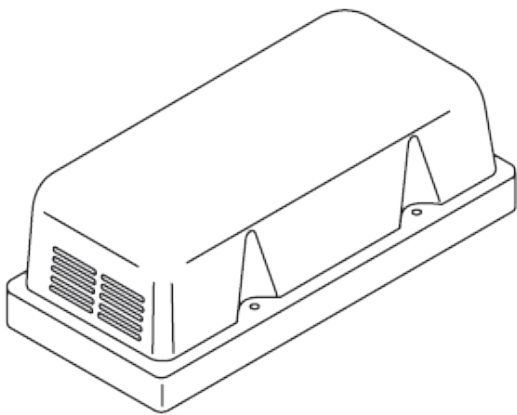


Installation Instructions

CC5 E-Unit

Air Conditioning



English

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1 Introduction

1.1 Contents and purpose

This installation and service manual contains information on the installation, operation and repair of the E-unit CC5. It is intended to assist trained personnel and only applies in conjunction with 24 volt versions of the CC5.

1.2 Meaning of signal words

1.2.1 Use of symbols and highlighting

	DANGER This signal word denotes a hazard with a high degree of risk which, if not avoided, may lead to death or serious injury.
	WARNING This signal word denotes a hazard with a moderate degree of risk which, if not avoided, may lead to minor or moderate injury.
	CAUTION This signal word denotes a hazard with a low degree of risk which, if not avoided, will lead to minor or moderate injury.
	NOTE This signal word denotes a Special Technical Feature or (if not observed) potential damage to the product.

- ✓ Requirements for the following necessary action
- ▶ Necessary action

1.3 Additional documents to be used

1. Operating instructions for the CC5 roof-top air-conditioning system
2. Installation and service manual for the CC5 roof-top air-conditioning system (645 22C)

1.4 Safety instructions and regulations

The E-unit CC5 has been designed and is produced in accordance with EC directives.

The system is safe to operate provided it is properly installed and used in accordance with the instructions contained in this installation and service manual.

If the vehicle height stated in the vehicle registration document is exceeded due to the installation of the roof-top air-conditioning system, it must be legalised through a type approval in accordance with the relevant motor vehicle construction and use regulations.

In principle, the following general accident prevention regulations and current works safety instructions are applicable:

- Safety regulations concerning the construction and operation of earth-moving machinery of the German employers' liability insurance association for civil.
- DIN ISO 3471 Roll-over protective structures.
- DIN ISO 3449 Falling object protective structures.
- DIN ISO 3411 Human physical dimensions of operators, minimum operator space envelope.
- Guidelines, safety regulations, rules, principles and leaflets of technical committees at the Deutsche Gesetzliche Unfallversicherung (DGUV).

The "General safety regulations" that go beyond the scope of the above regulations are stated below.

Any special safety regulations relevant to the present instruction manual will be highlighted in the relevant sections or text passages of the procedures.

General safety regulations

Non-compliance with the installation instructions and the warnings contained therein will lead to the exclusion of all liability by Webasto. The same applies to improperly performed repairs or repairs where parts other than genuine spare parts are used.

The electrical cables and controls for the CC5 air-conditioning system and the E-unit must be arranged in the vehicle so that their proper functioning cannot be adversely affected in normal operating conditions.


Safety instructions for maintenance work

If malfunctions occur in the refrigerant circuit, the system must be checked and properly repaired by a specialised service centre. Never release the refrigerant into the atmosphere (§ 8, Directive on the Prohibition of CFC-Halon Substances dated 06.05.1991).

Never heat refrigerant bottles using an open flame.

Liquid refrigerant must not come into contact with the skin. The relevant safety data sheet is to be observed.

When handling refrigerant, wear protective clothing and safety goggles.

