motor vehicle workshops may well have to provide the relevant local authorities with information on their use of refrigerant. It is recommended to always keep a record sheet.

Note

- *A record sheet no longer needs to be kept in the EU due to a provision by the European Parliament in 2005. A record sheet is currently necessary when a use of 50 kg or more in the year (see also Provision (EU) no.1005/2009).*
- *It is recommended to keep a record sheet because the local authorities can request information regarding refrigerant use starting from a certain amount (currently starting with a use of 20 kg in a year).*
- *Other provisions may apply in countries that are not members of the EU.*

5 Refrigerant Circuit

5.1 A/C System Repair Information

- Air conditioning systems designed for refrigerant R12 are only to be filled with refrigerant R134a if certain requirements are fulfilled. Refer to ⇒ “4.2.1 Refrigerant Circuit, Converting R12 to R134a and Servicing”, page 71 and Repair manual: Air Conditioner with R12 Parts 2 and 3. This repair manual is only available in hard copy.
- The refrigerant oils specifically developed for R134a and R12 refrigerant circuits are never to be mixed.
- Service stations which come in contact with the refrigerant are only to be used for the intended refrigerant.
- Components of R134a refrigerant circuits can be identified by their markings, green labels or design (such as different threads) to prevent interchanging with components designed for refrigerant R12.
- A label indicating the refrigerant used is provided in the engine compartment on the lock carrier or in the plenum chamber.
- Different refrigerants are never to be mixed.

Note

Pay attention to the information in the chapter when working on the refrigerant circuit. Refer to “Refrigerant Circuit General Precautions”. Refer to ⇒ “2.12 Refrigerant Circuit, General Precautions”, page 17 .

5.2 Refrigerant Circuit, Converting R12 to R134a

CFC refrigerants are no longer used in the automotive industry.

Converting refrigerant circuits from R12 refrigerant to R134a refrigerant and servicing converted circuits

Refer to Repair Manual: Air Conditioner with Refrigerant R12 Parts 2 and 3 (This repair manual is only available in printed form).

5.3 Using Service Station

5.3.1 General Information

Caution

- *If it is suspected that chemicals were added to the refrigerant circuit to seal leaks, chemical substances to seal leaks in the refrigerant circuit (leak stop additive), do not connect the A/C service station and do not extract the refrigerant.*
- *Chemicals that seal leaks in the coolant circuit form deposits that affect the function of the A/C system and lead to failure of the A/C system and the A/C service station.*
- *Inform that customer that there are substances in the A/C system that are no approved by Audi.*

Note

- *The chemical materials (stop leak additive) for sealing leaks in the refrigerant circuit offered on the market are not approved by Audi AG. There are no permanent- ,validity or material compatibility tests. Therefore, damage or malfunctions in the A/C system or the A/C Service Station cannot be excluded.*
- *The stop leak additives offered on the open market have different physical and chemical properties, which can impair the function of the A/C system and the A/C Service Station and can even shut down the system completely.*
- *Audi does not approve the use of chemicals to seal leaks in the refrigerant circuit (leak stop additives).*
- *Chemical materials (leak stop additives) to seal leaks in the refrigerant circuit react with air or the moisture in the air and form deposits in the refrigerant circuit (and in the A/C service station) that lead to malfunctions in the valves and other components that come into contact with such chemicals. These deposits cannot be removed completely from the components (also not through cleaning/flushing with refrigerant R134a).*
- *It is not possible to recognize chemical substances to seal leaks in the refrigerant circuit (leak stop additive) and the label that is supposed to come with them is usually not there. Therefore be careful when working with if you do not know its service history.*
- *Accessories offer containers used to separate out these chemicals (used to seal leaks in the refrigerant circuit). Since Audi does not know composition and the physical and chemical properties of these materials, it is not possible to make a statement about their effectiveness and the deposition rate of these filters.*
- *The Filter for Sealants - VAS6592- offers a certain protection for the A/C service station. This filter is incorporated between the A/C service station and the Service connection on the low pressure side of the refrigerant circuit in a vehicle (the A/C service station may not be connection to the service connection of the high pressure side of the refrigerant circuit for draining, evacuating and measuring). This filter separate certain materials that were added to seal leaks in the refrigerant circuit. It prevents these materials from getting into the refrigerant and refrigerant oil in the A/C service station unchecked and doing damage. For the protection to work, it is necessary that the filter be changed in regular intervals and exactly according to the manufacturer specifications (described in the instructions provided). Audi does not support using chemical materials (stop leak additives) for sealing leaks in the refrigerant circuit. There are many different formulas of these chemicals (stop leak additives), that are offered as "sealant for refrigerant circuits" and it is not possible to make a statement about the effectiveness of the Filter for Sealants - VAS6592- .*

If the refrigerant circuit gets filed with a chemical material (stop leak additive) to seal any leaks (or if there is a suspicion of this) and if it then necessary to perform a repair to the refrigerant circuit, then it is necessary to inform the customer of the following:

- It is not possible to evacuate the refrigerant from the A/C system due to the stop leak additive that has been added to the system because it will damage the A/C Service Station. It will necessary to hire an outside company the can evacuate the contaminated refrigerant with a suitable device and then dispose of it (for example, a local waste management company that specializes in disposing of refrigerant).

- It will be necessary to replace any refrigerant circuit components that have come in contact with the stop leak additive in order to repair the A/C system properly. Certain refrigerant circuit components may already be damaged by the stop leak additive (for example, the A/C Compressor Regulator Valve - N280-) or will get damaged if they are used over again and will fail after a short amount of time. In addition to this, if there is any sediment from the stop leak additive still in the circuit, it could come loose at a later point and cause the A/C system to fail again (currently it is not possible to clean these components with any workshop tools).

Working on the A/C system refrigerant circuit

Refer to
⇒ “5.3.2 Service Station, Important Usage Information”, page 75

Refer to
⇒ “5.3.3 A/C Service Station, Connecting for Measuring and Testing”, page 76

Refer to
⇒ “5.3.4 Refrigerant Circuit, Discharging with A/C Service Station”, page 77

Refer to
⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79

Refer to
⇒ “5.3.6 Refrigerant Circuit, Charging with A/C Service Station”, page 84

Refer to
⇒ “5.3.7 A/C System, Operating after Charging”, page 86

Refer to
⇒ “5.3.8 Refrigerant to Service Station Reservoir (Charging Cylinder or Reservoir Bottle), Transferring”, page 88

Refer to ⇒ “5.3.9 Service Station, Draining”, page 88

5.3.2 Service Station, Important Usage Information

Observe the following with regard to service station operation. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).

- The filters and dryers installed must be replaced at the latest on completion of the service life specified in the relevant operating instructions.
- If a service station is also used for cleaning (flushing) the refrigerant circuit, dryer and filter must be replaced in shorter intervals. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 .
- Only refrigerant oils which have been approved for the refrigerant circuit in that vehicle may be added (if necessary, fill refrigerant oil directly into refrigerant circuit). Refer to the Parts Catalog.

Extracted refrigerant is not to be reused if there is any doubt about the composition of the refrigerant extracted, even after cleaning in the service station.

- The service station is to be drained in all these cases. Refer to ⇒ “7 A/C Service Station, Connecting”, page 190). The system is cleaned if necessary and the filters, dryers and refrigerant oil are replaced.

– For example, within Germany, contaminated refrigerant can be returned to the supplier in recycling containers for recycling or for environmentally safe disposal. Other or additional regulations may apply in other countries.

Commercially available service stations can be classified in two groups:

- Service stations which clean extracted refrigerant for use (so-called extraction and recycling stations for currently available service stations). Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- Service stations which transfer extracted refrigerant to recycling containers (for large-scale recycling). These are referred to as extraction systems.

5.3.3 A/C Service Station, Connecting for Measuring and Testing

- Work procedure may vary depending on the type of tools selected (the tool-specific operating instructions should therefore be followed).

Note

The work procedure is always to be performed as described in the operating instructions for the A/C service station.

The charging hoses are to be connected as follows to prevent the ingress of air or moisture into the refrigerant circuit:

– Turn off the ignition.

– Connect the service station to the power supply.

– Remove the caps from the service connections or connections with valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Evacuate the charging hoses if necessary.

– Connect the quick-release coupling to the refrigerant circuit service connection.

WARNING

- ***Never open valves on low or high-pressure side with the engine running. Otherwise, compressor or service station could be destroyed by a short circuit between high and low-pressure sides of refrigerant circuit if air conditioning system is switched on.***

– Only tighten the handwheel in the quick-release coupling just enough so the service connection is open. Watch the pressure gauge and do not place too much pressure on the valve.

– Start the engine and perform the planned tests and measurements.

– Compare values determined to specified measured values. Refer to ⇒ “8 Pressures, Checking”, page 195 .

– Before disconnecting the quick-release coupling, close it by screwing out the hand wheel.

Vehicles with Only One Service Connection:

Note

Install the A/C Adapter Set - Adapter 9 - VAG1785/9- , A/C Adapter Set - Adapter 10 - VAG1785/10- or A/C Adapter Set - VAG1786- onto the connections with the refrigerant circuit valve and bleed the charging hoses while connecting to the adapters (faintly audible escape of refrigerant gas is permitted). Refer to *⇒ "7 A/C Service Station, Connecting", page 190* *.*

– The charging hose must be installed with a valve opener for opening valve in valve adapter.

On vehicles with High-Voltage System and Additional Functions of the A/C System (for example on Audi Q7 e-tron):

Note

On vehicles with the "heat pump" function and/or "high-voltage battery cooling" in not all operating conditions is the A/C system high pressure on the service connection of the high pressure side. The refrigerant circuit pressure on the high pressure side can on these vehicles depending on the operating conditions of the A/C system, can only be measured via the pressure/temperature sensor installed in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

To check the different functions of these A/C systems

– Select the respective function ("cooling the vehicle interior", "heat pump operation" or "cooling the high-voltage battery") via the Vehicle Diagnostic Tester and perform the respective specifications using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

– Select the measured values of the different pressure/temperature sensor installed in the refrigerant circuit and read out. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

5.3.4 Refrigerant Circuit, Discharging with A/C Service Station

- Work procedure may vary depending on the type of tools selected (the tool-specific operating instructions should therefore be followed).
- The refrigerant circuit is to be discharged if parts of the refrigerant circuit are to be removed, if there is any doubt about the quantity of refrigerant in the circuit or if the safety precautions so require.
- All the necessary usage information for working with the refrigerant A/C service station can be found in the A/C service station operating instructions.

Discharging:

– On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.

– Switch off the ignition.

– Connect the A/C service station to the vehicle service connections according to the operating instructions and start the

A/C service station. Refer to vehicle-specific refrigerant circuit and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Also for vehicles with electrically operated valves in the refrigerant circuit that cannot be opened without current (for example the Audi Q7 e-tron):

Note

For vehicles with a high-voltage system and additional A/C system functions (“heat pump operation” or “cooling the high-voltage battery”), valves may be installed in the refrigerant circuit that cannot be opened without current. These valves are opened and closed via stepper motors, for example, and are no longer activated after switching off the ignition. To completely discharge, correctly evacuate and charge the refrigerant circuit, no sections may be closed. Therefore these valves must be opened before performing this work. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

– Open the electrically activated valves (not open without current) using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.
– Discharge the refrigerant circuit using the A/C service station according to the operating instructions.

Caution

There is a risk of damaging the A/C compressor if the refrigerant circuit is empty.

Do not start the engine if the refrigerant circuit is empty.

- *Depending on the version of the A/C service station, the refrigerant circuit pressure may be less than 1 bar absolute pressure after it has been discharged.*
- *Depending on the version of the A/C compressor, it may be damaged if it is operated when there is low refrigerant circuit pressure.*
- *Do not start the engine while the refrigerant circuit pressure is less than the ambient pressure.*

WARNING

There is a risk of freezing.

Refrigerant may leak out if the refrigerant circuit is not discharged.

Refrigerant must be extracted before opening the refrigerant circuit. If the refrigerant circuit is not opened within 10 minutes of extraction, pressure may form in refrigerant circuit due to evaporation. Extract the refrigerant again.

Note

- *There is a possibility of refrigerant oil being extracted from the refrigerant circuit together with the refrigerant. To ensure A/C compressor lubrication, the refrigerant oil in the circuit must be topped up with fresh oil. Refer to ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .*
- *For vehicles with an A/C compressor with no A/C clutch (with an A/C Compressor Regulator Valve - N280-), the engine should not be run for longer than absolutely necessary with the refrigerant circuit empty. Avoid higher engine speeds (A/C compressor always in operation as well).*
- *For vehicles with an A/C compressor with no A/C clutch, the engine may only be started following complete assembly of the refrigerant circuit (avoid high engine speeds).*
- *Depending on the A/C compressor version, there may be a valve installed on the high pressure side of the A/C compressor, which prevents the liquid refrigerant from flowing back into the A/C compressor once the A/C system is turned off. If an A/C compressor with this valve is installed in a vehicle with a refrigerant circuit having an expansion valve, then it may take some time until the pressure in the high pressure side decreases (the expansion valve is cold and the pressure in the low pressure side quickly increases after it is turned off, the expansion valve closes and the refrigerant can flow slowly to the low pressure side). If the A/C compressor is switched on (or the refrigerant circuit is evacuated on the low pressure side), the pressure on the low pressure side goes down, the expansion valve opens and the refrigerant can flow to the low pressure side.*
- *Depending on the version of the A/C service station, the previous operating condition and the ambient temperatures, etc., the amount displayed by the A/C service station for the extracted refrigerant R134a can vary from the actual extracted amount. The amount displayed by the A/C service station for the extracted refrigerant is therefore only a reference point for the amount of refrigerant actually extracted from the refrigerant circuit. Also pay attention to the A/C service station operating instructions and technical product description.*

Should work be performed on the vehicle after discharging that does not require using the A/C service station

– Disconnect the A/C service station from the refrigerant circuit and turn it off.

Should the refrigerant circuit be evacuated and recharged after the discharging. Refer to ⇒ "5.3.6 Refrigerant Circuit, Charging with A/C Service Station", page 84 .

5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station

- The work procedure is always to be performed as described in the operating instructions for the A/C service station.
- The quantity of refrigerant oil in the refrigerant circuit is checked and if necessary corrected. Refer to ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .
- The quantity of refrigerant in the A/C service station is checked.

The refrigerant circuit must be evacuated before it is filled with refrigerant (vacuum). Moisture is also extracted from the circuit.

Leaks may be found when evacuating the refrigerant circuit.

Evacuating:

Caution

- *Do not start the engine during the evacuation process or when there is a vacuum in the refrigerant circuit.*
- *The A/C compressor could be damaged if the engine is started when there is a vacuum in the refrigerant circuit.*
- *Only start the engine when the refrigerant circuit is charged.*

– On vehicles with a high-voltage system, switch off (deactivate) the “auxiliary climate control” function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.

– Switch off the ignition.

– Connect the A/C service station to the power supply.

– Connect the A/C service station charging hoses to the vehicle refrigerant circuit with the quick-release coupling adapter. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Install the hand wheel on the quick-release coupling adapter far enough so that the valves in the service connections are securely open. Do not put too much pressure on the valve.

Note

If pressure is to be measured after charging the system on vehicles that only have a service connection on one side of the refrigerant circuit, use the valve adapter and charging hose with valve opener. Refer to
⇒ “7 A/C Service Station, Connecting”, page 190 .

Also for vehicles with electrically operated valves in the refrigerant circuit that cannot be opened without current (for example the Audi Q7 e-tron):

Note

- *For vehicles with a high-voltage system and additional A/C system functions (“heat pump operation” or “cooling the high-voltage battery”), valves may be installed in the refrigerant circuit that cannot be opened without current. These valves are opened and closed via stepper motors, for example, and are no longer activated after switching off the ignition. To completely discharge, correctly evacuate and charge the refrigerant circuit, no sections may be closed. Therefore these valves must be opened before performing this work. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.*
- *The check valves in the refrigerant circuit have a specified residual pressure (approximately 0.1 bar or 100 mbar) in the flow direction. So that the refrigerant circuit can be completely evacuated (residual pressure less than 5 mbar), all electrically activated valves must be opened.*

– Open the electrically activated valves (not open without current) using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

All

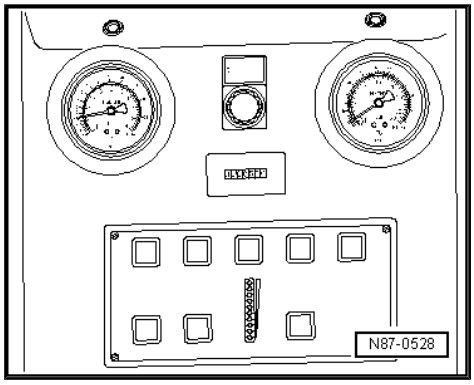
– Turn on the A/C service station and evacuate the refrigerant circuit for at least 30 minutes. The pressure indicator must indicate an absolute pressure of less than 10 mbar (corresponding to 990 mbar vacuum).

Note

At this pressure, both green LEDs light up, for example, on the -VAG1885- . For currently available A/C service stations. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).

– Turn off the A/C service station and allow it to stand for at least one hour.

• If the vacuum indicator (LED chain) does not change, the system is free of leaks and can be charged.



Note

- *A current vacuum reading (LED) is only obtained using the -VAG1885- , for example, after pressing the Evacuate button again. For currently available service stations. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).*
- *On this A/C service station, if the upper (green) LEDs do not illuminate immediately after turning on, either the refrigerant circuit is leaking or there is still residual moisture/refrigerant in the refrigerant circuit.*

If the vacuum is not maintained or if a sufficient vacuum cannot be generated, perform the following:

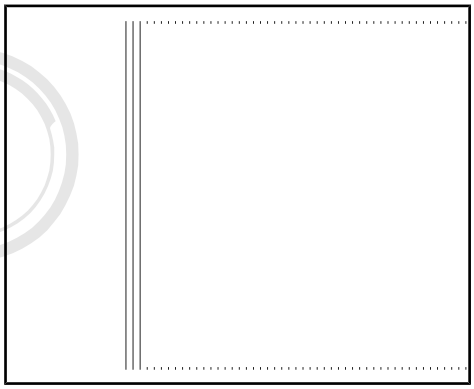
- If the pressure in refrigerant circuit only increases slowly after evacuating, for example, due to evaporating refrigerant from the refrigerant oil:

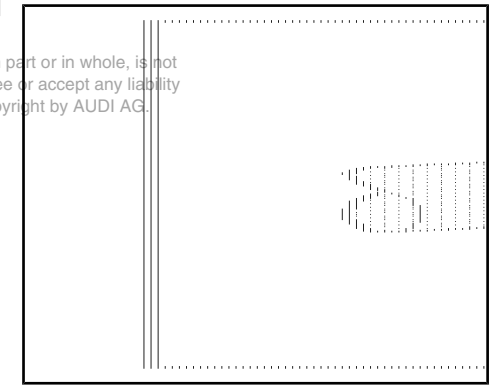
– If there is any doubt as to whether or not the refrigerant circuit has leaks, evacuate again and monitor the vacuum indicator for a longer period of time. Only when the vacuum is maintained can the refrigerant circuit be charged.

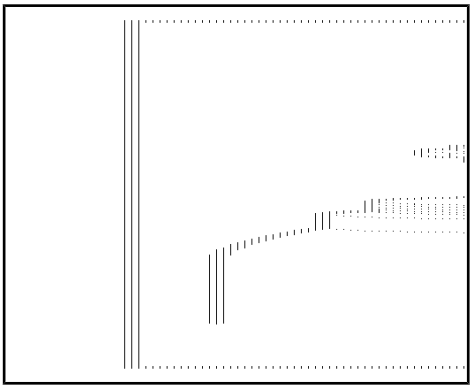
– If it is certain that the refrigerant circuit does not have any leaks, it can be charged.

- If there is a large enough leak that allowed enough air to enter during evacuation that the A/C service station cannot generate a sufficient vacuum or that the vacuum is lost immediately after switching the A/C service station off:

– Determine the location of the leak in the refrigerant circuit as follows:







Note

- *A large leak can be identified, for example, if a pressure of maximum 15 bar can be generated in the refrigerant circuit using clean, dry compressed air or nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 . If the leak is large enough, the sound of escaping air or gas can be heard at the location of the leak.*
- *Add the compressed air or nitrogen to the closed refrigerant circuit through the service connection after fitting it with a quick-release connector adapter.*
- *The quick-release coupling adapter for service connections can be connected to the workshop compressor unit, for example, using a modified charging hose -A- (for example, with 5/8" 18 UNF threads, depending on the threads on the quick-release coupling adapter) and a suitable adapter -B-. Refer to ⇒ "11.4 Improvised Tools", page 383 . This keeps the moisture, oil and dirt from the workshop compressor unit from getting into the A/C system refrigerant circuit. Also use a combination fine-mesh filter for compressor units that separates out oil, dirt and water, such as those that are standard in paint shops. Install it between the compressor unit and the charging hose -A-. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating)*
- *A compressed gas cylinder filled with nitrogen -3- can be connected to the closed refrigerant circuit using a pressure gauge battery with a pressure reducer for nitrogen (maximum reduction pressure: 15 bar (217.5 psi) -1- and with a charging hose -2- (for example, with 5/8" 18 UNF threads) connected to the service connection (to which a quick-release coupling adapter for service connections is connected. Refer to ⇒ "11.3 Commercially Available Tools and Materials", page 381 .*

– Slowly increase the pressure in the refrigerant circuit to a maximum of 15 bar (217.5 psi).

WARNING

- ***Nitrogen can leak uncontrolled from the cylinder.***
- ***Only use pressure reducers for nitrogen cylinders (maximum work pressure 15 bar (217.5 psi)).***
- ***When testing for leaks with nitrogen (maximum permissible pressure 15 bar (217.5 psi)), only work with a pressure reducer for nitrogen cylinders.***
- ***Use appropriate extraction units to draw off the gas mixture escaping from the components.***

– Find the location of the leak by listening for the sound of venting gas.

– Repair the leak.

– Evacuate and again monitor the vacuum indicator over a period of hours. Only when the vacuum is maintained can the refrigerant circuit be charged.

- If there is a leak that is small enough that little or no air vents through it and the A/C service station can generate a sufficient vacuum: The vacuum indicator does not increase after switching the A/C system service station or only increases very slowly, indicating that air is only entering through a small leak.

– Add 100 grams of refrigerant to the circuit, find the location of the leak using an electronic leak detector and repair it or add UV contrast dye to the refrigerant and find the location of the leak using the -VAS6201- and repair it. Refer to ⇒ “5.6.2 Refrigerant Circuit, Tracing Leaks Using Electronic Leak Detector (for example, VAG1796)”, page 175 and ⇒ “5.6.3 Leak Detection on Refrigerant Circuit Using Leak Detection Kit VAS6201A ”, page 177 .

– Discharge the refrigerant circuit, if necessary. Refer to ⇒ “5.3.4 Refrigerant Circuit, Discharging with A/C Service Station”, page 77 .

– Evacuate the refrigerant circuit and monitor the vacuum indicator again over several hours. Only when the vacuum is maintained can the refrigerant circuit be charged.

5.3.6 Refrigerant Circuit, Charging with A/C Service Station

Note

The entire refrigerant charge can be added to either the high or low pressure side. Refer to ⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .

- The work procedure is always to be performed as described in the operating instructions for the A/C service station.
- Before adding the refrigerant, correct the quantity of refrigerant oil. Refer to ⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .
- Make sure that the A/C Service Station is standing at the same level as the vehicle (maximum difference: 50 cm) when charging the refrigerant circuit. If the difference in height is large enough, the displayed and the actual amount of refrigerant added to the circuit may differ, depending on the version of the A/C Service Station . The filling accuracy of the A/C Service Station may change.

– On vehicles with a high-voltage system, switch off (deactivate) the “auxiliary climate control” function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.

– Switch off the ignition.

– Evacuate the refrigerant circuit using the A/C service station. Refer to ⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79 .

Also for vehicles with electrically operated valves in the refrigerant circuit that cannot be opened without current (for example the Audi Q7 e-tron):

Note

For vehicles with a high-voltage system and additional A/C system functions ("heat pump operation" or "cooling the high-voltage battery"), valves may be installed in the refrigerant circuit that cannot be opened without current. These valves are opened and closed via stepper motors, for example, and are no longer activated after switching off the ignition. To completely discharge, correctly evacuate and charge the refrigerant circuit, no sections may be closed. Therefore these valves must be opened before performing this work. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

– Open the electrically activated valves (not open without current) using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

All

– Remove the hand wheel at the quick-release coupling adapter (to close it).
– Allow an amount of refrigerant to flow into the charging hose.
– Check the charging cylinder.
– Install the hand wheel at the quick-release coupling adapter (to open it) and charge with the specified quantity of refrigerant.
– Turn off the A/C service station.

Vehicle that has the discharging and charging of the refrigerant circuit scheduled in the maintenance schedule after a certain operating time

– Enter the performed "A/C system re-charged" procedure into the maintenance schedule.

Note

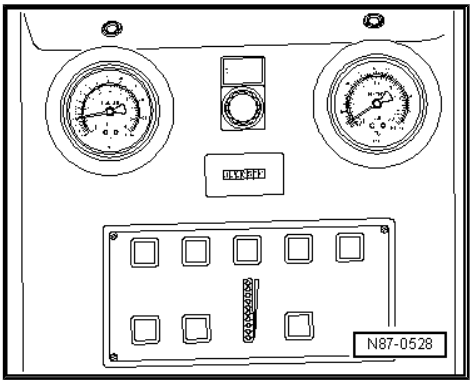
Discharging and re-charging are only included as maintenance work in the maintenance schedule for certain vehicles (currently for the Audi Q7 e-tron and the Audi A6 e-tron, for example).

5.3.7 A/C System, Operating after Charging

Note

- *If the mechanically driven Air Conditioning (A/C) compressor was removed, rotate it approximately 10 times by hand before using it for the first time (during or after installing, for example before installing the belt) to prevent damage caused by liquid impact when first switched on (any oil in compressor cylinder is forced out on rotation).*
- *If the electronically driven A/C compressor was removed, activate it after filling the A/C compressor before the A/C system on via the "basic setting, compressor cut-in" function for the Guided Fault Finding. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/C System and Battery Regulation. This prevents the A/C compressor from being damaged, for example, by liquid impact when it is first switched on (any oil in the A/C compression chamber is forced out).*
- *The vehicle engine drives the mechanically driven A/C compressor via a belt or shaft. The electronically driven A/C compressor is driven via an electric motor attached directly to the A/C compressor (for example on hybrid vehicles).*

Operating an A/C System with a Mechanically Driven A/C Compressor



- Start engine with compressor switched off (version with A/C clutch).
- Set compressor to minimum output, for example, "Econ" or A/C off mode (version with no A/C clutch with regulating valve).
- Wait until idle speed has stabilized.
- Switch on the compressor and operate the system for at least two minutes at idling speed.
- If necessary, check pressures in the refrigerant circuit using the A/C service station.
- Turn the engine off.
- Screw out the hand wheel on the quick-release coupling adapter.
- Disconnect the charging hoses from the refrigerant circuit.
- Install the caps.

Operating an A/C System with an Electrically Driven A/C Compressor

- Operate the A/C compressor using “basic setting, compressor cut-in” in Guide Fault Finding. Use the Vehicle Diagnostic Tester “Guided Fault Finding” A/C System and Battery Regulation.

Additionally on vehicles with an electric operated valves in the refrigerant circuit, which cannot be opened without power (for example the Audi Q7 e-tron):

- Via the Vehicle Diagnostic Tester the electrically activated valves which do not open without power for the operation of the A/C system enable the activation of these valves via the respective control module (to open or close) using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

Note

On vehicles with high-voltage system and additional functions of the A/C system (“heat pump operation” or “cooling the high-voltage battery”) valves may be installed in the refrigerant circuit which cannot be opened without power. These valves are opened and closed for example via a step motor and after switching off the ignition are no longer activated. To completely drain, correctly discharge and charge the refrigerant circuit no areas may be closed, for this reason the valves must be opened before these procedures. After completing the work on the refrigerant circuit, use the respective control module to re-activate the triggering of the valves, which are controlled by stepper motors, for example. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

All

- After the basic setting and If necessary, check pressures in refrigerant circuit using A/C service station. Refer to ⇒ “5.3.3 A/C Service Station, Connecting for Measuring and Testing”, page 76 .
- Screw out the hand wheel on the quick-release coupling adapter.

– Disconnect the charging hoses from the refrigerant circuit.

– Install the caps.

5.3.8 Refrigerant to Service Station Reservoir (Charging Cylinder or Reservoir Bottle), Transferring

- The work procedure is always to be performed as described in the operating instructions for the Air Conditioning (A/C) service station.
- A certain quantity of refrigerant is specified as charge for each air conditioning system. To ensure that neither too much nor too little refrigerant is added (either would reduce the cooling output), the charging cylinder has a scale indicating the weight.
- The volume of a refrigerant changes as a function of pressure. The scale must therefore be set according to the pressure in the charging cylinder.

Note

Do not completely drain the reservoir (charging cylinder or bottle) as the liquid column boundary layer cannot be traced in the tube during filling (outside visible range).

WARNING

Do not overfill. A completely filled reservoir (charging cylinder or bottle) will explode when the temperature rises.

5.3.9 Service Station, Draining

Note

- *If it is necessary to drain the service station (for example, due to extraction of contaminated refrigerant), all filters and dryers must always be replaced (do not remove filter and dryer from the air-tight packaging until immediately before installation to minimize moisture absorption).*
- *Refrigerant containers filled with contaminated used refrigerant are referred to as “Recycling containers”.*
- *Thoroughly evacuate the recycling containers prior to initial filling with refrigerant (if there is air in a refrigerant container it is not to be filled with refrigerant).*
- *Different types of refrigerant may not be mixed together (refrigerant mixtures cannot be recycled and are to be disposed of). If there is any doubt about the composition of the contents of the container, the refrigerant recycling company is to be informed accordingly.*

Caution

- *When filling recycling containers (compressed-gas containers), observe applicable regulations, technical rules and laws.*
- *Recycling containers are never to be overfilled. Overfilled containers do not have a sufficient gas cushion to accommodate the liquid expansion caused by the effects of heat. There is a danger of rupture.*
- *To ensure safety, make exclusive use of recycling containers fitted with a safety valve.*
- *Recycling containers must be weighed on calibrated scales during the filling process. The maximum permissible capacity is 75% (charge factor 0.75) of the charge weight indicated on the recycling container (the possibility of refrigerant oil entering the recycling container along with the refrigerant cannot be ruled out).*

5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen

⇒ "5.4.1 General Information", page 89

⇒ "5.4.2 Refrigerant Circuit, Flushing", page 92

5.4.1 General Information

Compressed air and nitrogen are to be used in order to force out moisture and other contaminants as well as old refrigerant oil as efficiently as possible, without wasting refrigerant. In the refrigerant circuit is to be cleaned (flush with refrigerant R134a or blow through with compressed air and nitrogen)

Note

- *For the most part, blowing through the refrigerant circuit with compressed air and nitrogen requires significantly more work than cleaning (flushing) with refrigerant R134a. As cleaning (flushing) with refrigerant R134a cleans the components more efficiently, always flush in case of a complaint (blowing through should only be used for certain complaints and individual components).*
- *Under certain conditions it may be sufficient to blow through certain components (for example individual refrigerant lines or refrigerant hoses) with compressed air and nitrogen (for example for purposes of forcing out old refrigerant oil from individual components that were removed).*
- *Certain contaminants cannot or can only be insufficiently removed from the refrigerant circuit with compressed air, these contaminants can be removed, for example by cleaning (flushing) with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 .*
- *When blowing through, the maximum work pressure of 15 bar (217 psi) must not be exceeded (corresponding to pressure that is reached in a filled refrigerant circuit with an ambient temperature of approximately 60 °C (140 °F), if necessary use pressure reducer also for compressed air)*

WARNING

- *Nitrogen can leak uncontrolled from the cylinder.*
- *Make exclusive use of pressure reducers for nitrogen cylinders (maximum work pressure 15 bar (217 psi)).*
- *Use appropriate extraction units to draw off gas mixture escaping from components.*

– Always flush components in direction opposite to refrigerant flow.

Note

Restrictor, expansion valve, compressor, receiver and reservoir cannot be flushed with compressed air and nitrogen.

– Remove this dryer cartridge on condensers that have one installed in the integrated receiver/dryer.

Note

- *If the receiver/dryer or dryer cartridge is integrated in the condenser, then they cannot be replaced separately and the condenser must be replaced after cleaning (flushing).*
- *Receivers/dryers where it is possible to replace the dryer cartridge have an additional filter, which must also be replaced with the dryer cartridge.*

– First flush out old refrigerant oil and dirt using compressed air and then use nitrogen to remove component moisture.

– Adapter for sealing off the pressure hose to the refrigerant circuit. Refer to
⇒ “7 A/C Service Station, Connecting”, page 190 .

Note the following points to prevent oil and moisture from entering the refrigerant circuit from the compressed air system.

– The compressed air must be routed through a compressed air purifier for cleaning and drying. For this reason use the filter and dryer for the compressed air (included in scope of delivery as tool for painting work).

– On refrigerant lines with thread or union nut on the connection, use the adapter from the A/C Adapter Set - VAG1785- (A/C Adapter Set - Adapter 1 - VAG1785/1- through A/C Adapter Set - Adapter 8 - VAG1785/8-) to connect charge hoses 5/8" -18 UNF (a section of this adapter is also contained in the Refrigerant Circuits Adapter Set 1 - VAS6338/1- .

– On refrigerant lines without thread or union nut on the connection (for connecting adapters), use adapter from Refrigerant Circuits Adapter Set 1 - VAS6338/1- or a standard blower pistol with rubber mouthpiece.

Note

- *Only blow through refrigerant circuit with compressed air and then with nitrogen if there is no possibility of cleaning (flushing) the refrigerant circuit with refrigerant R134a or the amount of work to flush individual components becomes excessive (for example minor contaminants and moisture can also be blown out of the refrigerant lines in a short period of time).*
- *Compressed air/nitrogen emerging from components is to be drawn off by way of an appropriate system (for example, a workshop extraction system).*

The circuit (or individual components) must be blown through (if there is no possibility for cleaning or flushing with refrigerant R134a is not recommended):

- In the event dirt or other contaminants are located in individual components of the circuit.
- If vacuum reading is not maintained on evacuating a leak-free refrigerant circuit (pressure build-up due to moisture in refrigerant circuit).
- The refrigerant circuit has been left open for longer than normal (for example, following an accident).
- Pressure and temperature measurements in the refrigerant circuit indicate the likelihood of moisture.
- In the event of doubt about the amount of refrigerant oil in the circuit.
- The A/C compressor had to be replaced on account of internal damage (for example, noise or no output).

Note

Pay attentions when replacing the Electrical A/C Compressor -V470- on vehicles with electrically driven A/C compressor (if the electronic on the A/C compressor is damaged the refrigerant circuit must not always be cleaned. Refer to *⇒ "9.1.4 Compressor, Replacing without the Need for Flushing Refrigerant Circuit", page 288* *.*

- If it is stipulated by the vehicle-specific repair manual following the replacement of certain components.

Note

Certain contaminants and old refrigerant oil cannot or can only be insufficiently removed from the refrigerant circuit with compressed air, these contaminants can be removed, for example, by cleaning (flushing) with refrigerant R134a. Refer to *⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93* *.*

5.4.2 Refrigerant Circuit, Flushing

Note

- *In the case of vehicles on which the refrigerant lines have no threads for connection of Adapter Set - 1785- . Use for example a flushing gun with rubber end piece or an adapter from the Refrigerant Circuits Adapter Set 1 - VAS6338/1- for blowing through the individual components. When using a flushing gun with rubber end piece, take special care not to damage the connections (crushing or scratching).*
- *Evaporator is to be flushed via the connection for low-pressure line (large diameter) after removing expansion valve or removing restrictor.*
- *Always clean (flush or blow) components in direction opposite to refrigerant flow.*
- *Check expansion valve and replace if dirty or corroded.*
- *Locate any components on which dark, sticky deposits cannot be removed with compressed air and either clean (flush) them using refrigerant R134a or replace them.*
- *Thin, light grey deposits on the inside of lines do not impair the function of the components.*
- *After flushing, always replace receiver/dryer or reservoir and restrictor. Replace the dryer cartridge on condensers that have one installed in the integrated receiver/dryer.*
- *If the receiver/dryer or dryer cartridge is integrated in the condenser, then they cannot be replaced separately and the condenser must be replaced. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Receivers/dryers where it is possible to replace the dryer cartridge have an additional filter, which must also be replaced with the dryer cartridge.*

After Blowing through the Refrigerant Circuit:

– Replace these components depending on equipment (restrictor and reservoir, expansion valve and receiver/dryer or dryer cartridge). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

– Replace the A/C compressor, depending on its condition. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual) and Parts Catalog or drain the rest of the refrigerant oil still inside the removed A/C compressor (replace the refrigerant circuit components) and will new refrigerant. Refer to
⇒ “9 Refrigerant Circuit Components, Replacing”, page 283
and
⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 ().

Note

- *There is a defined and prescribed amount of refrigerant oil in the replacement compressor. If the vehicle has two evaporators, then there refrigerant circuit requires a specific quantity of refrigerant oil. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and*
  ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 . (Approved Refrigerant Oils and Capacities).
- *If the A/C compressor is not be replaced, the quantity of refrigerant oil in the A/C compressor must be topped off to the prescribed capacity (tilt the refrigerant oil out and refill the prescribed quantity into the A/C compressor or refrigerant circuit). Refer to*
  ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 (replacing refrigerant circuit components) and
  ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 . Approved Refrigerant Oils and Capacities).

– Reassemble the refrigerant circuit completely. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Evacuate and recharge the refrigerant circuit according to specification. Refer to
⇒ "5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station", page 79 and
⇒ "5.3.6 Refrigerant Circuit, Charging with A/C Service Station", page 84 .

– Start up A/C system according to specification. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit; A/C System, Starting Operation after Filling Refrigerant Circuit (vehicle-specific repair manual) and
⇒ "5.3.7 A/C System, Operating after Charging", page 86 .

5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a

Caution

- ***If it is suspected that chemicals to seal leaks (leak stop additive) were added to the refrigerant circuit that is to be flushed, do not connect the A/C service station and do not clean (flush) this refrigerant circuit.***
- ***Chemicals that seal leaks in the refrigerant circuit (leak stop additives) form deposits that affect the function of the A/C system and lead to malfunctions in the A/C system and the A/C service station.***
- ***Inform the customer that there are substances in the A/C system that are not approved by Audi and for this reason the A/C system cannot be cleaned (flushed) and serviced.***

Note

- *Audi does not approve the use of chemicals (stop leak additives) to seal leaks in the refrigerant circuit.*
- *Chemical materials (leak stop additives) to seal leaks in the refrigerant circuit react with air or the moisture in the surrounding air and form deposits in the refrigerant circuit (and in the A/C service station) that lead to malfunctions in the valves and other components that come into contact with such chemicals. These deposits cannot be removed completely from the components, even by cleaning/flushing. It is only possible to service the refrigerant circuit by replacing all the components that have come into contact with this material.*
- *It is generally not possible to externally recognize chemical substances to seal leaks in the refrigerant circuit (leak stop additive), and the stickers that are supposed to come with them are usually not there. Therefore be careful when working with a vehicle if its service history is unknown.*

- The refrigerant circuit must be cleaned by flushing with refrigerant R134a in order to remove moisture, contaminants (such as abraded material from a faulty A/C compressor) as well as old refrigerant oil as cleanly and efficiently as possible, without wasting refrigerant, without the need for extensive assembly work and without endangering the environment.

Flush the Refrigerant Circuit:

– If dirt or other contaminants are in the circuit.

– If the vacuum reading is not maintained when evacuating a leak-free refrigerant circuit (pressure build-up due to moisture in the refrigerant circuit).

– The refrigerant circuit has been left open for longer than normal (for example, after a collision).

– Pressure and temperature measurements in the circuit indicate that there is moisture in the refrigerant circuit.

– If there is any uncertainty as to how much refrigerant oil is in the refrigerant circuit.

– The A/C compressor had to be replaced due to internal damage (for example, noise or no output).

Note

- *For vehicles with an electrically-driven A/C compressor, pay attention to the notes for replacing the Electrical A/C Compressor - V470- (the refrigerant circuit does not always have to be cleaned if there is damage to the A/C compressor electronics). Refer to ⇒ "9.1.4 Compressor, Replacing without the Need for Flushing Refrigerant Circuit", page 288 .*
- *If a faulty A/C compressor is replaced with an A/C compressor from another manufacturer, check if the same refrigerant oil is approved for the A/C compressor to be installed as the one that is already in the refrigerant circuit (from the removed A/C compressor). If a different refrigerant oil is approved for the A/C compressor to be installed than the one in the removed A/C compressor, the refrigerant circuit must be flushed. Refer to ⇒ "10.3.1 Approved Refrigerant Oils", page 340 .*

– If it is stipulated by the vehicle-specific repair manual following the replacement of certain components.

Required Tools

- A/C Service Station with Flushing Device (these A/C service stations have the additional “flush refrigerant circuit” function and are equipped with the refrigerant circuit flushing device required for it). Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- Refrigerant Circuits Adapter Set 1 - VAS6338/1- . Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 and the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).

Note

- *If an A/C Service Station with Flushing Device is not available (refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating)), a Refrigerant Circuit Flushing Device (refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating)) may also be attached to the refrigerant circuit to flush with refrigerant R134a, depending on the A/C service station version. The procedure must however be performed manually. Refer to ⇒ page 101 .*
- *For vehicles with threaded connections on the refrigerant circuit, the A/C Adapter Set - Adapter 7 - VAG1785/7- and A/C Adapter Set - Adapter 8 - VAG1785/8- from the Refrigerant Circuits Adapter Set 1 - VAS6338/1- can be used; for vehicles with threaded connections on the A/C compressor and reservoir, two A/C Adapter Set - Adapter 8 - VAG1785/8- are required.*
- *In the Refrigerant Circuits Adapter Set 1 - VAS6338/1- , there is also a Hose - VAS6338/31- with 5/8" 18 UNF connections and a large inner diameter in the short version (commercially available).*

Preliminary Work

– Discharge the refrigerant circuit. Refer to ⇒ “5.3.4 Refrigerant Circuit, Discharging with A/C Service Station”, page 77 .

– Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).

Vehicle with Restrictor and Reservoir

– Remove the restrictor (vehicle-specific) and reconnect the lines to each other. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Remove the reservoir (vehicle-specific) and reconnect the lines to each other (use adapters and the Hose - VAS6338/31- from the Refrigerant Circuits Adapter Set 1 - VAS6338/1-). Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Note

- *Depending on the version, the reservoir could be potentially flushed but it will take too much refrigerant because of its large internal volume; the reservoir would ice-up too much when extracting the refrigerant, the refrigerant would evaporate too slowly and the extraction process would take too long.*
- *Depending on the version, the receiver/dryer can be potentially flushed (see vehicle-specific description) but it will take too much refrigerant because of its large internal volume; the receiver/dryer would ice-up too much when extracting the refrigerant, the refrigerant would evaporate too slowly and the extraction process would take too long.*

Vehicle with expansion valve and receiver/dryer

– Remove the receiver/dryer (vehicle-specific; not necessary on all vehicles) and reconnect the lines to each other (use adapters and the Hose - VAS6338/31- from the Refrigerant Circuits Adapter Set 1 - VAS6338/1-). Refer to
⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117
and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Note

- *The receiver/dryer can be flushed depending on the version (remove the dryer cartridge installed inside of it if necessary). Refer to*
⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117
and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- *The receiver/dryer attached to the condenser (on the Audi A3 from MY 2004, for example) remains installed during flushing (it can be flushed due to its design and is only replaced after flushing). Refer to*
⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117
and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- *If the receiver/dryer or dryer cartridge is integrated in the condenser, then they cannot be replaced separately or are not available as a single part, and the condenser must be replaced after flushing. In this case, replace the condenser with the receiver/dryer on these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*
- *Depending on the version, there may be an additional filter element on receiver/dryers where the dryer cartridge can be replaced separately. This filter element must be replaced with the dryer cartridge if necessary.*

– Remove the dryer cartridge on vehicles with a dryer cartridge in the receiver/dryer attached to the condenser (vehicle-specific) and seal off the opening on the receiver/dryer. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Remove the expansion valve (vehicle-specific) and install an adapter from the Refrigerant Circuits Adapter Set 1 - VAS6338/1- in its place. Refer to
⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117

and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– For vehicles with one or multiple shut-off valves and check valves, remove them and install suitable adapters (or manual shut-off valves) from the Refrigerant Circuits Adapter Set 1 - VAS6338/1- in their place. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

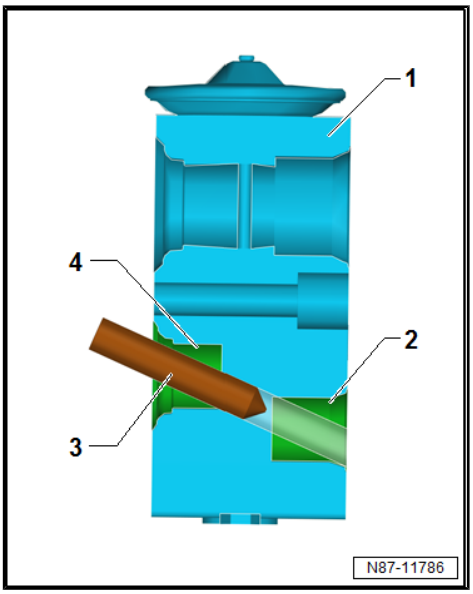
Note

If there is no adapter suitable for the expansion valve in the Refrigerant Circuits Adapter Set 1 - VAS6338/1- , the removed expansion valve can also be drilled open (the old expansion valve must also be replaced in most cases and is therefore no longer required).

Note

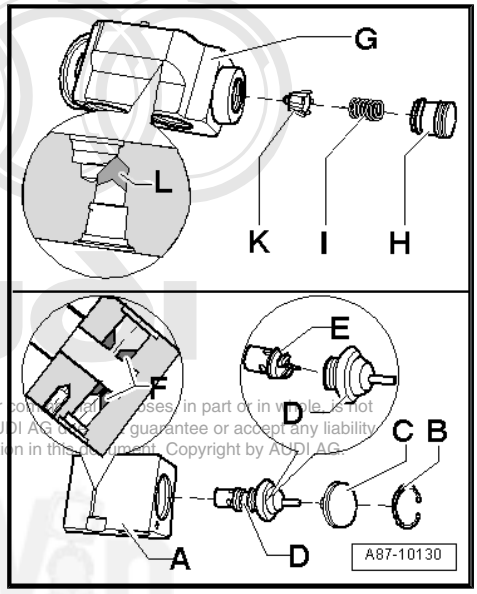
- *Ignore item -3-.*
- *Make sure when drilling that the flow holes -2 and 4- in the expansion valve -1- are offset to each other.*
- *If not paying attention while drilling, the sealing surface on the expansion valve -1- could be damaged and then the expansion valve may no longer be used when installing the flushing circuit.*

Drill a hole for the expansion valve.



Note

- *Before drilling open, remove the regulating element and drill open the expansion valve using a suitable drill, for example (drill bit diameter 6.0 mm, for example).*
- *Several components are to be removed from the expansion valve before drilling open.*
- *Expansion valves are available in various versions and with different constructions. For version -A-, parts -B-, -C- and -D- must be removed, for example. Separate the part -E- (regulating element) from component -D-. Then drill open the expansion valve in area -F- using a suitable drill bit.*
- *For version -G-, for example, parts -H-, -I- and -K- must be removed and then drill open the area -L- using a suitable drill bit.*



– Clean the drilled open expansion valve of residue from the work (shavings).
– Install the parts -B-, -C- and -D- for version -A-, or the part -H- for version -G-.

Note

For vehicles with two evaporators, the circuit to the second evaporator must be disconnected from the circuit of the first evaporator and must be flushed in a separate work procedure. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Flushing

– Check the refrigerant quantity in the A/C service station. There must be at least 6 kg of refrigerant R134a.

Note

If necessary, turn on the heating installed in the A/C service station for the refrigerant cylinder before the first flushing procedure (to increase the pressure in the refrigerant cylinder) and turn it off before the first extraction during the flushing procedure.

– Drain the used oil container of the A/C service station.
– Connect the supply hose (high pressure side) of A/C service station to the low pressure line leading to the A/C compressor (line with larger diameter) using an adapter. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .
– Connect the return hose (low pressure or intake side) of the A/C service station to the output of the refrigerant circuit flushing device.
– Connect the input on the refrigerant circuit flushing device to the high pressure line leading to the A/C compressor (line with smaller diameter) using an adapter. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .

Note

- *Components are always (with the exception of the electric A/C compressor) flushed in the opposite direction of refrigerant flow when the A/C system is operating. Refer to ⇒ "5.5.1 Flushing Circuit Block Diagrams", page 103 .*
- *While flushing, contaminants from the refrigerant circuit enter the refrigerant circuit flushing device and the A/C service station and are absorbed by the filters and dryers installed there. Depending on the contaminant, these components are to be replaced in shorter intervals in line with operating instructions for A/C service station or refrigerant circuit flushing device.*
- *Depending on the type and degree of contamination in the flushed refrigerant circuit, the filter in the refrigerant circuit flushing device must be changed after five to ten flushing cycles (flushed vehicles) at the latest. If a heavily contaminated refrigerant circuit is flushed (the refrigerant oil from the circuit is black and viscous or there are many shavings in the refrigerant circuit), the filter should be replaced after flushing this refrigerant circuit. With a refrigerant circuit heavily contaminated in this way, it is wise to flush the refrigerant circuit again after changing the filter.*
- *Depending on the type of contamination, dirt (old refrigerant oil and abraded material from A/C compressor) accumulates on the viewing glass of the refrigerant circuit flushing device. Clean the viewing glass after flushing if necessary, and flush the refrigerant circuit once more with one flushing procedure as a check (one cycle is sufficient).*
- *Liquid refrigerant cannot be channeled through the expansion valve, restrictor and desiccant bag of certain receiver/dryers at the necessary speed, therefore these components must be removed and replaced by adapters if necessary. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Adapters for connecting the A/C service station and for bridging certain refrigerant circuit components. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .*

– Depending on the refrigerant circuit, assemble the flushing circuit in the vehicle. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .

Vehicles with Two Evaporators in Refrigerant Circuit:

Note

- *The refrigerant circuit is cleaned in two flushing cycles (first the section with the evaporator in the front heater and A/C unit and then the section with the evaporator in the rear heater and A/C unit. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .*
- *For vehicles with two evaporators, the circuit to the second evaporator must be disconnected from the circuit of the first evaporator and must be flushed in a separate work procedure. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Vehicles with High-Voltage System (without Additional A/C System Functions, for Example the Audi A3 e-tron, Audi Q5 hybrid etc.)

Note

- *The refrigerant circuit is cleaned in two flushing cycles (first the section with the evaporator in the front heater and A/C unit and then the section with the high-voltage battery heat exchanger or the evaporator in the battery cooling module). Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .*
- *For vehicles with two evaporators or an evaporator with a heat exchanger, disconnect the circuit to the second evaporator or to the heat exchanger from the circuit for the first evaporator using the manual shut-off valves and flush it in a separate work procedure. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *A flushing cycle currently consists of three flushing procedures one after the other (depending on the program in the respective A/C service station). Refer to ⇒ page 101 .*

– If necessary, close or open the installed manual shut-off valves depending on which section of the refrigerant circuit should be flushed during this flushing cycle.

– Close or open the installed power-operated valves using the designated routine in the corresponding vehicle control module depending on which section of the refrigerant circuit is to be flushed in this flushing cycle.

Vehicles with High-Voltage System (with Additional A/C System Functions, such as Heat Pump Operation on Audi Q7 e-tron, for Example)

Note

- *The refrigerant circuit is cleaned in multiple flushing cycles. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).*
- *To flush, the circuit is divided into multiple sections and then cleaned during one flushing cycle at a time. It is divided by activating the installed electrically activated valves and using the installed manual shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).*
- *A flushing cycle currently consists of three flushing procedures one after the other (depending on the program in the respective A/C service station). Refer to ⇒ page 101 .*
- *The design of the different flushing circuits for these vehicles is described in the respective vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).*

– Close or open the installed manual shut-off valves depending on which section of the refrigerant circuit should be flushed during this flushing cycle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).
– Close or open the installed power-operated valves using the designated routine in the corresponding vehicle control module depending on which section of the refrigerant circuit is to be flushed in this flushing cycle. Use the Vehicle Diagnostic Tester ⇒ Vehicle diagnostic tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).

All Vehicles

– Turn on the A/C service station and flush the refrigerant circuit (duration approximately one to one and a half hours for one flushing cycle with three flushing operations).

Note

- *Perform the flushing procedure according to operating instructions of the A/C service station. Refer to the A/C Service Station Operating Instructions.*
- *Depending on version of A/C service station, the used oil container only holds approximately 125 cm ^{3} of refrigerant oil. If a system with a larger quantity of refrigerant oil must be flushed, it may be necessary to drain the used oil container after the first flushing procedure of one flushing cycle.*
- *Observe the refrigerant that flows back into the A/C service station from the refrigerant circuit. Only when the refrigerant streams clear and completely colorless through the viewing glass on the refrigerant circuit flushing device into the A/C service station is the refrigerant circuit cleaned.*
- *All the refrigerant oil is washed out of the refrigerant circuit during flushing (except for a very small amount in the evaporator, however this can be disregarded).*
- *If heavily contaminated, it may be necessary to perform the flushing procedure twice (two flushing cycles with three flushing operations each).*

Sequence of flushing procedure (sequence occurs automatically according to the A/C service station program)

- After turning on, the flushing circuit (refrigerant circuit with connecting hoses and refrigerant circuit flushing device) is evacuated first and the refrigerant circuit is checked for leaks at the same time. Depending on the A/C service station version, manually switching to advance the program may be required. Refer to the A/C Service Station Operating Instructions .
- A prescribed quantity of refrigerant (such as 5 kg) is added to the evacuated refrigerant circuit via the high pressure side of the A/C service station (in the opposite direction of normal flow when A/C system is in operation and also on the low pressure side of the vehicle refrigerant circuit), or, it is filled with so much refrigerant until the refrigerant circuit and viewing glasses on the refrigerant circuit flushing device are completely filled with fluid refrigerant (depending on version of A/C service station, it detects, for example, that refrigerant no longer flows in over a certain time period).

- ♦ After the prescribed quantity of refrigerant has been filled, for example, the heater for the refrigerant circuit flushing device is turned on (only if the refrigerant is extracted in its gaseous form from the refrigerant circuit flushing device), depending on version of A/C service station and refrigerant circuit flushing device.
- ♦ After the refrigerant has been extracted, the heating of the refrigerant circuit flushing device is switched off (if equipped). Depending on the version, the refrigerant circuit may be briefly evacuated again. After evacuation, the refrigerant oil extracted from the refrigerant circuit is separated by the A/C service station.
- ♦ The sequence of filling refrigerant, extracting (and evacuating) is repeated twice (performed a total of three times). Refer to the A/C Service Station Operating Instructions.
- ♦ After the third extraction, the flushing circuit is evacuated depending on the version of the A/C service station.

– After the flushing procedure has ended, check the viewing glass(es) of the refrigerant circuit flushing device. If they are dirty, clean them if necessary according to the operating instructions for the refrigerant circuit flushing device or A/C service station and perform the flushing procedure once more as a test (one cycle is sufficient, duration approximately 30 minutes). Refer to the Operating Instructions for the A/C Service Station.

– Check the pressure in the refrigerant circuit; there must be no positive pressure in the refrigerant circuit (evacuate briefly once more if necessary).

– Disconnect the connections to the A/C service station from the vehicle refrigerant circuit (there must be no positive pressure in the refrigerant circuit).

– Replace these vehicle-specific components (restrictor and reservoir, expansion valve and receiver/dryer or dryer cartridge in the receiver/dryer). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog .

– Replace the A/C compressor, depending on the complaint (refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual) and Parts Catalog), or drain the rest of the refrigerant oil from the removed A/C compressor (refer to ⇒ “9 Refrigerant Circuit Components, Replacing”, page 283 ; replacing refrigerant circuit components) and fill with the specified amount of new refrigerant oil (refer to ⇒ “10.3 Approved Refrigerant Oils and Capacities”, page 340 ; approved refrigerant oils and capacities).

Note

- *There is a specific prescribed amount of refrigerant oil in the replacement A/C compressor. If the vehicle has two evaporators, a certain amount of refrigerant oil must also be added to the circuit if necessary. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ "10.3 Approved Refrigerant Oils and Capacities", page 340 (Approved Refrigerant Oils and Capacities).*
- *If the A/C compressor is not to be replaced, the quantity of refrigerant oil in the A/C compressor must be topped off according to the prescribed capacity (pour out the refrigerant oil and refill the prescribed quantity into the A/C compressor or refrigerant circuit). Refer to ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 (replacing refrigerant circuit components) and ⇒ "10.3 Approved Refrigerant Oils and Capacities", page 340 (approved refrigerant oils and capacities).*

– Completely reassemble the refrigerant circuit again. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Evacuate and fill the refrigerant circuit according to specification. Refer to ⇒ "5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station", page 79 and ⇒ "5.3.6 Refrigerant Circuit, Charging with A/C Service Station", page 84 .

– Start the A/C system according to specification. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit; A/C System, Starting Operation after Charging Refrigerant Circuit (vehicle-specific repair manual) and ⇒ "5.3.7 A/C System, Operating after Charging", page 86 .

⇒ "5.5.1 Flushing Circuit Block Diagrams", page 103

⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117

⇒ "5.5.2 Electrically-Driven A/C Compressor, Flushing (Removing Refrigerant Oil)", page 112

5.5.1 Flushing Circuit Block Diagrams

Note

- *The arrows in the following illustrations show the refrigerant flow direction during flushing (refrigerant flows in the opposite direction of flow when A/C system is in operation while flushing, therefore the high pressure side of the A/C service system is connected to the low pressure connection of the refrigerant circuit to the A/C compressor).*
- *These block diagrams indicate a refrigerant circuit with restrictor and reservoir, and a refrigerant circuit with expansion valve, receiver/dryer and a second evaporator (optional equipment on certain vehicles).*
- *Depending on the design of the A/C service station, check valves may be installed between the refrigerant circuit and the A/C service station (to guarantee the correct direction of refrigerant flow during flushing).*

Flushing Circuit on Vehicles with High-Voltage System

Refrigerant Circuit with Restrictor and Reservoir. Refer to ⇒ page 104 .

