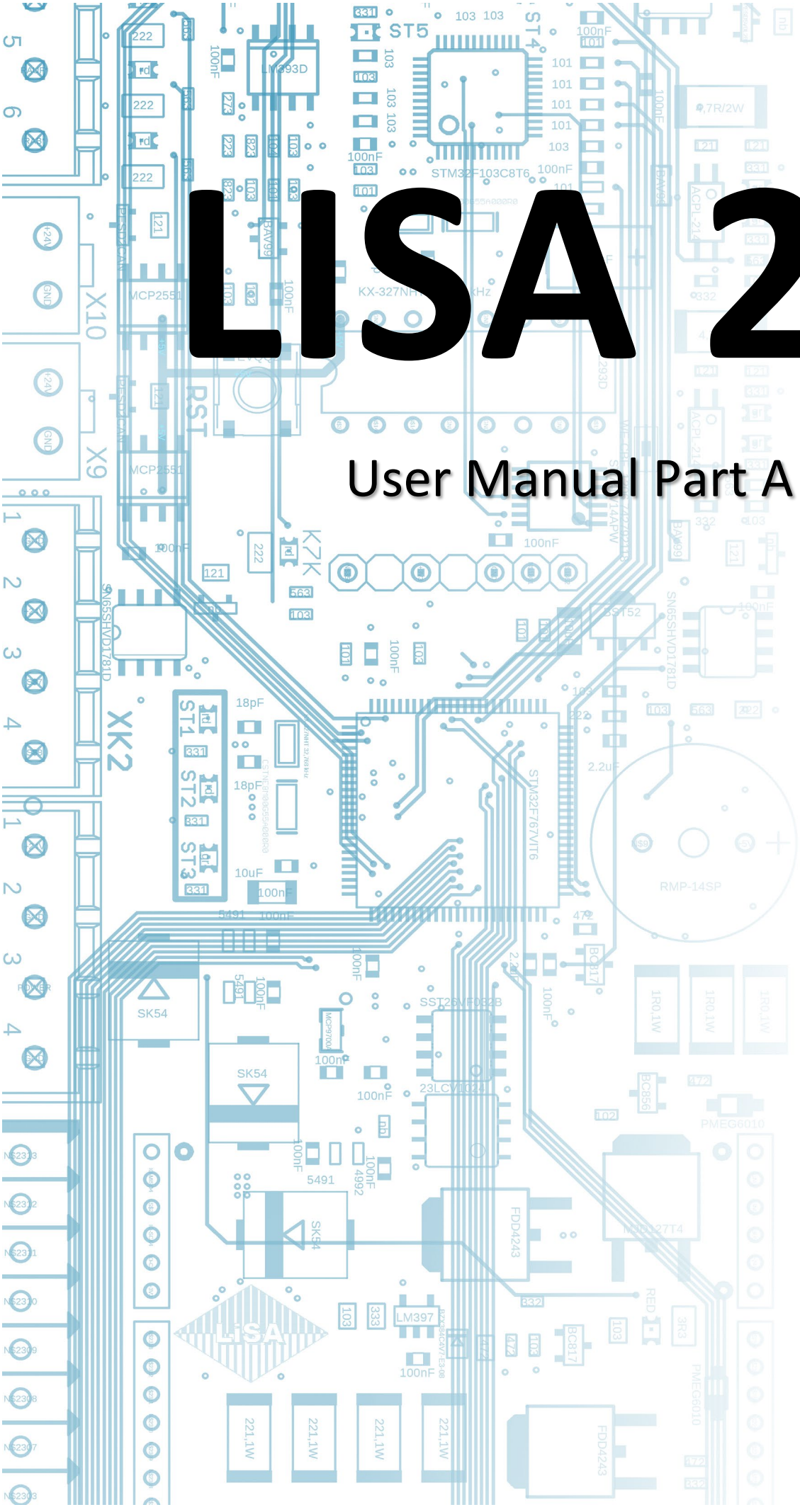

LISA 21

User Manual Part A

F. Giebel	12 Jan. 2018	Newly created	Version 1.00
F. Giebel	20 Feb. 2020	Completely revised	V1.01
F. Giebel	08 Jul. 2021	Menu, APO16 updated, Certificate add.	V1.02
F. Giebel	18 Oct.2022	Certificate new	--
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As of: 14.12.2023

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Safety information

Explanation of symbols and notices

The following safety notes serve to avoid damage to persons and property. These safety notes indicate situations posing a hazard to people and product. They are marked by a symbol and illustrated as follows.

Warning: Indicates a dangerous situation. Failure to observe may lead to death or severe personal injury. -> Read and observe the warning notice!

Caution: Indicates a dangerous situation. Failure to observe may lead to personal injury or material damage. -> Read and observe the warning notice!

Notice: Indicates an important piece of information. Failure to observe may lead to loss of function or material damage. -> Read and observe the notice!

This piece of information may also be indicated by an italicised ***Notice:*** in the text followed by the notice text.

Due diligence / personnel requirements

Persons charged with the installation, commissioning and maintenance relating to the described lift controller must have the qualifications and skills associated with their activity. Due to their training and experience as well as their knowledge of relevant standards, they must be able to assess the work assigned to them and to recognise and avert any possible dangers.
In addition they must have knowledge of the relevant safety regulations as well as accident prevention regulations.

Storage information

For storage ensure a clean and dry environment, temperatures of
-10 to +60°C are permissible. It is recommended to limit the storage duration to a maximum of 2 years.
In case of systems with frequency inverter, also observe the maximum storage period and storage conditions specified by the inverter manufacturer.

Disposal / recycling

The products by Schneider Steuerungstechnik comply with the RoHS directive.
Disposal must be effect properly and environmentally friendly in compliance with statutory provisions.

1. Overview of LiSA21

1.1 General information

LiSA21 is an innovative, future-oriented control system. Due to the two-piece design (processor board 78 x 210 x 20mm and relay board 78 x 194 x 40mm), this system can be used even if space is very limited. The boards can be installed on top of each other, next to each other or, in small areas, also separately. This allows to decouple the electronic components from the mains supply side and thus helps to avoid EMC-related problems.

1.2 EMC

LiSA21 complies with the requirements of EM12015 (interference emission) and EN12016 (interference immunity).

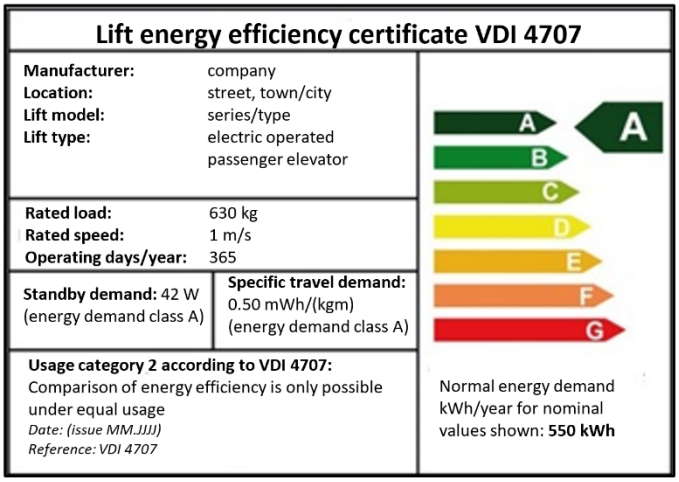
1.3 Interfaces

Thanks to its interfaces such as LiSA bus, CAN BUS, DCP, LAN, USB and SD card it is all geared for current and future tasks.

1.4 Energy efficiency

Using state-of-the-art components and the sophisticated allow for the operation at minimum consumption. Functions like light off, display off, inverter in standby operation, inverter and door drive off, provide for economic consumption values of the whole lift system.

➔ it has energy efficiency category A



2. Hardware

2.1 LiSA21 processor board (LiSA21 PB)

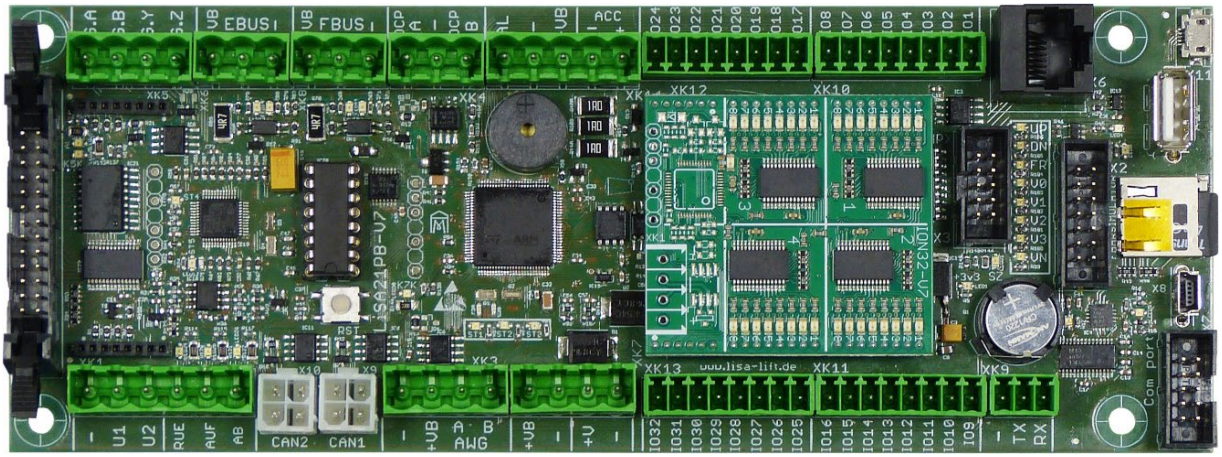


Figure 1: LiSA21 processor board

Technical data:

- Dimensions (WxHxD) = 78 x 210 x 20mm (35mm in depth with plug-in terminals)
- Voltage supply - 24VDC, max. 3A
- Battery charging and monitoring
- Switching voltage - 24VDC npn (L<15V); pnp (H>15V)
- 32-bit ARM Cortex M4 micro-controller, 216 MHz clock frequency
- Monitoring electronics (watchdog)
- Programme memory 2 MB flash
- Working memory RAM 512k, SRAM 4k
- Storage battery CR1220, 3V
- Parameters stored on exchangeable SD card
- Parameters loadable via USB port (USB flash drive) and SD card
- LEDs for diagnosis without display
- RS422 interface for group connection
- COM port RS232 for modem or COM server connection
- USB comport for monitor PC
- Connections for LiSA EBUS (landing bus) and FBUS (car bus)
- CAN bus
- DCP interface
- Ethernet interface (via ETH5500 adapter)
- Inverter interface (digital inverter signals)
- Port for absolute encoder signals
- Inputs for recall control (recall on, up, down)
- 2 inputs for drive monitoring (PTC thermistor)

Connections:

- X1 - 26-pole ribbon cable connector to relay board
- X2 - 14-pole ribbon cable connector for travelling simulator
- X3 - 10-pole ribbon cable connector for inverter signals (VVVF) - 24V pnp
- X4 - 8-pole terminal block for LAN adapter (ETH5500)
- X5 - 8-pole terminal block for LAN adapter (ETH5500)
- X6 - 8-pole RJ45 connector for operating terminal
- X7 - 10-pole ribbon cable connector for COM server
- X8 - USB mini connector for (USB comport)
- X9 - CAN bus connector 1
- X10 - CAN bus connector 2
- X11 - USB micro connector (OTG-USB)
- X12 - USB port for USB flash drive (software update)

