OPERATING INSTRUCTIONS
CONTROL ELEMENTS AND REGULATORS KL01 FOR AC SYSTEMS

THIS DESCRIPTION IS ONLY VALID FOR THE FOLLOWING AC SYSTEMS:

AC systems operated with the vehicle engine

- Operation and temperature control by
  - Switches
  - Regulators
  - KlimaLogic 1 (KL01)

AC systems operated with a separate diesel engine

- Operation and temperature control by
  - KlimaLogic 1 (KL01)
  - Mechanical thermostat
  - Electronic thermostat

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Eberspächer Sütrak GmbH & Co. KG
Heinkelstraße 5
71272 Renningen

Phone:
+49 7159 923-0

E-mail:
info.suetrak@eberspaecher.com

Internet:
www.eberspaecher.com

The currently valid version of these operating instructions is available from your local Eberspächer Sütrak dealership. Dealership overview see http://www.eberspaecher.com/air-conditioning/bus-ac-solutions/service-parts/dealersearch.html

DISCLAIMER

These operating instructions have been put together with all due care and attention. However, Eberspächer Sütrak does not assume any warranty for the provided information being up to date, correct, complete or of the requisite quality. Liability claims against Eberspächer Sütrak GmbH & Co. KG referring to material or immaterial damage caused by the use or non-use of the provided information or by using faulty and incomplete information is fundamentally ruled out insofar as Eberspächer Sütrak is not culpable of verifiable wilful intent or gross negligence.

VEHICLE AND AC SYSTEM DETAILS

Please keep the following information available in the interests of correct **SPARE PARTS ORDERS** and for **SERVICE QUERIES**. Any missing details for the AC system can be found on the nameplate. Position of the nameplate on page 20
Please use block letters.

VEHICLE DETAILS	AC SYSTEM DETAILS
Brand / model	System type
Vehicle identification number	System serial number
Initial registration	Compressor type
Customer	Compressor serial number
	Compressor driven by: ☐ vehicle engine ☐ separate diesel engine ☐ without pre-glow device ☐ with pre-glow device
Installation company (company stamp)	Initial commissioning
	Part number AC controller
	Software version AC controller

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CONTENTS

1 INTRODUCTION

FOREWORD

Read these operating instructions through carefully before starting to operate and work on the AC system. These operating instructions are an integral part of the AC system.

ALWAYS KEEP THESE OPERATING INSTRUCTIONS IN THE VEHICLE WITH THE MOUNTED AC SYSTEM. IT MUST BE POSSIBLE TO CONSULT THESE OPERATING INSTRUCTIONS AT ALL TIMES.

Comply with the warning and safety instructions on page 6 to avoid any injury to persons or damage to the product. Operation of the system in other countries is also subject to the corresponding legislation, guidelines and regulations of the country concerned.

Deviations from these installation instructions may occur, depending on the version or modification status of the product.

TARGET GROUP

The operating instructions for the AC controller and the care instructions for the AC system address the vehicle driver.

The maintenance instructions in these operating instructions only address trained, qualified skilled staff with professional knowledge in vehicle engineering and vehicle air conditioning systems.

STYLES USED IN THIS DOCUMENT

Differing styles are used to highlight the meaning of a text in these operating instructions.

Descriptive text is presented without a prefixed character.

- Text preceded by a dot (▪) indicates a list which is started by a heading.
  - – Text preceded by a dash (–) is subordinate to a list with a dot.

➔ Indented text preceded by an arrow (➔) indicates measures to prevent danger.

Underlined blue text denotes a cross-reference, which can be clicked in the PDF document. The part of the document named in the text is then displayed.

SPARE AND WEAR PARTS

As a basic principle, only original spare parts and accessories supplied by Eberspächer Sütrak should be used.

Spare parts and accessories not supplied by Eberspächer Sütrak have not been tested and approved.

Other spare parts and accessories may be used after obtaining Eberspächer Sütrak's approval. The installation or use of products that have not been confirmed may possibly change the design attributes of the AC system.

Eberspächer Sütrak does not assume any liability for damage caused by using spare parts and accessories that have not been approved or by carrying out incorrect work to the AC system.

NOTE

Eberspächer Sütrak uses copper and aluminium components in its AC systems which are capable of lasting for the lifetime of the AC system under normal ambient conditions. However, corrosion to the copper and aluminium components cannot be ruled out if the AC systems are operated under aggressive ambient conditions, e.g. air with extreme levels of salt, phosphate or ammonia. The standard copper and aluminium components fitted in the Eberspächer Sütrak systems are not suitable for these extreme operating conditions. Special applications are available on request for these situations. Eberspächer Sütrak draws explicit attention to the fact that corrosion is not covered by material defect liability. Eberspächer Sütrak does not assume any liability for corrosion or damaged caused by cleaning the systems with compressed or corrosive substances.

GUARANTEE

Eberspächer Sütrak does not grant any guarantee if:

- Individual parts or parts of products are damaged by negligence, accident or other cases of misadventure.
- The owner does not perform any normal maintenance at all, or only in part, or deficiently.
- The AC systems are not operated according to the written operating instructions issued by Eberspächer.
- Eberspächer Sütrak parts are replaced because of normal wear.
- Parts or products are repaired or changed by third parties. The only exception applies if Eberspächer Sütrak has given written permission for such repairs or changes.
- Parts fitted as spare parts in Eberspächer Sütrak AC systems are not original parts from Eberspächer Sütrak.

2 SAFETY INSTRUCTIONS

WARNINGS AND INDICATIONS

Warnings and indications can be found in each case before the operating instruction which could result in a hazard or damage to property.

EXPLANATION OF THE INDICATIONS USED IN THE TEXT

DANGER!

This indication refers to a high-risk hazard which, if not heeded, will result in imminent death or serious physical injury.

➔ This arrow indicates the appropriate precaution to take to avert the danger.

WARNING!

This indication refers to a medium-risk hazard which, if not heeded, can result in possible death or serious physical injury.

➔ This arrow indicates the appropriate precaution to take to avert the danger.

CAUTION!

This indication refers to a low-risk hazard which, if not heeded, can result in possible slight to medium physical injury or damage to property.

➔ This arrow indicates the appropriate precaution to take to avert the danger.

