KONVEKTA

The Innovation Company.

Maintenance – and Repair Instruction

for KONVEKTA Air Conditioners

UL500 – UL800 3.Gen.

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- Maintenance Schedule Bus WP07050618

Introduction

You will certainly understand that we will not recognize any warranty claims due to improper handling, inadequate maintenance, applications that do not correspond with the determined use, utilization of unadmitted fuels or the non-observance of safety provisions.
KONVEKTA will annul without prior notice all obligations concerning guarantee, service contracts etc. regardless if granted by KONVEKTA or its distributors in case other than original KONVEKTA spare parts or parts bought from KONVEKTA AG have been used for maintenance and repair.
These operating instructions contain all necessary information to operate your air conditioning unit. In case you need more explanations please contact the next KONVEKTA service station.

The machine is in accordance with the EC machinery directive 2006/42/EC.

The unit contains or needs fluorinated greenhouse gas for operation and is subject to identification requirements in accordance with F-Gas Regulation 517/2014.

Manufacturer KONVEKTA AG, P.O. Box 2280, D-34607 Schwalmstadt

Information on the operating instructions

This maintenance instruction is valid for the a/c unit types**:**

- **UL500**
- **UL700**
- **UL750**
- **UL800**

3. Generation

and was exclusively written for maintenance personnel.
It contains:

⇒ **Maintenance Plan**
⇒ **Maintenance Instructions**
⇒ **Operating Instructions**
⇒ **Repair Instructions**

Maintenance and service works have to be carried out regularly by a **KONVEKTA** service station according to our maintenance plans No.: WP07050618. On our homepage www.konvekta.com you can find under the heading >*Service*< contact data of service stations nearby

- Only qualified staff is allowed to carry out these works! -

For general instructions on repair – and maintenance works please contact via email:
TKD@konvekta.com

Danger of accidents!
Qualified staff in charge of installation and maintenance have to be trained in accordance with EN 378-Part 4 and (EC) No.307/2008 and must strictly follow the legal provisions.
Any works or modifications at the air conditioner which are carried out improperly can lead to malfunction and so endanger operational reliability. We recommend having all works and modifications carried out at an authorized KONVEKTA Service Station. Before carrying out any maintenance works at your air conditioning unit, carefully read the
KONVKETA safety provisions (TD00052A) in order to avoid any dangers and accidents!

Before carrying out any maintenance works read carefully the operation instructions:
- Operation, including troubleshooting and disposal of operating materials.
- Maintenance

The maintenance instruction has to be amended by instructions based on national rules for accident prevention and environmental protection.

Attention is to be paid to:

- All screw connections have to be checked on leak tightness.
- Tightening torques for o-ring connections according to work instruction AA07050122.
- Torque figures for bolts, screws A2/A4 AA090019
- Country or regional specific rules for accident prevention have to be followed (for Germany e.g. BGV 29).
- Vehicles are only allowed to be maintained in compliance with the generally acknowledged rules of technology and observance of the maintenance and operating instruction of the manufacturer. In addition, maintenance, conversion or retrofitting works that need specific technical knowledge are to be carried out only by qualified companies.

Directives for Installation, Connection and Use

Please read carefully the following instructions before installing, connecting and operating the device. We assume no liability for incorrect handling and usage.

⚠ WARNING

MAKE THE CORRECT CONNECTIONS.
Failure to make the proper connections may result in fire or product damage.

USE ONLY SUITABLE VOLTAGE.
The usage with a not suitable voltage may result in fire. Furthermore, a not suitable voltage may result in failure or product damage.

TAKE CARE THAT WIRES NOT CARRY CURRENT WHILE CONNECTING.
Connecting wires which carry current may result in electrical shorts or product damage.

ONLY USE WIRES WITH SUFFICIENT LARGE CROSS SECTIONS.
Using wires with not sufficient large cross sections will exceed the current carrying capacity of the wires and result in fire or electric shock.

DO NOT DISASSEMBLE OR ALTER.
Doing so may result in an accident, fire or electric shock.

DO NOT INSTALL IN LOCATIONS WHICH MIGHT HINDER VEHICLE OPERATIONS.
Doing so may obstruct forward vision or hamper movement and result in serious accident.

DO NOT BLOCK VENTS OR RADIATOR PANELS.
Doing so may cause heat to build up inside and may result fire.

USE THE CORRECT AMPERE RATING WHEN REPLACING FUSES.
Failure to do so may result in fire or electric shock.

DO NOT PLACE HANDS, FINGERS OR FOREIGN OBJECTS IN INSERTION SLOTS OR GAPS.
Doing so may result in personal injury or damage to the product.

AVOID HIGH FORCE EFFECTS.
Do not expose the device high force effects or strokes. Doing so may result in product damage.

⚠ CAUTION

HAVE THE WIRING AND INSTALLATION DONE BY EXPERTS.
The wiring and installation of this device requires special technical skill and experience and have to be done by experts.

ARRANGE THE WIRING SO IT IS NOT CRIMPED OR PINCHED BY A SHARP METAL EDGE.
Arrange the wiring so it will not be damaged.

DO NOT INSTALL IN LOCATIONS WITH HIGH MOISTURE OR DUST.
Avoid installing the device in locations with high incidence of moisture or dust. Moisture or dust that penetrates into this device may result in product failure or damage.

USE SPECIFIED ACCESSORY PARTS AND INSTALL THEM SECURELY.
Be sure to use the specified accessory parts. Use of other than designated parts may damage this device internally or may not securely install the device in place.

HALT USE IMMEDIATELY IF A PROBLEM APPEARS.
Failure to do so may cause personal injury or damage to the product. Return it to your authorized customer service.

TEMPERATURE.
Be sure the environment-temperature is in the allowed range before turning the device on.

USE DEVICE ONLY FOR SPECIFIED APPLICATION AREA.
Using the device for another purpose or in another application area than the intended one, may result failure, product damage or injury.

PRODUCT CLEANING.
Use a soft dry cloth for cleaning the device. For more severe dirt, please dampen the cloth with water only. Anything else has the chance of damage the product.

RANGE OF THESE DIRECTIVES.
These directives apply for all devices, on which this directives-sheet is added. One directives-sheet is sufficient per box.

TRANSPORT TERMS
Handle the unit with care at any time. During transport make sure that the unit is stored safely and cannot be damaged. If more than one unit are transported, every unit has to be packed singly to avoid that the unit's damage one another.
The forwarder is liable for all damages during transport.

1. Technical data

1.1. Air conditioning units

Type		UL 500	UL 700	UL750	UL800
Refrigerant		R 134a *	R 134a *	R 134a *	R 134a *
GWP		1.430	1.430	1.430	1.430
Refrigerant quantity approx. [1]	*kg*	2,8	4,8	5,5	4,8
Refrigerant quantity with Frontbox[1]	*kg*	3,3	5,3	6,0	5,3
Operating voltage	*Volt DC*	26	26	26	26
Current consumption	*A*	63	90	98	118
Cooling capacity	*W*	24.000	33.000	36.000	39.000
Heating capacity	*W*	30.000	38.000	38.000	48.000
Evaporator- air volume	m^3/h	4.720	7080	7080	9440
Weight	*kg*	96,5	129,0	131,0	161,0

*The system is also approved fort the refrigerant R513A

[1]The exact filling quantity depends on the vehicle equipment

1.2. Pressure Switches

Low pressure switch	*BAR*	0,3 bar (± 0,2) off	2,1 bar (± 0,3) on
High pressure switch	*BAR*	25,5 bar (± 1,0) off	18 bar (± 0,7) on

1.3. Compressors

Important:

To avoid leakages at the shaft seal of the compressor:

The compressor should be started every 4 weeks for approx. 15 minutes!