- XK1 - 6-pole terminal (overtemperature/recall)
- XK3 - 4-pole terminal for absolute encoder (movable controller)
- XK4 - 3-pole terminal for DCP (A, B, GND)
- XK5 - 4-pole terminal (group signals)
- XK6 - 3-pole terminal for EBUS (landing bus)
- XK7 - 4-pole terminal (24V voltage supply)
- XK7 - 3-pole terminal for FBUS (car bus)
- XK9 - 3-pole terminal for modem (extra)
- XK10 - 8-pole terminal (I/O 1-8)
- XK11 - 8-pole terminal (I/O 9-16)
- XK12 - 8-pole terminal (I/O 17-24)
- XK13 - 8-pole terminal (I/O 25-32)

Overview of the LiSA21 processor board (PB) connections:

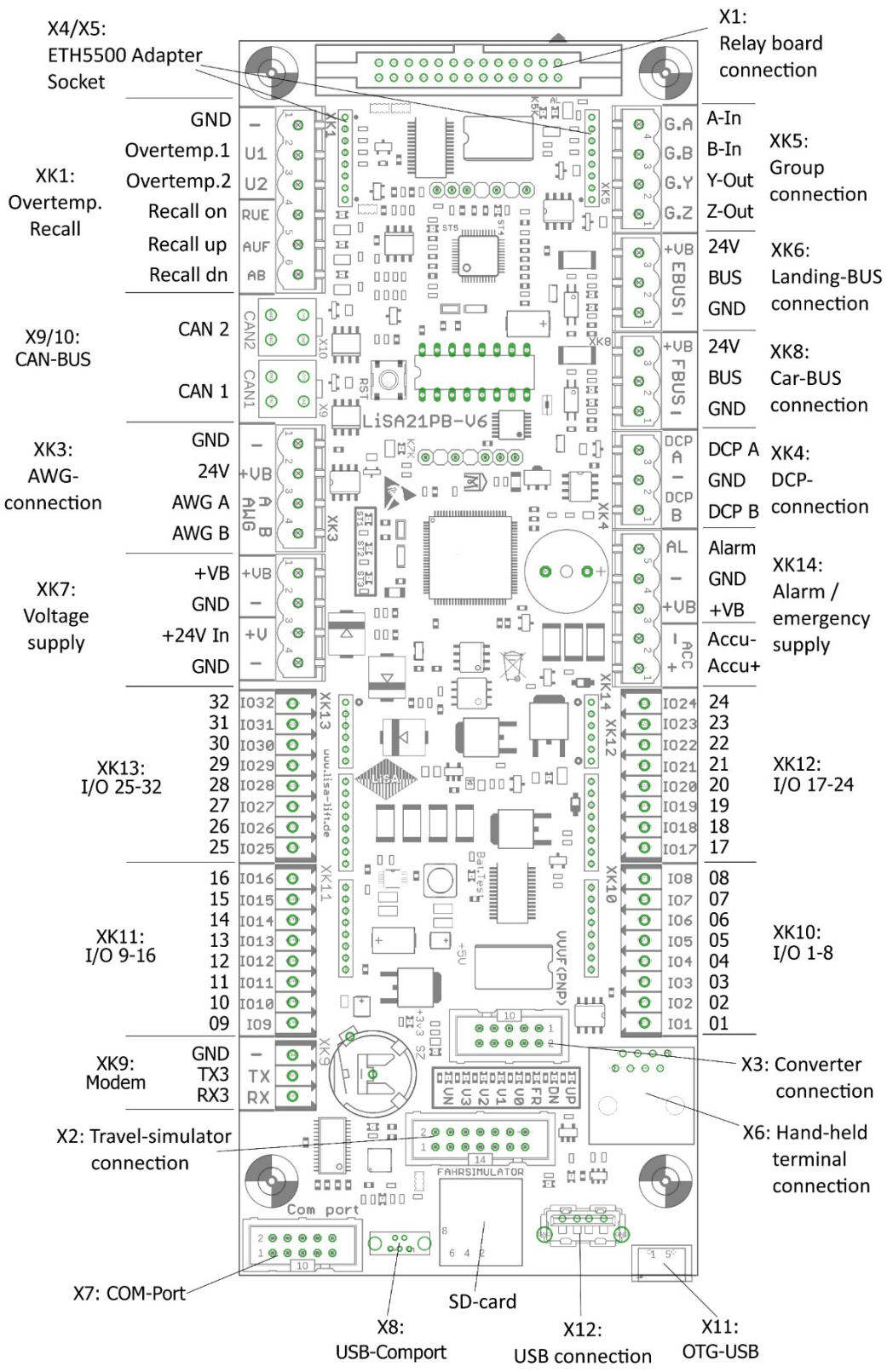
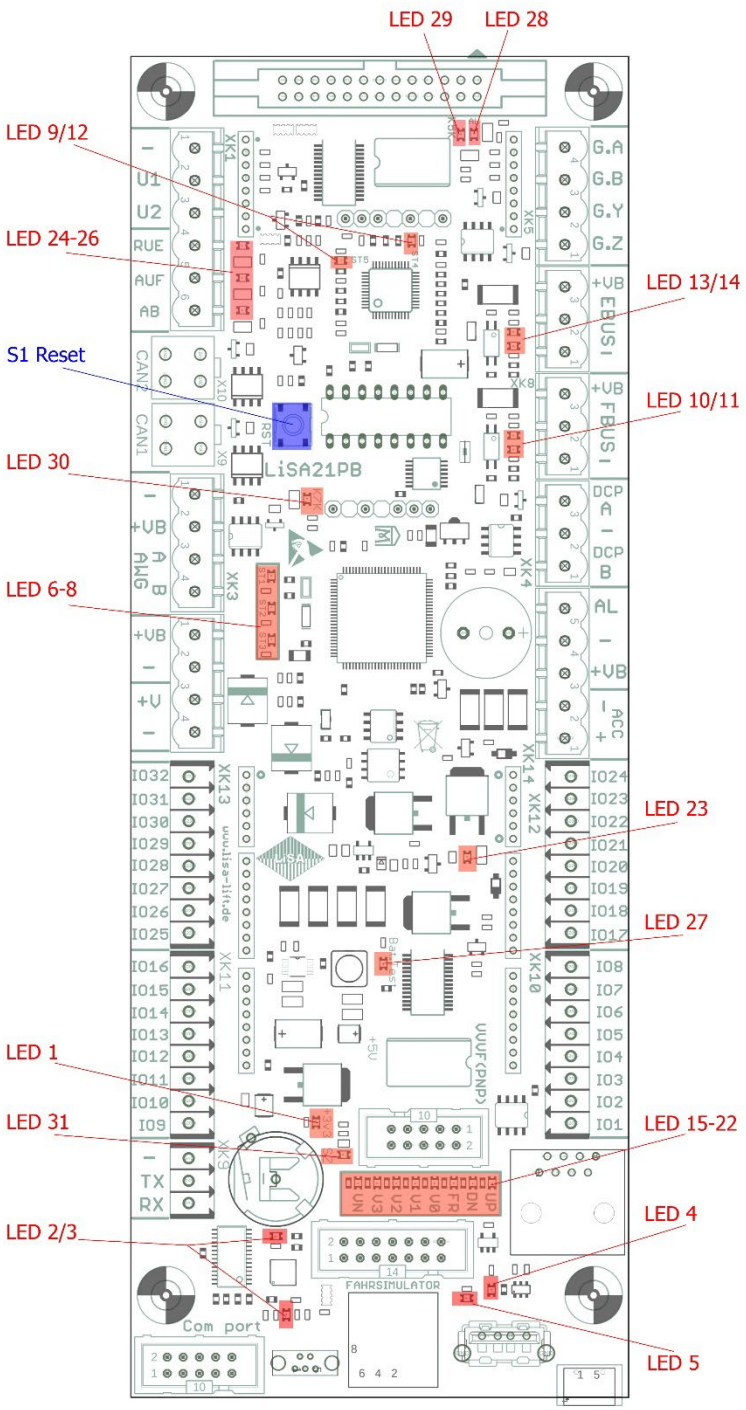


Figure 2: LiSA21PB connections

LED displays / buttons:



LED 1: supply 3.3V available (on)

LED 2/3: USB com port communication

LED 4: USB error

LED 5: USB 5V ok

LED 6/7/8: processor 1 status ST1-ST3

LED 9/12: processor 2 status ST4-ST5

LED 10/11: LiSA FBUS:
FBUS - car bus active (enable/data flashing)

LED 13/14: LiSA EBUS:
EBUS - landing bus active (enable/data flashing)

LED 15-22: inverter signals:
UP = upwards
DN = down
FR = release
V0 = positioning speed
V1 = inspection speed
V2 = intermediate speed

V3 = rated speed
VN = adjustment speed

LED 23: backup battery Charging active

LED 24-26: recall on/up/down

Figure 3: LiSA21PB LEDs

LED 27: backup battery
Battery test under load

LED 28: alarm

LED 29: safety relay K5 on

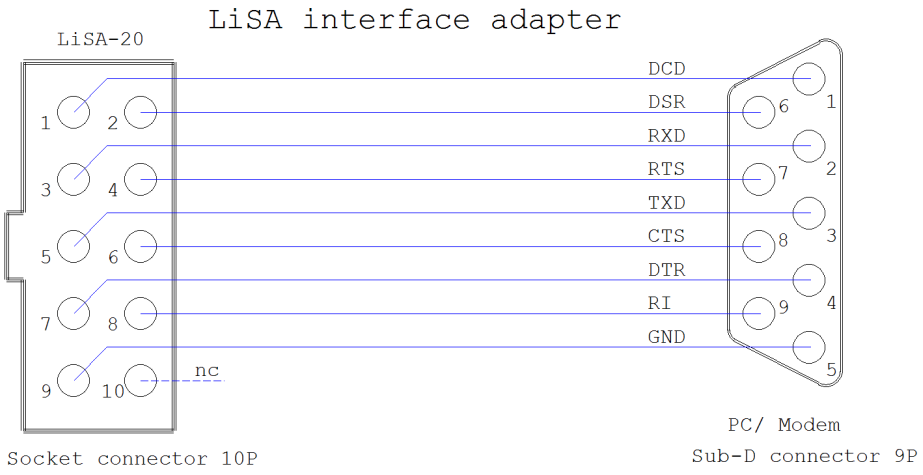
LED 30: safety relay on

LED 31: inductor switch SZ

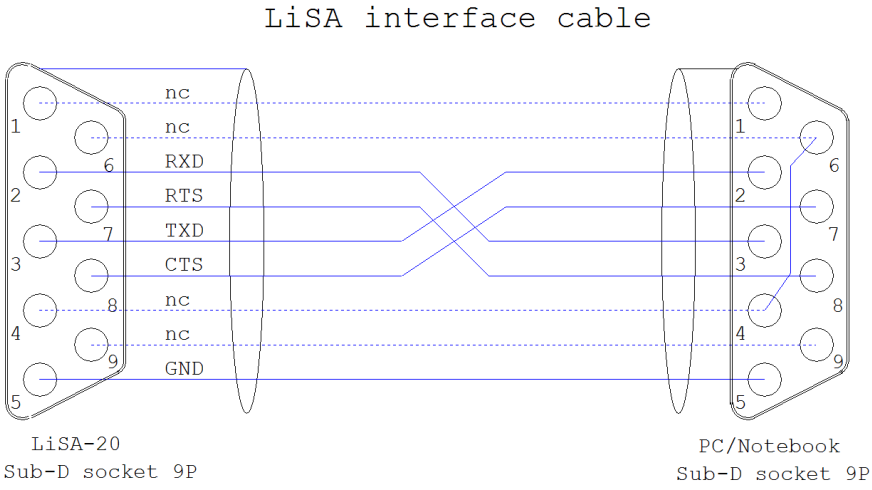
S1: reset button
-> processor board reset

Modem / COM port connection

The ribbon cable pin strip X7 (COM port) is provided for the connection of modem or PC with LiSA21.
For this purpose, an adapter cable from the 10-pole pin strip to a 9-pole SUB-D plug is required.
The assignment is shown in the following image.