NOTE

These indications provide recommendations for use and useful tips for operation, installation and repair.

REGULATION!

This information indicates a statutory regulation.

WARNINGS ON MACHINERY AND PACKAGING

The following pictograms are used as warnings on the machinery and packaging of Eberspächer Sütrak GmbH & Co. KG, possibly in combination, apart from danger indications.


General warning.


Warning of dangerous electrical voltage.


Warning of hot surface.


Warning of the risk of crushing/hand injuries.


Warning of rotating parts with sharp edges.

ACCIDENT PREVENTION

General and specific national accident prevention regulations and the corresponding workshop and operating safety instructions are to be observed.

DIRECTIVES, LEGISLATION AND STANDARDS

Due consideration must be given to the following directives and regulations:

- Machinery Directive 2006/42/EC
- Pressure Equipment Directive 97/23/EC
- Low Voltage Directive 2006/95/EC
- Electromagnetic Compatibility 2004/108/EC
- Guideline relating to safety and environmental requirements for refrigerating systems and heat pumps pursuant to DIN EN 378.
- Directive 2006/40/EC relating to emissions of refrigerants from air conditioning systems in motor vehicles with fluorinated gases.
- Regulation (EC) 307/2008 relating to training attestations regarding the handling of fluorinated gases in air-conditioning systems.
- Regulation (EC) 842/2006 relating to the test intervals of refrigeration equipment and the corresponding records to be kept.

GENERAL SAFETY INSTRUCTIONS

All instructions stated below must be read and heeded. Failure to comply at all or correctly with these instructions can result in malfunctions or serious physical injury through to death.

- Eberspächer Sütrak only recommends refrigerant R134a as per ARI standard 700. It is forbidden to use additives as leak-detecting contrast agent.
- Air-conditioning systems by Eberspächer Sütrak GmbH & Co. KG have been developed according to the very latest refrigeration and air-conditioning technology and are designed for optimum safety of the operating and maintenance staff.
- During normal operation, all moving parts are protected to prevent accidents. However, there may be open access to moving parts during inspections, checks and maintenance work. It is therefore important to observe sufficient clearance to these parts when the air-conditioning system is working. Removing these safety covers is strictly forbidden.

2 SAFETY INSTRUCTIONS

REQUIREMENTS MADE OF THE STAFF

Installation, maintenance and repair work to air-conditioning systems may only be carried out by skilled workers with corresponding training and proficiency certification.

PERSONAL SAFETY GEAR

Persons working on the air-conditioning system and in the immediate vicinity must always wear the personal safety gear.
This includes:


Safety gloves


Safety goggles


Non-slip safety boots

It is also strongly recommended not to wear loose clothing or jewellery. Loose clothing and jewellery can get trapped in rotating fan wheels.

A safety harness must be used when working on the vehicle roof.


Safety harness

WORKING AREA

- Highly concentrated refrigerant vapours can cause cardiac arrhythmia and sudden death.
  - ➔ Ensure there is adequate ventilation of closed rooms.
  - ➔ Wear a respirator mask.
- The heat developed by a glowing cigarette can decompose the refrigerant with the emission of highly toxic substances.
  - ➔ Smoking is strictly forbidden when working on the AC system and with the refrigerant.
- When working on the vehicle roof, there is a risk of falling off with fatal injuries or death.
  - ➔ Use safety harness and ropes for a secure working position.
  - ➔ Use a safety platform with safety grille or safety net.

ELECTRICAL SAFETY

- Mains-powered compressors work with AC voltage of up to 400 volts. Any contact with unprotected cables poses mortal danger from an electric shock.
  - ➔ Turn off the vehicle ignition.
  - ➔ Do not touch unprotected cables.
  - ➔ Have unprotected cables repaired by a qualified electrician.

SAFETY FOR INSTALLATION, OPERATION AND MAINTENANCE

- Refrigerants can cause frostbite on contact with the skin or eyes.
  - ➔ Wear personal safety gear (safety gloves, safety goggles, safety boots), see Personal safety gear.
  - ➔ If refrigerant is spilled on the skin, rinse the affected area with warm water. Seek medical advice immediately.
  - ➔ If refrigerant is spilled in the eyes, rinse for at least 10 minutes with clean water or preferably an eyewash. Seek medical advice immediately.
- Pressure lines can heat up considerably during operation of the system and cause burns.
  - ➔ Wear personal safety gear (safety gloves, safety goggles, safety boots), see Personal safety gear.
- Thin fins with sharp edges on the evaporator and condenser pipes can cut your hands.
  - ➔ Wear personal safety gear (safety gloves, safety goggles, safety boots), see Personal safety gear.
- The impeller wheels of the ventilators and fans can cause crushing injuries and even possibly result in severed limbs.
  - ➔ Do not remove any safeguards while the system is working.
  - ➔ Do not do any work to the AC system while it is working.
  - ➔ Only proceed with work on the AC system when the ventilators and fans are at a standstill.
- When there is an increase in temperature, overfull refrigerant bottles can burst because of the generated overpressure.
  - ➔ Only fill refrigerant bottles up to the stipulated level.
- AC systems operate under high pressure. Uncontrolled refrigerant leaks may cause serious injuries and permanent damage to health.
  - ➔ Ensure that the maximum pressure and level in the AC system are never exceeded.
- When doing soldering work to the refrigerant circuit, any residual refrigerant may emit highly toxic decomposition products.
  - ➔ The refrigerant circuit must be drained completely before starting work.
  - ➔ Purge the refrigerant circuit with forming gas 95/5 (H_2N_2) or dried nitrogen (quality 4.6 or 5.0).

2 SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS FOR INSTALLATION, OPERATION AND MAINTENANCE

- In an overfull refrigerant circuit, an increase in temperature and resulting overpressure may reduce the performance of the system or cause faults and disruptions.
  ➔ Always only fill the refrigerant circuit up to the stipulated level.
- The unit covers of the AC system are secured with locks. Any unit covers that are not locked may work loose while the vehicle is moving and cause considerable damage to the vehicle, the AC system and other road users.
  ➔ Always check that the locks have been correctly secured every time after maintenance work has been carried out.
- Any unexpected activation of the AC system during installation, maintenance or repair work can cause serious injuries.
  ➔ Turn the ignition off before any kind of work begins on the AC system and secure it to prevent it being switched on again.