This also applies when the vehicle is not into operation for a longer period or when the air conditioning unit is not used!

⇨ The type of compressor is dependent on the scope of supply, see type label on the compressor.

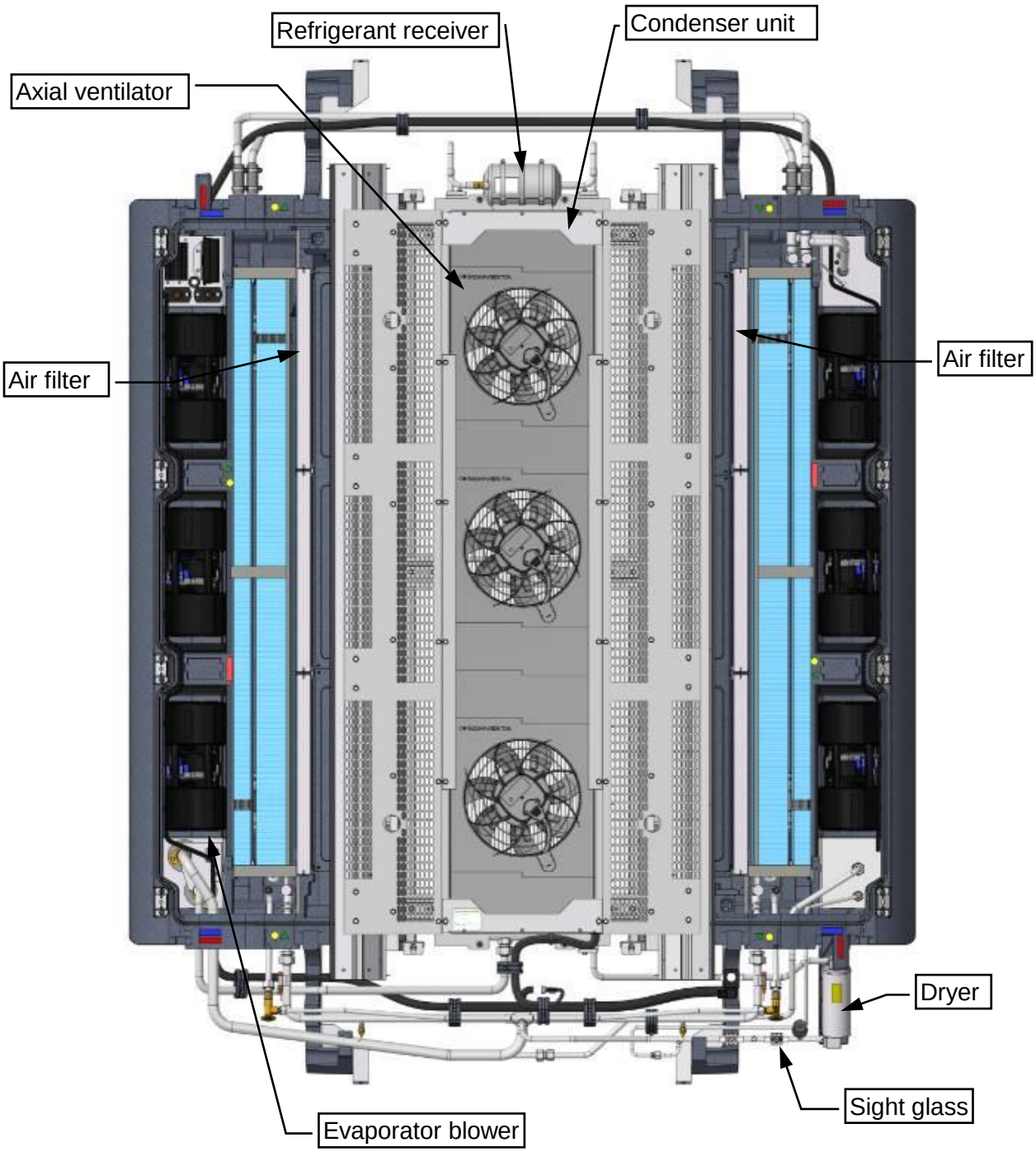
2. Maintenance plan

Pos.	Maintenance and repair schedule				
3	**Cooling cycle and components**	**A**	**B**	**C**	**D**
3.1	Refrigerant level check at the inspection glass of the roof installation			X	
3.2	Air tightness check with leakage detector			X	
3.3	Condenser coil cleaning			X	
3.4	Refrigerant receiver check for corrosion			X	
3.5	Replacement of filter dryer - functional test of low pressure switch			X	
3.6	Function check of high pressure switch			X	
3.7	Check of screw connections on compressor for tightness		X		
3.8	Condition check of compressor V-belt		X		
3.9	Compressor V-belt tension check		X		
3.10	Fresh air / recirculation air filter check for contamination, if necessary replace	X			
3.11	Oil level check of the compressor at the oil sight glass		X		
3.12	Compressor oil exchange			(X)	X
4	**Electrical installations**	**A**	**B**	**C**	**D**
4.1	Function check of the condenser fans			X	
4.2	Function check of evaporator blowers			X	
4.3	Function check of magnetic clutch on compressor			X	
4.4	Visual check of safety fuses			X	
4.5	Plug connection check for tightness			X	
4.6	Visual check of electrical cables for abrasion			X	
4.7	Check the control			X	

The maintenance periods are as follows:

Maintenance type **A**:	Quaterly maintenance (if required monthly)
Maintenance type **B**:	Half-yearly
Maintenance type **C**:	Annual
Maintenance type **D**:	Every 3 years

2.1. Overview maintenance parts



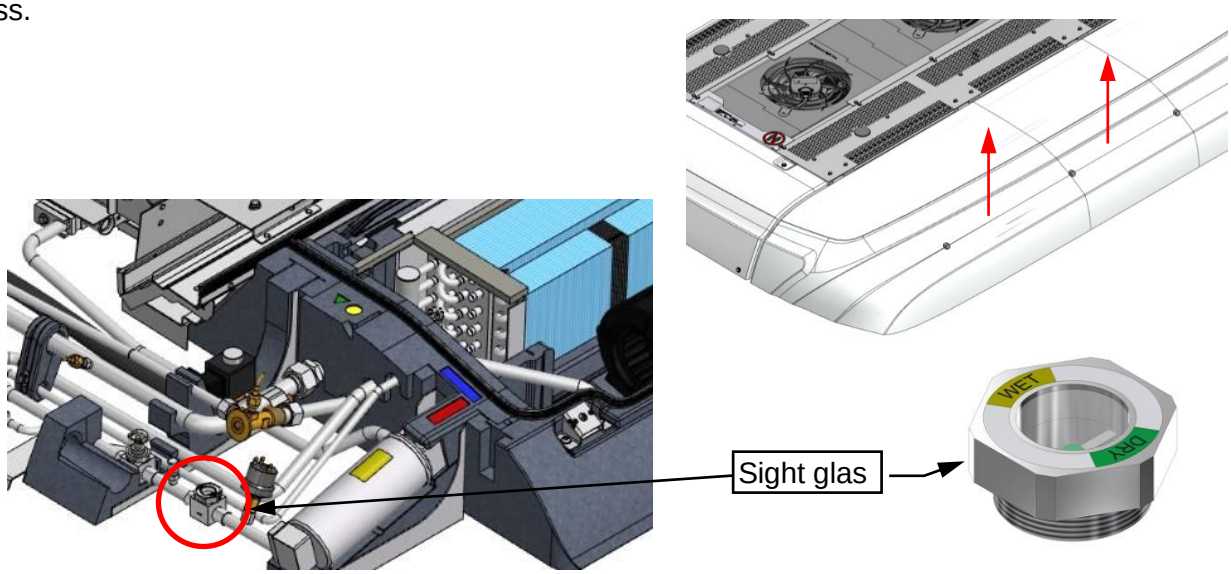
3. Maintenance of the refrigerant circuit

3.1. Check of refrigerant level in the sight glass of the roof unit

Start air conditioner.