Refrigerant Circuit with Expansion Valve, Receiver/Dryer and Second Evaporator. Refer to ⇒ page 107 .

Vehicles with High-Voltage System (without Additional A/C System Functions, for Example the Audi A3 e-tron, Audi Q5 hybrid etc.). Refer to ⇒ page 111 .

Vehicles with High-Voltage System (with Additional A/C System Functions, such as Heat Pump Operation on Audi Q7 e-tron, for Example). Refer to ⇒ page 111 .

Refrigerant Circuit with Restrictor and Reservoir

Note

For vehicles with a restrictor and reservoir, the restrictor and reservoir are removed and the lines that were disconnected to remove the restrictor are reassembled. The line connections to the removed reservoir are connected with each other via two adapters and the Hose - VAS6338/31- (from the Refrigerant Circuits Adapter Set 1 - VAS6338/1-).

1 - A/C Service Station

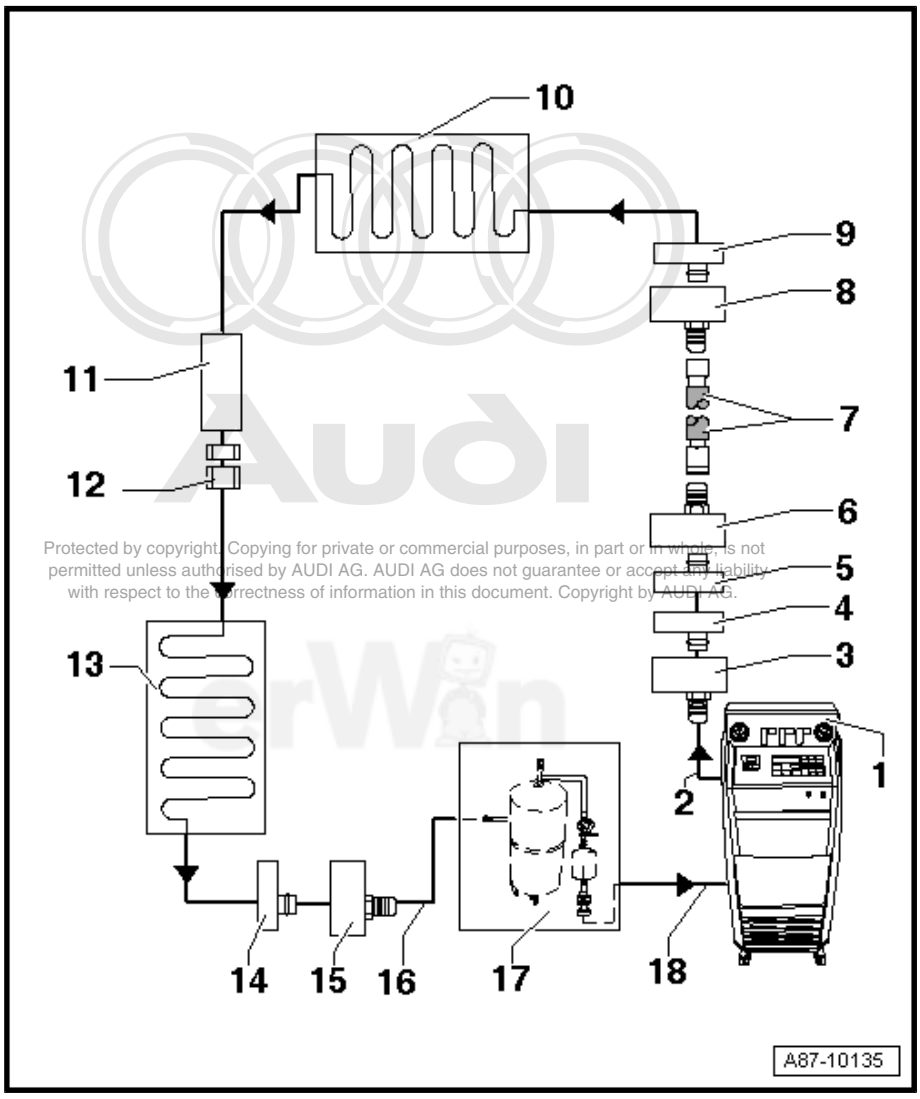
- With electronics and a flushing program, for example A/C Service Station with Flushing Device . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- If an A/C service station without a flushing program is used, the procedure must be performed manually (evacuate, flush three times with at least 4 kg refrigerant each and extract refrigerant again, evacuate).

2 - A/C Service Station Refrigerant Hose

- From the high pressure side of the A/C service station (mostly colored red) to the connection for the low pressure side of the A/C compressor on the refrigerant circuit (larger diameter).

3 - Adapter to Connection for Low Pressure Side on Refrigerant Circuit

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .



- From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

4 - Low Pressure Side Connection on Refrigerant Circuit

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- On the refrigerant line from the A/C compressor to the reservoir

5 - Connection to Reservoir

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- On the refrigerant line from the A/C compressor to the reservoir

6 - Adapter for Bridging Removed Reservoir

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

7 - Refrigerant Charging Hose. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .

- For example, Hose - VAS6338/31- (from the Refrigerant Circuits Adapter Set 1 - VAS6338/1-)

8 - Adapter for Bridging Removed Reservoir

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

9 - Connection to Reservoir

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .

10 - Evaporator

11 - Restrictor Component Location

- The restrictor is removed.
- Restrictor, Removing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

12 - Refrigerant Line Threaded Connection

- Bolt together again after removing the restrictor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

13 - Condenser

14 - High Pressure Side Connection on Refrigerant Circuit

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .

15 - Adapter to Connection for High Pressure Side on Refrigerant Circuit

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

16 - Charging Hose for Refrigerant Circuit Flushing Device

- From the connection to the high pressure side of the A/C compressor on the refrigerant circuit (smaller diameter) to the input of the refrigerant circuit flushing device.

17 - Refrigerant Circuit Flushing Device

- There are different versions of the Refrigerant Circuit Flushing Device . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- With filter, viewing glass, safety valve, heater, refrigerant reservoir, etc. (depending on version).
- Depending on the construction of the A/C service station and of refrigerant circuit flushing device, a check-valve may be installed at output of refrigerant circuit flushing device (to guarantee correct direction of refrigerant flow during flushing).
- Depending on the design of the refrigerant circuit flushing device, a connection for a refrigerant circuit service coupling may be located at the outlet (and possibly also at the inlet) of the flushing device (instead of a 5/8-18 UNF external thread). If a service connection with a valve is installed on the outlet of the

flushing device, this valve must be all the way open when the service coupling is attached (a partially opened valve creates a constriction). If there is a connection for a service coupling on the inlet of the flushing device, the inlet must be modified so that the refrigerant hose coming from the vehicle can be directly connected (a service coupling and a valve in the flushing device inlet create a constriction that impedes the flow of refrigerant from the vehicle to the flushing device and thus the flushing procedure).

Caution

Risk of icing over the output of the flushing device via the installed valve which is not correctly opened.

A partially opened valve installed in this connection creates a constriction that impairs the flow of refrigerant in the flushing device and can ice over due to severe cooling.

If there is a service connection with a valve on the outlet of the flushing device, this valve must be all the way open during the flushing procedure.

If there is too strong of cooling (icing over) at the outlet of the flushing device during the flushing procedure, stop the flushing procedure and evacuate the refrigerant from the flushing device and the vehicle via the high and low pressure side. Check the valve in the outlet of the flushing device and service it if necessary.

Risk of icing on the input of the flushing device due to a constriction which is created via a service coupling and in a service connection installed valve.

Remove the service connection installed on this connection, and connect the service hose that comes from the vehicle directly (without constriction) to the flushing device, possibly using a necessary adapter (depending on the inlet thread of the flushing device).

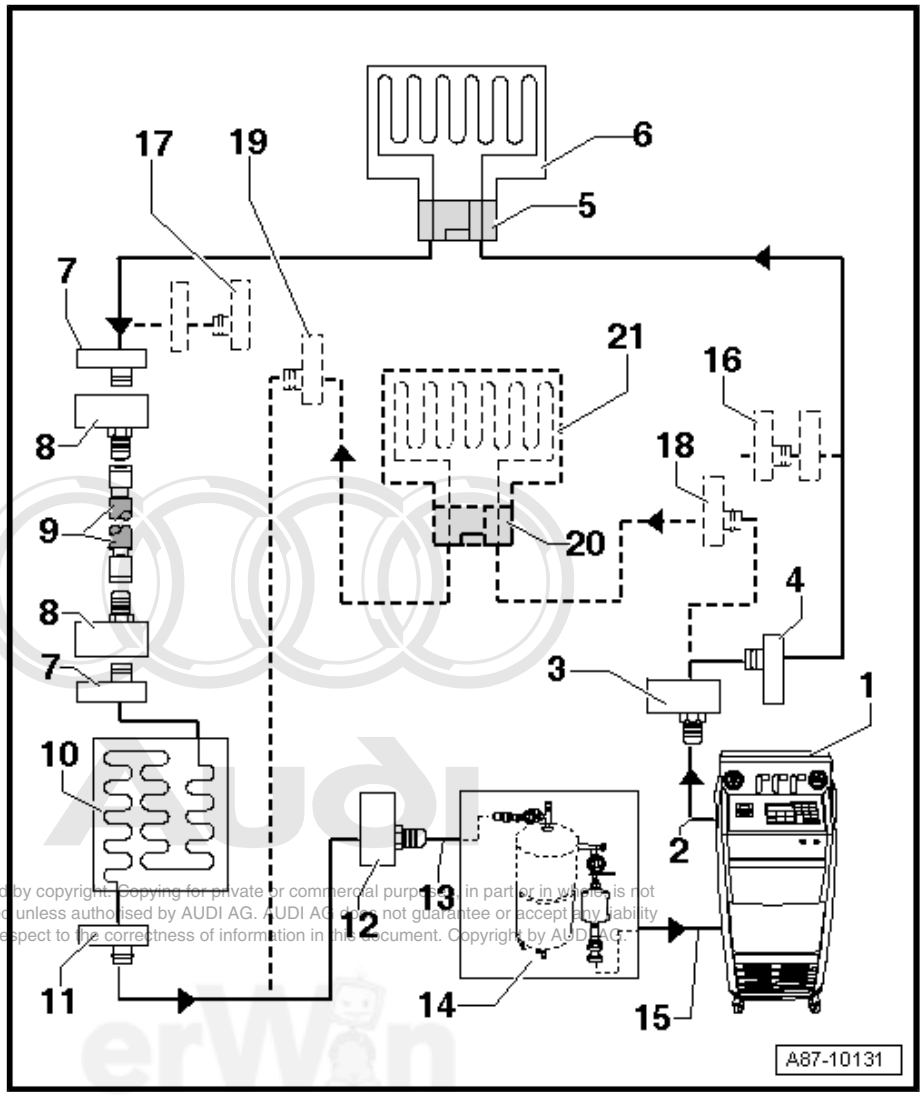
18 - A/C Service Station Refrigerant Hose

- From the A/C service station low pressure side (mostly blue) to the outlet of the refrigerant circuit flushing device.

Refrigerant Circuit with Expansion Valve, Receiver/Dryer and Second Evaporator

Note

- *This main wiring diagram shows a refrigerant circuit with expansion valve, receiver/dryer and second evaporator (optional equipment on certain vehicles).*
- *On vehicles with an expansion valve and receiver/dryer, the expansion valve is removed and replaced by an adapter. Depending on the vehicle, the receiver/dryer must also be removed and line connections to fluid reservoir be connected to each other by two adapters and a charge hose.*
- *On a vehicle with only one evaporator, components from item "16" are not present or are not needed.*



1 - A/C Service Station

- ❑ With electronics and a flushing program, A/C Service Station With Flushing Device . Refer to Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- ❑ If an A/C service station without a flushing program is used, the procedure must be performed manually (evacuate, flush three times with at least 4 kg refrigerant each and extract refrigerant again, evacuate).

2 - A/C Service Station Refrigerant Hose

- ❑ From the high pressure side of the A/C service station (mostly colored red) to the connection for the low pressure side of the A/C compressor on the refrigerant circuit (larger diameter).

3 - Adapter to Connection for Low Pressure Side on Refrigerant Circuit

- ❑ There are different versions depending on the vehicle. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .
- ❑ From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

4 - Low Pressure Side Connection on Refrigerant Circuit

- ❑ There are different versions depending on the vehicle. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .

5 - Adapter for Removed Expansion Valve

- ❑ There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- ❑ From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

6 - Evaporator

7 - Connection to Receiver/Dryer

- ❑ There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- ❑ Not present on vehicles with a dryer cartridge in the receiver/dryer on the condenser or with a receiver/dryer installed in the condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

8 - Adapter for Bridging Removed Receiver/Dryer

- ❑ Not required for all vehicles.
- ❑ There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- ❑ From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

9 - Refrigerant Charging Hose. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .

- ❑ For example, Hose - VAS6338/31- (from the Refrigerant Circuits Adapter Set 1 - VAS6338/1-)

10 - Condenser

- ❑ If a receiver/dryer with dryer cartridge is installed on the condenser, the dryer cartridge must be removed (reseal the receiver/dryer at or in the condenser after removing). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- ❑ If the receiver/dryer is attached directly to the condenser, the receiver/dryer must be removed and replaced only after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Note

On certain vehicles the receiver/dryer is integrated inside the condenser and the dryer cartridge cannot be replaced separately and is not available as a single part. In this case, replace the condenser with the receiver/dryer / dryer cartridge after flushing on these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

11 - High Pressure Side Connection on Refrigerant Circuit

- ❑ There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .

12 - Adapter to Connection for High Pressure Side on Refrigerant Circuit

- ❑ There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- ❑ From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

13 - Charging Hose for Refrigerant Circuit Flushing Device

- ❑ From the connection to the high pressure side of the A/C compressor on the refrigerant circuit (smaller diameter) to the input of the refrigerant circuit flushing device.

14 - Refrigerant Circuit Flushing Device

- ❑ There are different versions of the Refrigerant Circuit Flushing Device . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- ❑ With filter, viewing glass, safety valve, heater, refrigerant reservoir, etc. (depending on version).

- Depending on the construction of the A/C service station and of refrigerant circuit flushing device, a check-valve may be installed at output of refrigerant circuit flushing device (to guarantee correct direction of refrigerant flow during flushing).
- Depending on the design of the refrigerant circuit flushing device, a connection for a refrigerant circuit service coupling may be located at the outlet (and possibly also at the inlet) of the flushing device (instead of a 5/8-18 UNF external thread). If a service connection with a valve is installed on the outlet of the flushing device, this valve must be all the way open when the service coupling is attached (a partially opened valve creates a constriction). If there is a connection for a service coupling on the inlet of the flushing device, the inlet must be modified so that the refrigerant hose coming from the vehicle can be directly connected (a service coupling and a valve in the flushing device inlet create a constriction that impedes the flow of refrigerant from the vehicle to the flushing device and thus the flushing procedure).

Caution

Risk of icing over the output of the flushing device via the installed valve which is not correctly opened.
A partially opened valve installed in this connection creates a constriction that impairs the flow of refrigerant in the flushing device and can ice over due to severe cooling.

If there is a service connection with a valve on the outlet of the flushing device, this valve must be all the way open during the flushing procedure.

If there is too strong of cooling (icing over) at the outlet of the flushing device during the flushing procedure, stop the flushing procedure and evacuate the refrigerant from the flushing device and the vehicle via the high and low pressure side. Check the valve in the outlet of the flushing device and service it if necessary.

Risk of icing on the input of the flushing device due to a constriction which is created via a service coupling and in a service connection installed valve.
Remove the service connection installed on this connection, and connect the service hose that comes from the vehicle directly (without constriction) to the flushing device, possibly using a necessary adapter (depending on the inlet thread of the flushing device).

15 - A/C Service Station Refrigerant Hose

- From the A/C service station low pressure side (mostly blue) to the outlet of the refrigerant circuit flushing device.

16 - Adapter for Sealing Outlet to Second Evaporator

- Only necessary on certain vehicles with optional equipment “second evaporator”
- From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

17 - Adapter for Sealing Outlet to Second Evaporator

- Only necessary on certain vehicles with optional equipment “second evaporator”
- From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

18 - Low Pressure Side Connection on Refrigerant Circuit to Second Evaporator

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- Only present on certain vehicles with optional equipment “second evaporator”

19 - High Pressure Side Connection on Refrigerant Circuit to Second Evaporator

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- Only present on certain vehicles with optional equipment “second evaporator”

20 - Adapter for Removed Expansion Valve on Second Evaporator

- There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- Only necessary on certain vehicles with optional equipment “second evaporator”
- From the Refrigerant Circuits Adapter Set 1 - VAS6338/1-

21 - Second Evaporator

- Only present on certain vehicles with optional equipment “second evaporator”

Vehicles with High-Voltage System (without Additional A/C System Functions, for Example the Audi A3 e-tron, Audi Q5 hybrid etc.)

Note

- *The refrigerant circuit is cleaned with one or two flushing cycles depending on its design.*
- *On vehicles without a high-voltage battery heat exchanger (refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit; System Overview - Refrigerant Circuit) the refrigerant circuit is cleaned with a flushing cycle. Refer to ⇒ page 107 .*
- *On vehicles with high-voltage battery heat exchanger or battery cooling module evaporator (refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit; System Overview - Refrigerant Circuit) the refrigerant circuit is cleaned in the second flushing cycle (first in the step with the evaporator in the front heater and A/C unit and the step with the high-voltage battery heat exchanger or the evaporator in the battery cooling module). Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .*
- *For vehicles with two evaporators or an evaporator with a heat exchanger, disconnect the circuit to the second evaporator or to the heat exchanger from the circuit for the first evaporator using the manual shut-off valves and flush it in a separate work procedure. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *The design of the different flushing circuits for this vehicle is similar to a vehicle with two evaporators. Refer to ⇒ page 107 .*

Vehicles with High-Voltage System (with Additional A/C System Functions, such as Heat Pump Operation on Audi Q7 e-tron, for Example)

Note

- *The refrigerant circuit is cleaned in multiple flushing cycles. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).*
- *To flush, the circuit is divided into multiple sections and then cleaned during one flushing cycle at a time. It is divided by activating the installed electrically activated valves and using the installed manual shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).*
- *The design of the different flushing circuits for these vehicles is described in the respective vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).*

5.5.2 Electrically-Driven A/C Compressor, Flushing (Removing Refrigerant Oil)

General notes to remove the refrigerant oil from the electrically driven A/C compressor (by flushing).

Note

- *Electrically driven A/C compressors cannot have the refrigerant oil poured out in the same manner as a mechanically driven A/C compressor. There is no drain plug and because it is installed inside defending on the version only a specialized part or no refrigerant oil can be poured out. Depending on the version and the storage of the A/C compressor there remains when pouring our approximately 30 to 80 cm ^{3} refrigerant oil in the A/C compressor (the electrically driven A/C compressor cannot be turned). For this reason, the A/C compressor is to be flushed to remove the refrigerant oil and to determine the amount of refrigerant oil in the A/C compressor, depending on the complaint. Refer to*
  ⇒ “9.1.4 Compressor, Replacing without the Need for Flushing Refrigerant Circuit”, page 288 .
- *The refrigerant oil can be removed by flushing in the flow direction for electrically driven A/C compressors (because of the installed valve it is not possible to flush against the flow direction).*
- *To flush, arrange the A/C compressor so that the connection for the refrigerant line on the high pressure side is as low as possible.*

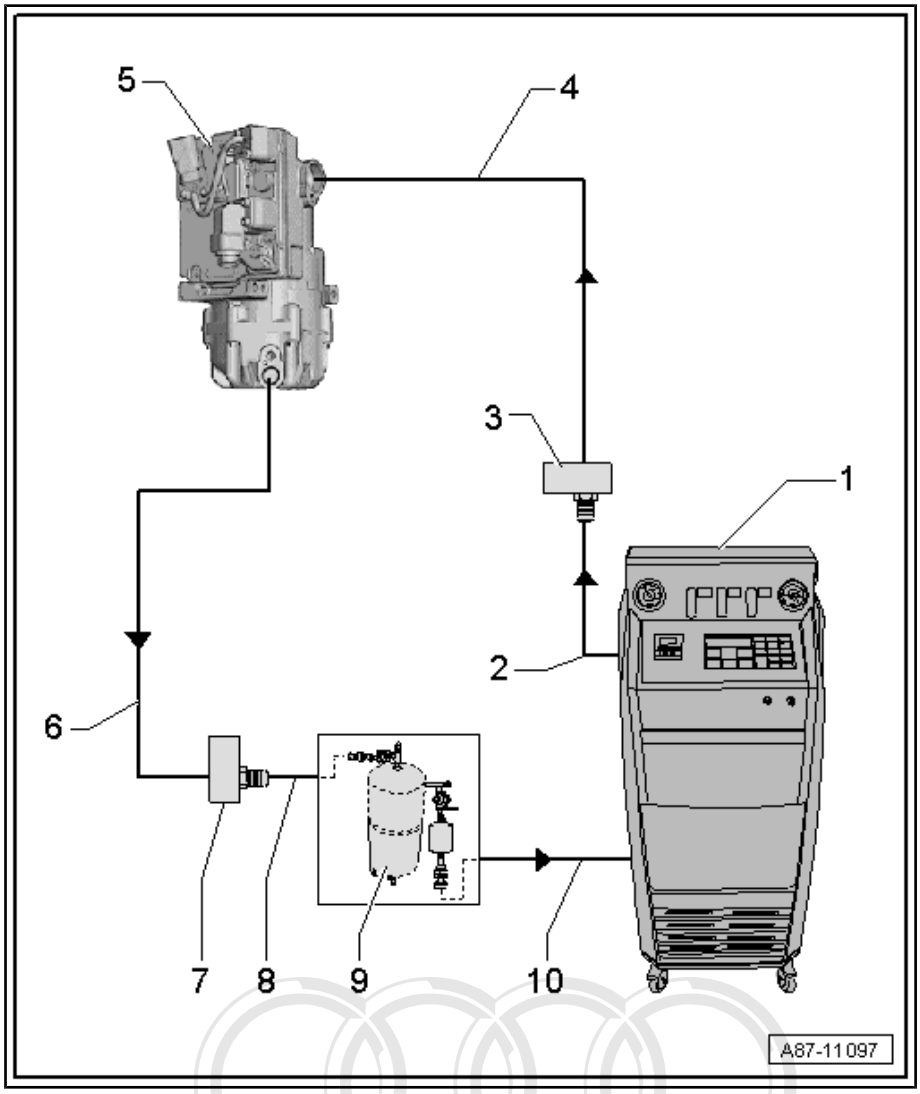
- The electrically driven A/C compressor is to be flushed when, there is dirt, too much refrigerant oil is in the refrigerant circuit, or is contaminated (with moisture debris) and to remove refrigerant oil from the A/C compressor. In these cases the refrigerant circuit must also be flushed, so that it will be cleaned and the correct refrigerant oil quantity for the refrigerant circuit can be set. Refer to
  ⇒ “10.3.2 Refrigerant Oil Capacities”, page 340 .
- If the electrically driven A/C compressor is replaced, it is not always necessary to flush the coolant circuit. The amount of refrigerant oil found in the removed A/C compressor can be removed by flushing the A/C compressor. Pour the refrigerant oil out of the new A/C compressor so that only the amount remains (plus 10 cm ^{3}) as before the old A/C compressor was flushed out. Refer to
  ⇒ “9.1.4 Compressor, Replacing without the Need for Flushing Refrigerant Circuit”, page 288 .
- To remove the refrigerant oil from the removed A/C compressor the refrigerant oil must be flushed from the replaced A/C compressors and the removed amount measured (Empty the used oil collection from the A/C service station before flushing). Pour the refrigerant oil out of the new A/C compressor so that only the amount or refrigerant oil remains (plus 10 cm ^{3}) in the new A/C compressor as the amount of flushed out refrigerant oil from the old A/C compressor. Dispose of the refrigerant oil removed from the defective and the new A/C compressor and poured out refrigerant oil from the new A/C compressor. Refer to ⇒ Audi ServiceNet, HSO Environment (pay attention to local regulations).
- If not enough refrigerant oil can be poured out from the A/C compressor to be installed, flush the new A/C compressor. Fill the A/C compressor to be installed in after flushing with as much new refrigerant oil as was flushed from the removed A/

C compressor. Example: 120 cm ^{3} of refrigerant oil was flushed out of the removed A/C compressor and there is 200 cm^3 in the new A/C compressor to be installed (refer to the type plate and ⇒ “10.3.2 Refrigerant Oil Capacities”, page 340). 110 cm^3 (120 cm^3 minus 10 cm^3) must be poured out of the A/C compressor to be installed so that the amount of refrigerant oil in the refrigerant circuit after installing is correct. If the required amount of refrigerant oil cannot be poured out, flush the A/C compressor to be installed. In the new A/C compressor as much refrigerant oil is to be filled as was flushed out of the old A/C compressor.

Flush the electrically driven A/C compressor.

Note

Depending on the A/C compressor, a larger amount of refrigerant oil (for example, 290 cm^3 on an Audi Q7 e-tron) may be filled in a new A/C compressor (refer to the manufacturer label on the A/C compressor and ⇒ “10.3.2 Refrigerant Oil Capacities”, page 340). On a new A/C compressor that is filled with more than 100 cm^3, pour out as much refrigerant oil as possible before flushing. Reason: depending on the A/C service station version, the oil amount that is deposited/separated in one step may be limited (150 cm^3, for example). For additional information. Refer to -item 5- ⇒ Item 5 (page 114) .



1 - A/C Service Station

- With electronics and a flushing program, A/C Service Station With Flushing Device . Refer to Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- If an A/C service station without a flushing program is used, the procedure must be performed manually (evacuate, flush three times with at least 2 kg refrigerant each and extract refrigerant again, evacuate).

2 - A/C Service Station Refrigerant Hose

- From the high pressure side of the A/C service station (mostly colored red) to the connection for the low pressure side of the A/C compressor on the refrigerant circuit (larger diameter).

3 - Adapter to the Connection for the Low Pressure Side on the A/C Compressor

- There are different versions depending on the vehicle. Refer to ⇒ "5.5.3 Adapter for Assembling Flushing Circuit", page 117 .
- Use the adapter from the Refrigerant Circuits Adapter Set 1 - VAS6338/1- (here the Adapter - VAS6338/41-).

4 - Refrigerant Line

- For connecting the A/C compressor to the adapter -item 3- ⇒ Item 3 (page 114) .

Note

- *Only use the refrigerant line when the Adapter - VAS6338/41- is not available.*
- *If the Adapter - VAS6338/41- is not available to remove the flushing circuit, for example remove the refrigerant lines to the condenser, from the vehicle (or use a refrigerant line with the part number 7L6 820 744 AD). Refer to the Parts Catalog).*

5 - Electrically-Driven A/C Compressor

- The A/C compressor is flushed in the flow direction (from the low pressure side input to the high pressure side output)
- So that as much refrigerant oil as possible is flushed out from the A/C compressor, the A/C compressor must be positioned so that the high pressure side output is as low as possible

Caution

Risk to A/C service station function depending on the version and the amount of refrigerant oil in the A/C compressor

- *Depending on the A/C service station version, the oil amount that is deposited in one step may be limited (100 cm^3, for example). Pay attention to the A/C service station operating instructions and technical product description.*
- *Depending on the A/C compressor, a larger amount of refrigerant oil (for example, 290 cm^3 on an Audi Q7 e-tron) may be filled in a new A/C compressor (refer to ⇒ "10.3.2 Refrigerant Oil Capacities", page 340 and ⇒ "9.1.4 Compressor, Replacing without the Need for Flushing Refrigerant Circuit", page 288).*
- *On a new A/C compressor that is filled with more than 150 cm^3, pour out as much refrigerant oil as possible (via the high and low pressure connection) into a clean container before flushing. This prevents the A/C service station oil separator from overfilling during the flushing procedure.*
- *Then flush the rest of the refrigerant oil out of the A/C compressor.*

Note

If the clean refrigerant oil is poured out of a new A/C compressor into a clean container and the A/C compressor is then sealed air-tight, this refrigerant oil can be reused to adjust the amount of refrigerant oil in the circuit.

6 - Refrigerant Line

- ❑ For connecting the A/C compressor to the adapter -item 7- ⇒ Item 7 (page 116) .

Note

- *Only use the refrigerant line when the Adapter - VAS6338/40- is not available.*
- *If the Adapter - VAS6338/40- is not available to remove the flushing circuit, use for example, a refrigerant line with the part number 7L6 820 721 BF or 4G0 260 701 AB. Refer to Parts Catalog.*

7 - Adapter to the High Pressure Side Connection on the Refrigerant Circuit

- ❑ There are different versions depending on the vehicle. Refer to ⇒ “5.5.3 Adapter for Assembling Flushing Circuit”, page 117 .
- ❑ Use the adapter from the Refrigerant Circuits Adapter Set 1 - VAS6338/1- (here the Adapter - VAS6338/40-).

8 - Charging Hose for Refrigerant Circuit Flushing Device

- ❑ From the connection to the high pressure side of the A/C compressor on the refrigerant circuit (smaller diameter) to the input of the refrigerant circuit flushing device.

9 - Refrigerant Circuit Flushing Device

- ❑ There are different versions of the Refrigerant Circuit Flushing Device . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- ❑ With filter, viewing glass, safety valve, heater, refrigerant reservoir, etc. (depending on version).
- ❑ Depending on the construction of the A/C service station and of refrigerant circuit flushing device, a check-valve may be installed at output of refrigerant circuit flushing device (to guarantee correct direction of refrigerant flow during flushing).
- ❑ Depending on the design of the refrigerant circuit flushing device, a connection for a refrigerant circuit service coupling may be located at the outlet (and possibly also at the inlet) of the flushing device (instead of a 5/8-18 UNF external thread). If a service connection with a valve is installed on the outlet of the flushing device, this valve must be all the way open when the service coupling is attached (a partially opened valve creates a constriction). If there is a connection for a service coupling on the inlet of the flushing device, the inlet must be modified so that the refrigerant hose coming from the vehicle can be directly connected (a service coupling and a valve in the flushing device inlet create a constriction that impedes the flow of refrigerant from the vehicle to the flushing device and thus the flushing procedure).

Caution

Risk of icing over the output of the flushing device via the installed valve which is not correctly opened.

A partially opened valve installed in this connection creates a constriction that impairs the flow of refrigerant in the flushing device and can ice over due to severe cooling.

If there is a service connection with a valve on the outlet of the flushing device, this valve must be all the way open during the flushing procedure.

If there is too strong of cooling (icing over) at the outlet of the flushing device during the flushing procedure, stop the flushing procedure and evacuate the refrigerant from the flushing device and the vehicle via the high and low pressure side. Check the valve in the outlet of the flushing device and service it if necessary.

Risk of icing on the input of the flushing device due to a constriction which is created via a service coupling and in a service connection installed valve.

Remove the service connection installed on this connection, and connect the service hose that comes from the vehicle directly (without constriction) to the flushing device, possibly using a necessary adapter (depending on the inlet thread of the flushing device).

10 - A/C Service Station Refrigerant Hose

- ❑ From the A/C service station low pressure side (mostly blue) to the outlet of the refrigerant circuit flushing device.

5.5.3 Adapter for Assembling Flushing Circuit

- ♦ Various adapters which are required to connect the A/C service station to the refrigerant circuit for flushing and to bridge

the removed receiver/dryer or reservoir and expansion valve (specific to vehicle) are in the following table.

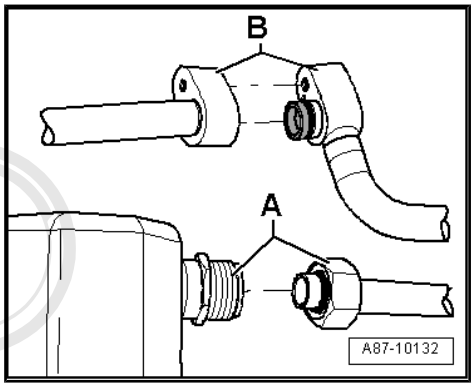
- Using a charge hose with 5/8 -18 UNF connections (short version, for example Refrigerant Circuits Adapter Set 1 - Adapter 31 - VAS6338/31-), connect the two adapters (contained in Refrigerant Circuits Adapter Set 1 - VAS6338/1-) which have been installed for the removed reservoir or receiver/dryer.
- If a flushed refrigerant circuit is not reassembled immediately after flushing, leave the adapters on the connections and seal the connections on the adapters using Refrigerant Circuits Adapter Set 1 - Adapter 30 - VAS6338/30- (from Refrigerant Circuits Adapter Set 1 - VAS6338/1-).
- Depending on the A/C compressor version and the date of manufacture, different connection and sealing techniques can be found on the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- Beginning from production year 2006, the name of the “Zexel” A/C compressor was changed from “Zexel” to “Valeo”.

Block or screw connections

– Threaded connection -A-

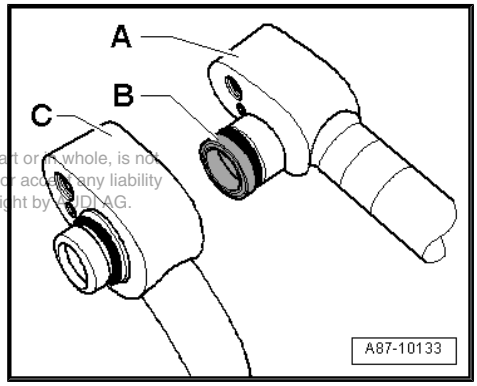
– Block connection -B-

Block connections with different types of seals



– Block connection with radially sealed connection -A- (with plastic or metal guide -B-)

– Block connection with axial sealing connection -C-



Assembling the Flushing Circuit	
Audi A1 (8X_) and Audi A2	Refer to ⇒ page 119
Audi A1 (GB_)	Refer to ⇒ page 121
Audi Q2, Audi A3, Audi Q3 and Audi TT	Refer to ⇒ page 121
Audi Q2L e-tron (GAG) from MY 2019	Refer to ⇒ page 123
Audi A3 e-tron	Refer to ⇒ page 125
Audi 80, Audi 90, Audi Coupe, Audi Cabriolet and Audi A4	Refer to ⇒ page 129
Audi A5 Coupe and Sportback, Audi Q5, Audi A5 Cabriolet	Refer to ⇒ page 133
Audi Q5 Hybrid	Refer to ⇒ page 135
Audi 100, Audi A6 (4A_, 4B_ and 4F_), Audi allroad and Audi V8	Refer to ⇒ page 139

Assembling the Flushing Circuit	
Audi A6 (4G_ or 4X_ for China), Audi A7 (4G_ or 4X_ for China)	Refer to ⇒ page 140
Audi A6 Hybrid, Audi A6 e-tron	Refer to ⇒ page 142
Audi A6 (4A_ or 48_ for China), Audi A7 (4K_)	Refer to ⇒ page 147
Audi A7 TFSI e (4K) from MY 2018	Refer to ⇒ page 148
Audi A8 (4D_, 4E_ and 4H_)	Refer to ⇒ page 150
Audi A8 Hybrid (4H_)	Refer to ⇒ page 154
Audi A8 (4N_)	Refer to ⇒ page 158
Audi A8 (4N_) TFSIe from MY 2019	Refer to ⇒ page 161
Audi Q7 (4L_)	Refer to ⇒ page 163
Audi Q7 (4M_), Audi Q8 (4M_)	Refer to ⇒ page 165
Audi Q7 e-tron (4M_)	Refer to ⇒ page 167
Audi R8 (42_)	Refer to ⇒ page 169
Audi R8 (4S_)	Refer to ⇒ page 170
Audi e-tron (GE_) from MY 2019	Refer to ⇒ page 172

Audi A1 (8X_) from MY 2011 and Audi A2

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
Audi A1 (8X_) from MY 2011	– Compressor manufacturer “Denso”, “Sanden” or “Delphi/ Mahle” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- or Refrigerant Circuits Adapter Set 1 - Adapter 2 - VAS6338/2- (depending on the version of the A/C compressor and its refrigerant line).	Different versions – Version 1 (the receiver/dryer is integrated on the condenser): the adapter is not needed, the desiccant bag is removed form the receiver/dryer on the condenser and opening is closed again for flushing. – Version 2 (receiver/ dryer attached to the condenser): the adapter is not needed, the receiver/ dryer remains installed (it will be replaced after flushing)	The expansion valve is removed and the Refrigerant Circuits Adapter Set 1 - Adapter 34 - VAS6338/ 34- or Refrigerant Circuits Adapter Set 1 - Adapter 39 - VAS6338/ 39- (see the note below) is installed (or the removed expansion valve is drilled for flushing and installed again). Refer to ⇒ page 97 .

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
Audi A2 (8Z_) from MY 2001	– Compressor manufacturer “Denso” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 2 - VAS6338/2-	Reservoir – Threaded connection at input Refrigerant Circuits Adapter Set 1 - Adapter 9 - VAS6338/9- . – Block connection with axial sealing at output Refrigerant Circuits Adapter Set 1 - Adapter 10 - VAS6338/10- .	- Restrictor removed, connections reconnected

Note

- *The receiver/dryer may be attached to or integrated in the condenser on the Audi A1 / S1, depending on the version of the condenser. A dryer cartridge is installed in the integrated receiver/dryer and can be replaced separately. An attached receiver/dryer (introduction TBD) must be replaced after the flushing. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *There are different versions of the A/C unit (different heater core and sears different expansion valve etc.) depending on time period of production and from the VIN number on Audi A1 / S1. Refer to the Parts Catalog. Vehicles with the type keys “8X1” and “8XA” in the VIN have an expansion valve installed, where both refrigerant lines are attached at the top. This is where the Refrigerant Circuits Adapter Set 1 - Adapter 34 - VAS6338/34- fits. Vehicles with the type keys “8XF” and “8XK” in the VIN have an expansion valve installed, where both refrigerant lines are attached from below. This is where the Refrigerant Circuits Adapter Set 1 - Adapter 39 - VAS6338/39- fits. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Audi Q2, Audi A3, Audi Q3, Audi TT and Audi A1 (GB_) from MY 2019

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters Necessary for the Connections to the Reservoir or Receiver/Dryer	Miscellaneous
Audi A3 (8L_) from MY 1997 Audi TT (8N_) from MY 1999	– Compressor manufacturer “Sanden” or “Zexel / Valeo” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 7 - VAS6338/7- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 2 - VAS6338/2-	Receiver/Dryer – Block connections with axial sealing at input and output Refrigerant Circuits Adapter Set 1 - Adapter 2 - VAS6338/2- (necessary two times).	Expansion valve removed and Refrigerant Circuits Adapter Set 1 - Adapter 19 - VAS6338/19- installed (or drilled expansion valve, for example 6N0 820 679 C installed, refer to ⇒ page 97).
Audi A3 (8P_) from MY 2004 Audi TT (8J_) from MY 2007 Audi Q3 (8U_ / 84_) from MY 2012	– Compressor manufacturer for the Audi A3 / Audi Q3: “Sanden”, “Denso”, “Delphi/ Mahle” or “Zexel / Valeo” – Compressor manufacturer for the Audi TT: “Denso”, “Sanden” or “Delphi/ Mahle” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/dryer (different versions) – No adapter needed, the receiver/ dryer remains installed – Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note).	Expansion valve removed and Refrigerant Circuits Adapter Set 1 - Adapter 18 - VAS6338/18- installed (or drilled expansion valve, for example 1K0 820 679 installed). Refer to ⇒ page 97 .

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters Necessary for the Connections to the Reservoir or Receiver/Dryer	Miscellaneous
Audi Q2 (GA_), Audi A3 (8V_/85_) from MY 2013 Audi TT (FV_) from MY 2015 Audi Q2 (G1_) from MY 2019 Audi Q3 (F3_/G2_) from MY 2019 Audi A1 (GB) from MY 2019, Audi A3 (8Y_) from MY 2021	– Compressor manufacturer: “Denso” or “Sanden”, ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- ♦	Receiver/dryer (different versions) – No adapter necessary, the receiver/dryer remains installed (or is integrated in the condenser). – Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note).	Expansion valve removed and Refrigerant Circuits Adapter Set 1 - Adapter 38 - VAS6338/38- installed (or drilled expansion valve, for example 5Q0 820 679 X installed). Refer to ⇒ page 97

Note

- *Depending on the condenser manufacturer, the receiver/dryer version is different. An Audi TT (8J_) from MY 2007 with a 5-cylinder engine has a different condenser version than on models with a 4- or 6-cylinder engine. The receiver/dryer is, for example, inside the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. If there is a complaint regarding a vehicle with this condenser, it may be necessary to replace the entire condenser after correcting the complaint. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*

Audi Q2L e-tron (GAG) from MY 2019

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters Necessary for the Connections to the Reservoir or Receiver/Dryer	Miscellaneous
Audi Q2L e-tron (GAG) from MY 2019	♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	– Remove the dryer cartridge before flushing out of the receiver/dryer on the condenser and reseal the opening refer to the notes).	♦ Expansion valve remove and installed with the Refrigerant Circuits - Adapter 38 - VAS6338/38- (or a drilled open expansion valve, refer to ⇒ page 97 .)

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters Necessary for the Connections to the Reservoir or Receiver/Dryer	Miscellaneous
	Required adapter / lines for the connections to the electrically driven A/C compressor (to flush the A/C compressor) (refer to ⇒ page 113) (flushing the electrically-driven A/C compressor).		♦ The refrigerant oil is removed by flushing in the flow direction for electrically-driven A/C compressors (because of the installed valve it is not possible to flush against the flow direction). ♦ To flush, arrange the A/C compressor so that the connection for the refrigerant line on the high pressure side is as low as possible.

Note

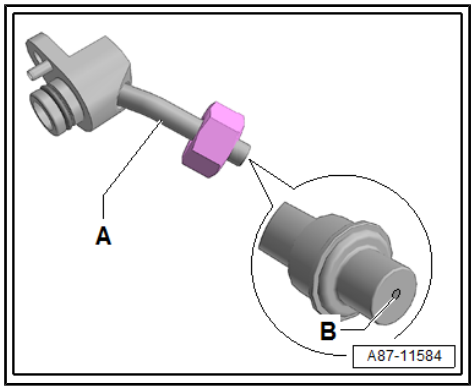
After flushing the dryer cartridge in the receiver/dryer on the condenser must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .

Audi A3 e-tron

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
Audi A3 (8V_/ 85_) from 2013	– Compressor manufacturer: “Denso” or “Sanden”, ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/dryer (different versions) – No adapter necessary, the receiver/dryer remains installed (or is integrated in the condenser). – Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note). ♦ Refrigerant Circuits Adapter Set - Shut-Off Valve - VAS6338/42-	♦ Expansion valve removed and Refrigerant Circuits Adapter Set 1 - Adapter 38 - VAS6338/38- installed (or drilled expansion valve, for example 5Q0 820 679 X installed). Refer to ⇒ page 97 ♦ Heater and A/C Unit Refrigerant Shut-Off Valve -N541- and High-Voltage Battery Heater Core Refrigerant Shut-Off Valve -N542- removed and a Shut-Off Valve - VAS6338/42- installed (refer to the notes below). Replace the Heater and A/C Unit Refrigerant Shut-Off Valve -N541- and High-Voltage Battery Heater Core Refrigerant Shut-Off Valve -N542- after flushing.

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
			♦ The restrictor in the refrigerant line to the high-voltage battery heat exchanger is removed or the refrigerant line is drilled (refer to the notes below). Replace after flushing.

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
	Required adapter / lines for the connections to the electrically driven A/C compressor (to flush the A/C compressor) (refer to ⇒ page 113) (flushing the electrically-driven A/C compressor).		◆ The refrigerant oil is removed by flushing in the flow direction for electrically-driven A/C compressors (because of the installed valve it is not possible to flush against the flow direction). ◆ To flush, arrange the A/C compressor so that the connection for the refrigerant line on the high pressure side is as low as possible.



Note

- *On the Audi A3 e-tron the refrigerant circuit is flushed in two sections. In the first flushing cycle, the adapter, which is installed for the Heater and A/C Unit Refrigerant Shut-Off Valve -N541- , is opened and the adapter, which is installed for the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve -N542- is closed. Thus the refrigerant circuit with the evaporator in the A/C unit is flushed. In the second flushing cycle, the adapter, which is installed for the Heater and A/C Unit Refrigerant Shut-Off Valve -N541- , is closed and the adapter, which is installed for the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve -N542- is opened. The refrigerant circuit with the evaporator in the high-voltage battery heat exchanger is flushed as a result. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *This illustration shows a refrigerant line -A- with a permanently installed restrictor -B- (without screen). This refrigerant line is drilled with a suitable drill 5.0 mm to flush the refrigerant circuit (an inserted restrictor is removed) and cleaned in the flushing circuit before installing. The refrigerant line or an inserted restrictor must be replaced after flushing. Refer to Parts Catalog.*
- *The diameter of the illustrated restrictor hole -B- is approximately 0.7 mm. Depending on the version of the refrigerant line, this constriction is either permanently installed in the refrigerant line or is only inserted. A screen to separate floating deposits may be installed on the inserted version, which can block the restrictor hole.*
- *The version of the receiver/dryer on the Audi A3 will differ depending on the manufacturer of the condenser. The receiver/dryer is, for example, inside the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. If there is a complaint regarding a vehicle with this condenser, it may be necessary to replace the entire condenser after correcting the complaint. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*

Audi 80, Audi 90, Audi Coupe, Audi Cabriolet and Audi A4

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
Audi 80 (8A_/ 8C_), Audi Coupe (8B_), Audi Cabriolet (8G_) through MY 2002 Audi A4 (8D_) from MY 1995	– Compressor manufacturer “Zexel / Valeo” (threaded connections) ♦ Low pressure side A/C Adapter Set - Adapter 8 - VAG 1785/8- ♦ High pressure side A/C Adapter Set - Adapter 7 - VAS1785/7-	Reservoir with different connection versions ♦ Version “1” – Threaded connection at input Refrigerant Circuits Adapter Set 1 - Adapter 9 - VAS6338/9- . – Threaded connection at output A/C Adapter Set - Adapter 8 - VAG 1785/8-	- Restrictor removed, connections reconnected
	– Compressor manufacturer “Denso” (block connections with radial and axial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 2 - VAS6338/2-	♦ Version “2” – Threaded connection at input Refrigerant Circuits Adapter Set 1 - Adapter 9 - VAS6338/9- . – Block connection with axial sealing at output Refrigerant Circuits Adapter Set 1 - Adapter 10 - VAS6338/10- .	
Audi A4 (8E_) from MY 2001 Audi A4 Cabriolet (8H_) from MY 2003	– Compressor manufacturer “Denso” (block connections with radial and axial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 2 - VAS6338/2-	Reservoir with different connection versions ♦ Version “1” – Block connections with axial sealing at input and output ♦ Refrigerant Circuits Adapter Set 1 - Adapter 10 - VAS6338/10- (necessary two times)	- Restrictor removed, connections reconnected

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
	– Compressor manufacturer “Denso” (block connections with radial seal). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	♦ Version “2” – Block connections with radial sealing at input and output ♦ Refrigerant Circuits Adapter Set 1 - Adapter 8 - VAS6338/8- (necessary two times)	

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
Audi A4 (8K_) from MY 2008	– Compressor manufacturer “Denso” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/dryer (different versions) – No adapter needed, the receiver/dryer remains installed – Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note).	Expansion valve removed and Refrigerant Circuits Adapter Set 1 - Adapter 36 - VAS6338/36- installed (or drilled expansion valve, for example 8K0 820 679 A installed). Refer to ⇒ page 97 . – The refrigerant line with the inner heat exchanger remains installed or will be installed after installing the adapter.

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
Audi A4 (8W_) from MY 2016 Audi A4 (86_) from MY 2017	– Compressor manufacturer: “Denso” or “Sanden” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	– No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- is installed (or an old expansion valve is drilled on and installed as an adapter. Refer to ⇒ page 97 and the Parts Catalog.

Note

- *Depending on the condenser manufacturer, the receiver/dryer version for the Audi A4 (8K_) from MY 2008 varies. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). The receiver/dryer may be attached to or integrated in the condenser, depending on the version of the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. In the event there is a complaint on a vehicle with this condenser, the condenser must be completely replaced. Refer to the Parts Catalog.*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*

Audi A5 Coupe and Sportback, Audi Q5, Audi A5 Cabriolet

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
Audi A5 Coupe and Sportback (8T_) from MY 2008 Audi Q5 (8R_ / 83_) from MY 2008 Audi A5 Cabriolet (8F_) from MY 2009	– Compressor manufacturer “Denso” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/dryer (different versions) – No adapter needed, the receiver/dryer remains installed – Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note).	Expansion valve removed and Refrigerant Circuits Adapter Set 1 - Adapter 36 - VAS6338/36- installed (or drilled expansion valve, for example 8K0 820 679 A installed). Refer to ⇒ page 97 . – The refrigerant line with the inner heat exchanger remains installed or will be installed after installing the adapter.

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
Audi A5 (F5_) from MY 2016 Audi Q5 (FY_) from MY 2017 Audi Q5 (87_) 2019	– Compressor manufacturer: “Denso” or “Sanden” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	– No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- is installed (or an old expansion valve is drilled on and installed as an adapter). Refer to ⇒ page 97 and the Parts Catalog.

Note

- *Depending on the condenser manufacturer, the receiver/dryer version for these vehicles varies. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). The receiver/dryer may be attached to or integrated in the condenser, depending on the version of the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. In the event there is a complaint on a vehicle with this condenser, the condenser must be completely replaced. Refer to the Parts Catalog.*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*

Audi Q5 Hybrid

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
Audi Q5 (8R_) from MY 2011	Required adapters for the connections to A/C compressor – Compressor manufacturer “Denso” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/dryer (different versions) – No adapter needed, the receiver/dryer remains installed – Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note).	Expansion valve removed and Refrigerant Circuits Adapter Set 1 - Adapter 36 - VAS6338/36- installed (or drilled expansion valve, for example 8K0 820 679 A installed). Refer to ⇒ page 97 . – The refrigerant line with the inner heat exchanger remains installed or will be installed after installing the adapter.

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
◆ Additionally on vehicles with battery cooling module		To flush the circuit with the evaporator in the A/C unit and the condenser ◆ Refrigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- for sealing the “low pressure side” connection (to the second evaporator in the battery cooling module) ◆ Refrigerant Circuits Adapter Set 1 - Adapter 11 - VAS6338/11- for sealing the “high pressure side” connection (to the second evaporator in the battery cooling module) ◆ Shut-Off Valves - VAS6338/42- or A/C Adapter Set - Adapter 5 - VAG 1785/5- to install for the removed Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- (refer to the notes).	To flush the circuit, there are several methods ◆ Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- removed and a Shut-Off Valve - VAS6338/42- installed (refer to the notes below) Replace the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- after flushing. ◆ Flush the circuit in one or two steps (see notes).
		To flush the evaporator in the battery cooling module and the corresponding lines ◆ Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- for connecting the A/C service station to the “low-pressure side” connection (for the second evaporator). ◆ Refrigerant Circuits Adapter Set 1 - Adapter 4 - VAS6338/4- for connecting the A/C service station to the “high-pressure side” connection (for the second evaporator).	The expansion valve in the refrigerant lines for the second evaporator is removed and the Refrigerant Circuits Adapter 36 - VAS6338/36- is installed (or the removed expansion valve is drilled for flushing and reinstalled) Refer to ⇒ page 97 .

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
	Required adapter / lines for the connections to the electrically driven A/C compressor (to flush the A/C compressor) (refer to ⇒ page 113) (flushing the electrically-driven A/C compressor).		◆ The refrigerant oil is removed by flushing in the flow direction for electrically-driven A/C compressors (because of the installed valve it is not possible to flush against the flow direction). ◆ To flush, arrange the A/C compressor so that the connection for the refrigerant line on the high pressure side is as low as possible.

Note

- *In vehicles with two evaporators, the refrigerant circuit is flushed in two / three work steps.*
- *Currently the expansion valves on the evaporator in the A/C unit and on the evaporator in the battery cooling module have the same connections (only the control characteristics and those on the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- are different).*
- *The refrigerant circuit cannot be rinsed with a Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- installed in the circuit to the evaporator in the A/C unit. The Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- is in a constricted location and prevents the refrigerant from reaching a sufficient flow speed. If a Shut-Off Valve - VAS6338/42- is available, install it for the Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- and open. If the Shut-Off Valves - VAS6338/42- are not available, but there are two A/C Adapter Set - Adapters 5 - VAG 1785/5- , the circuit with the evaporator in the A/C unit can be flushed in one work procedure (reassemble the circuit with a filler hose and two A/C Adapter Set - Adapters 5 - VAG 1785/5-). If the Shut-Off Valve - VAS6338/42- is not available and there is only one A/C Adapter Set - Adapters 5 - VAG 1785/5- available, the circuit must be flushed in two steps. From the low pressure connection on the A/C compressor via the evaporator in the A/C unit up to the connection for the removed Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- and from the connection for the removed Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- via the condenser to the high pressure connection on the A/C compressor.*
- *The Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Depending on the condenser manufacturer, the receiver/dryer version for these vehicles varies. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). The receiver/dryer may be attached to or integrated in the condenser, depending on the version of the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. In the event there is a complaint on a vehicle with this condenser, the condenser must be completely replaced. Refer to the Parts Catalog.*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*

Audi 100, Audi A6 (4A_, 4B_ and 4F_), Audi allroad and Audi V8

Vehicle	Required Adapters for the Connections to A/C Compressor	Required adapters for the connections to the reservoir	Miscellaneous
Audi 100 / Audi A6 (4A_) through MY 1998 Audi A6 (4B_) from MY 1998 Audi allroad (4B_) through MY 2005 Audi V8 (4C_) through 1994	– Compressor manufacturer “Zexel / Valeo” (threaded connections) ♦ Low pressure side A/C Adapter Set - Adapter 8 - VAG 1785/8- ♦ High pressure side A/C Adapter Set - Adapter 7 - VAS1785/7-	Reservoir with different connection versions ♦ Version “1” – Threaded connection at input Refrigerant Circuits Adapter Set 1 - Adapter 9 - VAS6338/9- . – Threaded connection at output A/C Adapter Set - Adapter 8 - VAG 1785/8-	- Restrictor removed, connections reconnected
	– Compressor manufacturer “Denso” (block connections with radial and axial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 2 - VAS6338/2-	♦ Version “2” – Threaded connection at input Refrigerant Circuits Adapter Set 1 - Adapter 9 - VAS6338/9- . – Block connection with axial sealing at output Refrigerant Circuits Adapter Set 1 - Adapter 10 - VAS6338/10- . ♦ Version “3” – Block connections with axial sealing at input and output Refrigerant Circuits Adapter Set 1 - Adapter 10 - VAS6338/10- (necessary twice).	

Vehicle	Required Adapters for the Connections to A/C Compressor	Required adapters for the connections to the reservoir	Miscellaneous
Audi A6 (4F_) from MY 2005	– Compressor manufacturer “Denso” (block connections with radial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	– Reservoir with radially sealed block connections at input and output ♦ Refrigerant Circuits Adapter Set 1 - Adapter 8 - VAS6338/8- (necessary two times)	- Restrictor removed, connections reconnected

Note

The specifications for the Audi A6 (4F_) from MY 2005 also apply to the Audi S6 and Audi RS 6.

Audi A6 (4G_ or 4X_ for China), Audi A7 (4G_ or 4X_ for China)

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
Audi A6 (4G_ / 4X_) from MY 2011 Audi A7 (4G_ / 4X_) from MY 2011	– Compressor manufacturer “Denso” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/dryer (different versions) – No adapter needed, the receiver/dryer remains installed – Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note).	The expansion valve is removed and the Refrigerant Circuits Adapter 18 - VAS6338/18- (or the removed expansion valve is drilled for flushing and installed again). Refer to ⇒ page 97 .

Note

- *The type designation 4X_ is used instead of the type designation 4G_ for specific versions in China*
- *Depending on the condenser manufacturer, the receiver/dryer version for these vehicles varies. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*

Audi A6 Hybrid and Audi A6 e-tron

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
Audi A6 (4G_) from MY 2012	Required adapters for the connections to A/C compressor – Compressor manufacturer “Denso” (A6 Hybrid) or “Sanden” (A6 e-tron) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/dryer (different versions) – No adapter needed, the receiver/dryer remains installed A6 Hybrid – Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note). A6 e-tron – Detach the receiver/dryer from the bracket. With the refrigerant lines connected, turn 180 degrees and secure it so that the connections are on the bottom (in this way the refrigerant is evacuated as a liquid when flushing and the receiver/dryer does not ice over). Refer to the notes.	Expansion valve is removed and Refrigerant Circuits Adapter 18 - VAS6338/18- (or an old, drilled out and cleaned expansion valve is installed, refer to ⇒ page 97). – The refrigerant line with the inner heat exchanger remains installed or will be installed after installing the adapter.

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
◆ Additional information for a vehicle with a battery cooling module or heat exchanger		To flush the circuit with the evaporator in the A/C unit and the condenser ◆ Refrigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- for sealing the “low pressure side” connection (for the second evaporator in the battery cooling module or on the heat exchanger) ◆ Refrigerant Circuits Adapter Set 1 - Adapter 11 - VAS6338/11- for sealing the “high pressure side” connection (for the second evaporator in the battery cooling module or on the heat exchanger) ◆ Shut-Off Valves - VAS6338/42- or A/C Adapter Set - Adapter 5 - VAG 1785/5- for installing the removed Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- or Refrigerant Shut-Off Valve -V424- (refer to notes)	To flush the circuit, there are several methods ◆ Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- / Refrigerant Shut-Off Valve -V424- removed and one Shut-Off Valve - VAS6338/42- installed (refer to notes below) ◆ Flush the circuit in one or two steps (see notes).

