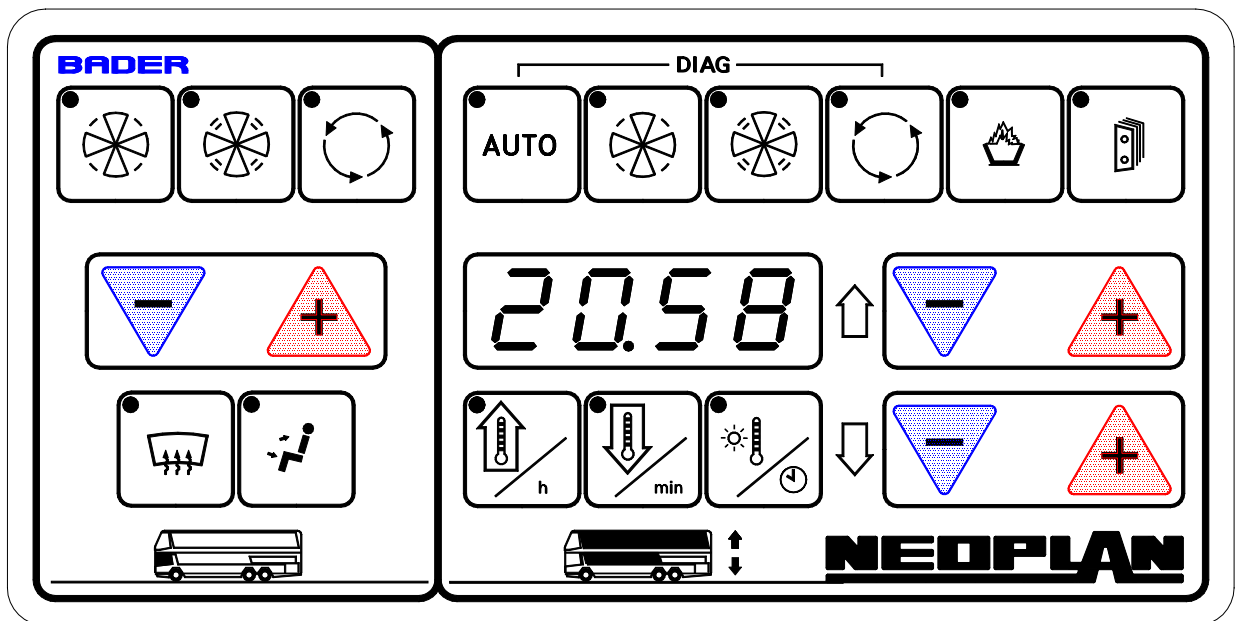


# OPERATING INSTRUCTIONS

## NEOPLAN

### AIR- CONDITIONER- CONTROLLER KR-454



October 1998

Version 1.14

# Digital air- conditioner controller KR- 454

## CAUTION!

### IMPORTANT SAFETY TIPS:

As a leader of a vehicle you must dedicate full attention to the traffic.

Always operate with your controller in a way that you are equal to the current traffic situation.

In critical situations we advise against operating.

Please consider that already at a rate of 50 k.p.h the vehicle will go about a distance of 14 m / sec.

In the event of occurrence of a trouble please look for the next car park and try to overcome the error with the use of the manual.

### IMPORTANT INFORMATION FOR THE USER:

Unplug the air-conditioner centre before carrying out welding work on the vehicle.

Errors and faults which have not actually occurred in the vehicle may be indicated if you attempt to start the engine with a partially discharged vehicle battery.

All internal memories of the computer are reset by briefly interrupting the air-conditioner centre's power supply (wait approx. 30 sec.) or by pressing the "RESET" keys.

(Then please wait for the air-conditioner centre to conduct its self-test approx. 3 min.)

Always keep the air-conditioner controller dry!

Please clean the surface of the control panel only with a damp cloth!

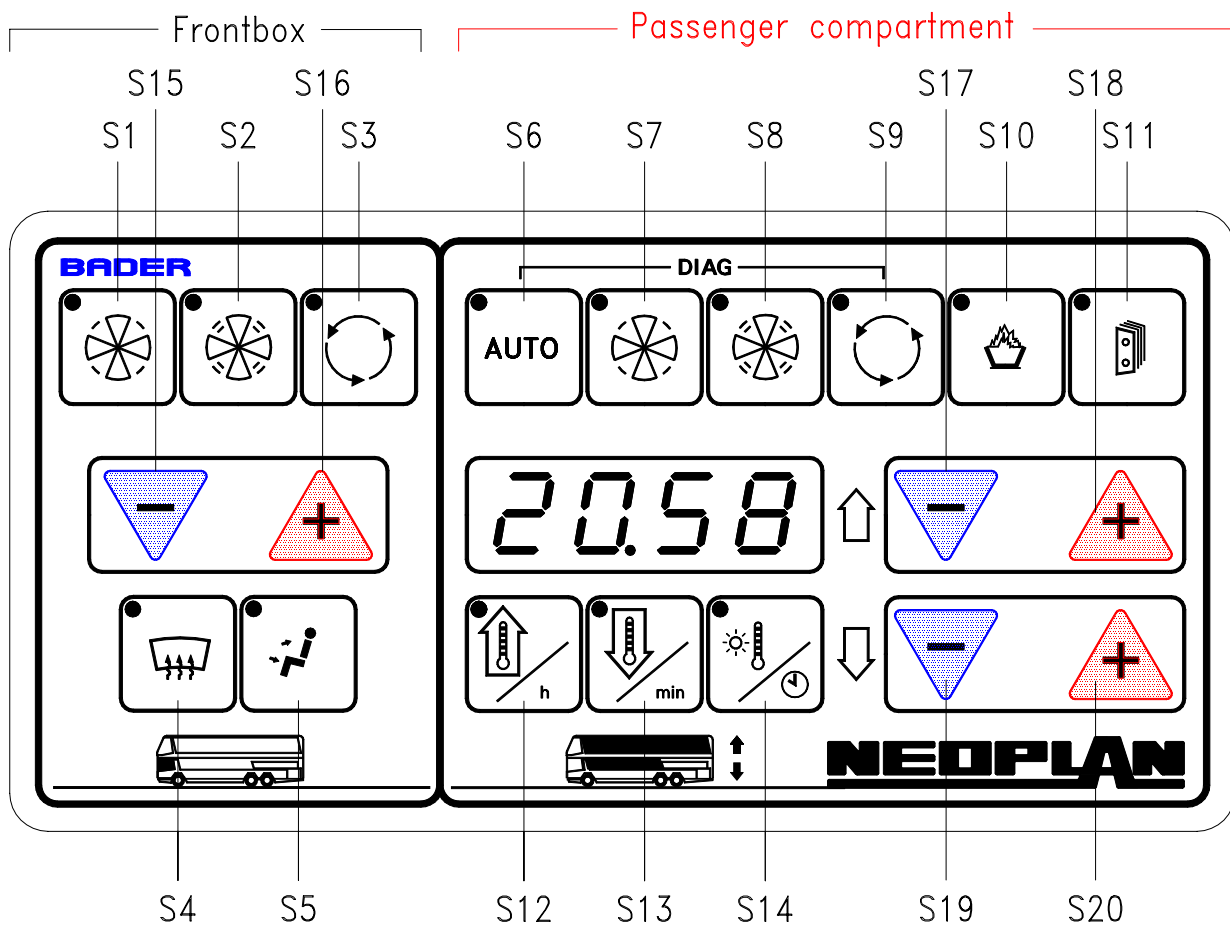
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# Digital air- conditioner controller KR- 454

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# Digital air- conditioner controller KR- 454

## 1. KEY ASSIGNMENT ON THE FRONT PANEL



### Key assignment, temperature, driver's cockpit (Front box)

Key S1:	Front box fan, stage I
Key S2:	Front box fan, stage II
Key S3:	Flap, fresh air/circulating air
Key S4:	Flap, screen + screen defrost
Key S5:	Flap, driver's cockpit/centre aisle
Keys S4+S5:	Lamp test with ignition switched off
Key S15:	Setpoint key (-) for valve position at the driver's cockpit (front box)
Key S16:	Setpoint key (+) for valve position at the driver's cockpit (front box).

# Digital air- conditioner controller KR- 454

## Key assignment, air-conditioner control system, passenger compartment

Key S6:	-Automatic mode with ignition switched on -Diagnostic mode with ignition switched off with S9
Key S7:	-Ventilation mode, stage I
Key S8:	-Ventilation mode, stage II
Key S9:	-Flap, fresh air/circulating air with ignition switched on with S6
Key S10:	-Auxiliary heating system
Key S11:	-Convectors on/off
Key S12:	-Setting time or time switch (h) with "ignition off" -Increment test mode -LED-display reduce intensity on/off
Key S13:	-Setting time or time switch (min) with "ignition off" -Decrement test mode -Passenger compartment temperature with "igniton on"
Key S14:	-Activating time setting mode and time switch for auxiliary heating system with "ignition off" -Confirm key for new time entered -Outside temperature display
Key S17:	-Setpoint key ( - ) for passenger compartment temperature upper deck
Key S18:	-Setpoint key ( + ) for passenger compartment temperature upper deck
Key S19:	-Setpoint key ( - ) for passenger compartment temperature lower deck
Key S20:	-Setpoint key ( + ) for passenger compartment temperature lower deck

## LED DISPLAY

The following information is shown on the LED display:

- 1) With the ignition switched off:
  - Setting the time and time switch for the auxiliary heating system
  - Diagnosis
  - Dot display (blinks as tell-tale indicator for processor function)
- 2) With ignition switched on:
  - Passenger compartment and outside temperature display with
  - Frost warning
  - Time
  - Error message
  - Front box opening or setpoint passenger compartment temperature

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# Digital air- conditioner controller KR- 454

## 2. QUICK-START OPERATING INSTRUCTIONS

These instructions provide you with general information on the individual functions of the KR-454 air-conditioner controller.

