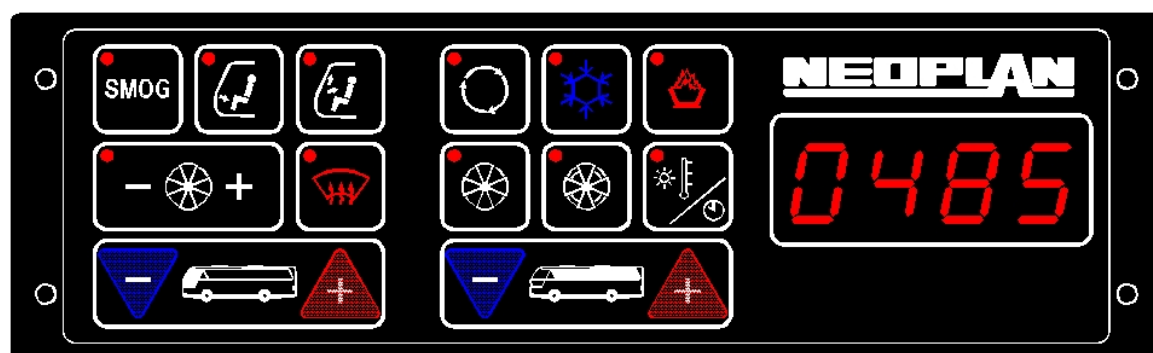


OPERATING INSTRUCTIONS

NEOPLAN

AIR-CON CONTROLLER KR-485



Issue January 2002
(V1.14)

CAUTION !

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.

CAN-Bus air- conditioner controller KR-485

IMPORTANT INFORMATION

Unplug the air- conditioner controller and it's CAN units before carrying out welding work at 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 flat vehicle battery.

All internal memories are reset by briefly interrupting the controller's power supply (wait approx. 30 sec.) or by pressing the reset keys.

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

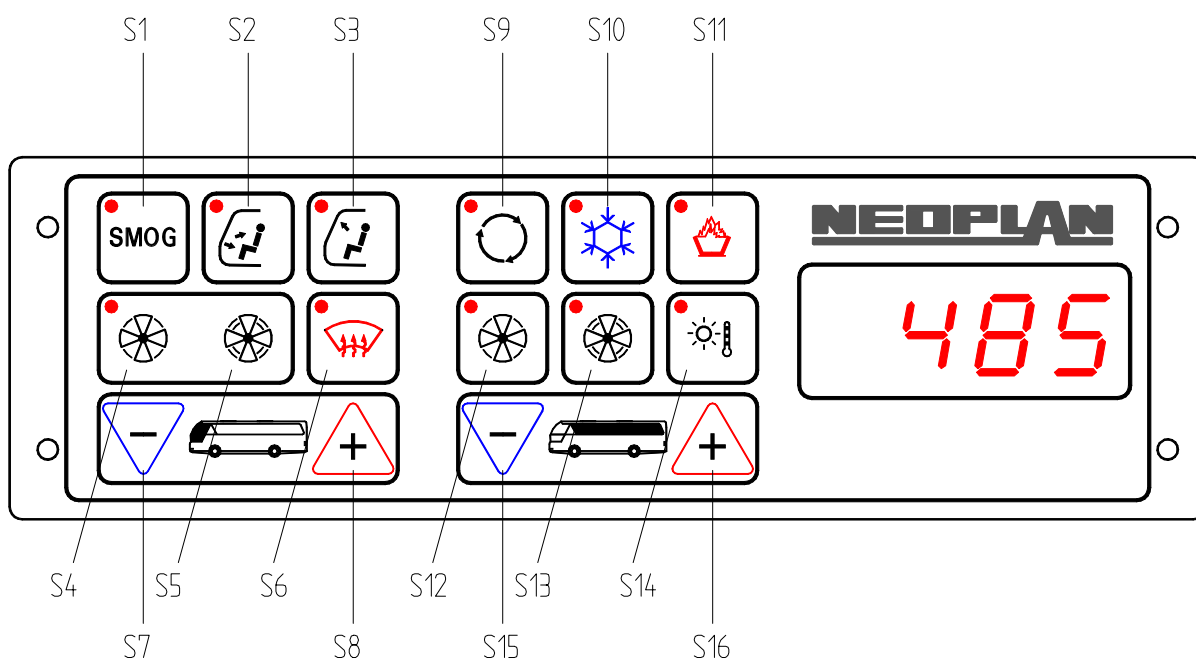
CAN-Bus air- conditioner controller KR-485

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1 Key assignment



1.1 Key assignment front box (S1-S8)

- Key S1: Opens and closes the front box- and the circulation flap of passenger compartment
Key S2: Opens and closes the flap for driver cockpit
Key S3: Opens and closes the windscreen flap
Key S4: Decreases ventilation stage of the front box fan
Key S5: Increases ventilation stage of the front box fan
Key S6: Starts and ends the defroster function
Key S7: Decreases the set point of front box controller
Key S8: Increases the set point of front box controller

1.2 Key assignment passenger compartment (S9-S16)

- Key S9: Opens and closes the circulation flap of compartment
Key S10: If engine on: switching on and off the air conditioner
Key S11: Switching on and off the auxiliary heating
Key S12: Switching on and off the ventilation stage I in the compartment
Key S13: Switching on and off the ventilation stage II in the compartment
Key S14: If ignition off: start mode of clock, timer
If ignition or engine on: switchover between outside temperature, inside temperature and time; accept errors, menu-key
Key S15: Decrease of temperature in the passenger compartment
Key S16: Increase of temperature in the passenger compartment

CAN-Bus air- conditioner controller KR-485


2 Short instruction

This short instruction allows an overview of the individual functions of the air condition control system KR-485.

With the engine running, the controller drives the temperature of the passengers compartment automatically to the set-point temperature set with keys S15 and S16.

2.1 Display

The outside temperature is always shown as a basic indication in the case of switched on ignition.

Pressing  (S14) switches over to the readout of the internal temperature. While calling specific functions, a corresponding information is announced on a short-term basis.


With outside temperatures between 3°C and -5°C the display automatically switches back to outside temperature as an ice warning. When other displays are active the key LED flashes as indication.

The display is dark, if the ignition is switched off.

During specific operation modes and calibration - test mode and programming mode - the display is used for information output.

2.2 Front box


The front box controller is in the left part of the device.