	CAUTION
	<ul style="list-style-type: none"> ▶ Do not carry out any soldering or welding work directly on parts of the sealed refrigeration circuit or in its immediate vicinity. The extreme heat will cause the pressure in the system to rise. Danger of explosion. ▶ Allow the system to cool fully before starting any work on it. There is a risk of scalding from the condenser, the compressor and the hoses. ▶ Installation, maintenance and repair work must be carried out by trained personnel only. This work may only be carried out with the engine at a standstill and the power supply switched off. ▶ Always disconnect the battery before you open the roof-top air-conditioning unit, remove the compressor, or work on the electrical cabling. ▶ Do not wear any metal jewellery when working on electrical components (take off bracelets, watches, necklaces and rings).

1.5 Certification

- The unit has been tested for electromagnetic compatibility.
- Compliance with standard EN 45014 has been assured.
- The CE mark has been affixed to the roof-top air-conditioning system.

2 General description

Fig. 1 shows the installation on the roof.

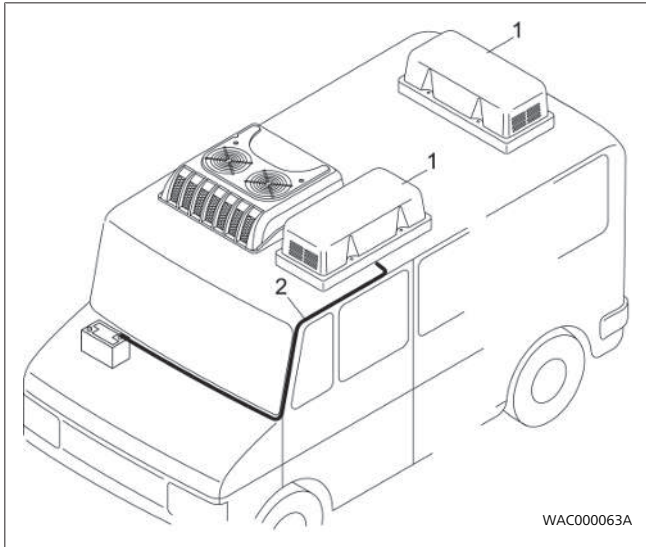


Fig. 1 Installation on the vehicle roof

The E-unit CC5 (1) includes all documents necessary for its operation in conjunction with a roof-top air-conditioning system CC5. The system is supplied with electrical power from the vehicle power supply via cables (2). The system is designed to operate with 24 V.

The E-unit CC5 in conjunction with the roof-top air-conditioning system CC5 is designed for the cooling/air-conditioning of truck cabs as well as the driving cabs of agricultural machinery, earth-moving machinery, airport vehicles, municipal vehicles, and for air-conditioning the driver's seat in buses.

The system must be filled with refrigerant (R134a) after installation.

Installation on the vehicle roof

The drive can be mounted on the vehicle roof, for example, either lengthways or sideways. The position of the ventilation slots is not relevant.

2.1 E-Unit CC5

The E-unit CC5 is illustrated in Fig. 2.

The base plate (2) serves as the load-bearing structural part.

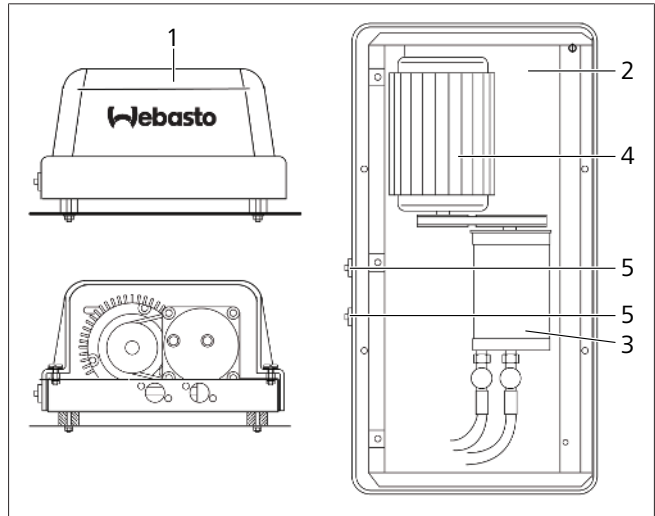


Fig. 2 E-unit CC5

1	Cover with ventilation slots.	5	Terminal pin for + terminal M8
2	Base plate	6	-
3	Compressor	7	Connection for clutch
4	Electric motor	8	Connection for motor signal cable

2.2 Electrical system

The electrical connection of the units is to be made as shown in the circuit diagrams in Fig. 3 and Fig. 4 .

