



**Operating Instruction**  
**for**  
**KONVEKTA Air Conditioner**  
**KL60CT/4/fully automatic version**



**With digital air conditioning control system KS105**

- R134a
- 24Volt DC
- Compressor: FKX4 / KV4  
FKX24 / KV5  
FKX40 / KV6

**ID#: BA- KL6C502AA**

**KONVEKTA AG**

P.O.Box 2280  
34607 Schwalmstadt  
GERMANY

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## Append.:


- **KONVEKTA** Service Stations
- Registration card / service proof

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## Foreword

This operating instruction has been written for drivers, users and maintenance personnel of your air conditioner.

It contains:

- ⇒ **Operating instruction**
- ⇒ **Security informations** 
- ⇒ **Registration card**

This operating instruction has studied and applied from **the first taking into operation** and later on **regularly** by each person who is involved in handling the machine, e.g.:

- ⇒ Operation including trouble clearing, care and waste management of fuels and auxiliaries.
- ⇒ Maintenance, inspection, repair
- ⇒ Transportation

This makes the user's training easier and troubles by improper handling will be avoided. Compliance with the Operating instruction by the maintenance personnel increases the reliability during operation, increases the life time and reduces expenses for repair and loss of time.

**The national prescriptions for accident prevention and environment protection are to be added to this instruction.**

**The Operating instruction belong to the air conditioner . Please keep one copy handy in the driver's cabin.**

You will certainly understand that we will not recognize any warranty claims due to improper handling, inadequate maintenance, applications that do not correspond to the determined use, utilization of not admitted fuels, or the non-observance of security prescriptions.

**KONVEKTA** will annul without prenotice 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.

This Operating instruction contain all necessary information to operate your air conditioner. In case you need more explanations please contact the next **KONVEKTA** service station<sup>1)</sup>.

<sup>1)</sup> see hand book: „**KONVEKTA** Service Stations“

**NOTES TO THE OPERATING INSTRUCTION**

This Operating instruction is valid for the air conditioners type:

- **KL60CT/4/**

When taking the unit into operation we recommend to add the following data.  
This will also be important for your orders of spare parts, and in case of warranty.

<b>Serial number of the unit:</b>
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<b>Order No.:</b>	<b>A (X) /</b>
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<b>Year of construction:</b>	/	(MM/JJ)
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<b>Date of first operation:</b>	/	/	(TT/MM/JJ)
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The machine corresponds to the security prescriptions of the EC # 89/392/EWG i.d.F. 91/368/EWG and 93/44/EWG.

**Due to the fact that scope of supply depends on the order, equipment of your product may differ in some parts of description.**

**In case your product is equipped with details not shown or described in the operating instruction, your KONVEKTA -Service-Station will always be at disposal for informing you about correct operation.**

In the course of further developments we reserve the right to technical modifications without prenotice. Guarantee and liability conditions of **KONVEKTA AG**'s general business conditions are not enlarged by the above notes.

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

## 1. Technical data air conditioner

Type		KL60CT/4
Refrigerant		R134a
-- quantity approx.	kg	
Operating voltage	Volt DC	24
Current consumption	A	65
Cooling capacity	W	22.000
Air volume	m <sup>3</sup> /h	28.000
<b>Measurements:</b>		4.800
- length	mm	
- width	mm	2.596
- height	mm	1.800
Weight of unit,	kg	215
		170

### 1.1. Pressure Switch

Low pressure switch	0,3 ± 0,1 bar off	2,1 ± 0,2 bar on
High pressure switch	25,5 ± 0,5 bar off	18,0 ± 1,0 bar on

### 1.2. Technical data compressors



#### Important:

In order to avoid leakages on shaft packing of the compressor you have to distinguish two different cases:

1. If the vehicle itself is withdrawn from operation for a longer time, it is also not necessary to switch on the compressor.
2. If the vehicle is used for a longer time without using the cooling unit, it is recommended to activate the compressor every two weeks. Otherwise the shaft packing of the compressor could be damaged by vibrations of the motor.

#### **Refrigerant R134a**

The chlorine-free refrigerant R 134a is used for charging the air conditioner. The traditional refrigerant R 12 is replaced by R 134a. Air conditioners already charged with R 12 should not be recharged nor newly charged with R 134a. This is also valid for components used with R 12. They should not at all be used in units to be charged with R 134a.

Mineral oils used in units with R 12 must not be used in units with R 134a. In this case synthetic oils are to be used. The application of mineral oils in connection with R 134a would cause a break down of the compressor, as the miscibility of mineral oil and R 134a and, thus the refrigerant circuit, are not ensured.