### DISPLAY

The outside temperature is always displayed as the basic display with the ignition switched on.

If the ignition is switched off, the decimal point between the minutes and hours display blinks as a tell-tale indication of the function of the microprocessor. The display is used to show the data for error detection in test mode.

### AUTO

The normal mode of operation of the air-conditioner controller is Automatic mode. This mode is activated automatically with the engine running. Both the LED-display "Auto" (**S6**) and the "Convactor" (**S11**) are flashing. You can now set the required passenger compartment temperature for the passenger compartment with the setpoint keys **S17** or **S18**. You can set a temperature between 18°and 28°C.

### VENTILATION

The roof duct fans can be switched on manually with keys **S7** and **S8**. This closes the motor valves for the roof duct heaters and ventilates at 40 % or 100 % of the fan capacity. You can fix the fan speed to 40% or 100% by pressing keys **S7** or **S8** in Automatic mode. (**Caution:** The automatic passenger compartment control is obstructed by that.)

### CONVECTORS

The convectors are switched on automatically and control their temperature as preset on the setpoint passenger compartment in Automatic mode. The value sensed by the convector sensor serves as the actual value, and the passenger compartment temperature sensor limits heating of the passenger compartment.

The convectors can also be switched on during Ventilation- and Stationery heating mode and are controlled as in Automatic mode.

### FRONT BOX

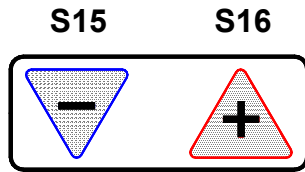
The air-conditioner controller includes a front box control system for the driver's cockpit accommodated in the left-hand part of the unit. You enter the temperature with the setpoint keys **S15** or **S16**. Various keys permit you to operate the flaps and the 2-stage fan.

## 3. DESCRIPTION OF KEY FUNCTIONS

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# Digital air- conditioner controller KR- 454

## 3.1. OPERATION, DRIVER'S COCKPIT (FRONT BOX)



### Setting the setpoint for the temperature of the driver's cockpit

Setting- and display range 0-100% in 1%-steps with the standard model without air-conditioning. With air-conditioned front box with incorporated temperature sensor the display of the setting range has got a decimal dot. Display range from **F 0.0** to **F10.0**.

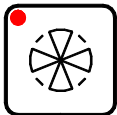
The actual setpoint of the driver's cockpit is displayed by a short pressing (press and release) of keys **S15** or **S16**.

Display f.ex. "F50" or "F5.0".

You can change the setpoint in 1%-steps per key pressure with keys **S15** and **S16**. If you press any key for more than 2 seconds the setpoint is changed at a high speed.

If you don't press any of these keys the actual setpoint is stored and displayed. The display goes back to its former status after 5 seconds.

**S1:**



### Front box fan 40%

Also functions without the engine running

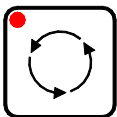
**S2:**



### Front box fan 100%

Functions only when the engine is running

**S3:**



### Flap "Fresh air/circulating air", driver's cockpit

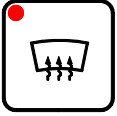
Basic setting: Fresh air

**S4**

### Flap "Screen defrost"

Basic setting: flap open

# Digital air- conditioner controller KR- 454



The flap is opened or closed if you press the key shorter than 2 seconds. The key - LED S4 flashes with open flap.

The defrost function is initiated if you press the key longer than 2 seconds. That means:

- Flap screen opens, key - LED S4 blinks
  - Flap centre aisle closes, key - LED S5 goes out
  - Flap circulating air closes (fresh air), key- LED S3 goes out
  - Front box fan 100%, key - LED S2 flashes
  - Front box valve opens, LED - display f.ex. "F100" for 5 sec.
- You can reset the defrost function by pressing alternatively keys **S1 , S2 , S3 , S4 , S5 , S15** or **S16** .

**S5**



**Flap "Driver's cockpit/centre aisle"**

The flap opens when you press the key. In this setting a part of the air stream is directed towards the driver and into the centre aisle.

**NOTES:**

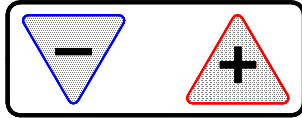
## 3.2 OPERATION OF AIR-CONDITIONER CONTROL SYSTEM, PASSENGER COMPARTMENT

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# Digital air- conditioner controller KR- 454

S17

S18



## Setting the setpoint for temperature upper deck

Setting- and display range from 18°-28° C

The actual setpoint of the upper deck is displayed by a short pressing (press and release) of keys **S17** or **S18**.

Display => f.ex. " 20 "

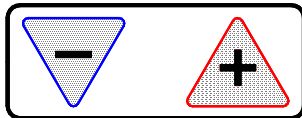
You can change the setpoint with keys **S17** and **S18** in 1°C -steps per key pressure.

The actual setpoint is displayed after releasing the corresponding key.

If you don't press the keys for further 5 sec. the value is stored and the display goes back to its former status.

S19

S20



## Setting the setpoint for temperature lower deck

Setting- and display range from 18°-28° C

The actual setpoint of the lower deck is displayed by a short pressing (press and release) of keys **S19** or **S20**.

Display => f.ex. " 20 "

You can change the setpoint with keys **S19** and **S20** in 1°C -steps per key pressure.

The actual setpoint is displayed after releasing the corresponding key.

If you don't press the keys for further 5 sec. the value is stored and the display goes back to its former status.

S6



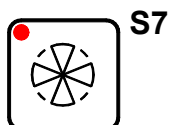
## AUTOMATIC MODE

The temperature control system of the passenger compartment is switched on automatically after starting the engine. The LED of key **S6** flashes. You can switch off the Automatic mode by pressing key **S6**. Automatic control is only possible with the engine

# Digital air- conditioner controller KR- 454

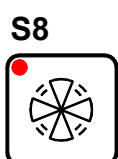
running. The fan and the air- conditioner are always switched off when you switch off the ignition. The motor valves and flaps remain in position. In Automatic mode the passenger compartment temperature is automatically regulated to the temperatures set with the setpoint keys using the components of the system (fan, air-conditioner, heater).

As a special function, you can switch off automatic speed control of the roof duct fans with the ventilation keys (**S7/S8**). The fan speed is then permanently set to 40 % (stage I - **S7**) or 100 % (stage II - **S8**) as is the case in Ventilation mode (f.ex. to vent the vehicle quickly).



## **VENTILATION MODE, stage I**

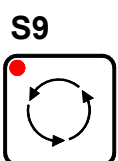
When you press key **S7**, the motor valves of the roof duct heater close and the roof duct fans are switched on to stage I (approx. 40 %). This ventilation mode is possible even without the engine running and only with the ignition switched on. The incorporated undervoltage protection facility in the unit avoids exhaustive discharge of the vehicle battery.



## **VENTILATION MODE, stage II**

Function as with key S7, but ventilation capacity 100 %. This key operates only with the engine running (alternator).

**NOTE:** The fans are increased slowly and in controlled manner to 100% fan capacity in order to avoid a high making current! (this takes approx. 15 sec.!).



## **Flap "Fresh air/circulating air" passenger compartment**

You can use this key when on the move to switch the ventilation system to circulating air, and an automatic function switches back to fresh air after 10 min.

In addition, the system switches over automatically to circulating air at temperatures above 28°C and below -20°C (according to the function chart).



## **AUXILIARY HEATING SYSTEM**

The auxiliary heating system is started up when you press this key. Operation of the auxiliary heating system is indicated by the LED in the key.

# Digital air- conditioner controller KR- 454

**S11**



## CONVECTORS

This key can be used to switch the convectors on and off. They are also controlled via their own sensor in Ventilation mode, dependent on the set temperature (setpoint keys **S17**, **S18**, **S19**, **S20**). The measured passenger compartment temperature is used as the basis for limiting the temperature for convector control.

**S12**

## PASSENGER COMPARTMENT TEMPERATURE UPPER DECK AND SETTING THE TIME

When setting the time and the time switch, this key is used to increment (count up) the hours display. In Diagnostic mode, this key is used to increment the diagnostic steps.

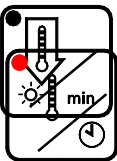
**S13**



## PASSENGER COMPARTMENT TEMPERATURE LOWER DECK AND SETTING THE TIME

When setting the time and the time switch, this key is used to increment (count up) the minute display. In Diagnostic mode, this key is used to decrement (count down) the diagnostic steps.

**S14**



## OUTSIDE TEMPERATURE

With ignition switched on:

-The outside temperature is displayed.

-The current time is displayed after you press the function key.

With ignition switched off:

-Activating Clock-set mode

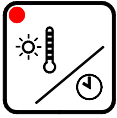
-Confirm key for new time entered.