SAFETY FOR THE ENVIRONMENT

- The refrigerant must not be allowed to drain into the environment and certainly not discharged in the local sewage system.
  ➔ The refrigerant must be disposed of at the corresponding collection points.

3 HOW AN AC SYSTEM FUNCTIONS

FUNCTIONAL PRINCIPLE

The refrigerant is drawn in gaseous state from the evaporator (16) into the compressor (1). During compression, both the temperature and the pressure of the gaseous refrigerant increase. The hot, pressurised refrigerant is then forwarded to the condenser (5).

In the condenser (5), heat is withdrawn from the hot, pressurised refrigerant so that the refrigerant condenses and becomes liquid. The heat is released to the outside air, expelled by the condenser fans (6) via the condenser fins (5).

The condenser (5) now forces the liquid refrigerant through various components into the drier (10).

From the drier (10), the refrigerant flows through the liquid line via the sight glass (12) to the expansion valve (13).

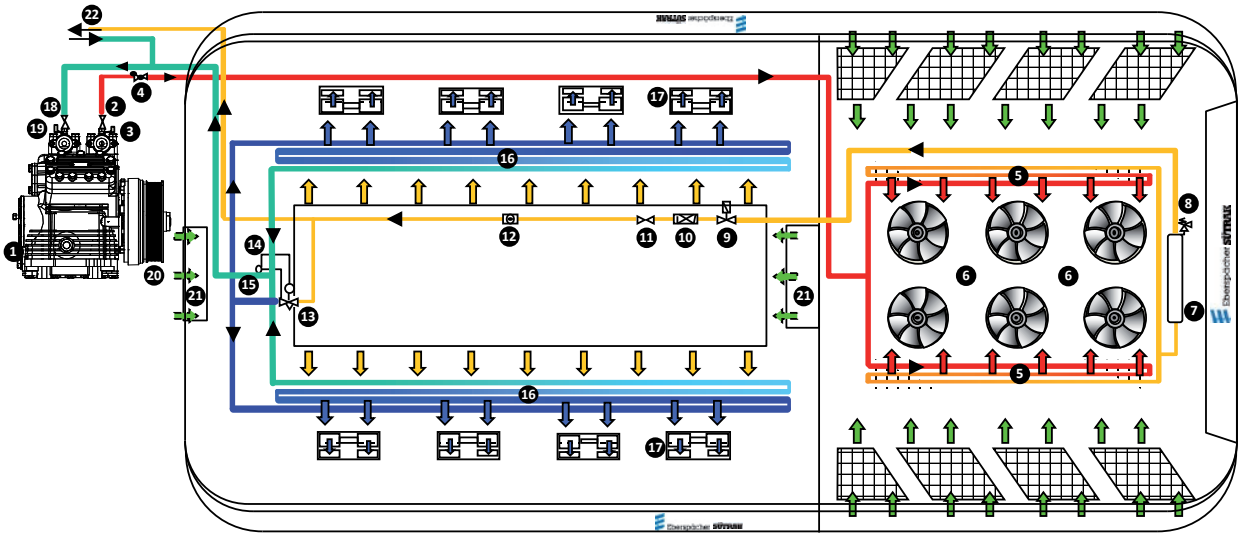
The task of the expansion valve (13) is to control the amount of liquid refrigerant flowing into the evaporator (16). The expansion valve (13) also holds pressure in the area of the evaporator (16) to a constant level to achieve optimum cooling.

The refrigerant is distributed evenly in the evaporator (16) by feeding the refrigerant into the individual evaporator coils (16) via a distributor and several injection pipes.

The evaporator fans (17) draw warm inside air from the vehicle into the system via the evaporator fins so that the air releases part of its heat to the refrigerant which cools the inside air from the vehicle by starting to evaporate on account of the low pressure.

This is a constantly recurring process.

EXAMPLE OF AN IN-LINE AC SYSTEM



REFRIGERANT AGGREGATE STATE

Low pressure - gaseous	Outside air
High pressure - gaseous	Heated extraction air
High pressure - liquid	Heated inside air
Low pressure - liquid	Cooled inside air

1 Compressor
2 Pressure shut-off valve
3 HP pressure switch
4 Non-return valve
5 Condenser with fins
6 Condenser fan
7 Receiver
8 Pressure-relief valve (safety valve)
9 Solenoid valve
10 Drier
11 Shut-off valve
12 Sight glass
13 Expansion valve
14 Sensor for expansion valve
15 Equaliser line
16 Evaporator
17 Evaporator fan
18 Suction shut-off valve
19 LP pressure switch
20 Electromagnetic clutch
21 Fresh air flap
22 Front box connection

4 OPERATING THE AC SYSTEM

4.1 OPERATING EBERSPÄCHER-SÜTRAK AC SYSTEMS

Eberspächer-Sütrak AC systems are operated

- with the vehicle engine or
- with a separate diesel engine

and regulated with various control units.

For the configuration of the fitted AC system, see page 2 in the section “Information about the vehicle and AC system”.

Operation and temperature control in
AC systems operated with the vehicle engine is based on:

- Switches
- Regulators
- AC controller KlimaLogic 1 (KL01)

Operation and temperature control in
AC systems operated with a separate diesel engine is based on:

- AC controller KlimaLogic 1 (KL01)
- Mechanical thermostat
- Electronic thermostat

4.2 AC SYSTEMS OPERATED WITH THE VEHICLE ENGINE

OPERATION AND TEMPERATURE CONTROL
If no electronic control unit is provided in the vehicle, the AC system can be controlled manually with switches or knobs.

The AC system or the ventilation can only be started up when the vehicle engine is running with the power supply created by the generator.

4.2.1 OPERATION AND TEMPERATURE CONTROL WITH SWITCHES

Suitably marked toggle switches are used to turn the AC system on as well as adjusting the fan speed and fresh air supply.

AC SYSTEM switch

Switch AC system on:

- Press switch on the side with the symbol.

Switch AC system off:

- Press switch on the side without the symbol.

VENTILATION switch

There is a choice of two fan speeds for the ventilation mode.