The E-unit CC5 is equipped with a battery discharge protection circuit. The system is automatically switched off if the power supply drops below 20 V for longer than 10 s. It can be started up again by switching it on. If you only want the system to operate when the ignition is on, please connect the air-conditioning system on/off switch to terminal 15 (see circuit diagrams in Fig. 3 and Fig. 4).

The system should only be operated when the engine is running. To this end, please install a NO contact relay and connect this via terminal D+/61 on the generator. (See circuit diagrams in Fig. 3 and Fig. 4.)

The motor electronics are equipped with a soft-start feature in order to avoid current spikes in the vehicle's electrical system. Furthermore, the electric motor is automatically switched off in case of an overload (i.e. current consumption > 80 A for longer than 1 s) to prevent damage to the system.

It can be started up again by switching the system back on.

The electric motor is automatically switched off at temperatures below +5 °C and above +96 °C to prevent damage to the electrical system.

2.3 Principles of operation of the complete system

See the CC5 installation and service manual.

2.4 Design, function and principle of operation of the assemblies

See the CC5 installation and service manual.

3 Technical data

3.1 E-Unit CC5

Designation	E-Unit CC5
Dimensions Length x Width x Height	390 x 774 x 215 mm
Weight	Approx. 20 kg
Operating voltages (depending on vehicle's electrical system)	24 Volts DC
Power consumption	
– Electric motor	53 A
Switching points, low pressure cut-out switch	
– Off	2.1 ± 0.3 bar
– On	2.0 ± 0.2 bar
Refrigerant, max. ambient temperature 45 °C	R134a
Volume of refrigerant (R134a)	900 - 1100 g depending on hose length

3.2 Electrical fuses

Fused components	Fuse Symbol	Fuse Amperage
24 V		
– E-Motor (Verpolschutz)	F3	75 A

3.3 Compressor

Designation	Type Sanden 5D5 H09
Dimensions (length x width x height)	183 x 124 x 124 mm
Direction of rotation	CW
Capacity per revolution	131 cm ³
Refrigerator oil (type / amount)	PAG ZXL 100 PG / 150 cm ³
Refrigerant connections	
– Discharge side (standard)	3/4" O-Ring
– Intake side (standard)	7/8" O-Ring
Installation position, pivot range	
– Around the longitudinal axis	max. ± 30°
– Around the transverse axis	max. ± 10°
Electromagnetic clutch	
– Power supply	24 Volts DC
– Power consumption	max. 34 Watts
– Connector type	DIN 46343 - AMP 6.3

3.4 Circuit diagram of E-unit version with roof-top air-conditioning system CC5

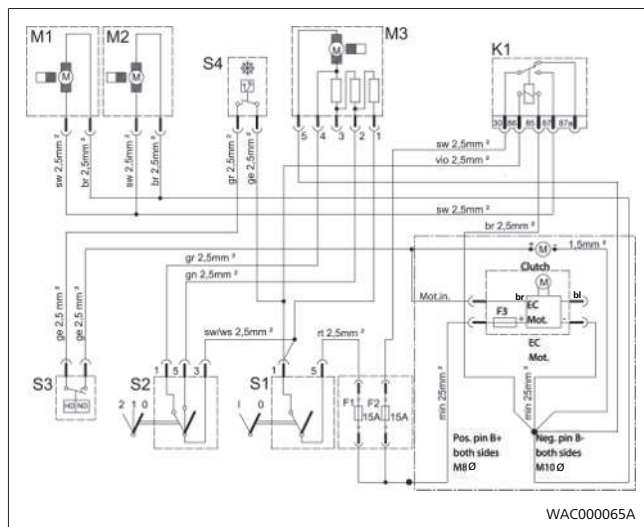


Fig. 3 Circuit diagram of E-unit version with roof-top AC system CC5

	Minimum cable thickness (in vehicle)		
	+	Earth	Compressor
24 V version	25 mm ²	25 mm ²	2.5 mm ²