The keys  (S4, S5) switch the front box ventilation in 10 steps. (Without running engine limited to step 5) Pressing simultaneously S4 and S5 switches off the ventilation.

With keys  (S7, S8) the front box temperature can be set in 10 steps between 20° and 65°C.


Step 0 = Valve closed, step 1-9 = 20° bis 65°C, Step 10 = Valve 100% opened.

The remaining keys of the left block are used for the operation of the front box flaps and calling the defrost function.

The defrost function  is used to dry a clouded windscreen by 100% heat directed to the screen at maximum blower speed and if allowed by the outside temperature 10 minutes dehumidification of the passengers compartment. Pressing one of the frontbox keys cancels the defrost function.

2.3 Air conditioning of the passenger compartment

With the ignition on, starting the auxiliary heater or the roof duct blowers (step 1) activates the temperature control without cooling mode.

Conditioning is started automatically at the start of the engine. The desired room temperature can be adjusted by  (S15, S16).

The variable temperature ranges between 20°C and 28°C.

Key S10 is used to block the air-conditioning equipment for the controller. In this situation, if the controller requests cooling, this is indicated by a flashing LED in key S10.

2.4 Ventilation

Usually the roof duct fans are controlled depending on the compartment temperature while the engine is running.

Nevertheless, two different rotation speeds can be set with the keys  (S12) and  (S13)

If the air-conditioning equipment is not active, the roof duct fans can be switched off by simultaneous pressing of S12 and S13.

In heating mode the fans are switched on as soon as the water temperature is high enough.

CAN-Bus air- conditioner controller KR-485

2.5 CAN-Bus (Controller Area Network)

Caused by the different locations of the air-conditioning components in the vehicle, the harness was a large and very complex wiring with over-all lengths up to several kilometers. For this reason maintenance and reliability is difficult.

This is much easier with the new concept of distributed control units. The air-conditioning system in its new form is divided into functional groups which relate to certain components.

The co-operation of all functional groups is ensured through constant communication via a network line, the CAN line.

The CAN system is a serial network which was developed especially for the vehicle environment.

It provides high transfer rates and reliability. As for the connection between CAN components only a 2-wire shielded cable is necessary, the harness and the error possibilities are reduced to a minimum.

The air-con control system KR-485 consists of 4 functional groups:

Control panel U1 (KR-485): Mounted in the dash board the control panel is used to control all functions of the air-conditioning system. With the integrated display the controller shows information such as time, temperatures and warnings. The front box is driven directly from the KR-485.

Water valve node U2 (CBS-1361): functional group to control the valves of the water station, the cooling components, pumps and other auxiliary components.

Roof node U3 (CBS-1360): functional group to control the components mounted on the left roof side, i.e. fresh air flaps and roof duct fans.

Roof node U4 (CBS-1360): functional group to control the components mounted on the right roof side, i.e. fresh air flaps and roof duct fans.

CAN-Bus air- conditioner controller KR-485

3 Operation

3.1 Time setting



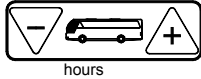
Condition: engine off, ignition off!

The setting mode is called with key S14. Readout: „-CL-“.

When pressing one of the arrow keys, the current time is displayed.

If no further key is pressed, the readout disappears after approx.

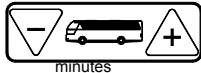
5 seconds and the time remains unchanged.



hours

The arrow keys S7 and S8 are used for setting the hours, the keys

S15 and S16 for setting the minutes.

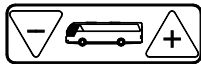


minutes



After setting the hours and minutes the newly adjusted time must be acknowledged with key S14. The readout „Tx“ appears, where x represents the day of the week.

If no acknowledge is given within approx. 5 seconds, the former time is retained.



With arrows keys S7 and S8 and/or S15 and S16 the current weekday is adjusted.

(1-Monday, 2-Tuesday, 3-Wednesday, 4-Thursday, 5-Friday, 6-Saturday, 7-Sunday)



After setting the weekday, acknowledge with key S14.

If no acknowledge is given within approx. 5 seconds, the former weekday is kept.

CAN-Bus air- conditioner controller KR-485

3.2 Programming the auxiliary heating

Condition: engine off, ignition off!

Function enabled in program -10-



Repeated pushing of S14 („-CL-“, „-H1-“, „-H2-“) calls up the starting times for the auxiliary heating.

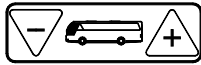
2 different starting times can be set:

„-H1-“ for times within the next 24 hours

„-H2-“ for times within the next 7 days

By pushing one of the arrow keys the actual starting time is displayed.

If no further key is pressed, the readout disappears after 5 seconds and the starting time is retained.



Hours



Minutes

The arrow keys S7 and S8 are used for setting the hours, the keys S15 and S16 for setting the minutes.



The starting time is activated with key S11, key LED is lightening. By pressing once more the time is deactivated.

If the clock hasn't been adjusted yet, the starting time cannot be activated.

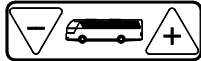
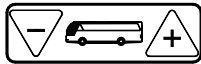


Setting the new starting time is confirmed by pressing key S14.

For starting time „-H1-“ the programming process is finished,

For starting time „-H2-“ the desired weekday is required additionally.

Readout: „Tx“ appears, where x represents the weekday.



With the arrow keys S7 and S8 and/or S15 and S16 the desired weekday for starting the auxiliary heating is adjusted.

(1-Monday, 2-Tuesday, 3-Wednesday, 4-Thursday, 5-Friday, 6-Saturday, 7-Sunday)



After setting the weekday acknowledge with key S14.

If no acknowledge is given within approx. 5 seconds the former weekday is retained.

When activated the next starting time is shown alternately with the readout „on“ for about 5 seconds. After this the readout disappears. The key LED of the auxiliary heating (S11) flashes slowly in order to indicate that the auxiliary heater will start at the set starting time.

CAN-Bus air- conditioner controller KR-485

3.2.1 Deactivating of a starting time for the auxiliary heating

Condition: engine off, ignition off!

Function enabled in program -10-



Repeated pushing of S14 calls up the starting times for the auxiliary heating. Select the respective starting time „-H1-“ or „-H2-“.

By pushing one of the arrow keys the actual starting time is displayed.

If the LED in key S11 is illuminated the starting time is active. The auxiliary heater would start automatically at that time.