## 3.3 SETTING THE TIME

**S14**

## OUTSIDE TEMPERATURE/TIME

# Digital air- conditioner controller KR- 454



**PRECONDITION: Engine off, ignition off!**

You can call Clock-set mode with key **S14**. Keys **S12** and **S13** light. The current system time is displayed on the display. If you do not press any other key, the display disappears after approx. 5 seconds and the previously set system time is retained.

After you press key **S14**, you can then press key **S12**

**S12**

to increment the hours display. If you keep the key pressed, the display counts up in 1/2 second steps.

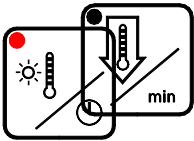
You can set the minute display with key **S13**

**S13**



and the same operating steps apply as for key

**S12.**



After you set the hours and minutes display, you can confirm the new time entered with key **S14**. If you do not confirm within approx. 5 seconds, the unit retains the previously set system time.

## 3.4 PROGRAMMING THE AUXILIARY HEATING SYSTEM

**S14**

The same operating steps as for setting the time apply to programming the time switch for the auxiliary heating system.

# Digital air- conditioner controller KR- 454



However, after you press key **S14** (Setting mode), you must then, within approx. 5 sec press **S10 (AUXILIARY HEATING SYSTEM)**

**S10**



Then, as when setting the time, you must program the required switch-on time for the auxiliary heating system and confirm this with key **S14** (Key-LED **S10** blinks in 2-second-steps).

If the auxiliary heating system has been started automatically, it can be switched off again with key **S10**. Otherwise, the heating system switches off again automatically after 1 hour. The convectors are also switched on and the temperature is controlled together with the auxiliary heating system.

The temperature value of the setpoint control is used as is the case with passenger compartment temperature control. Set the relevant setpoint to "**min**" if you do not wish to pre-heat a deck.

The current switch-on time can be checked with the Automatic key **S6** with the ignition off. If the auxiliary heating system has been programmed, you will see the switch-on time on the display. You will see display "**OFF**" if no times have been programmed.

This check display is cleared again after approx. 5 seconds.

If you want to reset a programmed switch-on-time call the starting time as when programming; but **don't** confirm it with key **S14**.

## 4. FAULTS AND ERRORS - DIAGNOSIS

The KR-454 air-conditioner controller features a sophisticated error and fault diagnosis program.

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This error and fault diagnosis program runs, as it were, "in the background" during normal air-conditioner operation and monitors the sensors, setpoint potentiometers and valve potentiometers and the switched outputs of the valve motors and other loads for discontinuity and short circuit. If one or more faults or errors occur when on the move, the time display is cleared and the relevant malfunction is displayed in the form of a consecutive number. An "E" for ERROR in front of the number signals the error.

**S14**



The LED in key **S14** blinks simultaneously.

You must then "acknowledge" the fault with this key. The air-conditioner centre then continues to operate in Emergency mode, and the sensor values are simulated for instance, dependent on the operating state. This Emergency mode can be seen from a dot at the far right on the display. The time is displayed once again after you acknowledge the error.

If there is a valve potentiometer error, the air-conditioner controller attempts to operate the valves even without a check-back signal so as to permit it to regulate the system, even if not precisely.

If an output has a short circuit, this output is disconnected and the relevant error is shown on the display. The system attempts to reactivate the output each time you switch the ignition off and on.

## 4.1 ERROR MEMORY FUNCTION

If an error occurs when on the move and if this error is acknowledged, the error number is stored in the so called unit's error memory.

# Digital air- conditioner controller KR- 454

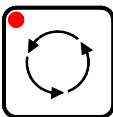
These errors are displayed again each time you switch on the ignition in order to indicate the defect to you. The contents of the error memory must be cleared manually when the error has been rectified.

## 4.2 CALLING AND CLEARING THE CONTENTS OF THE ERROR MEMORY

**S6**



**S9**



The contents of the error memory can be called by pressing keys **S6** and **S9** simultaneously with the ignition switched off.

You will first see the program version of the unit on the display (e.g. 1.10).



You will then see the number of errors detected, shown by an "A" and a consecutive number.

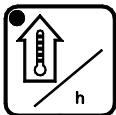
**S12**

**S13**

You can then "page" forwards and backwards in the error memory with keys **S12** and **S13**.

You can clear the contents of the error memory by pressing both keys simultaneously.

You will then see "A 00" on the display.



If there is still an error in the system (e.g. sensor discontinuity), this error message will be displayed again immediately.

## 4.3 LIST OF ERROR MESSAGES - DOUBLE-DECKER-COACH

Error	1	Working-hour meter not set at 0
Error	3	Short circuit, outside sensor
Error	4	Discontinuity, -"
Error	5	Short circuit, passenger compartment sensor lower deck

# Digital air- conditioner controller KR- 454

Error	6	Discontinuity, -"-
Error	7	Short circuit, roof duct sensor lower deck
Error	8	Discontinuity, -"-
Error	9	Short circuit, convector sensor, front lower deck
Error	10	Discontinuity, -"-
Error	11	Short circuit, convector sensor, rear lower deck
Error	12	Discontinuity, -"-
Error	13	Short circuit, passenger compartment sensor upper deck
Error	14	Discontinuity, -"-
Error	15	Short circuit, roof duct sensor upper deck
Error	16	Discontinuity, -"-
Error	17	Short circuit, convector sensor, front upper deck
Error	18	Discontinuity, -"-
Error	19	Short circuit, convector sensor, rear upper deck
Error	20	Discontinuity, -"-
Error	21	Short circuit front box sensor driver's cockpit (option)
Error	22	Discontinuity -"-
Error	23	Short circuit front box sensor upper deck (option)
Error	24	Discontinuity -"-

## Error messages: Input/output errors

Error	33	No air-conditioner compressor check-back signal
Error	34	No auxiliary heating system (WEBASTO) check-back signal
Error	35	Prop valve roof duct lower deck potentiometer defective
Error	36	Prop valve driver's cockpit potentiometer defective
Error	37	Prop valve convector lower deck potentiometer defective
Error	39	Prop valve roof duct upper deck potentiometer defective
Error	40	Prop valve front box upper deck potentiometer defective
Error	41	Prop valve convector upper deck potentiometer defective
Error	42	Prop valve front box upper deck potentiometer defective
Error	43	Setpoint potentiometer front box upper deck, discontinuity

## Error messages: voltage errors

Error	80	No valve potentiometer voltage (+5V)
Error	81	Outputs valve motors or servo motors of front box overloaded
Error	82	Valve assignment (valve-potentiometer) error
Error	84	Outputs overloaded (total current)

# Digital air- conditioner controller KR- 454

Error	85	Front box stage 1 overcurrent
Error	86	Front box stage 2 overcurrent

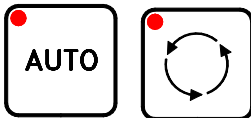
# Digital air- conditioner controller KR- 454

## 5. SPECIAL FUNCTIONS

### 5.1 INTENSITY CONTROL OF THE LED-DISPLAYS

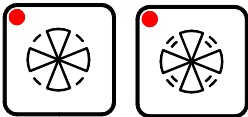
The KR-454 air-conditioner controller features an intensity control which dims the display when the vehicle's headlights are on. The driver himself can set the intensity in 2 stages.

The intensity can be set in "DIAGNOSTIC MODE" with the ignition switched off:



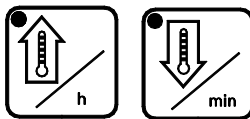
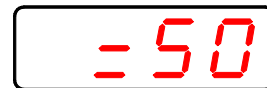
Press keys **S6** and **S9** simultaneously.

After the program version and the contents of the error memory have been shown on the display



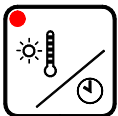
you can call the intensity control by pressing **S1** and **S2** simultaneously.

You will now see the following f.ex. on the display

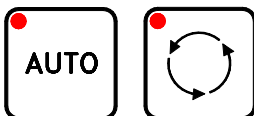


This display means intensity set to 50%.

This value can be varied from 50% to 100% with keys **S12** and **S13**.



You can store this value with key **S14** after setting the intensity.

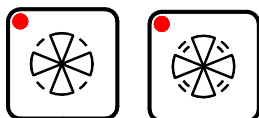


You quit DIAGNOSTIC-MODE again by pressing keys **S6** / **S9**.



If you now drive with your headlights on, the display is dimmed to the set intensity value.

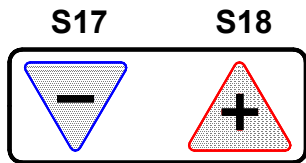
If you intend to drive with your headlights on under daylight conditions (e.g. in Sweden), you will not want the display dimmed.



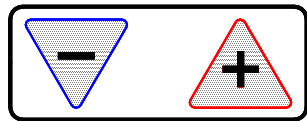
You can switch the intensity control on and off even when on the move by pressing keys **S1** and **S2** simultaneously.

# Digital air- conditioner controller KR- 454

## 5.2 MAXIMUM/ MINIMUM SETTING OF THE SETPOINT CONTROLS, PASSENGER COMPARTMENT TEMPERATURE (OVERRIDE-MODE)



system heats in an uncontrolled manner. All actuators of the heating system (motor



### Override - mode heating (uncontrolled heating)

Set setpoint temperature to max. 28°C with key **S18/S20** and release it. Then press key **S18/S20** longer than 2 seconds; you can then see an "H" on the display - the

uncontrolled system heats in an manner. All actuators of the heating system (motor **S19 S20** valves and convector valves) are fully opened. This operating mode is used for bleeding the water circuit for instance.