Fan speed 1:

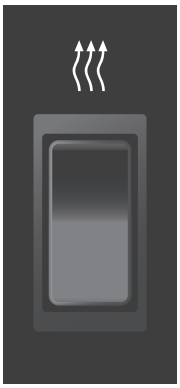
- Press switch on the side with the symbol .

Fan speed 2:

- Press switch on the side with the symbol .

Switch fan off.

- Put switch in middle setting.



FRESH AIR switch

For additional fresh supply:

- Press switch on the side with the symbol.

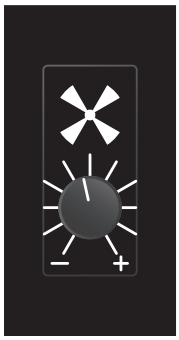
To switch the additional fresh supply off:

- Press switch on the side without the symbol.

Condition:
The vehicle must be fitted with fresh air flaps.

4.2.2 OPERATION AND TEMPERATURE CONTROL WITH KNOBS

There are two regulator knobs with identical functions for switching the AC system on and for adjusting the fan speed and temperature level.



FAN knob

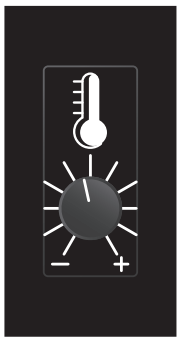
Switch AC system on:

- Turn the knob clockwise from the minus sign (–) to the plus sign (+).
- Adjust the fan speed within the control range (dial).

Switch AC system off:

- Turn the knob counterclockwise to the minus sign (–).

4 OPERATING THE AC SYSTEM



TEMPERATURE knob

Adjust the inside temperature with the two knobs. The thermostat assumes control and keeps the temperature constant.

Condition:
The system must be equipped with a thermostat and temperature sensor.

4.2.3 OPERATION AND TEMPERATURE CONTROL WITH THE KLIMALOGIC 1 (KL01) AC CONTROLLER

For a description of operation and temperature control with the AC controller KlimaLogic 1 (KL01) see chapter 4.4 from page 13:

4.3 AC SYSTEM OPERATED WITH SEPARATE DIESEL ENGINE

START, MONITORING, TEMPERATURE CONTROL AND OPERATION

An AC system with separate diesel engine can only be switched on when the engine is running.
The function of the diesel engine is monitored constantly and indicated by corresponding displays.

The separate diesel engine must be switched off and the vehicle engine switched on for vehicle ventilation.

4.3.1 CONNECT THE POWER SUPPLY AND START THE DIESEL ENGINE

CONNECT THE POWER SUPPLY
SWITCH ON THE AC CONTROLLER KLIMALOGIC 1 (KL01)

PRESS THE MAIN SWITCH on the side with the symbol:
- Power supply connected.
- AC controller KlimaLogic 1 (KL01) switched on.

Display
⇨ Brief display of AC system configuration, see table on page 13.
⇨ Depending on the software and hardware version, the status of the roof fan operating hours counter appears for a few seconds (in units of 10 h). Display 0001 ≙ 10 h.

START THE DIESEL ENGINE
SWITCH THE AC SYSTEM ON

Press the AUTOMATIC AC button of the KlimaLogic 1 (KL01):
- Green control LED.
- Enable diesel engine START.

CAUTION!
The diesel engine can be damaged if the START button is pressed too long or pressed and held.
➔ Press the START button max. 10 seconds.
➔ The START button should **not** be pressed and held.

- Press the START button briefly

The diesel engine starts up and the AC system is switched on.

LED indicator
⇨ Depending on the software and hardware version, the red control LED in the AUTOMATIC AC button lights up for 3 seconds and then goes off again.

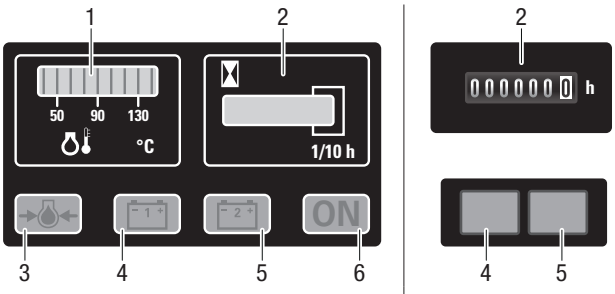
Display
⇨ Inside temperature setting e.g. 22.

4 OPERATING THE AC SYSTEM

4.3.2 MONITORING SEPARATE DIESEL ENGINE

The separate diesel engine is monitored constantly. The AC system is switched off immediately in the event of any faults.
The operating status is indicated with the displays A or B.

4.3.2.1 Displays



1 **Engine temperature** operating status.

2 **Operating hours counter** for the diesel engine:
Information for heeding the maintenance intervals stipulated by the engine manufacturer:
2A (in units of 10 h). Display 0001 ≙ 10 h
2B (in units of 1 h). Display 0001 = 1 h

3 **Oil pressure display**
- Lights up:
  - when the diesel engine starts up
  - when there is an oil pressure fault in the diesel engine. AC system is switched off immediately
- Goes off:
  - when the AC system reaches its operating state.

4A **Control lamp generator 1**

5A **Control lamp generator 2**
- Lights up:
  - when the diesel engine starts up
  - when there is a fault in the generators; AC system is switched off immediately.
- Goes off:
  - when the AC system reaches its operating state.

4B **Control lamp diesel engine generator**

5B **Control lamp external generator**
- Lights up:
  - when the diesel engine starts up
- Goes off:
  - when the AC system reaches its operating state.

6 **Control lamp diesel engine**
- Lights up:
  - when the diesel engine reaches its operating state.
- Goes off:
  - when there is a fault in the diesel engine or AC system; AC system is switched off immediately.

4.3.3 TEMPERATURE CONTROL

In AC systems with separate diesel engine, the temperature is controlled either with
- a mechanical thermostat
- an electronic thermostat
- the AC controller KlimaLogic 1 (KL01).