The starting time is deactivated by pressing key S11, key LED is switched off.



The new state has to be acknowledged with key S14.

For starting time „-H1-“ the programming process is finished,

For starting time „-H2-“ the weekday is has to be acknowledged too.

If another starting time is still active the display shows it alternately with the readout „on“ for about 5 seconds. After this the readout disappears.

If no other starting time is active the display disappears immediately after confirming and the LED in key S11 does not start flashing.

3.2.2 Processes during auxiliary heating



If the auxiliary heating was started automatically, it can be switched off again by key S11, otherwise the heating will switch off automatically after 60 minutes.

The following aggregates are influenced:

| Aggregates | Start until 20th minute | 21st to 40th minute | 41st minute until end |
|---------------------------|--------------------------------|----------------------------|------------------------------|
| circulating flap frontbox | closed | closed | closed |
| driver cockpit flap | closed | closed | open |
| windscreen flap | open | open | open |
| frontbox valve | open | open | open |
| roof valve | closed | closed | closed |
| convector valves | open | controlled to 50°C | open |
| frontbox fan | off | Stage 4 | Stage 1 |

CAN-Bus air- conditioner controller KR-485

3.3 Annotations

3.3.1 Calibration

Readout: „CALI“

After the KR-485 was connected to the power supply, the device is waiting for the connection to the CAN-bus. During this time the readout „CALI“ flashes. If the connection is established („CALI“ lights up permanently), the system carries out a calibration of all valves. On the one hand, this is used for a functional test of the connected motors, on the other hand to teach in the mechanical stops of the valves. Calibration can take up to 2 minutes depending on motor type.



If the calibration is not carried out correctly, it can happen, that the valves are not positioned correctly or the pumps are running, although the valves are closed.

Calibration can also be called manually from the test mode (-11-).

Calibration of the valves is also carried out after low voltage and once a week.

Controller functions, which are called during calibration, become active after ending and the responsible aggregates are moved into the corresponding positions.

If no function is active, all valves are closed.

If at the beginning of calibration the readout „CALI“ flashes for longer than 5 seconds, the connection to the valve node cannot be established. By simultaneous pressing of key  (S1) and  (S11), an error message occurs for about 2 seconds. After that the controller KR-485 retries to connect to the valve node.

3.3.2 Shut down process / External water heating

When the ignition is switched off, the valves will be closed, if external water heating is not activated.

The shut down process can take up to 30 seconds depending on motor type.

If an external water heater is used, all valves have to be opened.

To do so, press S8 and S16 simultaneously when the ignition is off. The display shows „FHZG“ for several seconds.

When switching on the ignition, the valves are closed again.

If the system is connected to an external water heater the auxiliary heating shouldn't be programmed.

CAN-Bus air- conditioner controller KR-485

3.3.3 Auxiliary heating

The auxiliary heating is a stand-alone unit. When requested by the KR-485 the control unit in the auxiliary heating is activated.(stand by mode)

If the water temperature is too cold, the auxiliary heating ignites automatically. If the water is warm enough the control unit does not ignite.

In addition to the manual switch-on with the corresponding key, two starting times can also be programmed in advance.

This is used as a pre-heating of the bus when the ignition is off.

At the beginning of the heating process, the controller switches the auxiliary heating to stand by, provided, that the outside temperature is lower than 5°C and the water temperature lower than 40°C.

A turn on of the air-conclutch eliminates the stand by mode of the auxiliary heating, in order to prevent that the cooling system must work against the heating.

In case of manually turned on auxiliary heating the possibly programmed starting time is not displayed.

If all water valves are closed when the ignition is on, it is not possible to switch on the auxiliary heating manually. If all valves are closed during the regulation process, the auxiliary heating is switched off. This prevents that the water pump has to work against closed valves.

3.4 Reset- function



If keys S1, S4 and S7 are pressed simultaneously during switched off engine, the system carries out a reset.



The control panel reports itself with "0485" and then starts the valve calibration.



The error memory, the current time and possibly programmed times of the auxiliary heating are deleted.

3.5 Power-on test

When ignition is switched on for the first time after applying power supply, the control unit starts a short test to check the CAN connection, the temperature sensors and the valve feedbacks. An occurring error is displayed immediately. If no error occurred „ i.O.“ for „okay“ is displayed for 5 seconds.

CAN-Bus air- conditioner controller KR-485

3.6 Error- diagnosis

The air-con controller KR-485 is equipped with a fault diagnosis program, that is active if the engine is running.

The following is checked:

- CAN- Bus connection
- Sensor open circuit and sensor short circuit
- Valve potentiometer
- air-concompressor

Errors are represented on the display by an "E", followed by the corresponding error number.



These must be acknowledged by the menu key S14, before the system returns to normal operation.

Errors of the air-concompressor occurring during the tour are stored and displayed immediately.

All other errors are only stored.

If errors occur in the sensors, in some cases a default value of 22°C is preset, which allows an emergency operation of the system.

Displaying the error memory:



The error memory is displayed by pressing the keys S1 and S7 simultaneously when the ignition is off. The controller displays the respective error code or „i.O.“ for „okay“.

If the cause for an error has been repaired, the error code has to be deleted from the memory manually.

Deleting error memory:

The error memory can be erased by the corresponding check program in the test mode. (see chapter 4)



The error memory is also erased by calling the reset function or when pressing key S11 while Displaying the error memory.

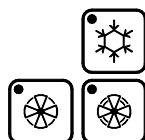
3.7 Emergency operation

If there is a fault in the CAN- BUS - connection between the control panel and the roof nodes, they switch automatically to an emergency operation. That means, in case of switched on ignition, the roof fans are turned to 50% of the rotation speed, as soon as the power supply voltage is higher than approx. 26.5V. If the voltage is lower than approx. 25.3V the fans are switched off.

3.8 Error E33 of air conditoning equipment

If the pressure-switches of the air-con compressor switch off three times within approx.10 minutes, the error E33 is displayed and the cooling equipment is disabled. It is enabled again, if the engine is switched off.

3.9 Refrigerant solenoid valve



With the ignition switched on the refrigerant solenoid valves for the passengers compartment and the frontbox can be opened by simultaneous pressing of keys S10, S12 and S13.

„vent“ is displayed.

