



KONVEKTA

Thermo Systems

Operating Instruction

for KONVEKTA Air Conditioning
unit

KL40T / KL45T



with control K5

Versions:

- 12 / 24 Volt DC
- Recirculated Air
- Fresh Air
- Heating

ID#: BBA-KL40T12AB

Version: A03

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- Maintenance Schedule Bus [WP07050618](#)
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Introduction

These operating instructions have been written for drivers, operators and the maintenance staff of your air conditioning unit.

In this context, we refer implicitly to the compliance with our general installation guidelines. These can be obtained from the KONVEKTA technical after sales service: TKD@konvekta.com.



It contains:

- Operating instructions
- Safety information 
- Service information

These operating instructions have to be read carefully and made use of before the first start-up and after that regularly by each person who is involved in handling the machine:

- Operation including troubleshooting and waste disposal of fuels and auxiliary agents.
- Servicing, inspection, repair
- Transport

This facilitates the handling and avoids trouble caused by improper operation. Working in compliance with these operating instructions increases operation reliability and service life of the air conditioning unit and reduces life cycle costs.

-  **Please complete these instructions by adding the national provisions for prevention of accidents and environmental protection.**
-  **These instructions are part of the air conditioning unit. Always have a copy at hand 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 with the determined use, utilization of unadmitted fuels or the non-observance of safety provisions.

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.

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^①.

^① See hand book,,KONVEKTA Service Stations

Information on the operating instructions

These operating instructions are valid for the a/c-units type:

- **KL40T/12V** • **KL45T/12V**
- **KL40T/24V** • **KL45T/24V**

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

Serial number of the unit:

Order No.:

Year of construction: (MM/JJ)

Date of first operation: (TT/MM/JJ)

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.

Indications and photos should neither be copied and circulated nor used for competitor's purposes. All rights according to the copyright remain expressly reserved.

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

I. Technical data



Important!

In vehicles that are equipped with an a/c unit with heating function the heating medium has to consist of water/glycol – antifreeze protection (conform the mixing ratio to manufacturers` instructions). This is absolutely necessary to prevent the heaters from frost damage!

(The prevalent antifreeze filling of the vehicle manufacturers goes down to -40°C)

Type:		KL40T	KL45T
Refrigerant		R134a	R134a
- quantity <i>with front box</i>	[kgs] <i>approx.</i>	2,5 3,3	2,5 3,3
Operating voltage <i>resp.</i>	[Volt DC]	12 24	12 24
Current consumption (three-stage) at 13V: (three-stage) at 26V: (stageless) at 26V	[Ampere]	88 44 53	88 44 53
Cooling capacity with KVX40 KVX30 or TM3I TM2I	[Watt]	18.000 15.000. 12.000	18.000 15.000. 12.000
Heating capacity Q= 80	[Watt]	15.000	15.000
Evaporator – Air volume* , <i>free-blowing</i>	[m ³ /h]		
three-stage		4.000	4.000
stageless		4400	4400
Measurements:			
- length	[mm]	1.966	1.966
- width	[mm]	1.368	1.836
- height, - depending on roof radius	[mm]	221 183 – 221	229 183 – 229
Weight of unit, Version:			
- Recirculated Air	[kgs] <i>approx.</i>	65,5	78,5
- Fresh Air	[kgs] <i>approx.</i>	66,5	79,5
- Heating	[kgs] <i>approx.</i>	69	82

* With standard fans and/or blowers

I.1. Pressure Switches

	Bar OFF	Bar ON
Low pressure switch (LP)	0,3 ± 0,1	2,1 ± 0,2
High pressure switch (HP)	25 +0,0/ -0,5	18 ± 0,5

1.2. 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!

⇒ **Compressor type depending on scope of delivery, see identification plate at compressor.**

Kompressor Typ	KVX40/390	KVX30/325	HDC 33	TM2I
Weight (kgs) approx.	33	24,5	15,5	9,7
Oil brand	Esteröl SE55	Esteröl SE55	ZXL 100PG	ZXL 100PG
- quantity (kgs)	2	2	0,5	0,18
Magnetic clutch ¹⁾	12 / 24V DC	12 / 24V DC	12 / 24V DC	12 / 24V DC
- Weight (kgs)	12	7,6		

¹⁾ ∅ depending on vehicle type

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. Generally information for a/c unit



Attention in case of roof top a/c units: Never switch on the a/c unit during car-wash!