4.3.3.1 Temperature control with mechanical thermostat

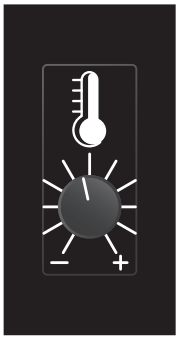
Mechanical THERMOSTAT

The mechanical thermostat (bimetal switch) is mounted in the passenger compartment. The required temperature inside the vehicle is adjusted with the thermostat dial.
The thermostat automatically controls the AC system and keeps the required temperature inside the vehicle on a constant level.

4.3.3.2 Temperature control with electronic thermostat

The fitted electronic thermostat is regulated by a temperature controller and a temperature sensor.

There are two regulator knobs with identical functions for adjusting the temperature. One of the two knobs is fitted in the driver's instrument panel.



TEMPERATURE knob

The temperature inside the vehicle is adjusted with the two knobs. The thermostat assumes control of the AC system and keeps the required temperature inside the vehicle on a constant level.

Condition:
The system must be equipped with a thermostat and temperature sensor.

4.3.3.3 Temperature control with AC controller KlimaLogic 1 (KL01)

For a description of operation and temperature control with the AC controller KlimaLogic 1 (KL01) see chapter 4.4 from page 13:

4 OPERATING THE AC SYSTEM

4.4 OPERATING AN AC SYSTEM WITH AC CONTROLLER KLIMALOGIC 1 (KL01)

The AC controller KlimaLogic 1 (KL01) can be used in

- AC systems operated with the vehicle engine
- AC systems operated with a separate diesel engine

for making the necessary adjustments and displaying queries.

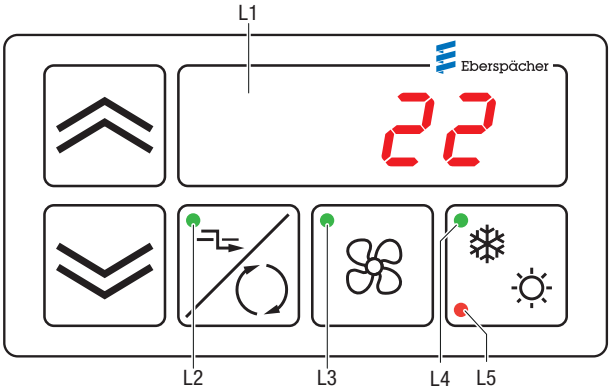
In AC systems operated with a separate diesel engine, connect the power supply first (see chapter 4.3.1, on page 11). After switching on the KlimaLogic 1 (KL01) and enabling the start, turn the diesel engine on.

NOTE

- The AC controller is equipped with the Automatic Reheat, Dry Heat Mode or ECO Mode functions, depending on the climate at the operation site and software version.
  Information about these features is available from your dealership.
- All activities, adjustments and queries are only possible when the vehicle engine/diesel engine is running.

4.4.1 SWITCH KLIMALOGIC 1 (KL01) AND THE AC SYSTEM ON

- The AC controller KlimaLogic 1 (KL01) and the AC system are switched on by pressing any button on the control unit when the vehicle engine is running.
- In AC systems with separate diesel engine, the AC controller KlimaLogic 1 (KL01) is switched on when the power supply is connected (by pressing the main switch).



L1: Temperature and function display
L2: LED fresh air mode “ON” (green)
L3: LED manual fan control “ON” (green)
L4: LED cooling mode “ON” (green)
L5: LED fault AC system (red)

4.4.2 DISPLAYS AND LED INDICATORS

Displays and LED indicators only light up when the vehicle engine/diesel engine is running and the KlimaLogic 1 (KL01) has been switched on.

4.4.2.1 Display of the AC system configuration

The KlimaLogic 1 (KL01) briefly shows the AC system configuration in the display when:

- supply voltage connected.
- main switch ON, power supply, diesel engine.

Displays according to the listed configurations.

Display	AC system configuration	Comment
CS	24 volts, with fully variable fan	Standard
CS =	24 volts, with two-speed fan (type 1)	
CS _ =	24 volts, with two-speed fan (type 3)	
CS ≡	24 volts, with three-speed fan (type 2)	
CS _	24 volts, with fully variable fan (type 4)	
CS .	12 volts, with fully variable fan	
CS =.	12 volts, with two-speed fan (type 1)	Standard
CS _ =.	12 volts, with two-speed fan (type 3)	
CS ≡.	12 volts, with three-speed fan (type 2)	

4.4.2.2 Roof fan operating hours counter display

Depending on the software and hardware version, the status of the roof fan operating hours counter appears for a few seconds (in units of 10 h) after the system configuration. Display 0001 ≙ 10 h.

4.4.2.3 Inside temperature setting display

After a start delay, which may be adjusted, the last adjusted functions are reactivated and then the inside temperature setting is displayed.

4.4.2.4 Information display

Corresponding information appears briefly when certain functions are called up.

4 OPERATING THE AC SYSTEM

4.4.3 BUTTON FUNCTIONS

PLUS button

Depending on the currently active function, every time the button is pressed:

- the inside temperature setting is increased by 1°C.
- the fan speed is increased.

The adjusted value is adopted after a short time without pressing a button.

MINUS button

Depending on the currently active function, every time the button is pressed:

- the inside temperature setting is decreased by 1°C.
- the fan speed is decreased.

The adjusted value is adopted after a short time without pressing a button.

FRESH AIR/RECIRCULATING AIR

Changes over from fresh air to recirculating air mode, or from recirculating air to fresh air mode.

- Green control LED:
  - fresh air mode is activated.

MANUAL FAN CONTROL

Switches the manual fan control ON / OFF.

- Green control LED:
  - Manual fan control is activated.

AUTOMATIC AC

Activates automatic inside temperature control and fan control.

- Green control LED:
  - Cooling mode is activated.
- Red control LED:
  - AC system fault.

4.4.4 SWITCH THE AC CONTROLLER AND AC SYSTEM OFF

4.4.4.1 Switch off the AC system operated with the vehicle engine

- by turning off the vehicle engine
- with button combination

SWITCH THE AC CONTROLLER KLIMALOGIC 1 (KL01) AND THE AC SYSTEM OFF WITH THE BUTTON COMBINATION

Press the RECIRCULATING AIR/FRESH AIR and FAN CONTROL buttons **at the same time**.
The AC controller KlimaLogic 1 (KL01) is deactivated and the AC system switched off.