### Override - Mode cooling (uncontrolled cooling)

Set setpoint temperature to minimum 18°C with key **S17/S19** and release it. Then press key **S17/S19** longer than 2 seconds; you can see a "C" on the display - the system cools in an uncontrolled manner. In this operating mode the air-conditioning system is switched on continuously and no regulation function is performed (e.g. in order to fill the system).



You leave the automatic control range of the unit in Override-mode. In this case the red LED in the auto- and convector key blinks.

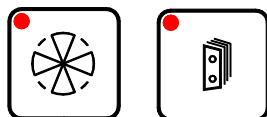
If you want to finish the Override-mode you can set the temperature to normal with keys **S17** or **S18**.

## 5.3 Minimum speed setting of the roof duct fans

-see service-/ test program No. 11 and 12

# Digital air- conditioner controller KR- 454

## 5.4. RESET OF THE INTERNAL MEMORY



In case of an error the internal memories of the air-conditioner controller KR-454 can be reset by interrupting the air-conditioner centre's power supply, by pressing the emergency switch module or by a RESET with the keys of the air-conditioner controller.

RESET is started by simultaneously pressing keys **S1** and **S11**.

Press the keys for about 5 sec. . You can see a "5" on the LED-display. The "5" decrements to "0" in one-second-steps. Then the air-conditioner controller conducts its self-test. All memory data are cleared, the internal clock of the unit must be reset.

This measure is necessary in case of electric errors in the air-conditioner (short-circuit, discharged batteries, etc.)

## 5.5. DEACTIVATING OF THE AUTOSTART-FUNCTION (AUTOMATIC MODE)



After starting the engine the air-conditioner KR-454 automatically switches to Automatic mode (AUTO). If not desired - this function can be cleared:

1. engine off, ignition off.

2. press automatic key **S6**, you can see "OFF" on the display or the switch-on time in case of a programmed stationary heating.



Keep key **S6** pressed and start the ignition simultaneously till the time can be seen on the display.

The autostart function is deactivated. At every engine start you must switch on the automatic function manually by pressing AUTO-key **S6**.

Use the same procedure to activate it again.

# Digital air- conditioner controller KR- 454

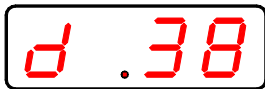
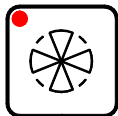
## 5.6. ENCODING WITH VEHICLES WITHOUT AIR-CONDITIONING

If the vehicle has no air-conditioning the air-conditioner must be encoded accordingly. To do this fix a 24V-signal terminal 15 (ignition) to the control input air-conditioner check-back (plug X2 Pin 9) tightly.  
(e.g. wire bridge X10 Pin 2/5)

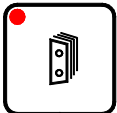
With its system check the air-conditioner controller recognizes automatically if it's any special model without roof duct heating or convector heating. The controller finds f. ex. the connected roof duct sensor and looks for the corresponding roof duct valve. If there is no valve the controller gives an error message. If there is no sensor **and** valve the unit realizes and stores the control circuit as not existing. (Analogous the convector control circuit). The convector key is without any function if the unit has recognized that the convector control circuit system is not existing (no sensor **and** no valve).

That is why you can equip either the front or the rear convector control circuit without changing or setting the unit.

## 5.7 SPECIAL FUNCTIONS OF THE DISPLAY



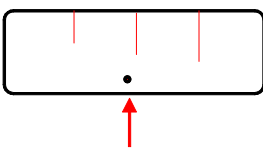
If you press key **S7** within 5 seconds after pressing keys **S12/S13** (passenger compartment temperature) the current roof duct temperature is displayed for a short period of time. You can see a "d" on the left side of the display with the temperature value in °C next to it.



If you press the convector key equally, you can see the current convector temperature "c" in °C on the display.

The display switches back to the basic function outside temperature after 5 seconds.

By lighting up individual decimal dots on the LED-display the air-conditioner controller informs about different operating modes of the air-conditioning.



With ignition on the decimal dot of the second digit blinks. This dot also blinks at **undervoltage** (< 22,5V), however with short blink pulses. If you press any key at undervoltage you can see a "U" on the display.

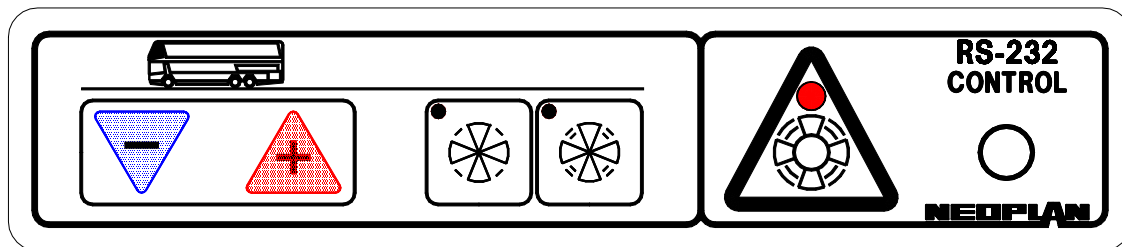
# Digital air- conditioner controller KR- 454

## 6. ACCESSORY UNITS

### 6.1. EMERGENCY VENTILATION SWITCH AND RS-232 COMPUTER INTERFACE

The emergency switch module FBS-477 features an emergency switch for the roof duct fans and a separate socket for the computer interface to diagnose the air-conditioning system.

The unit also features a front box control for the upper deck.



S1 S2 S3 S4 emergency switch and interface

#### Function:

If a total failure of the AIR-CONDITIONER CONTROLLER should occur, you can use a ball-point pen, pencil or other sharp implement to press the switch located in the triangle symbol. This switches off the air-conditioner controller and increases the speed of the roof duct fans to maximum speed with no regulation function. This function is indicated by a red LED in the emergency switch triangle.

The emergency function "ventilation mode" can only be stopped by switching off the engine. The air-conditioner controller is switched back on and then runs through its test cycle (which takes approx. 3 minutes).

### 6.2 COMPUTER INTERFACE

There is a socket for the test computer (e.g. laptop) on the right-hand side of the FBS-477 for test purposes.

Only systems of Messrs. NEOPLAN or BADER GmbH may be connected!

Connecting circuit diagrams: see appendix

### 6.3 CONTROL UNIT FOR FRONT BOX UPPER DECK:

Setting- and display range 0-100 in 5-step-intervals.

The actual setpoint of the front box upper deck is displayed by a short pressing (press and release) of keys **S1** or **S2 (FBS-477)**. Display f.ex. " **O 50** "

You can change the setpoint in 5-step-intervals per key pressure with keys "-" and "+".

With air-conditioned front box with incorporated temperature sensor the display of the setting range has got a decimal dot. For example: " **O 5.0** ".

If you don't press any of these keys the actual setpoint is stored and displayed. The display goes back to its former status after about 5 seconds.

# Digital air- conditioner controller KR- 454

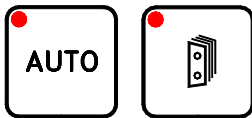
(Alternatively you can also use the previous control unit FBS-450 with potentiometer.)  
You can also switch on two different fan speeds of the front box by pressing keys **S3** and **S4** eingeschaltet werden (S3 > stage 1; S4 > stage 2).

If the front box features a cooling system, the 1. fan stage is switched on automatically by the air-conditioner controller. It remains in operation till the engine is switched off or a key is pressed manually. The LEDs located in the key corners indicate operation.

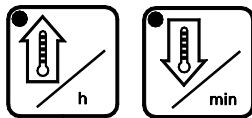
Connecting diagrams: see chapter 8.1

## 7. SYSTEM SELF-TEST

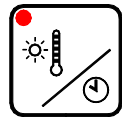
The KR-454 air-conditioner controller features a special operating mode which can be used to check the individual control circuits and monitoring elements, this is referred to below as the self-test. This operating mode is practical only with the ignition switched on.



The self-test is activated by simultaneously pressing keys **S6** and **S11**. You will then see "-01" on the display, i.e. test program 1.



You can select test programs 1 to 10 with keys **S12** and **S13**.



You start the relevant test program by pressing key **S14**.



You can quit the self-test again by pressing key **S6** ( AUTO ).

### 7.1. THE TEST PROGRAMS IN DETAIL

#### PROGRAM 1:

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# Digital air- conditioner controller KR- 454

This test program tests the key lighting on the control section. The LEDs in the keys light one after the other. You will see “LED“ on the display.

You can quit the test program by pressing key **S6** ( AUTO ).

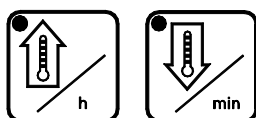
## PROGRAM 2:

This program is used to test the 7-segment display. All segments are activated at all four digits one after the other.

You can quit the test program again by pressing key **S6** ( AUTO ).

## PROGRAM 3:

This program tests the keys on the control section. When you press a key, the related LED in the key lights providing the control section is operating correctly. You will also see the key number **1...18** on the display



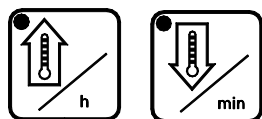
You can quit this test by pressing keys **S12** and **S13** simultaneously.

