KONVEKTA

Technical leadership starts with ideas.

Operating Instruction

for KONVEKTA

Air Conditioning unit

KL40T / KL45T / KL46T

with control KS60

Versions:

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

ID#: BBA-KL40T12AA
Version: A05

Konvekta AG
Am Nordbahnhof 5
34613 Schwalmstadt
Germany

✆ +49 (0) 66 91 / 76 – 0
🖷 +49 (0) 66 91 / 76 – 200
✉ Info@konvekta.com
www.konvekta.com

KONVEKTA
Technical leadership starts with ideas.

Contents

Appendix:

- Maintenance Schedule Bus WP07050618

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.

Please observe our valid safety instructions, available under www.konvekta.de/asv.html. In case of order placement or any other conclusion of contract the safety instructions get integral part of the contract.

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 unproper 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[ⓘ].

ⓘ *On our website www.konvekta.com in category >service< you will find a survey of contact details of all our service partners close to your location.*

Information on the operating instructions

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

- **KL40T/12V**
- **KL45T/12V**
- **KL46T/12V**
- **KL40T/24V**
- **KL45T/24V**
- **KL46T/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 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.

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.

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

1. 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**	**KL46T**
Refrigerant		R134a		
GWL		1.430		
-- quantity *with front box*	[kgs] *approx.*	2,5 3,3	2,5 3,3	2,5 3,3
Operating voltage *resp.*	[Volt DC]	12 24	12 24	12 24
Current consumptio (three-stage) at 13V: (three-stage) at 26V: (stageless) at 26V:	[Ampere]	88 44 53	88 44 53	88 44 53
Cooling capacity with KVX40 KVX30 or TM31 TM21	[Watt]	18.000 15.000. 12.000	18.000 15.000. 12.000	21.000 - -
Heating capacity Q= 100	[Watt]	25.000	25.000	25.000
Evaporator – Air volume*, *free-blowing*	[m^3/h] 3-stage stageless	4.000 4.400	4.000 4.400	4.000 4.400
Measurements:				
- length	[mm]	1.966	1.985	1.985
- width	[mm]	1.368	1.336	1.336
- **hight,** - **depending on roof radius**	[mm]	221 188	234 188	239 193
Weight of unit, Version:				
- **Recirculated Air**	[kgs] *approx.*	65,5	78,5	81
- **Fresh Air**	[kgs] *approx.*	66,5	79,5	82
- **Heating**	[kgs] *approx.*	69	82	84

* With standard fans and/or blowers

1.1. 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.**

Compressor Type	**KVX40/390**	**KVX30/325**	**HDC 33**	**TM21**
Weight (kgs) approx.	33	24,5	15,5	9,7
Oil brand - quantity (kgs)	Esteröl SE55 2	Esteröl SE55 2	ZXL 100PG 0,5	ZXL 100PG 0,18
Magnetic clutch [1)] - Weight (kgs)	12 / 24V DC 12	12 / 24V DC 7,6	12 / 24V DC	12 / 24V DC

[1)] ø 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.

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 cupper- and aluminium components can not be ruled out. The cupper- 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 KS60

The air conditioning control ***KS60*** 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. LED is shining red if button is pressed or if unit is in operation. Control board KS60 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 (LED green) is also activated.

☛ **Note:**

We recommend driving with automatic mechanism (Key S5, see 5). Additionally to the automatic the following functions can be activated:

a) **SMOG**-flap manually, in order to prevent the entrance of exhaust fumes (in tunnels)
b) **REHEAT-**function to dehydrate the steamed up wind shield

4.1.1. Auto-test

If voltage supply to unit is interrupted, unit starts a self test immediately after reset. Here all entrances and exits are controlled:

Process of auto test will be show at the display:

1. Indication of all LED's and display indication -88
2. Indication Software version: 03
3. Indication Configuration (DIP-Code, for example:)08
4. Indication of auto-test code 01, 02... etc.

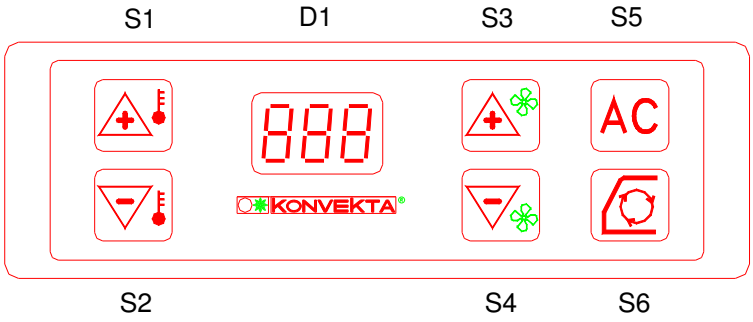
After self-test, the actual temperature can be read on display.

5. Operation

Danger of accident!

- Focussing your attention on the road traffic is of top priority
- Only operate your air conditioning unit when the traffic situation allows it
- Make sure you can clearly recognize and read all operation- and display-elements at any time
- Protect all displays against irritating sunglare and any other optical disturbances
- Please note that the control panel keys have not been designed for heavy stressing
- Excessive or fast pressing of the keys for adjusting the set temperature does not accelerate the cooling down process. It possibly damages the control panel and so affects the general performance of the air conditioning unit

5.1. Operation panel / function of the keys



Short.	*Function*
D1	3-figure display
S1	required **room temperature** can be adjusted (increase) 16 to 28°C
S2	required **room temperature** can be adjusted (decrease) 16 to 28°C
S3	required **air volume** can be adjusted (increase), step 1 or 2 (resp. stepless adjustment)
S4	required **air volume** can be adjusted (decrease), step 1 or 2 (resp. stepless adjustment)
S5	**A/C automatic** (A/C ON/OFF)
S6	**Recirculated Air operation** Close resp. Open. Recirculated air flap; in case of **closed recirculated air flap**, ***LED*** inside key button **is indicating**.