Now a modem can be connected to this interface adapter using a serial cable.
If a PC or COM server is to be connected, use a LiSA interface cable (null-modem cable) instead of the serial cable as depicted in the following image.



2.2 LiSA21 relay board (LiSA21 RB)

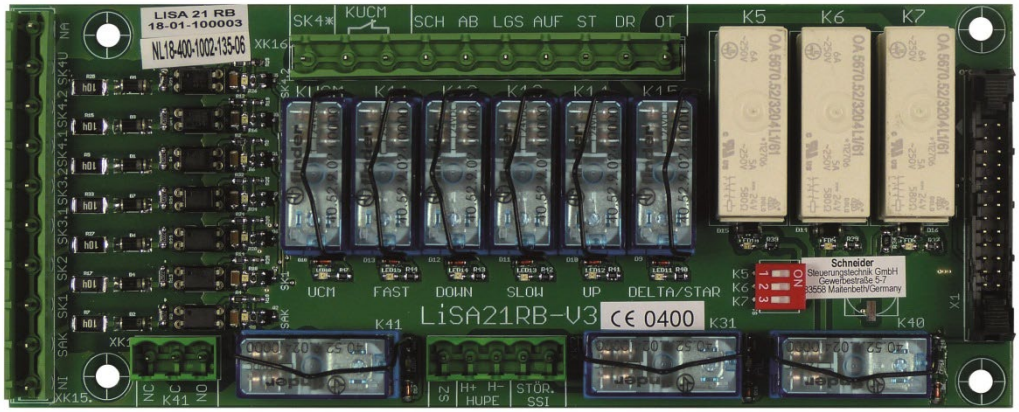


Figure 4: LiSA21 relay board

Technical data:

- Dimensions (WxHxD) = 78 x 194 x 40mm
- 7 safety circuit queries via opto-couplers
- Safety circuit
- Indication of the input and switching states by LED
- 5 preselection relays for travel signals
- 1 emergency call relay (K31)
- 1 freely programmable relay (K41)
- DIP switch to test the safety circuit

Connections:

- X1 - 26-pole ribbon cable connector to processor board
- XK12 - 11-pole terminal (RM 7.62)
- XK1 - 3-pole terminal (RM 5.08)
- XK2 - 5-pole terminal (RM 5.08)
- XK15 - 10-pole terminal (RM 7.62)
- XK16 - 10-pole terminal (RM 7.62)

LED displays:

- SAK - Contactor monitoring active (LED on)
- SK1 - Safety circuit 1 active
- SK2 - Safety circuit 2 active
- SK3.1 - Safety circuit 3.1 active
- SK3.2 - Safety circuit 3.2 active
- SK4.1 - Safety circuit 4.1 active
- SK4.2 - Safety circuit 4.2 active
- LEDxx - for each relay

DIL switch:

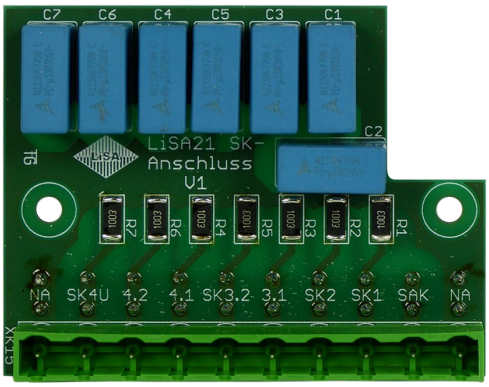
- S1 - Test of safety relays K5, K6, K7

Relays:

- K5, K6, K7 - Safety relays (Dold OA5670.52 24VDC)
- K31 - Emergency call relay (24VDC, 2xNO)
- K40 - Muting of safety circuit
- K41 - Freely programmable relay (24VDC, 1 change-over)
- K11-K15 - Preselection relays for travel signals (24VDC, 1xNO)
- KUCM - Relay for UCM test

2.2.1 The interference suppression board SK-Anschluss (optional):

Due to the very long cables of lifts and the way they are laid there may be interference coupling which can affect the evaluation of the safety circuit taps in some circumstances. An optional interference suppression board is used in these cases, reducing the interference voltage to a harmless minimum.



LiSA21 SK-Anschluss

If necessary, the board can also be added on easily. The interference suppression board is directly plugged into the relay board in position XK15 instead of the plug of the safety circuit taps. The plug of the safety circuit taps is then plugged into the interference suppression board.

Note: Observe the technical documentation of the LiSA SK-Anschluss interference suppression board!

Connections of LiSA21 relay board (RB)

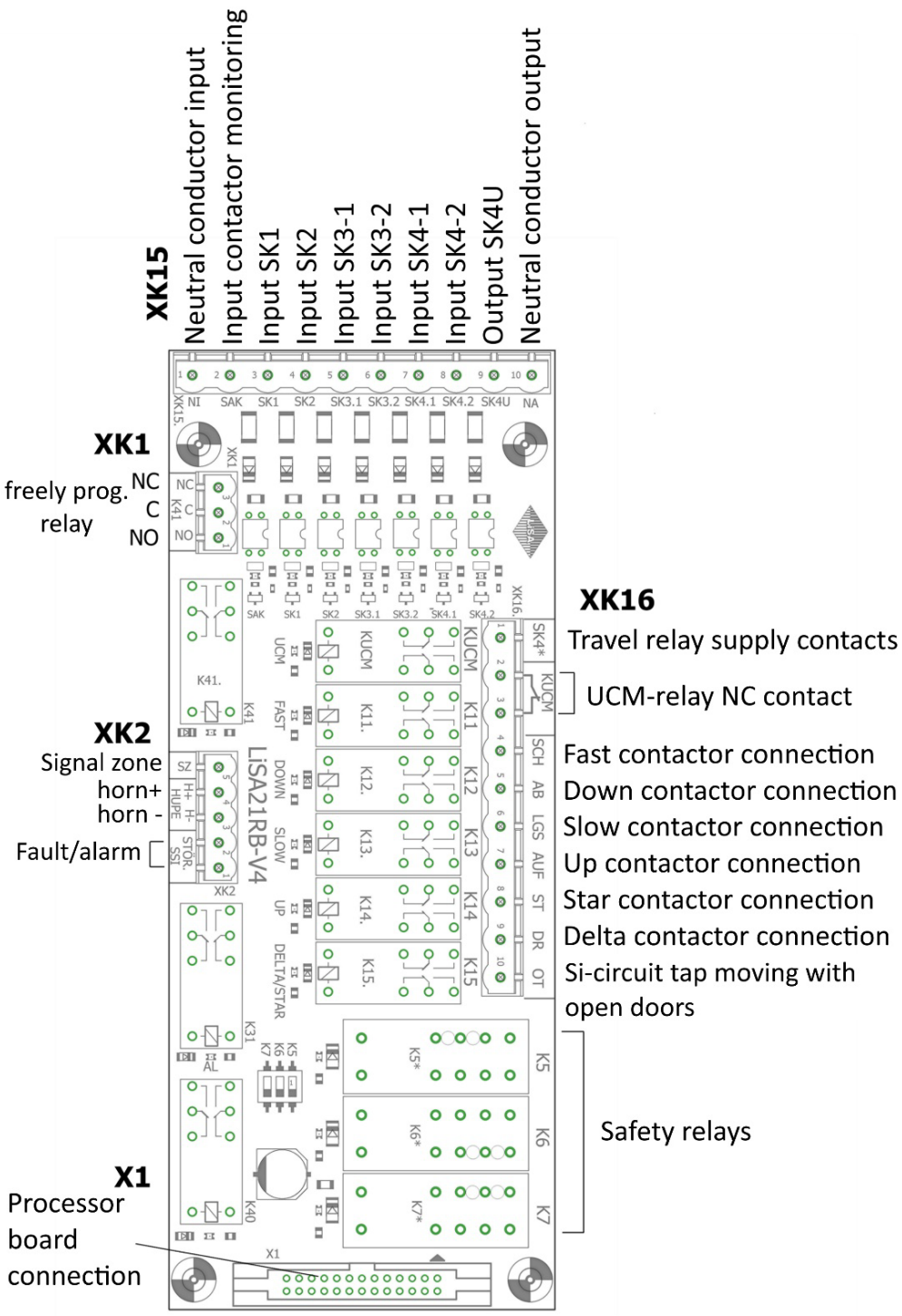


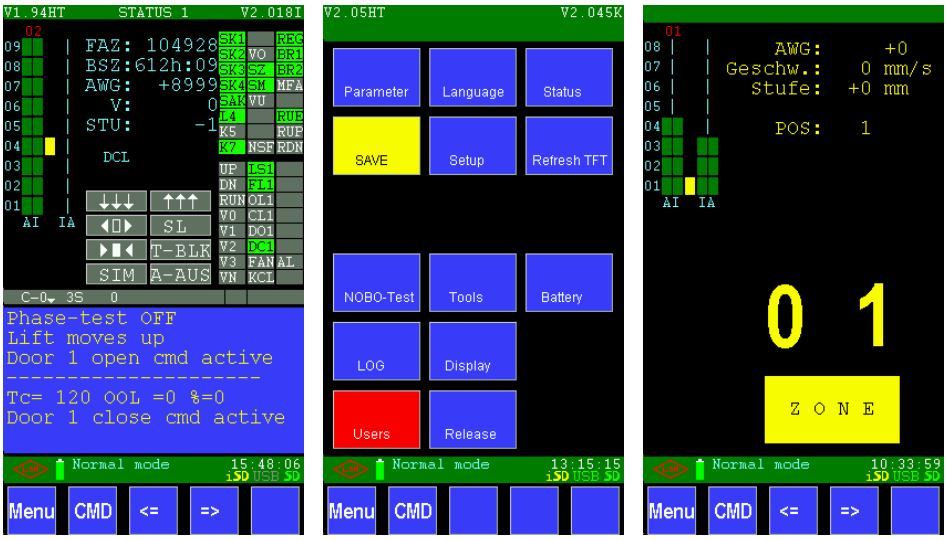
Figure 5: LiSA21 RB connections

2.3 TFT colour touch display (handheld terminal)

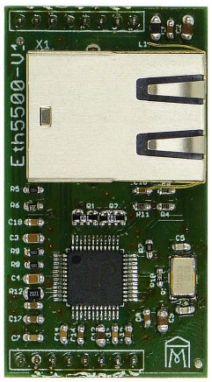
Technical data

- TFT touch 4.3“
- 72 MHz CPU frequency
- 512 kB FLASH programme memory
- 64 kB SRAM working memory
- RS485 interface, 8-pole connector Modular jack or optionally 10-pole ribbon cable
- Dimensions (WxHxD) = 88 x 113 x 25mm

The TFT colour touch display serves for operation, programming, error analysis as well as direction and position indication for emergency rescue.