- The current functions and settings are saved.
- The display and the control LEDs in the buttons go off.

4.4.4.2 Switch off the AC system operated with a separate diesel engine

- by interrupting the power supply with the main switch.

INTERRUPT THE POWER SUPPLY
SWITCH THE AC CONTROLLER KLIMALOGIC 1 (KL01) AND THE AC SYSTEM OFF

PRESS MAIN SWITCH on the side without the symbol:

- Power supply interrupted.
- AC controller KlimaLogic 1 (KL01) and the AC system switched off.

4.4.5 ACTIVATE FUNCTIONS

SWITCH AUTOMATIC AC ON

Press AUTOMATIC AC button.
Green control LED:

- Automatic inside temperature control is activated.
- Automatic temperature-dependent fan control is activated.

Display is as follows:
⇨ Inside temperature setting e.g. *22*.
Adopt or change inside temperature setting.

ADOPT INSIDE TEMPERATURE SETTING
The displayed setting is adopted after a short time without pressing a button.

4 OPERATING THE AC SYSTEM

CHANGE INSIDE TEMPERATURE SETTING

Press PLUS or MINUS to adjust the required inside temperature in 1 °C steps.

The adjustable temperature range is between 18 °C and 28 °C. The selected inside temperature appears in the display and is adopted after a short time without pressing a button.

The cooling function is blocked for outside temperatures below 2 °C.

CHANGE INSIDE TEMPERATURE SETTING AGAIN IF NECESSARY (AUTOMATIC AC IS ACTIVATED)

Press PLUS or MINUS.

Display is as follows:

⇨ Current inside temperature setting

Press Plus or Minus again to adjust the required inside temperature in 1 °C steps.

MANUAL FAN CONTROL,
automatic AC **is activated**

The FAN CONTROL button can be used to switch off the automatic fan control and to make a manual selection of the fan speed.

Press FAN CONTROL.

- The manual fan control is switched on. Green control LED.

Display is as follows:

⇨ **5** (highest fan speed)

Press PLUS or MINUS to select one of five fan speeds.

The selected fan speed appears in the display and is adopted after a short time without pressing a button.

Fan speeds 1 – 5 correspond to a fan output of 20 %, 40 %, 60 %, 80 %, 100 %.

The fans cannot be switched off when the automatic AC is activated (when the AC system is working).

Press FAN CONTROL again.

- The manual fan control is switched off and the automatic fan control is switched on again.

NOTE

- For 2- or 3-speed fans and activated automatic AC, the “Fan OFF” setting is blocked.
- For fully variable fans and activated automatic AC, the “Fan OFF” and “fan speed 1 (20 %)” settings are blocked.

MANUAL FAN CONTROL,
automatic AC **is deactivated**

When the automatic AC is deactivated, the roof fans can be used for ventilating the vehicle and adjusted manually. If necessary, press the automatic AC button to deactivate an activated automatic AC.

Press FAN CONTROL.

- The manual fan control is switched on. Green control LED.

Display is as follows:

⇨ Current fan speed

Press PLUS or MINUS to select one of five fan speeds.

The selected fan speed appears in the display and is adopted after a short time without pressing a button.

Fan speeds 1 – 5 correspond to a fan output of 20 %, 40 %, 60 %, 80 %, 100 %. The roof fan is stopped in the “Fan OFF” setting.

Press FAN CONTROL again.

- The manual fan control is switched off. The control LED goes off.

REHEAT (OPTIONAL)

The REHEAT function is used to clear the vehicle windows.

Press the RECIRCULATING AIR/FRESH AIR and AUTOMATIC AC buttons at the same time. Both control LEDs are green.

- The REHEAT function is started.

The heating and cooling functions work together for about 3 minutes with the fan set to maximum speed and the ventilation flaps adjusted to recirculation mode.

Condition:

- The outside temperature sensor must be connected to the KlimaLogic 1 (KL01) control unit.
- Outside temperature above 2 °C.
- Functioning inside/outside temperature sensors.

4 OPERATING THE AC SYSTEM

4.4.6 DISPLAYS

TEMPERATURE DISPLAY

Press the FRESH AIR / RECIRCULATING AIR button and MINUS at the same time:

- The current inside temperature (*I* = inside temperature) appears in the display for 10 seconds, e.g. *I 22*.
- Press both buttons again to show the outside temperature (*O* = outside temperature) e.g. *O 27*.
- A defective inside temperature sensor is indicated in the display as *I* --, a defective outside temperature sensor as *O* --.

FAULT DISPLAY

If the red LED in the AUTOMATIC AC button stays on all the time, this indicates a defect in the refrigerating circuit.

COOLING MODE

If three faults are triggered within 10 minutes by the high pressure or low pressure controller with activated compressor monitoring, the magnetic clutch is no longer actuated.

Solution
Enable the AC system by turning the vehicle ignition on again. If this happens again, contact your workshop immediately.

NOTE

After the magnetic clutch has been working constantly for 60 minutes, the actuation is turned off for 5 seconds. The ball bearing now turns and lubricates itself.

5 MAINTENANCE

MAINTENANCE

Regular maintenance work and function checks are necessary to warrant proper operation of the AC system. When maintenance work is carried out in accordance with the maintenance chart, this increases the service life and enhances the operating safety of the AC system, as well as minimising faults in the system.

The maintenance intervals have to be adapted accordingly under extreme climatic conditions (dust, snow, ice, etc.).

CAUTION!

It is vitally important for maintenance work to be carried out professionally, because refrigeration and AC systems are self-contained systems. Always heed absolute cleanness when replacing individual components or performing repairs to the systems. As a rule, damage caused by soiling does not become immediately evident. Any work that has to be carried out on the open system must be performed swiftly to prevent moisture from penetrating the refrigerant circuit.

➔ Always replace the filter drier every time after the refrigeration system has been opened.

NOTE

When AC systems are operated with a separate diesel engine, separate operating instructions are enclosed for the diesel engine. Maintenance work must be carried out according to the maintenance instructions in this manual. Additional maintenance charts are available from Eberspächer Sütrak on request. Please consult your customer service advisor.

MAINTENANCE CHARTS

If the compressor has not been working for a longer period of time during the winter months, the AC system must be started up for about 30 minutes at least once a month.