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
		To flush the evaporator in the battery cooling module (Audi A6 Hybrid) or at the high-voltage battery heat exchanger (Audi A6 e-tron) and the associated lines ♦ Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- for connecting the A/C service station to the “low-pressure side” connection (for the second evaporator). ♦ Refrigerant Circuits Adapter Set 1 - Adapter 4 - VAS6338/4- for connecting the A/C service station to the “high-pressure side” connection (for the second evaporator). ♦ Shut-Off Valves - VAS6338/42- for installing the removed Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- / Refrigerant Shut-Off Valve - V424-	Expansion valve in the refrigerant lines to the second evaporator / heat exchanger is removed and Refrigerant Circuits Adapter 36 - VAS6338/36- or Refrigerant Circuits Adapter Set 1 - Adapter 18 - VAS6338/18- (different connections depending on the version) is installed (or the old removed expansion valve is drilled for flushing and is reinstalled; refer to ⇒ page 97).

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
	Required adapter / lines for the connections to the electrically driven A/C compressor (to flush the A/C compressor) (refer to ⇒ page 113) (flushing the electrically-driven A/C compressor).		◆ The refrigerant oil is removed by flushing in the flow direction for electrically-driven A/C compressors (because of the installed valve it is not possible to flush against the flow direction). ◆ To flush, arrange the A/C compressor so that the connection for the refrigerant line on the high pressure side is as low as possible.

Note

- *The type designation 4X_ is used instead of the type designation 4G_ for specific versions in China*
- *For vehicles with two evaporators (one evaporator in the A/C unit and one evaporator in the battery cooling module or on the high-voltage battery heat exchanger, for example in the Audi A6 e-tron), the refrigerant circuit is flushed in two/three steps.*
- *The expansion valve on the evaporator in the A/C unit and on the evaporator in the battery cooling module (Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- on the A6 Hybrid or the expansion valve with the Refrigerant Shut-Off Valve 2 - N640- on the A6 e-tron) does not currently always have the same connections (when they have the same connections, they differ in the control characteristic). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *The refrigerant circuit cannot be flushed with a shut-off valve installed in the circuit to the evaporator in the A/C unit (the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- on an A6 Hybrid or the Refrigerant Shut-Off Valve - V424- on an A6 e-tron). The Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- (the Refrigerant Shut-Off Valve -V424-) is a constriction and prevents the refrigerant from flowing at a suitable speed. If a Shut-Off Valve - VAS6338/42- is available, install it for the Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- (the Refrigerant Shut-Off Valve -V424-) and open. If the Shut-Off Valves - VAS6338/42- are not available, but there are two A/C Adapter Set - Adapters 5 - VAG 1785/5- , the circuit with the evaporator in the A/C unit can be flushed in one work procedure (reassemble the circuit with a filler hose and two A/C Adapter Set - Adapters 5 - VAG 1785/5-). If the Shut-Off Valve - VAS6338/42- is not available and there is only one A/C Adapter Set - Adapters 5 - VAG 1785/5- available, the circuit must be flushed in two steps. From the low pressure connection on the A/C compressor via the evaporator in the A/C unit up to the connection for the removed Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- (Refrigerant Shut-Off Valve -V424-) and from the connection for the removed Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- (Refrigerant Shut-Off Valve -V424-) via the condenser to the high pressure connection on the A/C compressor.*
- *The Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- (the Refrigerant Shut-Off Valve 1 -V424-) must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *The receiver/dryer on the Audi A6 e-tron must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit; Receiver/Dryer, Removing and Installing .*
- *Depending on the condenser manufacturer, the receiver/dryer version for these vehicles varies. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). The receiver/dryer may be attached to or integrated in the condenser, depending on the version of the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. In the event there is a complaint on a vehicle with this condenser, the condenser must be completely replaced. Refer to the Parts Catalog.*

- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *On the Audi A6 hybrid it can be helpful to remove both refrigerant lines in the engine compartment from the inner heat exchanger to flush the components in the battery cooling module and the related refrigerant lines. Then the adapters needed for flushing and the corresponding refrigerant hoses can be installed and removed more easily. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *On the Audi A6 hybrid, if the charge hose knurled nut cannot be screwed onto the connection (depending on the tolerance at the refrigerant pipe outlet at the connection) with an Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- attached to the refrigerant line for the evaporator in the battery cooling module, then carefully bend the refrigerant pipe approximately 1 mm to the side.*

Audi A6 (4A_ or 48_ for China), Audi A7 (4K_)

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
Audi A6 (4A_ or for 48_ for China) from MY 2019 Audi A7 (4K) from MY 2018	– Compressor manufacturer “Denso” ♦ Low pressure side Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected to the A/C Service Station and the Refrigerant Circuits Adapter Set - Adapter 48 - VAS6338/48- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	– No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- is installed (or an old expansion valve is drilled on and installed as an adapter). Refer to ⇒ page 97 and the Parts Catalog.

Note

Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Audi A7 (4K_) TFSI e from MY 2019

Vehicle	Required Adapters for the Connections to A/C Compressor	Necessary Adapter for the Connections to the Receiver/Dryer / for the Check Valves and Shut-Off Valves	Miscellaneous
Audi A7 (4K_) TFSI e from MY 2019 ◆ Vehicle with one evaporator	– Compressor manufacturer “Sanden” (block connections with radial sealing) ◆ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ◆ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/Dryer – No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44 - is installed (or an old expansion valve is drilled on and installed as an adapter). Refer to ⇒ page 97 and the Parts Catalog.
		Check Valves – The four check valves are removed and installed for the shut-off valves (-6338/47-1- and -6338/47-2-) from the Shut-off Valves -6338/47- .	The shut-off valves installed for the check valves are opened or closed according to the area to be flushed. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
		Shut-off valve – Remove the Refrigerant Shut-Off Valve -V424- and install a Shut-off Valve - VAS 6338/42- for it.	Then open or close the shut-off valve installed for the shut-off valve according to the area to be flushed. Replace the Refrigerant Shut-Off Valve - V424- after flushing.

Note

- *On the Audi A7 TFSIe, the refrigerant circuit is flushed in four steps (flushing cycles). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *So that the entire refrigerant circuit can be flushed, not only the installed shut-off valve must be positioned correctly (opened or closed) on the Audi A7 TFSIe, Additionally the electric activated valves (in the valve block) must be positioned correctly. The activation of the electric valves takes place via different routines, which are stored in the respective control module (for example in the Thermal Management Control Module - J1024-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *To flush, the circuit on the Audi A7 TFSIe is divided into multiple sections and then cleaned respectively in a flushing cycle. The division takes place by activating the installed electrically activated valves and via the installed manually activated hand shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning) use the ⇒ Vehicle diagnostic tester in the "Guided Fault Finding" function.*
- *The design of the different flushing circuits for the Audi A7 TFSIe is described in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*
- *After flushing, the refrigerant receiver on the heat exchanger for heat pump operation must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*
- *The Refrigerant Shut-Off Valve - V424- must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*

Audi A8

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
Audi A8 (4D_) from MY 1994	– Compressor manufacturer “Zexel / Valeo” (threaded connections) ♦ Low pressure side A/C Adapter Set - Adapter 8 - VAG 1785/8- ♦ High pressure side A/C Adapter Set - Adapter 7 - VAS1785/7-	Reservoir with different connection versions ♦ Version “1” – Threaded connection at input Refrigerant Circuits Adapter Set 1 - Adapter 9 - VAS6338/9- . – Threaded connection at output A/C Adapter Set - Adapter 8 - VAG 1785/8-	- Restrictor removed, connections reconnected
	– Compressor manufacturer “Denso” (block connections with radial and axial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 2 - VAS6338/2-	♦ Version “2” – Threaded connection at input Refrigerant Circuits Adapter Set 1 - Adapter 9 - VAS6338/9- . – Block connection with axial sealing at output Refrigerant Circuits Adapter Set 1 - Adapter 10 - VAS6338/10- . ♦ Version “3” – Block connections with axial sealing at input and output Refrigerant Circuits Adapter Set 1 - Adapter 10 - VAS6338/10- (necessary twice).	
Audi A8 (4E_) from MY 2003	– Compressor manufacturer “Denso” (block connections with radial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Reservoir – Block connections with radial sealing at input and output ♦ Refrigerant Circuits Adapter Set 1 - Adapter 8 - VAS6338/8- (necessary two times)	- Restrictor removed, connections reconnected

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
Audi A8 (4H_) from MY 2010	– Compressor manufacturer “Denso” (block connections with radial sealing) ◆ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ◆ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	– No adapter required, desiccant bag is removed from receiver/dryer on the condenser and the opening is sealed again for flushing.	The expansion valve is removed and the Refrigerant Circuits Adapter 18 - VAS6338/18- (or the removed expansion valve is drilled for flushing and installed again). Refer to ⇒ page 97 .
◆ Additionally on a vehicle with two evaporators (four zone A/C system)		To flush the circuit with the evaporator in the front A/C unit ◆ Refrigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- for sealing the “low pressure side” connection (for the second evaporator). ◆ Refrigerant Circuits Adapter Set 1 - Adapter 11 - VAS6338/11- for sealing the “high pressure side” connection (for the second evaporator). • The adapter may need an additional hole (see below) so that the refrigerant lines can be sealed with the Refrigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- and Refrigerant Circuits Adapter Set 1 - Adapter 11 - VAS6338/11- .	

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters necessary for the connections to the reservoir or receiver/dryer	Miscellaneous
		To flush the second evaporator and corresponding lines ♦ Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- for connecting the A/C service station to the “low-pressure side” connection (for the second evaporator). ♦ Refrigerant Circuits Adapter Set 1 - Adapter 4 - VAS6338/4- for connecting the A/C service station to the “high-pressure side” connection (for the second evaporator). • It may be necessary to rework the adapter (see below) so that the refrigerant line can be attached to the Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- .	The expansion valve in the refrigerant lines for the second evaporator is removed and the Refrigerant Circuits Adapter 18 - VAS6338/18- is installed (or the old removed expansion valve is drilled for flushing and reinstalled (Refer to ⇒ page 97)).

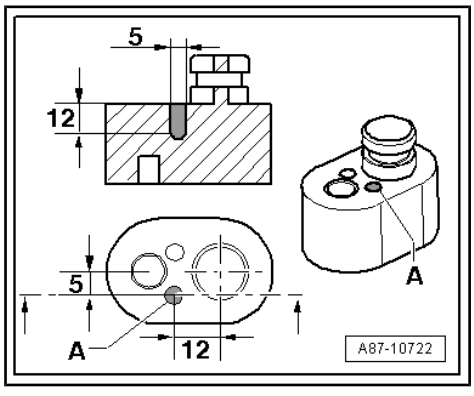
Note

- *In vehicles with two evaporators, the refrigerant circuit is flushed in two work steps.*
- *Currently the front and rear expansion valves have the same connections (only the control characteristics are different)*

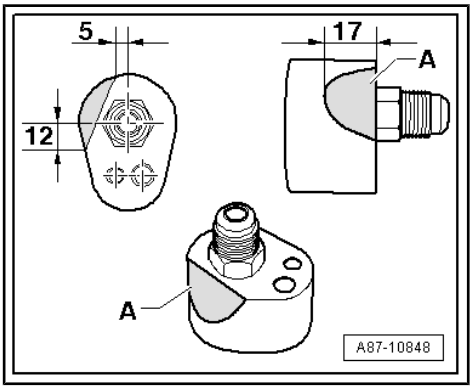
Drill an additional hole in the Refrigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- and Refrigerant Circuits Adapter Set 1 - Adapter 11 -VAS6338/11- .

– Drill a hole -A- in addition to the already existing hole (the dimensions in the illustration are given in mm).

Rework the Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- .



– By grinding or filing down material in section -A-, rework the Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- so that it can be connected without bending the refrigerant line (the dimensions in the illustration are in mm).



Audi A8 Hybrid

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
Audi A8 (4H_) from MY 2012	Required adapters for the connections to A/C compressor – Compressor manufacturer “Denso” ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/dryer (different versions) – No adapter needed, the receiver/dryer remains installed – Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note).	Expansion valve is removed and Refrigerant Circuits Adapter 18 - VAS6338/18- (or an old, drilled out and cleaned expansion valve is installed, refer to ⇒ page 97). – The refrigerant line with the inner heat exchanger remains installed or will be installed after installing the adapter.

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
◆ Additionally on vehicles with battery cooling module		To flush the circuit with the evaporator in the A/C unit and the condenser ◆ Refrigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- for sealing the “low pressure side” connection (to the second evaporator in the battery cooling module) ◆ Refrigerant Circuits Adapter Set 1 - Adapter 11 - VAS6338/11- for sealing the “high pressure side” connection (to the second evaporator in the battery cooling module) ◆ Shut-Off Valves - VAS6338/42- or A/C Adapter Set - Adapter 5 - VAG 1785/5- to install for the removed Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- (refer to the notes).	To flush the circuit, there are several methods ◆ Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- removed and a Shut-Off Valve - VAS6338/42- installed (refer to the notes below) Replace the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- after flushing. ◆ Flush the circuit in one or two steps (see notes).
		To flush the evaporator in the battery cooling module and the corresponding lines ◆ Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- for connecting the A/C service station to the “low-pressure side” connection (for the second evaporator). ◆ Refrigerant Circuits Adapter Set 1 - Adapter 4 - VAS6338/4- for connecting the A/C service station to the “high-pressure side” connection (for the second evaporator).	The expansion valve in the refrigerant lines for the second evaporator is removed and the Refrigerant Circuits Adapter 36 - VAS6338/36- is installed (or the removed expansion valve is drilled for flushing and reinstalled) Refer to ⇒ page 97 .

Vehicle	Required adapters for the connections to / from A/C compressor	Required Adapters for the Connections to Receiver/Dryer	Miscellaneous
	Required adapter / lines for the connections to the electrically driven A/C compressor (to flush the A/C compressor) (refer to ⇒ page 113) (flushing the electrically-driven A/C compressor).		♦ The refrigerant oil is removed by flushing in the flow direction for electrically-driven A/C compressors (because of the installed valve it is not possible to flush against the flow direction). ♦ To flush, arrange the A/C compressor so that the connection for the refrigerant line on the high pressure side is as low as possible.

Note

- *In vehicles with two evaporators, the refrigerant circuit is flushed in two / three work steps.*
- *Currently the expansion valve on the evaporator in the A/C unit and on the evaporator in the battery cooling module do not have the same connections.*
- *The refrigerant circuit cannot be rinsed with a Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- installed in the circuit to the evaporator in the A/C unit. The Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- is in a constricted location and prevents the refrigerant from reaching a sufficient flow speed. If a Shut-Off Valve - VAS6338/42- is available, install and open it for the Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- . If the Shut-Off Valve - VAS6338/42- is not available, but there are two A/C Adapter Set - Adapters 5 - VAG 1785/5- and the circuit with the evaporator in the A/C unit can be flushed in one work procedure (reassemble the circuit with a filler hose and two A/C Adapter Set - Adapters 5 - VAG 1785/5-). If the Shut-Off Valve - VAS6338/42- is not available and there is only one A/C Adapter Set - Adapters 5 - VAG 1785/5- available, the circuit must be flushed in two steps. From the low pressure connection on the A/C compressor via the evaporator in the A/C unit up to the connection for the removed Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- and from the connection for the removed Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- via the condenser to the high pressure connection on the A/C compressor.*
- *The Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Depending on the condenser manufacturer, the receiver/dryer version for these vehicles varies. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). The receiver/dryer may be attached to or integrated in the condenser, depending on the version of the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. In the event there is a complaint on a vehicle with this condenser, the condenser must be completely replaced. Refer to the Parts Catalog.*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*

Audi A8 (4N)

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for Connections to Receiver/Dryer / to Second Evaporator	Miscellaneous
Audi A8 (4N) from MY 2018 ◆ Vehicle with one evaporator	– Compressor manufacturer “Denso” (block connections with radial sealing) ◆ Low pressure side Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected to the A/C Service Station and the Refrigerant Circuits Adapter Set - Adapter 48 - VAS6338/48- ◆ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	– No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- is installed (or an old expansion valve is drilled on and installed as an adapter). Refer to ⇒ page 97 and the Parts Catalog.

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for Connections to Receiver/Dryer / to Second Evaporator	Miscellaneous
♦ Additionally on vehicles with two evaporators (four zone A/C system)		To flush the circuit with the evaporator in the front A/C unit ♦ Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- (to seal the refrigerant circuit to the second evaporator)	The expansion valve is removed from the evaporator in the front of the A/C unit and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- is installed. Expansion valve is removed from the refrigerant lines to the evaporator in the rear A/C unit and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- is installed.

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for Connections to Receiver/Dryer / to Second Evaporator	Miscellaneous
		To flush the second evaporator and corresponding lines ♦ Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- (to seal the refrigerant circuit to the evaporator in the front of the A/C unit)	Expansion valve is removed from the evaporator in the front A/C unit and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- is installed. Expansion valve is removed from the refrigerant lines to the evaporator in the rear A/C unit and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- is installed.

Note

- *In vehicles with two evaporators, the refrigerant circuit is flushed in two work steps.*
- *On vehicles with two evaporators, the refrigerant circuit with the evaporator in the front of the A/C unit is flushed first. So that the refrigerant flows in a fixed direction when flushing, the refrigerant circuit to the second evaporator (in rear of A/C unit) must be blocked off. This is done by removing the expansion valve in the refrigerant lines to the second evaporator and installing the Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- (closed adapter). After the refrigerant circuit with the evaporator is flushed, switch both adapters Refrigerant Circuits Adapter Set 1 - Adapter 43 -VAS6338/43- and Refrigerant Circuits Adapter Set 1 - Adapter 44 -VAS6338/44- and flush the refrigerant circuit with the evaporator in the rear of the A/C unit.*

Audi A8 (4N_) TFSIe from MY 2019

Vehicle	Required adapters for the connections to A/C compressor	Necessary adapter for the connections to the receiver/dryer / for the check valves and shut-off valves	Miscellaneous
Audi A8 (4N_) TFSIe from MY 2019 ♦ Vehicle with one evaporator	– Compressor manufacturer “Sanden” (block connections with radial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/Dryer – No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44 - is installed (or an old expansion valve is drilled on and installed as an adapter). Refer to ⇒ page 97 and the Parts Catalog.
		Check Valves – The four check valves are removed and installed for the shut-off valves (-6338/47-1- and -6338/47-2-) from the Shut-off Valves - 6338/47- .	The shut-off valves installed for the check valves are opened or closed according to the area to be flushed. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
		Shut-off valve – Remove the Refrigerant Shut-Off Valve -V424- and install a Shut-off Valve - VAS 6338/42- for it.	Then open or close the shut-off valve installed for the shut-off valve according to the area to be flushed. Replace the Refrigerant Shut-Off Valve - V424- after flushing.

Note

- *On the Audi A8 TFSIe, the refrigerant circuit is flushed in four steps (flushing cycles). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *On the Audi A8 TFSIe, not only do the installed shut-off valves have to be in the correct position (open or closed), but also the electric valves (in the valve block) have to be in the correct position so that the entire refrigerant circuit can be flushed. The activation of the electric valves takes place via different routines, which are stored in the respective control module (for example in the Thermal Management Control Module - J1024-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*

- *To flush, the circuit on the Audi A8 TFSIe is divided into multiple sections and then cleaned respectively in a flushing cycle. The division takes place by activating the installed electrically activated valves and via the installed manually activated hand shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning) use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.*
- *The design of the different flushing circuits for the Audi A8 TFSIe is described in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *After flushing, the refrigerant receiver on the heat exchanger for heat pump operation must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*
- *The Refrigerant Shut-Off Valve - V424- must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*

Audi Q7 (4L_)

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for Connections to Receiver/Dryer / to Second Evaporator	Miscellaneous
Audi Q7 (4L_) from MY 2006 ♦ Vehicles with one evaporator (two-zone A/C system)	– Compressor manufacturer “Denso” (block connections with radial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	– No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	Expansion valve removed and Refrigerant Circuits Adapter Set 1 - Adapter 17 - VAS6338/17- or Refrigerant Circuits Adapter Set 2 - Adapter 33 - VAS6338/33- installed (depending on the expansion valve version or a drilled expansion valve, for example, 7L0 820 712 A or 7H0 820 679 B or 7L0 820 679 C installed. Refer to ⇒ page 97 .). Refer to Parts Catalog.
♦ Additionally on vehicles with two evaporators (four zone A/C system)		To flush the circuit with the evaporator in the front A/C unit ♦ Refrigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- for sealing the “low pressure side” connection (for the second evaporator). ♦ Refrigerant Circuits Adapter Set 1 - Adapter 11 - VAS6338/11- for sealing the “high pressure side” connection (for the second evaporator).	

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for Connections to Receiver/Dryer / to Second Evaporator	Miscellaneous
		To flush the second evaporator and corresponding lines ◆ Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- for connecting the A/C service station to the “low-pressure side” connection (for the second evaporator). ◆ Refrigerant Circuits Adapter Set 1 - Adapter 4 - VAS6338/4- for connecting the A/C service station to the “high-pressure side” connection (for the second evaporator).	Expansion valve on second evaporator removed and Refrigerant Circuits Adapter Set 1 - Adapter 17 - VAS6338/17- installed (or drilled expansion valve, for example 7L0 820 712 A installed ⇒ page 97). Refer to the Parts Catalog.

Note

In vehicles with two evaporators, the refrigerant circuit is flushed in two work steps.

Audi Q7 (4M_) and Audi Q8 (4M_)

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for Connections to Receiver/Dryer / to Second Evaporator	Miscellaneous
Audi Q7 (4M_) from MY 2016 Audi Q8 (4M_) 2018 ♦ Vehicle with one evaporator	– Compressor manufacturer “Denso” (block connections with radial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	– No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- is installed (or an old expansion valve is drilled on and installed as an adapter). Refer to ⇒ page 97 and the Parts Catalog.
♦ Additionally on vehicles with two evaporators (four zone A/C system)		To flush the circuit with the evaporator in the front A/C unit ♦ Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- (to seal the refrigerant circuit to the second evaporator)	The expansion valve is removed from the evaporator in the front of the A/C unit and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- is installed. Expansion valve is removed from the refrigerant lines to the evaporator in the rear A/C unit and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- is installed.

Vehicle	Required Adapters for the Connections to A/C Compressor	Required Adapters for Connections to Receiver/Dryer / to Second Evaporator	Miscellaneous
		To flush the second evaporator and corresponding lines ♦ Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- (to seal the refrigerant circuit to the evaporator in the front of the A/C unit)	Expansion valve is removed from the evaporator in the front A/C unit and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- is installed. Expansion valve is removed from the refrigerant lines to the evaporator in the rear A/C unit and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- is installed.

Note

- *In vehicles with two evaporators, the refrigerant circuit is flushed in two work steps.*
- *On vehicles with two evaporators, the refrigerant circuit with the evaporator in the front of the A/C unit is flushed first. So that the refrigerant flows in a fixed direction when flushing, the refrigerant circuit to the second evaporator (in rear of A/C unit) must be blocked off. This is done by removing the expansion valve in the refrigerant lines to the second evaporator and installing the Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- (closed adapter). After the refrigerant circuit with the evaporator is flushed, switch both adapters Refrigerant Circuits Adapter Set 1 - Adapter 43 -VAS6338/43- and Refrigerant Circuits Adapter Set 1 - Adapter 44 -VAS6338/44- and flush the refrigerant circuit with the evaporator in the rear of the A/C unit.*

Audi Q7 e-tron (4M_)

Vehicle	Required Adapters for the Connections to A/C Compressor	Necessary adapter for the connections to the receiver/dryer / for the check valves and shut-off valves	Miscellaneous
Audi Q7 e-tron (4M_) from MY 2016 ♦ Vehicle with one evaporator	– Compressor manufacturer “Sanden” (block connections with radial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/Dryer – No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44 - is installed (or an old expansion valve is drilled on and installed as an adapter). Refer to ⇒ page 97 and the Parts Catalog.
		Check Valves – The four check valves are removed and installed for the shut-off valves (-6338/47-1- and -6338/47-2-) from the Shut-off Valves -6338/47- .	The shut-off valves installed for the check valves are opened or closed according to the area to be flushed. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .
		Shut-off valve – Remove the Refrigerant Shut-Off Valve -V424- and install a Shut-off Valve - VAS6338/42- for it.	Then open or close the shut-off valve installed for the shut-off valve according to the area to be flushed. Replace the Refrigerant Shut-Off Valve - V424- after flushing.

Note

- *On the Audi Q7 e-tron, the refrigerant circuit is flushed in four steps (flushing cycles). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *So that the entire refrigerant circuit can be flushed, on the Audi Q7 e-tron not only the installed shut-off valve must be positioned correctly (opened or closed). Additionally the electric activated valves (in the valve block) must be positioned correctly. The activation of the electric valves takes place via different routines, which are stored in the respective control module (for example in the Thermal Management Control Module - J1024-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *To flush on the Audi Q7 e-tron the refrigerant circuit is divided into multiple sections and then cleaned respectively in a flushing cycle. The division takes place by activating the installed electrically activated valves and via the installed manually activated hand shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning) use the ⇒ Vehicle diagnostic tester in the "Guided Fault Finding" function.*
- *The design of the different flushing circuits for the Audi Q7 e-tron is described in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *After flushing, the refrigerant receiver on the heat exchanger for heat pump operation must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*
- *The Refrigerant Shut-Off Valve - V424- must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*

Audi R8 (42_)

Vehicle	Required Adapters for the Connections to A/C Compressor	Required adapters for the connections to the reservoir	Miscellaneous
Audi R8 (42_) from MY 2008	– Compressor manufacturer “Denso” (block connections with radial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Reservoir – Block connections with radial sealing at input and output ♦ Refrigerant Circuits Adapter Set 1 - Adapter 8 - VAS6338/8- (necessary two times)	- Restrictor removed, connections re-connected

Note

- *The A/C compressor can only be removed when the engine is removed on the Audi R8. To flush the refrigerant circuit, the refrigerant lines can be removed when the A/C compressor is installed. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). With the A/C compressor installed the refrigerant oil quantity in the A/C compressor cannot be determined, for this reason flushing the refrigerant circuit with the A/C compressor installed would not be productive.*
- *Both installed condensers are flushed in opposite direction of the refrigerant flow direction.*

Audi R8 (4S_)

Vehicle	Required Adapters for the Connections to A/C Compressor	Required adapters for the connections to the receiver/dryer (with dryer)	Miscellaneous
Audi R8 (4S_) from MY 2015	– Compressor manufacturer “Denso” (block connections with radial sealing) ♦ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ♦ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/Dryer – Block connections with radial sealing at input and output ♦ Refrigerant Circuits Adapter Set 1 - Adapter 45 - VAS6338/45- (2 required)	Expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 36 - VAS6338/44- is installed (or an old expansion valve is drilled on and installed as an adapter). Refer to ⇒ page 97 and the Parts Catalog. The receiver/dryer is removed and both refrigerant line connections are connected to each other with two adapters Refrigerant Circuits Adapter Set 1 - Adapter 45 - VAS6338/45- and a commercially available filler hose (short version with 5/8" thread on both sides).

Note

- *Depending on the engine, the A/C compressor can only be removed when the engine is removed on the Audi R8. To flush the refrigerant circuit, the refrigerant lines can be removed when the A/C compressor is installed. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). With the A/C compressor installed the refrigerant oil quantity in the A/C compressor cannot be determined, for this reason flushing the refrigerant circuit with the A/C compressor installed would not be productive.*
- *Both installed condensers are flushed in opposite direction of the refrigerant flow direction.*
- *A short version of the filler hose is also included in the Refrigerant Circuits Adapter Set 1 - VAS6338/1- .*
- *The receiver/dryer could potentially be flushed but it will take too much refrigerant because of its large internal volume; the receiver/dryer would ice-up too much when extracting the refrigerant, the refrigerant would evaporate too slowly and extraction would be prolonged too much.*

Audi e-tron (GE_) e-tron from MY 2019

Vehicle	Required Adapters for the Connections to A/C Compressor	Necessary Adapter for the Connections to the Receiver/Dryer / for the Check Valves and Shut-Off Valves	Miscellaneous
Audi e-tron (GE_) e-tron from MY 2019	– Compressor manufacturer “Sanden” (block connections with radial sealing) ◆ Low pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- ◆ High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-	Receiver/Dryer – No adapter required, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expansion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44 - is installed (or an old expansion valve is drilled on and installed as an adapter). Refer to ⇒ page 97 and the Parts Catalog .
		Check Valves – The four check valves are removed and installed for the shut-off valves (-6338/47-1- and -6338/47-2-) from the Shut-off Valves - 6338/47- .	The shut-off valves installed for the check valves are opened or closed according to the area to be flushed. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .
		Shut-off valve – Remove the Refrigerant Shut-Off Valve -V424- and install a Shut-off Valve - VAS 6338/42- for it.	Then open or close the shut-off valve installed for the shut-off valve according to the area to be flushed. Replace the Refrigerant Shut-Off Valve - V424- after flushing.

Note

- *On the Audi e-tron, the refrigerant circuit is flushed in four steps (flushing cycles). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *So that the entire refrigerant circuit can be flushed, not only the installed shut-off valve must be positioned correctly (opened or closed) on the Audi e-tron. Additionally the electric activated valves (in the valve block) must be positioned correctly. The activation of the electric valves takes place via different routines, which are stored in the respective control module (for example, in the Thermal Management Control Module - J1024-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *To flush, the refrigerant circuit on the Audi e-tron is divided into multiple sections and then cleaned respectively in a flushing cycle. The division takes place by activating the installed electrically activated valves and via the installed manually activated hand shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning) use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.*
- *The design of the different flushing circuits for the Audi e-tron is described in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).*
- *Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *After flushing, the refrigerant receiver on the heat exchanger for heat pump operation must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*
- *The Refrigerant Shut-Off Valve - V424- must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .*

5.6 Refrigerant Circuit, Determining Leaks

5.6.1 General Information

WARNING

There is a risk of freezing.

Refrigerant may leak out if refrigerant circuit is not discharged.

Note

- *Minor leaks can be detected using an electronic leak detector or UV leak detector lamp.*
- *This repair manual describes two different methods for detecting leaks in the refrigerant circuit. These methods have been tested and result in success when used correctly.*
- *Many methods for detecting leaks in the refrigerant circuit are offered in the open market. These methods do not always have optimum results and if they are not performed exactly to the specification and may result that several components in the refrigerant circuit have leaks. Also, refrigerant circuit components can be damaged by some methods.*
- Do not repair components with leaks; always replace them.
- Do not charge a leaking refrigerant circuit with refrigerant. Evacuate the circuit and check it for leaks before charging. Refer to ⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79 .

Caution

- *Audi does not approve the use of chemicals to seal leaks in the refrigerant circuit (leak stop additives).*
- *Chemicals that seal leaks in the coolant circuit form deposits that affect the function of the A/C system and lead to A/C system failure (and failure of the A/C service station).*

Note

Chemical materials (leak stop additives) to seal leaks in the refrigerant circuit react with air or the moisture in the air and form deposits in the refrigerant circuit (and in the A/C service station) that lead to malfunctions in the valves and other components that come into contact with such chemicals. These deposits cannot be removed completely from the components, even by flushing. It is only possible to service the refrigerant circuit by replacing all the components which come in contact with this material.

5.6.2 Refrigerant Circuit, Tracing Leaks Using Electronic Leak Detector (for example, -VAG1796-)

Note

- *The various refrigerants have differing molecular compositions. The electronic leak detector sensors are set up to detect these molecules. If an electronic leak detector is used, which is not specifically designed to detect refrigerant R134a, it will not respond to the refrigerant R134a or will only do so when there is a larger concentration of R134a in the area of the leak.*
- *Depending on the version of the A/C unit, an evaporator leak can be determined either by holding the leak detector test probe over the glove compartment cooling connection in the A/C unit, or by holding the test probe on an open connection of a disconnected A/C condensation water hose.*

Perform a leak detection test to locate the leak while the refrigerant circuit is completely empty:

Caution

To prevent more refrigerant than is necessary for the leak test from venting into the air, proceed as follows with the refrigerant circuit completely empty:

– Evacuate the refrigerant circuit with the A/C service station. Refer to ⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79 .

Note

- *If a larger leak is found during evacuation, find and it and repair it as described. Refer to ⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79 .*
- *If no leak is found during evacuation or there is a leak that is so small that the location cannot be found with the vacuum test, proceed as follows.*

– Fill the evacuated refrigerant circuit with approximately 100 grams of refrigerant and perform the leak test in the same way as for a refrigerant circuit that is filled with refrigerant ⇒ page 176 .

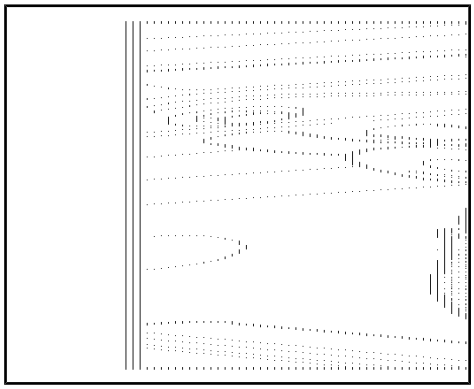
Perform a Leak Detection Test for a Refrigerant Circuit that is Filled with Refrigerant:

– On vehicles with a high-voltage system, switch off (deactivate) the “auxiliary climate control” function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.

– Switch off the ignition.

– Start up the leak detector in line with relevant operating instructions.

– Always hold the test probe underneath the suspected leak.



Depending on the model, leak detection is indicated by an increase in clicking rate or a warning tone. Refer to operating instructions for leak detector.

Note

- *Currents of air quickly disperse refrigerant gas. Drafts must therefore be avoided during leak detection.*
- *Refrigerant gas is heavier than air and will escape.*

5.6.3 Leak Detection on Refrigerant Circuit Using Leak Detection Kit - VAS6201A-

Note

- *Certain leaks cannot or only with difficulty be found using an electric leak detection unit. Leak detection can be performed using Leak Detection Kit - VAS6201A- .*
- *Refrigerant and refrigerant oil escape when there is a leak in the refrigerant circuit. Generally, this oil remains in the vicinity of the leaking area. A small amount of fluorescent fluid must be added into refrigerant circuit so that this oil becomes visible under UV light. This fluid (PAG oil with an additive that lights up under UV light) is added into the refrigerant circuit and distributes itself with the refrigerant oil when the A/C system is switched on.*
- *A/C system must be operated for a minimum of 60 minutes so that the additive distributes itself in the entire refrigerant circuit (compressor must be running). Depending on the size of the leak, it may become visible under UV light within that time.*
- *Refrigerant oil with additive that lights up under UV-light can be added directly with an open circuit or be pumped into a filled circuit via service connection on the low pressure side using Leak Detection Kit - Hand Pump w/Cartridge - VAS6201/1- (from Leak Detection Kit - VAS6201A-).*
- *If the UV-leak detection additive is added to a filled refrigerant circuit via the service connection on the low pressure side, a small amount of it remains in the service connection. Carefully remove this residual amount so that a leaking area is not detected erroneously upon a later leak detection.*
- *If a component in which UV-leak detection additive has been added is being replaced on a circuit, thoroughly clean the connection areas to the other components after assembling the refrigerant circuit. The UV-leak detection additive residue may register erroneously as leaking areas during later leak detection.*
- *Refrigerant oil as well as UV-leak detection additive get into the service station when evacuating a refrigerant circuit. The refrigerant oil is separated from refrigerant in oil collector of service station and removed from the service station via the draining device. The refrigerant oil drained off must not be poured back in. It must be replaced with new refrigerant oil.*
- *If leak detection fluid was filled already in a refrigerant circuit for an earlier repair, note the following: Only add new leak detection fluid if the refrigerant oil will be replaced. If only a portion of refrigerant oil was replaced, only top-off with a corresponding amount of leak detection fluid as well. For example, if 100 ml of refrigerant oil was replaced in a vehicle with 250 ml, add only 1 ml (cm^3) of UV-leak detection additive.*
- *Certain materials and their connections (for example, oxidation products on aluminum components, corrosion protection growth, etc.) also light up under UV-light.*
- *Depending on the version of the A/C service station, UV-leak detection additive can also be added directly at the top. Refer to the operating instructions that come with the A/C service station.*

To prevent more refrigerant than is necessary for the leak test from venting into the air, proceed as follows with the refrigerant circuit completely empty:

– Evacuate the refrigerant circuit with the A/C service station. Refer to ⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79 .

Note

- *If a larger leak is found during evacuation, find and repair it as described. Refer to ⇒ “5.6.4 Finding Leaks via Vacuum Test using A/C Service Station or Nitrogen Pressure Testing”, page 186 and ⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79 .*
- *The UV-leak detection additive can also be filled in a filled or open refrigerant circuit with the Leak Detection Kit - VAS6201A- . Refer to ⇒ page 179 .*

If no leak is found during evacuation or there is a leak that is so small that the location cannot be found, proceed as follows.

- Add the UV-leak detection additive using the A/C service station to the refrigerant circuit. Refer to ⇒ page 178 .
- Add UV-leak detection additive using the Leak Detection Kit - VAS6201- in the refrigerant circuit. Refer to ⇒ page 179 .

Add the UV-Leak Detection Additive Using the A/C Service Station to the Refrigerant Circuit.

– Add the UV-leak detection additive and the prescribed refrigerant amount using the A/C Service Station to the refrigerant circuit. Refer to ⇒ “10.2 Refrigerant R134a Capacities”, page 301 .

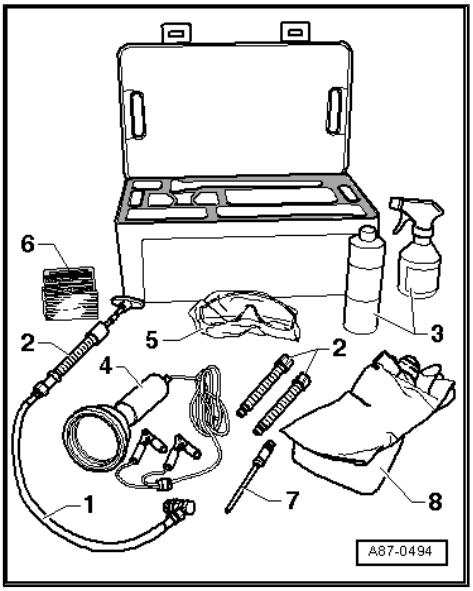
Note

Add 2.5 ± 0.5 cm^3 of UV-leak detection additive for a refrigerant circuit with a refrigerant capacity of 100 to 150 cm^3 with the Leak Detection Kit - VAS6201- for the Leak Detection Kit - VAS6201- . If the refrigerant oil capacity in the refrigerant circuit is larger, then more UV leak detection additive must be added accordingly (for example, 5.0 ± 0.5 cm^3 for a refrigerant circuit with a refrigerant oil capacity of 250 cm^3. When adding the UV-leak detection additive using the A/C service station, consult the corresponding Owner's Manual as the required amount may vary. For the relevant refrigerant oil quantities in the refrigerant circuit. Refer to ⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .

Special tools and workshop equipment required

- A/C service station with the option for adding the UV-leak detection additive to the refrigerant circuit. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- Approved leak detection additive. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).

- Leak Detection Kit - Cleaning Solution - VAS6201/3- -3-



- UV Leak Detection Lamp - VAS6201/4A- -4-
- Leak Detection Kit - Eye Protection - VAS6201/6- -5-
- Leak Detection Kit - Label - VAS6201/7- -6-

– Apply a label near the service connection stating that UV-leak detection additive was added to the refrigerant circuit.

– Start the A/C system.

Note

- *A/C system must be operated for a minimum of 60 minutes so that the additive distributes itself in the entire refrigerant circuit (compressor must be running). Depending on the size of the leak, it may become visible under UV light within that time.*
- *Depending on the size of the leak, it can now last up to several days until enough refrigerant oil with UV-leak detection additive flows out to clearly determine the leaking area.*

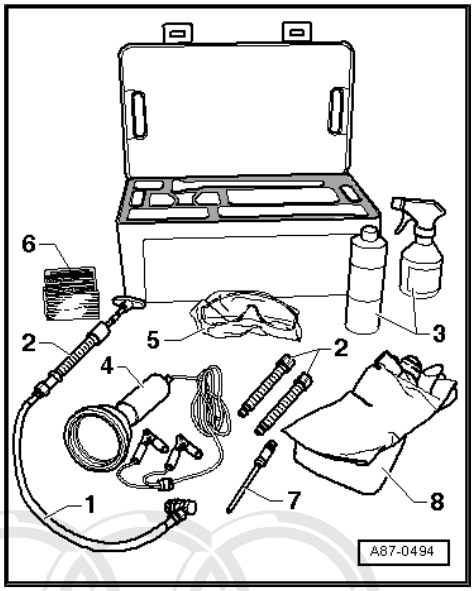
– Find the leak in the refrigerant circuit with the UV Lamp - VAS6196/4- . Refer to ⇒ page 185 .

Add UV-Leak Detection Additive using the Leak Detection Kit - VAS6201- in the Refrigerant Circuit

Special tools and workshop equipment required

- Leak Detection Kit - VAS6201A-

The -VAS6201A- includes the following tools. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).



1 - Leak Detection Kit - Hand Pump w/Cartridge - VAS6201/1-

2 - Leak Detection Kit - Cartridge - VAS6201/2- (with UV-leak detection additive)

3 - Leak Detection Kit - Cleaning Solution - VAS6201/3-

4 - UV Leak Detection Lamp - VAS6201/4A-

5 - Leak Detection Kit - Eye Protection - VAS6201/6-

6 - Leak Detection Kit - Label - VAS6201/7-

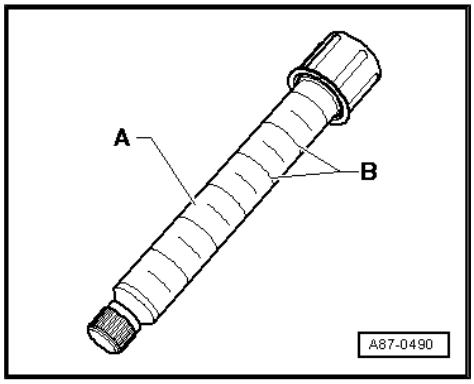
7 - Leak Detection Kit - Filler Tube - VAS6201/8-

8 - Leak Detection Kit - Hand Protection - VAS6201/9-

Note

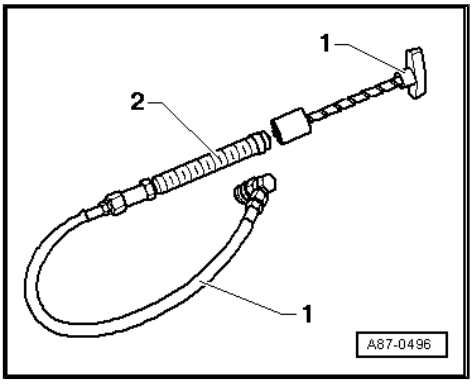
- *Described in the following are instructions for how to pour the UV-leak detection additive into the refrigerant circuit using the Leak Detection Kit - VAS6201A- . If the UV-leak detection additive is added to the refrigerant circuit with the help of other tools (for example, with the A/C service station) read the applicable operating instructions.*
- *The following is the given amount of UV-leak detection additive that is to be added to a refrigerant circuit with a refrigerant oil quantity of 100 to 150 cm ^{3} using the Leak Detection Kit - VAS6201A- (2.5 ± 0.5 cm^3). If the refrigerant oil capacity in the refrigerant circuit is larger, then more UV leak detection additive must be added accordingly (for example, 5.0 ± 0.5 cm^3 for a refrigerant circuit with a refrigerant oil capacity of 250 cm ^{3} For the relevant refrigerant oil quantities in the refrigerant circuit. Refer to*
  ⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .
- *If the UV-leak detection additive is added to the refrigerant circuit with the help of other tools (for example, with the A/C service station), observe the prescribed quantities of UV-leak detection additive given in the corresponding operating instructions.*

Adding UV-Leak Detection Additive when the Refrigerant Circuit is Empty



The cartridge -A- contains 15.4 ml of UV-leak detection additive (one unit -B- corresponds to 2.5 ml).

– Assemble the Leak Detection Kit - VAS6201A- -1- with the cartridge -2- Leak Detection Kit - Cartridge - VAS6201/2- .
– Insert the Leak Detection Kit - Filler Tube - VAS6201/8- . Refer to ⇒ page 180 -item 7- into the hand pump.
– Open the hand pump service valve.

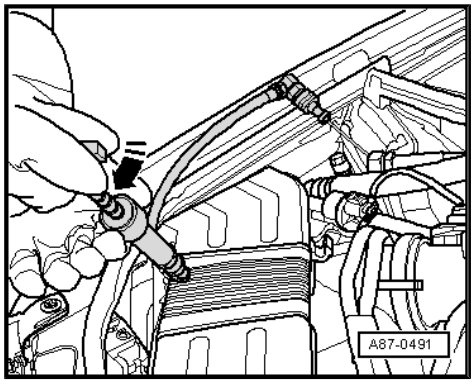


Note

- *UV-Leak detection additive is best added to the empty refrigerant circuit via a service connection or an opened connection.*
- *If the refrigerant circuit is empty, then it is better to add the UV-leak detection additive via a connection point (for example, when the connection point is already open). This way no UV-leak detection additive remains in the service connection and the connection does not need to cleaned.*

- Add the UV-leak detection additive to the refrigerant circuit via a service connection. Refer to ⇒ page 183 .
- Add the UV-leak detection additive to the refrigerant circuit via an opened connection. Refer to ⇒ page 182 .

Add the UV-Leak Detection Additive to the Refrigerant Circuit via an Opened Connection



- Open an easily accessible connection point on the refrigerant circuit
- Cover the area around connection point with foil or absorbent paper.
- Hold the tube upwards.
- Tighten the hand pump handle just enough until the UV-leak detection additive comes out of the tube.
- Add 2.5 ± 0.5 ml (Milliliter = cm^3) of UV-leak detection additive to the refrigerant circuit (for a refrigerant circuit with a refrigerant oil capacity from 100 to 150 cm^3).

Note

If UV-leak detection additive was already added to the refrigerant circuit for an earlier repair, note the following: Only add new UV-leak detection additive if the refrigerant oil will be replaced. If only a portion of the refrigerant oil was replaced, only add a proportionate amount of the UV-leak detection additive. For example, if 100 ml of refrigerant oil was replaced in a vehicle with 250 ml, add only 2 ml (cm^3) of UV-leak detection additive.

- Replace the O-ring seal at the opened connection point.
- Assemble the refrigerant circuit.
- Apply a label near the service connection stating that leak detection fluid was added to the refrigerant circuit.
- Evacuate and recharge the refrigerant circuit according to specification. Refer to
⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79 and
⇒ “5.3.6 Refrigerant Circuit, Charging with A/C Service Station”, page 84 .
- Start the A/C system.

Note

- *A/C system must be operated for a minimum of 60 minutes so that the additive distributes itself in the entire refrigerant circuit (compressor must be running). Depending on the size of the leak, it may become visible under UV light within that time.*
- *Depending on the size and location of the leak, it can now last up to several days until enough refrigerant oil with additive flows out to determine definitely the leaking area.*

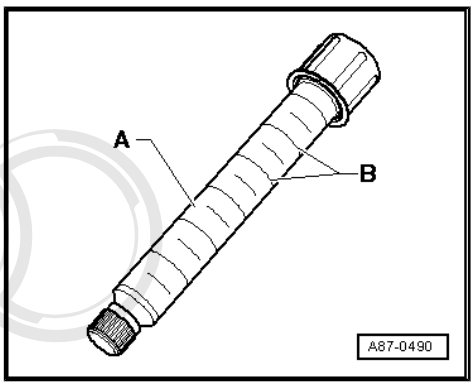
- Find the leak in the refrigerant circuit with the UV Lamp - VAS6196/4- . Refer to ⇒ page 185 .

Adding UV-Leak Detection Additive when the Refrigerant Circuit is Full

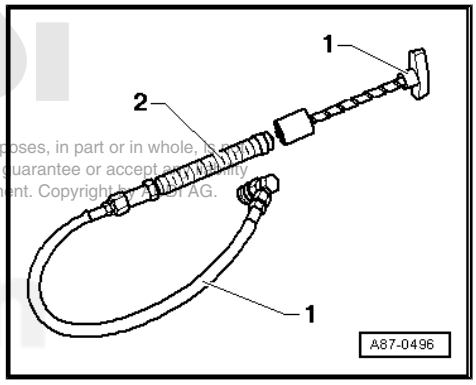
Note

- *If leak detection fluid was filled already in a refrigerant circuit for an earlier repair, note the following: Only add new leak detection fluid if the refrigerant oil will be replaced. If only a portion of refrigerant oil was replaced, only top-off with a corresponding amount of leak detection fluid as well. For example, if 100 ml of refrigerant oil was replaced in a vehicle with 250 ml, add only 1 ml (cm^3) of UV-leak detection additive.*
- *A small quantity of UV-leak detection additive remains in the service connection. Carefully remove this residual amount so that a leaking area is not detected erroneously upon a later leak detection.*

The cartridge -A- contains 15.4 ml of UV-leak detection additive (one unit -B- corresponds to 2.5 ml).



- Switch off ignition.
- Remove sealing cap from service connection of low pressure side in refrigerant circuit.
- Assemble the Leak Detection Kit - VAS6201A- -1- with the cartridge -2- Leak Detection Kit - Cartridge - VAS6201/2-.
- Insert Leak Detection Kit - Filler Tube - VAS6201/8- -7-into service coupling and open service coupling by screwing in handwheel. Refer to ⇒ page 180 . Hold the hose upward and tighten the handle of the hand pump just enough until the UV-leak detection additive starts to emerge from the tube.

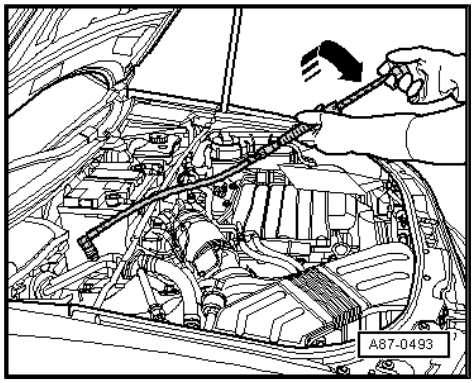


Note

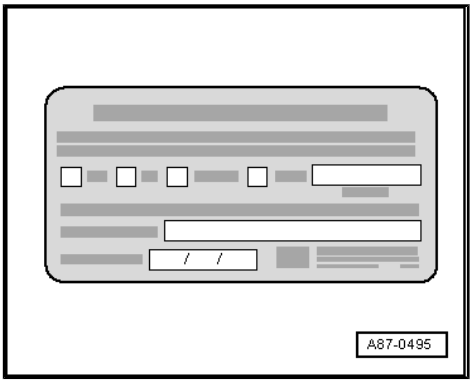
Make sure hand pump hose is completely filled with refrigerant.

- Close the service coupling and remove tube from the retainer.

- Cover the area around the service connection on the vehicle with foil or absorbent paper.
- Connect the filler device to the refrigerant circuit service connection on the vehicle.
- Open the service connection by screwing in the handwheel.
- Turn the hand pump handle to add 2.5 ± 0.5 ml (Milliliter = cm^3) UV-leak detection additive to the refrigerant circuit (for a refrigerant circuit with a refrigerant oil quantity from 100 to 150 cm^3).



– Remove the filling device from the service connection.
– Remove the rest of the UV-leak detection additive from the service connection, for example using absorbent paper.
– Seal the service connection with the sealing cap.
– If necessary, clean the area around service connection using cleaning solution.
– Apply a label near the service connection stating that leak detection fluid was added to the refrigerant circuit.
– Start the A/C system.



Note

- *A/C system must be operated for a minimum of 60 minutes so that the additive distributes itself in the entire refrigerant circuit (compressor must be running). Depending on the size of the leak, it may become visible under UV light within that time.*
- *Depending on the size and location of the leak, it can now last up to several days until enough refrigerant oil with additive flows out to determine definitely the leaking area.*

– Find the leak in the refrigerant circuit with the UV Lamp - VAS6196/4- . Refer to ⇒ page 185 .

Detecting Leaks on the Refrigerant Circuit using UV Lamp - VAS6196/4-

WARNING

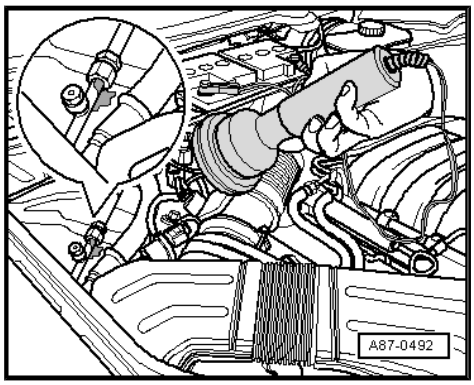
Do not look into UV lamp.

Do not direct UV lamp at other people.

Note

- *After adding the UV-leak detection additive, the A/C system must be operated for a minimum of 60 minutes so that the additive distributes itself in the entire refrigerant circuit (compressor must be running). Depending on the size of the leak, it may become visible under UV light within that time.*
- *Depending on the size and location of the leak, it can now last up to several days until enough refrigerant oil with additive flows out to determine definitely the leaking area.*
- *With leaks on the evaporator, leak detection additive is possibly washed off with condensation and flows out via evaporator drain. Since the evaporator is not easily accessible on most vehicles, checking the evaporator drain may indicate if the evaporator is leaking. However, it is necessary for this purpose that leak detection additive has already been in the refrigerant circuit for a long period of time (for example, a few days).*
- *The protective goggles do not only serve as eye protection but also amplify the illumination of leak detection additive under UV light.*
- *Depending on the accessibility of different components in the refrigerant circuit, it may be necessary to remove some vehicle components such as the bumper or air filter.*
- *Only a little refrigerant oil will get onto certain places on the refrigerant circuit when A/C is being used (for example, on the top cover of the receiver/dryer attached to the condenser on an Audi A8 from MY 2010). If there is a leak at this spot, it may take longer until enough refrigerant with refrigerant oil and additive start to leak out, which then can be viewed under UV light. It may be useful to use an electronic leak detector at these locations to find a leak. Refer to ⇒ "5.6.2 Refrigerant Circuit, Tracing Leaks Using Electronic Leak Detector (for example, VAG1796)", page 175 .*

- Move vehicle into a slightly darker area of the workshop (with daylight or bright lighting the effect of the UV light is diminished).
- Check the accessibility of the various components in the refrigerant circuit and remove any components in the area that block access to the refrigerant circuit such as noise insulation and the bumper.
- Wear protective eyewear to protect the eyes.
- Connect the UV-lamp to a 12 volt battery (vehicle battery). Observe the correct polarity of connections.
- Switch on the UV lamp and illuminate the components of refrigerant circuit. Locations where refrigerant, refrigerant oil and UV-leak detection additive has leaked out light up under fluorescent UV light.



5.6.4 Finding Leaks via Vacuum Test using A/C Service Station or Nitrogen Pressure Testing

Vehicles with a High-Voltage System (Hybrid Vehicles)

- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.

All Vehicles

– Switch off the ignition.

♦ Finding leaks via the vacuum test using the A/C service station or nitrogen pressure testing. Refer to ⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79 .

Note

♦ *Small leaks (less than 100 g of refrigerant loss per year) are not often detected with the vacuum test or with the nitrogen pressure test. The incoming air and the amount of nitrogen flowing out is too small to be able to locate the faulty location based on noise.*

♦ *Leaks on the refrigerant circuit that are greater than 100 g of refrigerant loss each year are also not always detectable with the vacuum test or with the nitrogen pressure test, depending on the ambient conditions (ambient noise, leak location etc.). The incoming air and the quantity of nitrogen flowing out is currently too small to detect any noise and locate the faulty location.*

♦ *Larger leaks on the refrigerant circuit (for example, an impact from a rock on the condenser, refrigerant loss greater than 100 g per year) can be detected, for example by noise, using the vacuum test or the nitrogen pressure test. Refer to ⇒ “5.3.5 Refrigerant Circuit, Evacuating with A/C Service Station”, page 79 .*

6 Refrigerant Circuit Complaints

⇒ “6.1 Possible Refrigerant Circuit Concerns”, page 188

6.1 Possible Refrigerant Circuit Concerns

⇒ “6.1.1 Test Requirements”, page 188

⇒ “6.1.2 Possible Concerns”, page 188

6.1.1 Test Requirements

- Electrical Equipment, vacuum system and air duct fault-finding has not revealed any faults. Refer to Guided Fault Finding for the A/C system (“OBD” or “Guided Fault Finding for the A/C system”), ⇒ Wiring diagrams, Troubleshooting & Component locations.
- The OBD/Guided Fault Finding for the A/C System with Vehicle Diagnostic Tester cannot detect a fault, the A/C compressor shut off condition is not displayed in the measured values block (only on vehicles with OBD “A/C System”). Refer to “Guided Fault Finding”.

6.1.2 Possible Concerns

Note

- *For all complaints marked * . Refer to ⇒ “8 Pressures, Checking”, page 195 “Checking pressures”.*
- *If a malfunction occurs at only one evaporator in vehicles with two evaporators, also check the pressures in the refrigerant circuit.*
- *Observe the test requirements. Refer to ⇒ “6.1.1 Test Requirements”, page 188 .*

Vehicles without a High-Voltage System

- Total cooling system failure *
- Insufficient cooling output at all vehicles speeds or engine speeds *
- None or insufficient cooling after driving a few miles *
- No or insufficient cooling at one or both evaporators (for vehicles with two A/C units) *
- The A/C compressor, A/C Clutch - N25- or A/C Compressor Regulator Valve - N280- are shut off by a pressure switch (for example, A/C Refrigerant Low Pressure Switch - F73- , Magnetic Clutch High Pressure Switch - F118- or by the Front A/C Display Control Head - E87- or Climatronic Control Module - J255-) due to excessive or inadequate pressure *. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit
- None or sharp decrease in fresh-air supply after driving several miles (evaporator iced up) *

Vehicles with a High-Voltage System

- Total cooling system failure *
- Insufficient cooling output at all vehicles speeds or A/C compressor speeds *
- None or insufficient cooling after driving a few miles. *

- No or insufficient cooling in the evaporator or on a heat exchanger (for example on the high-voltage battery heat exchanger) *. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .
- No or insufficient heating output on the heat exchanger for the heat pump output (for example on the Audi Q7 e-tron) *. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit .
- The Electrical A/C Compressor - V470- is switched off by a control module (for example Front A/C Display Control Head - E87- , Climatronic Control Module - J255- or Thermal Management Control Module - J1024-) due to excessive or inadequate pressure. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function
- None or sharp decrease in fresh-air supply after driving several miles (evaporator iced up). *

All Vehicles

From these, the following complaints may also occur:

The A/C Compressor Makes Noises

– Tighten compressor securing bolts and compressor bracket using a torque wrench.