Designation	Item 24 V	Item 24 V
Fuse	F1, F2	15 A, 15 A
Fuse box 4-f.	FA	81676
LP/HP switch	S3	66553
Icing inhibited th.	S4	65345
Relay	K1	34098
Rocker switch	S1, S2	66596, 66595
Axial fan	M1, M2	64506
Radial fan	M3	80866
Reverse polarity protection	F3	75 A

Wire colours	
bl	blue
br	brown
ge	yellow
gn	green
gr	grey
or	orange
rt	red
sw	black
vio	purple
ws	white



CAUTION

The drive must be protected by a 100 A fuse on the battery side.
Select an appropriate cable cross-section if the cables are long.

3.5 Circuit diagram of deluxe version

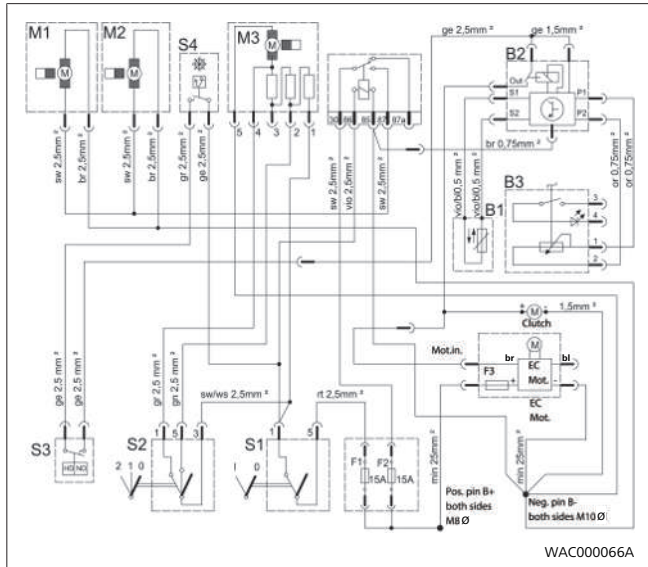


Fig. 4 Circuit diagram of deluxe version

Minimum cable thickness (in vehicle)			
	+	Earth	Compressor
24 V version	25 mm ²	25 mm ²	2.5 mm ²

Designation	Item 24 V	Item	24 V
Temp. selector switch	B3		83051
Thermostat module	B2		66784
Temperature sensor	B1		Philips KTY 81-110
Fuse	F1, F2		15 A, 15 A
Fuse box 4-f.	FA		81676
LP/HP switch	S3		66553
Icing inhibited th.	S4		65345
Relay	K1		34098
Rocker switch	S1, S2		66596, 66595
Axial fan	M1, M2		64506
Radial fan	M3		80866
Reverse polarity protection	F3		75 A

Wire colours	
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or	orange
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sw	black
vio	purple
ws	white

CAUTION
 The drive must be protected by a 100 A fuse on the battery side.
 Select an appropriate cable cross-section if the cables are long.

4 Installation instructions

4.1 Safety instructions

Read and observe the safety instructions contained in chapter 1.4, "Safety instructions and regulations" on page 3 prior to starting any work.

The installation work should be carried out or supervised by personnel trained in the field of automobile air-conditioning systems.

4.2 Installation kit

The following main components are supplied in the basic kit:

- E-Unit CC5 complete with cover.