2.4 LAN adapter board (ETH5500)



The ethernet adapter ETH5500 can optionally be plugged on the processor board. This makes it possible to access the controller directly via a network.

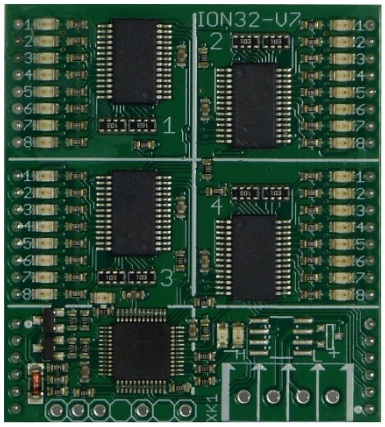
Technical data

Protocol: TCP / UDP

Speed: 10 Base T / 100 Base TX

2.5 I/O board (ION32)

There are 32 electronic inputs/outputs (I/Os) on the ION32 board.
The board is plugged using pin strips, e.g. on the processor board, APO or APT board. When using in APO or APT, the ION32 must completely be equipped with a processor which emulates the bus module addresses. Modules 48-51 are for the APO, modules 52-55 for the APT.
The status of the I/Os is displayed by LEDs. If the LED is on, it means that -H is applied to the connection or that the output electronics has activated the output. The outputs are short-circuit-proof.
Power rating: 100mA for 8 I/Os means that each output can be permanently charged with 100mA (in case of 24V switching voltage) if 8 connected I/Os (IO1 – IO8 / IO9 – IO16) are simultaneously activated. Each individual I/O can only be charged with a maximum of 500mA.



2.6 LiSA bus module (LBM)

The LiSA bus module (LBM) which has already stood the test of time in LiSA10 and LiSA20 controllers provides 8 electronic inputs/ooutput of 12V - 24V in npn or pnp design. The LBM is operated at the LiSA bus. 64 LBM each can be connected to car bus and landing bus.

Structure and functions:

- 8 short-circuit-proof, freely programmable inputs/outputs (I/Os) at XK1 and XK2 or X1.
- 8 I/O status LEDs of inputs/outputs
- 1 LED (L1) for the operating mode indication
  LED on: LBM-12 is OK
  LED flashes (frequency of 1 sec.): LBM-08 faulty
  LED flashes (frequency of 0.2 sec.): faulty bus code
- X1: 10-pole ribbon cable connector for LiSA components
- XK3 and XK4: Edge connectors for LBM on APO or LF (car) carrier boards
- XK5: Bus connector for LiSA bus components
- The jumpers JP1 - JP32 are used for addressing (0 - 63)

Normally the following address ranges are used to address the LBM.
<u>Landing bus addresses:</u>
0 – 63: address range for landing modules

<u>Car bus addresses:</u>
0 – 47: address range for landing modules of door side 2 (in case of selective external door control)
48 – 60: address range for modules in the lift car.

2.7 Connection board on the car APO

2.7.1 APO 15

The APO is the central board for the majority of connections on the car. Despite the small dimensions of 210 x 78mm, APO-15 contains 3 freely programmable relays as well as additional terminals for emergency light switching. Furthermore there are 8 freely programmable I/Os available at address 51. The bus module used is a pluggable 4-fold bus module of type ION32. Connections for encoder and selector block have been omitted to the benefit of smaller dimensions.

Note: APO-15 cannot be exchanged with previous APO versions.

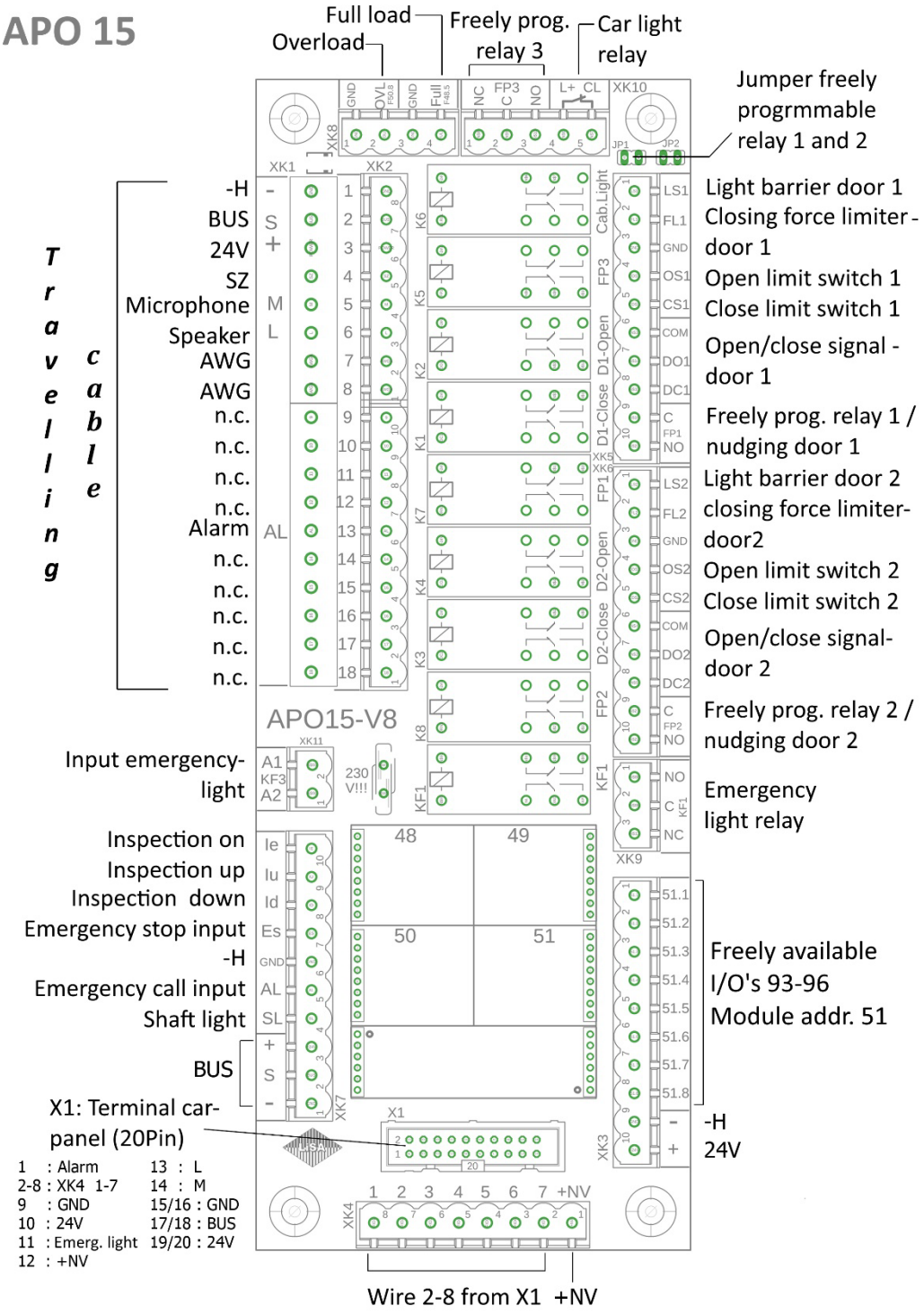


Figure 6a: APO-15

Relays:

- K1: door closed, door 1
- K2: door open, door 1
- K3: door closed, door 2
- K4: door open, door 2
- K5: freely programmable relay 3 / car fan
- K6: car light relay
- K7: freely programmable relay 1 / shoving door 1
- K8: freely programmable relay 2 / shoving door 2
- KF1: emergency light switching

Connections:

- XK1/XK2: travelling cable connection
- XK3: freely programmable I/O, bus module 51
- XK4: wires 7-14 of X1 (e.g. for emergency call device)
- XK5: door signals, door side 2 / freely programmable relay 2
- XK6: inspection control
- XK7: door signals, door side 1 / freely programmable relay 1
- XK8: load measurement
- XK9: emergency light switching
- XK10: car light / freely programmable relay 3
- XK11: input for emergency light switching
- X1: connection to car panel (APT)

2.7.2 APO 16

APO 16 is an advancement of the previous car connection boards. With 255 x 78mm, it has been designed as a space-saving car connection board for new controllers. The connection options have been extended in order to allow for the direct connection of a LiMAX33CP absolute encoder safety reader. Two CAN bus connections, e.g. for door control devices, are now also provided on the APO16. Instead of individual bus modules, a pluggable 4-fold bus module of type ION32 is used here, too. The I/Os of the bus modules, such as door signals, are all wired to contact strips and can therefore be tapped. Furthermore there are 8 freely programmable I/Os at bus module 51 as well as 3 freely programmable relays on the APO-16 available.
The functions of the previous APO have been carried over to a large extent, only the connections for encoder and selector block are no longer contained in favour of smaller dimensions.

Note: APO 16 is not plug compatible with previous APO versions.