CAN-Bus air- conditioner controller KR-485

3.10 Undervoltage

When the engine is not running the power supply voltage is monitored. If it drops below approx. 21V for longer than 30 seconds, the system enters undervoltage mode. All functions, connected components and the display are switched off, key functions are inhibited. Whenever a key is pressed the controller displays „U“ for a short time.

If the power supply voltage raises again above 23V, all functions are reenabled. Please reset the system as soon as the vehicle's power supply has been recharged.

CAN-Bus air- conditioner controller KR-485

4 Test mode

With the test mode the air-con controller KR-485 has a specific operating mode, in which the local-mode functions as well as those of the connected nodes and of the connected aggregates can be checked up.

Condition: *engine off, ignition on!!*



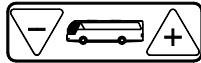
The test mode is called up by simultaneous pressing of keys S1 and S11.

Then the display shows „CodE“ and expects the entering of the corresponding access code within the next 5 seconds.

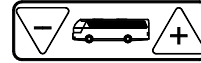
The access code (standard access) for the KR-485 is S4, S8, S5.

When entering no code or an incorrect code, controller returns to its previous operating condition after timeout.

To select a specific test program switch one step up or down with keys S15 and S16. The programs can be selected in steps of 10 with keys S7 and S8.



+/-10



+/- 1



With key S14 the currently displayed test program is started and stopped (except for the keyboard test).

If "----" appears on the display when calling up the test program this program is not available in this device or with this access code.



Press S1 and S11 simultaneously to quit test mode.

CAN-Bus air- conditioner controller KR-485

4.1 Test programs

4.1.1 - 1-: LED test

With this test program the key-LEDs in the control panel are tested.
All available key-LEDs must light up separately in sequence.



Termination with any key.

4.1.2 - 2-: LCD test

In this test program the function of the 7- segment -display is tested. All segments are switched on and off separately in sequence. After activation of all segments the test starts once again from the beginning. During this process all segments have to light.



Termination with key S14.

4.1.3 - 3-: Keyboard test

With this test program the keys of the panel can be tested. By pushing a key the corresponding key code appears on the display.



Termination by simultaneous pressing of S1 and S11

4.1.4 - 4-:

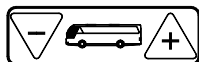
Not available in KR-485.

CAN-Bus air- conditioner controller KR-485

4.1.5 - 5-: Valve test

This test program is used for testing the motor valves.

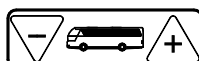
The output of the valves are only active in case of switched on ignition.



Valves 1...4 are selected by keys S7 and S8.

Assignment of the valves:

| Valve | Description | Pin | Min. | Max. |
|-------|---------------------------------|---------------|------|------|
| 1 | Roof valve | U2 / X3.1-6 | | |
| 2 | Driver cockpit valve | U2 / X3.7-12 | | |
| 3 | Convactor valve front | U2 / X3.13-18 | | |
| 4 | Convactor valve rear (optional) | U2 / X3.19-24 | | |



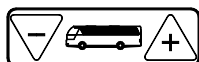
The valves can be adjusted by keys S15 and S16. The display shows the current valve feedback from 0% (closed) to 99% (open).

Due to the mechanic parts of the valves the electrical limits (0%, 99%) are never reached. The valves are completely opened or closed much earlier.



Termination with key S14

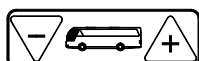
4.1.6 - 6-: Analog input test



+/- 1

With this test program all analog inputs of the system can be displayed.

The analog inputs 1...14 can be selected by keys S7 and S8.



Read out: "number of input" for example " 1 "



+/- 10

The corresponding value is shown by pressing the key S11.

Assignment of the analog inputs:

| | | |
|------|------------------------------------|---------------|
| A 1 | Outside temperature [°] | U1 / X5.1 |
| A 2 | Front box temperature [°] | U1 / X4.23 |
| A 3 | Valve voltage [HEX] | U1 / (intern) |
| A 4 | Low voltage input [HEX] | U1 / (intern) |
| A 5 | freezing sensor [°] | U3 / X3.14 |
| A 6 | Room temperature [°] | U4 / X3.11 |
| A 7 | Channel temperature [°] | U4 / X3.14 |
| A 8 | Convactor sensor rear [°] | U2 / X2.10 |
| A 9 | Water temperature [°] | U2 / X2.13 |
| A 10 | Convactor sensor front [°] | U2 / X2.7 |
| A 11 | Feedback roof valve [%] | U2 / X3.4 |
| A 12 | Feedback driver cockpit valve [%] | U2 / X3.10 |
| A 13 | Feedback convactor valve front [%] | U2 / X3.16 |
| A 14 | Feedback convactor valve rear [%] | U2 / X3.22 |

[%] - Indication in percent of valve angle

[°] - Indication in ° C and/° F -33°: possible not connected sensor

69°: possible short-circuited sensor

[HEX] - Indication in hexa decimal presentation



Termination with key S14

CAN-Bus air- conditioner controller KR-485

4.1.7 - 7-: Digital output test

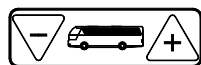
WARNING!

At inappropriate use of this test program defects in the equipment are possible. This can lead to injuries.

With this test program all digital outputs can be controlled (ignition on).

Read out: "o number of the output", e.g. "o 10"

The digital outputs 1...47 can be selected by keys S15 and S16 or S7 and S8.



+/- 1



+/- 10

Display: „o Number of output“ i.e. „o 10“

Key S11 sets and resets the current digital output. The state of the output is signalled by the LED in key S11.