**PROGRAM 4:** Not available in the KR-454!

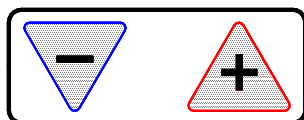
# Digital air- conditioner controller KR- 454

## PROGRAM 5:

This test program is used to test the valves.



You can select valves 1...6 with keys **S12** and **S13**. The valve number is displayed on the left on the display, and the valve setting from 0% to 100% is displayed on the right.



You open or close each of the selected valves by pressing keys **S15** and **S16** (driver's cockpit temperature).

(Normal angle: about 7% - 87% >80% old BÜRKERT-series  
about 15% - 65% >50% new BÜRKERT-series)

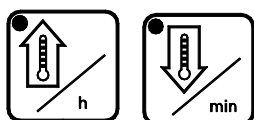
Assignment of the valves:

- 1: roof valve upper deck
- 2: roof valve lower deck
- 3: valve front box driver's cockpit
- 4: valve front box upper deck
- 5: convector valve lower deck
- 6: convector valve upper deck

You can quit the test program by pressing key **S6** ( AUTO ).

## PROGRAM 6:

This displays the temperatures of all sensors.



You can select the sensors 1...11 with keys **S12** and **S13**. The number of the sensor is displayed on the left on the display. The sensor temperature is displayed on the right.

Assignment of the sensors:

- sensor 1: outside temperature
- sensor 2: passenger compartment lower deck
- sensor 3: roof duct lower deck
- sensor 4: convector lower deck
- sensor 5: passenger compartment upper deck
- sensor 6: roof duct upper deck
- sensor 7: convector upper deck front
- sensor 8: convector upper deck rear
- Fühler 9: setpoint front box upper deck
- Fühler 10 (A): Reserve
- Fühler 11 (b): Reserve

You can quit the test program by pressing key **S6** ( AUTO ).

## PROGRAM 7:

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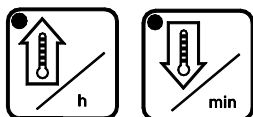
# Digital air- conditioner controller KR- 454

You can select the outputs **1...16** with this test program. The number is displayed on the right on the display. You quit the test program by pressing key **S6** ( AUTO ).  
By pressing key **S14** "time" you can switch the outputs on and off.

## Assignment of the outputs:

output 1:	front box 40%
output 2:	front box 100%
output 3:	auxiliary water pump roof duct upper deck
output 4:	auxiliary water pump roof duct upper or lower deck
output 5:	auxiliary water pump roof duct lower deck
output 6:	roof duct fan
output 7:	compressor clutch
output 8:	air-conditioning 100%
output 9:	circulating air flap
output 10:	stationary heating (Webasto)
output 11:	water pump
output 12:	frost warning
output 13:	reserve
output 14:	reserve
output 15:	convector valve open upper deck
output 16:	convector valve close upper deck

## PROGRAM 8:



This program tests the valve- and servo motor outputs I/1...8 .  
You will see "v1" on the left on the display. You can select the outputs 1...8 with keys **S12** and **S13**. The number is displayed on the right. You quit the test program by pressing key **S6** ( AUTO ).

## Assignment of the outputs:

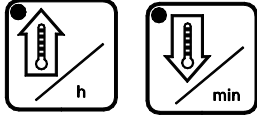
output 1:	circulating air driver's cockpit open
output 2:	circulating air driver's cockpit close
output 3:	screen defrost open
output 4:	screen defrost close
output 5:	driver/centre aisle open
output 6:	driver/centre aisle close
output 7:	front box valve driver's cockpit close
output 8:	front box valve driver's cockpit open

## PROGRAM 9:

This program tests the valve outputs II/1...8 .

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You will see "v2" on the left on the display. You can select the outputs 1...8 with keys **S12** and **S13**. The number is displayed on the right.

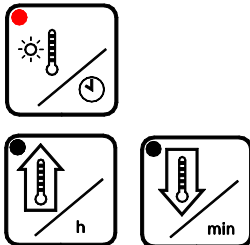
## Assignment of the outputs:

output 1:	roof duct valve upper deck close
output 2:	roof duct valve upper deck open
output 3:	roof duct valve lower deck close
output 4:	roof duct valve lower deck open
output 5:	front box valve upper deck close
output 6:	front box valve upper deck open
output 7:	convector valve lower deck close
output 8:	convector valve lower deck open

You quit the test program by pressing key **S6** ( AUTO ).

## PROGRAM 10:

This tests the control voltage outputs. The number of the output 1/2 is displayed on the left-hand display position.



You can select output 1/2 with key **S14**. The output voltage from 0% to 100% is displayed on the right.

You can set the output voltage from 0% to 100% with keys **S12** and **S13**.

An output voltage of 0% corresponds to maximum speed (0V - control voltage) and an output voltage of 100% corresponds to minimum speed (about +22V control voltage).

Measuring with voltmeter with disconnected outputs!!!

The keys have a repeat function if you keep them pressed.

You quit the test program by pressing key **S6** ( AUTO ).

## PROGRAM 11:

Here the characteristic curve of the front box valve is adjusted to the setpoint display. You can adjust the 0-position of the valve to the real water cut-off. So, in order to open the front

# Digital air- conditioner controller KR- 454

box valve, the driver need not enter f.ex. 10 or 20 steps till water actually flows through the valve.

**Danger:** If the entered value is too high the valve doesn't close completely any more!

Minimal angle: display 0 - 100

(100: valve at min. almost open !!)

Practical: max. about 15; setting at delivery: 0

You quit the test program by pressing key **S6** ( AUTO ).

## PROGRAM 12:

This features the minimum speed of the roof duct fan upper deck for heating and ventilation.

Display: 0 - 255 with:

0 = maximum speed (not advisable !!) and

255 = minimum speed (not advisable!!)

Basic setting (delivery): 127 > about 12V control voltage

You quit the test program by pressing key **S6** ( AUTO )

## PROGRAM 13:

This features the minimum speed of the roof duct fan lower deck for heating and ventilation.

Display: 0 - 255 with:

0 = maximum speed (not advisable !!) and

255 = minimum speed (not advisable!!)

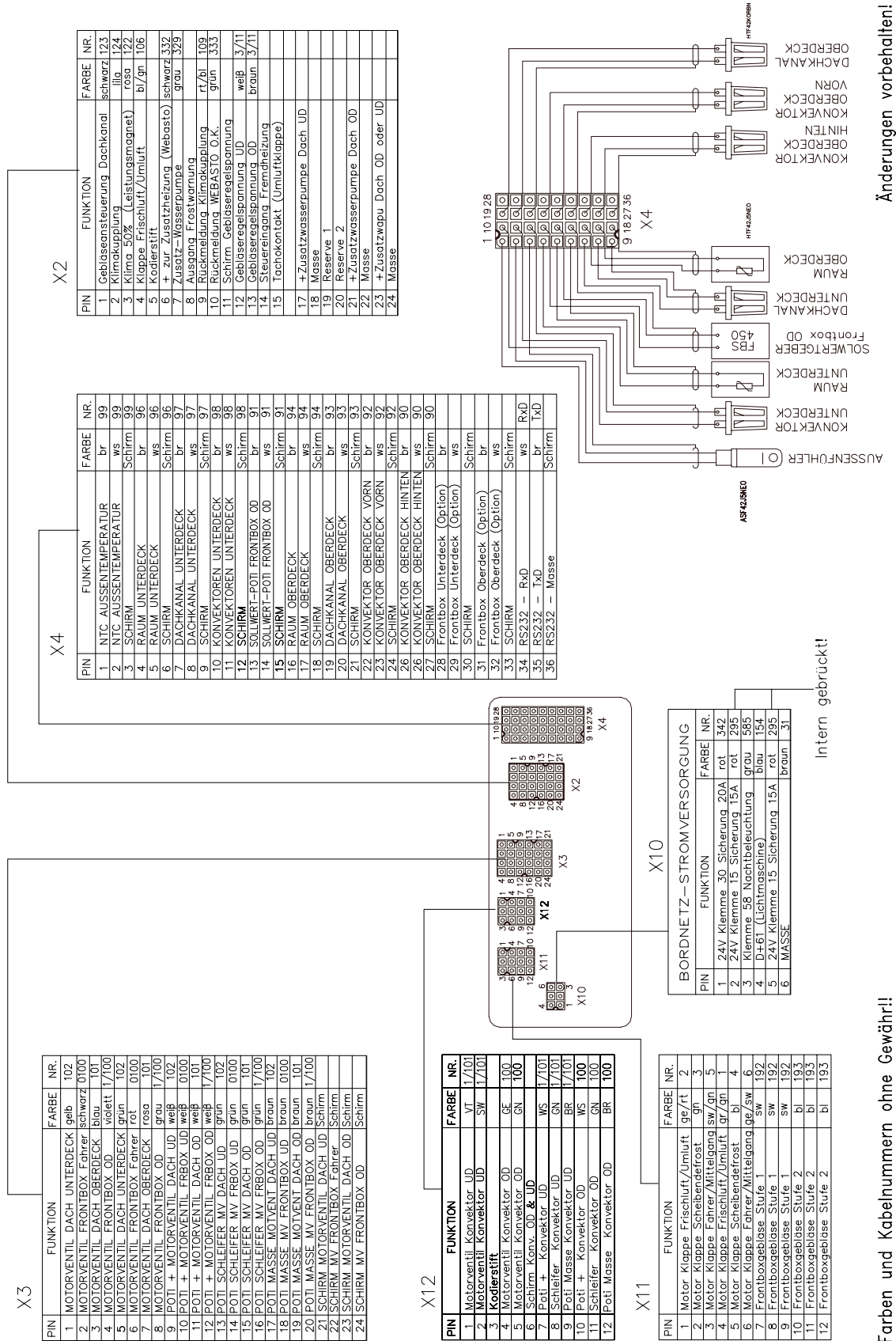
Basic setting (delivery): 127 > about 12V control voltage