APO16

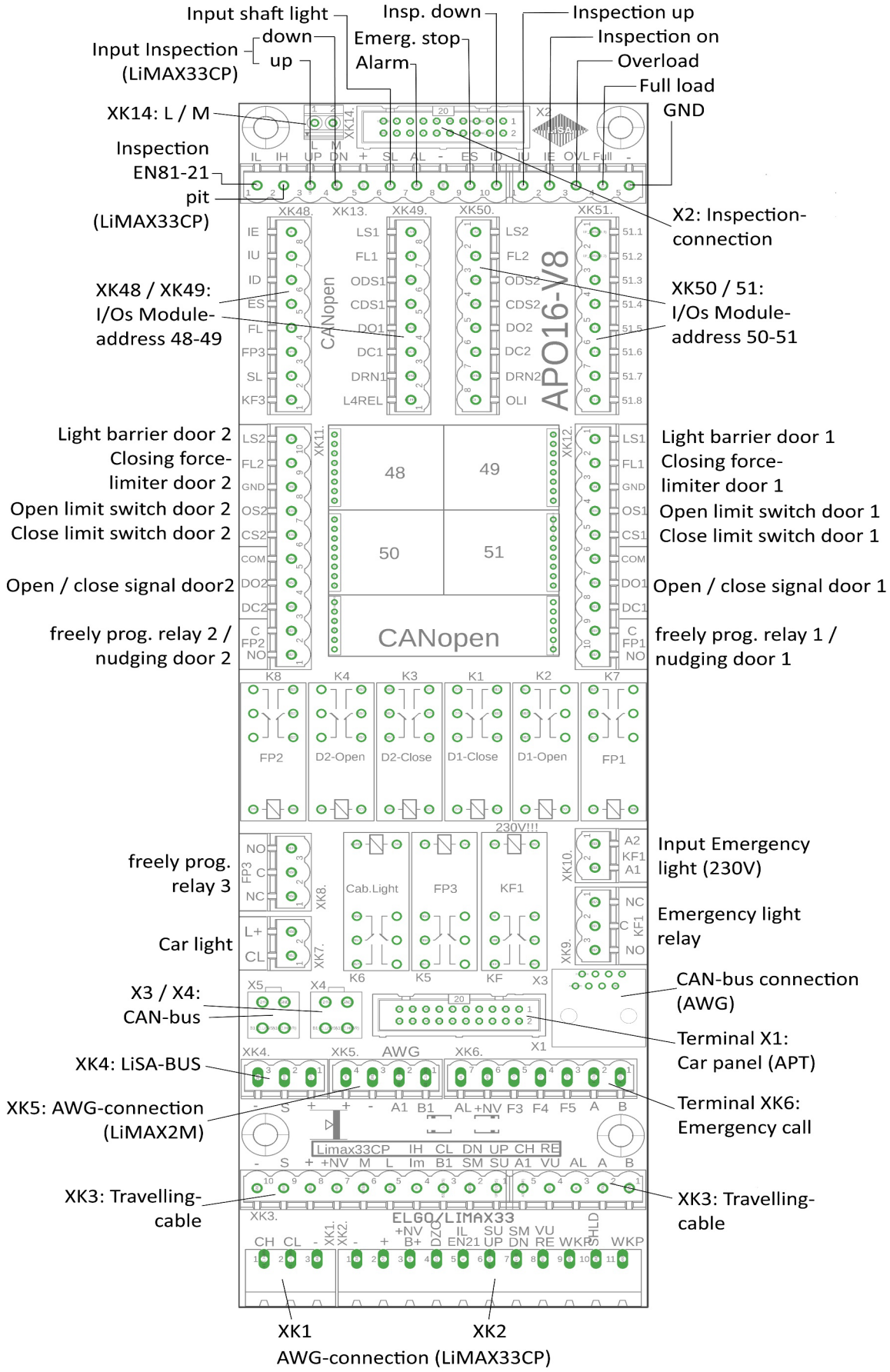


Figure 6b: APO-16

Connections:

- X1: connection to car panel (APT)
- X2: Connection inspection-module (Multibox)
- X3: CAN bus (AWG)
- X4/X5: CAN Bus
- XK1/XK2: connection for absolute encoder with integrated safety functions (LiMAX 33CP)
- XK3: travelling cable connection
- XK4: connection for LiSA bus
- XK5: connection for standard absolute encoder (LiMAX 2M)
- XK6: Emergency call device
- XK7: car light switching contact
- XK8: freely programmable relay 3
- XK9: emergency light switchover contact
- XK10: input for emergency light switching (230V)
- XK11: door signals, door side 2 / freely programmable relay 2
- XK12: door signals, door side 1 / freely programmable relay 1
- XK13: inspection control
- XK14: Loudspeaker / microphone
- XK2.1: inspection control / load measurement
- XK48: tap I/O bus module 48
- XK49: tap I/O bus module 49
- XK50: tap I/O bus module 50
- XK51: tap I/O bus module 51 (8 freely programmable I/Os)

Relays:

- K1: door closed, door 1
- K2: door open, door 1
- K3: door closed, door 2
- K4: door open, door 2
- K5: freely programmable relay 3 / car fan
- K6: car light relay
- K7: freely programmable relay 1 / shoving door 1
- K8: freely programmable relay 2 / shoving door 2
- KF1: emergency light switching

Overview of the pin assignment:

X1:

20P ribbon cable

1: Alarm	6: free wire (XK6-5)	12: +NV
2: phone A, white wire (green)	7-10: not assigned	13/14: HK wire blue/white
3: phone B, green wire	9: GND	15/16: not assigned
4: free wire (XK6-3)	10: +24V	17/18: bus
5: free wire (XK6-4)	11: emergency light	19/20: not assigned

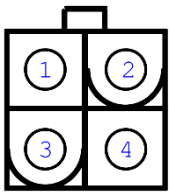
X2:

Inspection connector (Multibox) (20P ribbon cable)

1 : alarm	9 : GND	16 : ID - Inspection down
2 : shaft light	10 : +24V	17 : IL - Inspection on/off
3 : safe room unsafe (SRU)	11 : emergency light	18 : IH - Inspection on/off in pit
4 : safe room safe (SRS)	12 : +NV - emergency supply	19 : A1_UP wire wh (LiMAX)
5 : door open relay TS1+2	13 : ES - emergency stop (car)	20 : B1_DN wire br (LiMAX)
6 : door close relay TS1+2	14 : IF - Inspection drive	
7/8 : not assigned	15 : IU - Inspection up	

X4/X5:

CAN bus



1: +24V
2: GND
3: CAN-L
4: CAN-H

XK1:

CAN bus (LiMAX 33CP) 1: CAN-H 2: CAN-L 3: GND

XK2:

LiMAX 33CP

1: GND	5: EN21 (EN81-21 status)	9/11: WKP (working platform)
2: +24V	6: UP (insp. direction up)	10: SHLD (shield, GND)
3: +NV (battery supply)	7: DN (insp. direction down)	
4: DZO (door zone)	8: RE (reset)	

XK3:

travelling cable (from left to right)

1: GND	**5:** M, white wire (blue) -> XK14: M	**9:** CAN-H, orange wire	**13:** Alarm
2: bus	**6:** L, blue wire -> XK14: L	**10:** IH	**14:** phone A, white wire (green)
3: +24V	**7:** CAN- L, white wire (orange)	**11:** B1, brown wire	**15:** phone B, green wire
4: +NV	**8:** A1, white wire (brown)	**12:** RST	

XK5:

absolute encoder (LiMAX 2M, from left to right)

1: +N 2: GND 3: A1 4: B1

XK6:

emergency call device (from left to right)

1: Alarm	4: free wire (X1-5)	7: phone B, green car wire
2: +NV	5: free wire (X1-6)	
3: free wire (X1-4)	6: phone A, white car wire (green)	

2.8 Car connection board APT

The panel connection board (APT) is the central board for all connections in the car panel. APT provides connection possibilities for up to 24 call buttons as well as the alarm button and open/close door buttons. The buttons can be connected using ribbon cables or conventional wiring. In addition to the relays for alarm and emergency call suppression, the features comprise an acoustic signal generator for warning signals, e.g. to indicate overloads.
A ION32 4-fold bus module (address 52-55) is the centre for inputs and outputs. The connection board is linked with the car (APO) using a 20-pole ribbon cable.

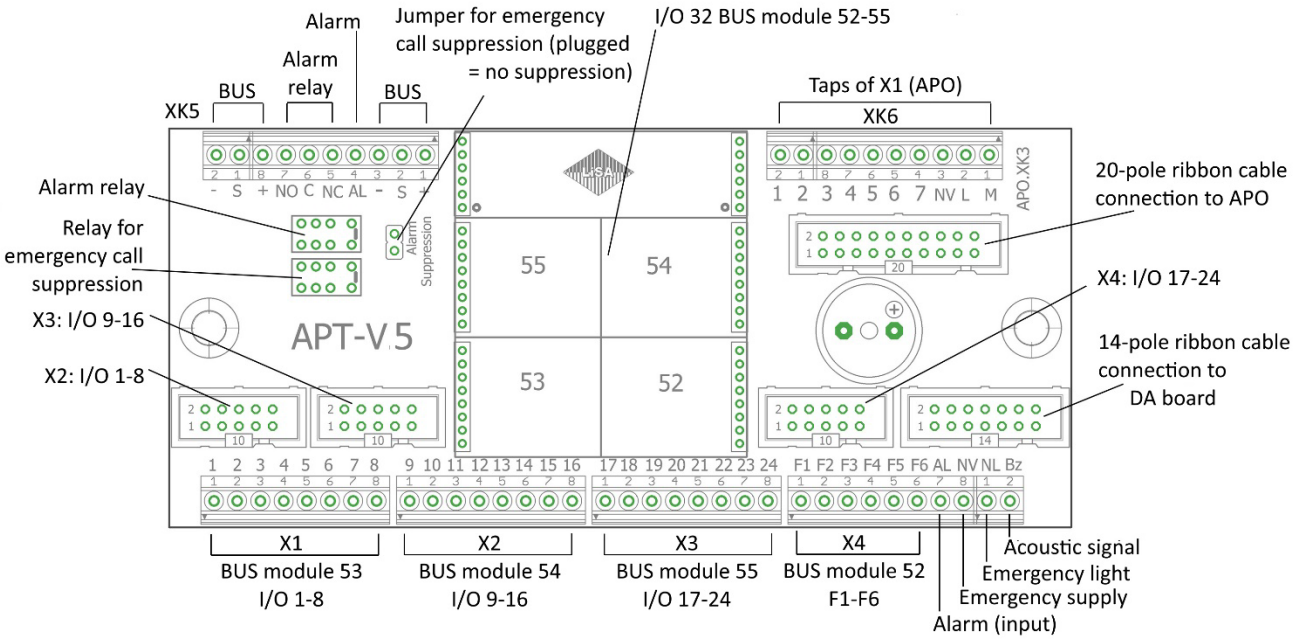


Figure 7: APT board

Connection of buttons:

The call buttons can be connected using the 10-pole ribbon cable connectors X2/X3/X4 or as a conventional connection for which the I/Os 1-24 are additionally wired to terminal strips.
The 14-pole ribbon cable connector X5 in conjunction with the DA board is provided to connect the open/close door buttons and the alarm button. F1-F6 are reserved for the open/close door buttons. They are wired to bus module 52 and must be programmed according to the buttons connected.

Note: If the open/close door buttons and F1-F4 should be wired to the APO at bus module 51, as previously usual, wires 2-8 and 12-14 of the 20-pole connection to the APO (X1) via terminal XK6 are available as a tap.

Pin assignment:

X1: 20-pole ribbon cable connector (connection to APO)

1: Alarm	13: Loudspeaker
2-8: Connection to X10/12	14: Microphone
9: GND	15/16: GND
10: 24V	17/18: bus
11: emergency light	19/20: 24V
12: +NV	

X5: 14-pole ribbon cable connector (connection to DA board)

1: Alarm-in	10: +24V
2-7: F1-F6 addr. 52	11: emergency light
8: n.a.	12: +NV
9/13: GND	14: +24V

X2/X3/X4: 10-pole ribbon cable connector (button connection 1-3)

1-8: I/Os 1-8	1-8: I/Os 9-16	1-8: I/Os 17-24
9: +24V	9: +24V	9: +24V
10: GND	10: GND	10: GND

Further connections:

- **BUS:** Connection to the LiSA bus
- **Alarm relay:** Changeover contact connection of the alarm relay
- **Alarm:** Alarm input for conventional connection
- **JP1:** Jumper for emergency call suppression; if the jumper is plugged, the emergency call is not suppressed, the emergency call suppression relay (K1) is bridged.