LED on: Output active 24V

LED off: Output inactive 0V/testing voltage

Assignment of the digital outputs:

node / pin:

| | | |
|------|----------------------------------------------------------------|---------------|
| o 1 | Fan in driver's cockpit (0485.1.A01)/ Ice warning (0485.2.A01) | U1 / X4.4 |
| o 2 | Defrost flap closed | U1 / X4.1 |
| o 3 | Flap lower cockpit closed | U1 / X4.2 |
| o 4 | Circulating air flap closed | U1 / X4.3 |
| o 5 | Defrost flap open | U1 / X4.5 |
| o 6 | Flap lower cockpit open | U1 / X4.6 |
| o 7 | Circulating air flap open | U1 / X4.7 |
| o 8 | Entrance heating in front | U1 / X3.4,5 |
| o 9 | Solenoid valve front box | U1 / X4.12 |
| o 10 | Evaporator fan I | U3 / X1.9,10 |
| o 11 | Evaporator fan II | U3 / X1.12,13 |
| o 12 | Evaporator fan III | U3 / X1.15,16 |
| o 13 | Condenser fan I | U3 / X2.9,10 |
| o 14 | Condenser fan II | U3 / X2.12,13 |
| o 15 | Condenser fan III (optional) | U3 / X2.15,16 |
| o 16 | Solenoid valve refrigerant (optional) | U3 / X3.10 |
| o 17 | Power supply flap motors | U3 / X3.9 |
| o 18 | Reserve output | U3 / X3.5 |
| o 19 | Circulating air flap compartment (U) | U3 / X3.6 |
| o 20 | Circulating air flap compartment (F) | U3 / X3.7 |
| o 21 | Circulating air flap compartment (M) | U3 / X3.8 |
| o 22 | Evaporator fan I | U4 / X1.9,10 |
| o 23 | Evaporator fan II | U4 / X1.12,13 |
| o 24 | Evaporator fan III | U4 / X1.15,16 |
| o 25 | Condenser fan I | U4 / X2.9,10 |
| o 26 | Condenser fan II | U4 / X2.12,13 |
| o 27 | Condenser fan III (optional) | U4 / X2.15,16 |
| o 28 | Reserve output | U4 / X3.10 |
| o 29 | Power supply flap motors | U4 / X3.9 |
| o 30 | Reserve output | U4 / X3.5 |
| o 31 | Circulating air flap compartment (U) | U4 / X3.6 |
| o 32 | Circulating air flap compartment (F) | U4 / X3.7 |
| o 33 | Circulating air flap compartment (M) | U4 / X3.8 |

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| | | |
|------|-------------------------------|------------|
| o 34 | Valve roof closed | U2 / X3.1 |
| o 35 | Valve driver's cockpit closed | U2 / X3.7 |
| o 36 | Valve convector rear closed | U2 / X3.19 |
| o 37 | Valve convector front closed | U2 / X3.13 |
| o 38 | Valve roof open | U2 / X3.2 |
| o 39 | Valve driver's cockpit open | U2 / X3.8 |
| o 40 | Valve convector rear open | U2 / X3.20 |
| o 41 | Valve convector front open | U2 / X3.14 |
| o 42 | Air-con compressor clutch | U2 / X1.3 |
| o 43 | Power regulation 50% | U2 / X1.4 |
| o 44 | Entrance heating rear | U2 / X2.5 |
| o 45 | Roof pump | U2 / X1.5 |
| o 46 | Auxiliary heating | U2 / X2.3 |
| o 47 | Webasto water pump | U2 / X2.4 |

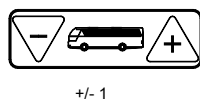


Termination with key S14.

On Leaving this program all outputs are reset.

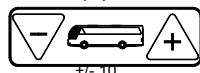
4.1.8 - 8-: Digital input test

This test program is used to monitor all digital inputs.



The digital inputs 1...13 can be selected by keys S15 and S16 or S7 and S8

Read out: "i number of the input", e.g. "i 4"



The state of the inputs is signalled by the LED in key S11.

LED on: Input active 24V

LED off: Input inactive 0V

Assignment of the digital inputs

node /pin:

| | | |
|------|--------------------------------|------------|
| i 1 | KL 15 ignition on | U1 / X1.2 |
| i 2 | D+61 dynamo | U1 / X1.4 |
| i 3 | KL 58 light on | U1 / X1.3 |
| i 4 | Door open | U1 / X4.19 |
| i 5 | Input node number | U3 / X3.2 |
| i 6 | Reserve | U3 / X3.3 |
| i 7 | Feedback fresh air | U3 / X3.4 |
| i 8 | Entry node number | U4 / X3.2 |
| i 9 | Reserve | U4 / X3.3 |
| i 10 | Feedback fresh air | U4 / X3.4 |
| i 11 | HD / ND - switch | U2 / X1.6 |
| i 12 | Feedback auxiliary heating | U2 / X2.6 |
| i 13 | Feedback voltage at valve poti | (internal) |



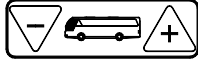
Termination with key S14.

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4.1.9 - 9-: Control voltage test (analog output test)

This program is used for the test of the two control voltage outputs.

Read out: „r number of output: % value“ e.g. "r1:32"



By keys S7 and S8 the current control voltage can be adjusted between appr. 0% and 98%, and/or 1% and 99%.



The next control voltage is selected by pressing key S11.

Assignment of the control voltages:

node / pin:

| | | |
|----------------------------------------------|------------|-----------------|
| r1. Control voltage driver fan | U1 / X4.10 | |
| r2. Control voltage roof fan | | U3 / X1.3, 5, 7 |
| r3. Control voltage condenser fan (optional) | | U3 / X2.3, 5, 7 |
| r4. Control voltage roof fan | | U4 / X1.3, 5, 7 |
| r5. Control voltage condenser fan (optional) | | U4 / X2.3, 5, 7 |

The following voltages can be measured at unloaded output:

| Percentage | Voltage |
|---------------------|----------------|
| 0% (minimum speed) | approx. 21,9 V |
| 25% | approx. 18,6 V |
| 50% | approx. 12,4 V |
| 75% | approx. 6,2 V |
| 98% (maximum speed) | approx. 0,3 V |



Termination with key S14.

4.1.10 -10-: Auxiliary heater parameter

This program is used to set the default parameter for the auxiliary heater.

1. starting times programmable „P“ / not programmable „-“
2. use front box blowers when preheating „F“ / don't use front box blowers „-“
3. automatic mode „A“ / no automatic mode „-“



Mit den Tasten S15 und S16 werden die Optionen ein- bzw. ausgeschaltet.



Key S14 switches to the next setting or quits the program.

4.1.11 -11-: Calibration of the valves

This program starts the valve calibration.

"CALI" is announced at the start of the program. By further pressing S14 the program is left without calibration.



If the calibration is confirmed by S11, the calibration is started and the test mode is left automatically.

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4.1.12 - 41-: Which node is connected to the CAN-Bus?

Condition: Engine off, ignition on!!

You can find out with this test which of the connected CAN-Bus nodes reports itself properly at the control panel of the KR-485. An available node is represented by its number, a missing node by a stroke in place of the appropriate number.