4.3 Not included in the installation kit and to be ordered according to the price list

- Refrigerant hoses for connecting to the compressor (see *Standard installation kit* in chapter 4.4, "Required equipment, special tools and accessories" on page 6)
- Electrical connecting cables and elements (on the vehicle) (see Fig. 3 or Fig. 4)
- Fastening elements for routing the connecting cables and refrigerant hoses
- Reinforcing elements, roof bows for the inside of the roof to ensure that the roof is adequately strong

4.4 Required equipment, special tools and accessories

- Standard installation kit incl. refrigerant hose 2 x 6 m ID no. 64497 or standard installation kit incl. refrigerant hose 2 x 11 m ID no. 65362
- For installation
 - Sheet metal cutter for cut-outs in the vehicle / cab roof
 - Mechanic's tool kit
 - Clip pliers to install the refrigerant hoses
 - Hose shears
- For service (evacuating, filling and checking the refrigerant circuit)
 - Servicing / recycling station for R134a refrigerant
 - Vacuum pump, intake rate min. 5 m³/h, final pressure 1 Torr
 - Filler hoses with fast-action connector for R134a
 - Leak detector
 - Digital thermometer
 - R134a refrigerant
 - Recycling bottle for R134a refrigerant
 - Bottle connectors R134a
 - Refrigerator oil ZXL PAG 100 for Seltec compressor
 - Test fittings with intake pressure and high pressure gauges
 - Spring balance or scales (min. 35 kg)
 - Nitrogen bottle with pressure reducer.

4.5 Preparations on vehicle / cab roof

- The method of installation depends on the type of vehicle. It is therefore essential to refer to the vehicle manufacturer's instructions.
- Fig. 5 shows the installation dimensions and the mounting hole pattern for the E-unit CC5. The cut-outs for the electrical connections and refrigerant hoses are off-centre in the base plate.
- The roof-top air-conditioning system is mounted in accordance with the CC5 installation instructions.

NOTE
 Make sure that the mounting area for the E-unit CC5 is capable of supporting the load. Reinforce the area if necessary, e.g. using roof bows.

CAUTION
 Be careful not to damage any supporting structures (for example roof bows and reinforcements) or interior fittings.

- Align the E-unit CC5 (without cover) on the vehicle and drill the 6 \varnothing 9 mm holes.
- Remove the E-unit CC5.
- Deburr/smooth the edges of cut-outs and holes and treat them with anti-corrosive paint.
- The height of the spacers may have to be adjusted so they also fit around any curves in the roof contour