1.2.1. Type KONVEKTA KV4-KV6

Compressor Type	KV 4*	KV 5	KV 6*
Weight <sup>1)</sup>	32 kg	32 kg	32 kg
Oil brand / quantity	Esteröl SE55 / 2l	Esteröl SE55 / 2l	Esteröl SE55 / 2l
Magnetic clutch <sup>2)</sup>	24V DC	24V DC	24V DC

1.2.2. Type FKX

Compressor Type	FKX40/ 465/555/650	FKX4	FKX24 /465/650*
Weight <sup>1)</sup>	35 kg	45 kg	39 kg
Oil brand / quantity	Esteröl SE55 / 2l	Esteröl SE55 / 2l	Esteröl SE55 / 2l
Magnetic clutch <sup>2)</sup>	24V DC	24V DC	24V DC

<sup>1)</sup> Weight without Electro-magnetic clutch (with clutch app. + 10kg).

<sup>2)</sup> ø depending on vehicle type

\* for articulated bus

## **2. Determined use**

The **KONVEKTA** air conditioner represents an air conditioning system that works with the ozone friendly refrigerant R 134a and which creates a pleasant and individually adjustable room temperature by means of forced convection. The determined use includes also the observance of the Operating instruction and the proof of regular inspections as well.

## **3. Working with air conditioning unit**

- **ACTIVATING CONDITIONS:**

Control system does only work if ignition/D + and release of switch S362 are applicable. If one of the 3 signals is interrupted, control system starts to close all outlets.

- **SELF CONTROL:**

If control system on 24VDC is connected, self control is started in order to execute a trouble check of the whole system.

- Short circuit of the digital outlets
- Re-registration from compressor and return air flap
- Sensor data
- Internal system

**Setpoint room temperature:**

If automatic control system of the a/c unit is switched on, control system starts to calculate a comfortable room temperature measured on basis of the outside temperature.

**Outside temperature:**

-30 °C up to 25 °C  
25 °C up to 30 °C  
30 °C up to 70 °C

**Setpoint room temperature:**

Between approx. 22 °C and 24 °C  
approx. 3K below outside temperature  
approx. 27 °C

## **4. Task and function of air conditioning unit**

### **4.1. Task of the air conditioning unit**

- to dehumidify the air
- comfortable room temperature
- to guarantee sufficient fresh air

### **4.2. Function of the air conditioning unit**

- A/C unit only operable with running engine
- A/C unit has to be switched on by air conditioning switch (S362)
- Room temperature is reached automatically in dependence of the outside temperature
- Defrosting thermostat (on evaporator), low pressure switch (on evaporator) and high pressure switch (on condenser) do supervise cooling circuit.
- In case of disturbance compressor is automatically interrupted. Signal light „disturbance air conditioning,, (H218 red) is flashing up. See Chapter 7, (Fault indicators and corrective action).
- **In case of an eventual damage of the a/c unit - operation should immediately be interrupted to avoid consequential damages.** It's recommended to contact one of **KONVEKTA's Service Stations <sup>1)</sup>** and **the unit should first be taken into operation again after it has been checked through specialists.**

#### **4.2.1. Return Air/Mixed Air/Fresh Air Flap**

In dependence to the outside temperature, air flap is automatically changing to return-, mixed- or fresh air.

Outside temperature: - 30°C up to approx. 10°C	Circulated Air
10°C up to approx. 18°C	Mixed Air
18°C up to approx. 23°C	Fresh Air
23°C up to approx. 28°C	Mixed Air
28°C up to approx. 70°C	Circulated Air

#### **4.2.2. Evaporator Blowers**

The evaporator blowers are continuously activated through difference of room temperature. Control response of 40% up to 100% air performance works at approx. 2°C above setpoint temperature. During heating process, it is permanently air conditioned with 30% air performance.

#### **Blower Reduction Activated Through Tacho-Contact:**

Blowers are reduced by tacho-contact (below 5km/h + 24 Volt) at 40% air performance and after release they are immediately adjusted to run slowly and uniformly, if required also with higher speed range.

<sup>1)</sup> see hand book „**KONVEKTA Service Stations** “



### 4.2.3. Cooling Operation

The compressor is working in dependence of room temperature.

Compressor ON	100%	2 °C above setpoint temperature
Compressor OFF	100%	1 °C below setpoint temperature

Both condenser fans are also activated.

In case of switching on the a/c unit, rotational speed of condenser fans is increasing continuously from 0 - 100% specially by means of starting modules .