> The air conditioner is operated via the original controller of the vehicle (see original operating manual)

Check the refrigerant level in the sight glass. To this, the cover must be opened to see the sight glass.



> The refrigerant should be bubble-free through the sight glass!

3.2. Leakage test with an electronic leak detector

If the unit performs insufficient due to lacking refrigerant or after interventions in the refrigerant circuit and maintenance the unit has to be tested for leaks.
This can be done during operation of the unit resp. at a system pressure of approx. 15 bar nitrogen with refrigerant portion.

> **Use only electronic leak detectors! The usage of contrast agents for leak detection is not permitted and can cause warranty rejection!**

3.3. Cleaning of condenser coil

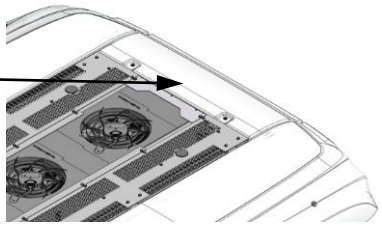
Clean the condenser coil only when the **vehicle engine is stopped and the a/c unit is shut off**!

> **Danger!**
> Cleaning of the condenser is only possible from the top of the roof. Safeguard the vehicle so that no unauthorized person can move the vehicle. Protect against falling down the roof (safety belt, scaffold, ladder, etc.)

Demount the condenser fans completely (see point 5.4) and blow compressed air through the opening against the air flow direction.

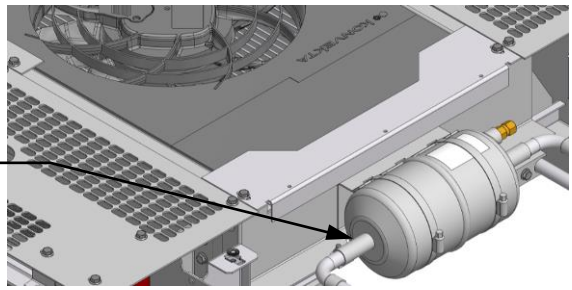
3.4. Check of the refrigerant receiver for corrosion

Demount the middle cover in the back.



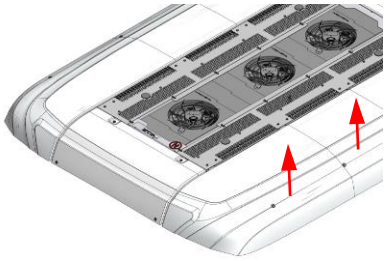
The system may be also installed opposite to the driving direction.

Make a visual inspection of the refrigerant receiver.
If the receiver is corroded it has to be replaced!

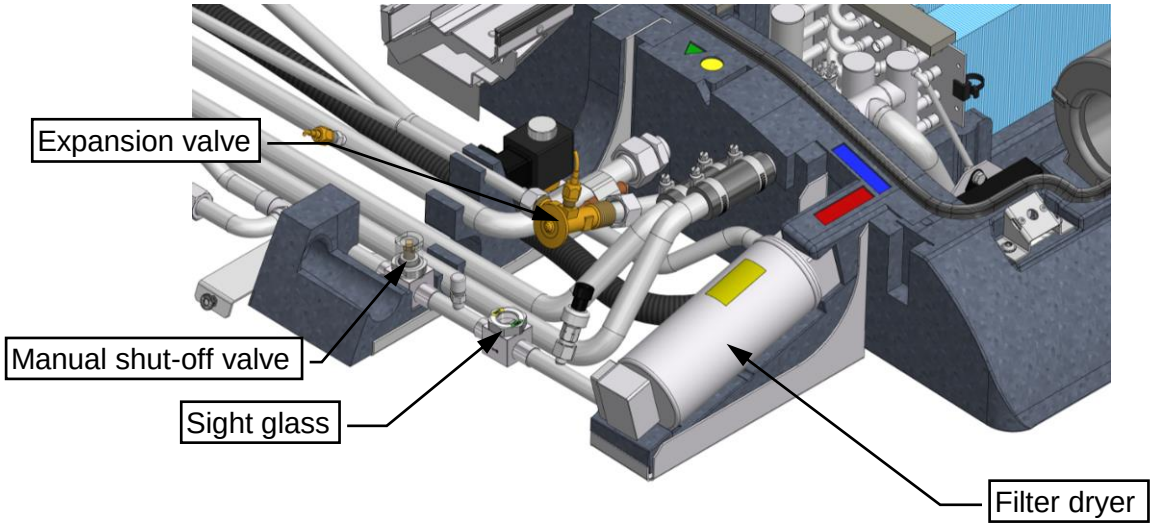


3.5. Replacement of filter dryer – functional test of low pressure switch

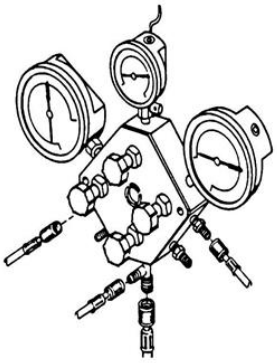
Open the evaporator cover on the right. To get access to the filter dryer the **right evaporator cover** has to be opened.



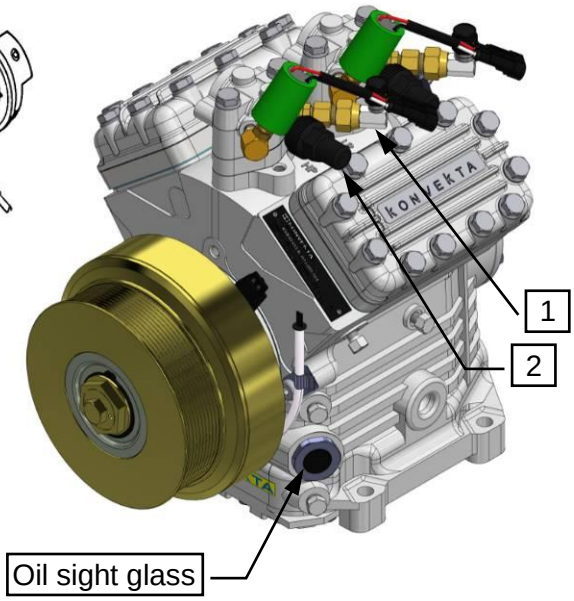
⚠ Risk of getting injured by down falling parts!



Manual shut-off valve: remove cap and bring into „shut off" position.



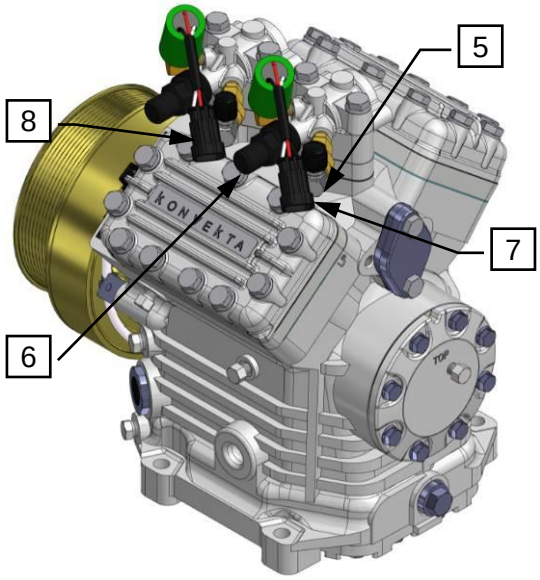
Connect the red manometer (to atmospheric pressure) to service connection (1) of the service shut-off valve HD – high pressure – (2) and the blue manometer (to atmospheric pressure) to service connection (5) of the service shut-off valve ND – low pressure – (6) of the refrigerant compressor.
Set service shut-off valve ND (6) and HD (2) in “Service Position” (turn spindle clockwise ca. three full circles), and then evacuate.