This prevents the compressor gaskets and bearings from drying out and running dry. The compressor oil pump only operates when the AC system is working.

Furthermore, starting the system in this way prevents the insulation of the electrical heating elements from absorbing moisture and becoming hygroscopic. Moist insulation clearly reduces the insulation resistance and dielectric strength.

To prevent moisture absorption, those heating elements kept as spare parts or not in use for a longer period of time should be stored in a dry place. This prevents the insulation resistance from falling below the permitted minimum level.

Prevent moisture absorption by

- regularly operating the electrical heating in the AC system
- storing the heating elements in a dry place.

NOTE

- To start up the compressor during the winter months, the vehicle inside temperature must be above the thermostat cut-off point. To this end, you may need to heat up the vehicle interior or set the AC controller to constant cooling mode.
- The shaft seal uses oil for sealing and lubrication. It is therefore normal for there to be a certain amount of oil leakage (oil droplets). This applies in particular to the run-in period of the compressor (200 to 300 hours).

Weekly maintenance work, every 50 operating hours but at the latest after 10,000 km mileage.

This maintenance work must be carried out by trained staff.

- Clean the air filter mats at the recirculating air intake and at the evaporator. To do so, remove the filter mat and wash it thoroughly. Insert the dried filter mat again. Always replace any damaged filter mats.
- Check the pollen filter and replace if necessary. Exhausted pollen filters can cause an unpleasant odour in the vehicle.

WARNING!

Rotating ventilators or fan wheels can cause serious cuts and injuries or result in severed limbs.

➔ Never reach into rotating ventilators or fan wheels.

- Check that the evaporator and condenser fans work properly (note direction of rotation).
- Check the V-belt tension at the compressor drive (see instructions issued by vehicle manufacturer) and adjust if necessary. Always replace defective V-belts in pairs.

5 MAINTENANCE

Monthly maintenance work, every 200 operating hours but at the latest after 35,000 km mileage.

This maintenance work must be carried out by trained dealership staff.

- Check the refrigerant level at the AC system sight glass. Check the refrigerant level with the AC system running. This entails operating the system for 10 minutes with revs of at least 1500 rpm. There must not be any bubbles in the sight glass.

CAUTION!

Pressure lines can heat up greatly while the AC system is operating.

➔ Never touch pressure lines without wearing safety gloves, see also Personal safety gear.

- Check the condenser; if necessary, clean with compressed air against the flow direction. Clean any extreme or greasy soiling with an agent suitable for copper / aluminium. Align any bent fins with a fin comb.
- Check that water can drain freely in the evaporator condensation pipe and in the rainwater drainpipes in the condenser chamber.
- Check the hoses, pipes and cables for leaks, chafe marks, breakages and lost connections. Avoid contact with sharp edges and hot parts. Check electric connections for signs of corrosion.
- Check fastening screws and additional parts on the compressor. Tighten screws if necessary, and replace defective or worn parts. Lubricate V-belts / tension or return pulleys.

Yearly maintenance work, every 1000 operating hours but at the latest after 100,000 km mileage.

This maintenance work must be carried out by trained refrigeration system engineers. It is vitally important for maintenance work to be carried out professionally, because these are self-contained systems.

- Check refrigerating system for leaks.
- Check refrigerant pipes and screwed unions for secure fastening, leaks and correct installation.
- Replace contaminated refrigerator oil.
- Renew the filter drier.
- Check the functions of the HP and LP pressure switches. If installed, check the functions of the condenser control pressure controllers.
- Check the functions of the expansion valves.
- Check the compressor for leaks, output and secure fastening.
- Check the oil level (heeding the maximum and minimum level).
- If installed, check the functions of the compressor capacity regulator.
- Check the functions and bearing noises of the electromagnetic clutch. Replace the bearing if it makes loud running noises. Also check that the clutch sits correctly on the shaft.
- Check the condition of the seals and locks and the general condition of the housing.
- Check the functions of the AC system
  – Cooling (adjust continuous operation).
  – Heating (adjust continuous operation).
  To do so, activate the test program
  – Ventilating.
  – Recirculating air mode.
- Check the condition and functions of the electrical components.
- Check the thermostat and control.
- Check the function of the fresh air flaps.
- Replace the pollen filter (if installed) and filter mats.
- Check the V-belt for alignment, tension and signs of wear.
- Check the receiver bottle for signs of corrosion.

6 REFRIGERANTS AND OILS

REFRIGERANT

§ REGULATION!

AC systems by Eberspächer Sütrak may only be operated with the chlorine-free HFC coolant R134a. This corresponds to the statutory classification L1 and safety group A1.

Failure to comply with this regulation results in expiry of the type-approval for the AC system and exclusion of any guarantee and liability claims against Eberspächer Climate Control Systems GmbH & Co. KG and Eberspächer Sütrak GmbH & Co. KG.

Quantity of refrigerant

Refrigerant hoses differ in length depending on the vehicle and the installation position. The quantity of refrigerant can vary, depending on the length and cross-section of the refrigerant hoses. The correct quantity of refrigerant is stated on the nameplate or can be obtained from Eberspächer Sütrak or authorised dealerships.

OILS

⚠ CAUTION!

Never mix different types of oil as this is detrimental to the properties of the oil and can cause considerable damage in the AC system. Furthermore, no additives may be mixed with the refrigerating machine oil (including leak-detecting contrast agents).

➔ Any contraventions will make the guarantee null and void.

Refrigerator oil

Eberspächer Sütrak recommends using refrigerator oil with the Eberspächer specification. See spare parts list for article and order numbers. Alternatively, the following oil types can be used, depending on the design of the AC system or AC compressor:

- **SE 55 (POE):**
  - Fuchs (DEA) Triton SE 55
  - Fuchs Reniso E 68
  - ICI RL 68 S
  - EAL Arctic 68
  - Mobil Arctic EAL 68
- **PAG:**
  - PAKELO PAG ISO 100 (recommended)
  - PAKELO PAG ISO 46
- **SE 170 (Hermetic / Compact Screw Compr. VSK):**
  - BSE 170
  - ICI EMKARATE RL 170H
  - CPI SOLEST 170
  - Castrol SW 220 HT
  - BP Enersyn MP-S170

For AC systems without flexible refrigerant hoses:

- Castrol Icematic SW 68

7 IDENTIFICATION OF THE AC SYSTEM

NAMEPLATE

Every AC system by Eberspächer Sütrak GmbH & Co. KG can be unequivocally identified by the details on its nameplate. It is advisable to enter these details in the table on page 2 of this document to ensure they are available for quick access.