If pressure of refrigerant circuit is exceeding 17 bar, condenser fans work with maximum rotational speed. If pressure drops under 12 bar, rotational speed is reduced to 50% by means of pressure switch (rotational speed/condenser fan).

**NOTE:** Pressure Switch (rotational speed/condenser fan „P„) placed on condenser  
 Set up 17 bar on  
 12 bar off  
 Starting module placed on electric mounting plate inside return air suction.

### 4.2.4. Heating Process

#### **Digital outlet heating performance:**

If heating is required in roof-and floor area, the digital outlet starts to work, in order to open the main water valve. The digital outlet has a coast down time of 10 minutes maximum. If heating-and cooling performance is required, outlet „heating performance„ is automatically in operation.

#### **Roof-Heating:**

The roof top unit is equipped with a water valve driven with a direct current motor. Depending on status of the pole, valve will be opened or close. In order to avoid that valve is opened or closed immediately, controlling works with time cycle.

Valve	OPEN	->	1 sec.	Valve	CLOSED	->	1 sec.
	STOP	->	25 sec.		STOP	->	2 sec.

#### **Heating Floor:**

a) Heaters equipped with a mixing valve (de-energized open, which means digital outlet ON, valve closed!) working with time cycle depending on heating performance and a water pump transporting water into heating circuit. The water pump has a coast down time of 10 minutes after the last heating process.

b) Underseat-Heater with 2 step collector switch, which is automatically switching to heat performance (0/1/2) which always starts to work in dependence to the measured floor-area-temperature.

Step 1 on:	approx.	4 K below setpoint temperature
Step 2 on:	approx.	6 K below setpoint temperature
Step 2 off:	approx.	4 K below setpoint temperature
Step 1 on:	approx.	2,5 K below setpoint temperature

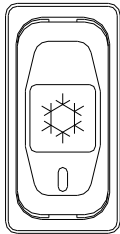
## 5. Operator Controls



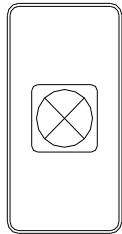
### **Risk of accident!**

- Priority must be given to the traffic.
- Do only operate your air conditioner if the traffic situation does allow it.
- Please make sure that all operation and indicating elements can be recognized and read properly.
- Protect the displays and all indicating instruments against sun rays and other optical faults.
- Take into consideration that the keys at the operation panel are not designed for extreme demands.
- An excessive or quick pressing of the keys / potentiometers for temperature adjustment does not accelerate the cooling process but leads possibly to a damage on the operation panel and spoils the total functioning of your air conditioner.

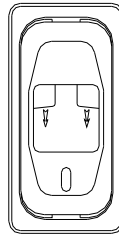
### 5.1. Operation panel / function of the keys



S362  
a/c switch

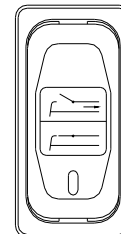


H218  
signal lamp  
disturbance



S363  
switch Reheat

(BBZW0014)



S411  
Smog switch

(BBZW0015)

### **REHEAT:**

Humidity Extraction

While activating switch „Reheat (S363)“, compressor starts to work for 20 minutes, which let temperature in channel go down. Then heating valve is opened until setpoint temperature in the channel is reached.

### **SMOG/RETURN AIR**

If smog switch (S411) is activated, return air-, /mixed air-/ fresh air flap changes to position return air, even if air flap position is e.g. adjusted to fresh air position.

**Note:** After a while switch has to be readjusted to position mixed - or fresh air.

## 6. Maintenance / Servicing

Service and maintenance works have to be executed on basis of registration/service card (see enclosed).

**- Only skilled personnel is allowed to execute these works! -**



### **Risk of accident !**

The experts in charge of installation and maintenance works should at least be trained in accordance with the VBG 20 § 30 (Prescription of the professional/trade association) and strictly obey the legal regulations.

All works or modifications at the air conditioner which are improperly executed can lead to function troubles and can jeopardize the operation safety. We recommend to have works and modifications only executed in a **KONVEKTA service station**<sup>4)</sup>. Also the prescribed regular maintenance works should be executed in an authorized **KONVEKTA service station**<sup>1)</sup>.

**Before having the maintenance executed please read carefully the KONVEKTA safety prescriptions (TD00052A<sup>2)</sup>), in order to avoid dangers and accidents!**

### 6.1. Period of maintenance

At least once a year - **only by refrigerant expert**<sup>1)</sup>

- Check unit for leakages.
- Retighten fixing screws of compressor and bracket at the engine.
- Check electrical connections.
- Check refrigerant Level at sight glass. (If air bubbles are formed - consult service station)
- Check hoses and electric cables on possible damages.
- exchange drier
- Check blower motors and fans at evaporator and condenser

### 6.2. Return air grid

Clean the return air grid in the passenger area monthly. In case of enormous dirt weekly.