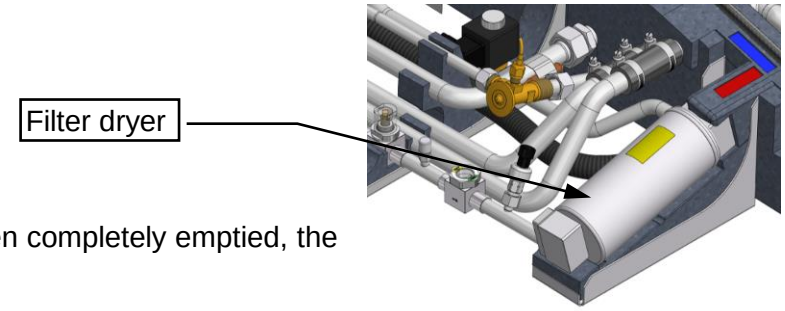


Switch on the air conditioner and start running the compressor until the manometer ND shows „0 bar“ on the scale. The compressor is switched off when the low pressure switch (7) gets activated. Depending on the pressure situation the compressor is switched on and off again so that the refrigerant can evaporate.

Set service shut-off valve ND (6) in „Stop Position“ (turn spindle clockwise until stop).

The low pressure switch turns off the compressor when the pressure is < 0,3 bar. Restarting of the air conditioning is possible, provided that the pressure at the low-pressure switch is above 2.1 bar and the system is turned on.



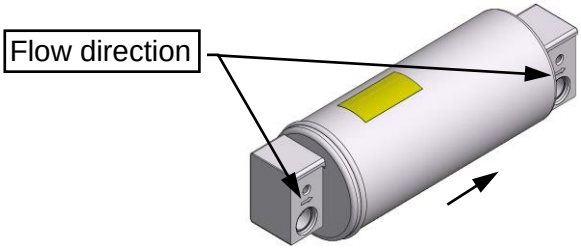


When this area of the system has been completely emptied, the filter drier can be replaced.

⚠ Demount the used filter dryer only immediately before installing the new filer dryer to ensure that the refrigerant circuit remains open only for a short time. If this is not possible, close the refrigerant circuit (tubing) with caps or stoppers to prevent entry of air and humidity into the system

Mount a new filter dryer. Put filter dryer according to the flow direction (arrow) into seating and fasten.

The filter dryer needs to be mounted as indicated (flow direction). The flow marker (arrow on the filter dryer) points the direction of expansion valve. Remove the protective caps on both sides of the filter dryer only immediately prior to mounting.

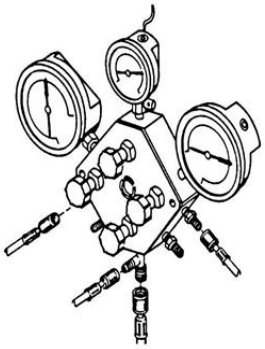


Evacuate the area between manual shut-off valve and magnetic valve at the service connection.

With an ambient temperature of ca. 20°C, a vacuum of less than 20 mbar must be achieved in order to ensure optimal evaporation of any humidity that may have entered the system with humid air.

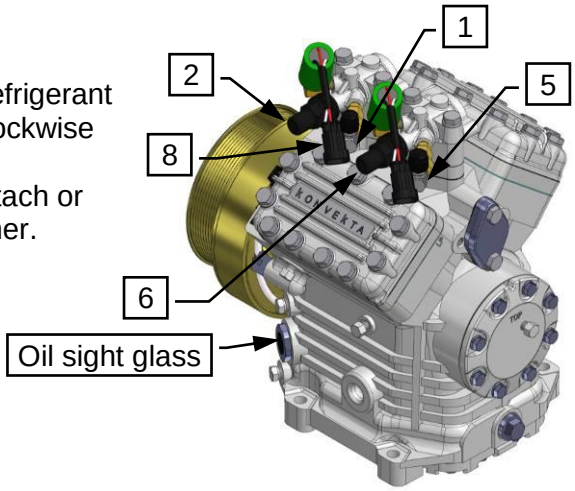
Manual shut-off valve to „bring normal position“ and mount cap.

Balance the pressure in the high and low pressure areas of the refrigerant circuit with the aid of the shut-off valves on the manometer combination. For this purpose, open the “Red” and “Blue” shut-off valves of the manometer combination for approx. 5 sec.



Pressure in the low pressure volume must exceed 2.1 bar, otherwise the air conditioner does not operate (Low Pressure Malfunction).

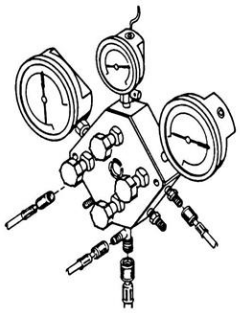
Set the service shut-off valves ND (6) and HD at the refrigerant compressor again to “Normal” (turn spindle counter-clockwise until stop).
Start the air conditioner and check for any leakage. Attach or close and secure service flaps on the roof air conditioner.



3.6. Function check of high pressure switch (8)

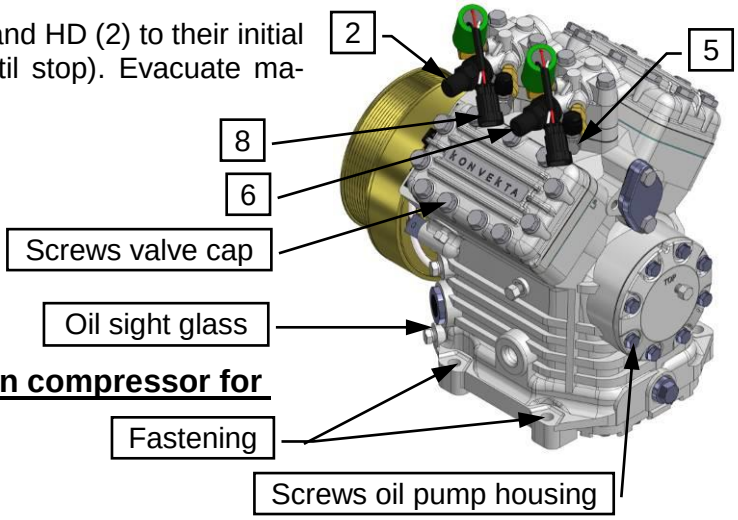
Connect the blue manometer (to atmospheric pressure) to service connection (1) of the service shut-off valve ND – low pressure - (6) and the red manometer (to atmospheric pressure) to service connection (5) of the service shut-off valve HD – high pressure - (2) of the refrigerant compressor.
Set service shut-off valve ND (6) and HD (2) in “Service Position” (turn spindle clockwise ca. three full circles) and then evacuate.
Interrupt operation of the condenser fan (e.g. disconnect plug connections or remove fuses of the condenser fan).

The high pressure switch (8) can alternatively be checked with the diagnostics device “Star Diagnostics”. This method also requires prior connection of the pressure manometers (HD and ND) to the refrigerant compressor, in order to read the switch-off and re-switch-on points.



Danger! Attention!
The service shut-off valve on the refrigerant compressor (ND and HD) must not be closed (turned clockwise until stop) when the refrigerant compressor is running because the very rapid pressure increase on the high pressure side (HD) or the rapid pressure drop on the low pressure side (ND) can damage the refrigerant compressor

Return the service shut-off valves ND (6) and HD (2) to their initial position (turn valve counter-clockwise until stop). Evacuate manometer hoses and detach.