– Check the routing of refrigerant lines; they must not touch other components and must not be subject to strain (align if necessary).

Noise (Refrigerant Hammer) Occurring Immediately after Switching on Air Conditioner and/or When Cornering or Braking

– Discharge, evacuate and charge refrigerant circuit (too much refrigerant in circuit).

Note

Too much refrigerant oil in the circuit could also cause this problem. This could occur if the amount of refrigerant oil was not adjusted when replacing the A/C compressor.

Water Sprays out of Vents (in Dash Panel or Footwell) Although Air Conditioning System is Otherwise Functioning Properly:

– Check proper routing of condensate drain; it must not be crushed or kinked.

– Check condensation drain valve, it must not be clogged by wax or underbody sealant and must close properly.

– Check plenum chamber cover; it must not be damaged and must be properly installed (to stop water running into evaporator).

– Check the water drains in plenum chamber; they must not be blocked (for example, by leaves).

7 A/C Service Station, Connecting

7.1 General Information

- If work on the high-voltage system components is necessary, de-energize the high-voltage system. Refer to ⇒ Rep. Gr. 93 ; High-Voltage System, De-Energizing or ⇒ Electrical Equipment; Rep. Gr. 93 ; High-Voltage System, De-Energizing .

Note

Working on the refrigerant circuit with the A/C service station can normally be performed without needing to de-energize the high-voltage system.

– Switch off the ignition.

Refer to
⇒ “7.2 Service Station, Connecting with Connections on Low- and High Pressure Side of Refrigerant Circuit”, page 190

Refer to
⇒ “7.3 Service Station, Connecting with No Connection on Low- and High Pressure Side of Refrigerant Circuit”, page 191

7.2 Service Station, Connecting with Connections on Low- and High Pressure Side of Refrigerant Circuit

Servicing Station, Connecting for Measuring and Testing

– Turn off the ignition.

– Connect the service station to the power supply.

– Connect the quick-release coupling adapter to the charging hoses of service station (handwheels not screwed in/hand shut-off valve not open).

– Switch on the service station and evacuate the charging hoses (only necessary if there is air in charging hoses).

– Switch on the A/C service station.

– Remove the caps from the service connections (with valve).

– Connect the service station via the service connections with the quick-release coupling adapters to the vehicle refrigerant circuit.

– Screw in the handwheel of the quick-release coupling adapters only until the valves are definitely open at the refrigerant circuit connection (observe pressure gauge, do not strain valves).

On Vehicles with High-Voltage System and Additional Functions of the A/C system (for example on Audi Q7 e-tron):

Note

On vehicles with the "heat pump" function and/or "high-voltage battery cooling" in not all operating conditions is the A/C system high pressure on the service connection of the high pressure side. The refrigerant circuit pressure on the high pressure side can on these vehicles depending on the operating conditions of the A/C system, can only be measured via the pressure/temperature sensor installed in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit and the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

To check the different functions of these A/C systems

– Select the respective function ("cooling the vehicle interior", "heat pump operation" or "cooling the high-voltage battery") via the Vehicle Diagnostic Tester and perform the respective specifications using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

– Select the measured values of the different pressure/temperature sensor installed in the refrigerant circuit and read out. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

All Vehicles

– Perform the planned tests and measurements.

7.3 Service Station, Connecting with No Connection on Low- and High Pressure Side of Refrigerant Circuit

⇒ "7.3.1 General Information", page 191

⇒ "7.3.2 Service Station, Connecting with A/C Adapter Set VAG1786 to Refrigerant Circuit", page 192

⇒ "7.3.3 Service Station, Connecting with A/C Adapter Set - Adapter VAG1785 to Refrigerant Circuit", page 193

⇒ "7.3.4 A/C Service Station, Connecting for Measuring and Testing", page 193

7.3.1 General Information

On the following vehicles, no service connection is provided for the service station on the low-pressure side of the refrigerant circuit; adapters must be used to connect the service station to the refrigerant circuit on these vehicles:

- Audi 80, Audi Cabrio, Audi Coupe
- Audi A4 up to 07.96
- Audi 100/Audi A6 up to 03.97
- Audi A8 up to 11.97

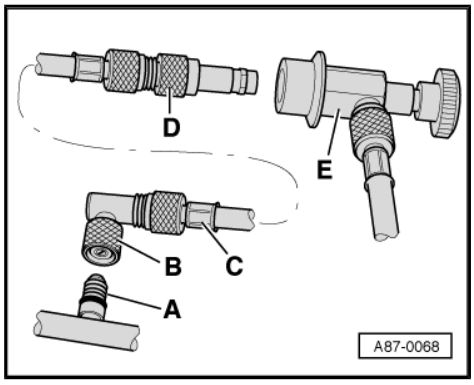
Note

On vehicles with no or inaccessible connection at compressor, remove A/C Refrigerant Low Pressure Switch - F73- (bridge terminals in connector to A/C Refrigerant Low Pressure Switch - F73-) and screw adapter to this connection. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Note

- *The tools listed below are commercially available or can be obtained from local distributor or importer.*
- *Should it be necessary to measure the pressures at the switch connections on the high-pressure side, use the adapter Adapter Set for Refrigerant Circuit - VAG1785/9- and proceed in the same manner.*

7.3.2 Service Station, Connecting with A/C Adapter Set - VAG1786- to Refrigerant Circuit



A - Connection with valve (small valve insert) on low-pressure side of refrigerant circuit

B - A/C Adapter Set - Adapter 1 - VAG1786/1- .

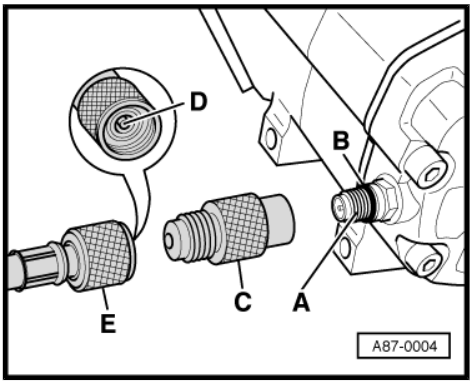
C - Commercially available charging hose (short version with 5/8" thread on each end).

D - A/C Adapter Set - Adapter 2 - VAG1786/2- (for connection of quick-release coupling of service station -E-).

Note

- *Assemble the adapter and charging hose as shown and connect to connection with valve -A- first.*
- *The A/C Adapter Set - Adapter 2 - VAG1786/1- is only to be used at connections with "small" valve insert (standard for connection with valve for A/C Refrigerant Low Pressure Switch - F73- and gradually introduced as of 10.94 also at compressor).*
- *Instead of the A/C Adapter Set - Adapter 1 - VAG1786/1- , the A/C Adapter Set - Adapter 10 - VAG1785/10- can also be used (remove valve from A/C Adapter Set - Adapter 10 - VAG1785/10 - or install valve opener in charging hose).*

7.3.3 Service Station, Connecting with A/C Adapter Set - Adapter - VAG1785- to Refrigerant Circuit



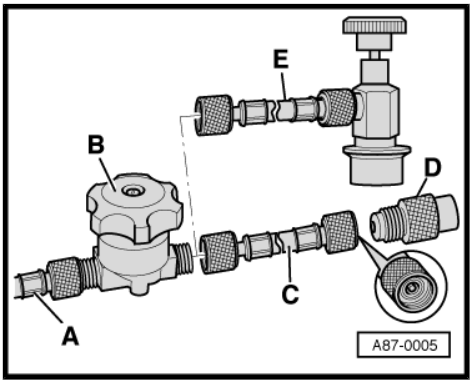
– Remove the cap from the connection with valve -A- (at A/C compressor).
– Attach the O-ring -B- to the connection (8.9 mm; 1.8 mm).
– Screw the Adapter - VAG1785/10- -C- onto the connection -B-.
– Install the valve opener -D- with the appropriate seal in the charging hose connection.

Note

- *The type of valve opener -D- and seals required depends on charging hose used (specific to manufacturer).*
- *The quick-release coupling adapter is not required for connection on the low-pressure side of Audi vehicles.*
- *Screw the charging hose -E- (to the service station) onto the A/C Adapter Set - Adapter 10 - VAG1785/10- .*

Note

To minimize the amount of air and moisture penetrating into the charging hoses and thus into the refrigerant circuit, the charging hoses should be connected together as illustrated.



A - Charging hose to service station

B - Hand shut-off valve

C - Charging hose (short version) with valve opener for connection to adapter -D-

D - A/C Adapter Set - Adapter 10 - VAG1785/10-

E - Charging hose (short version) with quick-release coupling adapter (for vehicles with quick-release coupling adapter on low-pressure side).

– Perform the planned tests and measurements.

7.3.4 A/C Service Station, Connecting for Measuring and Testing

– On vehicles with a high-voltage system, switch off (deactivate) the “auxiliary climate control” function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
– Switch off the ignition.
– Connect the A/C service station to the power supply.
– Assemble adapter set and screw to connection on low-pressure side.
– Connect the quick-release coupling adapter to the charging hoses of service station (handwheels not screwed in/hand shut-off valve not open).
– Switch on the service station and evacuate the charging hoses (only necessary if there is air in charging hoses).

– Switch off the service station.
– Remove the cap from the service connection/connection with valve (or remove low-pressure switch and bridge respective electrical connections).
– Connect the service station via the service connections with the quick-release coupling adapters to the vehicle refrigerant circuit.
– Install the handwheel on the quick-release coupling adapters only until valve is definitely open at refrigerant circuit connection (observe pressure gauge, do not strain valve).
– Perform the planned tests and measurements.

8 Pressures, Checking

8.1 Refrigerant Circuit, Checking Pressure with Service Station

8.1.1 General Information

Note

- *All test conditions marked * are vehicle-specific and are described in the Repair Manual for the relevant vehicle.*
- *Check cooling performance.*
- *Connections with valve and service connections for measurement and testing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Depending on the A/C compressor version, there may be a valve installed on the high pressure side of the A/C compressor, which prevents the liquid refrigerant from flowing back into the compressor once the A/C is turned off. If an A/C compressor with this valve is installed in a vehicle with a refrigerant circuit having an expansion valve, then it may take some time until the pressure in the high pressure side decreases (the expansion is cold and the pressure in the low pressure side quickly increases after it is turned off, the expansion valve closes and the refrigerant flows slowly into the low pressure side). If the A/C compressor is switched on, the pressure on the low pressure side goes down, the expansion valve open and the refrigerant can flow of the low pressure side.*

Under certain operating conditions, residual moisture in refrigerant circuit can lead to an ice build-up at A/C Compressor Regulator Valve. A/C compressor control is reduced by this ice build-up, evaporator is cooled too intensely and freezes. The freeze-up of the evaporator can be the cause for the following customer complaints:

- After a long drive, A/C system repeatedly or sporadically fails (no cooling or heating performance). After switching off the vehicle and after a short time, A/C function is OK again.
- After a long drive, windows (front/side and rear windows) fog up from inside, windows are also not cleared by then pressing the Defrost button, after switching off vehicle and after a short time, A/C function is OK again.

Corrective Action:

– On vehicles as of model year 2001 equipped with a compressor with A/C Compressor Regulator Valve - N280- , check measured value of evaporator outflow temperature Evaporator Vent Temperature Sensor - G263- (via function “Read measuring value block”). Is the measured value from the sensor is below the operating condition described by the customer (at an temperature above 0 °C (32 °F), longer when it is lower than 0 °C (32 °F) although the A/C Compressor Regulator Valve - N280- is not currently activated) or too high (above 10 °C (50 °F) even though the A/C is working correctly). Can ice up caused by the incorrect measured value from the evaporator. Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding for the A/C system”) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– In vehicles without the Evaporator Vent Temperature Sensor - G263- , for example via the Footwell Vent Temperature Sensor - G192- , check vent temperature at the adjustment: "Lo temperature" for driver and passenger side, 4 or 5 bar (58 or 73 psi) for fresh air blower RPM, air outlet in footwell and fresh air operation under operating conditions specified by customer. If measured value of sensor is too low (at ambient temperature above 0 °C (32 °F), colder than 0 °C (32 °F) for a long period of time).

– Check refrigerant line from evaporator to accumulator (thick tube, low pressure side) with engine running. If this line is thickly iced-up when complaint occurs (a thin layer of ice is permitted), this also indicates that the temperature in the evaporator is too low.

– Discharge refrigerant circuit, replace accumulator or receiver/dryer with dryer and evacuate refrigerant circuit for a minimum of three hours.

8.1.2 Test Requirements

Note

The following are the test requirements for a vehicle with a mechanically driven A/C compressor as an example. On vehicles with a high-voltage system (for example Audi A3 e-tron, Audi Q7 e-tron etc.) and/or the additional A/C functions (for example Audi Q7 e-tron) this arrangement varies. Pay attention on these vehicles to the specifications in the respective repair manuals and the Guided Fault Finding. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

- Radiator and condenser are clean (clean if necessary).
- The thermal insulation at expansion valve is OK and properly installed *
- Ribbed belt is OK and properly tensioned. Ribbed belt for A/C compressor and generator are OK and correctly tensioned *

- All air ducts, covers and seals are OK and properly installed.
- Fault finding on the electrical equipment and vacuum system found no malfunction * Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding” for the A/C system) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- Air conditioner On Board Diagnostic (OBD) has not revealed any faults (with engine running and air conditioner switched on), no compressor shutoff criterion displayed in measured value block (vehicles with “Air conditioner” On Board Diagnostic only) *. Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding”) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit vehicle-specific Repair Manual).
- The various pressure/temperature sensors installed on or in the refrigerant circuit provide valid measured values when the A/C system is being used. To check, use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System . If no errors can be detected, evacuate the refrigerant.
- Air flow through dust and pollen filter not obstructed by dirt *
- Air conditioner unit not drawing in secondary air at maximum fresh-air blower speed *. Evaporator and heater not drawing in secondary air at maximum fresh-air blower speed *
- Air doors in air conditioner unit, heater and evaporator reach end position *
- Fresh-air intake ducts beneath hood and in passenger compartment as well as corresponding water drain valves OK *. Refer to ⇒ Heating, Ventilation, Air Conditioning; Rep. Gr. 87 ; Air Guide (vehicle-specific repair manual)
- The engine is warm
- Vehicle is not exposed to direct sunlight. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual)
- The ambient temperature is greater than 15 °C (59 °F).
- All instrument panel vents are open.

– Start the engine.

Settings on the A/C system control module on the A/C Control Head - E87- or Climatronic Control Module - J255- (and Rear A/C Control Head (Climatronic) - E265- in vehicles with two A/C units):

– Preselect “Auto” mode (A/C compressor on).
– Set temperature pre-selector switch to “LO” for driver's side and front passenger's side (and the rear of the vehicle interior, left and right in vehicles with two A/C units).

Setting on heater controls:

– Press A/C button and Rec- or recirculated air button.
– Turn rotary temperature control towards “cold” stop.
– Set rotary fresh-air blower control to “4”.

The following system test conditions should be met:

- One or more Radiator Fan - V7- (Radiator Fan 2 - V177-) operated (at least speed 1)*

Note

For some versions, the fan is switched on only once the pressure in refrigerant circuit has exceeded a specified value.

- Fresh Air Blower - V2- (and Rear Fresh Air Blower - V80- in vehicles with two A/C units) running at maximum speed.
- Recirculated/fresh-air door set to “Recirculated air mode” (within one minute, after starting vehicle, air-flow door is closed and recirculated-air door is opened) *
- The coolant shut-off valve is closed *
- The valves of pump valve unit are closed and there is no coolant circulation pump delivery *
- Compressor is actually driven (A/C Clutch - N25- operated, overload safeguard (if installed) not tripped) *

Note

The A/C compressor is driven by different components depending on the engine (belt or input shaft). The belt pulley or the drive unit has an overload protection to protect these components and the engine, if the A/C compressor is runs with resistance. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).

8.1.3 Pressures, Checking

◆ Observe the test requirements. Refer to ⇒ “8.1.2 Test Requirements”, page 196 .

– On vehicles with a high-voltage system, switch off (deactivate) the “auxiliary climate control” function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.

– Turn off the ignition.

– Connect the A/C service station. Refer to ⇒ “7 A/C Service Station, Connecting”, page 190 .

Vehicles with an Electric Operated Valves in the Refrigerant Circuit, Which Cannot be Opened Without Power (for example the Audi Q7 e-tron):

Note

On vehicles with high-voltage system and additional functions of the A/C system (“heat pump operation” or “cooling the high-voltage battery”) valves may be installed in the refrigerant circuit which cannot be opened without power. These valves are opened and closed for example via a step motor and after switching off the ignition are no longer activated. To check the pressures in the refrigerant circuit with the A/C system switched off, no areas may be closed, therefore the valves must be opened before this procedure. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

– Open the electrically activated valves, which to now open without power using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

All Vehicles

– Take the pressure gauge readings (two possible results):

♦ Pressure in refrigerant circuit lower than indicated in table

♦ Pressure in refrigerant circuit in line with table or higher

Ambient Temperature in °C (°F)	Pressure in Refrigerant Circuit in bar (psi) Positive Pressure
15 (59)	3.9 (57)
20 (68)	4.7 (68)
25 (77)	5.6 (81)
30 (86)	6.7 (97)
35 (95)	7.8 (113)
40 (104)	9.1 (132)
45 (113)	10.5 (152)

Note

♦ *Temperature of refrigerant circuit components should be equal to ambient temperature. Pressure will deviate from values in table if individual components of refrigerant circuit are warmer or colder.*

♦ *At absolute pressure, 0 bar/psi corresponds to absolute vacuum. Normal ambient pressure (positive pressure) corresponds to 1 bar (14.5 psi) absolute pressure. 0 pressure corresponds to an absolute pressure of 1 bar (14.5 psi) on most pressure gauges (indicated by -1 bar (-14.5 psi) below 0).*

♦ *For vehicles with High Pressure Sensor - G65- , Refrigerant Circuit Pressure Sensor - G805- or A/C Pressure/Temperature Sensor - G395- , etc. for which measured pressure is displayed in measured value block, pressure measured should coincide. Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding for the A/C system”) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

♦ *Pressure is measured in different units: 1 MPa (145 psi) corresponds to 10 bar (145 psi) positive pressure. 1 bar (14.5 psi) absolute pressure corresponds to 0 bar/psi positive pressure and thus to the ambient pressure (atmospheric pressure).*

Pressure in Refrigerant Circuit Lower than Indicated in Table

Not enough refrigerant in refrigerant circuit

– Determine refrigerant circuit leaks. Refer to
⇒ “5.6 Refrigerant Circuit, Determining Leaks ”, page 174 .

– Check the pressure relief valve.

If pressure relief valve has responded:

– Check the coolant fan activation.

– Check the refrigerant lines and hoses for cross-section constrictions caused by inadequate bending radii.

– Check the refrigerant lines and hoses for external damage.

– If no fault is found, clean the refrigerant circuit (flush using refrigerant R134a. Refer to
⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through using compressed air and nitrogen. Refer to

⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).

Pressure in Refrigerant Circuit in Line with Table or Higher

– Start the engine or activate the ready mode (for example on vehicles with a high-voltage system).

– Set the A/C system to maximum cooling output.

Note

- *On vehicles with A/C Compressor Regulator Valve - N280- , the control current can be read in the measured value block. Use the Vehicle Diagnostic Tester (Function “OBD” or “Guided Fault Finding” of the Air Conditioning) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).*
- *On vehicles with an Electrical A/C Compressor - V470- read out the A/C Compressor Speed Sensor using the different control modules (for example via the respective climate control module or the Thermal Management Control Module - J1024-) using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.*

Vehicles with a Mechanically Driven A/C Compressor

If A/C compressor is not driven with the engine running or regulating valve is not actuated:

– Determine and eliminate cause, for example by checking A/C system DTC memory.

– Observe the test conditions.

– Check the A/C Clutch - N25- voltage supply. If it is OK, repair the A/C clutch.

– Check the A/C Compressor Regulator Valve - 87- activation. Use the Vehicle Diagnostic Tester (Function “OBD” or “Guided Fault Finding” of the Air Conditioning) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).

Note

- *If the low pressure switch was removed to connect the service station, bridge the electrical connections in the corresponding connector for the pressure measurement.*
- *A/C compressor is driven by the engine via A/C Clutch - N25- .*
- *The A/C Compressor Regulator Valve - N280- is activated by the Front A/C Display Control Head - E87- or Climatronic Control Module - J255- . Use the Vehicle Diagnostic Tester (Function “OBD” or “Guided Fault Finding” of the Air Conditioning) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Vehicles with an Electrical A/C Compressor - V470- (Vehicles with a High-Voltage System)

If the electrical A/C Compressor is not activated while the ready mode is active:

– Check the activation of the A/C compressor via the respective control module. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

All Vehicles

- Checking pressures on vehicles with a restrictor and reservoir (with internally regulated A/C compressor). Refer to ⇒ “8.2 Checking Pressures for Vehicles with Restrictor and Reservoir (with Internally Regulated Compressor)”, page 201 .
- Checking pressures on vehicles with an expansion valve and receiver/dryer (with internally regulated A/C compressor). Refer to ⇒ “8.3 Checking Pressures on Vehicles with Expansion Valve and Receiver/Dryer (with Internally Regulated Compressor)”, page 207 .
- Checking pressures for vehicles with restrictor, reservoir and A/C Compressor Regulator Valve - N280- (externally regulated A/C compressor). Refer to ⇒ “8.4 Vehicles with Restrictor, Reservoir and A/C Compressor Regulator Valve N280 (Externally Regulated A/C Compressor), Checking Pressures”, page 213 .
- Checking pressures on vehicles with restrictor, receiver/dryer and A/C Compressor Regulator Valve - N280- (externally regulated compressor). Refer to ⇒ “8.5 Vehicles with Restrictor, Receiver/Dryer and A/C Compressor Regulator Valve N280 , Checking Pressures, Externally Regulated Compressor”, page 222 .
- Check the pressures on vehicles with an electrically-driven A/C compressor (Audi A3 e-tron, Audi Q5 hybrid, Audi Q7 e-tron etc.). Refer to ⇒ “8.6 Pressures, Checking, Vehicles with Electrically Driven A/C Compressor (Vehicles with High-Voltage System)”, page 235 .

8.2 Checking Pressures for Vehicles with Restrictor and Reservoir (with Internally Regulated Compressor)

8.2.1 General Information

Note

- *Connect the A/C service station. Refer to ⇒ “7 A/C Service Station, Connecting”, page 190 .*
- *Observe the test requirements. Refer to ⇒ “8 Pressures, Checking”, page 195 .*

– With the ignition switched off, check the pressure in the refrigerant circuit (using the service station). Refer to ⇒ “8.1 Refrigerant Circuit, Checking Pressure with Service Station”, page 195 .

The pressures with the ignition turned off meet the specifications.

– Start the engine.

– Bring the engine speed up to 2000 RPM.

– Observe the pressure gauge of the service station.

Note

- *The switch pressures for refrigerant circuit switches are vehicle-specific.*
- *The connection with valve for low-pressure switch or at evaporator is only to be used for vehicles with no service connection on low-pressure side and inaccessible connection at compressor or accumulator (measurement accuracy). Only applies to specific vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

8.2.2 Specified Values for the Refrigerant Circuit Pressures

High-Pressure Side:

Increasing from initial pressure (when connecting the pressure gauges) to a maximum of 20 bar (290 psi).

Low-Pressure Side:

Decreasing from initial pressure (when connecting pressure gauges) to the value in the graph.

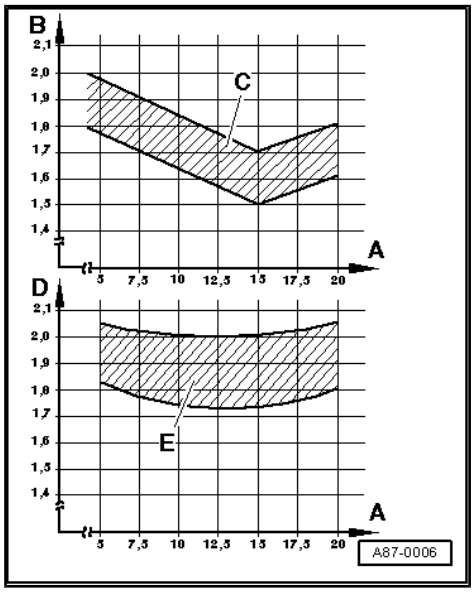
A - High pressure (measured at service connection) in bar (psi)

B - Low pressure (measured at connection with valve at compressor or accumulator) in bar

C - Permissible tolerance range

D - Low pressure (measured at connection with valve for low-pressure switch or at service connection) in bar (psi)

E - Permissible tolerance range



Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure remains constant or increases only slightly (above pressure with engine stopped), • Low pressure quickly drops to value in graph or below • Required cooling output is not attained	Not enough refrigerant in refrigerant circuit	– Localize leak with leak detector and eliminate. – Charge the refrigerant circuit.
• High pressure normal • Low pressure in line with value in graph • Required cooling output is not attained		

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal • Low pressure too low (see graph) • Required cooling output is not attained		

Note

If no fault is found with this malfunction, clean the refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89).

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure does not increase or only increases slightly above pressure with engine stopped. • Low pressure does not drop or drops only slightly. • Required cooling output is not attained	♦ The A/C compressor does not activate (the A/C clutch). ♦ The A/C compressor is not being driven.	– Check and service the A/C compressor activation and drive. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).
	♦ Constriction or obstruction in refrigerant circuit (for example, inside the refrigerant line between the service connection "low pressure side" and the A/C compressor).	– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89). – Replace the hose or line if kinked or constricted.
	♦ A/C compressor faulty.	– Replace the A/C compressor.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure increases above specification • Low pressure quickly drops to value in graph or below • Required cooling output is not attained	Constriction or obstruction in refrigerant circuit	– Run hand over refrigerant circuit to check for differences in temperature. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). • If difference in temperature is found at one component: – Replace the hose or line if kinked or constricted. – In the event of an obstruction, clean refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89). • If no malfunction can be found: – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).
• High and low pressure normal at first After some time, • High pressure increases above specification, • Low pressure quickly drops to value in graph or below, • Required cooling output is no longer attained.	Moisture in refrigerant circuit	– Check the reservoir (with dryer) and restrictor and replace if necessary. Then evacuate the refrigerant circuit for a minimum of three hours (see note). – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).
• High and low pressure normal at first • After lengthy operating period, the low pressure drops excessively (evaporator ices up).		

Note

- *If problem involving moisture in refrigerant circuit only occurs after a lengthy operating period or only infrequently (low pressure drops below specification and evaporator ices up), it is sufficient to replace the dryer (adjust quantity of refrigerant oil). Refrigerant circuit is then to be evacuated for at least three hours.*
- *It is not initially necessary to clean the refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 . Or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 when this problem occurs since normally there is only a small quantity of moisture in the system which can be removed by lengthy evacuation.*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal • Low pressure too low (see graph) • The required cooling performance is obtained.	A/C compressor faulty.	– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89). – Replace the A/C compressor.

Note

- *For the malfunction "high pressure normal, low pressure too low", note the following: This fault may cause the evaporator to ice up or the A/C Refrigerant Low Pressure Switch - F73- to shut off the compressor although the amount of refrigerant in the circuit is OK.*
- *On the Audi 100, Audi A6 (through MY1997) and Audi V8, this fault may result in compressor being shut off by the control head (if the temperature at fresh-air blower drops below -3 °C (27 °F)). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual).*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal or too high • Low pressure too high (see graph) • A/C compressor noise (particularly after switch-on) • Required cooling output is not attained	Too much refrigerant in the circuit.	– Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Replace the A/C compressor. • If quantity of refrigerant extracted is substantially greater than specified capacity: – Charge the refrigerant circuit. – Repeat the test.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High and low pressure normal • Required cooling output is not attained	Too much refrigerant oil in the circuit.	– Discharge the refrigerant circuit. – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).
• High and low pressure normal • A/C compressor noise (particularly after switch-on) • The required cooling performance is obtained.		

Note

- *Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*
- *If there is too much refrigerant oil in the circuit, the compressor must be drained and the accumulator must be replaced. After cleaning the refrigerant circuit (flushing with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blowing through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89), the correct quantity of refrigerant oil is filled into the circuit. Refer to ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .*

8.3 Checking Pressures on Vehicles with Expansion Valve and Receiver/Dryer (with Internally Regulated Compressor)

8.3.1 General Information

Note

- *Connect the A/C service station. Refer to ⇒ "7 A/C Service Station, Connecting", page 190 .*
- *Observe the test requirements. Refer to ⇒ "8 Pressures, Checking", page 195 .*

– With the ignition switched off, check the pressure in the refrigerant circuit (using the service station). Refer to ⇒ "8.1 Refrigerant Circuit, Checking Pressure with Service Station", page 195 .

The pressures with the ignition turned off meet the specifications.

– Start the engine.

– Bring the engine speed up to 2000 RPM.

– Observe the pressure gauge of the service station.

Note

- *The switch pressures and design of refrigerant circuit switches are vehicle-specific.*
- *Pressures must be measured at service connections; component locations of these connections are vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

8.3.2 Specified Values for the Refrigerant Circuit Pressures

High-Pressure Side:

Increasing from initial pressure (when connecting the pressure gauges) to a maximum of 20 bar (290 psi).

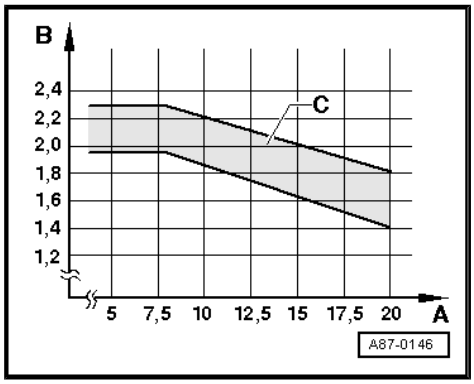
Low-Pressure Side:

Decreasing from initial pressure (when connecting pressure gauges) to the value in the graph.

A - High pressure in bar (psi)

B - Low pressure in bar (psi)

C - Permissible tolerance range



Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure remains constant or increases only slightly (above pressure with engine stopped), • Low pressure quickly drops to value in graph or below • Required cooling output is not attained	Not enough refrigerant in circuit or expansion valve malfunctioning.	– Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Replace expansion valve – Charge the refrigerant circuit. – Repeat the test.
• High pressure normal • Low pressure in line with value in graph • Required cooling output is not attained		• If quantity of refrigerant extracted is substantially less than specified capacity: – Localize the leak with leak detector and eliminate – Charge the refrigerant circuit. – Repeat the test.

Note

If no malfunction can be found and air conditioner operation is not OK when test is repeated, clean refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89).

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure does not increase or only increases slightly above pressure with engine stopped. • Low pressure does not drop or drops only slightly. • Required cooling output is not attained	♦ The A/C compressor does not activate (the A/C clutch). ♦ The A/C compressor is not being driven.	– Check and service the A/C compressor activation and drive. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).
	♦ Constriction or obstruction in refrigerant circuit (for example, inside the refrigerant line between the service connection “low pressure side” and the A/C compressor).	– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89). – Replace the hose or line if kinked or constricted.
	♦ A/C compressor faulty.	– Replace the A/C compressor.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure increases above specification • Low pressure quickly drops to value in graph or below • Required cooling output is not attained	♦ Constriction or obstruction in refrigerant circuit ♦ Expansion valve faulty	– Run hand over refrigerant circuit to check for differences in temperature. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Heating, Ventilation and Air Conditioning; System Overview - Refrigerant Circuit (vehicle-specific repair manual). • If difference in temperature is found at one component: – Replace the hose or line if kinked or constricted. – In the event of an obstruction, clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 ; and replace expansion valve if necessary) • If no malfunction can be found: – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 ; and replace expansion valve if necessary). – Repeat the test.

Note

If operation is not OK after cleaning refrigerant circuit (flushing with R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blowing through using compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89), expansion valve must be replaced.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High and low pressure normal at first • After some time, high pressure increases above specification and low pressure drops to value in graph or below • Required cooling output is no longer attained.	♦ Expansion valve faulty ♦ Moisture in refrigerant circuit	– Replace the receiver/dryer (with dryer) and evacuate the refrigerant circuit for a minimum of three hours. Refer to the notes below. – Examine expansion valve for dirt or corrosion; replace if necessary. – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).
• High and low pressure normal at first • After lengthy operating period, the low pressure drops excessively (evaporator ices up).		

Note

♦ *It is not initially necessary to clean the refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through using compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89) when this problem occurs since normally, there is only a small quantity of moisture in the system which can be removed by lengthy evacuation.*

♦ *If problem involving moisture in refrigerant circuit only occurs after a lengthy operating period or only infrequently (low pressure drops below specification and evaporator ices up), it is sufficient to replace the dryer (adjust quantity of refrigerant oil). Refrigerant circuit is then to be evacuated for at least three hours.*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal or too high • Low pressure too high (see graph) • Required cooling output is not attained, • A/C compressor noise (particularly after switch-on).	♦ Too much refrigerant in the circuit. ♦ Expansion valve or A/C compressor faulty.	– Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Replace expansion valve – Charge the refrigerant circuit. – Repeat the test. • If quantity of refrigerant extracted is substantially greater than specified capacity: – Charge the refrigerant circuit. – Repeat the test.

Note

If air conditioner operation is not OK when test is repeated, install old expansion valve, clean refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89). Then replace the A/C compressor and receiver/dryer.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure only increases slightly above pressure with engine stopped • Low pressure drops only slightly • Required cooling output is not attained	A/C compressor faulty.	– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89). – Replace A/C compressor and receiver/dryer.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal • Low pressure too low (see graph) • The required cooling performance is obtained.	Expansion valve or A/C compressor faulty.	– Replace expansion valve – Charge the refrigerant circuit. – Repeat the test.

Note

- *If air conditioner operation is not OK when test is repeated, install old expansion valve, clean refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89). Then replace the A/C compressor and receiver/dryer.*
- *With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High and low pressure normal • Required cooling output is not attained	Too much refrigerant oil in the circuit.	– Discharge the refrigerant circuit. – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89).
• High and low pressure normal • A/C compressor noise (particularly after switch-on) • The required cooling performance is obtained.		

Note

- *Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*
- *If there is too much refrigerant oil in the circuit, the compressor must be drained and the receiver/dryer must be replaced. After cleaning the refrigerant circuit (flushing with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blowing through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89), the correct quantity of refrigerant oil is filled into the circuit. Refer to ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .*

8.4 Vehicles with Restrictor, Reservoir and A/C Compressor Regulator Valve -

N280- (Externally Regulated A/C Compressor), Checking Pressures

⇒ "8.4.1 Specified Values for the Refrigerant Circuit Pressures", page 214

8.4.1 Specified Values for the Refrigerant Circuit Pressures

Note

- *Connect the Air Conditioning (A/C) service station. Refer to ⇒ "7 A/C Service Station, Connecting", page 190 .*
- *Observe the test requirements. Refer to ⇒ "8 Pressures, Checking", page 195 .*

– With the ignition switched off, check the pressure in the refrigerant circuit (using the service station). Refer to ⇒ "8.1 Refrigerant Circuit, Checking Pressure with Service Station", page 195 .

The pressures with the ignition turned off meet the specifications.

– Start the engine.

– Bring the engine speed up to 2000 RPM.

– Observe the pressure gauge of the service station.

Note

- *The switch pressures for the A/C A/C Compressor Regulator Valve - N280- and the Coolant Fan - V7- are vehicle specific.*
- *Pressures must be measured at service connections; component locations of these connections are vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Heating, Ventilation and Air Conditioning; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*

High-Pressure Side:

Increasing from initial pressure (when connecting pressure gauges) to 20 bar (290 psi).

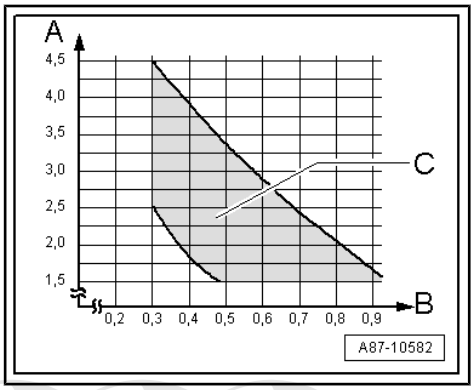
Low-Pressure Side:

Decreasing from initial pressure (when connecting pressure gauges) to the value in the graph.

A - Low pressure (measured at service connection) in bar (psi)

B - Control current for A/C Compressor Regulator Valve - N280- in amps.

C - Permissible tolerance range



Note

- *If high cooling output is needed (for example, the outside temperature is very high, the blower speed it set on high but the engine RPMs are low), then the A/C compressor will not bring the pressure on the low pressure side to the value specified in the diagram -C- (for example, for a certain time after turning on the A/C). The A/C compressor is actuated with maximum specified control current, however delivery volume is no longer sufficient at this engine speed to reduce pressure on low-pressure side to value in graph. To check the A/C compressor control under these conditions, for example, the fresh air blower is controlled only with approximately 40% of the maximum voltage, check the pressures at a lower fresh air blower speed. Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding for the A/C system”) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Under unfavorable conditions (very high ambient temperatures, high humidity), pressure on high-pressure side may increase up to maximum 29 bar (421 psi).*
- *Control current -B- is displayed in measured value block of A/C Control Head - E87- or control head, Climatronic Control Module - J255- .*
- *The measured pressure from the High Pressure Sensor - G65- or from the A/C Pressure/Temperature Sensor - G395- is displayed in the measured value block for the Front A/C Display Control Head - E87- and the Climatronic Control Module - J255- (“OBD” or “Guided Fault Finding for the A/C System”) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Low pressure settles as a function of control current for A/C Compressor Regulator Valve - N280- within compressor output range in tolerance range.*
- *Under unfavorable conditions (very high ambient temperatures, high humidity), compressor output may not always be sufficient to attain the specified value.*
- *If compressor capacity utilization is greater than 90%, pressure on low-pressure side may be in excess of tolerance range “C” shown in graph (compressor output no longer sufficient).*
- *The specified operating current for the regulator valve must be greater than 0.3 A in order to ensure reliable valve activation.*
- *At absolute pressure, “0 bar/psi” corresponds to absolute vacuum. Normal ambient pressure corresponds to 1 bar (14.5 psi) absolute pressure. 0 bar/psi pressure corresponds to an absolute pressure of 1 bar (14.5 psi) on most pressure gauges (indicated by “-1 bar (-14.5 psi)” below “0”).*
- *In "maximum cooling output" setting , control current is regulated to approximately 0.65 (vehicle-specific up to 0.85A, displayed in measured value block). Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding for the A/C System”) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual).*

Possible deviation from specification	Possible cause of fault	Corrective action
• High pressure remains constant or increases only slightly (above pressure with engine stopped), • Low pressure quickly drops to value in graph or below • The requested cooling output is not attained.	♦ Activation of A/C Compressor Regulator Valve - N280- malfunctioning. ♦ Not enough refrigerant in refrigerant circuit.	– Check the A/C Compressor Regulator Valve -N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Localize the leak with leak detector and eliminate. – Charge the refrigerant circuit.
• High pressure normal • Low pressure too low (see graph), • The requested cooling output is not attained.		

Note

If no fault is found with this malfunction, clean the refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89).

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure does not increase or only increases slightly above pressure with engine stopped. • Low pressure does not drop or drops only slightly. • Required cooling output is not attained	♦ The A/C compressor is not activated (A/C Compressor Regulator Valve - N280-) ♦ The A/C compressor is not being driven.	– Check and service the A/C compressor activation and drive. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual). – Check the A/C Compressor Regulator Valve - N280- activation and functionality.
	♦ Constriction or obstruction in refrigerant circuit (for example, inside the refrigerant line between the service connection "low pressure side" and the A/C compressor).	– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89). – Replace the hose or line if kinked or constricted.
	♦ A/C Compressor Regulator Valve - N280- faulty	– Check the A/C Compressor Regulator Valve - N280- functionality. If necessary, replace the valve -N280- and check for dirt. Refer to ⇒ "9.1.9 A/C Compressor Regulator Valve N280 , Removing and Installing", page 293 .

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
	♦ A/C compressor faulty.	– Replace the A/C compressor.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure increases above specification • Low pressure quickly drops to value in graph or below • Required cooling output is not attained	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning. ♦ Constriction or obstruction in refrigerant circuit	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Run hand over refrigerant circuit to check for differences in temperature • If difference in temperature is found at one component: – Replace the hose or line if kinked or constricted. – In the event of an obstruction, flush the refrigerant circuit with compressed air and nitrogen • If no malfunction can be found: – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High and low pressure normal at first, after some time high pressure increases above specification • Low pressure quickly drops to value in graph or below, • Required cooling output is no longer attained.	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning.	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Replace the reservoir (with dryer) and evacuate the refrigerant circuit for a minimum of three hours (see note).
• High and low pressure normal at first • After lengthy operating period, the low pressure drops excessively (evaporator ices up).	♦ A/C Compressor Regulator Valve - N280- faulty	– Check the A/C Compressor Regulator Valve - N280- functionality. If necessary, replace the valve -N280- and check for dirt. Refer to ⇒ “9.1.9 A/C Compressor Regulator Valve N280 , Removing and Installing”, page 293 .

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
	♦ Moisture in refrigerant circuit	– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).

Note

- *It is not initially necessary to clean the refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 or blow through using compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 .) when this problem occurs since normally there is only a small quantity of moisture in the system which can be removed by lengthy evacuation.*
- *If problem involving moisture in refrigerant circuit only occurs after a lengthy operating period or only infrequently (low pressure drops below specification and evaporator ices up), it is sufficient to replace the dryer (adjust quantity of refrigerant oil). Refrigerant circuit is then to be evacuated for at least three hours.*
- *Problem with Evaporator Vent Temperature Sensor - G263- can also cause icing-up of refrigerant circuit. If this problem is encountered, also pay attention to measured value of Evaporator Vent Temperature Sensor - G263- . Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding” for the A/C System) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal • Low pressure too low (see graph) • The required cooling performance is obtained.	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning. ♦ A/C Compressor Regulator Valve - N280- faulty	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Check the A/C Compressor Regulator Valve - N280- functionality. If necessary, replace the valve - N280- and check for dirt. Refer to ⇒ “9.1.9 A/C Compressor Regulator Valve N280 , Removing and Installing”, page 293 .

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
	♦ A/C compressor faulty.	– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89). – Replace the A/C compressor.

Note

For the malfunction "high pressure normal, low pressure too low", note the following: With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK. Check measured values of the Evaporator Vent Temperature Sensor - G263- and the actuation of the A/C Compressor Regulator Valve - N280- . If the measured value from the Evaporator Vent Temperature Sensor - G263- is incorrect, the evaporator may ice up or cooling output is not attained Vehicle Diagnostic Tester ("OBD" or "Guided Fault Finding for the A/C System") and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal or too high • Low pressure too high (see graph) • A/C compressor noise (particularly after switch-on) • Required cooling output is not attained	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning. ♦ Too much refrigerant in the circuit.	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Replace the A/C compressor. • If quantity of refrigerant extracted is substantially greater than specified capacity: – Charge the refrigerant circuit. – Repeat the test.
• High and low pressure normal • Required cooling output is not attained	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning. ♦ Too much refrigerant oil in the circuit.	– Check the a/c A/C Compressor Regulator Valve -N280- activation. – Discharge the refrigerant circuit.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High and low pressure normal. • A/C compressor noise (particularly after switch-on). • The required cooling performance is obtained.		– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).

Note

- *Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*
- *If there is too much refrigerant oil in the circuit, the compressor must be drained and the accumulator must be replaced. After cleaning the refrigerant circuit (flushing with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blowing through using compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89), the correct quantity of refrigerant oil is filled into the circuit. Refer to ⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .*

8.5 Vehicles with Restrictor, Receiver/Dryer and A/C Compressor Regulator Valve - N280- , Checking Pressures, Externally Regulated Compressor

⇒ "8.5.1 General Information", page 222

⇒ "8.5.2 Specified Values for Refrigerant Circuit Pressures", page 222

8.5.1 General Information

Note

- *Connect the Air Conditioning (A/C) service station. Refer to ⇒ "7 A/C Service Station, Connecting", page 190 .*
- *Observe the test requirements. Refer to ⇒ "8 Pressures, Checking", page 195 .*
- *If a malfunction occurs at only one evaporator in vehicles with two evaporators, also check pressures in the refrigerant circuit, are these OK? Check the line connection between the evaporator in question and the exit of line connection at distribution point of refrigerant lines (for constriction). If no malfunction can be detected, discharge the refrigerant circuit and charge it with the specified refrigerant quantity. Then check pressures and cooling performance of A/C system again; if the malfunction occurs again, replace the expansion valve which is prematurely switched by the malfunctioning evaporator. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

– With the ignition switched off, check the pressure in the refrigerant circuit (using the service station). Refer to ⇒ "8.1 Refrigerant Circuit, Checking Pressure with Service Station", page 195 .

The pressures with the ignition turned off meet the specifications.

– Start the engine.
– Bring the engine speed up to 2000 RPM.
– Observe the pressure gauge of the service station.

Note

- *Switching pressures for actuation of A/C Compressor Regulator Valve - N280- and Radiator Fan - V7- are vehicle-specific.*
- *Pressures must be measured at service connections; component locations of these connections are vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

8.5.2 Specified Values for Refrigerant Circuit Pressures

High-Pressure Side:

Increasing from initial pressure (when connecting the pressure gauges) to a maximum of 20 bar (290 psi).

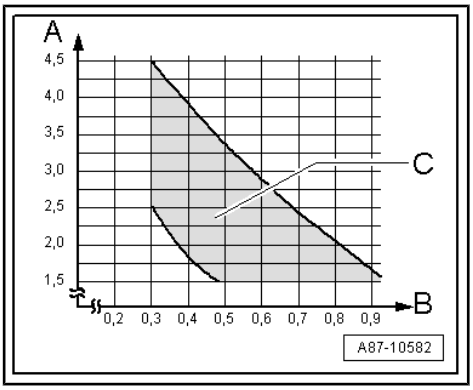
Low Pressure:

Decreasing from initial pressure (when connecting pressure gauges) to the value in the graph.

A - Low pressure (measured at service connection) in bar (psi)

B - Control current for A/C Compressor Regulator Valve - N280- in amps.

C - Permissible tolerance range (applicable to compressor capacity utilization of 10 to 90%)



Note

- *If high cooling output is needed (for example, the outside temperature is very high, the blower speed it set on high but the engine RPMs are low), then the A/C compressor will not bring the pressure on the low pressure side to the value specified in the diagram -C- (for example, for a certain time after turning on the A/C). The A/C compressor is actuated with maximum specified control current, however delivery volume is no longer sufficient at this engine speed to reduce pressure on low-pressure side to value in graph. To check the A/C compressor control under these conditions, for example, the fresh air blower is controlled only with approximately 40% of the maximum voltage, check the pressures at a lower fresh air blower speed. Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding for the A/C system”) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Under unfavorable conditions (very high ambient temperatures, high humidity), pressure on high-pressure side may increase to max. 29 bar (421 psi).*
- *Control current -B- is displayed in measured value block of A/C Control Head - E87- or control head, Climatronic Control Module - J255- .*
- *The high pressure measured from the High Pressure Sensor - G65- (or the A/C Pressure/Temperature Sensor - G395- or the Refrigerant Circuit Pressure Sensor - G805-) is displayed as the measured value (by the Front A/C Display Control Head - E87- , the A/C Control Module - J301- or the display and control unit, and the A/C Control Module - J255-).*
- *Low pressure settles depending on control current for A/C Compressor Regulator Valve - N280- and control characteristic of expansion valve within compressor output range in tolerance range.*
- *Under unfavorable conditions (very high ambient temperatures, high humidity), compressor output may not always be sufficient to attain the specified value.*
- *If compressor capacity utilization is greater than 90%, pressure on low-pressure side may be in excess of tolerance range “C” shown in graph (compressor output no longer sufficient).*
- *The specified operating current for the A/C Compressor Regulator Valve - N280- must be greater than 0.3 A in order to ensure reliable regulator valve actuation.*
- *In “maximum cooling output” setting, control current for A/C Compressor Regulator Valve - N280- is regulated to approximately 0.65 A (up to 0.85 A). This measured value is vehicle-specific and displayed in the measured value block.*
- *At absolute pressure, 0 bar/psi corresponds to absolute vacuum. Normal ambient pressure corresponds to 1 bar (14.5 psi) absolute pressure. On the scales of most pressure gauges, 0 bar/psi corresponds to an absolute pressure of 1 bar (14.5 psi) (can be seen from -1 bar (-14.5 psi) mark below 0). Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding for the A/C System”) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure remains constant or increases only slightly (above pressure with engine stopped), • Low pressure quickly drops to value in graph or below • Required cooling output is not attained	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning. ♦ Not enough refrigerant in refrigerant circuit ♦ Expansion valve faulty	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted is substantially less than specified capacity: – Localize the leak with leak detector and eliminate – Charge the refrigerant circuit. – Repeat the test.
• High pressure normal • Low pressure in line with value in graph • Required cooling output is not attained		
• High pressure normal • Low pressure too low (see graph) • Required cooling output is not attained		• If quantity of refrigerant extracted roughly corresponds to specified capacity: – Replace the expansion valve. – Charge the refrigerant circuit. – Repeat the test.

Note

- *If no fault is found with this malfunction, clean the refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 .*
- *Check the measured values from the Evaporator Vent Temperature Sensor - G263- and the A/C Compressor Regulator Valve - N280- control. If measured value of Evaporator Vent Temperature Sensor - G263- is not OK, evaporator may ice up or cooling output is not attained.*
- *If air conditioner operation is not OK when test is repeated after replacing expansion valve, install old expansion valve, clean refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 . Then replace the A/C compressor and receiver/dryer.*
- *With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.*
- *If the expansion valve is malfunctioning (permanently closed or does not open sufficiently), the A/C Compressor Regulator Valve - N280- is actuated to maximum output and low pressure drops to value in graph or below (compressor draws off refrigerant from low-pressure side). Since refrigerant cannot flow via expansion valve, cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy Vehicle Diagnostic Tester ("OBD" or "Guided Fault Finding for the A/C System") and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure does not increase or only increases slightly above pressure with engine stopped. • Low pressure does not drop or drops only slightly. • Required cooling output is not attained	♦ The A/C compressor is not activated (A/C Compressor Regulator Valve - N280-) ♦ The A/C compressor is not being driven.	– Check and service the A/C compressor activation and drive. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
	♦ A/C Compressor Regulator Valve - N280- faulty	– Check the A/C Compressor Regulator Valve - N280- functionality. If necessary, replace the valve A/C Compressor Regulator Valve - N280- and check for dirt. Refer to ⇒ “9.1.9 A/C Compressor Regulator Valve N280 , Removing and Installing”, page 293 .
	♦ Constriction or obstruction in refrigerant circuit (for example, inside the refrigerant line between the service connection “low pressure side” and the A/C compressor).	– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).
		– Replace the hose or line if kinked or constricted.
	♦ A/C compressor faulty.	– Replace the A/C compressor.

Note

- *Make sure the A/C compressor (the A/C compressor shaft) is actually being driven by the belt pulley/drive unit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).*
- *As of MY 2012, certain engines and A/C compressors that in addition to the A/C Compressor Regulator Valve - N280- , have an A/C clutch - N25- attached to the belt pulley. Make sure the A/C Compressor Regulator Valve - N25- is indeed being actuated and the A/C compressor (A/C compressor shaft) is being driven by the belt pulley. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual) and to the Parts Catalog.*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure increases above specification • Low pressure quickly drops to value in graph • Required cooling output is not attained	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning. ♦ Constriction or obstruction in refrigerant circuit ♦ Expansion valve faulty	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Run hand over refrigerant circuit to check for differences in temperature • If difference in temperature is found at one component: – Replace the hose or line if kinked or constricted. – In the event of an obstruction, clean refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89). – Charge the refrigerant circuit. – Repeat the test. • If no malfunction can be found: – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89). – Charge the refrigerant circuit. – Repeat the test if the function is not OK: – Replace the expansion valve and receiver/dryer

Note

- *If the function of the A/C system is not OK when the test is repeated, replace the expansion valve and receiver/dryer.*
- *With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.*
- *If expansion valve is malfunctioning (permanently closed or does not open sufficiently), A/C Compressor Regulator Valve - N280- is actuated to maximum output and low pressure drops to value in graph or below (compressor draws off refrigerant from low-pressure side). Since refrigerant cannot flow via expansion valve, cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester ("OBD" or "Guided Fault Finding for the A/C System") and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *If there is too much refrigerant oil in the circuit, the compressor must be drained and the receiver/dryer must be replaced. After cleaning the refrigerant circuit (flushing with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blowing through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89), the correct quantity of refrigerant oil is filled into the circuit. Refer to ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High and low pressure normal at first After some time, • High pressure increases above specification, • Low pressure quickly drops to value in graph or below, • Required cooling output is no longer attained.	◆ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning. ◆ Moisture in refrigerant circuit	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89).

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High and low pressure normal at first • After lengthy driving time, low pressure drops excessively (evaporator ices up).		– Replace the receiver/dryer with dryer. – Evacuate the refrigerant circuit for at least three hours. – Charge the refrigerant circuit. – Repeat the test.
	♦ A/C Compressor Regulator Valve - N280- faulty	– Check the A/C Compressor Regulator Valve - N280- functionality. If necessary, replace the valve -N280- and check for dirt. Refer to ⇒ "9.1.9 A/C Compressor Regulator Valve N280 , Removing and Installing", page 293 .

Note

- *It is not initially necessary to clean the refrigerant circuit (flush using refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 when this problem occurs since normally there is only a small quantity of moisture in the system which can be removed by lengthy evacuation.*
- *If a problem involving moisture in refrigerant circuit only occurs after a lengthy operating period or only infrequently (low pressure drops below specification and evaporator ices up), it is sufficient to replace the dryer installed in receiver/dryer (adjust quantity of refrigerant oil). Refrigerant circuit is then to be evacuated for at least three hours.*
- *With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.*
- *Problem with Evaporator Vent Temperature Sensor - G263- can also cause icing-up of refrigerant circuit. If this problem is encountered, also pay attention to measured value of Evaporator Vent Temperature Sensor - G263- . Use the Vehicle Diagnostic Tester ("OBD" or "Guided Fault Finding" for the A/C System) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal • Low pressure too low (see graph) • The required cooling performance is obtained.	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning.	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Clean refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 (not always necessary, see notes).
	♦ A/C Compressor Regulator Valve - N280- faulty	– Check the A/C Compressor Regulator Valve - N280- functionality. If necessary, replace the A/C Compressor Regulator Valve - N280- and check for dirt. Refer to ⇒ “9.1.9 A/C Compressor Regulator Valve N280 , Removing and Installing”, page 293 .
	♦ Expansion valve or A/C compressor faulty. ♦ A/C compressor faulty.	– Replace the expansion valve and receiver/dryer – Charge the refrigerant circuit. – Repeat the test if the function is not OK: – Replace the A/C compressor. – Charge the refrigerant circuit. – Repeat the test.

Note

- *For the malfunction “high pressure normal, low pressure too low”, note the following: With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.*
- *If the problem is with the -N280- A/C A/C Compressor Regulator Valve (regulator valve is not actuated but A/C compressor operates nevertheless), refrigerant circuit does not have to be cleaned (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through using compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89). In this case, it is sufficient to replace the A/C compressor (observe quantity of refrigerant oil in A/C compressor).*
- *If the expansion valve is malfunctioning (permanently closed or does not open sufficiently), the A/C Compressor Regulator Valve - N280- is actuated to maximum output and low pressure drops to value in graph or below (compressor draws off refrigerant from low-pressure side). As however refrigerant cannot flow via the expansion valve, the cooling output is not attained and high pressure may also not increase or only increase slightly due to the absence of energy conversion.*
- *Check the measured values from the Evaporator Vent Temperature Sensor - G263- and the A/C Compressor Regulator Valve - N280- control. If the measured value from the Evaporator Vent Temperature Sensor - G263- is incorrect, the evaporator may ice up or cooling output is not attained. Use the Vehicle Diagnostic Tester (“OBD” or “Guided Fault Finding for the A/C System”) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or (vehicle-specific repair manual).*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal or too high • Low pressure too high (see graph) • A/C compressor noise (particularly after switch-on) • The required cooling performance is obtained.	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning. ♦ Too much refrigerant in the circuit. ♦ Expansion valve faulty ♦ A/C compressor faulty.	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Replace the expansion valve and receiver/dryer – Charge the refrigerant circuit. – Repeat the test if the function is not OK: – Replace the A/C compressor. • If quantity of refrigerant extracted is substantially greater than specified capacity: – Charge the refrigerant circuit. – Repeat the test.

Note

♦ *This fault may also be caused by too much refrigerant oil in the circuit. Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*

♦ *If the expansion valve is malfunctioning (permanently closed or does not open sufficiently), the A/C Compressor Regulator Valve - N280- is actuated to maximum output and low pressure drops to value in graph or below (compressor draws off refrigerant from low-pressure side). Since refrigerant cannot flow via expansion valve, cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester ("OBD" or "Guided Fault Finding for the A/C System") and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output or ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High and low pressure normal • The required cooling performance is obtained.	♦ Actuation of A/C Compressor Regulator Valve - N280- malfunctioning. ♦ Too much refrigerant in the circuit. ♦ Expansion valve faulty	– Check the A/C Compressor Regulator Valve - N280- activation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Discharge the refrigerant circuit. – Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).
• High and low pressure normal • A/C compressor noise (particularly after switch-on) • The required cooling performance is obtained.		– Fill in correct quantity of refrigerant oil into circuit (see note). – Charge the refrigerant circuit. – Repeat the test if the function is not OK: – Replace the expansion valve. – Charge the refrigerant circuit. – Repeat the test.