Read out: "u 2 3 4"

Network numbers:

u2: K-1361 (electro box node)

u3: K-1360 (roof node left)

u4: K-1360 (roof node right)



Termination with key S14.

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5 Automatic test mode

This mode is used as a quick test to see if all sensors, ventilation and heating components are working properly.

Duration of the test: approx. 8 minutes.

5.1 Conditions

Before starting the automatic test the following conditions should be met:

- Ignition on, engine off
- Door I and Door II opened (front and rear entry)
- Service lids opened (for auxiliary heater and motor valves; left side behind the rear axle)

5.2 Test procedure

Start the test by pushing simultaneously the keys



S11 (aux. heater),



S14 (temperature)



S16 (temp. Passengers compartment plus)

During the test procedure „TEST“ will flash in the display.

The test procedure can be aborted by starting the engine, switching off ignition, cutting off the battery or pushing the keys again.

The results of the tests can be reported to the following check list.

The following components are tested during the test procedure:

- power supply voltage above 21,5 V
- CAN communication
- analog inputs (sensors and valve feedbacks)
- valves
- water pumps
- auxiliary heater (if water is cold)
- condensor blowers (Konvekta 2 Fach / Süttrak only stage I)
- entrance heater (Door II)
- evaporator blowers
- entrance heater (Door I)
- front box: blower, screen flap, driver's flap

If the supply voltage drops too low at the beginning or during the test, „U“ is flashing to indicate undervoltage. Press S11 (aux. heater) to confirm and quit.

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Check list automatic test mode

| Test | Test date | | | | | | |
|----------------------------------------------------------------------------------------------------|------------------|--|--|--|--|--|--|
| Roof duct valve (open, close) | | | | | | | |
| Front box valve (open, close) | | | | | | | |
| Convactor K1 (open, close) | | | | | | | |
| Convactor K2 (open, close) <small>(optional)</small> | | | | | | | |
| Water pump | | | | | | | |
| Auxiliary heater start <i>Attention! If the water is warm enough the heater will not start!</i> | | | | | | | |
| 2 condensor blowers front | | | | | | | |
| 2 condensor blowers rear | | | | | | | |
| Entry heater door II (exit) <small>(optional)</small> | | | | | | | |
| Roof duct fan left 1 | | | | | | | |
| Roof duct fan left 2 | | | | | | | |
| Roof duct fan left 3 | | | | | | | |
| Roof duct fan right 1 | | | | | | | |
| Roof duct fan right 2 | | | | | | | |
| Roof duct fan right 3 | | | | | | | |
| Entry heater door I (front entry) <small>(optional)</small> | | | | | | | |
| Front box ventilation windscreen / driver's feet | | | | | | | |
| Front box ventilation driver's feet | | | | | | | |
| Front box ventilation windscreen | | | | | | | |
| Front box maximum blower speed | | | | | | | |
| Displayed Errors | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
| Notes | | | | | | | |

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5.3 Test description

Please note that the automatic test needs a certain amount of time. If you are pressed for time, please postpone the test to a later date.

If you have the opinion that your heating, ventilation or cooling components are not working properly, there is an easy way of performing a quick overall test.

Before starting the test, please pay attention to the following:

The duration of the test is about 8 min.

Interrupt the test procedure only in urgent cases. If the test has been interrupted please restart the test procedure as soon as possible.

The test procedure is interrupted by starting the engine, switching off ignition, cutting off the battery or pushing the keys again.

The climate controller KR-486 is equipped with an online diagnosis. These errors are shown on the display by an "E", followed by the corresponding error number.

As you are able to test processes that cannot be tested by the controller itself please observe the following advices:

Switch on ignition.

Open door I and II (front and rear entrance)

Open the service lid where for the valve unit is mounted (left side behind the rear axle)

Start the test by pressing all 3 key S4, S5, S6 simultaneously.

The display „TEST“ flashes.

Duration of the test about 8 min.

If a flashing „U“ appears in the display, supply voltage is too low.

In this case confirm with key S11 (Aux. heater) and quit the test.

A new test should be started when the battery has been charged.

Exit the vehicle and go to the valve unit.

In the meantime the controller is testing the following:

After 3 sec. of waiting, the CAN communication (5 sec.) and the analog inputs are tested (ca. 7 sec.)

After approx. 15 sec:

The valves open and close alternately. (open to the outside, closed to the inside, see arrow).

The valves are marked: D = roof duct valve, K = convactor valve (K1, K2), F = front box valve

The roof duct valve D opens (10 sec) and closes (10 sec), the water pump is off.

The front box valve opens (10 sec) and closes (10sec), the water pump is on.

The convactor valve K1 opens (10 sec) and closes (10 sec), the water pump is off.

If available: The convactor valve K2 opens (10 sec) and closes (10 sec), the water pump is off.

The water pump starts pumping, the front box valve opens.

The auxiliary heater ignites (10 sec) and starts heating (Attention! No start with warm engine). Minimum burning time 30 sec.

Thereafter the auxiliary heater stops heating. Duration 40 sec. (Attention: pump and heater with approx. 2 Min after-running).

Now the condensor blowers on the rooftop start working (if available). At first the two front blowers (10 sec), and after a pause of 10 sec the two rear blowers (10 sec), followed by a pause of 10 sec.

CAN-Bus air- conditioner controller KR-485

Move to door II (rear exit).

Near the stairs is an optional heater mounted. If it is available it starts for 10 sec.

Enter the vehicle through the rear exit and move to the rear part of the compartment within the next 10 sec.

The evaporator blowers start running with ½ speed. First the left side blowers (On the left side of the coach air has to come out of the duct towards the windows and the aisle.) and after the right side blowers (On the right side of the coach air has to come out of the duct towards the windows and the aisle).

1. blower left: 5 sec.; pause 10 sec.

2. blower left: 5 sec.; pause 10 sec.

3. blower left: 5 sec.; pause 10 sec.

1. blower right: 5 sec.; pause 10 sec.

2. blower right: 5 sec.; pause 10 sec.

3. blower right: 5 sec.

pause 30 sec.

Go back to the driver's seat.

Near the stairs is an optional heater mounted. If it is available it starts for 10 sec.

Finally the front box is tested. The blower runs at ½ speed (stage 5).

Check if the air is flowing towards the screen and the driver's foot area.

For 30 sec. the air is flowing to all directions, then only to the driver's foot area (30 sec), finally to the screen and the driver's nozzles (30 sec).