3.7. Check of screw connections on compressor for tightness

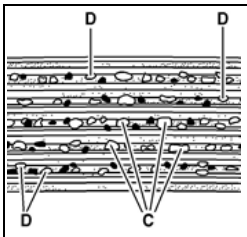
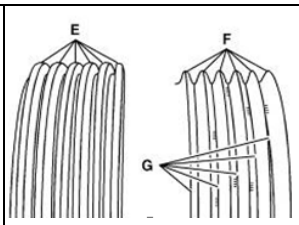
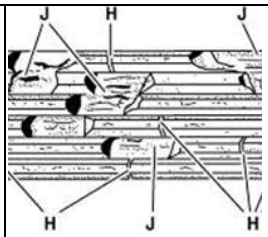
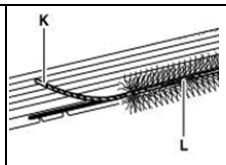
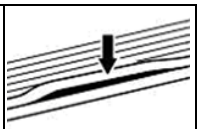
Check all fixing screws on the compressor, compressor mounting plate as well as the screws on the flange valves High Pressure (2) and Low Pressure (6) for tightness

Screw torque of fixing screws*:* *21 Nm*
Screw torque of flange valves *(2) and (6):* *45 Nm*

Also check the screws on the valve caps and the oil pump housing.

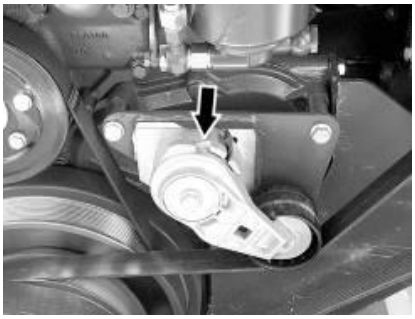
3.8. Condition check of compressor V-belt

Check V-belt for damage:

				
Rubber pellets in the rib foundation (C) and deposits of dirt or small stones (D) respectively.	Wedge-shaped ribs (F) and visible traction wire (G) in the rib foundation as a result of flank wear.	Transversal fissures in the ribs (H) and rib breaks (J).	Laterally torn out traction wire (K) and splicing of the external traction wires (L).	Ribs broken off from their foundation.

In case of wear and tear or damage replace drive belt.

3.9. Check V-belt on the compressor for tension

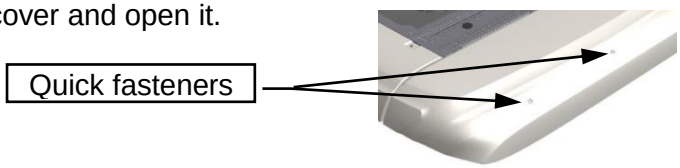


These data can be found in the original instructions of the vehicle manufacturer.

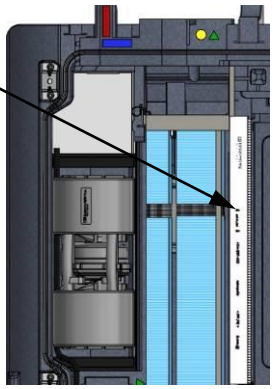
3.10. Check fresh air / recirculation air filter for contamination, replace if necessary

Danger! Use an appropriate scaffold for carrying out maintenance works.

Loosen the quick fasteners of the evaporator cover and open it.



Take out the air filters (UL500 – 4 pieces, UL700 – 6 pieces, UL750 – 6 pieces' front vehicle + 6 pieces' rear end of vehicle and UL800 – 8 pieces).
Clean or exchange filters.



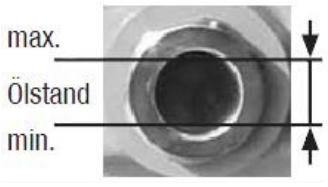
When mounting the filters, take care that the arrows on the upper side of the filter point towards the vehicle's outside.

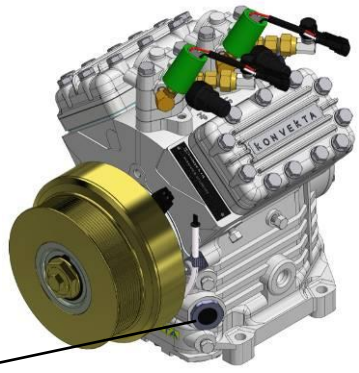
Reassemble in reverse order!

The Konvekta virus filter ISO18184 can optionally be used as a retrofit part (for information, see BTD-02131A).

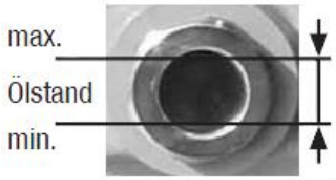
3.11. Oil level check of the compressor at the oil sight glass

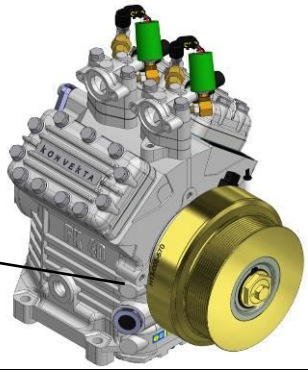
Observe inspection glass at compressor for ca. 10-15 min while the compressor is ON. Refrigerant oil must be visible. In the case of under- or over-filling there is a risk of serious damage to the compressor.
The oil should be clear and clean.





Since the installation position of the compressor can be different (inclined positions), it is advisable to check the oil level in both sight glasses. The oil level must be visible at least in one sight glass.





Danger! Risk of injury!
Be particularly careful when working close to hot, rotating or energized parts.

Refrigerant oil is circulating together with the refrigerant in the entire cooling system. For this reason, the oil level may be different for every reading.

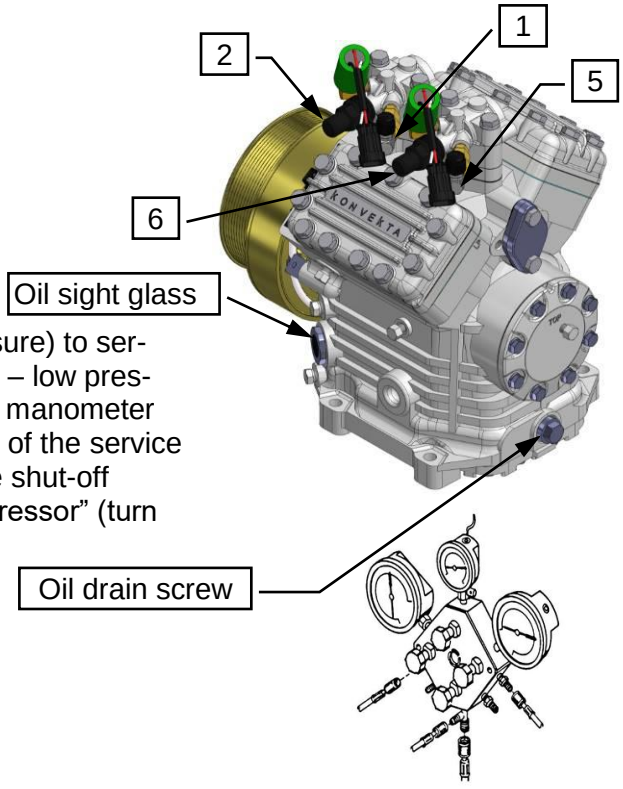
3.12. Compressor oil exchange

Whenever the refrigerant circulation system has been opened, the filter dryer must be renewed (see point 3.5).

Switch on ignition. Switch on the air conditioner into operation for approx. 10 min.