You quit the test program by pressing key **S6** ( AUTO )

## 8. Total connecting circuit diagram KR-454

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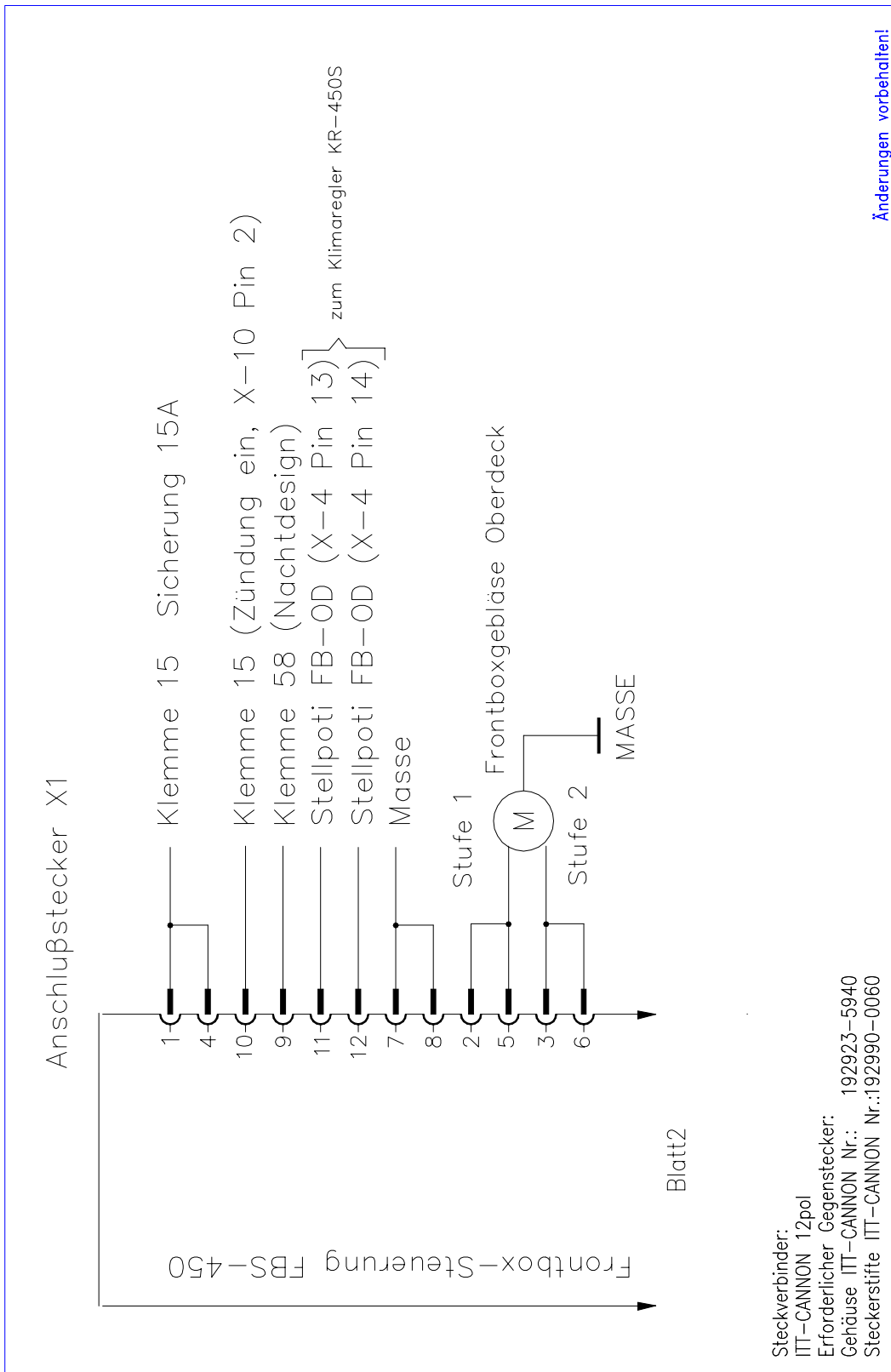
# Digital air- conditioner controller KR- 454