- The a/c unit is operational with running engine only.
- At cooling operation the humidity inside the vehicle is decreased, which avoids steamed up windows. The a/c unit works most effectively with windows and doors shut. If, however, the interior of the standing vehicle has been heated up severely by exposure to sunlight, short-time opening of windows and doors may accelerate the cooling down process.
- At high outside temperature and humidity condensate might drip off the evaporator and make a puddle under the vehicle. This is quite normal and no sign for a leakage.
- The filter in the return air grid (optional) retains pollution. If the external air is contaminated with gas switch over to return air operation. The filter should be cleaned or replaced respectively on a regular basis so that the capacity of the a/c unit is not affected.
- **If you think that the a/c unit is damaged, switch it off immediately.** To avoid further damage have it check at a KONVEKTA Service Station[Ⓞ]. Only after that you can take unit into operation.

[Ⓞ] See hand book „KONVEKTA Service Stations“

3.1. Operating Conditions

NOTE:

KONVEKTA uses components made of copper and aluminium, which last a whole unit lifetime under normal environmental conditions. Should the units be operated under aggressive environmental conditions, i.e. air containing salt-, phosphate- or ammoniac extremely, a corrosion of the copper- and aluminium components can not be ruled out. The copper- and aluminium components of the KONVEKTA systems are not suitable for such extreme application conditions. We indicate emphatically, that corrosion is not subject to warranties for defects. KONVEKTA does not take over any warranties for defect, neither for corrosion nor for consequential damage resulting there from, nor for damages caused by cleaning the systems with highly compressed or corrosion advancing substances.

4. Introduction control K5

The air conditioning control **K5** is a control and regulation device for air conditioners in modern buses. The bus driver is relieved from all questions of an optimum air conditioning in the passengers' compartment by a simple and clear handling.

All functions of the a/c unit are adjustable by different key-buttons. Every button has an indicating lamp, called **LED** used as a control function of the buttons or in case of operating. Control board **K5** is connected onto the original dash board lightning of the vehicle. This means that in case of running vehicle lamp, night lightning of control board is also activated.

Auto-test

After activation the control unit performs an auto-test which lasts 20 seconds. Only after finishing this test the control outputs of the unit are unblocked.

Afterwards the adjusted temperature is indicated.

5. Operation



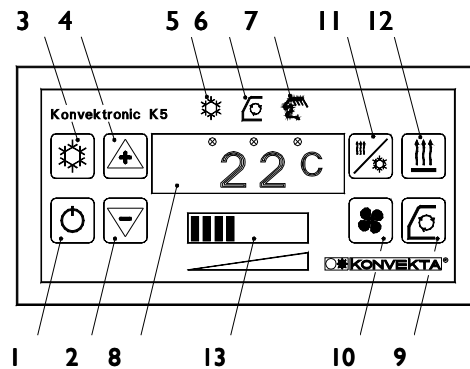
Risk of accident!

- 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 control are not designed for extreme demands.
- An excessive or quick pressing of the keys for temperature adjustment does not accelerate the cooling process but leads possibly to damage on the operation panel and spoils the total functioning of your air conditioner.

5.1. Operation panel / function of the keys

Note:

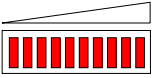






After the switching on the control is adjusted to the set value stored before it was switched off.



(BBZW0038)

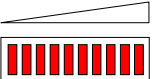
1. Key for switching the control ON/OFF
2. Key for reduction of the selected temperature setting,
Alternatively: Manual adjustment „slow speed“
3. Key for switching ON/OFF the a/c operation
4. Key for increasing the desired room temperature setting,
Alternatively: Manual adjustment "high speed“
5. LED lamp indicates that a/c operation is activated.
6. LED lamp indicates that circulated air function is activated.
7. LED lamp indicates that a manual set-up was effected.
8. 4-digit seven-segmental display for indication of the selected room temperature (°Celsius or °Fahrenheit)
Alternatively: Error code indication in case of trouble.
9. Key for switch-over fresh air- / circulated air operation.
10. Shift-key fan speed manual / automatic
11. Key for switching the REHEAT-operation ON/OFF
12. Shift-key heating operation manual / automatic
13. Illuminated display indicates the fan speed (in 10%- steps), Alternatively: Indication of the heating valve position

5.2.1. Manual adjustment of the blower speed

The set value will be indicated in the display.	e.g. 21°C:
The blower speed will be indicated by an illuminated display.	e.g. speed 100%: 
Push shift-key „fan speed manual/automatic“:	Press key  :  <ul style="list-style-type: none"> LED „manual adjustment“ is lighting up
Reduction of the blower speed:	e.g. press 6 times :  new fan speed will be indicated:  – After 5 sec. the new fan speed will be stored. – The new fan speed will be indicated. The automatic blower speed is deactivated.
Note: By pressing again the <u>fan key</u> the automatic operation will be reactivated. The fan speed is regulated depending on the difference between the existing and set value.	press key  :  <ul style="list-style-type: none"> LED „manual adjustment“ goes out. Automatic blower speed is activated.