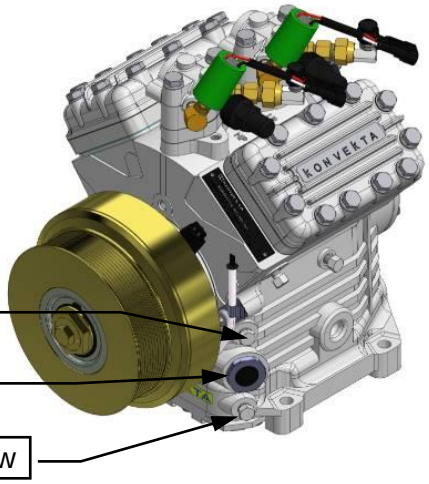
The electrical magnetic clutch of the refrigerant compressor is switched on with a delay of 60 sec. Any residual refrigerant present in the crankcase together with the cooling machine oil must first evaporate.

First check refrigerant oil level at the sight glass.



Connect the blue manometer (to atmospheric pressure) to service connection (5) of the service shut-off valve ND – low pressure - (6) of the refrigerant compressor and the red manometer (to atmospheric pressure) to service connection (1) of the service shut-off valve HD – high pressure – (2). Set service shut-off valve ND (6) and HD (2) in “Service Position Compressor” (turn clockwise until stop) and then evacuate.

Unscrew the oil drain screw und and drain the cooling machine oil. Mount oil drain screw with new oil seal.

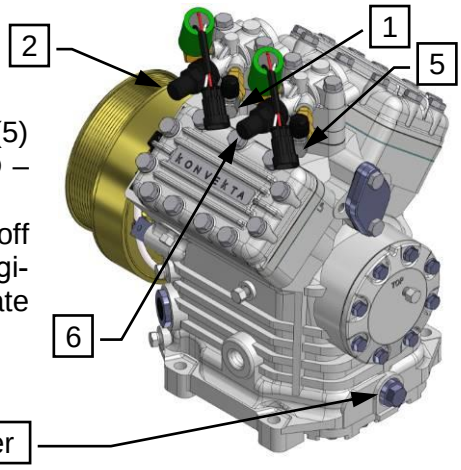


i	Tightening torque: Oil drain screw compressor oil M10 x 30: 60 Nm

Unscrew the oil filler screw and fill in new refrigerant oil. Mount the oil filler screw.

i	Make sure you use the right sort of refrigerant oil and a new batch. After the refrigerant oil has been drained, it must be replaced with new oil immediately. Refrigerant oil is strongly hygroscopic. **Amount refrigerant oil:** observe the nameplate depending on the compressor version **Tightening torque:** oil filler screw - note the manufacturer´s specifications!

Evacuate the compressor via the service connections (1) and (5) at the service shut-off valves HD – high pressure - (2) and ND – low pressure - (6).
Refill the evacuated refrigerant amount. Set service shut-off valves ND (6) and HD (2) of the refrigerant compressor in „Original Position“ (turn valve counter-clockwise until stop). Evacuate manometer and demount.



4. Maintenance work on the electrical installations

4.1. Function check of the condenser fans

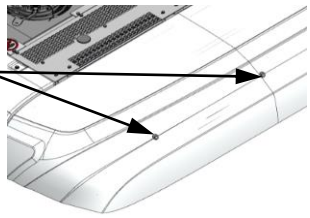
Switch on the ignition and start the engine.
Press button and take the air conditioner into operation.
Then check the functioning of the condenser fans.

⚠	**Danger! Risk of injury!** Take special care near hot, rotating or live parts.

4.2. Function check of the evaporator blowers

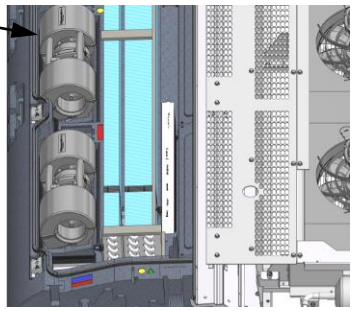
Take the air conditioner into operation.

Quick fasteners



Open quick fasteners by rotating motion, open side covers.

Evaporator blowers



Function check of all evaporator blowers.

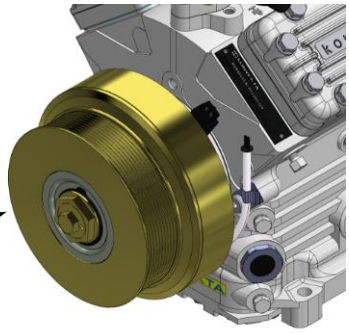
Danger! Risk of injury!
Take special care near hot, rotating or live parts.

4.3. Function check of magnetic clutch on compressor

Take the air conditioner into operation.

The electrical magnetic clutch on the refrigerant compressor is switched on with a delay of ca. 60 sec at every new start

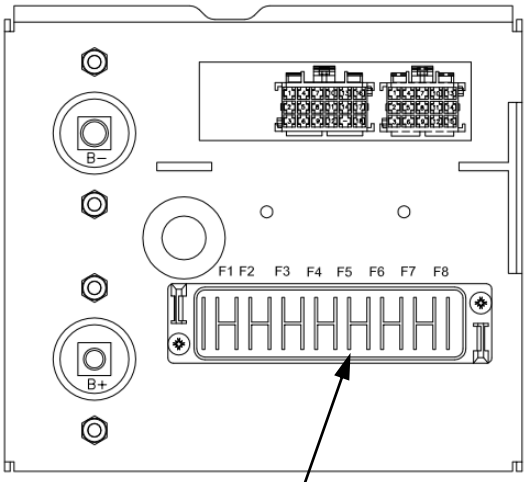
Magnetic clutch



4.4. Visual check of safety fuses

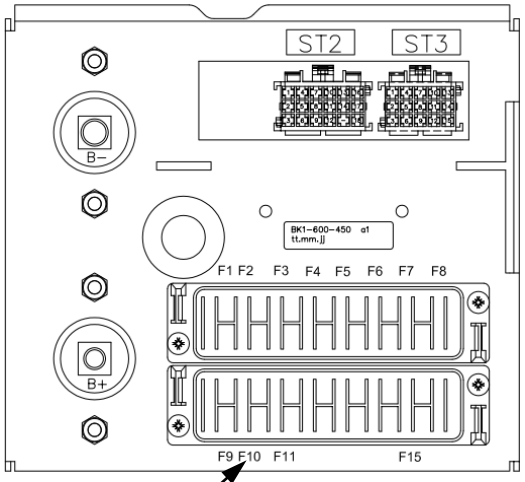
Open service covers in the passenger compartment below the roof installation with a square spanner.
Take fuses one-by-one out of their sockets, check and put back again.
Close cover when finished.