At last the air is again flowing to all directions. The blower is for 30 sec at full speed (stage 10) and switches off.

test end

If no error has been detected by the controller, „i.O.“ is displayed. If you recognised any error during the test, please fill in the check list.

Please note that the refrigerant circuit is not tested because this is only allowed to specially trained workshops and service plants.

If your system displays this error or does not work properly, please contact a NEOPLAN workshop, NEOPLAN-Stuttgart (Tel. +49 (0)711/7835-0) or a service workshop.

CAN-Bus air- conditioner controller KR-485

Appendix A: Technical data

| | | |
|------------------------------------------|---------------------------------------------------------------------|----------------|
| Operating voltage: | 20-32 VDC, incorrect polarities protected | |
| Nominal voltage: | 24 VDC | |
| Maximal current drain: | 2 A | |
| Current drain without load: (at 22°C) | KR-485: approx. 40 mA (ignition off) approx. 90 mA (ignition on) | |
| Digital outputs: | Approx. 24 VDC short circuit proof against ground | |
| Digital inputs: | High: 24 V (> 18 V) Low: 0 V (<6 V) | |
| Analog outputs: | Approx. 0 V to approx. 22 V $I_{\max} = 20 \text{ mA}$ | |
| Analog inputs: | $V_{\text{in}} = 0 \text{ V to } 5 \text{ V}$ | |
| Storage temperature: | -30° to +80°C | |
| Operating temperature: | -20°C to +70°C | |
| Weight: | KR-485: | approx. 810 g |
| | K-1360: | approx. 1850 g |
| | K-1361: | approx. 1300 g |

CAN-Bus air- conditioner controller KR-485

Appendix B: Error numbers since V1.06

Sensors and set point potis:

Error 3 short circuit external sensor
Error 4 open circuit „
Error 5 short circuit compartment sensor
Error 6 open circuit „
Error 7 short circuit channel sensor
Error 8 open circuit „
Error 9 short circuit convector sensor in front
Error 10 open circuit „
Error 11 short circuit convector sensor at rear
Error 12 open circuit „
Error 21 short circuit front box sensor driver place
Error 22 open circuit „
Error 23 short circuit frost sensor
Error 26 open circuit water sensor

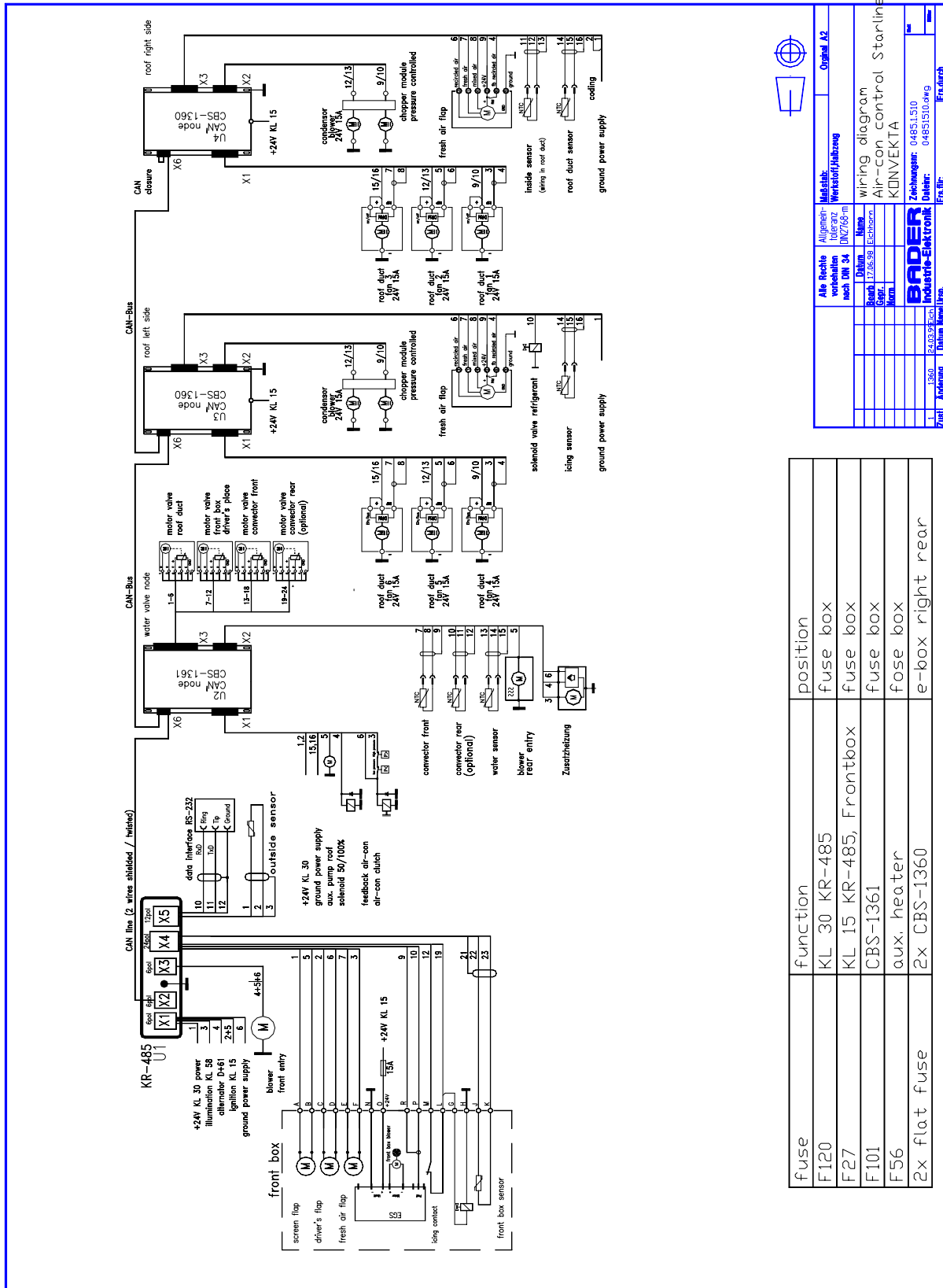
Input/output Error:

Error 33 compressor feedback is missing
Error 34 No start auxiliary heater
Error 35 Propvalve roof poti is defective
Error 36 Propvalve driver place poti is defective
Error 37 Propvalve convector in front poti is defective
Error 38 Propvalve convector at rear poti is defective
Error 44 during calibration: valve timeout