### 6.3. Condenser coil

Make sure that fins of condenser are clean. In case of enormous dirt, over pressure starts to be built up inside the air conditioning system which leads to an automatic operating interruption.

#### **Note:**

Regular cleaning should be executed **2 times per year**. In case of enormous dirt more than 2 times (blow through the condenser coil with compressed air).

<sup>1)</sup> see hand book, **KONVEKTA Service Stations**

<sup>2)</sup> source of supply: **KONVEKTA AG, P.O. Box 2280, D-34607 Schwalmstadt**

## 7. Trouble check list



- Only skilled personnel is allowed to execute these works! <sup>1)</sup>

### Malfunction

If the control light for malfunction a/c (H218) is on, the reasons might be the followings:

- short circuit of the digital outputs
- no feedback from the compressor or from the circulated air gate
- short circuit of sensors
- cable failure of sensors

If there is a malfunction, the control light is on until the fault is eliminated. With a certain computer program the faults can be called up in plain text and deleted when the fault is eliminated. When there is a short circuit the short-circuit-proof outputs are checked 5 times and afterwards switched off and a malfunction is registered. When the malfunction is deleted out of the memory the output is unblocked. If there is a short circuit or a cable failure in the sensor, a malfunction is registered with a delay of approx. 30 seconds. If there was only a briefly interruption of the sensor, the fault message remains but the sensor controls furthermore using the actual sensor value.

<b>Trouble</b>	<b>Cause</b>	<b>Repair</b> only by refrigeration expert <sup>1)</sup>
a/c is not running	thermostat is opened	- check inside temperature <sup>2)</sup> - reset thermostat <sup>2)</sup>
	electric wiring disconnected	- check wiring at switch plate
	relay defective	- check relay and replace, if necessary
	defrosting thermostat cuts off	- check evaporator blower and replace, if necessary
	too low outside temp. (possible icing of evaporator)	- switch on "ventilation" only <sup>2)</sup>
	dirt on evaporator coil	- clean evaporator coil with compressed air
	compressor does not compress	- check pressure at suction and discharge side replace compressor, if necessary
	too high pressure caused by high outside temperature	- let unit run until pressure is stabilized <sup>2)</sup>
	leak in unit, deficiency or refrigerant	- check unit for leaks - recharge refrigerant,
	too high pressure	- check if axial fans are running - check automatic fuse - clean condenser coil with compressed air
	low pressure, drier clogged	- replace drier
too low pressure, screen of expansion valve clogged	- clean screen; renew drier	
strong noise at compressor	Defect bearing on compressor.	- replace ball bearing or complete compressor only
	slack V-belt	- check V-belt at compressor drive
	magnetic clutch	- check connections at magnetic clutch

<sup>1)</sup> see handbook „**KONVEKTA** Service Stations“

<sup>2)</sup> operator is allowed to execute these works

## **8. Regulation of damages during the warranty period**

According to our general conditions of sale and delivery we replace defective parts. Labour costs, however, for the exchange of defective parts are not compensated.

If damages should occur to your **KONVEKTA** -air conditioner, refrigeration or deep-freezing unit during the warranty time please proceed as follows:

Please go to an authorized **KONVEKTA** -customer service station and point out that the damage in question has to be repaired on warranty.

### **- Please present your warranty documents -**

If the required parts should not be available at the service station they will be supplied immediately by **KONVEKTA**.

After termination of the repair works a warranty report has to be made together with the service station. Please point out that the service station has to send this report together with the defective parts immediately to us.

Apart from our warranty regulations and without recognition of any legal obligation we are prepared to take over according to our judgement costs for dismounting and re-installation in correspondence with our warranty time table. Assumption therefore is that these works are made by us or by an authorized **KONVEKTA** -service station.

We cannot take over the costs if the repair works have been carried through on your account and if the procedure described above has not been observed.

The dispatch of the replacement parts - free of charge - is made subject to our verification of the defective parts later on. If this inspection shows that the damages are due to improper handling we reserve ourselves the right to send you our invoice for the costs that have arisen.

Assumption for the validity of possible warranty claims is that the complete proof of all prescribed inspections and service works which have to be registered in the warranty card.

## **9. Adequate waste management**

**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 (EWC) No.3093/94 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 skilled personnel is allowed to execute 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)