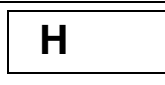
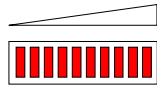

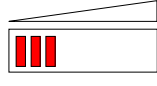


5.3. Heating operation fully automatic => only in case of a/c units with heating option

- Basis: Actual existing room temperature of 10 °C

desired temperature is indicated:	e.g. 21°C:
Blower speed actually 100%, will be indicated with an illuminated display.	e.g. speed 100%: 

Heating operation is activated since the room temperature is 1 K below the set value. The evaporator blower operates with the lowest possible speed. The blower speed will be increased since the room temperature is more than 3 K below the set value. A requirement therefore is that the air outlet temperature is higher than the set value. When room temperature and set value reach roughly the same level the fan speed will be reduced. After room temperature and set value have reached exactly the same level the evaporator blower will operate at the lowest possible speed. The heating valve is 100% opened. When room temperature and set value reach roughly the same level the heating valve will be cycle timed - see *PID- performance*. The air outlet temperature will be constantly kept at the level necessary to achieve the preselected set value.

5.3.1. Manual heating operation => only in case of a/c units with heating option

Press shift-key heating operation:	press key  ,  • LED „manual Adjustment“ is lighting up
„H“ for manual adjustment of the heating valve will be indicated in the display.	
The valve control will be indicated by an illuminated display.	display 100%: 
Reduction of the heating valve adjustment: – heating valve adjustment 30% will be indicated and after 5 sec. the new value will be stored. – Automatic heating is deactivated.	e.g. press key 7 times.  : New heating valve adjustment 30% will be indicated.: 
Note: By pressing again the <u>heating key</u> the automatic operation will be reactivated. The heating valve will be switched on/off automatically depending on the difference between existing value and set value.	press key  :  • LED „manual Adjustment“ goes out Automatic heating is activated.

5.4. REHEAT activate / stop => only for in case of a/c units with heating option

Note:

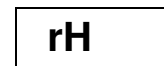
In the REHEAT- operation the compressor is constantly operating in order to dehumidify the air. If required the heating is switched on by the control panel in order to prevent that the selected room temperature changes.

REHEAT- operation is restricted to max. 10 min. After 10 min. the REHEAT operation is stopped by the control panel.. **REHEAT** will be activated for a period of 10 minutes.

Activate REHEAT operation

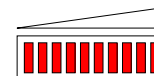
press key , REHEAT -operation is activated

„rH“ will be indicated in the display:



Blower speed 100% will be indicated with an illuminated display.

blowerspeed 100%:

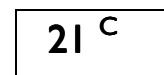


REHEAT Betrieb deaktivieren

press again , REHEAT - operation is deactivated

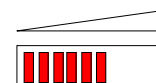
Set temperature value will be indicated

e.g.21°C:



Blower speed of actually 60% will be indicated with an illuminated display.





e.g. blower speed 60%:



5.5. Switch Recirc. Air operation => only in case of a/c units with Rec. air flaps option

In case of recirculated air operation, the income of fresh air is interrupted and the air inside the vehicle is going to be circulated which avoids that outside air, possibly dirty because of exhaust fumes (tunnel driving) has a chance to penetrate into interior room of the vehicle.



If windows are misting up, return air operation should be switched off:

<p>switch over from circulated air operation to fresh air operation</p> <p>NOTE: If key  is pressed again the fresh air flap will be reactivated and circulated air operation restarted (LED-display will light up).</p>	 <ul style="list-style-type: none"> • LED light up, recirculated air operation is active <p>Press key ,</p>  <ul style="list-style-type: none"> • LED is <u>not</u> lighting, fresh air operation restarted
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 **Note:**

After the switching on the control is adjusted to the set value stored before it was switched off.

5.6. Change over of the temperture indication to ° Fahrenheit

<p>Switch over:</p> <p>Note: By pressing the „-“ and „circulated air“-key the temperature indication switches over to <i>Celsius</i> again.</p>	 <i>press constantly, afterwards press the key</i>  <p>preselected set temperature value will be indicated in ° Fahrenheit.</p> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 200px;">50^F</div>
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6. Maintenance / Servicing

Service and maintenance works have to be executed on basis of “Maintenance Schedule, no: [WP05070618](#).”

 - Only skilled personnel are allowed to execute these works! -

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



Danger of accident!