## 8.1 Connecting diagram emergency switch / Front box control FBS-450

# Digital air- conditioner controller KR- 454

## Plug connection X1

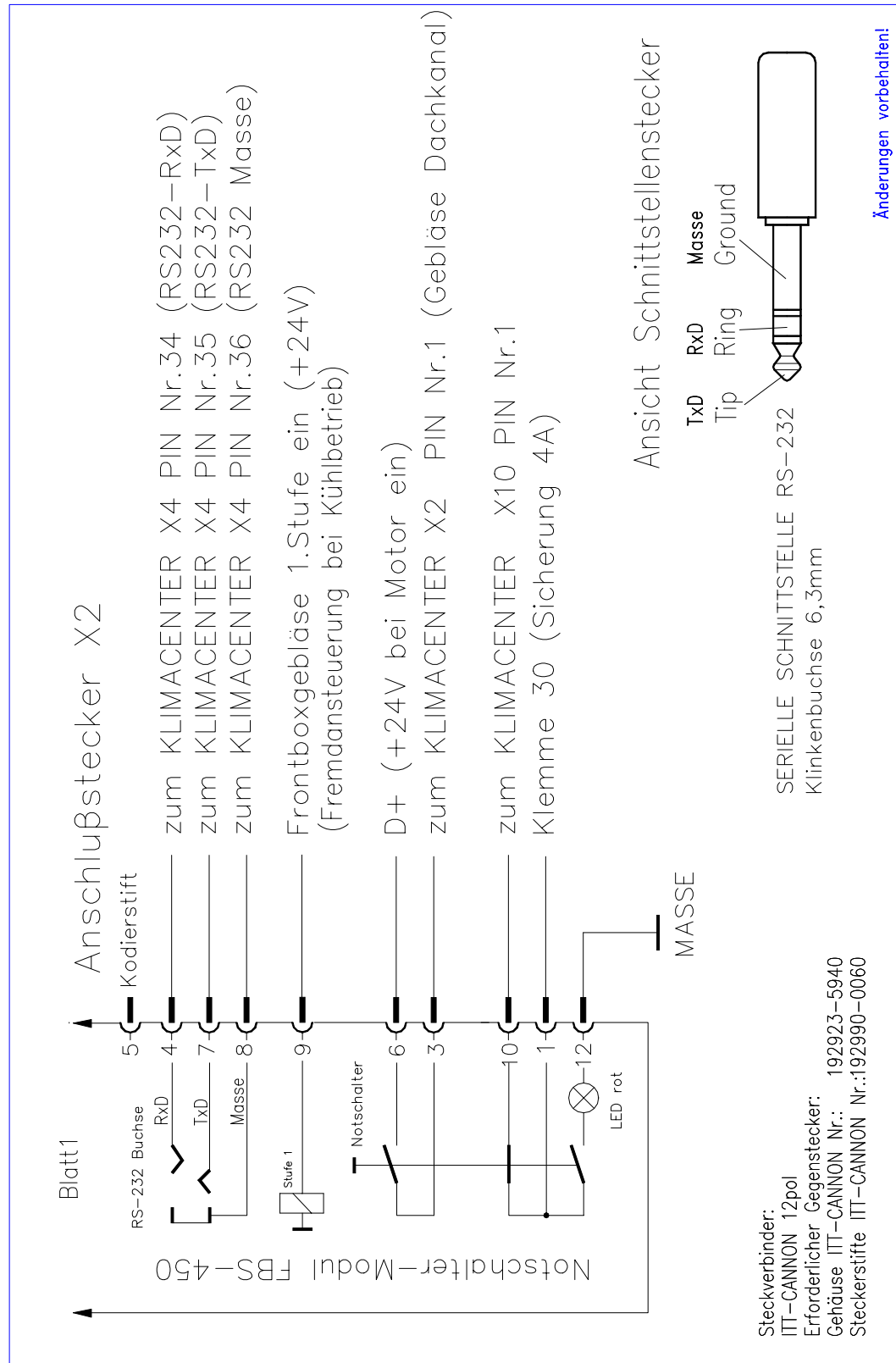


## 8.2

### Connecting diagram emergency switch / Front box control FBS-450

# Digital air- conditioner controller KR- 454

## Plug connection X2



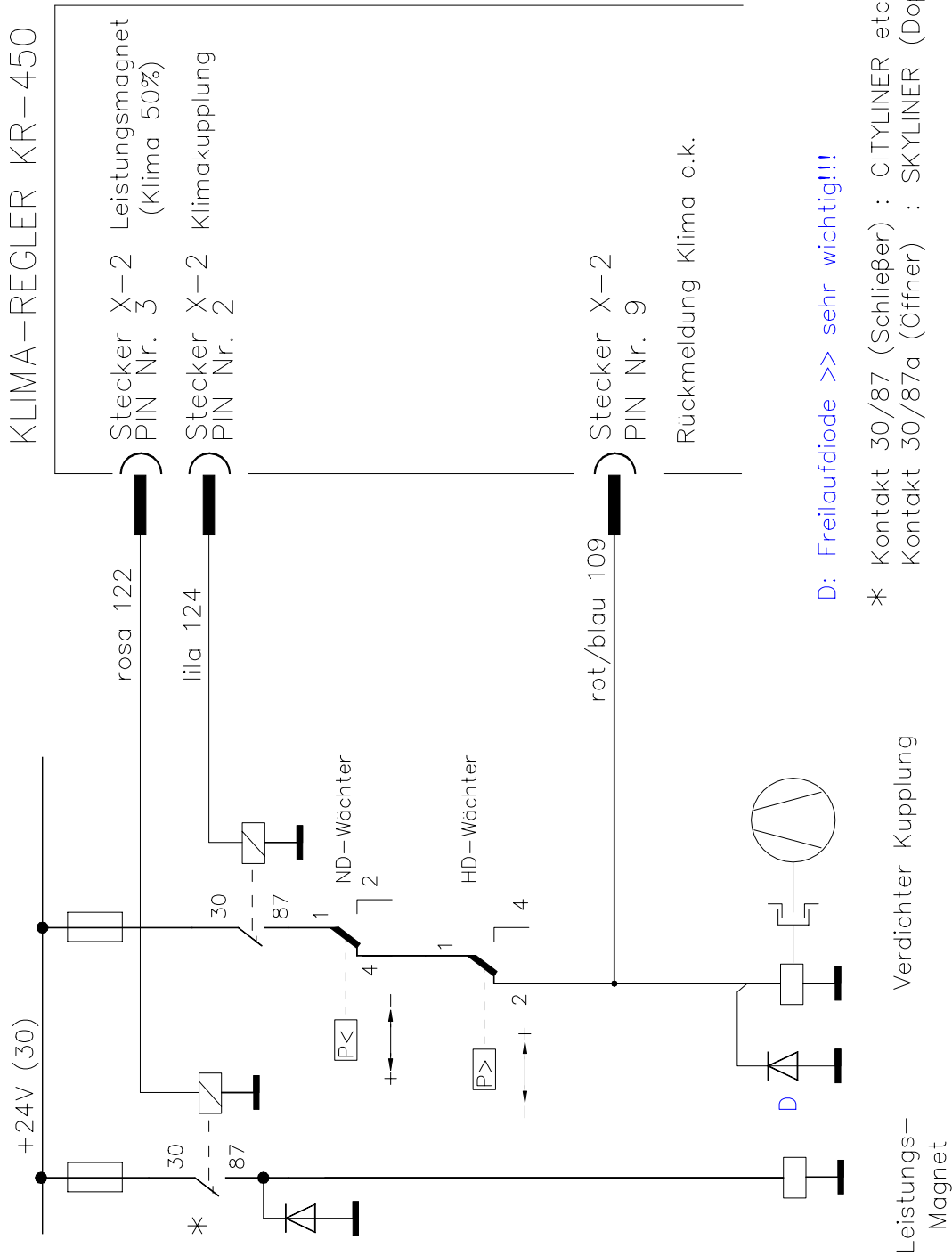
9.

## Service-Information KR-454

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# Digital air- conditioner controller KR- 454

## Basic connecting diagram of the air-conditioner



10.

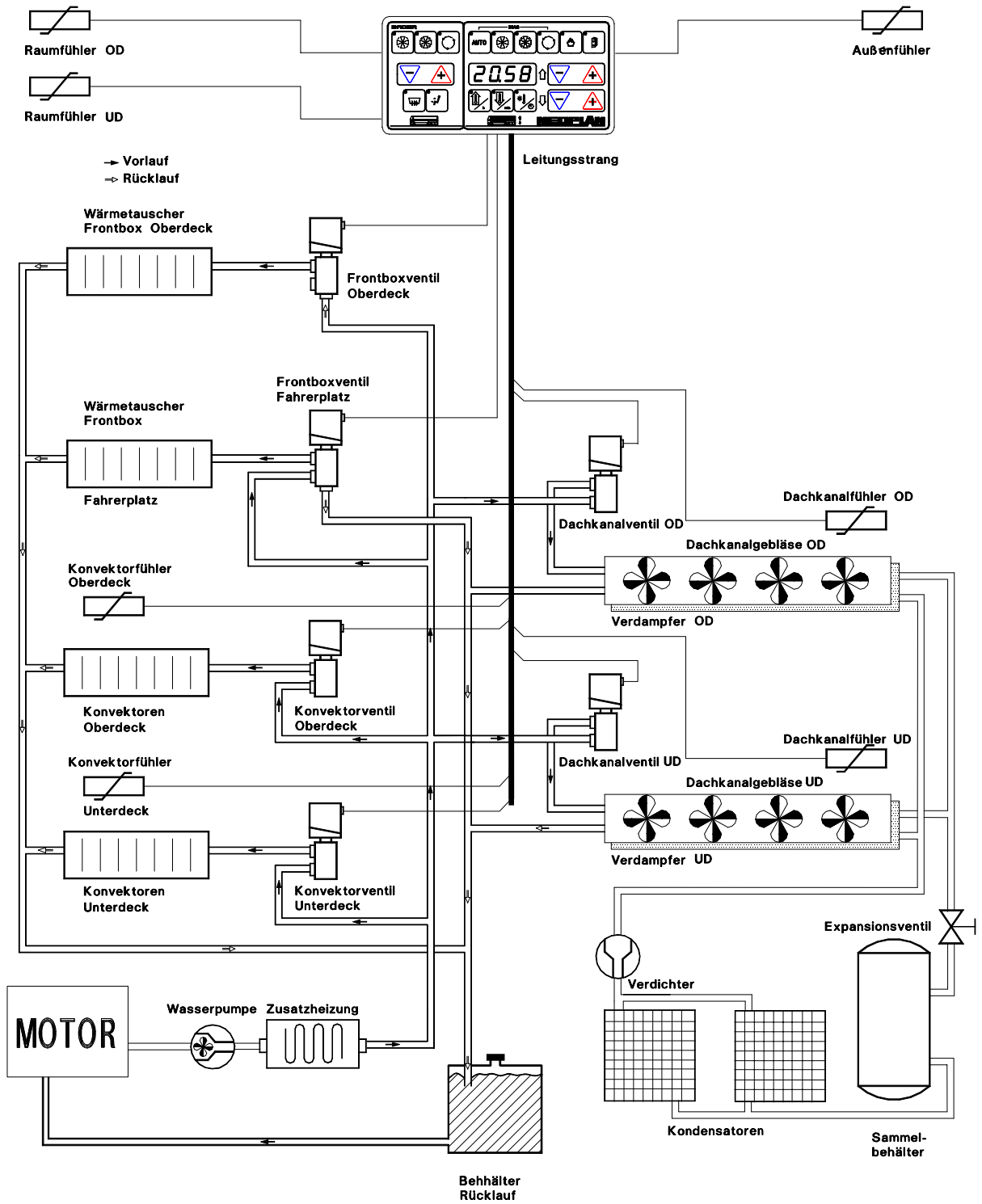
## BLOCK SCHEMA OF CONTROL IN DOUBLE-DECKER-COACH

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 04541530.SDW

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## 11. Technical Data

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# Digital air- conditioner controller KR- 454

<b>Inputs:</b>	11 Analog inputs to connect temperature- or other sensors	
	8 Digital inputs optically uncoupled	
	6 valve check-backs for prop. valves (s.full-bridge outputs)	
<b>Outputs:</b>	2 Power outputs	15A
	Max. load current of all power outputs	15A
	13 Small power outputs	180mA
	Max. load current of all small power relay outputs	1,2A
	9 Full-bridge or 18 semi-conductor outputs, short circuit proof	1,5A
	Max. load current of all semi-conductor outputs	1,5A
	2 Analog outputs	0-22V 100mA
	1 serial interface RS232	

## Operating- and display elements:

4 - figure 7-segment display
20 keys
14 Display-LEDs

## Current supply:

Power supply (distribution voltage):	20-30V
Drawing of current: at 24V no-load operation, not lightened	50 mA
Drawing of current: at 24V load operation, lightened	175 mA

**Weight:** about 1400g

**Plug connectors:** 5 or 6 ITT-plug connectors 6 to 36 pins

**Installment:** as you like, ensure sufficient ventilation!  
Always keep the unit dry!

Subject to technical alterations!