5.2. Operation of a/c system

- Start vehicle engine (refer to orig. operating instruction of the vehicle).
- The air conditioner is activated by means of key AC *„ a/c automatic“*, LED inside key button is indicated. Pressing key **S5** again, air conditioner switched off. The blowers are regulated automatically.
- With key or the required air volume can be adjusted manual.

ATTENTION:
In case of trouble in the a/c cooling circuit the LED-display (key AC S5) is lighting up. Operation of the a/c system only after verification by qualified a ***KONVEKTA***-Service- Station***.***

5.3. Adjustment of temperature

If a/c-unit is operating, vehicle inside temperature can be adjust with key or , in a range of 16°C up to 28°C. In case of operating key (+) or (-), temperature can be increased or reduced. The actual temperature can be read on display.

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

In case of recirculated air operation (key S6 activated), 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 (see 4)
Start of the recirculated air operation: Press key S6, the LED-display will light up. This position should not be adjusted very long. If windows are misting up, return air operation should be switched off:
If key S6 is pressed again the return air flap will be **reactivated** and fresh air operation restarted. The LED-display will **go out**.

Automatic In case of a temperature difference of more than 5°C between the set temperature (adjusted value) to the existing temperature the return air flaps switch to recirculated air operation

Manual If the button S6 is pressed, the recirculated air function of the return air flaps will be maintained independently from a temperature difference

5.5. REHEAT activate / stop

=> Only for units with heating option

Switching on of the air-conditioning system via button S5 afterwards the key **S5** will be pressed shortly twice (double click). **REHEAT** will be activated for a period of 20min., the **LED-display will light up at the same time.**

⇒ Operation of the blowers at the highest speed level by key S3 (increase of the air flow output)

⇒ Recirculated air operation must be switched off.

The premature termination of the **REHEAT** is possible by double-pressing the key S5.

5.6. Display of air duct temperature

=> Only for units with heating option

While pressing buttons **S1** and **S6** actual air duct temperature is displayed for 2 seconds.

5.7. Indicate outside temperature => only in case of a/c units with heating option

=> Standard for units with heating, optional for units without heating starting software version 3

While pressing buttons **S1** and **S4** actual outside temperature is displayed for 2 seconds.

6. Maintenance / Servicing

Please arrange regular dates for maintenance works and services with a KONVEKTA service station, as indicated in maintenance schedule bus no. WP07050618.

- 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 (EG) 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[1].
Before carrying out any maintenance works at your air conditioning unit, carefully read the KONVKETA safety provisions (TD00052A[2]) in order to avoid any dangers and accidents!

[1] *On our website www.konvekta.com in category >service< you will find a survey of contact details of all our service partners close to your location*
[2] *Source of supply:* ***KONVEKTA AG****, P.O. Box 2280, D-34607 Schwalmstadt*

6.1. Oil change Compressor type KVX

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 1.1).

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

Always keep condenser coil fins clean. Severe soiling causes 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.

6.4. Troubleshooting

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

Trouble	Cause	Repair *only by refrigeration expert* ①
a/c is not running	magnetic clutch / compressor is not switched on	• check inside temperature, adjust new if necessary ② • check connections at magnetic clutch
	electric connections disconnected	• check electric connections at switchboard
	relay defective	• check relay, replace if necessary
	defrost thermostat has switched off	• check evaporator blower, replace if necessary
	outside temperature too low (possible icing of evaporator)	• switch on "ventilation" only
	evaporator coil dirty	• clean evaporator coil with compressed air
	excess pressure (pressure too high)	• check axial fans • check fuses at switchboard • clean condenser coil with compressed air
LED AC flashes up	excess pressure caused by high outside temperature	• run unit until pressure has stabilized②
	leakage in a/c unit, lack of refrigerant	• check a/c unit for leakages, • refill refrigerant
	low pressure, dryer clogged	• replace dryer
	low pressure, screen of expansion valve clogged	• clean screen; replace dryer
	compressor does not compress	• check high and low pressure, replace compressor if necessary
Loud noise at compressor	defective bearing at compressor	• replace either bearing or entire compressor
	slack V-belt	• check V-belt at compressor drive

① *On our website www.konvekta.com in category >service< you will find a survey of contact details of all our service partners close to your location*
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
- 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).

---

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

9. History of modification

Version	Date	Name	Remark	File
A00	12.03.2007	S. Pfluger	source file	BAKL40T12AA
A01	09.07.2007	B.Keßler	Added KL45T and technical data	BAKL40T12AA
A02	24.10.2007	B.Keßler	Added item 1 and 1.1 "important"	BAKL40T12AA
A03	18.03.2009	B. Keßler	Pkt.1.2 updated; TM31 replaced by HDC 33	BAKL40T12AA
A04	21.06.2016	B. Keßler	Manual expanded and updated by KL46	BAKL40T12AA
A05	02.03.2017	B. Keßler	Information on the operating instructions and technical data expanded with F-gas-regulation	BAKL40T12AA