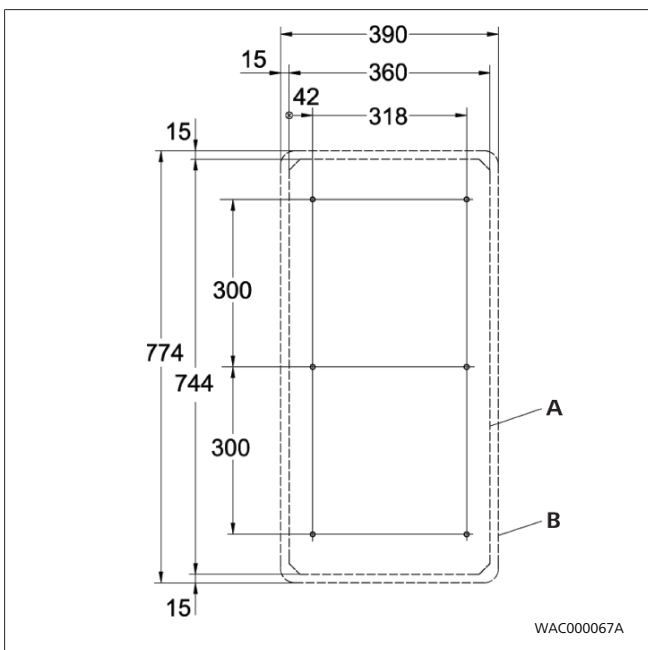


Fig. 5 Drilling pattern

A	Contour of the cover
B	Contour of the base Plate

Install the base plate

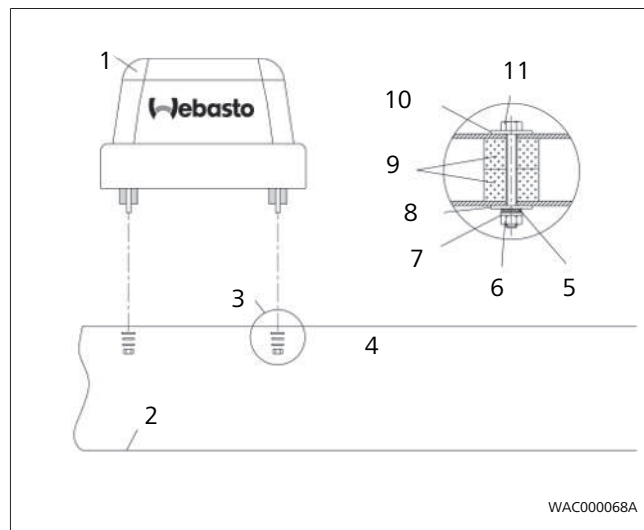


Fig. 6 Base plate installation

1	E-unit	7	Washer DIN 125-B6
2	Intermediate ceiling	8	Washer DIN 9021-B6
3	Detail	9	2x spacer disc
4	Vehicle roof	10	Washer DIN 9021-B6
5	Fan-disc washer	11	Hexagon bolt DIN 933 M6x60
6	Hexagon nut DIN 985 M6		

1. Remove the cover of the E-unit CC5.
2. Position the base frame on the roof (weatherseal) with spacers, align it, position spacer discs underneath the 6 fixing points and put the 6 M6 bolts (with washers) through the holes (See Fig. 6).
3. Check that the base frame is in the correct position and secure it uniformly using the washers, fan-disc washers and nuts supplied in the installation kit (tightening torque 9 Nm).

NOTE
 Ensure that any moisture between the vehicle roof and the base plate can escape.

4.6 Making electrical connections

The system must be protected by a 100 A fuse in the vehicle. Select the cable cross-section in accordance with the customer's cable length.

See also "Electrical copper cables for motor vehicles" DIN VDE 0298 Part 4.

NOTE

- ▶ Follow the vehicle manufacturer's instructions for connecting the power supply for the air-conditioning system.
- ▶ Only use cables approved for use in motor vehicles with an adequate cross-section (see Fig. 3 and Fig. 4).
- ▶ Work on the electrical system may only be carried out by authorized personnel.
- ▶ Use rubber grommets for routing cables through sheet metal cut-outs.

1. Disconnect the vehicle's battery.
2. Make the cable connections as shown in Fig. 3 or Fig. 4.

- Place cables in protective sheaths and secure them properly with cable ties.
- Connect the system's power supply to the cable pins provided on the E-unit for this purpose (Fig. 2).

**CAUTION****Irreparable damage due to reversed polarity**

Reversed polarity will result in irreparable damage to the electronic control unit!

It is essential to ensure correct polarity when doing this!

- ▶ + terminal: M8 cable pin.
- ▶ - terminal: M10 cable pin.

- Use strain-relief clamps

5 Start-up

5.1 Safety instructions

Observe the safety instructions and regulations in chapter 1.4, "Safety instructions and regulations" on page 3.

**DANGER****Danger of injury due to the motor fan, belts, compressor clutch**

Do not start up the system unless the cover is fitted.

5.2 Operator notes

**NOTE**

Do not start up the E-unit CC5 in conjunction with the roof-top air-conditioning system CC5 unless the vehicle's engine is running. This is because doing so with the vehicle's engine stopped will discharge the vehicle's battery.

**NOTE**

In keeping with the type of electrical connection (see Fig. 3 and Fig. 4), it should only be possible to switch on or operate the system when the vehicle's engine is running.

5.3 Controls and indicators

See the CC5 installation and service manual.