DA board:

The button adapter board provides a pluggable connection possibility of voltage supply and acoustic acknowledgement for up to three rows of buttons as well as the open/close door buttons and the alarm button from the Q32 and Q50 series. In addition, a conventional terminal serves to provide the connection for the acoustic acknowledgement, I/Os F1-F5 as well as alarm, 24V, emergency supply and emergency light.
The DA board is connected to the APT board via a 14-pole ribbon cable.

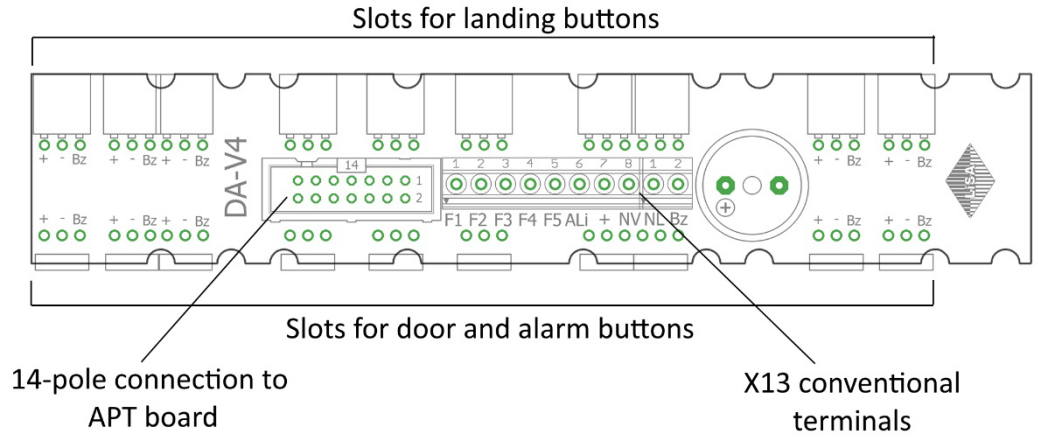


Figure 8: DA board

Up to 3 rows of buttons from the Q32 or Q50 series can be connected to this board. The connectors must be fitted in the respective places. The conventional terminal block X13 is assigned as follows:

X13: terminal assignment (from left to right)

1-5: F1 – F5	8: +emergency supply
6: Alarm-in	9: emergency light
7: +24V	10: Buzzer Signal

3. Operation

3.1 Basic features

Like LiSA20, the LiSA21 controller is equipped with a 4.3" graphic display touchscreen. It provides a structured and comprehensive overview of all inputs, outputs and error memories and equally serves to parameterise the controller.
The operation is intuitive and therefore only requires a short training period.

3.2 Menu structure

The menu structure depicted here only serves as a general overview and thus only shows the first menu items.

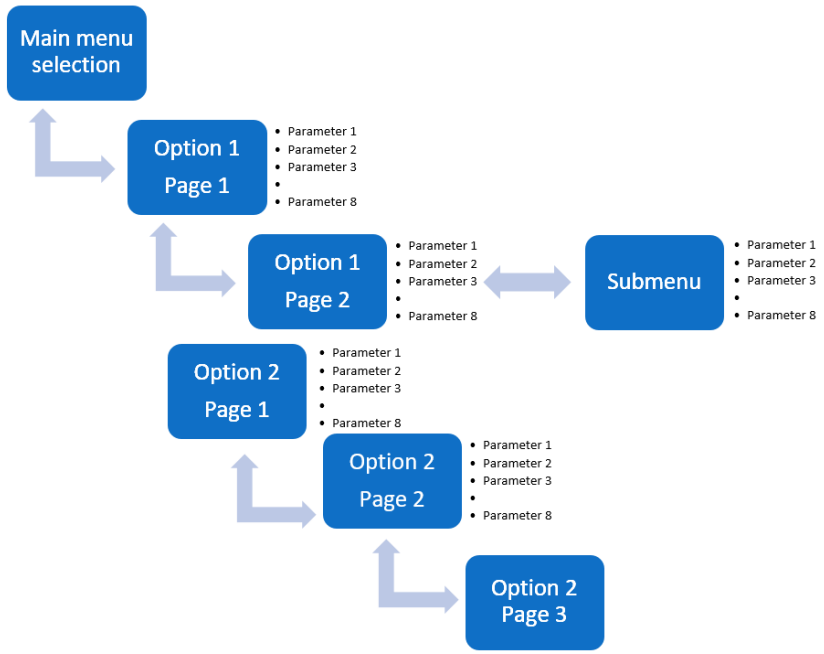
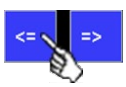


Figure 9: menu structure

3.2.1 Control concept

For menu navigation, parameter input and command input there are different buttons on the touchscreen.

Depending on the controller configuration, the individual screens are dynamically available.



In this description, the hand icon marks the button to be pressed on the touchscreen for the respective navigation.

Select a menu item in the main menu to go to the associated menu pages.

The upper green bar shows how many pages the menu item has as well as the current page (e.g. 2/6 -> page 2 of 6 pages). Using the > arrow you can go to the next page or < to go the previous page.
The 

buttons are used to scroll through the menu levels.

By clicking the Menu button you get back to the main menu.
The CMD (Command) button serves to get to the command level.

Scrolling forward through the LiSA21 status screen:

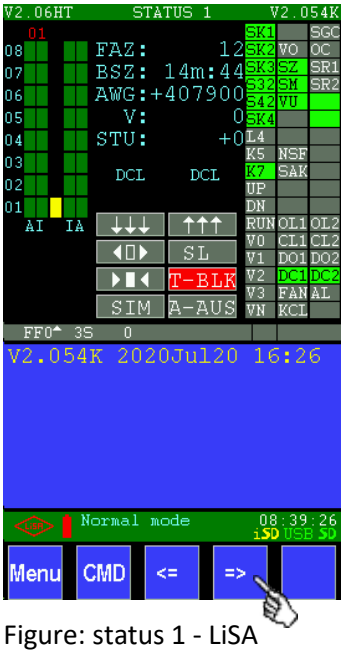


Figure: status 1 - LiSA

Figure: status 2 - LiSA

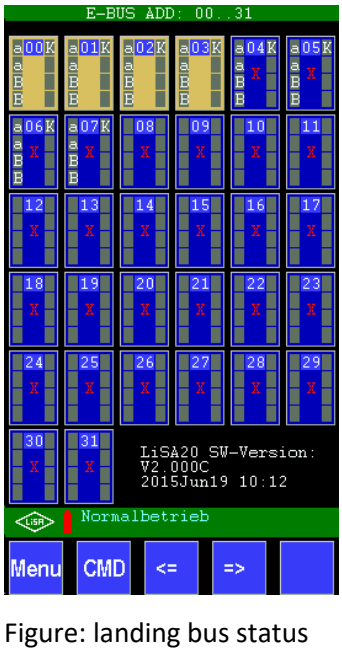


Figure: landing bus status

Scrolling backward through the LiSA20/21 status screen:

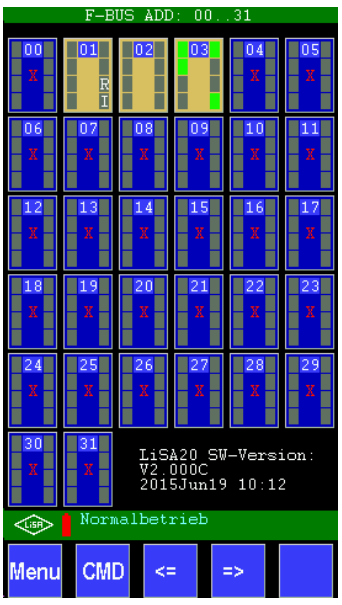


Figure: car bus status

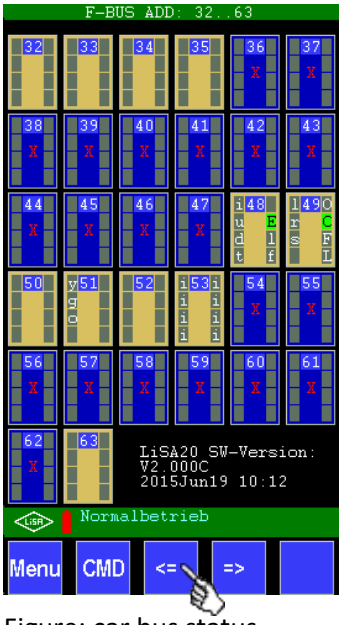


Figure: car bus status

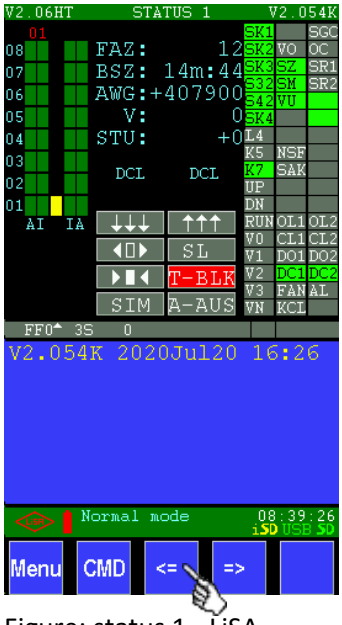


Figure: status 1 - LiSA

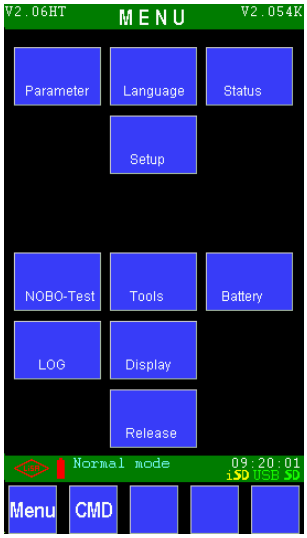


Figure: main menu

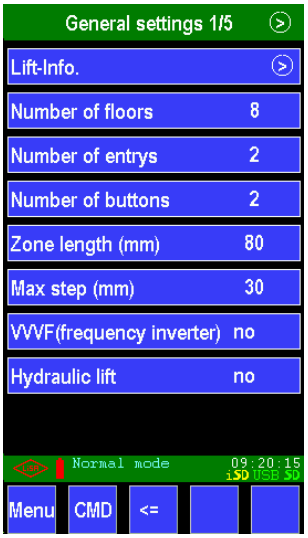


Figure: sub-menu

Figure: settings level

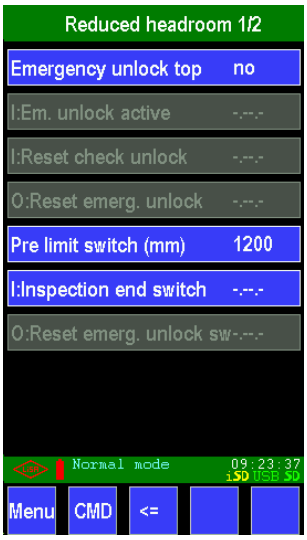
3.3 The LiSA21 command area

The LiSA21 command area allows to enter commands, change between pages and go back to the Home menu.