UL500



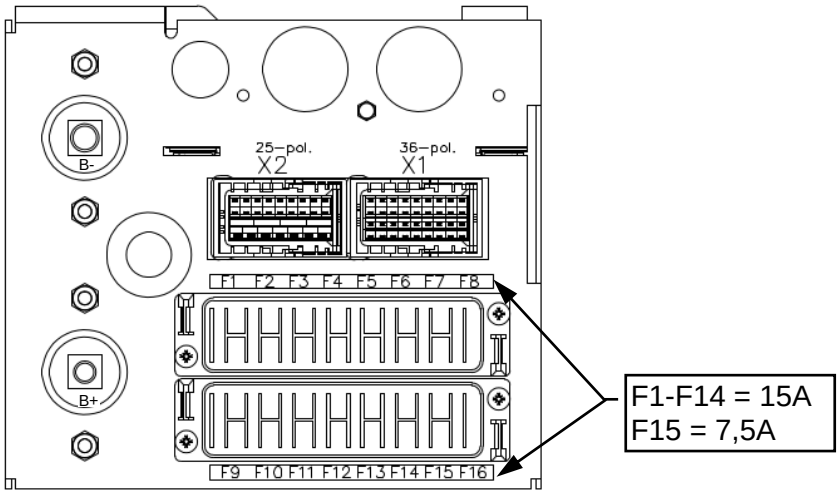
F1-F6 = 15A
F8 = 7,5A

UL700



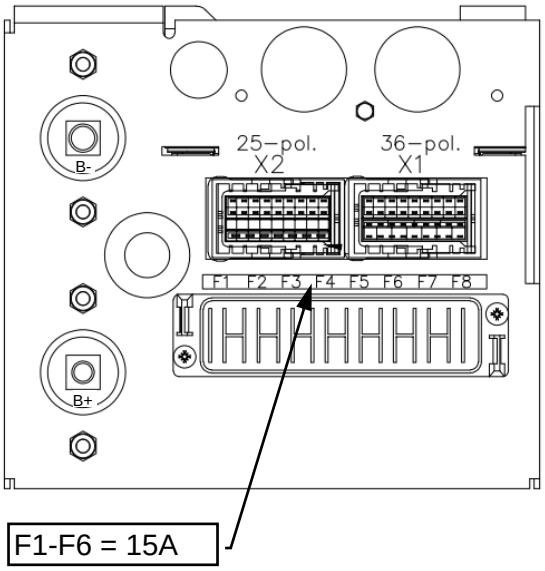
F1-F11 = 15A
F15 = 7,5A

UL800

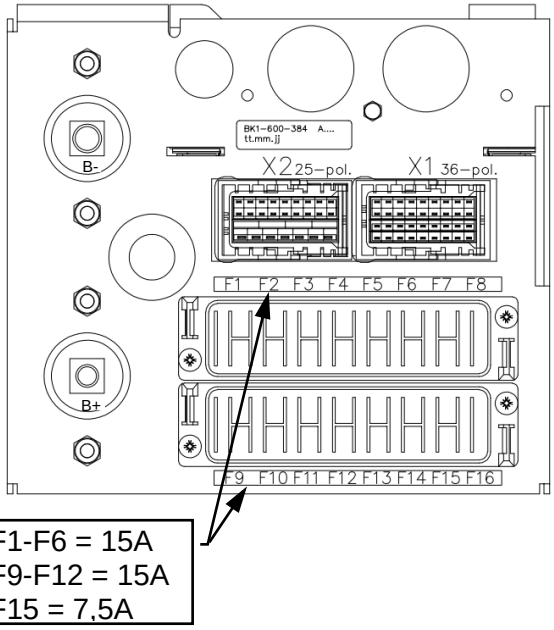


Für Gelenkzug:

UL700 VD



UL750



4.5. Plug connection check for tightness

Check tight fit of plugs and electric connections.

4.6. Visual check of electrical cables for abrasion

Open quick fasteners and side covers.
Take fan plate of the condenser fans out and check all electrical connections for correct placement and abrasion.
When finished, remount fans and close side cover.

4.7. Check the control

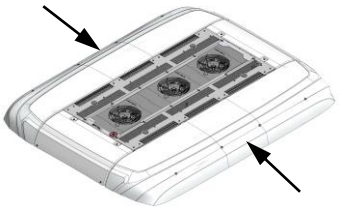
See the original instructions of the control!

5. Repair instructions for UL500 - UL800

Because of its modular design the air conditioner UL500 - UL800 features a series of characteristics in mounting and demounting of the components.

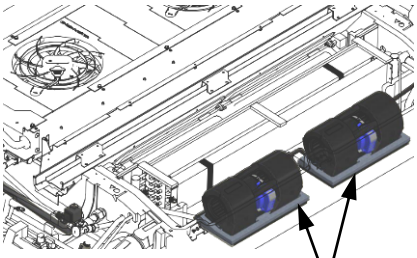
5.1. Demounting and mounting of evaporator blowers

Loosen the quick fasteners and open the evaporator cover /hoods and secure them against falling.



Danger! Risk of injury!
Make sure that the device is turned off!
There is a risk of injuries caused by rotating parts (blower)

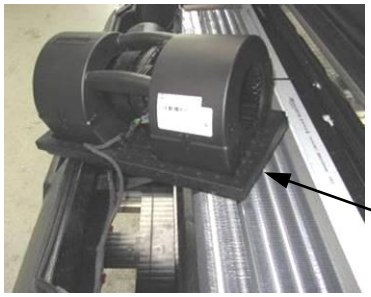
The blower is furnished with an insert (blower plate) that is fitted into the bottom part of the unit.



5.1.1. Demounting evaporator blowers

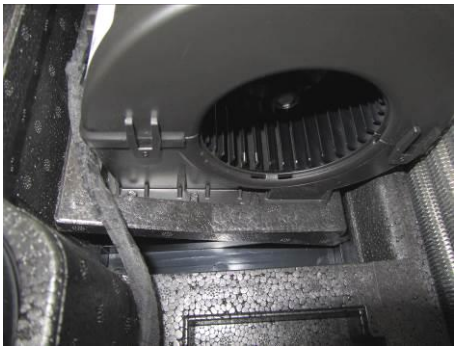
Remove the blower with the insert (blower plate) from the bracket on the side facing the evaporator heat exchanger, as shown by the arrow.

Disconnect the cable and replace it, if necessary.



5.1.2. Mounting evaporator blowers

Tilt the blower with the insert to the side facing the evaporator heat exchanger and put it into the bracket.

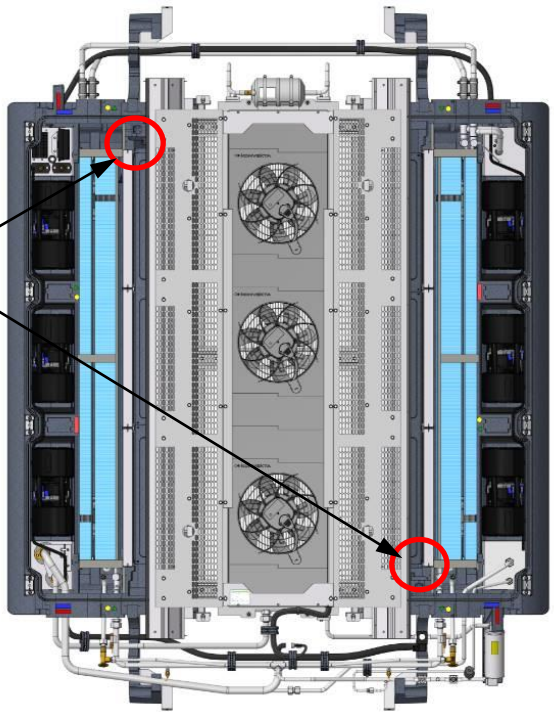


Then fix the blower by slightly pressing the bracket.

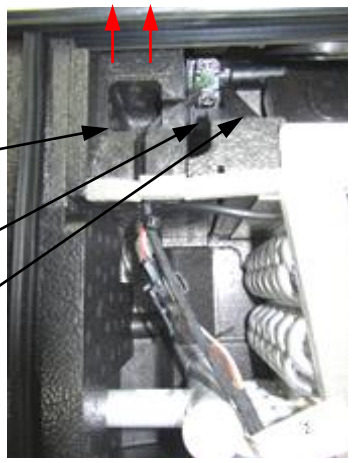
Attention!
Do not pinch the cables and arrange them in a manner eliminating the risk of chafing!

5.2. Demounting and mounting of the flap servo-motors

Actuators of flaps are installed on the right and left side of the evaporator, near the filters installed with a servicing element.