5.4 Initial start-up

See also the CC5 installation and service manual.

1. Start the engine following the manufacturer's instructions.
2. Switch on the system using the ON / OFF rocker switch. Operate the system at the maximum fan speed setting (3-speed rocker switch at setting 3). Cold air must be discharged from the air distribution panel after approx. 2 min.
3. Reduce the fan speed and check the air discharge rate.

5.5 Operation

**NOTE****Observe the operator notes in chapter 5.2, "Operator notes" on page 8 .**

Before you start the system, make sure that:

- ▶ The E-unit CC5 and roof-top air-conditioning system CC5 are in perfect condition.
- ▶ All routine maintenance work/checks have been carried out.
- ▶ The air inlets and outlets are clear (no leaves, etc.).
- ▶ The condensation drain holes are open.

Operating the system:

See the CC5 installation and service manual.

6 Maintenance

6.1 Safety instructions

Observe the safety instructions and regulations in chapter 1.4, "Safety instructions and regulations" on page 3.

6.2 General information

see also CC5 installation and service manual.

1. All work on the refrigerant circuit must be carried out by trained personnel at authorised special service centres.
2. The special equipment, special tools and operational accessories listed in chapter 4.5 are required and must be used for maintenance work on the air-conditioning circuit.
3. As is the case with all parts of a vehicle, the E-unit CC5 is continuously subjected to a certain amount of stress and strain. To guarantee that the system operates correctly and to prevent any damage to the parts, the maintenance work must be carried out at regular intervals.
4. The proper treatment of the system and a record of all maintenance work are necessary for the acceptance of any warranty claims involving damage to parts that require regular maintenance.
5. During extended shutdown periods, the air-conditioning system must be operated at least once a month for a period of approx. 15 minutes so as to prevent the shaft seals on the refrigerant compressor from drying out or any moving parts of the refrigerant circuit from seizing due to oil gumming. Prerequisite: (Minimum outside temperature > 5 °C or within a heated shed)

**NOTE**

Always ensure that the amount of oil in the air-conditioning system complies with the details in this installation and service manual.

6.3 Maintenance and care

See also CC5 installation and service manual

1. Irrespective of the schedule below, check all the attachments on the air-conditioning system to ensure that they are tight within the first four weeks of using the E-unit CC5 for the first time.
2. Even if the air-conditioning unit is not in use, individual components may be subject to wear due to the normal ageing process or the stresses or strains generated by driving the vehicle. The appropriate checks listed in the maintenance and service chart must therefore be carried out regardless of the time in which the system is in use.
3. Regardless of how long the system is in use, it is also possible to experience refrigerant loss despite the line connections being absolutely sealed. Owing to the material structure of the refrigerant hose lines they have a diffusion rate, the level of which may vary depending on the ambient temperatures. However, if relatively large quantities of refrigerant are lost over short periods of time, you may assume that there is a leak in the system.

**NOTE**

The refrigerant must never be vented into the open air (see § 8 CFC-Halon Prohibition Directive dated 06.05.91).

6.4 Maintenance and care checklist

System component	Maintenance work	Frequency		
		m	6m	a
Refrigerant circuit				
– Hose lines	Check for chafing and the general condition		X	
– Connections	Conduct a leak test using a leak detector			X
– E-unit CC5	Check overall condition and check the connections are tight			X
Compressor				
– Electromagnetic clutch	Check non-slip engagement/start-up of compressor		X	
– Compressor	Check that it operates silently		X	
– Poly V-belt	Check that it is in perfect condition and properly tensioned			X
– Fastening element	Check that it is in good condition and secure			X
Electrical connections				
– Connection lines	Check that they are in perfect condition		X	
– Plug connections	Check that they are in good condition and secure		X	
– Motor connections	Check for oxidation			

Key: m - monthly, a – annually (a – maintenance work to be carried out every six months if used all year round)

6.5 Inspections prior to repair

Prior to starting any repair work, check the overall condition of the E-unit CC5 so as to avoid any unnecessary dismantling work and doing the same work twice.