Note

- *Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*
- *If expansion valve is malfunctioning (permanently open), evaporator temperature is no longer regulated such that only refrigerant in gaseous state exits from the evaporator. Under certain usage conditions, liquid droplets may then be drawn in by the compressor and cause noise (liquid cannot be compressed).*
- *If there is too much refrigerant oil in the circuit, the compressor must be drained and the receiver/dryer must be replaced. After cleaning the refrigerant circuit (flushing with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or blowing through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89), the correct quantity of refrigerant oil is filled into the circuit. Refer to ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .*

8.6 Pressures, Checking, Vehicles with Electrically Driven A/C Compressor (Vehicles with High-Voltage System)

– On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.

– Switch off the ignition.

⇒ “7 A/C Service Station, Connecting”, page 190

⇒ “8 Pressures, Checking”, page 195

Note

If a malfunction occurs at only one evaporator in vehicles with two evaporators (one evaporator in the A/C unit and the other in the battery cooling module or in the high-voltage battery heat exchanger), also check pressures in the refrigerant circuit, are these OK? Check the line connection between the evaporator in question and the exit of line connection at distribution point of refrigerant lines (for constriction or blockage, for example in the refrigerant line restrictor to the high-voltage battery heat exchanger). If no malfunction can be detected, discharge the refrigerant circuit and charge it with the specified refrigerant quantity. Then check the pressures and A/C system cooling output again; if the malfunction occurs again, check/replace the following components: if the complaint is only occurs at the evaporator in the A/C unit, the shut-off valve is prematurely switched by the evaporator (for example Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Heater and A/C Unit Refrigerant Shut-Off Valve - N541-). This component is open when it is not activated and allows the refrigerant to flow through. Replace the expansion valve on the evaporator in the A/C unit, if no fault can be found on the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- / Heater and A/C Unit Refrigerant Shut-Off Valve - N541- . If a malfunction occurs only on the evaporator for the cooling the high-voltage components (for example in the battery cooling module), check the activation of the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- on the evaporator expansion valve in the battery cooling module (it is closed when it is not activated and does not allow the refrigerant to flow through). If the complaint only occurs at the high-voltage battery heat exchanger, check the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- (it is open when it is not activated and allows the refrigerant to flow through) and the restrictor installed in the refrigerant line. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– With the ignition switched off, check the pressures in the refrigerant circuit (using the A/C service station). Refer to ⇒ “8.1 Refrigerant Circuit, Checking Pressure with Service Station”, page 195 .

The pressures with the ignition turned off meet the specifications.

– Charge the vehicle batteries, for example, using the Battery Charger - VAS5904- in the battery support mode to minimize the number of automatic starts during the test- and measuring procedures while the ready mode is active. Refer to ⇒ Electrical Equipment General Information; Rep. Gr. 27 ; Battery; Battery, Charging and ⇒ Electrical Equipment; Rep. Gr. 93 ; General Warnings for Working on High-Voltage System .

Note

- *Also move the selector lever into position “P” and activate the parking brake for testing and measuring procedures that require the ignition to be on, but do not require the ready mode to be active.*
- *The engine must not be running when checking the pressures in the refrigerant circuit on vehicles with a high-voltage system.*
- *The ready mode appears in the Instrument Cluster Control Module - J285- via the “power meter”. Refer to the Owner's Manual.*
- *Activate the ready mode (and observe the display in the Instrument Cluster Control Module - J285-). Refer to the Owner's Manual.*

– Activate the drive ready mode. Refer to the Owner's Manual.
– Switch the A/C system on.
– Observe the pressure gauge of the service station.

Note

- *The activation of the electrically driven A/C compressor occurs from the vehicle electrical system. The engine speed does not have any effect on the A/C cooling output.*
- *The A/C compressor is not actuated at the maximum specified speed (of approximately 8500/min) on a stationary or slow moving vehicle (up to a speed of approximately 45km/h) (the A/C compressor speed is limited to approximately 5000/min).*
- *The activation of the electrically driven A/C compressor can be monitored by the Guided Fault Finding using the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for A/C System and the Battery Regulation.*
- *Pressures must be measured at the service connections; the component location for these connections are vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

⇒ “8.6.1 Specified Values for Refrigerant Circuit Pressures, Vehicles without Heat Pump”, page 238

⇒ “8.6.2 Specified Values for Refrigerant Circuit Pressures, Vehicles with Heat Pump”, page 264

8.6.1 Specified Values for Refrigerant Circuit Pressures, Vehicles without Heat Pump

Note

On vehicles with a high-voltage system but without a heat pump (for example on Audi A3 e-tron, Audi Q5 hybrid, Audi A6 hybrid and Audi A8 hybrid) no check valves are installed in the refrigerant circuit. On these vehicles valves are installed in the refrigerant circuit which regulate the flow of the refrigerant to the evaporator (in the heater and A/C unit) or to the heat exchanger for the cooling of the components of the high-voltage system. These valves only have two operating conditions (open or closed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for A/C System and the Battery Regulation.

High-Pressure Side:

Increasing from initial pressure (when connecting the pressure gauges) to a maximum of 20 bar (290 psi).

Low-Pressure Side:

Decreasing from initial pressure (when connecting the pressure gauges) to a value between 1.5 and 2.3 bar (21.7 and 33.35 psi) absolute pressure (depending on the required cooling output).

A/C Compressor Speed:

Depending on the required cooling output between 800 and 8600/min (currently a maximum of 5000/min for parked vehicles).

Note

- *The temperature of the air after the evaporator, the current A/C compressor speed and the pressure of the refrigerant on the high pressure side are displayed depending on the vehicle as the measured value from the different control modules (for example the display control head, the Climatronic Control Module - J255- , the Front A/C Display Control Head - E87- , the Thermal Management Control Module - J1024- etc.). Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the ⇒ Wiring diagrams, Troubleshooting & Component locations.*
- *If a high cooling output is required (for example, a high outside temperature and the blower speed set on high), then the A/C compressor will not bring the pressure on the low pressure side to the required value (for example, for a certain time after turning on the A/C). The A/C compressor is not actuated at the maximum specified speed (of approximately 8500/min) on a stationary or slow moving vehicle (up to a speed of approximately 45km/h) (the A/C compressor speed is limited to approximately 5000/min). After a vehicle reaches a speed of more than approximately 45 km/h (28 mph), the limit for the maximum permissible A/C compressor speed is lifted. At a A/C compressor speed of 5000/min, a high outside temperature and a high fresh air blower speed (inefficient environmental controls), the A/C compressor output (the delivery volume) is no longer sufficient to reduce the pressure on the low pressure side to the target value. To check the A/C compressor control under these conditions, for example, the fresh air blower is controlled only with approximately 40% of the maximum voltage, check the pressures at a lower fresh air blower speed. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/C System and the Battery Regulation and the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *Under unfavorable conditions (very high ambient temperatures, high humidity), pressure on high-pressure side may increase to max. 29 bar (421 psi).*
- *The specified rpm of the A/C compressor is displayed as the measured value of the different control modules depending on the vehicle (for example from the display control head, the Climatronic Control Module - J255-). Refer to the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and ⇒ Wiring diagrams, Troubleshooting & Component locations.)*
- *The measured high pressure of the respective sensor (for example from the A/C Pressure/Temperature Sensor - G395- or by the Refrigerant Circuit Pressure Sensor - G805-) is displayed as a measured value from the respective control module (for example from the Climatronic Control Module - J255- display control head). Use the Vehicle Diagnostic Tester "Guided Fault Finding" function for the air conditioner and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *Depending on the A/C compressor speed and the control characteristic of the expansion valve, the low pressure settles within the A/C compressor output range in the tolerance range (1.5 to 2.3 bar (22 to 33 psi) positive pressure).*
- *The target speed for the A/C compressor must be greater than 1500/min for this test.*

- *In setting “maximum cooling output” the target speed is regulated to approximately 4000 up to 5000/min. This value is vehicle-specific and is displayed as a measured value of the respective control module (for example the Climatronic Control Module - J255-) display and control head. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for A/C System and Battery Regulator.*
- *At absolute pressure, 0 bar (0 psi) corresponds to absolute vacuum. Normal ambient pressure corresponds to 1 bar (14.5 psi) absolute pressure. On the scales of most pressure gauges, 0 bar corresponds to an absolute pressure of 1 bar (14.5 psi) (can be seen from -1 bar (-14.5 psi) mark below 0 bar (0 psi)). Use the Vehicle Diagnostic Tester in the function “Guided Fault Finding” for the A/C System) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *If, on a vehicle with two evaporators (for example on a Audi A8 hybrid, one in the A/C unit and one for cooling the high-voltage components, for example, in the battery cooling module or the high-voltage battery heat exchanger as in the Audi A3 e-tron), the measured temperature on one evaporator corresponds to the specified value or the specified value falls short, but does not reach the required specified value on the other evaporator, the following adjustment is performed: the responsible control module (the Battery Regulation Control Module - J840- or the Climatronic Control Module - J255-) activates the Electrical A/C Compressor - V470- with increased speed via various other control modules (for example, the Electric Drive Power and Control Electronics - JX1- and the A/C Compressor Control Module - J842-). Thereby increasing the A/C cooling output and decreasing the pressure on the low pressure side as well as the evaporator temperature. If the specified value for the temperature falls short at one evaporator, the relevant control module (for example the Battery Regulation Control Module - J840- or the Climatronic Control Module - J255-) activates the installed shut-off valves (Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- , Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- or High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542-) so that the evaporator which is too cold is no longer supplied with refrigerant. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding ” Function for the A/C System. Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *Since the evaporator for cooling the high-voltage components output (in the battery cooling module and in the high-voltage battery heat exchanger) is essential for the evaporator output in the A/C unit, the required target temperature may still be reached in the evaporator for cooling the high-voltage battery with too little refrigerant in the refrigerant circuit, but the target temperature in the A/C unit evaporator will no longer be attainable (even though the A/C compressor is activated with increased A/C unit speed).*

Possible deviation from specification	Possible cause of fault	Corrective action
• High pressure remains constant or increases only slightly (above pressure with engine stopped), • Low pressure quickly drops to target value or lower. • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components.	♦ Activation of the A/C compressor is malfunctioning. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System, the A/C Compressor and the Battery Regulator. ♦ Not enough refrigerant in refrigerant circuit ♦ The evaporator expansion valve in the A/C unit is faulty. ♦ Shut-off valve in front of the evaporator in the A/C unit (for example Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle) is faulty (closed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).	– Check the activation and function of the A/C compressor – Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted is substantially less than specified capacity: – Localize the leak with leak detector and eliminate – Charge the refrigerant circuit. – Repeat the test.
• High pressure normal • Low pressure corresponds with the target value, • The requested cooling output is not attained.		• If quantity of refrigerant extracted roughly corresponds to specified capacity: – Check the shut-off valve function in front of the evaporator in the A/C unit (for example Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit (vehicle-specific repair manual). – Replace the expansion valve. – Charge the refrigerant circuit. – Repeat the test.

Note

Read the supporting information. Refer to ⇒ page 244 .

Possible deviation from specification	Possible cause of fault	Corrective action
For vehicles without a shut-off valve in front of the evaporator in the A/C unit (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- or Heater and A/C Unit Refrigerant Shut-Off Valve -N541- , depending on the vehicle). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). • High pressure normal • Low pressure is too low (lower than the target value) • The required cooling output is not attained in the evaporator in the A/C system.	♦ Activation of the A/C compressor is malfunctioning. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System, the A/C Compressor and the Battery Regulator. ♦ Not enough refrigerant in refrigerant circuit ♦ The evaporator expansion valve in the A/C unit is faulty.	– Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted is substantially less than specified capacity: – Localize the leak with leak detector and eliminate – Charge the refrigerant circuit. – Repeat the test. • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Replace the evaporator expansion valve in the A/C unit. – Charge the refrigerant circuit. – Repeat the test.

Possible deviation from specification	Possible cause of fault	Corrective action
For vehicles with a shut-off valve in front of the evaporator in the A/C unit (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). • High pressure normal • Low pressure is too low (lower than the target value) • The required cooling output is not attained on the A/C unit evaporator and on the evaporator for cooling the high-voltage components.	♦ Activation of the A/C compressor is malfunctioning. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System, the A/C Compressor and the Battery Regulator. ♦ Not enough refrigerant in refrigerant circuit ♦ The evaporator expansion valve in the A/C unit is faulty. ♦ Shut-off valve in front of the evaporator in the A/C unit (for example Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle) is faulty (closed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).	– Extract refrigerant from the refrigerant circuit • The extracted quantity of refrigerant is considerably less than the specified quantity (continue as with vehicles without a shut-off valve in front of the evaporator in the A/C unit.) • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Check the activation and function of the shut-off valve in front of the evaporator in the A/C unit (for example, Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle) and the shut-off valve in front of the evaporator for cooling the high-voltage components (for example, Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- or High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- , depending on the vehicle). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Replace the expansion valve in front of the expansion valve in the A/C unit. – Replace the expansion valve (or restrictor) in front of the evaporator for cooling high-voltage components. – Charge the refrigerant circuit. – Repeat the test.

Note

- *If no error is detected with this complaint, clean the refrigerant circuit (by flushing with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or clean using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89). One of these malfunctions may arise due to a constriction or a blockage in the refrigerant circuit.*
- *Depending on the vehicle, check the sensor measured values for the Evaporator Vent Temperature Sensor - G263- and, if equipped, the Temperature Sensor before Hybrid Battery Evaporator - G756- and the Temperature Sensor after Hybrid Battery Evaporator - G757- as well as the A/C compressor activation via the respective control modules (for example, the A/C Compressor Control Module - J842- by the Battery Regulation Control Module - J840- or the Climatronic Control Module - J255- A/C control head. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Wiring diagrams, Troubleshooting & Component locations.*
- *If there is an error in the measured value for the Evaporator Vent Temperature Sensor - G263- (or, for example, the Temperature Sensor before Hybrid Battery Evaporator - G756- or the Temperature Sensor after Hybrid Battery Evaporator - G757- , depending on the vehicle), this can lead to problems in the cooling output or the evaporator in the A/C unit can ice over. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *If the A/C system function is not OK after repeating the test, for example after replacing expansion valve (reinstalling the old expansion valve), clean the refrigerant circuit by flushing using the refrigerant R134a or blowing through using the compressed air and nitrogen. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 and ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 . Then replace the A/C compressor and receiver/dryer or dryer cartridge.*
- *With a malfunction on one of the temperature sensors, the evaporator may ice up even though the quantity of refrigerant in the circuit is OK.*

- *If the expansion valve on the evaporator in the A/C unit (or for example the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- / Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle) is faulty (constantly closed or does not open far enough), the A/C compressor is actuated to maximum output and the low pressure drops to the value in the graph or below (A/C compressor draws off refrigerant from the low pressure side). Since the refrigerant cannot flow via the expansion valve, the cooling output is not attained. High pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *The evaporator in the A/C system has more output than the evaporator for cooling the high-voltage components (depending on the vehicle for example in the battery cooling module or in the high-voltage battery heat exchanger). The shut-off valve (for example, the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- on the expansion valve in the battery cooling module or the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- , depending on the vehicle) is currently activated only from or up to a certain battery temperature by the Battery Regulation Control Module - J840- or the Climatronic Control Module - J255- A/C control head (depending on the cooling design for the Electric Vehicle Battery - A2- / Hybrid Battery Unit - AX1- (hybrid battery), so that the energy exchange via the evaporator for cooling the high-voltage components (in the battery cooling module or in the high-voltage battery heat exchanger) only marginally increases or not at all. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output .*

Possible deviation from specification	Possible cause of fault	Corrective action
For vehicles with a shut-off valve in front of the evaporator in the A/C unit (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). • High pressure normal • Low pressure is too low (lower than the target value) • The required cooling output is only not attained at the A/C unit evaporator (the cooling output on the evaporator for cooling the high-voltage components is OK).	♦ Activation of the A/C compressor is malfunctioning. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System, the A/C Compressor and the Battery Regulation . ♦ Not enough refrigerant in refrigerant circuit ♦ The evaporator expansion valve in the A/C unit is faulty. ♦ Shut-off valve in front of the evaporator in the A/C unit (for example Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle) is faulty (closed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).	– Extract refrigerant from the refrigerant circuit • If the quantity of refrigerant extracted is substantially less than specified capacity – Localize the leak with leak detector and eliminate – Charge the refrigerant circuit. – Repeat the test. • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Check the activation and function of the shut-off valve (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 -N516- or the Heater and A/C Unit Refrigerant Shut-Off Valve -N541- , depending on the vehicle). If no fault can be determined, replace the expansion valve on the evaporator in the A/C unit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Charge the refrigerant circuit. – Repeat the test.
• High pressure normal • Low pressure is too low (lower than the target value) • The required cooling output is only not attained at the evaporator for cooling the high-voltage components (the cooling output at the A/C unit evaporator is OK).	For vehicles with a battery cooling module ♦ Faulty activation or function of the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , an adjustment motor, for the blower or a temperature sensor in or on the battery cooling module. ♦ Constriction or blockage in the refrigerant line either to or from the expansion valve on the battery cooling module ♦ Expansion valve for the evaporator for cooling the high-voltage components is faulty. ♦ Not enough refrigerant in refrigerant circuit	– Check the function and activation of the components for cooling the high-voltage components. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” for the air conditioner, the A/C Compressor and the Battery Regulation. – Check the refrigerant lines. – Extract refrigerant from the refrigerant circuit – Depending on the vehicle, replace the expansion valve with the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , for example. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Possible deviation from specification	Possible cause of fault	Corrective action
	For a vehicle with a high-voltage battery heat exchanger ♦ Activation and function of the shut-off valve (for example High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- , depending on the vehicle) for a coolant pump is faulty, or there is a malfunction in the coolant circuit for the high-voltage components. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ Constriction or blockage in the refrigerant line to or from the high-voltage battery heat exchanger ♦ Restrictor in the refrigerant line to the high-voltage battery heat exchanger ♦ Not enough refrigerant in refrigerant circuit	– Check the restrictor in the refrigerant line to the high-voltage battery heat exchanger and if necessary clean or replace. – Charge the refrigerant circuit. – Repeat the test.

Note

- *On a vehicle with a battery cooling module, to cool the Electric Vehicle Battery - A2- (hybrid battery), for example the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- is currently activated by the Battery Regulation Control Module - J840- after a specific battery temperature is reached. If the A/C system driver is not already activated at this time, the Electrical A/C Compressor - V470- is activated via the A/C Compressor Control Module - J842- by the Battery Regulation Control Module - J840- . The temperature of the air in front of and behind the evaporator in the battery cooling module is determined by the Battery Regulation Control Module - J840- . If it can be determined that there is insufficient cooling, the information is stored in the Battery Regulation Control Module - J840- . Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *On a vehicle with a battery cooling module, the temperature of the air (as well as the evaporator cooling output) in the battery cooling module is determined via the installed temperature sensor (it currently cannot be measured using a thermometer while operating) and may only be checked using the Guided Fault Finding. Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation.*
- *On a vehicle with a battery cooling module pay attention to the additional notes ⇒ page 244 .*
- *On a vehicle with a high-voltage battery heat exchanger depending on the vehicle (for example on an Audi A3 e-tron, on other vehicles the name of the components can vary) for cooling the high-voltage battery (for example the Electric Vehicle Battery - A2- , the High-Voltage Battery Charger Control Module - J1050- etc.) the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- from a specified temperature of the control head, the Climatronic Control Module - J255- is no longer activated (the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve -N542- is open without power). If the A/C system driver is not already activated at this time, the Electrical A/C Compressor - V470- is activated via the A/C Compressor Control Module - J842- from the Climatronic Control Module - J255- control head. So that the high-voltage battery is actually cooled by the coolant, additionally further components of the circuit must be activated (for example the Engine Coolant Circulation Pump 2 - V178- and the Solenoid Valve 1 - N88-) and coolant must be flowing through the high-voltage battery heat exchanger. If it can be determined that there is insufficient cooling to the high-voltage components, this information will be stored in various control modules. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Rep. Gr. 19 ; Cooling System/ Coolant; Connection Diagram - Coolant Hoses .*

- *If no error is detected with this complaint, clean the refrigerant circuit (by flushing with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ; or clean using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89). One of these malfunctions may arise due to a constriction or a blockage in the refrigerant circuit.*

Possible deviation from specification	Possible cause of fault	Corrective action
For vehicles with a shut-off valve in front of the evaporator in the A/C unit (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). • High pressure does not increase or only increases slightly above pressure with engine stopped. • Low pressure does not drop or drops only slightly. • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components.	♦ No activation of the A/C compressor, the A/C compressor is not driven. ♦ Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- is faulty (closed), depending on the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).	– Check the activation and the function of the A/C compressor and service it. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation. – Check the activation and function of the shut-off valve (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle). If no fault can be determined, replace the expansion valve on the evaporator in the A/C unit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Possible deviation from specification	Possible cause of fault	Corrective action
	♦ Constriction or obstruction in refrigerant circuit (for example, inside the refrigerant line between the service connection “low pressure side” and the A/C compressor).	– Clean the refrigerant circuit by flushing with refrigerant R134a or blow through using compressed air and nitrogen. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 and ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 . – Replace the hose or line if kinked or constricted.
	♦ A/C compressor faulty.	– Replace the A/C compressor.

Possible deviation from specification	Possible cause of fault	Corrective action
For vehicles without a shut-off valve in front of the evaporator in the A/C unit (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). • High pressure increases above specification • The low pressure quickly falls to the target value, • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components.	♦ A/C compressor activation or functionality malfunctioning. ♦ Constriction or obstruction in refrigerant circuit ♦ Expansion valve malfunctioning	– Check the activation and the function of the A/C compressor and service it. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System, the A/C Compressor and the Battery Regulation. – Run hand over refrigerant circuit to check for differences in temperature • If difference in temperature is found at one component: – Replace the hose or line if kinked or constricted. – In the event of an obstruction, clean refrigerant circuit by flushing with refrigerant R134a or blowing through with compressed air and nitrogen. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 and ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 . – Charge the refrigerant circuit. – Repeat the test. • If the functionality is not OK and no errors can be determined: – Clean the refrigerant circuit by flushing with refrigerant R134a or blow through using compressed air and nitrogen. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 and ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 . – Charge the refrigerant circuit. – Repeat the test if the function is not OK: – Replace the expansion valve in front of the evaporator in the A/C unit and the receiver/dryer.

Possible deviation from specification	Possible cause of fault	Corrective action
For vehicles with a shut-off valve in front of the evaporator in the A/C unit (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). • High pressure increases above specification • Low pressure quickly drops to the target value • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components.	♦ Activation or function of the A/C compressor or a shut-off valve (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle) is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ Constriction or obstruction in refrigerant circuit ♦ Expansion valve malfunctioning	– Check the activation and function of the A/C compressor and the shut-off valves (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516-). Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Additional checks on a vehicle without a shut-off valve in front of the evaporator.

Note

- *If the A/C system function is not OK when the test is repeated, replace the expansion valve and receiver/dryer (and the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- / Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , if equipped). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.*
- *If the expansion valve on the evaporator in the A/C unit or the shut-off valve (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or Heater and A/C Unit Refrigerant Shut-Off Valve - N541-) is faulty (constantly closed or does not open far enough), the A/C compressor is actuated to maximum output and the low pressure drops to the specified value or below (A/C compressor draws off refrigerant from the low pressure side). Since no (or little) refrigerant can flow via the expansion valve (or the corresponding shut-off valve), the cooling output is not attained. The high pressure may not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*

- *If, in a vehicle with a battery cooling module, the expansion valve on the evaporator in the battery cooling module is faulty (or if the function or activation of the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- is malfunctioning), constantly closed or does not open enough, then the A/C compressor is also activated with the maximum output (the required temperatures in the battery cooling module are not attained). The pressure on the low pressure side only falls to the specified value or lower when there is no cooling output requested at the same time in the A/C unit (the shut-off valve in front of the evaporator in the A/C unit for example the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- is activated and is closed). The A/C compressor extracts the refrigerant from the low pressure side from both evaporators). Since, however, no refrigerant can flow over the expansion valve in the A/C unit (for example the -Hybrid Battery Refrigerant Shut-Off Valve 1 N516-) and the cooling output in the battery cooling module is not attained (there is a malfunction in the battery cooling module), the electrical A/C compressor will be activated with a higher speed. Since, however, none of the refrigerant can flow through, the pressure on the low pressure side falls below the target value. In addition, the high pressure may not or only slightly increase, due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*

- *If, on a vehicle with a high-voltage battery heat exchanger, the restrictor installed in the refrigerant line to the high-voltage battery heat exchanger is plugged or the shut-off valve (for example the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- on the Audi A3 e-tron) installed in this line is faulty, constantly closed or does not open wide enough, then the A/C compressor is also activated with the maximum output (the required temperatures in the battery cooling module are not attained). The pressure on the low pressure side only falls to the specified value or lower when there is no cooling output requested at the same time in the A/C unit (the Heater and A/C Unit Refrigerant Shut-Off Valve - N541- is activated and is closed on the Audi A3 e-tron, for example). The A/C compressor extracts the refrigerant from the low pressure side from both evaporators). Since, however, no refrigerant can flow via the expansion valve in the A/C unit (via the shut-off valve, for example the Heater and A/C Unit Refrigerant Shut-Off Valve - N541-) and the cooling output in the high-voltage battery heat exchanger is not attained, the electrical A/C compressor is activated with a higher speed. Since, however, none of the refrigerant can flow through, the pressure on the low pressure side falls below the target value. In addition, the high pressure may not or only slightly increase, due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual). The same also applies when a malfunction occurs in the coolant circuit in which the high-voltage battery heat exchanger is installed (for example the Engine Coolant Circulation Pump 2 - V178- or the Solenoid Valve 1 - N88- on the Audi A3 e-tron are not correctly activated or are faulty). The high-voltage battery heat exchanger is then cooled, but the cooled coolant does not reach the high-voltage components. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit (vehicle-specific repair manual) and ⇒ Rep. Gr. 19 ; Cooling System/Coolant; Connection Diagram - Coolant Hoses .*

- *Since the evaporator output for cooling the high-voltage components output is smaller than the evaporator output in the A/C unit, the required specified temperature may still be reached in the evaporator for cooling the high-voltage battery with too little refrigerant in the circuit, but the specified temperature in the A/C unit evaporator will no longer be attainable (even though the A/C compressor is activated with increased speed).*
- *If there is too much refrigerant oil in the circuit, the compressor must be drained (flushed) and the receiver/dryer or dryer cartridge must be replaced. After cleaning the refrigerant circuit by flushing with refrigerant R134a or blowing through using compressed air and nitrogen, then fill the circuit with the correct quantity of refrigerant oil (in the A/C compressor). Refer to*
  ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 ,
  ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 and
  ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .

Possible deviation from specification	Possible cause of fault	Corrective action
• High and low pressure normal at first After some time, • High pressure increases above specification, • The low pressure decreases to the target value or lower, • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components.	♦ Activation or function of the A/C compressor or the shut-off valve (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , depending on the vehicle) is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ Moisture in refrigerant circuit	– Check the activation of the A/C compressor and the shut-off valve (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Heater and A/C Unit Refrigerant Shut-Off Valve - N541-). Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System, the A/C Compressor and the Battery Regulation. – Clean the refrigerant circuit by flushing with refrigerant R134a or blow through using compressed air and nitrogen. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 and ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).
• High and low pressure normal at first • After lengthy driving time, low pressure drops excessively (evaporator in the A/C unit ices up).		– Replace the receiver/dryer with dryer. – Evacuate the refrigerant circuit for at least three hours. – Charge the refrigerant circuit. – Repeat the test.

Note

- *It is not initially necessary to clean the refrigerant circuit by flushing using refrigerant R134a or blow through using compressed air and nitrogen when this problem occurs since normally, there is only a small quantity of moisture in the system which can be removed by lengthy evacuation. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 and ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 .*
- *If a problem involving moisture in refrigerant circuit only occurs after a lengthy operating period or only infrequently (low pressure drops below specification and evaporator ices up), it is sufficient to replace the dryer installed in receiver/dryer (adjust quantity of refrigerant oil). Refrigerant circuit is then to be evacuated for at least three hours.*
- *With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.*
- *Likewise, the refrigerant circuit may become iced if there is a malfunction on the Evaporator Vent Temperature Sensor - G263- or/and on the Temperature Sensor after Hybrid Battery Evaporator - G757- (depending on the vehicle). For this complaint, also pay attention to the measured value of the Evaporator Vent Temperature Sensor - G263- and the Temperature Sensor after Hybrid Battery Evaporator - G757- (on vehicles with a battery cooling module, for example). Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system, and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*

Possible deviation from specification	Possible cause of fault	Corrective action
• High pressure normal • Low pressure too low, • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components.	♦ Activation or function of the A/C compressor or, if equipped, the shut-off valves (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- , Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , Heater and A/C Unit Refrigerant Shut-Off Valve - N541- or the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- , depending on the vehicle) is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ The A/C unit expansion valve or in the battery cooling module (if applicable) is faulty. ♦ The expansion valve in the A/C unit is faulty or, if equipped, the restrictor in the refrigerant line to the high-voltage battery heat exchanger is plugged. ♦ A/C compressor faulty.	– Check the activation and function of the A/C compressor and the shut-off valves if equipped (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- and the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517-). Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” Function for the A/C System, the A/C Compressor and the Battery Regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Clean the refrigerant circuit by flushing with refrigerant R134a or blowing through with compressed air and nitrogen. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 or ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 (not always necessary, see notes). – Replace the expansion valve for the evaporator in the A/C unit as well as in the receiver/dryer/dryer. – If equipped replace the expansion valve for the evaporator in the battery cooling module or clean or replace the refrigerant line with the restrictor to the high-voltage battery heat exchanger. – Charge the refrigerant circuit. – Repeat the test if the function is not OK: – Replace the A/C compressor. – Charge the refrigerant circuit. – Repeat the test.

Note

- *For the malfunction “high pressure normal, low pressure too low”, note the following: With this fault, it may be that the evaporator in the A/C unit is icing up although the refrigerant quantity in the circuit is OK.*
- *If there is a fault in the A/C compressor (the A/C compressor is activated by the A/C Compressor Control Module - J842- at too high of a speed), it is not necessary to clean the refrigerant circuit by flushing with refrigerant R134a or blowing through it with compressed air and nitrogen. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 or ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 . In this case, it is sufficient to replace the A/C compressor (observe quantity of refrigerant oil in A/C compressor and if necessary adjust).*
- *If, on a vehicle with a battery cooling module, the expansion valve for the A/C unit evaporator or the expansion valve for the evaporator in the battery cooling module is faulty (constantly closed or does not far enough), the A/C compressor is also actuated to maximum output and the pressure on the low pressure side drops to value in graph or below (A/C compressor draws off refrigerant from low-pressure side). Since the refrigerant cannot flow via the faulty expansion valve, the cooling output in the downstream evaporator is not attained and the high pressure may also not increase or only increase slightly due to the absence of energy. The A/C compressor may thereby be activated with a higher speed since the required cooling output is not attained in an evaporator. The same also applies if the function or activation of a shut-off valve (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , depending on the vehicle) is faulty. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function for the A/C system, and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *If, on a vehicle with a high-voltage battery heat exchanger, the expansion valve for the evaporator in the A/C unit is faulty (constantly closed or does not open far enough), or the restrictor in the refrigerant line to the high-voltage battery heat exchanger is plugged, the A/C compressor is also actuated to maximum output and the pressure on the low pressure side drops to value in graph or below (A/C compressor draws off refrigerant from the low-pressure side). Since the refrigerant cannot flow via the faulty expansion valve or the plugged restrictor, the cooling output in the downstream evaporator is not attained and the high pressure may also not increase or only increase slightly due to the absence of energy. The A/C compressor may thereby be activated with a higher speed since the required cooling output is not attained in an evaporator. The same also applies if the function or activation of a shut-off valve (for example, the Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , or the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- , depending on the vehicle) or one of the components installed in the coolant circuit for the high-voltage components (for example, the Engine Coolant Circulation Pump 2 - V178- or the Solenoid Valve 1 - N88- on the Audi A3 e-tron, depending on the vehicle) is faulty. Use the Vehicle Diagnostic Tester , and refer to ⇒ Rep. Gr. 19 ; Cooling System/Coolant; Connection Diagram - Coolant Hoses and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

- *Check the measured values of the Evaporator Vent Temperature Sensor - G263- (and if equipped the measured values of the Temperature Sensor Before Hybrid Battery Evaporator - G756- and the Temperature Sensor after Hybrid Battery Evaporator - G757- , depending on the vehicle) as well as the activation of the A/C compressor from the Battery Regulation Control Module - J840- or from the control head of the A/C system, the Climatronic Control Module - J255- or from the Front A/C Display Control Head - E87- or from the Thermal Management Control Module - J1024- (depending on the vehicle). If the measured value of the Evaporator Vent Temperature Sensor -G263- (the Temperature Sensor Before Hybrid Battery Evaporator -G756- or the Temperature Sensor after Hybrid Battery Evaporator -G757- , depending on the vehicle) or the activation of the A/C compressor faulty, the evaporator can freeze-up or the required cooling output is not reached. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system, and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*

Possible deviation from specification	Possible cause of fault	Corrective action
• High pressure normal or too high • Low pressure too high. • A/C compressor noise (particularly after switch-on) • The required cooling output is not attained in the A/C unit evaporator and/or in the evaporator for cooling the high-voltage components.	♦ A/C compressor activation or functionality malfunctioning. ♦ Depending on the version of the refrigerant circuit, the activation or function of one of these shut-off valves: Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- , Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , Heater and A/C Unit Refrigerant Shut-Off Valve - N541- or High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- (depending on the vehicle) is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ Too much refrigerant in the circuit. ♦ Expansion valve malfunctioning ♦ A/C compressor faulty.	– Check the activation and function of the A/C compressor and, if equipped, these shut-off valves (the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- , Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , and the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- , depending on the vehicle). Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function of the A/C system and battery regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Replace the expansion valve for the evaporator in the A/C unit as well as in the receiver/dryer/dryer. – Replace the expansion valve with the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- . – Check the restrictor in the refrigerant line to the high-voltage battery heat exchanger and if necessary clean or replace. – Charge the refrigerant circuit. – Repeat the test, is the function is not OK? – Replace the A/C compressor. • If quantity of refrigerant extracted is substantially greater than specified capacity: – Charge the refrigerant circuit. – Repeat the test.

Note

- *This fault may also be caused by too much refrigerant oil in the circuit. Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*
- *If, on a vehicle with a battery cooling module, the expansion valve for the A/C unit evaporator or the expansion valve for the evaporator in the battery cooling module is faulty (constantly closed or does not far enough), the A/C compressor is also actuated to maximum output and the pressure on the low pressure side drops to value in graph or below (A/C compressor draws off refrigerant from low-pressure side). Since the refrigerant cannot flow via the faulty expansion valve, the cooling output in the downstream evaporator is not attained and the high pressure may also not increase or only increase slightly due to the absence of energy. The A/C compressor may thereby be activated with a higher speed since the required cooling output is not attained in an evaporator. The same also applies if the function or activation of a shut-off valve (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , depending on the vehicle) is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system, and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *If, on a vehicle with a high-voltage battery heat exchanger, the expansion valve for the evaporator in the A/C unit is faulty (constantly closed or does not open far enough), or the restrictor in the refrigerant line to the high-voltage battery heat exchanger is plugged, the A/C compressor is also actuated to maximum output and the pressure on the low pressure side drops to value in graph or below (A/C compressor draws off refrigerant from the low-pressure side). Since the refrigerant cannot flow via the faulty expansion valve or the plugged restrictor, the cooling output in the downstream evaporator is not attained and the high pressure may also not increase or only increase slightly due to the absence of energy. The A/C compressor may thereby be activated with a higher speed since the required cooling output is not attained in an evaporator. The same also applies if the function or activation of the Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- (for example, on the Audi A3 e-tron) or one of the components installed in the coolant circuit for the high-voltage components (for example, the Engine Coolant Circulation Pump 2 - V178- or the Solenoid Valve 1 - N88- on the Audi A3 e-tron) is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system, and refer to ⇒ Rep. Gr. 19 ; Cooling System/Coolant; Connection Diagram - Coolant Hoses and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

Possible deviation from specification	Possible cause of fault	Corrective action
• High and low pressure normal • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components.	♦ A/C compressor activation or functionality malfunctioning. ♦ Depending on the version of the refrigerant circuit, the activation or function of one of these shut-off valves (for example, Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- , Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , Heater and A/C Unit Refrigerant Shut-Off Valve - N541- or High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- , depending on the vehicle) is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ Too much refrigerant in the circuit. ♦ Expansion valve malfunctioning	– Check the activation and function of the A/C compressor and, if equipped, these shut-off valves (for example, the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- , Hybrid Battery Refrigerant Shut-Off Valve 2 - N517- , Heater and A/C Unit Refrigerant Shut-Off Valve - N541- , and the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542-). Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function for the A/C system and battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Discharge the refrigerant circuit. – Clean the refrigerant circuit by flushing with refrigerant R134a or blow through using compressed air and nitrogen. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 or ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 .
• High and low pressure normal • A/C compressor noise (particularly after switch-on) • The required cooling output is not attained in the A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components).		– Fill in correct quantity of refrigerant oil into circuit (see note). – Charge the refrigerant circuit. – Repeat the test if the function is not OK: – Replace the expansion valve. – Charge the refrigerant circuit. – Repeat the test.

Note

- *Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*
- *If, for example, the expansion valve in the evaporator in the A/C unit is faulty (permanently open), the evaporator temperature (in the A/C unit) is no longer regulated such that only refrigerant leaves the evaporator in a gaseous state. Under certain usage conditions, liquid droplets may then be drawn in by the compressor and cause noise (liquid cannot be compressed).*
- *If there is too much refrigerant oil in the circuit, the compressor must be drained and the receiver/dryer must be replaced. After cleaning the refrigerant circuit by flushing with refrigerant R134a and fill the refrigerant circuit with the correct quantity of refrigerant. Refer to*
  ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 *and*
  ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .

8.6.2 Specified Values for Refrigerant Circuit Pressures, Vehicles with Heat Pump

Note

- *On vehicles with a high-voltage system and heat pump (for example on the Audi Q7 e-tron) installed in the refrigerant circuit and electrically activated vehicles which regulate the flow of the refrigerant in the refrigerant circuit depending on the current operating condition. There are different versions of these valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.*
- *For vehicles with the "heat pump" function and/or "high-voltage battery cooling", high pressure is not at the high pressure side service connection in every A/C system operating condition. Depending on the A/C system operating condition, the refrigerant circuit pressure on the high pressure side can only be measured via the pressure/temperature sensor installed in the refrigerant circuit on these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.*
- *On these vehicles the refrigerant circuit of the A/C system is used not only to cool the vehicle interior but also to cool the Hybrid Battery Unit - AX1- (via the refrigerant circuit for the high-voltage system) and to heat the vehicle interior (at low ambient temperature) via the heat pump function. So in order for these functions to be performed, the various valves, pressure and temperature sensors as well as the pumps in the refrigerant circuit and in the high-voltage system coolant circuit must be installed correctly and function correctly. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Engine Mechanical; Rep. Gr. 19 ; Cooling System/ Coolant; Coolant, Draining and Filling .*
- *To determine the possible cause of a malfunction, the basic setting of the Thermal Management Control Module - J1024- different routines are stored, which activate these functions "Cooling the A/C system", "heat pump", and "Cooling the components of the high-voltage system" in the Vehicle Diagnostic Tester "Guided Fault Finding" function.*

High-Pressure Side:

Increasing from initial pressure (when connecting the pressure gauges) to a maximum of 20 bar.

Note

Depending on the layout of the high pressure side service connection and the operating condition, the high pressure can only be measured via the pressure/temperature sensor installed in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Low-Pressure Side:

Decreasing from initial pressure (when connecting the pressure gauges) to a value between 1.5 and 2.3 bar absolute pressure (depending on the required cooling output).

A/C Compressor Speed:

Depending on the required cooling output between 800 and 8600/min (currently a maximum of 5000/min for parked vehicles).

Note

- *The temperature of the air downstream of the evaporator, the current A/C compressor speed and the pressure of the refrigerant on the high pressure side are displayed as the measured value by various control modules (for example, by the Thermal Management Control Module - J1024- , the Front A/C Display Control Head - E87- or the Climatronic Control Module - J255-), depending on the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.*

- *If a high cooling output is required (for example, a high outside temperature and the blower speed set on high), then the A/C compressor will not bring the pressure on the low pressure side to the required value (for example, for a certain time after turning on the A/C). The A/C compressor is not actuated at the maximum specified speed (of approximately 8500/min) on a stationary or slow moving vehicle (up to a speed of approximately 45km/h) (the A/C compressor speed is limited to approximately 5000/min). After a vehicle reaches a speed of more than approximately 45 km/h (28 mph), the limit for the maximum permissible A/C compressor speed is lifted. At a A/C compressor speed of 5000/min, a high outside temperature and a high fresh air blower speed (inefficient environmental controls), the A/C compressor output (the delivery volume) is no longer sufficient to reduce the pressure on the low pressure side to the target value. To check the A/C compressor control under these conditions, for example, the fresh air blower is activated only with approximately 40% of the maximum voltage, check the pressures at a lower fresh air blower speed. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function (for A/C system and the battery regulation) and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *Under unfavorable conditions (very high ambient temperatures, high humidity), pressure on high-pressure side may increase to max. 29 bar.*
- *The specified speed of the A/C compressor is displayed and the measured value for example from the Thermal Management Control Module - J1024- using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.*
- *The refrigerant circuit pressure (low or high pressure) measured by the different pressure/temperature sensors depending on the respective operating condition is displayed as the measured value by the respective control module. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *The low pressure settles depending on the A/C compressor speed and the control characteristic of the expansion valve (on the evaporator of the front heater and A/C unit) within the compressor output range in tolerance range (1.5 to 2.3 bar positive pressure).*
- *The target speed for the A/C compressor must be greater than 1500/min for this test.*
- *In setting "maximum cooling output" the target speed is regulated to approximately 4000 up to 5000/min. This value is vehicle-specific and is displayed and the measured value of the respective control module using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.*

- *At absolute pressure, 0 bar corresponds to absolute vacuum. Normal ambient pressure corresponds to 1 bar absolute pressure. 0 bar pressure corresponds to an absolute pressure of 1 bar on most pressure gauges (indicated by -1 bar below 0).*
- *If on a vehicle with two evaporators (one in the heater and A/C unit and one for cooling the heater and A/C unit for example the heat exchanger for the high-voltage battery) and two condensers (one in the front end for the A/C system and one as the heat exchanger for the heat pump function) depending on the selected function on a component the measured temperature or pressure, the specified value corresponds to another component whose specifications are not achieved, check the activation of the electrically activated valves installed in the refrigerant circuit. At the same time, also pay attention to the pressure distribution in the refrigerant circuit depending on the installed check valves. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).*
- *For the correct A/C function it is also necessary that depending on the selected functions of the respective heater cores enough heat is supplied or removed. Therefore also pay attention to the incorporation of the heater core into the respective coolant circuit for the engine and high-voltage system and the function of the pumps and valves installed in it. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit (vehicle-specific repair manual).*
- *Since the evaporator for cooling the high-voltage components output (in the battery cooling module and in the high-voltage battery heat exchanger) is smaller than the evaporator output in the heater and A/C unit, the required target temperature may still be reached in the evaporator for cooling the high-voltage battery with too little refrigerant in the refrigerant circuit, but the target temperature in the heater and A/C unit evaporator will no longer be attainable (even though the A/C compressor is activated with increased A/C unit speed).*

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure remains constant or increases only slightly (above pressure with engine stopped), • Low pressure quickly drops to target value or lower. • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components.	♦ Not enough refrigerant in refrigerant circuit	– Extract refrigerant from the refrigerant circuit • If quantity of refrigerant extracted is substantially less than specified capacity: – Localize the leak with leak detector and eliminate – Charge the refrigerant circuit. – Repeat the test. • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Check the activation and function of the A/C compressor and the valves installed in the refrigerant circuit (see below).

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
	♦ Activation of the A/C compressor is faulty.	– Check the activation and function of the A/C compressor using the Vehicle Diagnostic Tester in “Guided Fault Finding” function.
• High pressure normal • Low pressure corresponds with the target value, • The requested cooling output is not attained.	♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).	– Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
	♦ Not enough refrigerant in refrigerant circuit ♦ The shut-off valve in front of the expansion valve for the evaporator in the front heater and A/C unit is faulty. ♦ The expansion valve for the evaporator in the front heater and A/C unit is faulty.	– Discharge the refrigerant circuit and charge again (see above). – Repeat the test. – Check the shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Replace the expansion valve.

Note

- *To determine the possible cause of a malfunction, the basic setting of the respective control module (for example in the Thermal Management Control Module - J1024-) different routines are stored, which activate these functions “Cooling the A/C system”, “heat pump”, and “Cooling the Thermal Management Control Module component of the high-voltage system” in the Vehicle Diagnostic Tester “Guided Fault Finding” function.*
- *If for this concern no malfunction can be determined, check the activation of the electrically activated valves installed in the refrigerant circuit next. If no error can be detected here, remove and check the check valves installed in the refrigerant circuit. If no error can be detected here either, clean the refrigerant circuit (flush with refrigerant R134a). A constriction or blockage in the refrigerant circuit can also lead to these complaints. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and*
  ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 .
- *For vehicles with the “heat pump” function and/or “high-voltage battery cooling”, high pressure is not at the high pressure side service connection in every A/C system operating condition. Depending on the A/C system operating condition, the refrigerant circuit pressure on the high pressure side can only be measured via the pressure/temperature sensor installed in the refrigerant circuit on these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.*
- *Before beginning the repair work check the measured values of the different pressure/temperature sensors installed in the refrigerant circuit. If there is an error in the measured value of a pressure/temperature sensor, this can lead to problems in the cooling output, or the evaporator in the front heater and A/C unit can ice over. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual), and ⇒ Wiring diagrams, Troubleshooting & Component locations.*
- *When checking the different functions (heat pump or cooling the high-voltage battery), also pay attention to the activation and function of the coolant circuit components that are involved with these functions. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit (vehicle-specific repair manual).*
- *If the A/C system function is not OK after repeating the test, for example after replacing expansion valve (reinstalling the old expansion valve), clean the refrigerant circuit by flushing using the refrigerant R134a. Refer to*
  ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 . Then replace the A/C compressor and receiver/dryer or dryer cartridge.
- *With a malfunction on one of the temperature sensors, the evaporator may ice up even though the quantity of refrigerant in the circuit is OK.*

- *If the expansion valve on the evaporator in the A/C unit is faulty (constantly closed or does not open far enough), the A/C compressor is activated to maximum output and the low pressure drops to the value in the graph or below (A/C compressor draws off the refrigerant from the low pressure side). Since the refrigerant cannot flow via the expansion valve, the cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *The evaporator in the heater and A/C unit has a larger output than the evaporator for cooling the high-voltage battery. Depending on the version to cool the Electric Vehicle Battery - A2- / Hybrid Battery Unit - AX1- (hybrid battery), the expansion valve in front of this evaporator (the heat exchanger for cooling the high-voltage system components) is currently activated only from or up to a certain battery temperature by the respective control module, so that the exchange of energy via this evaporator does not increase, or only slightly. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *If there is too much refrigerant oil in the circuit, the compressor must be drained (flushed) and the receiver/dryer or dryer cartridge must be replaced. After cleaning the refrigerant circuit by flushing with refrigerant R134a and fill the refrigerant circuit with the correct quantity of refrigerant (in the A/C compressor). Refer to*
  ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 *and*
  ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal • Low pressure normal or too low (less than the specified value) • The required cooling output is only not attained at the A/C unit evaporator (the cooling output on the evaporator for cooling the high-voltage components is OK).	♦ Not enough refrigerant in refrigerant circuit	– Extract refrigerant from the refrigerant circuit • If the quantity of refrigerant extracted is substantially less than specified capacity – Localize the leak with leak detector and eliminate – Charge the refrigerant circuit. – Repeat the test. • If quantity of refrigerant extracted roughly corresponds to specified capacity: – Check the activation and function of the A/C compressor and the valves installed in the refrigerant circuit (see below).

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
	♦ Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function. ♦ The expansion valve for the evaporator in the front heater and A/C unit is faulty.	– Check the activation and function of the A/C compressor using the Vehicle Diagnostic Tester in “Guided Fault Finding” function.
	♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).	– Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
	♦ The shut-off valve in front of the expansion valve for the evaporator in the front heater and A/C unit is faulty. ♦ The expansion valve for the evaporator in the front heater and A/C unit is faulty.	– Check the shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Replace the expansion valve. – Charge the refrigerant circuit. – Repeat the test.

Note

Read the supporting information. Refer to ⇒ page 269 .

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure normal • Low pressure normal or too low (less than the specified value) • The required cooling output is only not attained at the evaporator for cooling the high-voltage components (the cooling output at the heater and the front A/C unit evaporator is OK).	♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ One of the pumps or one of the valves in the high-voltage system coolant circuit is faulty or does not function correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit (vehicle-specific repair manual).	– Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Check the function and activation of the components responsible for cooling the high-voltage components. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
	♦ Constriction of blockage in the refrigerant line to or from the expansion valve on the evaporator for cooling the high-voltage components. ♦ Expansion valve for the evaporator for cooling the high-voltage components is faulty.	– Extract refrigerant from the refrigerant circuit – Clean or replace the refrigerant line to the expansion valve if necessary. – Charge the refrigerant circuit. – Repeat the test.

Note

Read the supporting information. Refer to ⇒ page 269 .

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
• High pressure does not increase or only increases slightly above pressure with engine stopped. • Low pressure does not drop or drops only slightly. • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components.	♦ No activation of the A/C compressor, the A/C compressor is not driven.	– Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.
	♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).	– Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
	♦ Constriction or obstruction in refrigerant circuit (for example, inside the refrigerant line between the service connection “low pressure side” and the A/C compressor).	– Clean the refrigerant circuit (flush with refrigerant R134a). Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 . – Replace the hose or line if kinked or constricted.

Possible Deviation from Specification	Possible Cause of Fault	Corrective Action
	♦ A/C compressor faulty.	– Replace the A/C compressor.

Note

Read the supporting information. Refer to ⇒ page 269 .

Possible deviation from specification	Possible cause of fault	Corrective action
• High pressure increases above specification • The low pressure quickly falls to the target value, • The required cooling output is not attained in the front heater and A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components).	♦ A/C compressor activation or functionality malfunctioning. ♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ Constriction or obstruction in refrigerant circuit ♦ Expansion valve malfunctioning	– Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function. – Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Run hand over refrigerant circuit to check for differences in temperature • If difference in temperature is found at one component: – Replace the hose or line if kinked or constricted. – If there is a blockage clean the refrigerant circuit (flush with refrigerant R134a). Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 . – Charge the refrigerant circuit. – Repeat the test.

Note

- *With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.*
- *If the expansion valve in the heater and A/C unit evaporator or the installed shut-off valve is malfunctioning (permanently closed or does not open sufficiently), the A/C compressor is actuated to maximum output and the low pressure drops to specification or below (compressor draws off refrigerant from low-pressure side). Since no (or little) the refrigerant can flow via the expansion valve, the cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *If the expansion valve for the evaporator for cooling the high-voltage components is faulty (or the function and activation is faulty) is always closed or does not open wide enough the A/C compressor is also activated with the maximum output (the required temperatures in the heat exchanger are not reached). The pressure on the low pressure side only then decreases to the specified value or lower, if no cooling output is needed at the same time in the front heater and A/C unit. The A/C compressor extracts the refrigerant from the low pressure side from both evaporators. Because no refrigerant can low over the expansion valve in the front heater and A/C unit and the cooling output in the evaporator for cooling the high voltage battery is not reached (there is a malfunction in the area of the evaporator for the cooling of the high voltage battery) the electric A/C compressor is activated with a higher speed. If not refrigerant can flow the pressure on the low pressure side falls under the specified value, high pressure may also not increase or only increase slightly due to the absence of energy. The same applies if a valve in the refrigerant circuit is not OK a malfunction in the incorporation of the evaporator for cooling the high-voltage battery in the high-voltage system refrigerant circuit or the pump or a valve installed there is not OK. Then the high-Voltage Battery Heat Exchanger is cooled, but the cooled coolant reached the high-voltage battery heat exchanger which should not be cooled. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit (vehicle-specific repair manual).*
- *For additional information. Refer to ⇒ page 269 .*

Possible deviation from specification	Possible cause of fault	Corrective action
• High and low pressure normal at first After some time, • High pressure increases above specification, • The low pressure decreases to the target value or lower, • The required cooling output is not attained in the A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components). or • High and low pressure normal at first • After lengthy driving time, low pressure drops excessively (evaporator in the A/C unit ices up).	♦ Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function. ♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ Moisture in refrigerant circuit	– Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function. – Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Clean the refrigerant circuit (flush with refrigerant R134a). Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 . – Replace the receiver/dryer with dryer. – Evacuate the refrigerant circuit for at least three hours. – Charge the refrigerant circuit. – Repeat the test.

Note

- *First, it is not necessary to clean the refrigerant circuit (flushing with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93) in case of this complaint because generally only a small amount of moisture is in the system and this can be removed by a long evacuation.*
- *If a problem involving moisture in refrigerant circuit only occurs after a lengthy operating period or only infrequently (low pressure drops below specification and evaporator ices up), it is sufficient to replace the dryer installed in receiver/dryer (adjust quantity of refrigerant oil). Refrigerant circuit is then to be evacuated for at least three hours.*
- *With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.*
- *A malfunction on the Evaporator Vent Temperature Sensor - G263- or/and on the pressure/temperature sensor the can lead to the refrigerant circuit freezing-up. For this concern also pay attention to the measured values of the different pressure/ temperature sensor in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *For additional information. Refer to ⇒ page 269 .*

Possible deviation from specification	Possible cause of fault	Corrective action
• High pressure normal • Low pressure too low, • The required cooling output is not attained in the A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components).	♦ Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. ♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ One of the pressure/temperature sensors installed in the refrigerant circuit sends incorrect values.	– Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. – Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). – Clean the refrigerant circuit (flush with refrigerant R134a). Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 .

Possible deviation from specification	Possible cause of fault	Corrective action
	♦ The shut-off valve in front of the expansion valve for the evaporator in the front heater and A/C unit is faulty. ♦ The expansion valve for the evaporator in the front heater and A/C unit is faulty.	– Clean the refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93) (not always necessary see the notes). – Replace the expansion valve for the evaporator in the front heater and A/C unit as well as the receiver/dryer. – Charge the refrigerant circuit. – Repeat the test if the function is not OK: – Replace the A/C compressor. – Charge the refrigerant circuit. – Repeat the test.

Note

- *For the malfunction “high pressure normal, low pressure too low”, note the following: With this fault, it may be that the evaporator in the A/C unit is icing up although the refrigerant quantity in the circuit is OK.*
- *If there is a fault in the A/C compressor (the A/C compressor is activated by the A/C Compressor Control Module - J842- at too high of a speed), it is not necessary to clean the refrigerant circuit by flushing with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 . In this case, it is sufficient to replace the A/C compressor (observe quantity of refrigerant oil in A/C compressor and if necessary adjust).*
- *If the expansion valve for the evaporator for cooling the high-voltage components is faulty (or the function and activation is faulty) is always closed or does not open wide enough the A/C compressor is also activated with the maximum output (the required temperatures in the heat exchanger are not reached). The pressure on the low pressure side only then decreases to the specified value or lower, if no cooling output is needed at the same time in the front heater and A/C unit. The A/C compressor extracts the refrigerant from the low pressure side from both evaporators. Because no refrigerant can low over the expansion valve in the front heater and A/C unit and the cooling output in the evaporator for cooling the high voltage battery is not reached (there is a malfunction in the area of the evaporator for the cooling of the high voltage battery) the electric A/C compressor is activated with a higher speed. If not refrigerant can flow the pressure on the low pressure side falls under the specified value, high pressure may also not increase or only increase slightly due to the absence of energy. The same applies if a valve in the refrigerant circuit is not OK a malfunction in the incorporation of the evaporator for cooling the high-voltage battery in the high-voltage system refrigerant circuit or the pump or a valve installed there is not OK. Then the high-Voltage Battery Heat Exchanger is cooled, but the cooled coolant reached the high-voltage battery heat exchanger which should not be cooled. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit (vehicle-specific repair manual).*
- *A malfunction on the Evaporator Vent Temperature Sensor - G263- or/and on the pressure/temperature sensor the can lead to this concern. Also pay attention to the measured values of the different pressure/temperature sensor in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).*
- *For additional information. Refer to ⇒ page 269 .*

Possible deviation from specification	Possible cause of fault	Corrective action
• High pressure normal or too high • Low pressure too high. • A/C compressor noise (particularly after switch-on) • The required cooling output is not attained in the front heater and A/C unit evaporator and/or in the evaporator for cooling the high-voltage components.	♦ Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.	– Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.
	♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).	– Check the function and activation of the various valves and pressure/temperature sensors installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
	♦ One of the pressure/temperature sensor installed in the refrigerant circuit delivers incorrect values.	
	♦ Too much refrigerant in the circuit.	– Extract refrigerant from the refrigerant circuit
		• If quantity of refrigerant extracted is substantially greater than specified capacity:
		– Charge the refrigerant circuit.
		– Repeat the test.
		• If quantity of refrigerant extracted roughly corresponds to specified capacity:
		– Check the activation and function of the A/C compressor and the valves installed in the refrigerant circuit (see below).
	♦ The shut-off valve in front of the expansion valve for the evaporator in the front heater and A/C unit is faulty.	– Check the shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
	♦ The expansion valve for the evaporator in the front heater and A/C unit is faulty.	
	♦ A/C compressor faulty.	– Replace the expansion valve for the evaporator in the front heater and A/C unit as well as the receiver/dryer.
		– Charge the refrigerant circuit.
		– Repeat the test, is the function is not OK?
		– Replace the A/C compressor.