The positioning of the nameplate on the AC system differs according to the particular version, as illustrated below.

The nameplate contains the following details:

- Model number
- Serial number
- Parts list number (BOM)
- Order number
- Type and possibly quantity of refrigerant and refrigerator oil
- Date of manufacture of the AC system

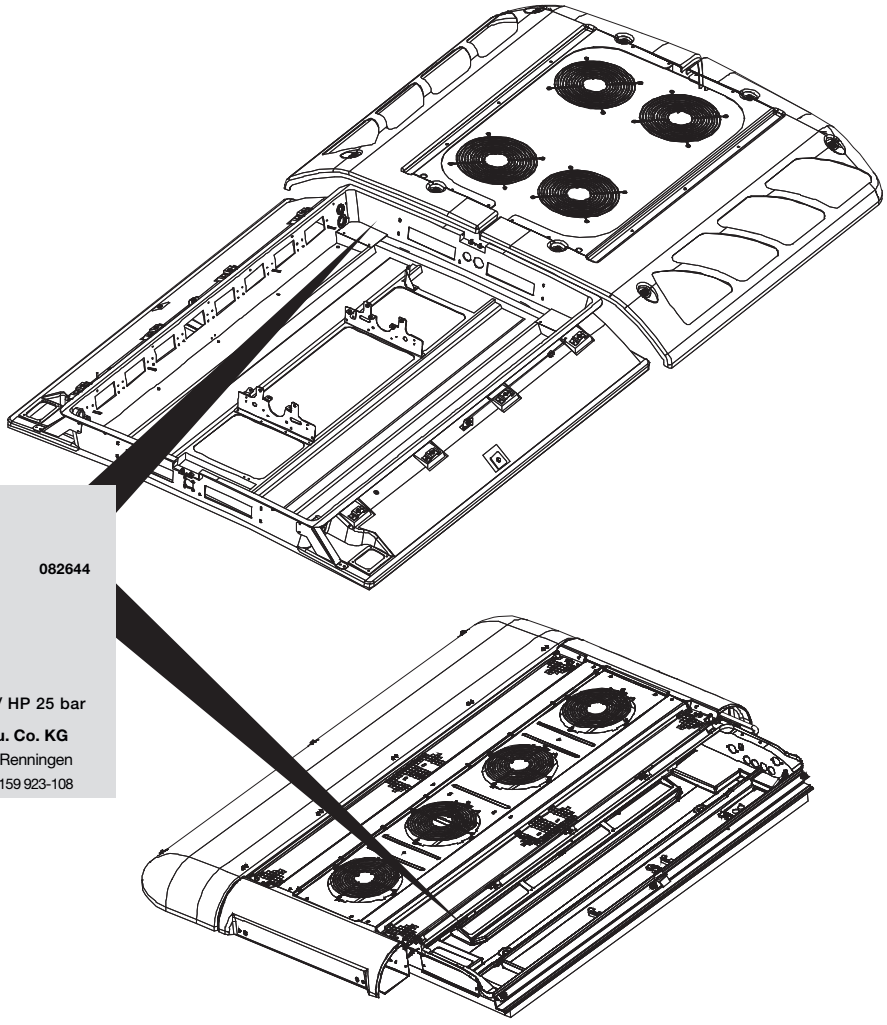
Another plate fitted to the switchboard contains the corresponding circuit diagram.

Please contact your local Eberspächer Sütrak dealership directly in the event of technical problems with the AC system.

Dealership overview see
http://www.eberspaecher.com/en/air-conditioning/bus-ac-solutions/service-parts/dealersearch.html

Eberspächer Sütrak needs the following data for customer service and further support:

- Name
- Order number
- Serial number
- Possibly parts list number



Type **AC353 G4 I**
Serial No. **00100154668**
Date / Part No.: 10.2011 AC353G4E / HX 082644
Electric Data : see product brochure
Refrigerant Type : R134a
Refrigerant Qty (kg) : See installation guide
Oil Type : See installation guide
Oil Qty : See installation
Max. working pressure LP x bar / HP 25 bar
Eberspächer Sütrak GmbH u. Co. KG
Heinkelstrasse 5 - D - 71272 Renningen
Eberspächer Fon +49 (0)7159 923-0 Fax +49 (0)7159 923-108

8 TECHNICAL DATA

PRESSURE CONTROLLERS AND SAFETY VALVES

AC system type		**All standard AC systems**	
AC system version		Mobile roof-mounted AC systems for driver cabs and buses.	
Rated voltage:		The AC system is preconfigured according to the customer requirements.	
	DC voltage:	12 V DC, 24 V DC, < 850 V DC	
	AC voltage:	230 V AC, 400 V AC, 460 V AC for adjustable frequency	
Pressure controllers:		Pressure gauge switching pressure OFF	Pressure gauge switching pressure ON
HP pressure switch depending on compressor (piston, screw, scroll compressor)		18 – 25 bar; 261 – 362 psig	13 – 16.5 bar; 188 – 239 psig
LP pressure switch depending on compressor (piston, screw, scroll compressor)		+0.35 bar; 5 psig	+2.10 bar; 25 psig
Safety valves:		Switching pressure (pressure gauge display) – valves open	
Spring-loaded pressure relief valve (with reset function)		28 bar; 405 psig	
Rupture disk valve (destructive)		30 bar; 435 psig	

In the event of technical problems and / or queries, please contact your local Eberspächer Sütrak dealership.
Dealership overview see
http://www.eberspaecher.com/en/air-conditioning/bus-ac-solutions/service-parts/dealersearch.html

Eberspächer Sütrak GmbH & Co. KG
Heinkelstraße 5
71272 Renningen
Phone: +49 7159 923-0
Fax: +49 7159 923-108
info.suetrak@eberspaecher.com
www.eberspaecher.com

Eberspächer

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