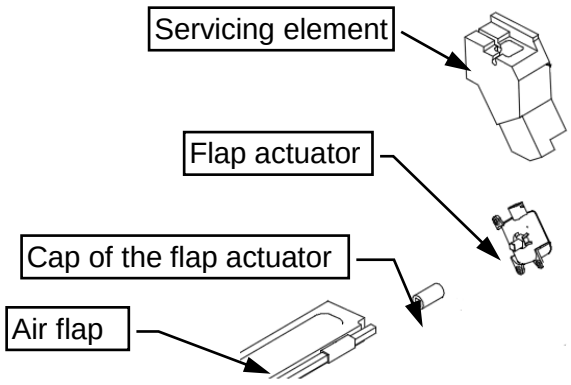


The servicing element can be removed upward, in order to gain.
access to the flap actuator.
The flap actuator is connected to the fresh air flap by a cap.
It facilitates its removal to the side.



Assembly instructions:
The shaft of the flap actuator and bracket of the flap are fitted to each other and they can be properly installed only in a specified position.
Therefore, during installation it is necessary to set the flap properly on the actuator shaft.
To do this, the flap may be easily repositioned.

The reassembly is carried out in reverse order.

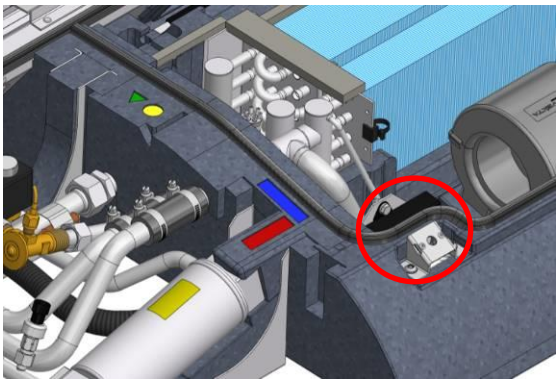


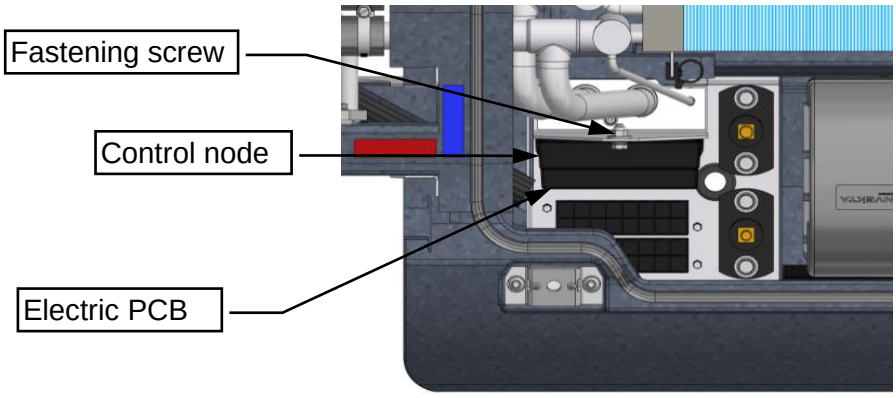
5.3. Mounting und demounting of control node

The control node is located in the evaporator part (in driving direction right side) and is mounted on an electric PCB with a fastening screw.

Unscrew the fastening screw, remove the control unit upward and disconnect plug connection.

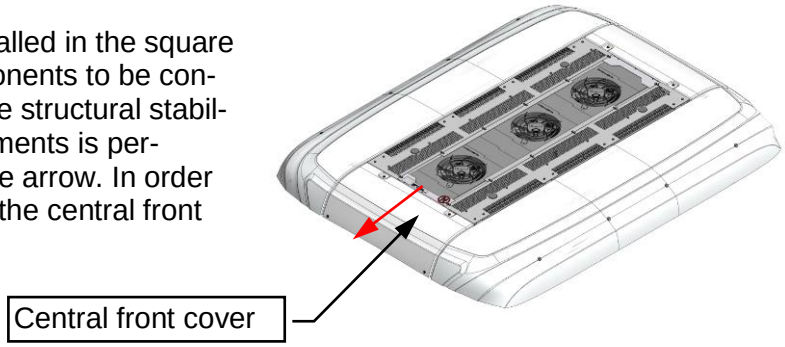
The control node may be replaced with another, which should be mounted in reverse order.





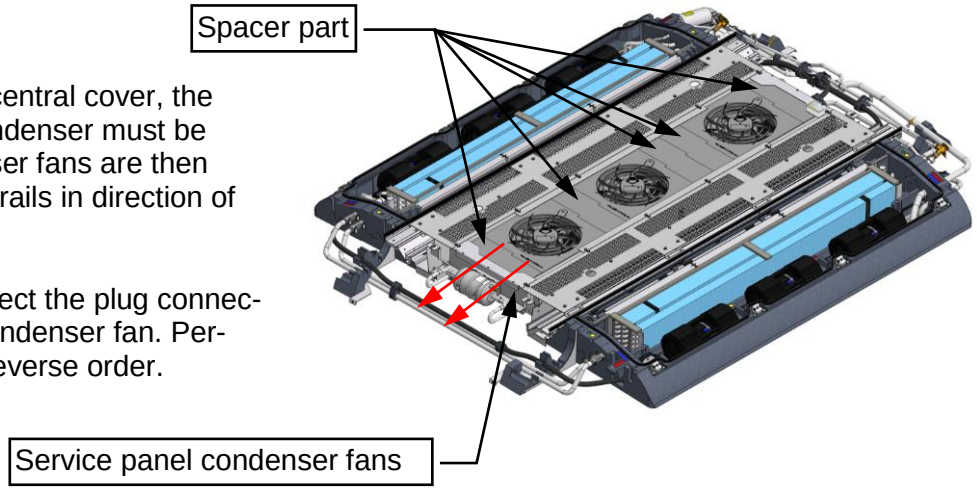
5.4. Mounting and demounting of the condenser fans

Condenser fans are of UL series, installed in the square form. This allows the individual components to be connected by plug-in system, ensuring the structural stability. Disassembly of the individual segments is performed in the direction indicated by the arrow. In order to repair the condenser fans, remove the central front cover.



After dismounting the central cover, the service plate of the condenser must be removed. The condenser fans are then pulled out of the guide rails in direction of the arrow.

Then, you can disconnect the plug connection and replace the condenser fan. Perform the assembly in reverse order.



6. Warranty Conditions

The current „General Warranty Conditions KONVEKTA AG“ will apply. A copy will be furnished by the warranty department. Please contact: **GWL@konvekta.com**.

7. Waste disposal in accordance with legal provisions

After the phase of use the last proprietor is responsible for the adequate waste management. The environmental regulations in the exporting country must be observed. The following list contains the most important regulating literature, valid for the *Federal Rep. of Germany*:

- Resolution for dangerous substances
- Law for waste circulation (KRW/AfgG)
- Resolution for the proofs of utilization and removal
- Criminal Code (StGB) 28th section „criminal acts against the environment” §326 - Environment jeopardizing waste management
- Law of chemicals § 27 - penal prescriptions
- Resolution for used oil
- Law of water balance
- Resolution for the waste management of old cars and the adaptation of road prescriptions
- Resolution (EC) No. 2037/2000 of the European Parliament and of the Council for materials that affect the ozone layer
- Resolution to prohibit certain ozone destroying halogen hydrocarbons

The used refrigerant endangers the environment. When dealing with refrigerants the existing prescriptions and regulations are to be followed. **Only qualified staff is allowed to carry out these works!** Water endangering substances - acc. to §§19g-19l - are solid, liquid, and gaseous substances. e.g.: mineral and tar oils (cooling oils), halogen containing organic combinations (refrigerants).

Bezugsquellen: Bundesanzeiger, Beuth Verlag, dtv (Deutscher Taschenbuch Verlag

8. History of modification

Version	Date	Name	Remark	File
A00	15.03.2021	B. Keßler	Source file	WAKL5N3502A
A01	13.12.2021	B. Keßler	Corrected point 3.6 page 12	WAKL5N3502A