Note

- *This fault may also be caused by too much refrigerant oil in the circuit. Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*
- *For additional information. Refer to ⇒ page 269 .*

Possible deviation from specification	Possible cause of fault	Corrective action
• High and low pressure normal • The required cooling output is not attained in the A/C unit evaporator and in the evaporator for cooling the high-voltage components. or • High and low pressure normal • A/C compressor noise (particularly after switch-on) • The required cooling output is not attained in the A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components).	♦ Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.	– Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the “Guided Fault Finding” function.
	♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).	– Check the function and activation of the various valves and pressure/temperature sensors installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
	♦ One of the pressure/temperature sensor installed in the refrigerant circuit delivers incorrect values.	
	♦ Too much refrigerant in the circuit.	– Discharge the refrigerant circuit.
	♦ The expansion valve for the evaporator in the front heater and A/C unit is faulty.	– Clean the refrigerant circuit (flush with refrigerant R134a). Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 .
	♦ Too much refrigerant oil in the circuit.	– Fill in correct quantity of refrigerant oil into circuit (see note). – Charge the refrigerant circuit. – Repeat the test.

Note

- *Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*
- *If, for example, the expansion valve for the evaporator in the A/C unit or for the evaporator for cooling the high-voltage components is faulty (always open), the evaporator temperature (in the front heater and A/C unit or in the evaporator for cooling the high-voltage components) is no longer regulated so that only refrigerant in gaseous state leaves the evaporator. Under certain usage conditions, liquid droplets may then be drawn in by the compressor and cause noise (liquid cannot be compressed).*
- *If there is too much refrigerant oil in the circuit, the compressor must be drained and the receiver/dryer must be replaced. After cleaning the refrigerant circuit by flushing with refrigerant R134a and fill the refrigerant circuit with the correct quantity of refrigerant. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 and ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .*
- *For additional information. Refer to ⇒ page 269 .*

Possible deviation from specification	Possible cause of fault	Corrective action
• High and low pressure normal • The required cooling output is attained in the front heater and A/C unit evaporator (and on the evaporator for cooling the high-voltage components). • The required cooling output is not attained on the heater core for the heat pump output.	♦ Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. ♦ If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). ♦ One of the pressure/temperature sensor installed in the refrigerant circuit delivers incorrect values.	– Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. – Check the function and activation of the various valves and pressure/temperature sensors installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Possible deviation from specification	Possible cause of fault	Corrective action
	One of the pumps or one of the valves in the coolant circuit for the high-voltage system or the engine is faulty or does not function correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit (vehicle-specific repair manual).	– Check the function and activation of the components for cooling the high-voltage components. Refer to Vehicle Diagnostic Tester in the “Guided Fault Finding” for the (A/C system, A/C compressor and battery regulation). – Check the incorporation of the heat exchanger in the coolant circuit of the engine as well as the function and activation of the different pumps and valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit .

Note

- *If the required cooling output on the evaporator in the front heater and A/C unit (and on the evaporator for cooling the high-voltage battery is OK) and there is a concern due to insufficient heating performance on the heat exchanger for the heat pump operation. The cause may be in the high-voltage system coolant circuit or in the engine coolant circuit. If the pumps and valves in the high-voltage system coolant circuit is not activated correctly or its function is not OK via the evaporator (heat exchanger) for the high-voltage system components not enough heat energy is absorbed from the coolant. If the pumps and valves in the engine coolant circuit are not activated correctly or are not functioning correctly, the absorbed heat energy, which is transferred via the heat exchanger for heat pump function, may not be delivered to the coolant which flows to the heater core in the heater and A/C unit. Use the Vehicle Diagnostic Tester in the “Guided Fault Finding” function and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Coolant Circuit (vehicle-specific repair manual).*
- *For additional information. Refer to ⇒ page 269 .*

9 Refrigerant Circuit Components, Replacing

⇒ “9.1 Components, Replacing”, page 283

9.1 Components, Replacing

9.1.1 General Information

WARNING

There is a risk of freezing.

Refrigerant may leak out if refrigerant circuit is not discharged.

Refrigerant must be extracted before opening the refrigerant circuit. If refrigerant circuit is not opened within 10 minutes of extraction, pressure may form in refrigerant circuit due to evaporation. Extract the refrigerant again.

- All components of the refrigerant circuit submitted for quality observation are always to be sealed (use original sealing caps of replacement part).
- To date, the following replacement parts (A/C compressor, reservoir, receiver/dryer, evaporator and condenser) have been filled with nitrogen gas. This charging stops gradually or the charging pressure is so low that gas does not escape noticeably when opening.
- On vehicles installed with a compressor with no A/C clutch, the engine is only to be started following complete assembly of the refrigerant circuit (compressor always in operation as well) .
- When the refrigerant circuit is empty, the A/C compressor with A/C Compressor Regulator Valve - N280- (without A/C clutch) is switched to internal lubrication with the result that only a minimal amount of oil is pumped from the compressor into the circuit.

Note

- *As parts are sometimes stored for lengthy periods and at different locations within the spare parts organization, it is entirely possible that gas will escape from some parts and not from others on initial opening (even in the case of identical spare part numbers). Sealing caps at replacement part connections are therefore to be removed carefully and the nitrogen gas allowed to escape slowly.*
- *The refrigerant circuit is equipped either with a restrictor and a reservoir, or with an expansion valve and receiver/dryer.*
- *The dryer cartridge or components with dryer bag (reservoir, receiver/dryer) are always to be replaced after cleaning the refrigerant circuit by flushing with refrigerant R134a. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 . Or blow through using compressed air and nitrogen. Refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 . In doing so, leave sealed as long as possible to minimize absorption of moisture.*
- *The dryer cartridge or components with dryer bag (reservoir, receiver/dryer) are to be replaced if it is required for certain repair manual operations or if the refrigerant circuit has been open for a lengthy period and moisture has penetrated (for example, following an accident). Refer to ⇒ "9.1.2 Leaking or Damaged Components except A/C Compressor, Reservoir or Receiver/Dryer", page 285 .*
- *The period of time which a refrigerant circuit may be left open without having to replace a component with the dryer bag (reservoir, receiver/dryer) depends on ambient influences to a large extent. Given a high ambient temperature and a high humidity level or if the vehicle, for example, has been standing in the open or driven (in wet, foggy weather conditions), the period will be considerably shorter than for a vehicle which has been standing in a heated dry area. The size of the opening through which moisture may ingress into the circuit also influences the period for which a refrigerant circuit can be left open without having to replace the component with the dryer bag. Refer to ⇒ "9.1.2 Leaking or Damaged Components except A/C Compressor, Reservoir or Receiver/Dryer", page 285 .*
- *Seal open connections and lines (to prevent absorption of moisture).*
- *Always replace the restrictor.*

Caution

- ***Dispose of dirty or used oils of unknown origin paying attention to local regulations.***

9.1.2 Leaking or Damaged Components except A/C Compressor, Reservoir or Receiver/Dryer

The Refrigerant Circuit was Completely Empty (for Example with Larger Leak or Cracked Hose)

Note

- *In the event of only a minor leak with slow escape of refrigerant (for example at a small leakage point), the amount of refrigerant oil lost and the amount of moisture penetrating is not sufficient to influence operation of the air conditioner.*
- *The operations marked * are only to be implemented in case of a major leak (for example following an accident).*

Electrically-Driven A/C Compressor

– Remove the faulty component. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Remove the electrically driven A/C compressor and flush. Refer to
⇒ “5.5.2 Electrically-Driven A/C Compressor, Flushing (Removing Refrigerant Oil)”, page 112 *.

– Clean the refrigerant circuit (flush with Refrigerant R134a). Refer to
⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 *.

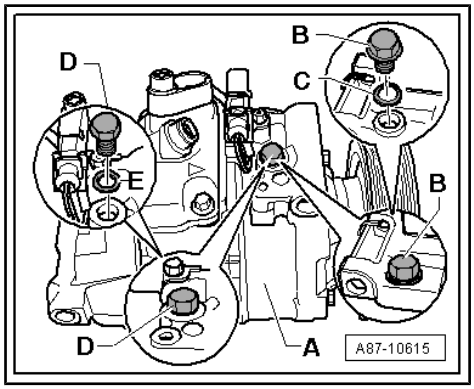
– Fill the A/C compressor or the refrigerant circuit with completely with refrigerant oil to the specified capacity.

Mechanically Driven A/C Compressor

– Remove the faulty component. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual)*

– Remove the oil drain plug -B-/-D- from the A/C compressor -A-.*



Note

- *There are different versions of the oil drain plug -B-/-D- and seal -C-/-E- (depending on the A/C compressor manufacturer).*
- *When installing the oil drain plug -B-/-D-, pay attention to the tightening specification (dependent on the A/C compressor manufacturer and the oil drain plug version). For example, a seal is installed on the oil drain plug on a "Denso" and "Delphi" A/C compressor (tightening specification currently 30 Nm on a "Denso" A/C compressor and 15 Nm on a "Delphi" A/C compressor). On "Sanden" or "Zexel-/Valeo" A/C compressors an oil drain plug or a seal is installed depending on the version on the oil drain plug (tightening specification currently 10 Nm).*
- *A/C compressors made by "Denso" or "Nippondenso" and "Delphi" have an oil drain plug -D-, for example, with a seal -E- installed on it. Replace according to the Parts Catalog.*
- *Depending on the version, an O-ring or a seal -C- is installed on the oil drain plug -B- on a "Sanden" or "Zexel/Valeo" A/C compressor. To replace. Refer to the Parts Catalog.*
- *If the seals (seal or O-ring) that are installed on the oil drain plug are not available as a replacement part, the removed seals may be used as an exception (check for damage before installing). If the removed seal is damaged or deformed if necessary replace with a commercially available component.*
- *To accelerate drainage of refrigerant oil, rotate the A/C compressor by way of clutch plate of A/C clutch, for example.*
- *After charging the refrigerant circuit check the installed oil drain plug for leaks for example using an electronic leak detector.*
- *Drain the old refrigerant oil from the A/C compressor.*

All

Note

- *Then fill A/C compressor with quantity of fresh refrigerant oil corresponding to quantity of refrigerant oil in replacement A/C compressor. Refer to ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .**
- *Use different refrigerant oils and quantities for the various A/C compressors. Refer to ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .*
- *To ensure compressor lubrication on start-up, at least 40 cm^3 of refrigerant oil must be poured into the compressor. The remainder can be added to the new reservoir or receiver/dryer. Refer to ⇒ "10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils", page 301 .*
- *If dirt has penetrated into the compressor with the refrigerant circuit open (for example after an accident), compressor is to be replaced.*
- *Clean refrigerant circuit (flush with refrigerant R134a or blow through with compressed air and nitrogen. Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 or ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 .**

– Replace the dryer cartridge*, receiver/dryer* or reservoir* and restrictor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Assemble, evacuate and recharge refrigerant circuit.

9.1.3 Leaking or Damaged Components except A/C Compressor, Reservoir or Receiver/Dryer

Refrigerant circuit still contains refrigerant (for example, with minor leak)

– Discharge the refrigerant circuit.

– Remove the malfunctioning component, flush with compressed air, collect escaping refrigerant oil.

– The new component is to be filled with the amount of refrigerant oil flushed out (positive 20 cm^3 for evaporator, positive 10 cm^3 for condenser, refrigerant pipes and refrigerant hoses) as fresh refrigerant oil fill.

Note

Dispose of old refrigerant oil (pay attention to local regulations). Refer to VW / Audi ServiceNet.

– If equipped, replace the restrictor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Assemble, evacuate and charge the refrigerant circuit.

9.1.4 Compressor, Replacing without the Need for Flushing Refrigerant Circuit

For example, because of noise or no A/C compressor output

Note

- *If there is damage on the A/C compressor electronics, for example on the A/C Compressor Regulator Valve - N280- on a mechanical A/C compressor or on the A/C Compressor Control Module - J842- of the electrical A/C compressor, then the refrigerant circuit does not have to always be cleaned. Here it is usually acceptable to replace the A/C compressor without cleaning the refrigerant circuit (adapt the amount of refrigerant oil). Refer to*
  ⇒ "9.1.4 Compressor, Replacing without the Need for Flushing Refrigerant Circuit", page 288 .
- *If a faulty A/C compressor is replaced with an A/C compressor from another manufacturer, check if the same refrigerant oil is approved for the A/C compressor to be installed as the one that is already in the refrigerant circuit (from the removed A/C compressor). If a different refrigerant oil is approved for the A/C compressor to be installed than the one in the removed A/C compressor, the refrigerant circuit must be flushed. Refer to*
  ⇒ "10.3.1 Approved Refrigerant Oils", page 340 .

– Discharge the refrigerant circuit.

– Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).

– Clean the refrigerant circuit (flush with refrigerant R134a). Refer to
⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 .

Note

- *For internal damage (to the A/C compressor) check the refrigerant hoses and condenser for example shavings have penetrated clean refrigerant hoses and condenser (flush with refrigerant R134a, (Refer to*
  ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 .) and if necessary replace the refrigerant hoses.
- *In vehicles with two evaporators, the refrigerant oil quantity in the refrigerant circuit may be greater than the quantity which is found in the replacement compressor; if necessary, add the remaining refrigerant oil quantity to the refrigerant circuit. Refer to*
  ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 .

– Replace the dryer cartridge, receiver/dryer or reservoir and restrictor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Check the expansion valve for dirt or corrosion; replace if necessary. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Assemble, evacuate and charge the refrigerant circuit.

9.1.5 Compressor, Replacing on Account of Leakage or Internal Damage

Note

Cleaning the refrigerant circuit means flushing it with refrigerant R134a (refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93) or blowing through with compressed air and nitrogen (refer to ⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89).

For example, on account of ingress of moisture (refrigerant circuit open for lengthy period) or contamination

– Discharge the refrigerant circuit.
– Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).
– Rectify the cause of the malfunction.
– Clean the refrigerant circuit (flush with refrigerant R134a). Refer to ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 .
– Examine the expansion valve for dirt or corrosion; replace if necessary.

Electrically-Driven A/C Compressor

– Flush the old refrigerant oil out of A/C compressor. Refer to ⇒ "5.5.2 Electrically-Driven A/C Compressor, Flushing (Removing Refrigerant Oil)", page 112 .

Mechanically Driven A/C Compressor

– Remove the oil drain plug from the A/C compressor.

Note

There are different versions of the oil drain plug and its seal (it can be either an O-ring or a gasket; replace). Refer to ⇒ "9.1.2 Leaking or Damaged Components except A/C Compressor, Reservoir or Receiver/Dryer", page 285 and to the Parts Catalog.

– To accelerate drainage of refrigerant oil, rotate the A/C compressor by way of clutch plate of A/C clutch, for example.
– Pour old refrigerant oil out of A/C compressor.

Note

Dispose of the old refrigerant oil (pay attention to local regulations).

All A/C Compressors

– Then add to the A/C compressor the new refrigerant oil quantity which matches the refrigerant oil quantity in the replacement compressor (or the specified refrigerant oil quantity in

vehicles with two evaporators if necessary). Refer to
⇒ “10.3 Approved Refrigerant Oils and Capacities”, page 340 .

Note

- *Use different refrigerant oils and quantities for the various compressors. Refer to*
  ⇒ “10.3 Approved Refrigerant Oils and Capacities”, page 340 .
- *To ensure compressor lubrication on start-up, at least 40 cm^3 of refrigerant oil must be poured into the compressor. The remainder can be added to the new reservoir or receiver/dryer. Refer to*
  ⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .
- *If dirt has penetrated into the A/C compressor with the refrigerant circuit open (for example after an accident), A/C compressor is to be replaced.*
- *In vehicles with two evaporators, the refrigerant oil quantity in refrigerant circuit may be greater than the quantity which is found in the replacement compressor, if necessary add the remaining refrigerant oil quantity to the refrigerant circuit. Refer to*
  ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 .

All Vehicles

– Replace the receiver/dryer or reservoir and restrictor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Assemble, evacuate and charge the refrigerant circuit.

9.1.6 Receiver/Dryer or Accumulator and Restrictor, Replacing after Cleaning Refrigerant Circuit

Note

Cleaning the refrigerant circuit means flushing it with refrigerant R134a. Refer to
⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 or blowing through with compressed air and nitrogen. Refer to
⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89).

For example, on account of ingress of moisture (refrigerant circuit open for lengthy period) or contamination

– Discharge the refrigerant circuit.

– Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).

– Rectify cause of trouble.

– Clean the refrigerant circuit (flush with Refrigerant R134a). Refer to
⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 .

– Examine expansion valve for dirt or corrosion; replace if necessary.

Electrically-Driven A/C Compressor

– Flush the old refrigerant oil out of A/C compressor
⇒ “5.5.2 Electrically-Driven A/C Compressor, Flushing (Removing Refrigerant Oil)”, page 112 .

Mechanically Driven A/C Compressor

– Remove oil drain plug from A/C compressor.

Note

There are different versions of the oil drain plug and its seal (it can be either an O-ring or a gasket; replace). Refer to
⇒ “9.1.2 Leaking or Damaged Components except A/C Compressor, Reservoir or Receiver/Dryer”, page 285 *and to the Parts Catalog.*

– To accelerate drainage of refrigerant oil, rotate the A/C compressor by way of clutch plate of A/C clutch, for example.

– Pour old refrigerant oil out of A/C compressor.

Note

Dispose of the old refrigerant oil. Pay attention to local regulations).

All A/C Compressors

– Then add to the compressor the new refrigerant oil quantity which matches the refrigerant oil quantity in the replacement compressor (or the specified refrigerant oil quantity in vehicles with two evaporators if necessary)
⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .

Note

- *Use different refrigerant oils and quantities for the various compressors. Refer to*
⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .
- *To ensure compressor lubrication on start-up, at least 40 cm^3 of refrigerant oil must be poured into the compressor. The remainder can be added to the new reservoir or receiver/dryer. Refer to*
⇒ “10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils”, page 301 .
- *If dirt has penetrated into the compressor with the refrigerant circuit open (e.g. after an accident), compressor is to be replaced.*
- *In vehicles with two evaporators, the refrigerant oil quantity in refrigerant circuit may be greater than the quantity which is found in the replacement compressor, if necessary add the remaining refrigerant oil quantity to the refrigerant circuit. Refer to*
⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 .

All Vehicles

– Replace receiver/dryer, or accumulator, and restrictor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Assemble, evacuate and charge the refrigerant circuit.

9.1.7 Receiver/dryer or Accumulator, Replacing without the Need for Flushing Refrigerant Circuit

Note

Cleaning the refrigerant circuit means flushing it with refrigerant R134a. Refer to
⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 or blowing through with compressed air and nitrogen. Refer to
⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89).

For example, in the event of accident damage; no escape of refrigerant and no ingress of moisture and dirt into circuit.

– Discharge the refrigerant circuit.

– Replace the restrictor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Remove receiver/dryer, or accumulator. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

– Remove dirt from receiver or reservoir.

– Weigh removed receiver/dryer or reservoir.

– Add refrigerant oil to the reservoir until it is the same weight as the receiver/dryer that was removed.

– Install new receiver/dryer or reservoir.

– Assemble, evacuate and charge the refrigerant circuit.

9.1.8 Dryer Cartridge and Dryer Bag, Replacing without the Need for Flushing Refrigerant Circuit

Note

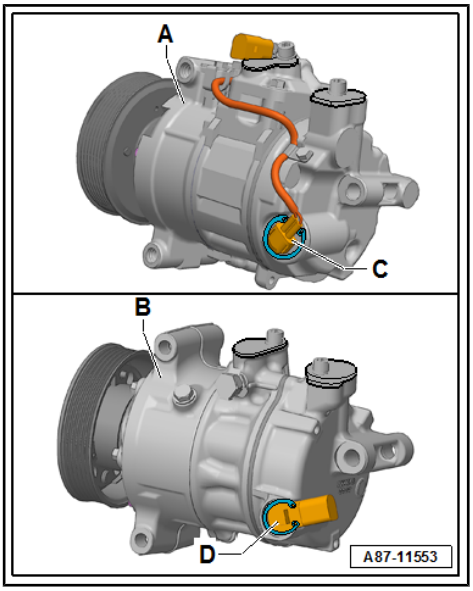
Cleaning the refrigerant circuit means flushing it with refrigerant R134a. Refer to
⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 or blowing through with compressed air and nitrogen. Refer to
⇒ "5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen", page 89 .

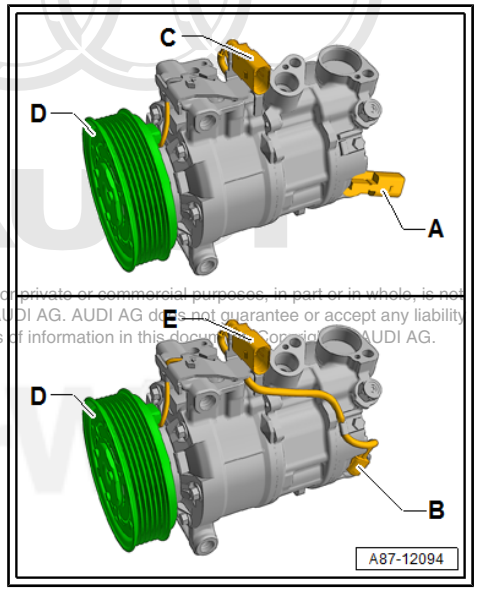
For example, no escape of refrigerant and no ingress of moisture and dirt into circuit.

– Discharge the refrigerant circuit.

– Replace the dryer cartridge. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
– Assemble, evacuate and charge the refrigerant circuit.

9.1.9 A/C Compressor Regulator Valve - N280- , Removing and Installing





Note

- *Certain functions on the A/C Compressor Regulator Valve - N280- (for example, a stuck valve or a disruption in the coil) can lead to a complaint regarding the A/C compressor (A/C system doesn't cool, the evaporator ices over, etc.). If the cause is with the A/C Compressor Regulator Valve - N280- (and not the A/C compressor itself), the A/C compressor can be serviced by replacing the A/C Compressor Regulator Valve - N280- -C and D-.*
- *The A/C Compressor Regulator Valve - N280- -C and D- is not available as a replacement part for all A/C compressors. If the A/C Compressor Regulator Valve - N280- is not available as an individual A/C compressor part, then the entire A/C compressor must be replaced. Refer to the Parts Catalog.*
- *The A/C Compressor Regulator Valve - N280- is available in different versions and settings. Refer to the Parts Catalog. On the A/C compressor -A- (shown is an A/C compressor manufactured by "Denso" without an A/C Clutch - N25-), the connector for the vehicle wiring harness connection is attached with a short wiring harness to the A/C Compressor Regulator Valve - N280- -C-. On the A/C compressor -B- (shown is an A/C compressor manufactured by "Sanden"), the connector for the vehicle wiring harness connection is mounted directly on the A/C Compressor Regulator Valve - N280- -C-. The removal and installation of the A/C Compressor Regulator Valve - N280- -C and D- on other A/C compressors (other type and manufacturer) is basically the same and only slightly deviates from the procedure described below.*
- *The A/C Compressor Regulator Valve - N280- is available in different versions and settings. Refer to the Parts Catalog. On an A/C Compressor with an A/C Clutch - N25- (shown is an A/C compressor manufactured by "Denso"), the connector for the vehicle wiring harness connection is mounted directly on the A/C Compressor Regulator Valve - N280- -A-. On another A/C compressor, the connector for the vehicle wiring harness connection is combined in a 3-pin connector -E- for the A/C Clutch - N25- and the A/C Compressor Regulator Valve - N280- .*
- *For version -B- of the A/C Compressor Regulator Valve - N280- , the wire connection may be directly connected to the A/C Compressor Regulator Valve - N280- , or there is an additional connector on the A/C Compressor Regulator Valve - N280- .*
- *Removing and installing the A/C Compressor Regulator Valve - N280- -A and B- is essentially the same on both versions. It only deviates slightly from the procedure described below. On an A/C compressor with a 3-pin connector -E-, disconnect the respective wires to the A/C Compressor Regulator Valve - N280- from the A/C Compressor Regulator Valve - N280- , remove from the connector -E- or cut at a suitable location (and reattach using wire connectors from the Wiring Harness Repair Set - VAS1978B-).*
- *If the A/C Compressor Regulator Valve - N280- malfunction was found to be caused by dirt, shavings or abraded A/C compressor material after the removal of the A/C Compressor Regulator Valve - N280- , clean the refrigerant circuit and replace the A/C compressor. Refer to*
  ⇒ "9.1.5 Compressor, Replacing on Account of Leakage or Internal Damage", page 289 and
  ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 .

Removing

– Discharge the refrigerant circuit. Refer to ⇒ “5.3 Using Service Station”, page 73 .

Caution

There is a risk of damaging the A/C compressor if the refrigerant circuit is empty.

Do not start the motor if the refrigerant circuit is empty.

- ***Depending on the version of the A/C Service Station, the pressure of the refrigerant circuit may be less than 1 bar (14.5 psi) absolute pressure after it has been discharged.***
- ***Depending on the version of the A/C compressor, it may be damaged if the pressure in the refrigerant circuit is too low.***
- ***Do not start the engine while the refrigerant circuit pressure is less than the ambient pressure.***

– Depending on the vehicle and installed location of the A/C compressor, remove the components that prevent access to the A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

On vehicles where at least one of the two refrigerant lines and the A/C Compressor Regulator Valve - N280- cannot be disconnected and removed while the A/C compressor is attached to the engine.

– Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).

Note

A refrigerant line must be removed on an installed A/C compressor so that it is assured, that the pressure in the A/C compressor is the same as the ambient pressure.

On a vehicle, where at least one of the two refrigerant lines and the A/C Compressor Regulator Valve - N280- can be disconnected and removed while the A/C compressor is attached to the engine (the A/C compressor is not removed).

WARNING

There is a danger of ice-up.

- *Before removing the A/C Compressor Regulator Valve - N280- , connect the service station and extract the refrigerant. Refrigerant circuit must be empty to avoid possible injury.*
- *Refrigerant and refrigerant oil will leak out if the refrigerant circuit is not discharged.*
- *The refrigerant is extracted before removing the A/C Compressor Regulator Valve - N280- . If the A/C Compressor Regulator Valve - N280- is not removed within 10 minutes after extraction, pressure may build up in the refrigerant circuit by renewed evaporation. Extract the refrigerant once more.*

– Check the pressure in the refrigerant circuit once more via the A/C service station pressure gauge.

- If the displayed pressure is larger than the ambient pressure (larger than approximately 1 bar (14.5 psi) absolute pressure), turn on the A/C service station and extract the refrigerant that is building up the pressure.

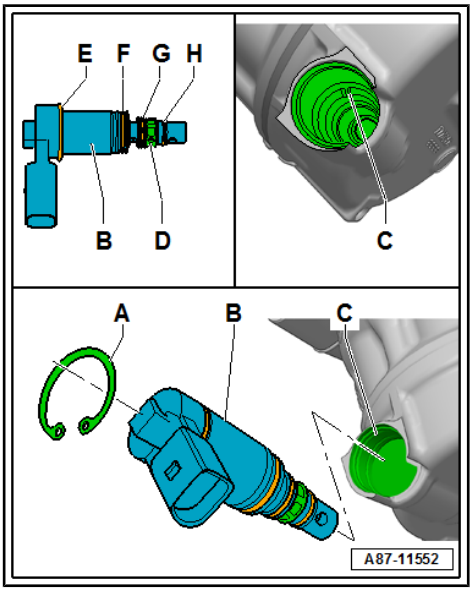
– Disconnect one of the two refrigerant lines from the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Note

A refrigerant line must be removed on an installed A/C compressor so that it is assured, that the pressure in the A/C compressor is the same as the ambient pressure.

All Vehicles

– Before removing the A/C Compressor Regulator Valve - N280- check again if the A/C compressor is actually being driven by the belt pulley/drive unit. If the belt pulley or the drive unit overload protection has triggered, the cause for the fault is not the regulator valve but rather the A/C compressor (for example does not move easily).



Note

- *This illustration shows the A/C Compressor Regulator Valve - N280- -B- on a A/C compressor manufactured by “Sanden” type “PXE 14”. On these A/C compressors the connector to the vehicle wiring harness connection is mounted directly on the A/C Compressor Regulator Valve - N280- -B-. The removal and installation of the A/C Compressor Regulator Valve - N280- -B- on other A/C compressors (other type and manufacturer, for example “Denso”, the A/C Compressor Regulator Valve - N280- with a short wiring harness, for example) can differ. The procedure for removal and installation is however the same, as described in the following for the A/C compressor manufactured by “Sanden” type “PXE 14”.*
- *This illustration shows an A/C Compressor Regulator Valve - N280- -B- with an O-ring -E- (not available on all versions).*
- *On a A/C Compressor Regulator Valve - N280- -B- without an O-ring -E-, dirt can penetrate into the A/C Compressor Regulator Valve - N280- -C- mount up to the O-ring -F-.*

If applicable, loosen the wire connection from the A/C Compressor Regulator Valve - N280- -B- to the connection to the vehicle wire harness from the A/C compressor.

Note

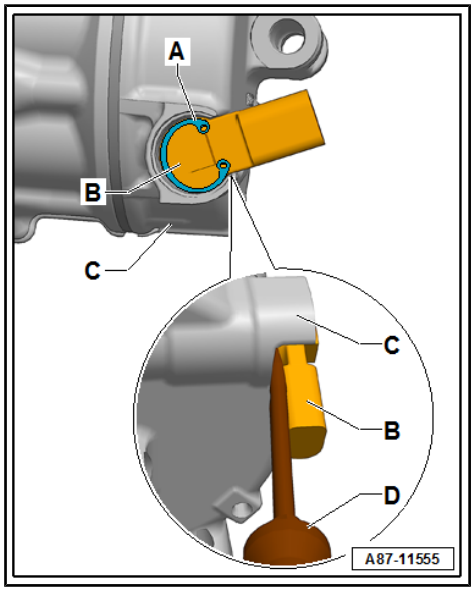
- *On an A/C compressor with an A/C Clutch - N25- where the A/C Clutch - N25- is activated via the same connector as the A/C Compressor Regulator Valve - N280- -B-, remove the applicable wires from the connector (for example, using an extractor from the Wiring Harness Repair Set - VAS1978B-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *If a connector should be installed on an A/C compressor with an A/C Clutch - N25- where the wires cannot be removed, cut the wires to the A/C Compressor Regulator Valve - N280- (or to the A/C Clutch - N25-) at a suitable location and reattach using wire connectors from the Wiring Harness Repair Set - VAS1978B- (or replace the connector itself. Refer to the Parts Catalog). Refer to ⇒ Electrical Equipment; Rep. Gr. 97 ; Connectors; Wiring Harnesses and Connectors, Repairing .*

– Clean the A/C compressor near the circlip -A- and the A/C Compressor Regulator Valve - N280- -B- thoroughly.

Caution

The pressure in the A/C compressor must be equal to the ambient pressure.

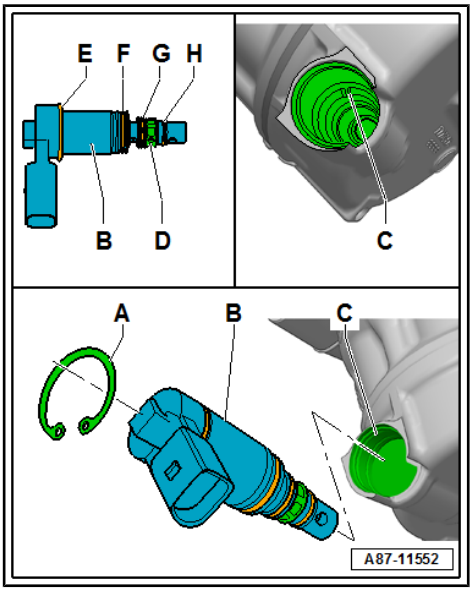
- *Refrigerant and refrigerant oil can leak out if there is excess pressure in the A/C compressor.*
- *Dirt can be absorbed into the A/C compressor if there is a vacuum in the A/C compressor.*
- *Make sure there is pressure equalization before removing the A/C Compressor Regulator Valve - N280- -B-.*



– Remove the circlip -A-.

– Carefully remove the A/C Compressor Regulator Valve - N280- -B- from the A/C compressor mount -C-, using a suitable screwdriver -D-, for example.

– Check the removed A/C Compressor Regulator Valve - N280- -B- and A/C compressor mount -C- for dirt.



Note

- *If the strainer -D-, A/C Compressor Regulator Valve - N280- -B- up to the O-ring -F- or the A/C compressor mount -C- are heavily contaminated in this area (with shavings or dark, sticky abraded material, for example), this indicates damage on the A/C compressor. In this case, the refrigerant circuit is to be cleaned and the A/C compressor is to be replaced. Refer to ⇒ "9.1.5 Compressor, Replacing on Account of Leakage or Internal Damage", page 289 and ⇒ "5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a", page 93 .*
- *If the strainer -D- on the A/C Compressor Regulator Valve - N280- -B- and the A/C compressor mount -C- up to the O-ring sealing surface -F- are only lightly contaminated in this area (with gray deposits from normal A/C compressor operation, for example), a malfunction at the A/C Compressor Regulator Valve - N280- -B- can cause the A/C compressor malfunctioning.*
- *On an A/C Compressor Regulator Valve - N280- -B- without an O-ring -E-, dirt can penetrate into the mount -C- up to the O-ring -E- during operation. Remove the dirt carefully and completely using, for example, a lint-free cloth (do not work with compressed air).*

Installing

– Check the A/C compressor mount -C- and the circlip groove for dirt, and if necessary, clean them carefully and thoroughly with a clean, lint-free cloth.

Caution

Danger of another A/C Compressor Regulator Valve - N280- -B- or A/C compressor failure due to dirt in the A/C compressor or damage to the sealing surfaces in the mount.

- ***If necessary, carefully clean the A/C compressor mount -C- using only a clean, lint-free cloth (do not use compressed air).***
- ***Make sure while cleaning the mount -C- that no dirt gets into the area underneath the O-ring sealing surface -F- or the existing channels and none of the mount sealing surfaces become damaged.***

– Check the A/C compressor mount -C- for damage (also pay attention to small scratches on the surface, if there is damage, replace the A/C compressor).

– Check the O-rings -F, G and H- and -E- (if applicable) of the A/C Compressor Regulator Valve - N280- -B- for damage.

– Coat the O-rings -F, G and H- and -E- (if applicable) of the A/C Compressor Regulator Valve - N280- -B- lightly with refrigerant oil and check for proper seating.

– Insert the A/C Compressor Regulator Valve - N280- -B- until the stop in the A/C compressor mount -C-.

– Install the new circlip -A- and check for proper seating in the groove.

– Install the removed parts in the opposite order.
– Evacuate and refill the refrigerant circuit. Refer to ⇒ “5.3 Using Service Station”, page 73 .

Note

Should refrigerant oil escape with the A/C Compressor Regulator Valve - N280- -B- removed, add this amount of refrigerant oil while filling the refrigerant oil with the A/C service station. Refer to ⇒ “5.3 Using Service Station”, page 73 .

– Check the A/C function. Refer to ⇒ “8 Pressures, Checking”, page 195 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

10 Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oils

⇒ "10.1 Refrigerant R134a Capacities", page 301

10.1 Refrigerant R134a Capacities

Refer to the ⇒ Fluid Capacity Tables; Rep. Gr. 03

10.2 Refrigerant R134a Capacities

10.2.1 Capacities for Audi A1 (8X_) from MY 2011

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- "Denso", "Sanden" (or "Delphi/Mahle") A/C compressors with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A1 (type key 8X1 or 8XA)	From 08/2010 through 06/2014 (running change)	500 + / - 15	• Refrigerant lines bolted to the top of the installed expansion valve
Audi A1 (8XF or 8XK model code)	From 06/2014 (running change)	475 + / - 15	• Refrigerant lines bolted to the bottom of the installed expansion valve

Note

- *Depending on time period of production and depending on engine, different A/C compressors are installed (these A/C compressors do not have an A/C clutch)*
- *At the start of production, A/C compressors manufactured by "Denso" type "6 SEU 14C" or "Sanden" type "7 PXE 16/14" were installed. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Depending on the engine, A/C compressors from manufacturers "Sanden" type "11 PXC 14" or "Delphi/Mahle" type "6 CVC 140" may also be installed at a later time (introduction TBD, planned from 09/2012). Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *From 11/2012 the refrigerant oil quantity for the "Denso" A/C compressor with the part number "5Q0 xxx xxx" was increased from 80 ccm to 110 ccm. The increased refrigerant oil capacity applies retroactively to all vehicles with this A/C compressor. For vehicles that were built through 11/2012 with this A/C compressor, check whether the refrigerant oil capacity was already topped up during a previous workshop visit. If not, fill the refrigerant circuit with an additional 30 ccm of refrigerant oil. Refer to ⇒ "10.3.3 Capacities for Audi A1 (8X_) from MY 2011", page 340 . Then note the refrigerant oil capacity with a waterproof marker on the sticker and fill the refrigerant circuit with the above-specified refrigerant quantity. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual).*
- *The evaporator, the expansion valve and the associated refrigerant lines were changed from 06/2014 (different lines, attachment points, etc.). These A/C systems were still filled with 500 g of refrigerant during production from 06/2014 through 11/2014. The refrigerant capacity was reduced from 500 g to 475 g from 11/2014. Reason: unfavorable ambient conditions (high ambient temperatures, dirty condenser, etc.) may cause excessive pressures in the refrigerant circuit when the capacity is 500 g on these vehicles. For vehicles that were built in this time period, check the capacity specification for the refrigerant on the information label and correct it to 475 g with a waterproof pen, if necessary (or replace the information label). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*

10.2.2 Capacities for Audi A2 (8Z_) from MY 2001

Features of the refrigerant system:

- Restrictor (colored).
- Reservoir.
- A/C compressor manufacturer "Denso" without A/C clutch and with A/C Compressor Regulator Valve - N280- .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A2	From 06/2000 to 07/2001	525 + / - 25	• Yellow colored restrictor • Condenser with part number 8Z0 260 401 (403) and index “B” or “C”
	From 07/2001	500 + / - 25	• Red colored restrictor • Condenser part number 8Z0 260 401 (403) with index “D”.

Note

- *Replacement restrictors with different holes are available (yellow colored 1.54 mm, red colored 1.42 mm).*
- *Depending on manufacturer, color of red restrictor may tend more towards orange.*
- *To avoid altering the cooling output of the air conditioner, restrictors with the same hole diameter must only be installed.*
- *A restrictor with a smaller hole (red colored) and a condenser with smaller internal volume were introduced from MY 2002. The capacity has therefore been changed slightly (condenser -70 g, smaller restrictor +50 g). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*

10.2.3 Capacities for Audi A3 (8L_) from MY 1997 and Audi TT (8N_) from MY 1999

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- “Sanden” or “Zexel / Valeo” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Capacities Audi A3 (8L_) 1997 to 2004

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A3	From 08/1996	750 + 50	• None

Note

- *Exclusive use was made at the start of production of "Sanden" A/C compressors. A/C compressors manufactured by "Zexel / Valeo" are also used from MY 1999. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*
- *If no condenser with a flat pipe width of 20 mm is available for Audi A3 as a replacement part, and a condenser with a flat pipe width of 16 mm is installed, only 650 + / - 20 g of refrigerant instead of 750 + 50 g may be filled in. In addition, capacity specification must be changed accordingly on sticker (to do so, please observe notes for Audi TT, refer to ⇒ page 305).*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

Capacities Audi TT (8N_) from MY 1999

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi TT	From 10/1998 through to 10/2003 (and from 06/2004 through 08/2004 ⇒ page 305)	750 + 50	• Condenser with flat pipe width of 20 mm. Refer to ⇒ page 305 .
	From 10/2003 (except 06/2004 up to 08/2004 ⇒ page 305)	650 $^{+}$ / $_{-}$ 20	• Condenser with flat pipe width of 16 mm. Refer to ⇒ page 305 .

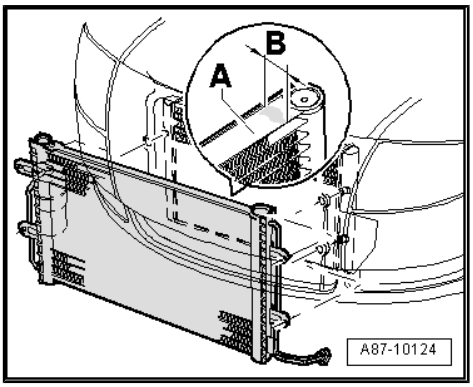
Note

- *Exclusive use was made at the start of production of "Sanden" A/C compressors. A/C compressors manufactured by "Zexel / Valeo" are also used from MY 1999. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*
- *From MY 2006, the "Zexel / Valeo" designation was changed to "Valeo".*
- *There was a change in production for Audi TT from 10/2003 (from vehicle identification number (VIN) 8N41015239) from condenser with part number "1J0 820 411 J" (flat pipe width of 20 mm) to condenser with part number "8N0 820 411 A" (flat pipe width of 16 mm). Refer to ⇒ page 305 . From 06/2004 to 08/2004, a certain number of vehicles not specified were equipped again with condensers having a flat pipe width of 20 mm.*
- *Condensers with a flat pipe width of 16 mm require 120 g less of refrigerant than condensers with flat pipe width of 20 mm. Refer to the ⇒ Electronic Parts Catalog (ETKA) .*
- *On the Audi TT, from 10/2003 (for vehicles from VIN 8N41015239) through 06/2004, a condenser with a 16 mm flat pipe width (part number "8N0 820 411 A") was installed and filled with 750 + 50 grams of refrigerant. In addition, these vehicles have an information label with the incorrect filling quantity: 750 grams (or 700 grams in 06/2004) instead of 650 grams. Refer to ⇒ page 305 . Due to overfilling of the system, the A/C compressor may be switched off under certain circumstances (for example high ambient temperatures) since the pressure in the refrigerant circuit is too high; in addition, drivers may complain about the engine performance (for example, rumbling and buzzing sounds, the engine is heavier loaded as the A/C compressor is working steadily against the excessive pressure). Solution: drain refrigerant circuit, then refill correct capacity and replace sticker with one indicating correct capacity specification, or cross out wrong capacity specification on sticker and note correct capacity, for example using a waterproof marker.*
- *If the condenser is replaced, observe flat pipe dimensions. If a condenser with another flat pipe dimension is installed, the sticker specifying the capacity for refrigerant R134a is also to be replaced, or the old capacity specification is to be removed and the new capacity is to be noted using a waterproof marker, for example. Refer to the ⇒ Electronic Parts Catalog (ETKA) .*

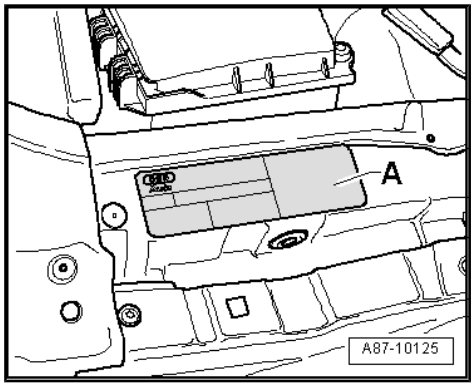
Determining dimensions of flat pipes from condenser

- Flat pipes of condenser -A-
- Width of flat pipes -B-

Sticker for capacity of refrigerant R134a



If the condenser is replaced, observe flat pipe dimensions. If a condenser with different dimensions is installed, the sticker -A- specifying the capacity for refrigerant R134a is also to be replaced, or the old capacity specification is to be removed and the new capacity is to be noted using a waterproof marker, for example. Refer to the ⇒ Electronic Parts Catalog (ETKA) .



10.2.4 Capacities for Audi A3 (8P_) from MY 2004 and Audi Q3 (8U_ or 84_ for China) from MY 2012

Note

- *The filling capacities provided in the following table apply for the Audi A3, the Audi A3 Sportback, the Audi RS 3, the Audi A3 Cabriolet and the Audi Q3 (and Audi RS Q3).*
- *Certain versions for China use the designation 84_ rather than 8U_.*

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- “Denso”, “Delphi/Mahle”, “Sanden”, or “Zexel / Valeo” A/C compressors with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A3 • With 4- or 6-cylinder engine	From 05/2003	525 + / - 25	• None
Audi RS 3 • With 5-cylinder engine	From 01/2011	500 + / - 25	• A different version of the condenser is installed. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
Audi Q3 (and RS Q3)	From 07/2011	520 + / - 20	• None

Note

- *Depending on time period of production and depending on engine, different A/C compressors are installed (these A/C compressors do not have an A/C clutch)*
- *At the start production, "Denso" type "7 SEU 16" A/C compressors were installed. From MY 2004, there was a running change to "Denso" compressor type "7 SEU 17".*
- *Depending on the engine, A/C compressors manufactured by "Zexel / Valeo" (type "DSC17E") and "Sanden" (type "PXE16") are also gradually being installed from MY 2004. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Depending on the engine, A/C compressors manufactured by "Denso" ("6 SEU 14") and "Delphi/Mahle" are also gradually being installed from MY 2008. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

10.2.5 Capacities for Audi Q2 (GA_) from MY 2017, Audi A3 (8V_ or 85_ for China) from MY 2013, Audi A3 e-tron (8V_) from MY 2015, and Audi RS 3 (8V_) from MY 2016

Note

The capacity for the Audi A3 (8V_ or 85_ for china) applies to all versions (sedan, sportback, and cabriolet etc.)

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Mechanically driven "Denso" or "Sanden" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) (all vehicles except A3 e-tron).
- For vehicles with a high-voltage system (A3 e-tron), with an electrically-driven "Sanden" or "Visteon" A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi Q2	From 07/2016	500 + / - 15	• None
Audi A3	From 05/2012	500 + / - 15	• None

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
A3 e-tron	From 09/2014	500 + / - 15	• Electrically-Driven A/C Compressor • With second evaporator in the high-voltage battery heat exchanger (chiller)
Audi RS 3 • With 5-cylinder engine	From 02/2015	570 + / - 15	• A different version of the condenser is installed. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Note

- *Depending on the date of manufacture and the engine, different A/C compressors are installed (these A/C compressors do not have an A/C clutch). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *From 11/2012 the refrigerant oil quantity for the A/C compressor manufacturer "Denso" was increased from 80 ccm to 110 ccm. The increased refrigerant oil capacity applies retroactively to all vehicles with this manufacturer's A/C compressor. On vehicles that were built through 11/2012, check whether the refrigerant oil capacity was already topped up during a previous workshop visit. If not, fill the refrigerant circuit with an additional 30 ccm of refrigerant oil. Refer to ⇒ "10.3.7 Audi A3 (8V_ or 85_ for China) from MY 2013, Audi e-tron (8V_) from MY 2015, Capacities", page 346 . Then note the refrigerant oil capacity with a waterproof marker on the sticker and fill the refrigerant circuit with the above-specified refrigerant quantity. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual).*

10.2.6 Capacities for Audi TT (8J_) from MY 2007

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- "Denso", "Delphi/Mahle" or "Sanden" A/C compressors with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi TT • With 4- or 6-cylinder engine	From 08/2006	525 + / - 25	• None
Audi TT • With 5-cylinder engine	From 03/2009	500 + / - 25	• A different version of the condenser is installed. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Note

- *At the start of production, "Denso" A/C compressors "6 SEU 14" were installed; these A/C compressor do not have an A/C clutch (driven by the engine). A/C compressors from other manufacturers may also be installed at a later time, depending on the engine. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *From MY 2008, "Sanden" A/C compressors (type "PXE16") are also installed as a running change on certain engines; they do not have an A/C clutch (it is driven continuously by the engine). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *With a gradual introduction starting from MY 2011 and depending on the engine, "Delphi" A/C compressors are installed. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*

10.2.7 Capacities for Audi TT (FV_) from MY 2015

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Mechanically driven "Denso" or "Sanden" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi TT	From 10/2014	500 + / - 15	• None
Audi TT RS • With 5-cylinder engine	From 07/2016	570 + / - 15	• A different version of the A/C compressor and condenser is installed. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Note

Depending on the date of manufacture and the engine, different A/C compressors are installed (these A/C compressors do not have an A/C clutch). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

10.2.8 Capacities for Audi 80 (8A_/8C_), Audi Coupe (8B_) and Audi Cabriolet (8G_) through MY 2002

Features of the refrigerant system:

- Restrictor (not colored).

- Reservoir
- “Zexel / Valeo” A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi 80 Audi Coupe Audi Cabriolet	From 10/1992	750 + 50 • Vehicles with 5-cylinder engine	• None
		650 + 50 • Vehicles with 4 or 6-cylinder engine	

Note

- *Replacement restrictors with different holes are available. If these vehicles are equipped with a yellow colored restrictor, add 50 g more refrigerant than specified in the table. After charging, amend capacity stated on label or affix label indicating new capacity.*
- *In order to distinguish between the two restrictor versions, the one with the smaller hole (1.54 mm) is colored yellow. The restrictor with the larger hole (1.83 mm) is not colored.*
- *Beginning from production year 2006, the name of the “Zexel” A/C compressor was changed from “Zexel” to “Valeo”.*

10.2.9 Capacities for Audi A4 (8D_) from MY 1995

Note

Applies to the Audi RS 4.

Features of the refrigerant system:

- Restrictor
- Reservoir
- “Denso” or “Zexel / Valeo” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A4	From 11/1994 to 11/1997	650 + 50	• Restrictor (not colored)
	From 11/1997	700 + 50	• Restrictor colored (yellow) • “Showa/ Keihin” condenser (distinguishing feature, refer to ⇒ page 312).

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
	From 11/1998	550 + 50	• Restrictor colored (yellow) • “AWG” condenser (distinguishing feature, refer to ⇒ page 312).
Audi RS 4	From 05/2000	650 + 50	• Restrictor colored (yellow)

Note

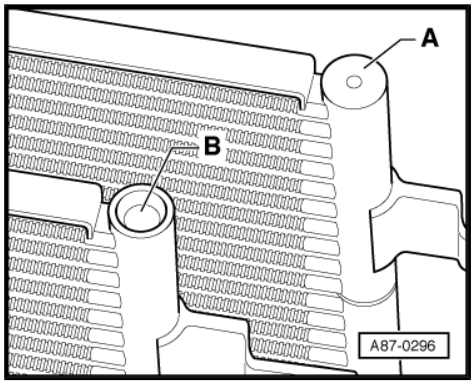
- *Restrictors with a modified hole have been installed at the factory from 11/1997 (yellow colored). The capacity was increased by 50 g for vehicles with yellow colored restrictor.*
- *In order to distinguish between the two restrictor versions, the one with the smaller hole (1.54 mm) is colored yellow. The restrictor with the larger hole (1.83 mm) is not colored.*
- *The Audi A4 was equipped with different A/C compressors depending on engine and production period. Exclusive use was made at the start of production of “Zexel / Valeo” A/C compressors. As of MY 1996, “Denso” A/C compressors were gradually introduced for vehicles with 6-cylinder engines.*
- *Beginning from production year 2006, the name of the “Zexel” A/C compressor was changed from “Zexel” to “Valeo”.*
- *Replacement restrictors with different holes (not colored, yellow colored, red colored) are available. If a vehicle is equipped with a different restrictor, add more or less refrigerant depending on type (⇒ table). After charging, amend capacity stated on label or affix label indicating new capacity.*
- *Depending on manufacturer, color of red restrictor may tend more towards orange.*
- *As of 11/1998, Audi A4 models have also been equipped with “AWG” condensers (initially approximately 10,000 vehicles, from vehicle identification number (VIN) 8DXA 065 253 to 8DXA 077 026). The specified capacity for vehicles with these condensers differs from those with “Showa/ Keihin” condensers. The condensers can be identified on the basis of certain characteristic features. Refer to ⇒ page 312 .*
- *If the condenser installed is replaced by one with a different part number, check the capacity indicated on the label in the vehicle and correct if necessary or affix a label with the correct capacity over the existing one. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System for the (vehicle-specific repair manual) and to the ⇒ Electronic Parts Catalog (ETKA) .*

Distinguishing features between“Showa/ Keihin” and “AWG” condensers

Different manifolds:

A - Manifold on “Showa/ Keihin” Condenser.

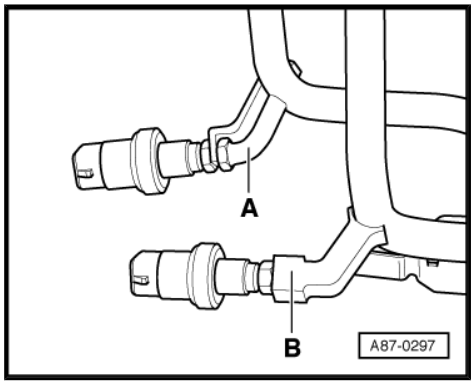
B - Manifold on “AWG” Condenser.



Different connections to pressure switch.

A - Connection Area on “Showa/ Keihin” Condenser.

B - Connection Area on “AWG” Condenser.



10.2.10 Capacities for A4 (8E_) from MY 2001 and Audi A4 Cabriolet (8H_) from MY 2003

Note

Applies to the Audi RS 4.

Features of the refrigerant system:

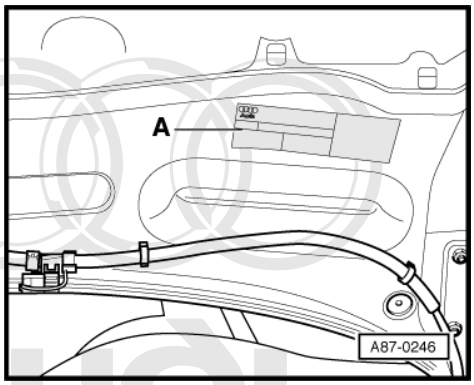
- Restrictor (yellow or red colored).
- Reservoir
- “Denso” A/C compressor with A/C Compressor Regulator Valve - N280- (without A/C clutch)

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A4	From 11/2000	500 + / - 20	• Restrictor yellow or red colored
Audi RS 4	From 07/2005	440 + / - 20	• Red colored restrictor

Note

- *Replacement restrictors with different holes are available: Yellow colored 1.54 mm, red colored 1.42 mm.*
- *Depending on manufacturer, color of red restrictor may tend more towards orange.*
- *To avoid altering the cooling output of the air conditioner, red or yellow colored restrictors must only be installed. Yellow colored restrictors were installed in MY 2001. Red colored restrictors were installed from MY 2002. The restrictor modification (a red colored restrictor may also be installed in vehicles of MY 2001 instead of a yellow colored restrictor) does not alter the capacity for these vehicles.*
- *Depending on time period of production and depending on engine, different A/C compressors are installed (these A/C compressors do not have an A/C clutch)*
- *At the start production, "Denso" A/C compressors "6 SEU 12" and "7 SEU 16" were installed. From MY 2004, there was a running change to other "Denso" compressor types ("6 SEU 14" and "7 SEU 17"). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*
- *The Audi RS 4 has an condenser with a smaller internal volume, therefore the capacity for this model is less than for other models. Refer to the ⇒ Electronic Parts Catalog (ETKA) .*

10.2.11 Capacities for Audi A4 (8K_) from MY 2008, Audi A5 Coupe and Sportback (8T_) from MY 2008, Audi Q5 (8R_ or 83_ for China) from MY 2008, Audi A5 Cabriolet (8F_) from MY 2009, and Audi Q5 Hybrid (8R_) from MY 2011



Note

- *Also applies to the Audi RS 4, Audi S 5, Audi SQ5 and Audi RS 5.*
- *Different capacities, depending on the version and the vehicle date of manufacture (see the following tables).*
- *Certain versions of the Audi Q5 for China use the designation 83_ rather than 8R_.*
- *An information label -A- with refrigerant R134a capacity information for the respective refrigerant circuit can be found in the engine compartment (shown here on the hood). These information label provides information about the capacity of refrigerant R134a (for the refrigerant R134a when the vehicle is manufacturered). If this label is not present or the correct filling capacities are not clear (if the condenser was replaced for example) then compare the information on the label to the information in the following tables. If the information is not the same, the label -A- with the filling capacity information for the refrigerant R134a should be replaced if necessary or the old capacity information should be removed from the label and the new capacity information should be written in with a waterproof marker. Refer to the ⇒ Electronic Parts Catalog (ETKA) .*

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Refrigerant Line with Inner Heat Exchanger
- Mechanically driven “Denso” A/C compressor, with A/C Compressor Regulator Valve - N280- (and depending on engine, also with an A/C Clutch - N25- from MY 2012). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) (all vehicles except on the Audi Q5 Hybrid).
- Vehicles with a high-voltage system (Audi Q5 Hybrid) have electrically-driven “Denso” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .
- Different version condensers (and for this reason different filling capacities for refrigerant R134a)

Audi A4, Audi A5 and Audi A5 Cabriolet

Note

- *Also applies to the Audi S 5.*
- *Capacity for the Audi RS 5 Cabriolet. Refer to ⇒ page 322 .*

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A4 and Audi A5 (Coupe, Cabriolet and Sportback)	♦ Audi A4, from 10/2007 through 03/2012 ♦ Audi A5 Coupe and Sportback from 05/2007 through 03/2012 ♦ Audi A5 Cabriolet from 03/2009 through 03/2012	570 + / - 20	• A/C compressor without A/C clutch and with the part number 8K0 xxx xxx (manufactured by “Denso”, type “6 SEU 14” or “7 SEU 17”) • A/C compressor with A/C clutch and with the part number 8T0 xxx xxx (manufactured by “Denso”, type “6 SAS 14”) • Condenser with the part number 8K0 xxx xxx manufactured by “Denso” or “Showa / Keihin”. Refer to ⇒ page 323 for differences. • For vehicles with a 4-, 6- or 8-cylinder engine (excluding Audi RS 5)
	From 03/2012 to 10/2013 (running changes, see notes)	550 + / - 15	• A/C compressor with the part number 8T0 xxx xxx (“Denso” manufacturer with and without solenoid coupling type “6 SES 14” or “6 SAS 14”) • Condenser with part number 8T0 xxx xxx manufactured by “Denso” or the manufacturer “Showa / Keihin” with the same part number from the index “D” (Differences, refer to ⇒ page 323). • The condensers are predominately installed in vehicles with a 4-cylinder engine and are manufactured by “Denso”. • Condenser with part number 8T0 xxx xxx manufactured by “Showa / Keihin” with the same part number from the index “D” are installed as a running change on all vehicles with 4-cylinder and 6-cylinder engines from 10/2013.