Error 80 Valve potis voltage is missing
Error 82 Wrong valve assignment / Calibration error

Error 85 general error U2
Error 86 general error U3
Error 87 general error U4
Error 88 CAN-Bus error

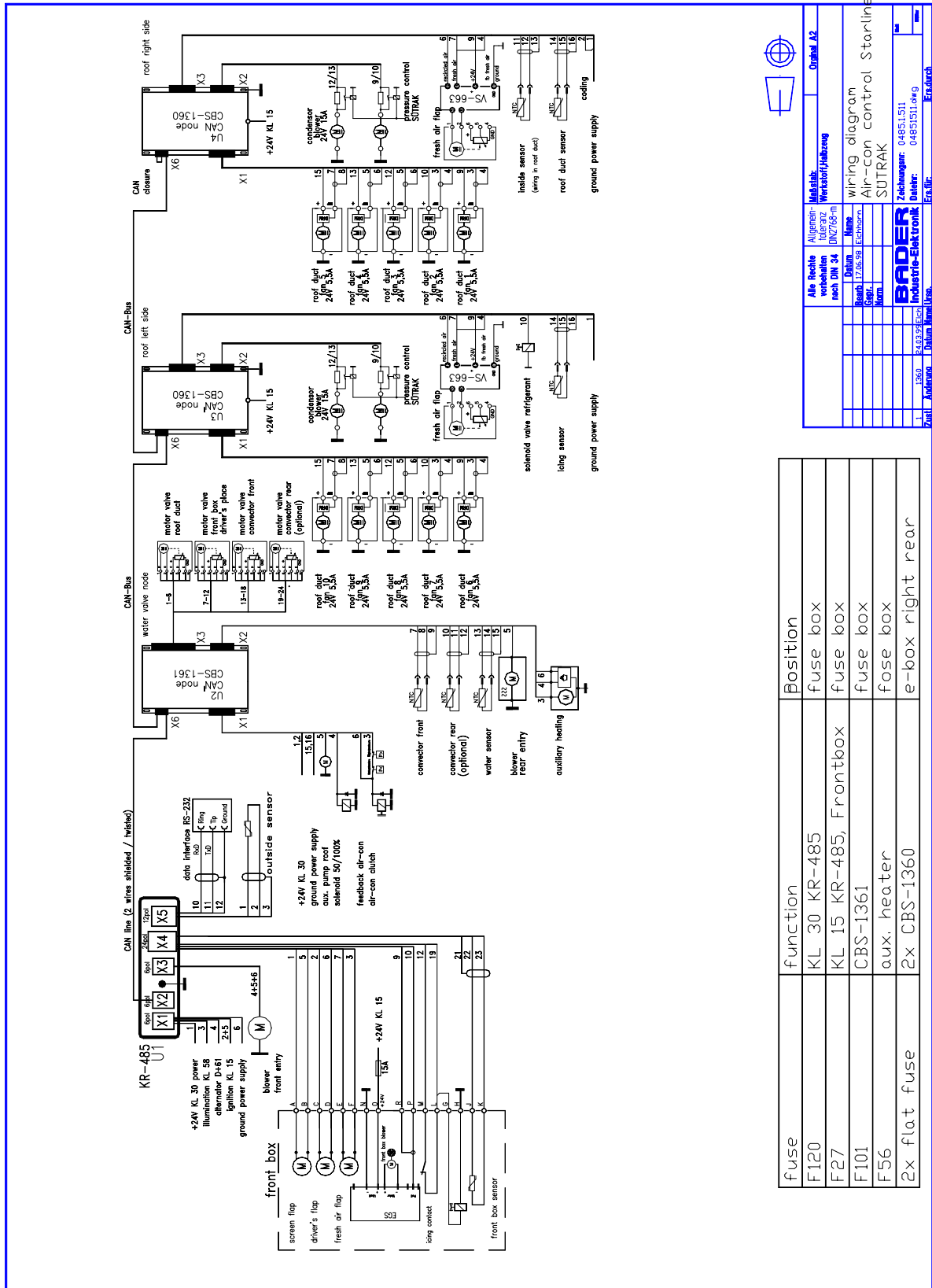
CAN-Bus air- conditioner controller KR-485



| function | position |
|--------------|------------------------|
| F120 | KL 30 KR-485 |
| F27 | KL 15 KR-485, Frontbox |
| F101 | CBS-1361 |
| F56 | aux. heater |
| 2x flat fuse | 2x CBS-1360 |
| | e-box right rear |

| | | | |
|-------------------------------------|--------------------------------|-------------------------------|-------------|
| Alle Rechte vorbehalten nach DIN 34 | Allgemeinrechtlich nach DIN 34 | Hersteller: Werstoff/Halsberg | Original A2 |
| Druck | Druck | Wiring diagram | |
| Stand | Stand | Air-con control Starliner | |
| Rev. | Rev. | KONVEKTA | |
| Zust. | Zust. | Zuschlaggeber: 0485.1.510 | |
| | | Hersteller: 04851510.dwg | |
| | | Erstellt: | |
| | | Erstellt: | |

CAN-Bus air- conditioner controller KR-485



| fuse | function | Position |
|--------------|------------------------|------------------|
| F120 | KL 30 KR-485 | fuse box |
| F27 | KL 15 KR-485, Frontbox | fuse box |
| F101 | CBS-1361 | fuse box |
| F56 | aux. heater | fuse box |
| 2x flat fuse | 2x CBS-1360 | e-box right rear |

| | | | |
|-------------------------------------|--|---------------------------|--|
| Alle Rechte vorbehalten nach DIN 34 | | Muster: Original A2 | |
| Allgemein: (0485) 151 | | Verstärkung: | |
| Drehmoment: 17,65/39 Nm | | Wiring diagram | |
| Drehmoment: 17,65/39 Nm | | Air-con control Starliner | |
| Drehmoment: 17,65/39 Nm | | SUSTRAK | |
| Drehmoment: 17,65/39 Nm | | Zeichnung: 0485.1511 | |
| Drehmoment: 17,65/39 Nm | | Datei: 04851511.dwg | |
| Drehmoment: 17,65/39 Nm | | Erstellt: | |
| Drehmoment: 17,65/39 Nm | | Erstellt: | |