Visual inspection

- External condition of the E-Unit CC5
Check that:
 - the cover is not cracked and has no paint damage
 - the ventilation slots are clear and undamaged
 - the mounting points are secure, no signs of corrosion
 - the hose and cable connections are in perfect condition
 - that the sheet metal cut-outs are in perfect condition.
- Condition of the compressor:
Check that:
 - the hose connections are undamaged and secure
 - the fastening elements/screws are secure
 - the Poly V-belt tension is correct
 - the Poly V-belt and V-belt sheaves are undamaged
 - the electrical connection is undamaged.

6.6 Troubleshooting

General

- We recommend that you adopt a systematic approach to troubleshooting. Corrective action in the event of general malfunctions or deviations from setpoint values during pressure tests is to be carried out using the following procedures.
- Some malfunctions can only be identified and rectified by trained personnel using special tools.
- If the compressor is damaged (for example defective valve plates), it is imperative that the expansion valve be replaced since it is a possible cause of the malfunction.

Causes of malfunctions in the electrical system

In this case the individual electrical circuits must be checked systematically using the circuit diagram (see Fig. 3 or Fig. 4), so that the fault can be identified. Ideally the plug connections, switches, relays, etc. must be checked for continuity.

The following potential sources of malfunctions should always be checked so that they can then be excluded as the cause of the particular fault:

- Defective fuses
- Corroded plug contacts
- Loose plug contacts
- Poor crimp contacts on plugs
- Corroded cables and fuses
- Corroded battery terminals

Causes of malfunctions in the air-conditioning system

- – Defective evaporator or condenser fan
- – Soiled or blocked air filter, condenser or evaporator fins
- – Refrigerant loss or lack of refrigerant in the system

If the air-conditioner cuts out continuously, we recommend that you have the system checked by an authorised service centre.

Refrigerant circuit troubleshooting

See the CC5 installation and service manual, chapter 6.6.

6.7 Repair work



NOTE

The refrigerant must never be vented into the open air (see § 8 CFC-Halon Prohibition Directive dated 06.05.91).



NOTE

Observe the safety instructions and provisions in chapter 1.4, "Safety instructions and regulations" on page 3 and guidelines in chapter 6.2, "General information" on page 8.

Always use genuine replacement parts for repair work and restore the unit



NOTE

Observe the safety instructions relating to handling refrigerants (see chapter 1.4, "Safety instructions and regulations" on page 3).

- When repairing the unit, use only genuine replacement parts or standard parts.
- The aim of repair work is to restore the system to its original state.
- Before you open or dismantle parts from the refrigerant system, the refrigerant must be placed in the recycling bottle provided for it and disposed of or reused in accordance with the relevant regulations.

4. When you have completed the work on the refrigerant system, the entire system must be
 - evacuated in accordance with the operating instructions for evacuation units,
 - filled with refrigerant in accordance with the CC5 installation and service manual, chapter 4.14 and
 - checked according to the CC5 installation and service manual, chapter 6.8.

6.8 Post-repair procedures and testing

Checking the refrigerant pressures and function of pressure cut-out switches

See the CC5 installation and service manual.

Topping up refrigerant in partially filled systems

See the CC5 installation and service manual.

6.9 Visual inspection

After completing all repairs, conduct a visual inspection as described in chapter 6.5, "Inspections prior to repair" on page 9.

7 Warranty claims

1. The warranty does not cover parts that are subject to normal wear, or improper handling. The repair or replacement of the unit or parts thereof will not result in an extension of the warranty period.
2. In the event you wish to make a claim under the warranty, contact the agent in your country presenting the
 - Part covered by the warranty
 - The warranty card
 - The warranty claim.

These are the original instructions. The English language is binding.
You can request your language if it is missing. The telephone number of each country can be found in the Webasto service centre leaflet or the website of the respective Webasto representative of your country.