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
		630 + / - 15	• A/C compressor with the part number 8T0 xxx xxx (“Denso” manufacturer with and without solenoid coupling type “6 SES 14” or “6 SAS 14”) • Condenser with part number 8T0 xxx xxx manufactured by “Showa / Keihin” until the index “C”. (Difference, refer to ⇒ page 323). • Condenser with part number 8T0 xxx xxx manufactured by “Showa / Keihin” through index “C” are predominately installed through 10/2013 on vehicles with a 6-cylinder engine. • If instead of the condenser with the part number 8T0 xxx xxx through index “C”, a condenser with the part number 8T0 xxx xxx from the index “D” is installed from 10/2013, the reduced filling capacity applies.
	From 10/2013 (gradual introduction)	550 + / - 15	♦ A/C compressor (manufacturer “Denso”) all versions, drive via a belt with and without magnetic coupling. ♦ Condenser with part number 8T0 xxx xxx manufactured by “Showa / Keihin” from the index “D”. (Difference, refer to ⇒ page 323). ♦ Does not apply to certain vehicles that were manufactured in China. Refer to the notes.
	From 06/2012 (only for specific vehicles manufactured in China, see notes)	600 + / - 15	• A/C compressor with the part number 8T0 xxx xxx (“Denso” manufacturer with and without solenoid coupling type “6 SES 14” or “6 SAS 14”) • Condenser with part number 8KD xxx xxx manufactured by “Showa / Keihin” (characteristic differences, refer to ⇒ page 323). • Currently this condenser made by “Showa / Keihin” is only installed in the vehicles manufactured in China.

Note

- *Starting from the production date in 03/2012, 8-cylinder engines will no longer be available for the Audi A4 and Audi A5 (excluding the RS models).*
- *At the start of production, A/C compressors manufactured by "Denso" (type "6 SEU 14" on vehicles with a 4- and 6-cylinder engine and type "7 SEU 17" on vehicles with an 8-cylinder engine) were installed. These A/C compressors do not have an A/C clutch (they are driven continuously by the engine). In MY 2012, the A/C compressor type "6 SEU 14" was gradually replaced by type "6 SES 14". A/C compressors from other manufacturers may also be installed at a later time, depending on the engine. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *For certain engines (for example, vehicles with a 4-cylinder TDI engine) and versions, A/C compressors (type "6 SAS 14") are gradually being used from MY 2012 that have an additional A/C Clutch - N25- installed on the belt pulley. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*
- *A/C compressors with an installed A/C Clutch - N26- is being gradually installed on specific 4-cylinder TDI engines starting from 08/2011. Refer to ⇒ Electronic Parts Catalog (ETKA) .*
- *From 03/2012, the refrigerant circuit (A/C compressor, condenser, evaporator etc.) was gradually changed depending on the engine. This resulted in a different capacity for the refrigerant (identifiable by the information label for the refrigerant circuit) and the refrigerant oil for these vehicles. Refer to ⇒ "10.3.13 Capacities for Audi A4 (8K_) from MY 2008, Audi A5 Coupe and Sportback (8T_) from MY 2008, Audi Q5 (8R_ or 83_ for China) from MY 2008, Audi A5 Cabriolet (8F_) from MY 2009, and Audi Q5 Hybrid (8R_) from MY 2011", page 353 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*
- *From 06/2012, a "Showa / Keihin" condenser (part number 8KD xxx xxx) is gradually being installed in vehicles that are manufactured in China. This condenser has a different inner construction, for this reason there is another filling specification of the coolant. For the characteristics, refer to ⇒ page 323 .*
- *From 10/2013 as a running change, a condenser from the manufacturer "Showa / Keihin" with the part number 8T0 xxx xxx from the index "D" is installed on all vehicles (except the RS models). This condenser has a different construction (smaller height of the flat pipes, 1.5 instead of 2.0 and with this a smaller interior volume) than the "Showa / Keihin" condenser with the part number 8T0 xxx xxx up to the index "C", for this reason there is another filling specification of the coolant. For the characteristics, refer to ⇒ page 323 .*

- *If in a vehicle, in the condenser from the manufacturer "Showa / Keihin" with the part number 8T0 xxx xxx until the index "C" (or a condenser with the part number 8K0 xxx xxx or 8KD xxx xxx) is installed, a condenser from the manufacturer "Showa / Keihin" with the part number 8T0 xxx xxx from the index "D" or a condenser from the manufacturer "Denso", then for these condensers fill with the specified capacity. (see the table). The same applies if a condenser from the manufacturer "Denso" if replaced with a condenser from another manufacturer of with another part number. In addition, the capacity specified on the label in the vehicle is to be checked and amended if necessary, or the existing label is to be replaced with one indicating the correct capacity (affix over old label).*
- *The changed components (A/C compressor, condenser) can only be differentiated by the part number on the outside (data plate on the A/C compressor, data plate or impression on the condenser). Refer to ⇒ page 323 and the ⇒ Electronic Parts Catalog (ETKA) .*
- *Condenser distinguishing marks. Refer to ⇒ page 323 .*

Audi Q5 and Audi Q5 Hybrid

Note

Applies also to the Audi SQ5.

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi Q5	From 09/2008 through 06/2012 / 08/2012 (gradual change, see notes)	570 + / - 20	• A/C compressor without A/C clutch and with the part number 8K0 xxx xxx (manufactured by "Denso", type "6 SEU 14") • A/C compressor with A/C clutch and with the part number 8T0 xxx xxx type "6 SAS 14" • Condenser with the part number 8K0 xxx xxx manufactured by "Denso" or "Showa / Keihin". Refer to ⇒ page 323 for differences.
	From 06/2012 / 08/2012 to 10/2013 (running changes, see notes)	550 + / - 15	• A/C compressor with the part number 8T0 xxx xxx ("Denso" manufacturer with and without solenoid coupling type "6 SES 14" or "6 SAS 14") • Condenser with part number 8T0 xxx xxx manufactured by "Denso" or the manufacturer "Showa / Keihin" with the same part number from the index "D" (Differences, refer to ⇒ page 323). • These condensers manufactured by "Denso" are currently not installed on the Audi Q5. (Predominantly installed on the Audi A4 and A5 with a 4-cylinder engine, and the introduction on the Audi Q5 is not finalized). For the characteristics, refer to ⇒ page 323 . • The condensers from the manufacturer "Showa / Keihin" with the part number 8T0 xxx xxx from the index "D" are installed from 10/2013 on all vehicles as a running change.

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
	From 06/2012 / 08/2012 to 10/2013 (running changes, see notes)	630 + / - 15	• A/C compressor with the part number 8T0 xxx xxx (“Denso” manufacturer with and without solenoid coupling type “6 SES 14” or “6 SAS 14”) • Condenser with part number 8T0 xxx xxx manufactured by “Showa / Keihin” until the index “C”. (Difference, refer to ⇒ page 323). • This condenser from the manufacturer “Showa / Keihin” with the part number 8T0 xxx xxx until the index “C” is installed on the Audi Q5 from the conversion to 06/2012 or 08/2012 (replacement “Denso” condenser for the Audi Q5 is not yet finalized, for vehicles manufactured in China see below). • If instead of the condenser with the part number 8T0 xxx xxx through index “C”, a condenser with the part number 8T0 xxx xxx from the index “D” is installed from 10/2013, the reduced filling capacity applies.
	From 10/2013 (gradual introduction)	550 + / - 15	◆ A/C compressor (manufacturer “Denso”) all versions, drive via a belt with and without magnetic coupling. ◆ Condenser with part number 8T0 xxx xxx manufactured by “Showa / Keihin” from the index “D”. (Difference, refer to ⇒ page 323). ◆ Does not apply to certain vehicles that were manufactured in China. Refer to the notes.
	From 08/2012 (only for specific vehicles manufactured in China, see notes)	600 + / - 15	• A/C compressor with the part number 8T0 xxx xxx (“Denso” manufacturer with and without solenoid coupling type “6 SES 14” or “6 SAS 14”) • Condenser with part number 8KD xxx xxx manufactured by “Showa / Keihin” (characteristic differences, refer to ⇒ page 323). • The condenser from the manufacturer “Showa / Keihin” with the part number 8KD xxx xxx, is at this time only installed in vehicles that are manufactured in China. • If instead of the condenser with the part number 8KD xxx xxx a condenser with another part number (for example 8T0 xxx xxx from the index “D”) is installed, then the specified filling capacity applies for this condenser.

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi Q5 Hybrid	From 05/2011 to 07/2012 (see notes)	840 + / - 20 (see notes)	• Electrically-Driven A/C Compressor • Condenser with part number 8R0 xxx xxx manufactured by “Denso” (characteristics, refer to ⇒ page 323). • The Climatronic Control Module - J255- A/C display control head with a part number 8Rx xxx xxx and an A/C unit with a part number 8Kx xxx xxx. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation, and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). • With second evaporator in the battery cooling module
	From 07/2012	900 + / - 15 ♦ Originally these vehicles were filled with 840 g of refrigerant from 07/2012 until 10/2013, then the capacity was raised to 900 g (see notes).	• Electrically-Driven A/C Compressor • Condenser with part number 8R0 xxx xxx manufactured by “Denso” (characteristics, refer to ⇒ page 323). • The Climatronic Control Module - J255- A/C display control head with a part number 8Kx xxx xxx and an A/C unit with a part number 8Tx xxx xxx. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation, and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). • With second evaporator in the battery cooling module

Note

- *At the start of production, mechanically driven A/C compressors manufactured by "Denso" (for example, type "6 SEU 14") were installed on all vehicles (except on the Audi Q5 Hybrid). These A/C compressors do not have an A/C clutch (they are continuously driven by the engine). In MY 2012, the A/C compressor type "6 SEU 14" was gradually replaced by type "6 SES 14". A/C compressors from other manufacturers may also be installed at a later time, depending on the engine. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *For certain engines (for example, vehicles with a 4-cylinder TDI engine) and versions, A/C compressors (type "6 SAS 14") are gradually being used from MY 2012 that have an additional A/C Clutch - N25- installed on the belt pulley. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*
- *A/C compressors with an installed A/C Clutch - N26- is being gradually installed on specific 4-cylinder TDI engines starting from 08/2011. Refer to ⇒ Electronic Parts Catalog (ETKA) .*
- *From 06/2012, the refrigerant circuit (A/C compressor, condenser, evaporator etc.) was gradually changed depending on the engine. This resulted in a different capacity for the refrigerant (identifiable by the information label for the refrigerant circuit) and the refrigerant oil for these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*

- *From 06/2012, vehicles manufactured in China, are being installed with a condenser manufactured by "Showa / Keihin" (part number 8KD xxx xxx) as a running change. This condenser has a different inner construction, for this reason there is another filling specification of the coolant. For the characteristics, refer to ⇒ page 323 .*
- *From 10/2013 as a running change, a condenser from the manufacturer "Showa / Keihin" with the part number 8T0 xxx xxx from the index "D" is installed on all vehicles (except the RS models). This condenser has a different construction (smaller height of the flat pipes, 1.5 instead of 2.0 and with this a smaller interior volume) than the "Showa / Keihin" condenser with the part number 8T0 xxx xxx up to the index "C", for this reason there is another filling specification of the coolant. For the characteristics, refer to ⇒ page 323 .*
- *If in a vehicle, in the condenser from the manufacturer "Showa / Keihin" with the part number 8T0 xxx xxx until the index "C" (or a condenser with the part number 8K0 xxx xxx or 8KD xxx xxx) is installed, a condenser from the manufacturer "Showa / Keihin" with the part number 8T0 xxx xxx from the index "D" or a condenser from the manufacturer "Denso", then for these condensers fill with the specified capacity (see the table). The same applies if a condenser from the manufacturer "Denso" if replaced with a condenser from another manufacturer of with another part number. In addition, the capacity specified on the label in the vehicle is to be checked and amended if necessary, or the existing label is to be replaced with one indicating the correct capacity (affix over old label).*

- *The changed components (A/C compressor, condenser) can only be differentiated by the part number on the outside (data plate on the A/C compressor, data plate or impression on the condenser). Refer to ⇒ page 323 and the ⇒ Electronic Parts Catalog (ETKA) .*
- *An electrical A/C compressor manufactured by "Denso" (Electrical A/C Compressor - V470- with A/C Compressor Control Module - J842-) is installed at the start of production on the Audi Q5 Hybrid. There is no A/C Compressor Regulator Valve - N280- present in this A/C compressor.*
- *From 10/2013 the refrigerant amount for the refrigerant circuit on the Audi Q5 Hybrid is raised from 840 g to 900 g. The raised capacity for the refrigerant applies retroactively to all vehicles from 07/2012 at the next filling with a Climatronic Control Module - J255- A/C display and control head with the part number 8Kx xxx xxx and an AC unit with the part number 8Tx xxx xxx (different software and different evaporator in AC unit). The coolant circuit does not have to be emptied, to fill it with the raised capacity. Here it is sufficient, when there is a raised capacity for example after working on the refrigerant circuit for which the emptying and refilling already is necessary, to fill. For vehicles which were built from 10/2013 check whether the refrigerant oil capacity was possibly filled during a previous workshop. If not, check the capacity table for the refrigerant on the data label and if necessary, attach a new label with the correct capacity and language. Refer to ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). If there is no information label available with the correct capacity and language, amend the capacity information on the existing information label accordingly using a waterproof marker. If necessary, fill the refrigerant circuit with the above-specified higher refrigerant amount.*
- *Condenser distinguishing marks. Refer to ⇒ page 323 .*

Audi RS 4 and Audi RS 5

Note

Also applies to the Audi RS 5 Cabriolet.

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi RS 4 and Audi RS 5	♦ RS 4 from 05/2012 ♦ RS 5 from 03/2010	570 + / - 20	• A/C compressor without A/C clutch and with the part number 8K0 xxx xxx (manufactured by "Denso", type "7 SEU 17". • Condenser with part number 8K0 xxx xxx (manufactured by "Denso", defining characteristics, refer to ⇒ page 323)

Note

- *At the start of production, A/C compressors manufactured by "Denso" (type "7 SEU 17") were installed. These A/C compressors do not have an A/C clutch (they are driven continuously by the motor through a shaft). A/C compressors from other manufacturers may also be installed at a later time, depending on the engine. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *The refrigerant circuit on the Audi RS 4 and RS5 will not be changed over in MY 2012 (refer to the other versions).*

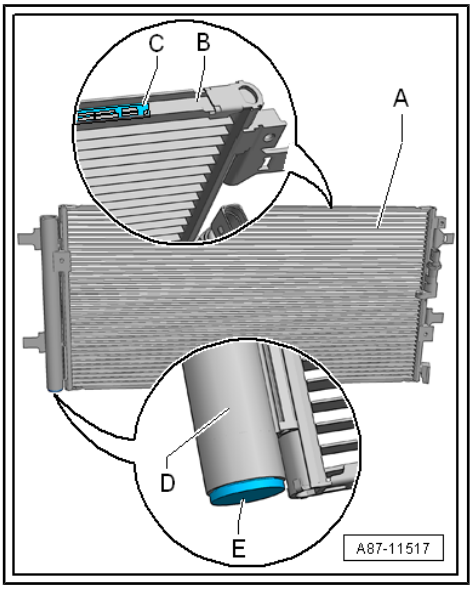
Condenser distinguishing marks

Note

- *Depending on when the vehicle was manufactured, on the version of the vehicle and on the engine, different condensers are installed on these vehicles. Refer to the ⇒ Electronic Parts Catalog (ETKA) . These condensers differ in their inner construction and volume. The refrigerant circuit capacity depends on the condenser. Always see which version of the condenser is installed when determining the refrigerant capacity.*
- *Currently condensers made by different manufacturers are being installed ("Denso" and "Showa / Keihin"). Each has specific distinguishing marks.*
- *A condenser from one manufacturer can have a different construction but also from the outside only the part number is different. The construction (different flow distribution, different inner volume) determines the refrigerant capacity for the refrigerant circuit. Refer to ⇒ "3.2.4 Condenser", page 27 .*
- *This condenser comes in different designs for different versions (identified, for example by the part number 8K0 xxx xxx , 8Rx xxx xxx, 8KD xxx xxx or 8T0 xxx xxx). Refer to ⇒ "3.2.4 Condenser", page 27 and to the ⇒ Electronic Parts Catalog (ETKA) for the allocation.*

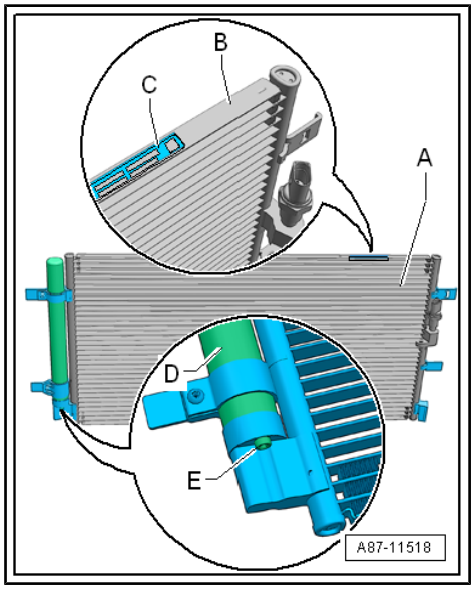
Identifying a condenser made by "Denso" -A-

- The upper sealing strip -B- is U-shaped.
- Condenser manufacturer part number and manufacturer information -C- (currently printed directly on it). Refer to the ⇒ Electronic Parts Catalog (ETKA) for the allocation.
- The receiver/dryer -D- is integrated on the condenser (the dryer cartridge can be replaced when the plastic screw / cap -E- is removed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).



Identifying a condenser made by “Showa / Keihin” -A-

- The upper sealing strip -B- is flat.
- Condenser manufacturer part number and manufacturing date -C- (currently on a data plate glued to it). Refer to the ⇒ Electronic Parts Catalog (ETKA) for the allocation.
- The receiver/dryer -D- is attached to the condenser (the receiver/dryer -D- can be replaced after removing the bolts -E-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).



Note

From 10/2013 as a running change, a condenser from the manufacturer “Showa / Keihin” with the part number 8T0 xxx xxx from the index “D” is installed on all vehicles (except the RS models). This condenser has a different construction (smaller height of the flat pipes, 1.5 instead of 2.0 and with this a smaller interior volume) than the “Showa / Keihin” condenser with the part number 8T0 xxx xxx up to the index “C”, for this reason there is another filling specification of the coolant. The condensers part numbers can vary, the different heights of the flat pipe cannot be defiantly determined using workshop tools.

10.2.12 Capacities for Audi A4 (8W_) from MY 2016, Audi A4 (86_ for China) from MY 2017, Audi A5 (F5_) from MY 2016, Audi Q5 (FY_) from MY 2017, Audi Q5 (87_ für China) from MY 2019

Note

Applies to the Audi A4 allroad, the Audi A4 (type 86_ for China), the Audi A5 (all versions), the Audi Q5 (type 87_ for China) as well as S and RS models.

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Refrigerant Line with Inner Heat Exchanger
- Mechanical A/C compressor manufactured by “Denso” or “Sanden” with A/C Compressor Regulator Valve - N280- , with or without A/C Clutch - N25- (depending on the engine). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A4 Audi A5 Audi Q5	From 07/2015	590 + / - 15	• None

10.2.13 Capacities for Audi 100 / Audi A6 (4A_) through MY 1998

Features of the refrigerant system:

- Restrictor (not colored)
- Reservoir
- “Denso” or “Zexel / Valeo” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi 100/Audi A6	From 10/1992 to 03/1997	750 + 50	• None

Note

- *If a vehicle is equipped with a yellow colored restrictor as replacement for a non-colored restrictor, add 50 g more refrigerant than specified in the table. In addition, the capacity specified on the label in the vehicle is to be checked and amended if necessary, or the existing label is to be replaced with one indicating the correct capacity (affix over old label).*
- *Restrictors with a modified hole have been installed at the factory since 11/1997 (colored). In order to distinguish between the two restrictor versions, the one with the smaller hole (1.54 mm) is colored yellow. The restrictor with the larger hole (1.83 mm) is not colored.*
- *The Audi 100 and Audi A6 were equipped with different A/C compressors depending on engine and production period. Exclusive use was made at the start of production of “Zexel / Valeo” A/C compressors. As of MY 1996, “Denso” A/C compressors were gradually introduced for vehicles with 6-cylinder engines.*
- *From MY 2006, the “Zexel / Valeo” designation was changed to “Valeo”.*
- *From 09/1994, production was gradually switched from condenser 4A0 260 403 AB to condenser 4A0 260 403 AC.*
- *The refrigerant capacity of 750+50 g applies to all Audi 100 (regardless of condenser).*
- *Only condensers with part number 4A0 260 403 AC are now available as replacement parts (if necessary, make use of label part number 8A0 010 126 P).*
- *After charging refrigerant circuit on vehicles manufactured through 10/1994, check the capacity stated on label in vehicle and correct if necessary, or affix a label with the correct capacity part number 8A0 010 126 P over the existing one (modified capacity). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*

10.2.14 Capacities for Audi A6 (4B_) from MY 1998 and Audi Allroad (4B_) through MY 2005

Features of the refrigerant system:

- Restrictor
- Reservoir

- “Denso” or “Zexel / Valeo” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A6	From 04/1997 to 11/1997	800 + 50	• Restrictor (not colored) • A/C unit version “1”. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). • Condenser with flat pipe dimensions 20 mm x 3 mm. Refer to ⇒ page 330 .
	From 11/1997 through 08/1998	850 + 50	• Restrictor colored (yellow) • A/C unit version “1”. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). • Condenser with flat pipe dimensions 20 mm x 3 mm. Refer to ⇒ page 330 .

Note

- *Restrictors with a modified hole have been installed at the factory from 11/1997 (yellow colored). The capacity was increased by 50 g for vehicles in which a yellow colored restrictor was installed.*
- *In order to distinguish between the two restrictor versions, the one with the smaller hole (1.54 mm) is colored yellow. The restrictor with the larger hole (1.83 mm) is not colored.*
- *If a vehicle is equipped with a colored restrictor as replacement for a non-colored restrictor, add 50 g more refrigerant than specified in the table. In addition, the capacity specified on the label in the vehicle is to be checked and amended if necessary, or the existing label is to be replaced with one indicating the correct capacity (affix over old label).*
- *The Audi A6 are equipped with different A/C compressors depending on engine and vehicle date of manufacture.*
- *Production was gradually switched in 08-09/1998 from A/C unit version “1” to A/C unit version “2”. Since the evaporator was also changed along with the A/C unit, the capacity could have been reduced.*
- *The two A/C unit versions can be identified on the basis of certain characteristics described in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*
- *Beginning from production year 2006, the name of the “Zexel” A/C compressor was changed from “Zexel” to “Valeo”.*

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A6 • With 4-cylinder engine • With 6-cylinder gasoline engine	From 08/1998 to 04/1999	750 + 50	• Restrictor colored (yellow) • A/C unit version “2”. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). • Condenser with part number 4B0 260 401 (403) and index “D”, “E” or “F” (flat pipe dimensions 20 mm x 3 mm, refer to ⇒ page 330). Refer to the ⇒ Electronic Parts Catalog (ETKA) .
Audi A6 • With 6-cylinder diesel engine	♦ From 08/1998 to 10/1998 ♦ From 12/1998 to 10/1999 (see notes)	750 + 50	• Restrictor colored (yellow) • A/C unit version “2”. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). • Condenser with part number 4B0 260 401 (403) and index “D”, “E” or “F” (flat pipe dimensions 20 mm x 3 mm, refer to ⇒ page 330). Refer to the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A6/ Audi allroad • With 6-cylinder diesel engine	♦ From 10/1998 to 12/1998 ♦ From 10/1999 (see notes)	550 + 50	• Restrictor colored (yellow) • A/C unit version “2 or 3”. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). • Condenser with part number 4B0 260 401 (403) and index “G” or “R” (flat pipe dimensions 16 mm x 1.7 mm, refer to ⇒ page 330). Refer to the ⇒ Electronic Parts Catalog (ETKA) .
Audi A6/ Audi allroad • With 4-cylinder engine except 2.0L • With 6-cylinder gasoline engine except 3.0L engine • With a 6-cylinder diesel engine (see note)	From 04/1999	650 + 50	• Restrictor colored (yellow) • A/C unit version “2 or 3”. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). • Condenser with part no. 4B0 260 401 (403) and index “H”, “J”, “K”, “S”, “T” or “N” (flat pipe dimensions 18 mm x 1.7 mm ⇒ page 330). Refer to the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A6 • With 4-cylinder 2.0L engine • With 6-cylinder 3.0L engine	From 05/2001	550 + 50	• Restrictor colored (yellow) • A/C unit version “3”. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). • Condenser with part number 8E0 260 401(403) and index A (flat pipe dimensions 18 mm x 1.7 mm, refer to ⇒ page 330). Refer to the ⇒ Electronic Parts Catalog (ETKA) . • A/C Compressor Regulator Valve - N280-

Note

- *Condensers with A/C Pressure Switch - F129- or High Pressure Sensor - G65- are supplied for production as part number XXX XXX 401 X. As a replacement part, this condenser is supplied without A/C Pressure Switch - F129- or High Pressure Sensor - G65- as part number XXX XXX 403 X.*
- *From 10/1998 to 12/1998, vehicles with 6-cylinder diesel engine (initially about 10,000 vehicles) were equipped with condensers of a different design. The capacity is different for vehicles with these condensers. The condensers can be identified on the basis of certain characteristics and the part number. Refer to ⇒ page 330 .*
- *The Audi A6 are equipped with different A/C compressors depending on engine and vehicle date of manufacture.*
- *On condenser replacement, observe part number index (different flat pipe versions, flat pipe dimensions 16 x 1.7 mm, 18 mm x 1.7 mm or 20 mm x 3 mm) and the different capacities involved. If a condenser with a different part number index is installed, the capacity specified on the label must be checked and amended if necessary or a label indicating the modified capacity must be affixed over the existing label. The part number can be found on a sticker affixed on the underside of the condenser.*
- *From 04/1999, production was gradually switched from condensers with flat pipe dimensions 20 mm x 3 mm to condensers with flat pipe dimensions 18 mm x 1.7 mm or 16 mm x 1.7 mm. The change in production took place gradually during the course of 1999 depending on the engine and existing supplies of the different versions. Refer to Electronic Parts Catalog (ETKA) for precise assignment of the different condensers ⇒ Electronic Parts Catalog (ETKA) .*
- *For vehicles from 04/1999 that are equipped with 6-cylinder diesel engine, a condenser with index “D”, “G”, “R” or “K” may be installed. Pay attention to the different capacities. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual) and to the ⇒ Electronic Parts Catalog (ETKA) .*

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A6 • With 8-cylinder engine	• Through 03/1999 And again • From 02/2000	550 + 50	• Restrictor colored (yellow) • A/C unit version “2 or 3”. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). • Condenser with part number 4B3 260 401 (403) B, D, E (flat pipe dimensions 18 mm x 1.7 mm ⇒ page 330). Refer to the ⇒ Electronic Parts Catalog (ETKA) .
Audi A6 • With 8-cylinder engine	From 03/1999 to 02/2000	650 + 50	• Restrictor colored (yellow) • A/C unit version “2”. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). • Condenser with part number 4B3 260 401 (403) C (flat pipe dimensions 18 mm x 1.7 mm ⇒ page 330). Refer to the ⇒ Electronic Parts Catalog (ETKA) .

Note

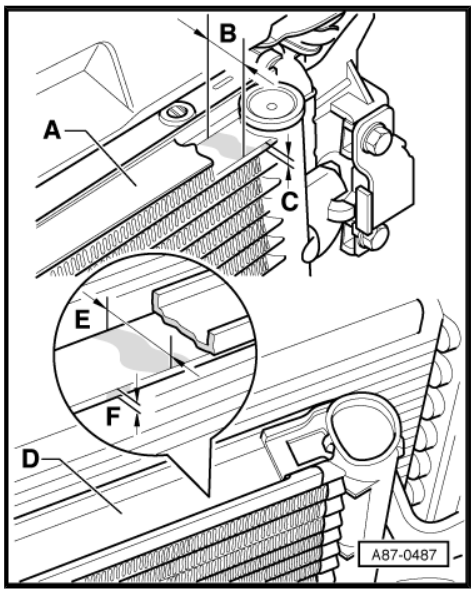
- *The 8-cylinder Audi A6 has a “Denso” A/C compressor.*
- *Production was gradually converted in 08-09/1998 from A/C unit version “1” to A/C unit version “2”. Vehicles with an 8-cylinder engine are only equipped with A/C unit as of version “2”.*
- *The different A/C unit versions can be identified on the basis of certain characteristics described in the repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual).*
- *For vehicles with 8-cylinder engines, different condensers were installed. Exclusive use was made for USA vehicles of condensers with part number 4B3 260 401 (403) C, D, E.*
- *In 03/1999, production was gradually switched from condensers with part number 4B3 260 401 (403) B to condensers with part number 4B3 260 401 (403) C.*
- *If the condenser installed is replaced by a condenser with a different part number, the capacity specified on the label must be amended and, if necessary, the label indicating the modified capacity must be affixed over the existing label. The part number can be found on a sticker attached to the bottom of the condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual) and ⇒ Electronic Parts Catalog (ETKA) .*

Determining dimensions of flat pipes from condenser

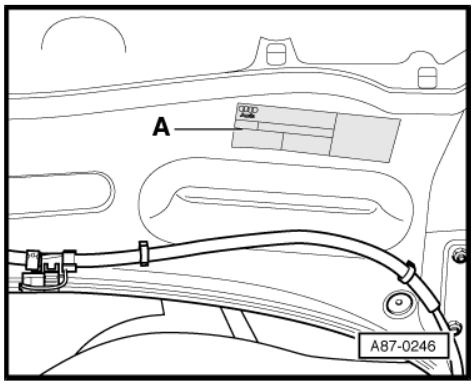
Note

- *Production was gradually switched to a condenser with smaller flat pipes starting from 11/08/1998 (initially on Audi A6 with a 6-cylinder diesel engine).*
- *Observe the part number when replacing a condenser (sometimes the only distinguishing feature). Refer to the ⇒ Electronic Parts Catalog (ETKA) .*

Condensers -A- with flat pipe dimensions -B- = 20 mm and -C- = 3.0 mm must be filled with more refrigerant than condensers -D- with flat pipe dimensions -E- = 18 mm or 16 mm and -F- = 1.7 mm. Refer to the ⇒ Electronic Parts Catalog (ETKA) .



If the condenser is replaced, observe flat pipe dimensions. If a condenser with different dimensions is installed, the sticker -A- specifying the capacity for refrigerant R134a is also to be replaced, or the old capacity specification is to be removed and the new capacity is to be noted, for example using a waterproof marker. Refer to the ⇒ Electronic Parts Catalog (ETKA) .



10.2.15 Capacities for Audi A6 (4F_) from MY 2005

Note

Also applies to the Audi S 6 and the Audi RS 6.

Features of the refrigerant system:

- Red colored restrictor.
- Reservoir
- “Denso” A/C compressor with A/C Compressor Regulator Valve - N280- (without A/C clutch)

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A6 /S 6	From 04/2004	530 + / - 20	• Red colored restrictor
Audi RS 6	From 05/2008	500 + / - 20	• Red colored restrictor • Condenser with a smaller internal capacity

Note

- *Replacement restrictors with different holes are available: Yellow colored 1.54 mm, red colored 1.42 mm.*
- *Depending on manufacturer, color of red restrictor may tend more towards orange.*
- *So as not to change the A/C system cooling output, only red-colored restrictors may be installed.*
- *Different A/C compressors are installed depending on the version. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual) and to the ⇒ Electronic Parts Catalog (ETKA) .*
- *In contrast to vehicles with other engines, vehicles with the 10-cylinder TFSI engine (Audi RS 6) have a condenser with a smaller interior volume installed. For this reason, the refrigerant fill volume is slightly less in a 10-cylinder TFSI engine than in other engines. Refer to the ⇒ Electronic Parts Catalog (ETKA) .*

10.2.16 Capacities for Audi A6 (4G_ or 4X_ for China) from MY 2011, Audi A7 (4G_ or 4X_ for China) from MY 2011, Audi A6 Hybrid (4G_) from MY 2012 and A6 e-tron (4G_) from MY 2017

Note

- *Also applies to the Audi S and the Audi RS models.*
- *A condenser with a reduced height is installed on RS models. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .*

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Refrigerant Line with Inner Heat Exchanger
- Mechanical “Denso” A/C compressor, with A/C Compressor Regulator Valve - N280- (and depending on engine, also with an A/C Clutch - N25- from MY 2014). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic

Parts Catalog (ETKA) (all vehicles except on the Audi A6 Hybrid).

- Vehicles with a high-voltage system (Audi A6 Hybrid) have electrical “Denso” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .
- Vehicles with a high-voltage system (Audi A6 e-tron) have electrical “Sanden” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A6	From 02/2011	570 + / - 20	• None
Audi A7	From 10/2010	570 + / - 20	• None
Audi RS 6 / RS 7	From 01/2013	540+ / - 20	• Condenser with smaller internal volume
Audi A6 Hybrid	From 11/2011	860 + / - 15 (see notes)	• Electrically-Driven A/C Compressor • With second evaporator in the battery cooling module
Audi A6 e-tron	From 09/2016	1000+ / - 15	• Electrically-Driven A/C Compressor • With second evaporator in the high-voltage battery heat exchanger

Note

- *The type designation 4X_ is used instead of the type designation 4G_ for specific versions in China*
- *At the start of production, mechanically-driven "Denso" A/C compressors were installed on all vehicles except for the Audi A6 Hybrid (Audi A6 e-tron). A/C compressors from other manufacturers may also be installed at a later time. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *An electrical A/C compressor manufactured by "Denso" (Electrical A/C Compressor - V470- with A/C Compressor Control Module - J842-) is installed at the start of production on the Audi A6 Hybrid. There is no A/C Compressor Regulator Valve - N280- present in this A/C compressor.*
- *At the start of production, an electrical "Sanden" A/C compressor (Electrical A/C Compressor - V470- with A/C Compressor Control Module - J842-) is installed on the Audi A6 e-tron. There is no A/C Compressor Regulator Valve - N280- present in this A/C compressor.*
- *A/C compressors with a refrigerant oil quantity of 200 ccm were installed at the start of production for Audi A6 Hybrid vehicles. A refrigerant filling capacity of 840 ± 15 g was planned for these vehicles at the factory (information can be found on the information label for the refrigerant). Shortly after the start of production, the refrigerant oil quantity was reduced to 160 ccm and the refrigerant quantity was raised to 860 ± 15 g. Always fill this vehicle when servicing to 860 ± 15 g with refrigerant, regardless of the refrigerant oil quantity (write the capacity information on the information label with a waterproof marker if necessary).*
- *In contrast to vehicles with other engines, the Audi S 6/ RS 7 has a condenser with a smaller interior volume installed. For this reason, the refrigerant fill volume is slightly less on this model than on other vehicles in this series. Refer to the ⇒ Electronic Parts Catalog (ETKA) .*

10.2.17 Capacities for Audi V8 (4C_) through MY 1994

Features of the refrigerant system:

- Restrictor (not colored).
- Reservoir
- "Zexel / Valeo" A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi V8	From 10/1992 to 10/1993	850 + 50	• None

Note

- *Replacement restrictors with different holes are available. If these vehicles are equipped with a yellow colored restrictor, add 50 g more refrigerant than specified in the table. After charging, amend capacity stated on label or affix label indicating new capacity.*
- *In order to distinguish between the different restrictor versions, the restrictors with a smaller hole are colored (yellow or red). The red colored restrictor is not to be installed into these vehicles.*
- *Depending on manufacturer, color of red restrictor may tend more towards orange.*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

10.2.18 Capacities for Audi A8 (4D_) from MY 1994

Features of the refrigerant system:

- Restrictor
- Reservoir
- "Denso" or "Zexel / Valeo" A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A8	From 05/1994 to 11/1997	750 + 50	• Restrictor (not colored)
	From 11/1997	800 + 50	• Restrictor colored (yellow)

Note

- *Restrictors with a modified hole have been installed at the factory from 11/1997 (yellow colored). The capacity was increased by 50 g for vehicles with a yellow colored restrictor.*
- *In order to distinguish between the different restrictor versions, the restrictors with a smaller hole are yellow (1.54 mm) or red (1.42 mm) colored. The restrictor with the larger hole (1.83 mm) is not colored.*
- *If a vehicle is equipped with a yellow colored restrictor as replacement for a non-colored restrictor, add 50 g more refrigerant than specified in the table. In addition, the capacity specified on the label in the vehicle is to be checked and amended if necessary, or the existing label is to be replaced with one indicating the correct capacity (affix over old label). The red colored restrictor is not to be installed into these vehicles.*
- *Exclusive use was made at the start of production of "Zexel / Valeo" A/C compressors. From MY 1996, production was gradually switched to "Denso" A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and to the ⇒ Electronic Parts Catalog (ETKA) .*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

10.2.19 Capacities for Audi A8 (4E_) from MY 2003

Features of the refrigerant system:

- Red colored restrictor.
- Reservoir
- "Denso" A/C compressor with A/C Compressor Regulator Valve - N280- (without A/C clutch). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A8	From 10/2002	620 + / - 20	• Red colored restrictor

Note

- *Replacement restrictors with different holes are available: Yellow colored 1.54 mm, red colored 1.42 mm.*
- *Depending on manufacturer, color of red restrictor may tend more towards orange.*
- *So as not to change the A/C system cooling output, only red-colored restrictors may be installed.*
- *Different A/C compressors are installed depending on the version. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and to the ⇒ Electronic Parts Catalog (ETKA) .*

10.2.20 Capacities for Audi A8 (4H_) from MY 2010 and Audi A8 Hybrid (4H_) from MY 2012

Features of the refrigerant system:

- Expansion Valve
- Depending on the vehicle equipment level with one or two evaporators
- Refrigerant Line with Inner Heat Exchanger
- Dryer cartridge in receiver/dryer on condenser
- Mechanical “Denso” A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) (all vehicles except Audi A8 Hybrid).
- Vehicles with a high-voltage system (Audi A8 Hybrid) have electrically-driven “Denso” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Caution

Capacities may vary for the refrigerant and the refrigerant oil on vehicles with an 8-cylinder TDI engine.

- ***Due to the installed location of the A/C compressor (above the engine), the refrigerant oil capacity may vary from what is on the A/C compressor data plate on vehicles with an 8-cylinder TDI engine.***

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A8 (all vehicles except for the 8-cylinder TDI engine)	From 03/2010		
◆ Vehicle with one evaporator		780 + / - 20	• One evaporator
◆ Vehicle with two evaporators		930 + / - 20	• Two evaporators
Audi A8 (only the 8-cylinder TDI engine)	From 03/2010		
◆ Vehicle with one evaporator		740 + / - 15	• One evaporator
◆ Vehicle with two evaporators		915 + / - 15	• Two evaporators

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi A8 Hybrid	From 01/2012	1080 + / - 15	• An evaporator in the A/C unit • Electrically-Driven A/C Compressor • 2. Evaporator in Battery Cooling Module

Note

- *On vehicles with an 8-cylinder TDI engine, the refrigerant oil quantity was increased in the refrigerant circuit from the vehicle identification number 4H_ BN 018846. To compensate, the refrigerant quantity must be slightly reduced. Since the filling capacity information on the information label does not change, proceed as follows: on vehicles that were built up to the specified vehicle identification number, check whether the refrigerant oil capacity was already topped up during a previous workshop visit. If not, fill the refrigerant circuit with an additional 50 ccm of refrigerant oil. Then correct the fill capacity for the refrigerant on the information label with a waterproof marker accordingly and fill the refrigerant circuit with the above specified refrigerant quantity. Then document the changes that have taken place in the vehicle data. For vehicles built from the specified VIN, check the refrigerant capacity specification on the information label and if necessary, amend the quantities with a waterproof marker accordingly and then fill the refrigerant circuit with the above-specified refrigerant quantity.*
- *For all vehicles except for the Audi A8 Hybrid, the mechanically driven A/C compressors manufactured by "Denso" are installed at the start of production. A/C compressors from other manufacturers may also be installed at a later time. Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *An electrical A/C compressor manufactured by "Denso" (Electrical A/C Compressor - V470- with A/C Compressor Control Module - J842-) is installed at the start of production on the Audi A6 Hybrid. There is no A/C Compressor Regulator Valve - N280- present in this A/C compressor.*
- *A/C compressors with a refrigerant oil quantity of 200 ccm were installed at the start of production on Audi A8 Hybrid vehicles. Shortly after the start of production, the refrigerant oil quantity was reduced to 160 ccm. Always fill this vehicle when servicing to 1080 ± 15 g with refrigerant, regardless of the refrigerant oil quantity (write the capacity information on the information label with a waterproof marker if necessary).*

10.2.21 Capacities, Audi Q7 (4L_) from MY 2006, Audi Q7 (4M_) from MY 2016

Audi Q7 (4L_) from MY 2006, Audi Q7 (4M_) from MY 2016

Features of the refrigerant system:

- Expansion Valve
- Depending on the vehicle equipment level with one or two evaporators
- Dryer cartridge in receiver/dryer on condenser
- "Denso" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Con-

ditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Audi Q7 e-tron (4M_) from MY 2016

- Expansion Valve
- An evaporator in the front heater and A/C unit
- Multiple change-over and check valves installed in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- Additional heat exchangers installed in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- Dryer cartridge in receiver/dryer on condenser
- Electrical A/C Compressor -V470- from the manufacturer “Sanden” with A/C Compressor Control Module - J842- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi Q7 (4L_)	From 02/2006		
◆ Vehicle with one evaporator		700 + 50	• One evaporator
◆ Vehicle with two evaporators		1050 + 50	• Two evaporators
Audi Q7 (4M_)	From 06/2015		
◆ Vehicle with one evaporator		700 + 15	• One evaporator
◆ Vehicle with one evaporator		950 + 15	• Two evaporators
Audi Q7 e-tron (4M_)	From 02/2016	890 +/-15	• Electric A/C Compressor

Note

- *On the Audi Q7 e-tron there are differences to the other vehicles additional components installed in the refrigerant circuit. For the layout of the different refrigerant circuits, refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).*
- *Due to the layout, the high pressure side service connection in the refrigerant circuit is located on the Audi Q7 e-tron on the high pressure side service connection only when operating the refrigerant circuit as a high pressure heat pump. In the A/C system operation the pressure is the same as on the low pressure side service connection.*
- *To discharge, evacuate, and charge the refrigerant circuit on the Audi Q7 e-tron the valves installed in the refrigerant circuit which are power operated are opened. Activate and open the valves through a routine stored in the Thermal Management Control Module - J1024- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester ⇒ Vehicle diagnostic tester in the "Guided Fault Finding" function.*

10.2.22 Capacities, Audi R8 (42_) from MY 2008, Audi R8 (4S_) from MY 2015

Characteristics of the Audi R8 (42_) refrigerant circuit from MY 2008:

- Red colored restrictor.
- Reservoir
- Two condensers switched in sequence
- "Denso" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Characteristics of the Audi R8 (4S_) refrigerant circuit from MY 2015:

- Expansion Valve
- Receiver/Dryer (with Dryer)
- Two condensers switched in sequence
- "Denso" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA) .

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi R8 (42_)	From 03/2007 to 11/2012	680 $^{+}$ / $_{-}$ 20 ♦ Originally these vehicles were filled with 650 g of refrigerant, then the capacity was raised to 680 g (see notes).	• Red colored restrictor
	From 11/2012	680 $^{+}$ / $_{-}$ 20	

Vehicle model	Production period	Capacity in grams	Differing features of this refrigerant circuit
Audi R8 (4S_)	From 08/2015	820 + / - 15	• Expansion Valve • Receiver/dryer (with dryer) as extra component

Note

- *Replacement restrictors with different holes are available: Yellow colored 1.54 mm, red colored 1.42 mm.*
- *Depending on manufacturer, color of red restrictor may tend more towards orange.*
- *So as not to change the A/C system cooling output, only red-colored restrictors may be installed.*
- *From the VIN 429 DN 000751 (time period of production from 11/2013) the refrigerant quantity for the refrigerant circuit was raised from 650 g to 680 g and the refrigerant oil quantity was raised from 150 ccm to 200 ccm. The increased refrigerant and refrigerant oil capacity applies retroactively to all vehicles. On vehicles that were built up to the specified vehicle identification number, check whether the refrigerant oil capacity was already topped up during a previous workshop visit. If not, fill the refrigerant circuit with an additional 50 ccm of refrigerant oil. Finally, check the refrigerant capacity information on the information label and if necessary, attach a new information label with the correct capacity and language (for example, the identification label with the part number 420 010 535 and the index BA with the labeling in German and English). Refer to the ⇒ Electronic Parts Catalog (ETKA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). If there is no information label available with the correct capacity and language, amend the capacity information on the existing information label accordingly using a waterproof marker. Finally, increase the refrigerant oil quantity in the refrigerant circuit by 50 ccm if necessary and fill the refrigerant circuit with the above-specified refrigerant amount. Refer to* *⇒ "10.3.24 Capacities for Audi R8 (42_) from MY 2008", page 373* *.*

10.3 Approved Refrigerant Oils and Capacities

Refer to the ⇒ Fluid Capacity Tables; Rep. Gr. 03

10.3.1 Approved Refrigerant Oils

Refer to the ⇒ Fluid Capacity Tables; Rep. Gr. 03

10.3.2 Refrigerant Oil Capacities

Refer to the ⇒ Fluid Capacity Tables; Rep. Gr. 03

10.3.3 Capacities for Audi A1 (8X_) from MY 2011

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer

- Compressors from various manufacturers with an A/C Compressor Regulator Valve - N280- (without a solenoid coupling). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A1	From 08/2010	110 +/- 10	110 +/- 10	• “Sanden” (or “Delphi”) A/C Compressor, part number “5N0 xxx xxx”
		90 +/- 10	90 +/- 10	“Denso” A/C Compressor, part number “1K0 xxx xxx”
		110+/- 10	110 +/- 10	“Denso” A/C Compressor, part number “5Q0 xxx xxx” (pay attention to the notes)
		75+/- 10	75+/- 10	“Sanden” A/C Compressor, part number “5K0 xxx xxx”
	From 07/2012	75+/- 10	75+/- 10	“Sanden” A/C Compressor, “5Q0 xxx xxx”
		110 +/- 10	110 +/- 10	• “Delphi”, A/C Compressor, part number “5K0 xxx xxx” or “5Q0 xxx xxx”

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .*
- *Different A/C compressors are installed depending on production period and engine.*
- *At the start of production, A/C compressors manufactured by "Denso" type "6 SEU 14C" or "Sanden" type "7 PXE 16/14" were installed. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *Depending on the engine, A/C compressors from manufacturers "Sanden" type "11 PXC 14" or "Delphi" type "6 CVC 140" may also be installed at a later time (launch TBD, planned from 09/2012). Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *Depending on the engine, a different version of "Denso" or "Sanden" A/C compressors may be installed at a later date (introduction not yet finalized). Refer to the Parts Catalog.*
- *These A/C compressors are available as replacement parts with different oil fill capacities, therefore note the capacity on the A/C compressor and the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*
- *From 11/2013 the refrigerant oil quantity for the A/C compressor manufacturer "Denso" with the part number "5Q0 xxx xxx" was gradually increased from 80 ccm to 110 ccm. The increased refrigerant oil capacity applies retroactively to all vehicles with this A/C compressor. On vehicles that were built through 11/2012 with this A/C compressor, check whether the refrigerant oil capacity was already topped up during a previous workshop visit. If not, fill the refrigerant circuit with an additional 30 ccm of refrigerant oil. Then note the refrigerant oil capacity with a waterproof marker on the sticker and fill the refrigerant circuit with the above-specified refrigerant quantity. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual).*

10.3.4 Capacities for Audi A2 (8Z_) from MY 2001

Features of the refrigerant system:

- Restrictor

- Reservoir
- A/C compressor with A/C Compressor Regulator Valve - N280- (without A/C clutch).
- “Denso” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3
Audi A2	From 06/2000	180 +/-15	180 +/-15

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ “9 Refrigerant Circuit Components, Replacing”, page 283*
- *As the A/C compressor and engine always operate at the same time and the entire quantity of refrigerant oil is contained in the A/C compressor, the circuit must be completely assembled before starting the engine. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *These A/C compressors are available as replacement parts with different oil fill capacities, therefore note the exact part number. Refer to the Parts Catalog.*

10.3.5 Capacities for Audi A3 (8L_) from MY 1997 and Audi TT (8N_) from MY 1999

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- “Sanden” or “Zexel/Valeo” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3
Audi A3	From 08/1996	135 +/-15	135+/-15
Audi TT	From 10/1998	135 +/-15	135+/-15

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ "9 Refrigerant Circuit Components, Replacing", page 283* *.*
- *Exclusive use was made at the start of production of "Sanden" A/C compressors. From My 1999 A/C compressors from the manufacturer "Zexel/Valeo" are being used. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

10.3.6 Capacities for Audi A3 (8P_) from MY 2004 and Audi Q3 (8U_ or 84_ for China) from MY 2012

Note

- *The filling capacities provided in the following table apply for the Audi A3, the Audi A3 Sportback, the Audi RS 3, the Audi A3 Cabriolet and the Audi Q3 (and Audi RS Q3).*
- *Certain versions for China use the designation 84_ rather than 8U_.*

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Compressors from various manufacturers with an A/C Compressor Regulator Valve - N280- (without a solenoid coupling). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A3 Audi Q3	From 05.03 to 10.03	180 +/- 10	180 +/- 10	• "Denso" A/C compressor "7 SEU 16"
	From 10/2003	120 +/- 10	120 +/- 10	• "Zexel" A/C compressor
		110 +/- 10	110 +/- 10	• "Sanden" A/C compressor
		140 +/- 10	140 +/- 10	"Denso" A/C compressor "7 SEU 17"
	From 06/2007	90 +/- 10	90 +/- 10	• "Denso" A/C compressor "6 SEU 14"

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
	From 08/2007	110 +/- 10	110 +/- 10	• “Delphi” A/C compressor

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to*
  ⇒ “9 Refrigerant Circuit Components, Replacing”, page 283 .
- *Different A/C compressors are installed depending on production period and engine.*
- *At the start of production, exclusive use was made of A/C compressors “7 SEU 16” from “Denso” (for example, A/C compressor with part no. 1K0 820 803 up to index “D”). In MY 2004 (as of approximately 10/2003), a gradual change was made to a different type of “Denso” A/C compressor (“7 SEU 17” for example, A/C compressor with part number 1K0 820 803 as of index “E”).*
- *With a gradual introduction from MY 2004 (approximately 10/2003) and depending on the engine, “Zexel/Valeo” (type “DSC17E”) and “Sanden” (“PXE16”) A/C compressors are installed. Refer to the Parts Catalog.*
- *Beginning from production year 2006, the name of the “Zexel” A/C compressor was changed from “Zexel” to “Valeo”.*
- *From of MY 2008, and depending on the engine, A/C compressors made by “Denso” (“6 SEU 14”) and “Delphi” are being installed. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *This A/C compressor is available as replacement parts with different oil fill capacities, therefore note the capacity on the A/C compressor and the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*

10.3.7 Audi A3 (8V_ or 85_ for China) from MY 2013, Audi e-tron (8V_) from MY 2015, Capacities

Note

The capacities for the Audi A3 (8V_ or 85_ for china) apply to all versions (sedan, sportback, and cabriolet etc.)

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Mechanically driven “Denso” or “Sanden” A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog (all vehicles except A3 e-tron).
- For vehicles with a high voltage system (Audi A3 e-tron), with electrically-driven “Sanden” or “Visteon” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Note

Depending on time period of production and depending on engine, different mechanically driven A/C compressors are installed (these A/C compressors do not have an A/C clutch). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A3	from 05/2012	110 +/- 10	110 +/- 10	• “Denso” A/C compressor
		75+/- 10	75 +/- 10	• “Sanden” A/C compressor
		110 +/- 10	110 +/- 10	• “Delphi” A/C compressor
Audi A3 e-tron	From 09/2014	120 +/- 10	120 +/- 10	• Electrically-driven A/C compressor • With two evaporators in the high voltage battery heat exchanger • Varying refrigerant oil

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .*
- *Different A/C compressors are installed depending on production period and engine.*
- *This A/C compressor is available as replacement parts with different oil fill capacities, therefore note the capacity on the A/C compressor and the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*
- *From 11/2012 the refrigerant oil quantity for the A/C compressor manufacturer "Denso" was gradually increased from 80 ccm to 110 ccm. The increased refrigerant oil capacity applies retroactively to all vehicles with this manufacturer's A/C compressor. On vehicles that were built through 06/2013, check whether the refrigerant oil capacity was already topped up during a previous workshop visit. If not, fill the refrigerant circuit with an additional 30 ccm of refrigerant oil. Then note the refrigerant oil capacity with a waterproof marker on the sticker and fill the refrigerant circuit with the above-specified refrigerant quantity. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *On the Audi A3 e-tron a different refrigerant oil is used than on vehicles with mechanically driven A/C compressors (for example the refrigerant oil with the part number G 052 535 M). Refer to the Parts Catalog. Because this refrigerant oil is not in the reservoir of most A/C service stations, after emptying the refrigerant circuit the removed refrigerant oil cannot be refilled via the A/C service station. Refrigerant oil on this vehicle can either be filled via an open connection before evacuating the refrigerant circuit, or with the valve removed via a service connection. Refer to ⇒ "10.3.1 Approved Refrigerant Oils", page 340 .*
- *For refrigerant circuits with electrically driven "Visteon" or "Sanden" - compressors (for example in the A3 e-tron) use the refrigerant oil with part number G 052 535 M. Refer to the Parts Catalog.*

10.3.8 Capacities for Audi TT (8J_) from MY 2007

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer

- Compressors from various manufacturers with an A/C Compressor Regulator Valve - N280- (without a solenoid coupling). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi TT	From 08/2006	90 +/- 10	90 +/- 10	• “Denso” A/C compressor “6 SEU 14”
		110 +/- 10	110 +/- 10	• “Sanden” A/C compressor
		110 +/- 10	110 +/- 10	• “Delphi” A/C compressor

Note

- *The replacement A/C compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ “9 Refrigerant Circuit Components, Replacing”, page 283* *.*
- *At the start of production, “Denso” A/C compressors “6 SEU 14” were installed; these A/C compressor do not have an A/C clutch (driven by the engine). Compressors from other manufacturers may also be installed at a later time, depending on the engine. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *As of MY 2008, on certain engines, “Sanden” A/C compressors (type “PXE16”) were installed; they do not have an A/C clutch (it is driven by the engine). Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *With a gradual introduction starting from MY 2011 and depending on the engine, “Delphi” A/C compressors are installed. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *This A/C compressor is available as replacement parts with different oil fill capacities, therefore note the capacity on the A/C compressor and the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*

- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*

10.3.9 Capacities for Audi TT (FV_) from MY 2015

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Mechanically driven “Denso” or “Sanden” A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Note

Depending on time period of production and depending on engine, different mechanically driven A/C compressors are installed (these A/C compressors do not have an A/C clutch). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).