## 12. List of errors with remedial measures

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# Digital air- conditioner controller KR- 454

## **E1** *Working-hour-meter not set to "0"*

**Position:** Integrated in the unit  
**Reason :** First operation or exchanging the program  
**Measure:** Acknowledge display, switch ignition off and on

## **E3** *Short circuit outdoor sensor*

**Position:** Under the bumper, front, left  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.001.13)

## **E4** *Discontinuity outdoor sensor*

**Position:** Under the bumper, front, left  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length

## **E5** *Short circuit sensor passenger compartment lower deck*

**Position:** Under the luggage rack on the left side in the lower deck, 3.-4. seat row  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.120.07)

## **E6** *Discontinuity sensor passenger compartment lower deck*

**Position:** Under the luggage rack on the left side in the lower deck, 3.-4. seat row  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length

## **E7** *Short circuit sensor roof duct lower deck*

**Position:** In the air duct on the right side, 12.-13. seat row  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.001.10)

## **E8** *Discontinuity sensor roof duct lower deck*

**Position:** In the air duct on the right side, 12.-13. seat row  
**Reason :** A wire of the sensor is disconnected

# Digital air- conditioner controller KR- 454

Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length

## **E9 Short circuit convector sensor front lower deck**

**Position:** Above the convector on the right side, 13.-14. seat row  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.001.10)

## **E10 Discontinuity convector sensor front lower deck**

**Position:** Above the convector on the right side, 8.-9. seat row  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length

## **E11 Short circuit convector sensor rear (only Sweden)**

**Position:** Above the convector on the right side at the rear, 13.-14. seat row  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.001.10)

## **E12 Discontinuity convector sensor rear (only Sweden)**

**Position:** Above the convector on the right side at the rear, 13.-14. seat row  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length

## **E13 Short circuit sensor passenger compartment upper deck**

**Position:** Under the luggage rack on the left side in the upper deck, 6.-7. seat row  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.120.07)

## **E14 Discontinuity sensor passenger compartment upper deck**

**Position:** Under the luggage rack on the left side in the upper deck, 6.-7. seat row  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken

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- Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length
- E15 *Short circuit sensor roof duct upper deck***  
**Position:** In the air duct on the right side upper deck, last seat row  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.001.10)
- E16 *Discontinuity sensor roof duct upper deck***  
**Position:** In the air duct on the right side upper deck, last seat row  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length
- E17 *Short circuit convector sensor front upper deck***  
**Position:** Above the convector on the left side upper deck, 4.-5. seat row  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.001.10)
- E18 *Discontinuity convector sensor front upper deck***  
**Position:** Above the convector on the left side upper deck, 4.-5. seat row  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length
- E19 *Short circuit convector sensor rear upper deck***  
**Position:** Above the convector on the left side upper deck,10.-11. seat row  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.001.10)
- E20 *Discontinuity convector sensor rear upper deck***  
**Position:** Above the convector on the left side upper deck, 10.-11. seat row  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length
- E21 *Short circuit sensor front box driver's cockpit (special version)***  
**Position:** Behind the steering wheel in the pedal area  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.001.10)
- E22 *Discontinuity sensor front box driver's cockpit (special version)***

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**Position:** Behind the steering wheel in the pedal area  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length

## **E23 Short circuit sensor front box upper deck**

**Position:** Blow out duct front box  
**Reason :** Sensor cable defective  
**Measure:** Isolate or exchange cable (No.1808.001.10)

## **E24 Discontinuity sensor front box upper deck**

**Position:** Blow out duct front box  
**Reason :** A wire of the sensor is disconnected  
Plug connection broken  
Cable cut off or broken  
**Measure:** Check connection at the air-conditioner controller or sensor  
Check cable in its full length

## **E33 Air-conditioner compressor no check-back**

**Position:** Engine compartment, facing the front right, at the side of the engine  
**Reason :** Maximum- and minimum pressure switch defective; plug connection loose or defective  
Fuse air-conditioner compressor defective  
Danger of icing  
Air-flow rate too little  
Vaporizer fan failed  
Heat exchanger fan failed  
Heat exchanger fan connected wrongly  
No recovery diode at the compressor clutch  
Flap circulating/fresh air not connected properly  
Ceck-back compressor clutch to air-conditioner controller interrupted  
Control relay of compressor clutch defective  
No V-belt to the compressor clutch  
**Measure:** Check maximum- and minimum pressure switch  
Check fuse compressor and replace it if necessary  
Check cable connections  
Check compressor level indicator  
Check vaporizer- and heat exchanger fan and replace it if necessary  
Check filter cloth, clean or replace it if necessary  
Check compressor clutch (recovery diode, control relay)  
Check flap circulating/fresh air  
Check V-belt to the compressor clutch

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## **E34 Stationary heating (Webasto) no check-back**

- Position:** The stationary heating is located at the water station in the engine compartment or in a separate compartment very close to the engine compartment.
- Reason:** Control unit failed  
Fuel supply interrupted  
Burner head defective
- Measure:** Check level indicator with separate diesel oil tank  
Check fuel shut-off  
Check burner head  
If there is no stationary heating check bridge between stationary heating control and stationary heating  
Check check-back at the air-conditioner controller

## **E35 Prop valve roof duct potentiometer defective**

- Position:** In the air intake duct right of the air-conditioner
- Reason :** Plug connection not plugged correctly  
Valve defective  
Cable squeezed or broken  
Opening angle of motor valve too small
- Measure:** Check plug connection, valve and cable  
Replace motor valve if necessary (No.1808.001.11)

## **E36 Prop valve driver's cockpit potentiometer defective**

- Position:** In the double-decker the water valve is located under the driver's cockpit. In the single-decker the valve is in the water station.  
It is a 3-way-valve
- Reason :** Plug connection not plugged correctly  
Valve defective  
Cable squeezed or broken  
Opening angle of motor valve too small
- Measure:** Check plug connection, valve and cable  
Replace motor valve if necessary (No.1808.001.12)

## **E37 Prop valve convector front potentiometer defective**

- Position:** The water valve is located behind the first step in the staircase central entrance
- Reason :** Plug connection not plugged correctly  
Valve defective  
Cable squeezed or broken  
Opening angle of motor valve too small

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**Measure:** Check plug connection, valve and cable  
Replace motor valve if necessary (No.1808.001.11)

## **E39 Prop valve roof duct upper deck potentiometer defective**

**Position:** The water valve is located behind the first step in the staircase central entrance

**Reason :** Plug connection not plugged correctly  
Valve defective  
Cable squeezed or broken  
Opening angle of motor valve too small

**Measure:** Check plug connection, valve and cable  
Replace motor valve if necessary (No.1808.001.11)

## **E40 Prop valve front box upper deck potentiometer defective**

**Position:** The water valve is located above the air-conditioner compressor in the engine compartment on the right side

**Reason :** Plug connection not plugged correctly  
Valve defective  
Cable squeezed or broken  
Opening angle of motor valve too small

**Measure:** Check plug connection, valve and cable  
Replace motor valve if necessary (No.1808.001.11)

## **E41 Prop valve convector upper deck potentiometer defective**

**Position:** The water valve is located above the driving axle, it is accessible through the attendance flap in the luggage boot

**Reason :** Plug connection not plugged correctly  
Valve defective  
Cable squeezed or broken  
Opening angle of motor valve too small

**Measure:** Check plug connection, valve and cable  
Replace motor valve if necessary (No.1808.001.11)

## **E42 Prop valve front box upper deck potentiometer defective**

**Position:** The water valve is located in the engine compartment on the upper right side

**Reason :** Plug connection not plugged correctly  
Valve defective  
Cable squeezed or broken  
Opening angle of motor valve too small

**Measure:** Check plug connection, valve and cable

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Replace motor valve if necessary (No.1808.001.11)

## **E43** *Setpoint potentiometer front box upper deck discontinuity*

**Position:** FBS in the instrument panel above the air-conditioner controller

**Reason :** Cable broken or unit defective

**Measure:** Check cable course  
Check soldering joint  
Exchange unit

## **E80** *No valve potentiometer voltage (+5V)*

**Position:** Possible at all valves

**Reason :** Ground contact at a valve potentiometer

**Measure:** Unplug all valves, ignition on, clear all errors, plug on the valves one after the other and find out the defective valve

## **E81** *No valve potentiometer voltage (+24V)*

**Position:** Possible at all valves

**Reason :** Valve outputs overloaded f.ex. if several valves are stiff or servo motors are stiff or defective (flap fresh air/circulating air, etc.)

**Measure:** Check all valves and replace them if necessary  
Unplug plug connection X11 and check if front box errors still occur

## **E82** *Valve assignment (valve potentiometer) error*

**Position:** Possible at all valves

**Reason :** Cabling error, valve motor and valve potentiometer interchanged

**Measure:** Check cabling in general

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## **E84 *Outputs (total current) overloaded***

- Position:** All loads connected to the air-conditioner controller (motor valves, relays, Webasto, etc.)
- Reason :** Drawing of total current at the relay outputs more than 2A  
Loads without auxiliary relays connected directly to the air-conditioner controller
- Measure:** Check all outputs connected by relays (measure drawing of current at terminal 15 - X10, Pin 2)

## **E85 *Front box stage 1 overcurrent***

- Position:** Front box driver's cockpit
- Reason :** Motor stiff (ball bearing damage, foreign substances)
- Measure:** Check and clean fan

## **E86 *Front box stage 2 overcurrent***

- Position:** Front box driver's cockpit
- Reason :** Motor stiff (ball bearing damage, foreign substances)
- Measure:** Check and clean fan

### **Note:**

**All shields of the sensor cables and the cables for the potentiometer check-back of the water valves as well as the control cable of the roof duct fans may only be connected to the air-conditioner controller with vehicle-ground. Ground connections within the vehicle (frame) may lead to uncontrolled error messages or to error functions of the air-conditioner controller!**

### **Notes:**