The experts in charge of installation and maintenance works should at least be trained in accordance with the EN 378 - part 4 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 having works and modifications only executed in a KONVEKTA service station^① Also the prescribed regular maintenance works should be executed in an authorized KONVEKTA service station^②.

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

^① See hand book, „KONVEKTA Service Stations

^② Source of supply: KONVEKTA AG, P.O. Box 2280, D-34607 Schwalmstadt

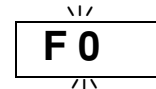
6.1. Trouble indication in the display

ATTENTION:

In case of trouble indication in the display (*F0* resp. *F1*) the control panel is not ready for operation. Operation of the a/c system only after verification by qualified a *KONVEKTA*-Service- Station^①.

6.1.1. Trouble at the temperature sensor F0 (room sensor, blue):

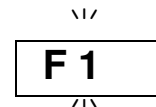
A trouble at the room temperature sensor will be indicated by a flashing display.



The control panel is not ready for operation. Only after the fault-finding and removal (for ex. cable rupture, short-circuit, sensor not connected) the control panel can be operated again.

6.1.2. Trouble at the temperature sensor F1 (air outlet, yellow):

A trouble at the air outlet temperature sensor will be indicated by a flashing display.



The control panel is not ready for operation. Only after the fault-finding and removal (for ex. cable rupture, short-circuit, sensor not connected) the control panel can be operated again.

6.2. Oil change Compressor type KVX

Reference to maintenance Schedule Bus No.: WP 07 05 06 18 Item WK15:

First oil change at the first maintenance of the vehicle, then approx. every 3 years. At every oil change the oil suction strainer has to be cleaned. Observe the oil quantity according to the compressor type (s. item 1.2).

6.3. Return air grid

Reference to Maintenance Schedule Bus No.: WP 07 05 06 18 Item WK13:

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

Important:

- If the filter is soiled, the cooling performance of the air conditioner will decrease.
- **It is not allowed to operate the air conditioner without filter.**
- **If filter is defective, filter must replace!**
- In case the a/c unit will be operated continuously with dirty filter, the evaporator blowers will be damaged
- Due to a reduction of the evaporator air flow, the a/c function „defrosting“ will be activated more often resulting in a decrease of the cooling capacity and damage of the cooling compressor!

6.4. Condenser coil

Reference to Maintenance Schedule Bus No.: WP 07 05 06 18 Item WK03:

Always keep condenser coil fins clean. Severe soiling cause's excess pressure within the a/c-unit system and it automatically stops working.

Attention: The condenser coil fins have to be cleaned with compressed air at least once a year, in case of severe soiling more often.

6.5. Trouble shooting

Trouble	Cause	Repair - <i>only by refrigeration expert</i> ^①
a/c is not running	thermostat is open	- check thermostat- adjust new if necessary ^② - check evaporator blower and replace, if necessary
	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 ^②
	excess pressure	- check if condenser fans are running - check fuses - clean condenser coil with compressed air - let unit run until pressure is stabilized ^②
	deficiency or refrigerant, leakage in unit	- check unit for leaks - refill refrigerant
	low pressure, drier clogged	- replace drier
	magnetic clutch	- check connections at magnetic clutch
	compressor does not compress	- check pressure at suction and discharge side - replace compressor, if necessary
strong noise at compressor	Defect bearing on compressor.	- replace bearing or complete compressor only
	slack V-belt	- check V-belt at compressor drive

^① See hand book,,KONVEKTA Service Stations

^② By user

7. 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

8. 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	Resolution for used oil
Law for waste circulation (KRW/AfgG)	Law of water balance
Resolution for the proofs of utilization and removal	Resolution for the waste management of old cars and the adaptation of road prescriptions
Criminal Code (StGB) 28th section „criminal acts against the environment“ §326 - Environment jeopardizing waste management	Resolution (EWC) No.3093/94 for materials that affect the ozone layer
Law of chemicals § 27 - penal prescriptions	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 are 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).

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- ③ Source of supply:
- Bundesanzeiger
 - Beuth Verlag
 - dtv (Deutscher Taschenbuch Verlag)

9. History of modification

version	date	name	remark	file
A00	07.03.2007	S. Pfluger	source file	BAKL40T12AB
A01	09.07.2007	B.Keßler	Added KL45T and technical data	BAKL40T12AB
A02	20.11.2007	B.Keßler	Fakt 1.2 has now been replaced and added Fakt 1 "Important"	BAKL40T12AB
A03	18.03.2009	B. Keßler	Pkt.1.2 updated; TM31 replaced by HDC 33	BAKL40T12AB