Vehicle Model	Production Period	Total Quantity of Oil in Refrigerant Circuit in cm^3	Quantity of Refrigerant Oil in Replacement Compressor in cm^3	Differing Features of This Refrigerant Circuit
Audi TT	From 10/2014	110 +/- 10	110 +/- 10	• “Denso” A/C compressor
		75+/- 10	75 +/- 10	• “Sanden” A/C compressor
		110 +/- 10	110 +/- 10	• “Delphi” A/C compressor

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .*
- *Different A/C compressors are installed depending on production period and engine.*
- *This A/C compressor is available as replacement parts with different oil fill capacities, therefore note the capacity on the A/C compressor and the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*

10.3.10 Capacities for Audi 80 (8A_/8C_), Audi Coupe (8B_) and Audi Cabriolet (8G_) through MY 2002

Features of the refrigerant system:

- Restrictor (not colored).
- Reservoir
- "Zexel/Valeo" A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3
Audi 80 Audi Coupe Audi Cabriolet	From 10/1992	250 + 50	250 + 50

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

10.3.11 Capacities for Audi A4 (8D_) from MY 1995

Features of the refrigerant system:

- Restrictor
- Reservoir
- “Denso” or “Zexel/Valeo” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3
Audi A4	From 11/1994	250 + 50	250 + 50

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ “9 Refrigerant Circuit Components, Replacing”, page 283 .*
- *The Audi A4 has different A/C compressors installed depending on the engine and the time of production. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *Beginning from production year 2006, the name of the “Zexel” A/C compressor was changed from “Zexel” to “Valeo”.*

10.3.12 Capacities for A4 (8E_) from MY 2001 and Audi A4 Cabriolet (8H_) from MY 2003

Features of the refrigerant system:

- Restrictor
- Reservoir
- “Denso” A/C compressor with A/C Compressor Regulator Valve - N280- (without solenoid coupling). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A4 Audi RS 4	From 11/2000 to 01/2004 • All	180 +/- 10	180 +/- 10	• A/C compressor type “6 SEU 12” “6 SEU 14” “7 SEU 16” or “7 SEU 17” (see notes below)
	From of 01/2004 • All except 8-cylinder engine	120 +/- 10	120 +/- 10	• Compressor type “6 SEU 14” or “7 SEU 17” (see notes below)

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
	From of 01/2004 • Only 8-cylinder engine	130 +/- 10	130 +/- 10	• A/C compressor type “7 SEU 17”(see notes below)

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to*
  ⇒ “9 Refrigerant Circuit Components, Replacing”, page 283 .
- *The Audi A4 is equipped with different A/C compressors depending on engine and production period. This A/C compressor is available as replacement parts with different oil fill capacities, therefore note the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *At the start of production, the compressor types in the first line of the table were supplied with a refrigerant oil quantity of 180 cm^3. These compressors can be recognized from the index of the part number (8E0 260 805 with one index or with double index up to “AH”). In MY 2004 (as of approximately 01/2004), a gradual change was made to other A/C compressor types with a refrigerant oil quantity of 120 cm^3 or 130 cm^3. These compressors can be recognized from the part number index 8E0 260 805 (with a double index from “AJ”) or 4F0 260 805 (and the index “E” on vehicles with an 8-cylinder engine). Refer to the Parts Catalog.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*

10.3.13 Capacities for Audi A4 (8K_) from MY 2008, Audi A5 Coupe and Sportback (8T_) from MY 2008, Audi Q5 (8R_ or 83_ for China) from MY 2008, Audi A5 Cabriolet (8F_) from MY 2009, and Audi Q5 Hybrid (8R_) from MY 2011

Note

- *Also applies to the Audi RS 4, Audi S 5, Audi SQ5 and Audi RS 5.*
- *Varying capacities depend upon the model and the time period of production (see the following tables)*
- *Certain versions of the Audi Q5 for China use the designation 83_ rather than 8R_.*

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Refrigerant line with inner heat exchanger.
- Mechanically driven “Denso” A/C compressor, with A/C Compressor Regulator Valve - N280- (and depending on engine, and the time period of production, also with a A/C Clutch - N25- from MY 2012). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog (all vehicles except on the Audi Q5 Hybrid).
- For vehicles with a high voltage system (Audi Q5 Hybrid) with electrically-driven “Denso” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

- Capacities for Audi A4, Audi A5 and Audi A5 Cabriolet ⇒ page 353
- Capacities for Audi Q5 and Audi Q5 Hybrid ⇒ page 355
- Capacities for Audi RS 4 and Audi RS 5 ⇒ page 357
- General Information for the refrigerant oil and for the refrigerant circuit ⇒ page 358

Audi A4, Audi A5 and Audi A5 Cabriolet

Note

- *Also applies to the Audi S 5.*
- *Capacity for the Audi RS 5 Cabriolet ⇒ page 357*

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A4 Audi A5 Coupe, Cabriolet and Sportback	◆ Audi A4, from 10/2007 through 03/2012 ◆ Audi A5 Coupe and Sportback from 05/2007 through 03/2012 ◆ Audi A5 Cabriolet from 03/2009 through 03/2012	150 +/- 10	150 +/- 10	• A/C compressor manufactured by “Denso” from type “6 SEU 14” and “7 SEU 17” (A/C compressor with part number 8K0 xxx xxx)
	◆ Audi A4 from 08/2011 through 03/2012 (with a specific engine, see notes)	110 +/- 10	110 +/- 10	• A/C compressor manufactured by “Denso” from type “6 SAS 14” with A/C clutch (A/C compressor with part number 8T0 xxx xxx)
	◆ All vehicles from 03/2012. Refer to the notes below.	110 +/- 10	110 +/- 10	• A/C compressor manufactured by “Denso” from type “6 SES 14” without A/C clutch or type “6 SAS 14” with A/C clutch (A/C compressor with part number 8T0 xxx xxx)

Note

- *Starting from the production date in 03/2012, 8-cylinder engines will no longer be available for the Audi A4 and Audi A5 (excluding the RS models).*
- *From 03/2012, the refrigerant circuit (A/C compressor, condenser, evaporator etc.) was gradually converted depending on the engine. This resulted in a different capacity of refrigerant (identified on the label for the refrigerant circuit) and refrigerant oil for these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *A/C compressors with an installed A/C Clutch - N26- are being gradually introduced for specific 4-cylinder TDI engines starting from August 2011. Refer to Parts Catalog.*
- *The changed components (A/C compressor, condenser) can only be differentiated by the part number on the outside (data plate on the A/C compressor, data plate or impression on the condenser). Refer to the Parts Catalog.*
- *For additional information* *⇒ page 358*

Audi Q5 Audi Q5 Hybrid

Note

Applies also to the Audi SQ5.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi Q5	From 09/2008 through 06/2012/08/2012 (gradual change, see notes)	150 +/- 10	150 +/- 10	• A/C compressor manufactured by “Denso” from type “6 SEU 14” (A/C compressor with part number 8K0 xxx xxx)
	From 08/2011 through 06-08/2012 (with a specific engine, running changes, see notes)	110 +/- 10	110 +/- 10	• A/C compressor manufactured by “Denso” from type “6 SAS 14” with A/C clutch (A/C compressor with part number 8T0 xxx xxx)

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
	From 06-08/2012 (running changes, see notes)	110 +/- 10	110 +/- 10	• A/C compressor manufactured by “Denso” from type “6 SES 14” without A/C clutch or type “6 SAS 14” with A/C clutch (A/C compressor with part number 8T0 xxx xxx)
Audi Q5 Hybrid	From 05/2011	200 +/- 20	200 +/- 20	• Electrically driven A/C compressor manufactured by “Denso”

Note

- *In the time period from June 2012 through August 2012, the refrigerant circuit (A/C compressor, condenser, evaporator etc.) was gradually introduced (depending on the engine and the vehicle model), for which a different capacity of refrigerant (identified on the label for the refrigerant circuit) and refrigerant oil was implemented for these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *For the Audi Q5 Hybrid there is no change in MY 2012 to the refrigerant circuit. Refer to other models.*
- *A/C compressors with an installed A/C Clutch - N26- are being gradually introduced for specific 4-cylinder TDI engines starting from August 2011. Refer to Parts Catalog.*
- *The changed components (A/C compressor, condenser) can only be differentiated by the part number on the outside (data plate on the A/C compressor, data plate or impression on the condenser). Refer to the Parts Catalog.*
- *An electrically driven A/C compressor manufactured by "Denso" (Electrical A/C Compressor - V470- with A/C Compressor Control Module - J842-) is installed at the start of production for the Audi Q5 Hybrid. There is no A/C Compressor Regulator Valve - N280- present in this A/C compressor.*
- *A/C compressors with a refrigerant oil quantity of 160 ccm were installed on Audi Q5 Hybrid vehicles at the start of production. Shortly after the start of production, the refrigerant oil quantity was increased to 200 ccm. Do not top off the refrigerant oil quantity on a vehicle in which an A/C compressor with a refrigerant oil capacity of 160 ccm is installed. If, for example, the refrigerant circuit is cleaned (flushed), a full quantity of 200 ccm of refrigerant oil is also to be added to the refrigerant circuit for this vehicle. The replacement A/C compressor already contains the correct amount of refrigerant oil. Refer to the Parts Catalog.*
- *For additional information* ⇒ page 358

Audi RS 4 and Audi RS 5

Note

Also applies to the Audi RS 5 Cabriolet.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi RS 4 and RS 5	♦ RS 4 from 04/2012 ♦ RS 5 from 03/2010	150 $^{+}$/$_{-}$ 10	150 $^{+}$/$_{-}$ 10	• "Denso" A/C compressor "7 SEU 17"

Note

- *The refrigerant circuit on the Audi RS 4 and RS5 will not be changed over in MY 2012. Refer to other versions.*
- *For additional information. Refer to ⇒ page 358*

Additional information

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .*
- *At the start of production, A/C compressors manufactured by "Denso" (type "6 SEU 14" on vehicles with a 4- and 6-cylinder engine and type "7 SEU 17" on vehicles with an 8-cylinder engine) were installed. These A/C compressors do not have an A/C clutch (they are driven continuously by the engine). In MY 2012, type "6 SEU 14" A/C compressors were gradually replaced by type "6 SES 14". Compressors from other manufacturers may also be installed at a later time, depending on the engine. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *An electrically driven A/C compressor with an integrated electronic control module is installed for Audi Q5 Hybrid.*
- *Running changes occurred for specific engines from MY 2012 (for example, for vehicles with a 4-cylinder TDI engine) and A/C compressor versions for which an additional A/C Clutch - N25- is installed on the belt pulley (type "6 SAS 14"). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *These A/C compressors are available as replacement parts with different oil fill capacities, therefore note the capacity on the A/C compressor and the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*
- *A/C compressors with A/C Clutch - N25- and part number 8T0 260 805 with the index "C" are installed at the start of production. For these A/C compressors, a refrigerant oil capacity of 80 ± 10 cm^3 is entered on the data plate. The refrigerant oil quantity was also raised for this A/C compressor to 110 ± 10 cm^3 shortly after the start of production.*

10.3.14 Capacities for Audi 100/Audi A6 (4A_) through MY 1998

Features of the refrigerant system:

- Restrictor
- Reservoir
- “Denso” or “Zexel/Valeo” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3
Audi 100/Audi A6	From 10/1992 to 03/1997	250 + 50	250 + 50

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ “9 Refrigerant Circuit Components, Replacing”, page 283* *.*
- *The Audi 100 and Audi A6 were equipped with different A/C compressors depending on engine and production period. Exclusive use was made at the start of production of “Zexel/Valeo” A/C compressors. From MY 1996, “Denso” A/C compressors were gradually introduced on vehicles with 6-cylinder engines. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit and the Parts Catalog.*
- *Beginning from production year 2006, the name of the “Zexel” A/C compressor was changed from “Zexel” to “Valeo”.*

10.3.15 Capacities for Audi A6 (4B_) from 1998 and Audi Allroad through MY 2005

Features of the refrigerant system:

- Restrictor
- Reservoir
- “Denso” or “Zexel/Valeo” A/C compressors with A/C Clutch - N25- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific Repair Manual) and to the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A6/Audi Allroad • 4-cylinder gasoline engine except 2.0L • 6-cylinder gasoline engine except 3.0L	From 04/1997 all	250 + 50	250 + 50	• See notes below

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A6/Audi Allroad • 4-cylinder diesel engine • 6-cylinder diesel engine (see notes for Audi Allroad)	From 04/1997 to 05/2001	250 + 50	250 + 50	• See notes below
Audi A6 • 8-cylinder engine (with chain-driven camshaft)	From 04/1997 all	250 + 50	250 + 50	• See notes below

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .*
- *The Audi A6 are equipped with different A/C compressors depending on engine and production period.*
- *From MY 2002, the Audi A6 features compressors with A/C clutch or regulator valve (different oil quantities) depending on the engine. For the Audi Allroad with 6 cylinder diesel engine, change over as you would a MY 2003 vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and Parts Catalog.*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

Features of the refrigerant system:

- Restrictor
- Reservoir
- "Denso" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
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Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A6 • 4-cylinder gasoline engine 2.0L • 6-cylinder gasoline engine 3.0L	All	220 + 20	220 + 20	Compressor type "6 SEU 12" or "7 SEU 16" (see notes below)

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A6/Audi Allroad • 4-cylinder diesel engine • 6-cylinder diesel engine (see notes for Audi Allroad)	From 05/2001	245 + 20	245 + 20	Compressor type “6 SEU 12” or “7 SEU 16” (see notes below)
Audi Allroad • 8-cylinder engine (with chain-driven camshaft)	All	220 + 20	220 + 20	A/C compressor type “7 SEU 17” (see notes below)

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ “9 Refrigerant Circuit Components, Replacing”, page 283* *.*
- *The Audi A6 are equipped with different A/C compressors depending on engine and production period.*
- *From MY 2002, the Audi A6 features compressors with A/C clutch or regulator valve (different oil quantities) depending on the engine. For the Audi Allroad with 6 cylinder diesel engine, the change occurred gradually in MY 2003.*
- *The replacement A/C compressor with an A/C Compressor Regulator Valve - N280- can have different oil capacities; pay close attention to the exact part number. Refer to ⇒ A/C System; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific Repair Manual) and to the Parts Catalog.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*

10.3.16 Capacities for Audi A6 (4F_) from MY 2005

Note

Also applies to the Audi S 6 and the Audi RS 6.

Features of the refrigerant system:

- Restrictor

- Reservoir
- “Denso” A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3
Audi A6/S 6	From 04/2004	130 +/- 10	130 +/- 10
Audi RS 6	From 05/2008	130 +/- 10	Depending on the version of the A/C compressor (see note below) ♦ 130 +/- 10

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted.*
- *The Audi A6 are equipped with different A/C compressors depending on engine and production period.*
- *This A/C compressor is available as replacement parts with different versions therefore note the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*
- *The compressor installed at the factory for a 10-cylinder TFSI engine (Audi R S6) has a smaller quantity of refrigerant oil (70 ± 10 cm^3) than the compressor for the 10-cylinder FSI engine (Audi S 6) and other engines (130 ± 10 cm^3) due to the different testing procedures for the engines (the compressors at present differ only in part number and quantity of refrigerant oil, see also the A/C compressor data plate). When adjusting the total oil quantity in the refrigerant circuit for a 10-cylinder TFSI engine (Audi RS 6) at the factory, the oil quantity that was reduced in the compressor (60 ± 10 cm^3), has to be filled somewhere else in the refrigerant circuit. This is not necessary during servicing, since the replacement A/C compressor is delivered with the original oil fill capacity (130 ± 10 cm^3) (it would only be necessary during servicing if a new A/C compressor with a lower oil capacity was being installed). Refer to the Parts Catalog.*

10.3.17 Capacities for Audi A6 (4G_ or 4X_ for China) from MY 2011, Audi A7 (4G_ or 4X_ for China) from MY 2011, and Audi A6 Hybrid (4G_) from MY 2012

Note

Also applies for the Audi S and Audi RS models.

Features of the refrigerant system:

- Expansion Valve
- Receiver/Dryer
- Refrigerant line with inner heat exchanger.
- Mechanically driven “Denso” A/C compressor, with A/C Compressor Regulator Valve - N280- (and depending on engine, also with a A/C Clutch - N25- from MY 2014). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog (all vehicles except on the Audi A6 Hybrid).
- For vehicles with a high voltage system (Audi A6 Hybrid) with electrically-driven “Denso” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A6	From 02/2011	120 +/- 10	120 +/- 10	• A/C compressor with oil separator manufactured by “Denso”
Audi A7	From 10/2010	120 +/- 10	120 +/- 10	• A/C compressor type (for example, “6 SEU 14” or “6 SBU 14”)
Audi A6/ A7	From 06/2014	110+20/- 10	110 +/- 10	• “Denso” A/C compressor (for example, type “6 SES 14” or “6 SAS 14”) with oil separator (with and without A/C Clutch - N25-)
Audi A6 Hybrid	From 11/2011	160 +/- 20	160 +/- 20	• Electrically driven A/C compressor manufactured by “Denso”

Note

- *The type designation 4X_ is used instead of the type designation 4G_ for specific versions in China*
- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to*
  ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .
- *At the start of production, the mechanically driven A/C compressors manufactured by "Denso" are installed on all vehicles except for the Audi A6 Hybrid, Compressors from other manufacturers may also be installed at a later time. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *An electrically driven A/C compressor manufactured by "Denso" (Electrical A/C Compressor - V470- with A/C Compressor Control Module - J842-) is installed at the start of production for the Audi A6 Hybrid. There is no A/C Compressor Regulator Valve - N280- present in this A/C compressor.*
- *A/C compressors with a refrigerant oil quantity of 200 ccm were installed at the start of production on Audi A6 Hybrid vehicles. Shortly after the start of production, the refrigerant oil quantity was reduced to 160 ccm. Do not reduce the refrigerant oil quantity on a vehicle in which an A/C compressor with a refrigerant oil capacity of 200 ccm is installed. If, for example, the refrigerant circuit is flushed, a total quantity of 160 ccm of refrigerant is also to be filled in the refrigerant circuit for this vehicle. The replacement A/C compressor already contains the correct amount of refrigerant oil. Refer to the Parts Catalog.*
- *As a running change, A/C compressors for certain engines and versions from MY 2014 have an additional A/C Clutch - N25- attached to the belt pulley (for example, type "6 SES 14" or "6 SAS 14"). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *As a running change, A/C compressors from MY 2015 have the refrigerant oil amount of 110 ccm in the A/C compressor (for example, type "6 SES 14" or "6 SAS 14"). Refer to ⇒ Heating and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog. On vehicles with these A/C compressors the refrigerant oil quantity in the refrigerant circuit is 110 ccm +20/-10 ccm (thus the specified refrigerant oil quantity remains valid from 120 ccm ± 10 ccm for customer service).*
- *As part of a Technical Service Bulletin (TSB), vehicles built through MY 2014 may be retrofitted with a type "6 SES 14" A/C compressor instead of the A/C compressor installed during production. A refrigerant oil capacity of 120 ccm also applies to these vehicles (if necessary, fill with 10 ccm refrigerant oil after flushing the refrigerant circuit and the installation of a new A/C compressor).*
- *This A/C compressor is available as replacement parts with different oil fill capacities, therefore note the capacity on the A/C compressor and the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*

- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*

10.3.18 Capacities for Audi V8 (4C_) through MY 1994

Features of the refrigerant system:

- Restrictor (not colored).
- Reservoir
- “Zexel/Valeo” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3
Audi V8	From 10/1992 to 10/1993	250 + 50	250 + 50

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ “9 Refrigerant Circuit Components, Replacing”, page 283* .
- *Beginning from production year 2006, the name of the “Zexel” A/C compressor was changed from “Zexel” to “Valeo”.*

10.3.19 Capacities for Audi A8 (4D_) from MY 1994

Features of the refrigerant system:

- Restrictor
- Reservoir
- “Denso” or “Zexel/Valeo” A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3
Audi A8	From 05/1994	250 + 50	250 + 50

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ "9 Refrigerant Circuit Components, Replacing", page 283* *.*
- *Exclusive use was made at the start of production of "Zexel/ Valeo" A/C compressors. As of model year 1996, production was gradually switched to "Denso" compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific Repair Manual) and to the Parts Catalog.*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

10.3.20 Capacities for Audi A8 (4E_) from MY 2003

Features of the refrigerant system:

- Restrictor
- Reservoir
- "Denso" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A8 • 8-cylinder gasoline engine with 3.7L or 4.2L (except FSI)	From 10/2002 all	200 +/- 10	200+/- 10	A/C compressor type "7 SEU 16" (see notes below)
• 6- and 12-cylinder gasoline engine • 6- and 8-cylinder diesel engine	From 10/2002 to 01/2004	200 +/- 10	200 +/- 10	A/C compressor type "6 SEU 14", "7 SEU 16" or "7 SEU 17" (see notes below)
• 6-, 10- and 12-cylinder gasoline engine • 6- and 8-cylinder diesel engine • 8-cylinder 4.2L gasoline engine (only FSI)	From of 01/2004	150 +/- 10	150+/- 10	Compressor type "6 SEU 14" or "7 SEU 17" (see notes below)

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ "9 Refrigerant Circuit Components, Replacing", page 283* *.*
- *The Audi A8 is equipped with different A/C compressors depending on engine and production period.*
- *This A/C compressor is available as replacement parts with different oil fill capacities, therefore note the exact part number. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.*
- *At the start of production, the compressor types in the first two lines of the table were supplied with a refrigerant oil quantity of 200 cm ^{3}. These compressors can be recognized from the index of the part number (4E0 260 805 with index "C", "D", "E", "F", "J", "L" or "S"). In MY 2004 (from approximately 01/2004), a gradual change was made to other types of compressor with a refrigerant oil quantity of 150 cm ^{3}. These compressors can be recognized from the index of the part number (4E0 260 805 with the index "G", "H", "T", "M", "N", "Q", or double index, for example, "AB"). Refer to the Parts Catalog.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*

10.3.21 Capacities for Audi A8 (4H_) from 2010 and Audi A8 Hybrid (4H_) from 2012

Features of the refrigerant system:

- Expansion Valve
- Depending on the vehicle equipment level with one or two evaporators
- Refrigerant line with inner heat exchanger.
- Dryer cartridge in receiver/dryer on condenser
- Mechanically driven "Denso" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog (all vehicles except A8 Hybrid).
- For vehicles with a high voltage system (Audi A8 Hybrid) with electrically-driven "Denso" A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Caution

Capacities may vary for the refrigerant and the refrigerant oil on vehicles with an 8-cylinder TDI engine.

- *Due to the installed location of the A/C compressor (above the engine), the refrigerant oil capacity may vary from what is on the A/C compressor data plate on vehicles with an 8-cylinder TDI engine.*

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A8 (all vehicles except for the 8-cylinder TDI engine)	From 03/2010			
♦ Vehicle with one evaporator		$130^{+}/_{-}$ 10	♦ $130^{+}/_{-}$ 10	• One evaporator
♦ Vehicle with two evaporators		$130^{+}/_{-}$ 10		• Two evaporators (see notes below)
Audi A8 (8-cylinder TDI engine only)				
♦ Vehicle with one evaporator		$180^{+}/_{-}$ 10	♦ $130^{+}/_{-}$ 10	• One evaporator
♦ Vehicle with two evaporators		$180^{+}/_{-}$ 10		• Two evaporators (see notes below)

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi A8 Hybrid	From 01/2012	$160^{+}/_{-}$ 20	$160^{+}/_{-}$ 20	• An evaporator in the A/C unit • Electrically-driven A/C compressor • 2. Evaporator in the battery cooling module

Note

- *A specified quantity of refrigerant oil can be found in the replacement compressor (currently 130 ± 10 cm^3, depending on the A/C compressor, see data plate). This refrigerant oil quantity currently includes vehicles with one and two evaporators for this refrigerant circuit with a specified oil capacity, with the exception of vehicles with an 8 cylinder TDI engine (for vehicles with an 8 cylinder TDI engine, see below). Vehicles with two evaporators have the same oil capacity as vehicles having just one evaporator. Due to the longer refrigerant lines and the second evaporator, this vehicle does not require more refrigerant inside the refrigerant circuit. The refrigerant circuit in this vehicle is designed so that a smaller portion of the refrigerant oil gets into the refrigerant lines leading to the second evaporator when the A/C is being used. If the compressor is replaced after cleaning the refrigerant circuit, this refrigerant oil quantity must therefore be added to the refrigerant circuit in vehicles with two evaporators (due to the second evaporator). If compressor is replaced without having to clean the refrigerant circuit, the refrigerant oil quantity in the new compressor to be installed must be adjusted to the oil quantity poured out of the old compressor. Refer to*
  ⇒ *"9 Refrigerant Circuit Components, Replacing", page 283* .
- *On vehicles with an 8-cylinder TDI engine, the refrigerant oil quantity was increased from 130 ccm to 180 ccm in the refrigerant circuit from the vehicle identification number 4H_ BN 018846. To compensate, the refrigerant quantity must be slightly reduced. Since the filling capacity information on the information label does not change, proceed as follows: On vehicles that were built up to the specified vehicle identification number, check whether the refrigerant oil capacity was already topped up during a previous workshop visit. If not, fill the refrigerant circuit with an additional 50 ccm of refrigerant oil. Then amend the fill capacity for the refrigerant in the information label with a waterproof marker accordingly and fill the refrigerant circuit with the stated refrigerant quantity. Finally, document the performed changes in the vehicle data. For vehicles built from the specified vehicle identification number, check the refrigerant capacity specification on the information label and if necessary, amend the quantities with a waterproof marker accordingly and then fill the refrigerant circuit with the specified refrigerant quantity.*
- *The same refrigerant oil quantity was added during production for other engines as for vehicles with an 8-cylinder TDI engine up to the vehicle identification number 4H_ BN 018845. Vehicles with an 8-cylinder TDI engine starting from the VIN 4H_ 018846 are filled with a larger amount of refrigerant oil during production. This refrigerant oil quantity applies retroactively to all vehicles with an 8-cylinder TDI engine. If the refrigerant circuit is refilled or the A/C compressor is replaced after cleaning the refrigerant circuit, for example, on vehicles with an 8 cylinder TDI engine, check the refrigerant oil quantity in the refrigerant circuit (for example, in open lines or component connections, or via the A/C service station before filling with refrigerant) and refill it with the correct quantity if necessary. If the A/C compressor is replaced without needing to clean the refrigerant circuit, adjust the refrigerant oil quantity in the newly installed A/C compressor so that it corresponds with the quantity of oil that was poured out of the old A/C compressor (and if necessary fill for corresponding vehicles through the specified VIN above). Refer to*
  ⇒ *"9 Refrigerant Circuit Components, Replacing", page 283* .

- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *These A/C compressors are available as replacement parts with different oil fill capacities, therefore pay attention to the exact part number. Refer to the Parts Catalog.*
- *Too much oil in the circuit leads to higher pressures and reduces cooling performance of the A/C system. Too little oil may lead to lubrication problems in the compressor, therefore note the specified refrigerant oil quantities.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*
- *For all vehicles except for the Audi A8 Hybrid, the mechanically driven A/C compressors manufactured by "Denso" are installed at the start of production. Compressors from other manufacturers may also be installed at a later time. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual).*
- *An electrically driven A/C compressor manufactured by "Denso" (Electrical A/C Compressor - V470- with A/C Compressor Control Module - J842-) is installed at the start of production for the Audi A8 Hybrid. There is no A/C Compressor Regulator Valve - N280- present in this A/C compressor.*
- *A/C compressors with a refrigerant oil quantity of 200 ccm were installed at the start of production on Audi A8 Hybrid vehicles. Shortly after the start of production, the refrigerant oil quantity was reduced to 160 ccm. Do not reduce the refrigerant oil quantity on a vehicle in which an A/C compressor with a refrigerant oil capacity of 200 ccm is installed. If, for example, the refrigerant circuit is flushed, a total quantity of 160 ccm of refrigerant is also to be filled in the refrigerant circuit for this vehicle. The replacement A/C compressor already contains the correct amount of refrigerant oil. Refer to the Parts Catalog.*

10.3.22 Capacities for Audi Q7 (4L_) from MY 2006

Features of the refrigerant system:

- Expansion Valve
- Depending on the vehicle equipment level with one or two evaporators
- Dryer cartridge in receiver/dryer on condenser
- "Denso" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi Q7	From 02/2006			
◆ Vehicle with one evaporator		140, 150 or 160 $^{+}$/$_{-}$ 10 (depending on the installed A/C compressor)	◆ 140 $^{+}$/$_{-}$ 10 (A/C compressor for a vehicle with a 6-cylinder TDI engine or with a 12-cylinder engine) ◆ 150 $^{+}$/$_{-}$ 10 (A/C compressor for a vehicle with an 8-cylinder engine or with a 6-cylinder 3.2L FSI engine) ◆ 160 $^{+}$/$_{-}$ 10 (A/C compressor for a vehicle with a 6-cylinder 3.6L FSI engine)	• One evaporator • Compressor type “6 SEU 14” or “7 SEU 16” (see notes below)
◆ Vehicle with two evaporators		240, 250 or 260 $^{+}$/$_{-}$ 10 (depending on installed A/C compressor, refrigerant oil quantity in A/C compressor plus 100)		• Two evaporators (see notes below)

Note

- *The replacement compressor is already filled with a specific refrigerant oil quantity (currently 140, 150 or 160 ± 10 cm^3, depending on the A/C compressor), this refrigerant oil quantity corresponds to the oil quantity designated for this refrigerant circuit on vehicles with one evaporator. On vehicles with two evaporators, a greater refrigerant oil quantity is required in the refrigerant circuit (currently an additional 100 cm^3) because of the longer refrigerant lines and the second evaporator. If the compressor is replaced after cleaning the refrigerant circuit, this refrigerant oil quantity must therefore be added to the refrigerant circuit (for example, into opened lines or component connections) in vehicles with two evaporators. If compressor is replaced without having to clean the refrigerant circuit, the refrigerant oil quantity in the new compressor to be installed must be adjusted to the oil quantity poured out of the old compressor. Refer to*
  ⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .
- *These A/C compressors are available as replacement parts with different oil fill capacities, therefore pay attention to the exact part number. Refer to the Parts Catalog.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the circuit leads to higher pressures and reduces cooling performance of the system. Too little oil may lead to lubrication problems in the compressor.*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity.*

10.3.23 Capacities for Audi Q7 (4M_) from MY 2016

The refrigerant oil capacities can be found in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities .

10.3.24 Capacities for Audi R8 (42_) from MY 2008

Features of the refrigerant system:

- Restrictor
- Reservoir
- Two condensers switched in sequence
- "Denso" A/C compressor with A/C Compressor Regulator Valve - N280- . Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; System Overview - Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Vehicle model	Production period	Total quantity of oil in refrigerant circuit in cm^3	Quantity of refrigerant oil in replacement compressor in cm^3	Differing features of this refrigerant circuit
Audi R8	From 03/2007 to 11/2012	200 +/- 10 ♦ From 11/2012, the oil fill capacity was retroactively increased from 150 to 200 cm^3 for these vehicles.	200+/- 10 ♦ Depending on the part number, the replacement A/C compressor may only be filled to 150 cm^3, if necessary add an additional 50 cm^3 (see notes below).	A/C compressor “7 SEU 17”
	From 11/2012	200 +/- 10	200 +/- 10	

Note

- *The replacement compressor contains the full quantity of oil intended for the refrigerant circuit. On A/C compressor replacement, the quantity of oil in the A/C compressor is therefore to be adjusted. Refer to* *⇒ "9 Refrigerant Circuit Components, Replacing", page 283 .*
- *These A/C compressors are available as replacement parts with different oil fill capacities, therefore pay attention to the exact part number. Refer to the Parts Catalog.*
- *From the vehicle identification number 429 DN 000751 (time period of production from 11/2013) the refrigerant quantity for the refrigerant circuit was raised from 650 g to 680 g and the refrigerant oil quantity was raised from 150 ccm to 200 ccm. The increased refrigerant and refrigerant oil capacity applies retroactively to all vehicles. On vehicles that were built up to the specified vehicle identification number, check whether the refrigerant oil capacity was already topped up during a previous workshop visit. If not, fill the refrigerant circuit with an additional 50 ccm of refrigerant oil. Finally, check the refrigerant capacity information on the information label and if necessary, attach a new information label with the correct capacity and language (for example, the identification label with the part number 420 010 535 and the index BA with the labeling in German and English). Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual). If there is no information label available with the correct capacity and language, amend the capacity information on the existing information label accordingly using a waterproof marker. Finally, increase the refrigerant oil quantity in the refrigerant circuit by 50 ccm if necessary and fill the refrigerant circuit with the above-specified refrigerant amount. Refer to .*
- *A data plate may be attached to the A/C compressor by the manufacturer, indicating the part number and refrigerant oil quantity (however, this data plate is not visible on an installed A/C compressor on the Audi R8). Therefore note in the vehicle records (and on the information label with the refrigerant quantity) for vehicles that were installed with an A/C compressor with the smaller refrigerant quantity during production (vehicles up to the above-mentioned VIN), that the refrigerant oil quantity was already increased by 50 ccm during a workshop visit.*
- *The reason for the different oil capacities inside the A/C compressor is due to the design of the A/C compressor (with or with an oil separator on the high pressure connection) or to the design of the refrigerant circuit if the A/C compressors are have the identical design. Pay attention to the different capacities. Too much oil in the refrigerant circuit leads to higher pressures and reduces cooling performance of the A/C system. Too little oil may lead to lubrication problems in the compressor, therefore note the specified refrigerant oil quantities.*

11 Tools and Equipment

11.1 Testing Equipment, Tools and Materials

11.1.1 General Information

Note

This list outlines the testers, tools and materials required for expert refrigerant circuit repair work.

- For tools and materials available from the distribution center or importer. Refer to ⇒ “11.1.2 Tools and Materials Available from Distribution Center or Importer”, page 376 .
- For commercially available tools and materials. Refer to ⇒ “11.1.3 Commercially Available Tools and Materials”, page 378 .
- For improvised tools. Refer to ⇒ “11.1.4 Improvised Tools”, page 378 .

11.1.2 Tools and Materials Available from Distribution Center or Importer

Overview	Page
A/C Service Station with Flushing Device , currently available A/C service stations. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating). – With program installed for flushing the refrigerant circuit using refrigerant R134a, and corresponding flushing equipment	Refer to the illustration and the Parts Catalog
Refrigerant Circuit Flushing Device , currently available A/C service stations. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating). – For flushing the refrigerant circuit using refrigerant R134a, also to be used for older service stations with a reservoir capacity of at least 10 kg refrigerant R134a (flushing must be performed manually).	Refer to the Parts Catalog
Refrigerant Circuits Adapter Set 1 - VAS6338/1- . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating). – For connecting service station to refrigerant circuit and for bridging certain removed components while flushing	Refer to the Parts Catalog

Overview	Page
Adapter Refrigerant Circuits Adapter Set 1 - Adapter 40 - VAS6338/40- and Refrigerant Circuits Adapter Set 1 - Adapter 41 - VAS6338/41- . Refer to Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating). – For vehicles with a high voltage system, to flush the electric A/C compressor. Refrigerant Circuits Adapter Set 1 - Adapter 42 - VAS6338/42- . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating). – For vehicles with a high voltage system, to bridge certain removed components when flushing the refrigerant circuit	Refer to the Parts Catalog
Shut-Off Valves - VAS6338/42- . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating). – For specified vehicles with high-voltage system (for example the Audi Q7 e-tron) to bridge the removed check valves when flushing the refrigerant circuit.	Refer to the Parts Catalog.
Leak detection unit, currently available leak detection units. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).	Refer to the illustration and the Parts Catalog
A/C Clutch Set - VAG1719- (Zexel/Valeo A/C Compressors). Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).	Refer to the illustration and the Parts Catalog
A/C Adapter Set - VAG1785- . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating). – For connecting service station to refrigerant circuit and for bridging certain removed components while flushing and blowing through	Refer to the illustration and the Parts Catalog
A/C Adapter Set valve adapter VAG1785/9 and VAG1785/10. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).	Refer to the illustration and the Parts Catalog
A/C Adapter Set VAG1786 with service connection. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).	Refer to the illustration and the Parts Catalog.
O-rings. Refer to the Parts Catalog.	Refer to the illustration and the Parts Catalog
Refrigerant oil. Refer to the Parts Catalog.	Refer to the illustration and the Parts Catalog
Leak Detection Kit - VAS6201A- comprising. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating). ♦ Leak Detection Kit - Hand Pump w/Cartridge - VAS6201/1- ♦ Leak Detection Kit - Cartridge - VAS6201/2- ♦ Leak Detection Kit - Cleaning Solution - VAS6201/3- ♦ UV Leak Detection Lamp - VAS6201/4A- ♦ Leak Detection Kit - Replacement Bulb - VAS6201/5- ♦ Leak Detection Kit - Eye Protection - VAS6201/6- ♦ Leak Detection Kit - Label - VAS6201/7- ♦ Leak Detection Kit - Protective Gloves - VAS6201A- ♦ Leak Detection Kit - Filler Tube - VAS6201/8- ♦ Leak Detection Kit - System Case - VAS6201A-	Refer to the illustration and the Parts Catalog
Adapter set for Service connections. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).	Refer to the illustration and the Parts Catalog
Air Conditioner Couplings Release Tool - T40149- Parts Catalog (Tools; Special Tools)	Refer to the Parts Catalog
Retaining Ring - T40232- for the refrigerant lines quick-release coupling. Refer to the Parts Catalog (Tools; Special Tools).	Refer to the Parts Catalog

11.1.3 Commercially Available Tools and Materials

Overview	Page
Fin comb	see illustration
Charging hoses 5/8" - 18 UNF with valve opener	see illustration
Connection piece for refrigerant cylinder and seal with quick-release coupling connection or threaded connection 5/8" - 18 UNF	see illustration
Valve caps 5/8"-18 UNF	see illustration
Pressure gauge set with pressure reducer for nitrogen	see illustration
Quick-release coupling adapter for service connections, 2x included in scope of delivery of service station	see illustration
The wrench size depends on the threaded connections on the refrigerant lines.	Not illustrated
Valve opener for charging hoses	Not illustrated
Connecting nipple for conical seal 5/8"-18 UNF	Not illustrated
Compressed-air gun with rubber end piece	Not illustrated
Combined fine filter unit for compressed-air system (oil, dirt and water separator as used for painting facilities).	Not illustrated
Valve opener for Schrader valve	Not illustrated
Hand shut-off valve 5/8"-18 UNF	Not illustrated
Recycling container for refrigerant R134a	Not illustrated
Digital thermometer	Not illustrated
Protective gloves not illustrated	Not illustrated
Protective glasses	Not illustrated
Refrigerant R134a with cylinder (capacity as required)	Not illustrated

11.1.4 Improvised Tools

Overview	Page
Charging hose with connection for workshop compressed-air system	Not illustrated

11.2 Tools and Materials Available from Distribution Center or Importer

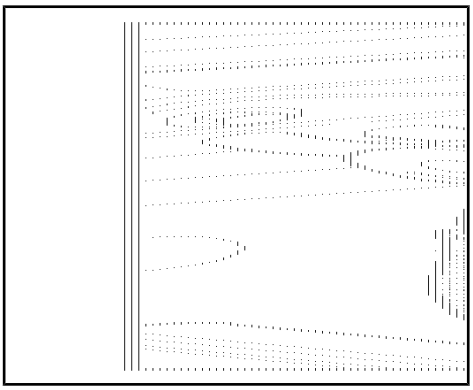
Service Station/A/C Service Station (this Illustration Shows), Currently Available A/C service stations. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).

- Work procedures: The operations "testing, extraction (recycling), evacuation and charging" are to be performed in line with the relevant operating instructions.
- The filters and dryers installed are to be replaced at the latest at the end of the period of use specified in the operating instructions and whenever the station has been drained (keep replacement filter to hand. Available from equipment manufacturer. Refer to A/C service station operating instructions.
- Use can also be made of service stations not described here. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- Currently available A/C service stations are equipped with a program for flushing the refrigerant circuit; the flushing equipment required for flushing is also included in delivery of these A/C Service Stations. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).

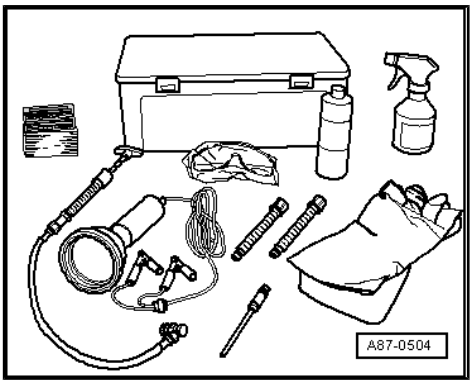
Note

- *This A/C service station has the following known units: charging cylinder, pressure gauge set, vacuum pump, shutoff valves and charging hoses.*
- *One quick-release coupling each (for service connections on high and low-pressure side) is included in the scope of delivery of this service station.*
- *Current vacuum display (LED) appears after pressing the "Evacuate" button again.*

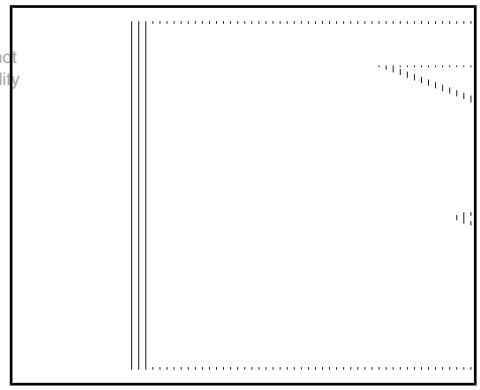
Leak Detection Unit, Currently Available Leak Detection Units. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).



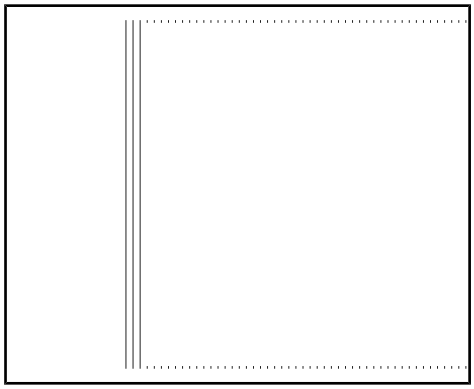
Leak Detection System (for example Leak Detection Kit - VAS6201A- , Currently Available Leak Detection Systems. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).



Puller for A/C Clutch Set - VAG1719- (for "Zexel" A/C compressor)



A/C Adapter Set - VAG1785-

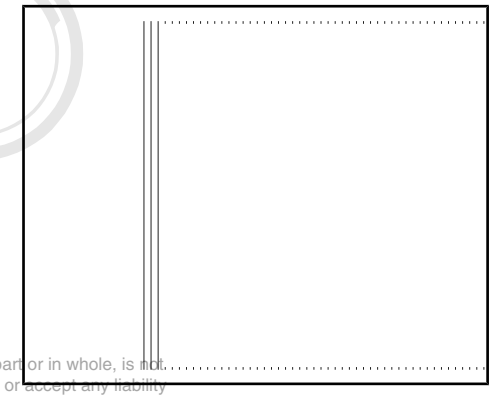


Adapter for cleaning refrigerant circuit (flush with refrigerant R134a. Refer to ⇒ “5.5 Refrigerant Circuit, Cleaning (Flushing) with Refrigerant R134a”, page 93 ; or blow through with compressed air and nitrogen. Refer to ⇒ “5.4 Refrigerant Circuit, Flushing with Compressed Air and Nitrogen”, page 89 .)

A - 5/8"-18 UNF thread for conical seal

B - Union nut (for connection with O-ring) with thread

- A/C Adapter Set - M18 x 1.5 - VAG1785/1-
- A/C Adapter Set - M20 x 1.5 - VAG1785/2-
- A/C Adapter Set - M24 x 1.5 - VAG1785/3-
- A/C Adapter Set - M28 x 1.5 - VAG1785/4-

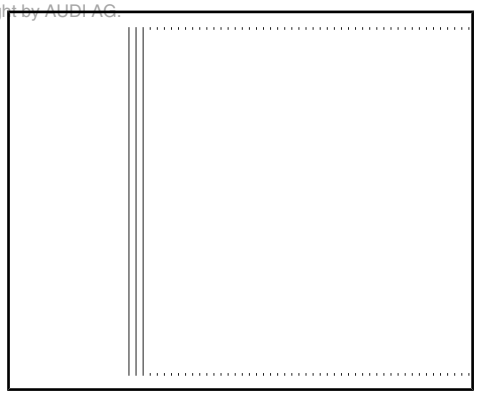


Adapter

A - 5/8"-18 UNF thread for conical seal

B - Threaded connection for O-ring

- A/C Adapter Set - M18 x 1.5 - VAG1785/5-
- A/C Adapter Set - M20 x 1.5 - VAG1785/6-
- A/C Adapter Set - M24 x 1.5 - VAG1785/7-
- A/C Adapter Set - M28 x 1.5 - VAG1785/8-



Valve adapter

A - 5/8"-18 UNF thread for conical seal

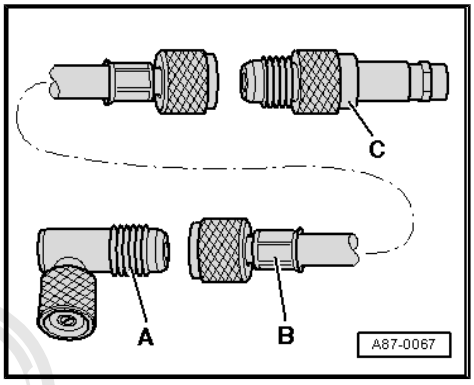
B - Internal thread with valve opener

- M10 x 1.25 VAG1785/9 (for connections with valve on high-pressure side)
- M10 x 1.5 VAG1785/10 (for connections with valve on high-pressure side)

Note

- *A Schrader valve is screwed into connection -A-.*
- *A valve opener must be installed in the charging hose connection.*
- *Various adapters from adapter set are also part of the Refrigerant Circuits Adapter Set 1 - VAS6338/1- .*

A/C Adapter Set - VAG1786-



A - A/C Adapter Set - Adapter 1 - VAG1786/1- (only for connections with small valve insert on low-pressure side)

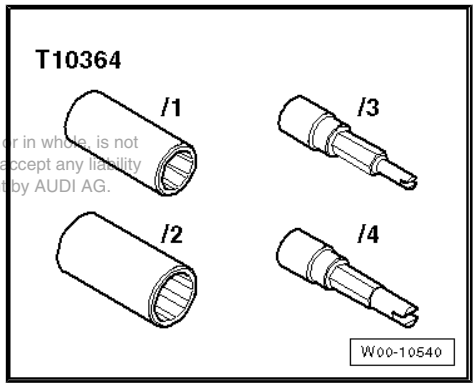
B - Charging hose with union nut 5/8"-18 UNF (short version)

C - A/C Adapter Set - Adapter 2 - VAG1786/2- .

Note

- *For connections with large valve insert (standard on "Zexel/ Valeo" compressors, gradual change to small valve insert from 10/1994), use is to be made of adapter VAG1785/10 (remove valve from adapter VAG1785/10 or install valve opener in charging hose -B-).*
- *Beginning from production year 2006, the name of the "Zexel" A/C compressor was changed from "Zexel" to "Valeo".*

Refrigerant Sockets - T10364-

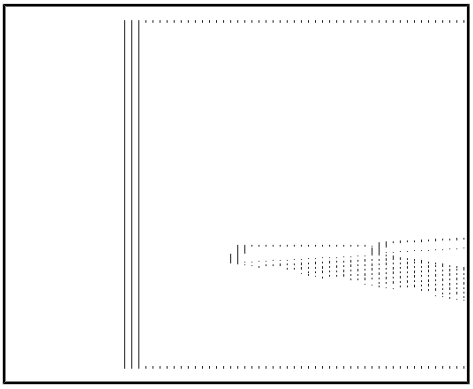


Note

For removing and installing service connections and valve units when the refrigerant circuit is empty.

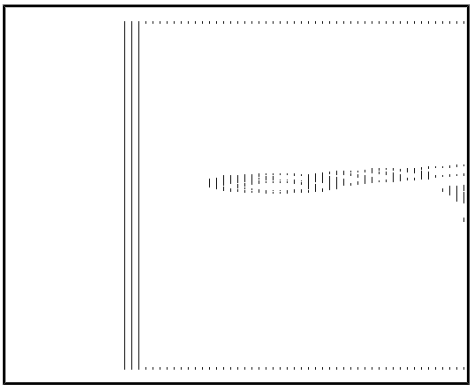
11.3 Commercially Available Tools and Materials

Fin Comb



Fill Hoses

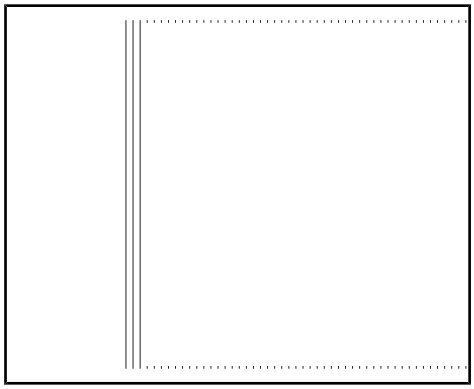
5/8"-18 UNF thread



Note

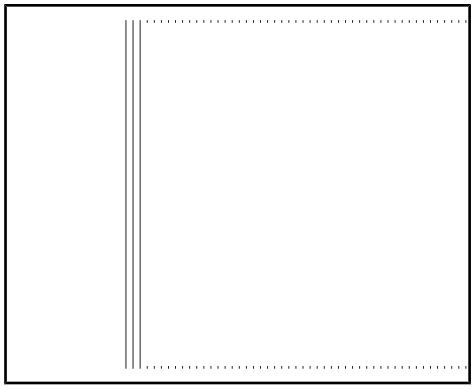
- *Use differently colored charging hoses (1800 mm long).*
- *Have valve opener and spare seals to hand.*
- *A charging hose in short version is also included in Refrigerant Circuits Adapter Set 1 - VAS6338/1- .*

Connection Piece for Refrigerant Cylinder with Seal, Quick-Release Coupling Connection or Threaded Connection 5/8" - 18 UNF



Valve Caps with Spare Seals (for 5/8"-18 UNF thread)

Seals can also be used for charging hoses.



Note

Valve caps with spare seals are also included in Refrigerant Circuits Adapter Set 1 - VAS6338/1- .

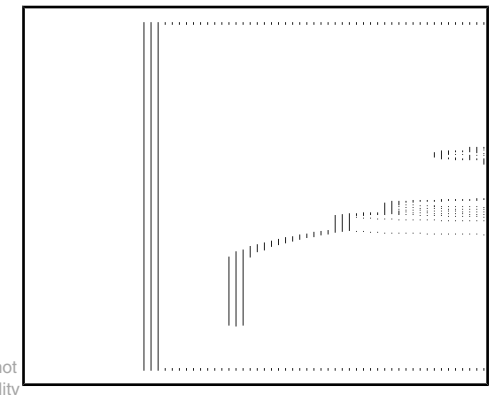
Pressure Gauge Set with Pressure Reducer for Nitrogen (Max. Reducing Pressure: 15 bar (218 psi))

1 - Pressure gauge set

2 - Pressure hose (inner diameter 5 mm, length 2 m)

3 - Nitrogen

4 - Hose fitting

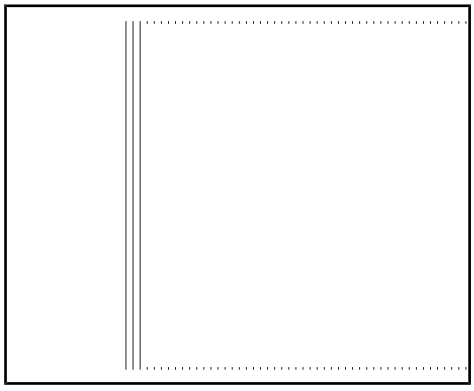


Note

For connection to A/C Adapter Set - VAG1785- with 5/8" -18 UNF thread

Quick-Release Coupling Adapter for Service Connections

- High-pressure side, nominal size 16 mm
- Low-pressure side, nominal size 13 mm
- 2x release tool (Sharan)



Note

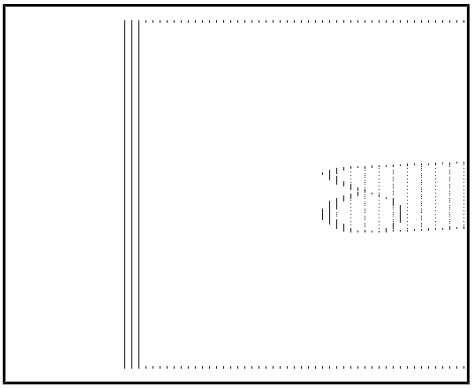
This quick-release coupling is delivered with the service station.

11.4 Improvised Tools

Charging Hose with Connection for Workshop Compressed-Air System

A - Charging hose 5/8" - 18 UNF** (version with large inner diameter)

B - Connection for workshop compressed-air system ** (always use filter)



12 Revision History

DRUCK NUMBER: A0053300221

Factory Edition	Edit Edition	Job Type	Feedback	Notes	Quality Checked By
03.2020	04/22/2020	Factory Update	N/A	Added 8Y content.	Eric P.
05.2019	09/25/2019	Factory Update	N/A		Eric P.
02.2019	04/10/2019	Factory Update	N/A		Eric P.
11.2018	01/22/2019	Factory Update	N/A		Eric P.
07.2018	11/28/2018	Correction	N/A	Fixed Refrigerant R134a Capacities - No data available	Eric P.
07.2018	08/31/2018	Factory Update	N/A		Juan S.
04.2018	06/28/2018	Correction	1346116		Joe Y
04.2018	06/20/2018	Factory Update	1346116		Joe Y
01.2018	01/09/2018	Factory Update	N/A		Joe Y
08.2017	10/13/2017	Local Feedback	1288999, 1289000, 1289001	Corrected links to capacities	Tom Perry
08.2017	09/05/2017	Factory Update	N/A		Eric P.
10.2016	11/18/2016	Correction	N/A	metadata correction; remove ServiceNet reference; metric conversions; refer to; tool numbers; spell check	Tom Perry

Factory Edition	Edit Edition	Job Type	Feedback	Notes	Quality Checked By
10.2016	11/15/2016	Factory Update	N/A		Joe Y
04.2016	5/26/2016	Factory Update	N/A		Jim H
12.2015	03/07/2016	Local Feedback	1157254	Remove links to fluid capacity and replace with reference to fluid capacity table.	Tom Perry
12.2015	01/12/2016	Factory Update	N/A		Tom Perry
08.2015	10/14/2015	Factory Update	N/A		Jim H
04.2015	06/19/2015	Correction	N/A	Adapter for Assembling Flushing Circuit - Audi A3 (8P_) from MY 2004 Audi TT (8J_) from MY 2007 Audi Q3 (8U_/84_) from MY 2012 - Corrected to match German version of Adapter 18 -VAS6338/18-	Tom Perry
04.2015	05/18/2015	Factory Update	N/A		Joe Y
	11/13/2014	Factory Update	N/A		Tom Perry
	9/10/2014	Local Feedback	1032103		Eric P
	8/15/201	Factory New (CO)	N/A		Jim H
	05/23/2014	Correction	N/A	Fixed obergroup title to read as Heating, Ventilation & Air Conditioning	Tom Perry
	5/14/2014	Factory New (CO)	N/A		Joe Y

Cautions & Warnings

Please read these WARNINGS and CAUTIONS before proceeding with maintenance and repair work. You must answer that you have read and you understand these WARNINGS and CAUTIONS before you will be allowed to view this information.

- If you lack the skills, tools and equipment, or a suitable workshop for any procedure described in this manual, we suggest you leave such repairs to an authorized Audi retailer or other qualified shop. We especially urge you to consult an authorized Audi retailer before beginning repairs on any vehicle that may still be covered wholly or in part by any of the extensive warranties issued by Audi.

- Disconnect the battery negative terminal (ground strap) whenever you work on the fuel system or the electrical system. Do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.

- Audi is constantly improving its vehicles and sometimes these changes, both in parts and specifications, are made applicable to earlier models. Therefore, part numbers listed in this manual are for reference only. Always check with your authorized Audi retailer parts department for the latest information.

- Any time the battery has been disconnected on an automatic transmission vehicle, it will be necessary to reestablish Transmission Control Module (TCM) basic settings using the Audi Factory Approved Scan Tool (ST).

- Never work under a lifted vehicle unless it is solidly supported on stands designed for the purpose. Do not support a vehicle on cinder blocks, hollow tiles or other props that may crumble under continuous load. Never work under a vehicle that is supported solely by a jack. Never work under the vehicle while the engine is running.

- For vehicles equipped with an anti-theft radio, be sure of the correct radio activation code before disconnecting the battery or removing the radio. If the wrong code is entered when the power is restored, the radio may lock up and become inoperable, even if the correct code is used in a later attempt.

- If you are going to work under a vehicle on the ground, make sure that the ground is level. Block the wheels to keep the vehicle from rolling. Disconnect the battery negative terminal (ground strap) to prevent others from starting the vehicle while you are under it.

- Do not attempt to work on your vehicle if you do not feel well. You increase the danger of injury to yourself and others if you are tired, upset or have taken medicine or any other substances that may impair you or keep you from being fully alert.

- Never run the engine unless the work area is well ventilated. Carbon monoxide (CO) kills.

- Always observe good workshop practices. Wear goggles when you operate machine tools or work with acid. Wear goggles, gloves and other protective clothing whenever the job requires working with harmful substances.

- Tie long hair behind your head. Do not wear a necktie, a scarf, loose clothing, or a necklace when you work near machine tools or running engines. If your hair, clothing, or jewelry were to get caught in the machinery, severe injury could result.

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Version 2.0

Cautions & Warnings

- Do not re-use any fasteners that are worn or deformed in normal use. Some fasteners are designed to be used only once and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual - replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.

- Illuminate the work area adequately but safely. Use a portable safety light for working inside or under the vehicle. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

- Friction materials such as brake pads and clutch discs may contain asbestos fibers. Do not create dust by grinding, sanding, or by cleaning with compressed air. Avoid breathing asbestos fibers and asbestos dust. Breathing asbestos can cause serious diseases such as asbestosis or cancer, and may result in death.

- Finger rings should be removed so that they cannot cause electrical shorts, get caught in running machinery, or be crushed by heavy parts.

- Before starting a job, make certain that you have all the necessary tools and parts on hand. Read all the instructions thoroughly, do not attempt shortcuts. Use tools that are appropriate to the work and use only replacement parts meeting Audi specifications. Makeshift tools, parts and procedures will not make good repairs.

- Catch draining fuel, oil or brake fluid in suitable containers. Do not use empty food or beverage containers that might mislead someone into drinking from them. Store flammable fluids away from fire hazards. Wipe up spills at once, but do not store the oily rags, which can ignite and burn spontaneously.

- Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use these tools to tighten fasteners, especially on light alloy parts. Always use a torque wrench to tighten fasteners to the tightening torque listed.

- Keep sparks, lighted matches, and open flame away from the top of the battery. If escaping hydrogen gas is ignited, it will ignite gas trapped in the cells and cause the battery to explode.

- Be mindful of the environment and ecology. Before you drain the crankcase, find out the proper way to dispose of the oil. Do not pour oil onto the ground, down a drain, or into a stream, pond, or lake. Consult local ordinances that govern the disposal of wastes.

- The air-conditioning (A/C) system is filled with a chemical refrigerant that is hazardous. The A/C system should be serviced only by trained automotive service technicians using approved refrigerant recovery/recycling equipment, trained in related safety precautions, and familiar with regulations governing the discharging and disposal of automotive chemical refrigerants.

- Before doing any electrical welding on vehicles equipped with anti-lock brakes (ABS), disconnect the battery negative terminal (ground strap) and the ABS control module connector.

- Do not expose any part of the A/C system to high temperatures such as open flame. Excessive heat will increase system pressure and may cause the system to burst.

back next

Cautions & Warnings

- When boost-charging the battery, first remove the fuses for the Engine Control Module (ECM), the Transmission Control Module (TCM), the ABS control module, and the trip computer. In cases where one or more of these components is not separately fused, disconnect the control module connector(s).

- Some of the vehicles covered by this manual are equipped with a supplemental restraint system (SRS), that automatically deploys an airbag in the event of a frontal impact. The airbag is operated by an explosive device. Handled improperly or without adequate safeguards, it can be accidentally activated and cause serious personal injury. To guard against personal injury or airbag system failure, only trained Audi Service technicians should test, disassemble or service the airbag system.

- Do not quick-charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.

- Never use a test light to conduct electrical tests of the airbag system. The system must only be tested by trained Audi Service technicians using the Audi Factory Approved Scan Tool (ST) or an approved equivalent. The airbag unit must never be electrically tested while it is not installed in the vehicle.

- Some aerosol tire inflators are highly flammable. Be extremely cautious when repairing a tire that may have been inflated using an aerosol tire inflator. Keep sparks, open flame or other sources of ignition away from the tire repair area. Inflate and deflate the tire at least four times before breaking the bead from the rim. Completely remove the tire from the rim before attempting any repair.

- When driving or riding in an airbag-equipped vehicle, never hold test equipment in your hands or lap while the vehicle is in motion. Objects between you and the airbag can increase the risk of injury in an accident.

I have read and I understand these Cautions and Warnings.

back OK

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