Menu	Menu -> back to main menu
CMD	Command -> open the command level
=>	Go to next page
<=	Go to previous/superordinate page

After opening the command level using CMD, any other parameter page can be called directly when entering 7 and the three-digit page number (e.g. page 60 -> 7060 -> OK)

3.4 Blue and grey input fields

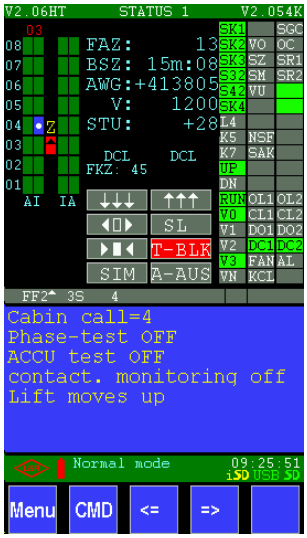


On the numerous system configuration pages you will find blue input fields, the value of which can be changed, and grey fields, which cannot be edited.

Depending on the controller settings it is therefore made easier for the user during set-up to change only the required and relevant parameters. This is much more convenient and helps to achieve one's goal faster. Parameters not yet realised in the system are also shaded in grey.

3.5 LiSA status

The "LiSA status" menu serves to display an overview of the controller status. Here you can open any page and execute commands directly.



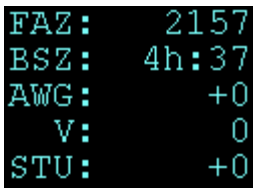
In detail:

On the upper left you can see a symbolic lift with a maximum of 12 visible landings. If the lift has more than 12 landings, the indication is shifted in such a way that the car is displayed in the middle and the landings shift.

From left to right:

- Landing number
- Rectangular icon: red = disabled or green = enabled landing for door 1 landing calls
- Rectangular icon: red = disabled or green = enabled landing for door 1 car calls
- Car icon. In the zone, the car is yellow; during the travel red or orange (depending on speed). In the icon, a small arrow shows the direction of travel. The current destination of the car is marked with “Z”. When the doors open, small yellow lines to the right and left indicate the open doors.
- Rectangular icon: red = disabled or green = enabled landing for door 2 car calls
- Rectangular icon: red = disabled or green = enabled landing for door 2 landing calls

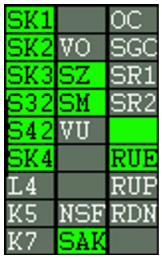
If a call is made in enabled landings, the green icon turns blue either with a white dot in the middle (car call) or a white arrow for the direction of travel (landing call).
Above the entire illustration you find the current landing (red “12” here) in which the lift is currently located.



The travel counter FAZ, the operating hours counter BSZ, the relative or absolute encoder position (depending on setting), the current speed V and the step STU are displayed at the top in the middle. If no absolute encoder reader is recognised, no position can be determined and “AWG: XXX” appears.
In operation, the relevant times (in seconds) to open and close the doors are displayed below.

Below there are activatable buttons.
The lower 6 buttons indicate the status for door open (arrows outwards), door close (arrows inwards), SIM = activate/deactivate simulator, SL = shaft light on/off, T-BLK = block doors, and A-AUS = block landing calls on/off. By touching these boxes, the respective function is enabled or disabled. In case of 8 buttons (depending on the software version), the upper 2 buttons are for travelling to the lowest landing (3 down arrows) and the top landing (3 up arrows).

On the right you can find the most important controller signals.



These are:

- SK1 = safety circuit 1 (green=active, grey=not active)
- SK2 = safety circuit 2 (green=active, grey=not active)
- SK3 = safety circuit 3 (green=active, grey=not active)
- S32 = additional safety circuit tap of SK3 for 2 door sides
- S42 = additional safety circuit tap of SK4 for 2 door sides
- SK4 = safety circuit 4 (green=active, grey=not active)
- L4 = car light (green=active, grey=not active)
- K5 = safety relay of door zone override (green=active, grey=not active)
- K7 = safety relay of door zone override (green=active, grey=not active)

- VO = top slow-down switch (green=active, grey=not active)
- SZ = zone inductor switch (green=active, grey=not active)
- SM = centrical inductor switch (green=active, grey=not active)
- VU = bottom slow-down switch (green=active, grey=not active)
- NSF = emergency stop in car (green=active, grey=not active)
- SAK = contactor monitoring (green=active, grey=not active)

- OC = safety circuit relay
- SGC = safety gear contact
- SR1 = safety relay of door override side 1
- SR2 = safety relay of door override side 2

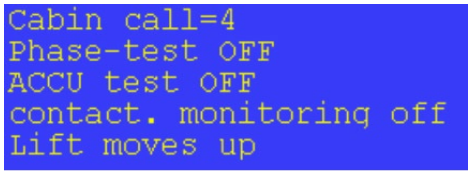
Only for type with abs. enc. LiMAX33CP assigned

- --- = not assigned
- RUE = recall (green=active, grey=not active)
- RAU = recall up (green=active, grey=not active)
- RAB = recall down (green=active, grey=not active)

Below

- UP = inverter direction up (green=active, grey=not active)
- DN = inverter direction down (green=active, grey=not active)
- RUN = inverter travel (green=active, grey=not active)
- V0 = inverter speed v0 (green=active, grey=not active)
- V1 = inverter speed v1 (green=active, grey=not active)
- V2 = inverter speed v2 (green=active, grey=not active)
- V3 = inverter speed v3 (green=active, grey=not active)
- VN = inverter speed vrated (green=active, grey=not active)

- LS1 = light barrier door 1 (green=active, grey=not active)
- LS2 = light barrier door 2 (green=active, grey=not active)
- FL1 = closing force limiter door 1 (green=active, grey=not active)
- FL2 = closing force limiter door 2 (green=active, grey=not active)
- OL1 = open limit switch door 1 (green=active, grey=not active)
- OL2 = open limit switch door 2 (green=active, grey=not active)
- CL1 = close limit switch door 1 (green=active, grey=not active)
- CL2 = close limit switch door 2 (green=active, grey=not active)
- DO1 = door 1 open (green=active, grey=not active)
- DO2 = door 2 open (green=active, grey=not active)
- DC1 = door 1 closed (green=active, grey=not active)
- DC2 = door 2 closed (green=active, grey=not active)
- FAN = car fan (green=active, grey=not active)
- AL = alarm (green=active, grey=not active)
- KCL = car light switch-off relay (green=active, grey=not active)



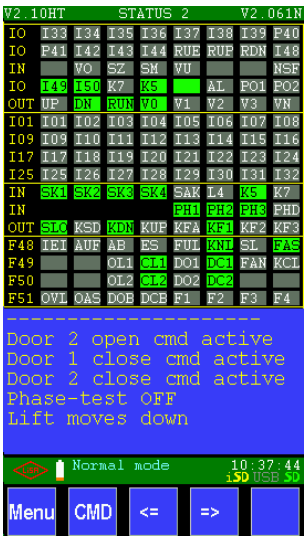
In the lower blue field you can find the status text with a maximum of 7 lines containing information on the current operation.

The green bar below starts with the LiSA hash. If you touch this hash and if an SD card is additionally plugged in the handheld terminal (“iSD” icon), a screen shot of the displayed page is stored as a file on the SD card in the handheld terminal.
The symbol next to it displays the battery state: green in different shades means OK; red means that the battery needs to be changed or that no battery is connected.
The operating state is display to the right of it. Here you can see "normal operation". At the far right, the current time and, below, the availability of a USB flash drive or SD card in the controller (grey=no / green= yes) is displayed.

At the bottom of the screen there are the Menu button, the command entry button (CMD), change to previous and next page and, if required "OK" for confirmation.

3.5.1 Processor board, relay board, APO

All signals of the processor board (PB), the ION32 module, the relay board (RB) and the 4 bus modules of the APO board are displayed here. If a bus module is not available, the name (F48-F51) is shaded in red.



Block 1: Process board
Line 1 = not assigned in LiSA21
Line 2 = recall
Line 3-4 = shaft signals
Line 5 = inverter signals

Block 2: ION32 module = I/O 1-32

Block 3: Relay board

Block 4: Car (APO)

Abbreviations:
Block 1: The I/Os on the processor board are shown in the standard assignment here.
I/Os programmed at variance with the standard assignment are only shown with an abbreviating letter (see table 3.6.1 Abbreviations). Any I/Os designated as “fixed” cannot be reprogrammed.

Block 1:

- --- not assigned (line 1)

- 41-44 = not assigned
- Rue = recall on (fixed)
- Rau = recall up (fixed)
- RAb = recall down (fixed)
- 48 = not assigned

- --- not assigned (1)
- VO = top slow-down switch (green=active, grey=not active)
- SZ = zone inductor switch (green=active, grey=not active)
- SM = centrical inductor switch (green=active, grey=not active)
- VU = bottom slow-down switch (green=active, grey=not active)
- --- not assigned (6-7)
- NSF = emergency stop at car

- 49-50 = not assigned
- K7 = safety relay of door zone override (green=active, grey=not active)
- K5 = safety relay of door zone override (green=active, grey=not active)
- --- not assigned (5)
- AL = Alarm (green=active, grey=not active)
- P01 = freely programmable output 1
- P02 = freely programmable output 2

- UP = inverter direction up (green=active, grey=not active)
- DN = inverter direction down (green=active, grey=not active)
- RUN= inverter travel (green=active, grey=not active)
- V0 = inverter spped v0 (green=active, grey=not active)
- V1 = inverter speed v1 (green=active, grey=not active)
- V2 = inverter speed v2 (green=active, grey=not active)
- V3 = inverter speed v3 (green=active, grey=not active)
- VN = inverter speed vrated (green=active, grey=not active)

Block 2: The I/Os of the ION32 module on the processor board are shown here.
The abbreviations with only one character from the table of abbreviations in chapter 3.6.1 are used.

Block 3: The inputs and outputs of the relay board are shown here.

- SK1 = safety circuit 1 (green=active, grey=not active)
- SK2 = safety circuit 2 (green=active, grey=not active)
- SK3 = safety circuit 3 (green=active, grey=not active)
- SK4 = safety circuit 4 (green=active, grey=not active)

- SAK = contactor monitoring (green=active, grey=not active)
- L4 = car light (green=active, grey=not active)
- K5 = safety relay of door zone override (green=active, grey=not active)
- K7 = safety relay of door zone override (green=active, grey=not active)
- SLO = low speed relay (green=active, grey=not active)
- KSD = star/delta relay (green=active, grey=not active)
- KDN = down relay (green=active, grey=not active)
- KUP = up relay (green=active, grey=not active)
- KFA = fast speed relay (green=active, grey=not active)
- KF1 = freely programmable relay 1 (green=active, grey=not active)
- KF2 = freely programmable relay 2 (green=active, grey=not active)
- KF3 = freely programmable relay 3 (green=active, grey=not active)

Block 4: This block shows the I/Os of the bus module on the car (APO)

Bus module 48:

- IEI = inspection on (green=active, grey=not active)
- AUF = inspection up (green=active, grey=not active)
- AB = inspection down (green=active, grey=not active)
- ES = emergency stop (green=active, grey=not active)
- FUL = full load (green=active, grey=not active)
- KNL = car emergency light (green=active, grey=not active)
- SL = shaft light (green=active, grey=not active)
- FAS = inspection fast (green=active, grey=not active)
-

Bus module 49/50:

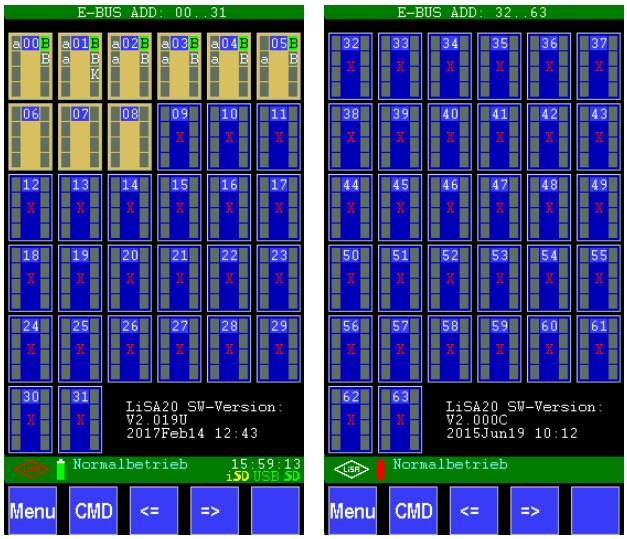
- LS1/LS2 = light barrier door 1/2 (green=active, grey=not active)
- SB1/SB2 = closing force limiter door 1/2 (green=active, grey=not active)
- OL1/OL2 = open limit switch door 1/2 (green=active, grey=not active)
- CL1/CL2 = close limit switch door 1/2 (green=active, grey=not active)
- DO1/DO2 = door 1/2 open (green=active, grey=not active)
- DC1/DC2 = door 1/2 closed (green=active, grey=not active)
- FAN = car fan (green=active, grey=not active)
- KCL = car light switch-off relay (green=active, grey=not active)

Bus module 51:

- OVL = overload (green=active, grey=not active)
- OAS = acoustic signal (green=active, grey=not active)
- DOB = door open button (green=active, grey=not active)
- DCB = door close button (green=active, grey=not active)
- F1-F4= freely programmable I/Os (depending on APO version)

3.5.2 Landing bus

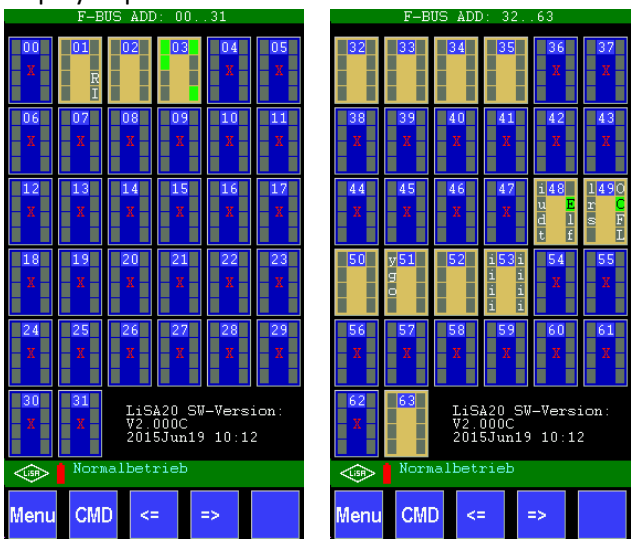
The landing modules of door side 1 are displayed. Recognised modules are highlighted in beige. The 8 I/O ports with the assignment abbreviation and the switching state (green) are displayed per module. (See table 3.6.1 Abbreviations)



When changing to the next page you can either display the landing bus with modules 32..63 (if assigned) or the car bus.
At the bottom there are the Menu button, the CMD button and the button to change to the previous and next page.

3.5.3 Car bus

Here the car bus or the landing modules of door side 2 are displayed (in case of a second door side it is the car bus). The 8 I/O ports with the assignment abbreviation and the switching state are displayed per module.



At the bottom there are the Menu button, the CMD button and the button to change to the previous and next page.

3.6 Abbreviations and addressing

Various abbreviations are used for operation and programming in order to realise clearer representation.

>	go to next page (top right)
<	go back to previous page (top left)
T	parameter requiring to enter a time value in seconds
t	parameter requiring to enter a time value in milliseconds
I	parameter requiring to determine an electronic input
O	parameter requiring to determine an electronic output
IO	parameter requiring to determine an electronic input and output

In LiSA21, 8 I/O ports are always assigned to a port range. The port range is given an address (connection range, slot) which is assigned to the processor bus, car bus or landing bus depending on the location.

Bus	Short designation	Address range	Max. I/O number
Processor	P	P01-P32	32
Car	F	F00-F63	64*8
Landing	PO	E00-E63	64*8
Relay board	R	1	1

The parameter description in part B of the manual indicates the addressing in the following form:

I:VVVF failure	**x.yy.z**

x = location (P, F, E)
y = address (1-32 for P or 0-63 for F and E)
z = 1-8

Addressing example:

I: Down-valve 1 check P 05
That means:
The input is on the processor module, address 05 (port 5 on XK10).

Another example:
O: Out of order F 00 4
The output is on the car bus, address (bus module) 0, port 4.

3.6.1 Abbreviations

Abbreviations are used in the dialogues with displayed signals in order to identify the assignment of the inputs and outputs.

Abbreviation	
?	Not defined!
o	I:Door 1 OPEN button, I:Door 2 OPEN button
z	I:Door 1 CLOSE button
j	I:Loading / door stop
K	O_ O:Pump overtravel
U	O:V1 speed hydraulic lift
O	O:Door 1 OPEN signal, O:Door 2 OPEN signal
C	O:Door 1 CLOSE signal, O:Door 2 CLOSE signal
f	I:Deactivate call door 1 for landing and car I:Enable car/landing call door 1 I:Deactivate landing call door 1, I:Deactivate car call door 1 I:Enable landing call door 1, I:Enable car call door 1 I:Deactivate call door 2 for landing and car I:Enable car/landing call door 2 I:Deactivate landing call door 2, I:Deactivate car call door 2 I:Enable landing call door 2, I:Enable car call door 2
l	I:Light barrier door 1, I:Light barrier door 2
b	I:Inspection limit switch
r	I:Closing force limiter door 1, I:Closing force limiter door 2
b	I:Create screenshot
s	I:Limit switch door 1 OPEN, I:Limit switch door 1 CLOSE
K	O:Urgent signal door 1, O:Fold-away apron door 1, O:Fold-away apron door 2, O:Ignore light barrier door 2

b	I:Fold-away apron door 1, I:Fold-away apron door 2
T	O:Landing lights
P	O:Position signal
R	O:Locking magnet door 1, O:Locking magnet door 2
U	O:Inverter simulator module
K	O:UCM test mode
r	I:Closing force limiter door 2
F	O:Motor fan
s	I:Limit switch door 2 OPEN, I:Limit switch door 2 CLOSE
b	O:Ignore light barrier door 2
z	I:Time relay 1, I:Time relay 2, I:Time relay 3 O:Time relay 1, O:Time relay 2, O:Time relay 3
K	O:RST phase error
b	I:Emergency call-Please wait
b	I:Emergency call-Please speak
B	O:Emergency call active, O:Voice communication active
K	O:Max. speed, O:Speed > speed early open
b	Hydraulic IValve SMA, I:ZÜS switch
W	O:Continue D1 group , O:Continue D2 group , O:Continue up/down D1 O:Warning sign. D1 closed, O:Warning sign. D2 closed
F	O:Error type 1 trigger, O:Error type 2 trigger, O:Error type 3 trigger, O:Error type 4, O:Error type 5, O:Error type 6, O:Step error

G	O:Car gong
t	I:Min. room temperature
K	O:Autom. emergency call reset, O:Conn. line to modem
B	O:Car direction Up/down, O:Direction up/down D2
W	O:Continue up/down D1, O:Continue up/down D2
K	O:Out of order D1, O:Car in operation DS1, O:Car busy DS1, O:Out of order O:Out of order door 2, O:Car in operation D2, O:Car busy door 2 O:Out of order in car
b	I:Reset emerg. release, I:Emergency release top, I:Partition door, I:Part. door special travel
H	O:Car here door 1, O:Car here door 2
b	I:Hydraulic start sign., I:Hydraulic stop signal
t	I:Turn off mode
T	O:Turn off mode
R	O:Locking magnet door 1, O:Locking magnet door 2
b	I:MFA-installation travel, I:REG-regulator OK, I:MIN-minimum pressure, I:MAX-maximum pressure, I:MRT-Machine room temp., I:MAI-maintenance,
u	I:Overtemperature U1, I:Overtemperature U2
b	I:Scrolling text 1 in car
K	O:Deceleration point, O:Creeping velocity, O:Brake overexcitation
i	I:Transfer IO 1, I:Transfer IO 2, I:Transfer IO 3, I:Transfer IO 4, I:Transfer IO 5, I:Transfer IO 6
v	I:Waiting area door 1, I:Waiting area Door 2, I:Waiting area car D1, I:Waiting area car D2
O	O:Transfer IO 1, O:Transfer IO 2, O:Transfer IO 3 O:Transfer IO 4, O:Transfer IO 5, O:Transfer IO 6
b	I:Dead man's mode in car
B	O:Dead man active
K	O:Fire emergency (BF) active

s	I:Special travel 0, I:Special travel 1, I:Special travel 2, I:Special travel 3, I:Special travel 4, I:Special travel 5, I:Special travel 6
T	O:Text special travel 0, O:Text special travel 1, O:Text special travel 2, O:Text special travel 3, O:Text special travel 4, O:Text special travel 5, O:Text special travel 6
G	O:Travel continue gong when door open
O	O D1 is open due to light curtain, O D2 is open due to light curtain
S	O:Special travel 0 active, door 1, O:Special travel 1 active, door 1, O:Special travel 2 active, door 1 O:Special travel 3 active, door 1, O:Special travel 4 active, door 1, O:Special travel 5 active, door 1 O:Special travel 6 active, door 1
s	I:Special travel 0 door 1, I:Special travel 1 door 1, I:Special travel 2 door 1, I:Special travel 3 door 1, I:Special travel 4 door 1, I:Special travel 5 door 1, I:Special travel 6 door 1, I:Special travel 0 door 2, I:Special travel 1 door 2, I:Special travel 2 door 2, I:Special travel 3 door 2, I:Special travel 4 door 2, I:Special travel 5 door 2, I:Special travel 6 door 2
H	O:Retract buffers, O:Extend buffers
b	I:Buffers retracted, I:Buffers extended
g	I:Input deactivate buffers
s	I:Input stop downwards (car is set down)
p	I:Pressure control (minimum pressure after setting down)
t	IO_Thyssen Teleservice

Z	O:Car in zone
b	I:Penthouse mode landing button (on/off)
K	O:Penthouse mode active in car
b	IO:Penthouse visitor mode (landing)
n	I:Fire emerg. (BF) in control cabinet, I:Fire emerg. (BF) in landing door 1, I:Fire emerg. (BF) in landing door 2
x	I:Shut-down (ABS) key in car, I:Shut-down (ABS) key in landing, I:Shut-down (ABS) key in control cabinet
b	I:Penthouse in car, I:Penthouse call release in landing, I:Penthouse, landing with waiting time
v	IO:Penthouse VIP (landing call with zero load)
b	I:Quick start
K	O:Quick start
c	I:Presence sensor
b	I:Frequency controller (VVVF) ready
K	O:Standby
l	I:Light barrier ok (DS1), I:Light barrier ok (DS2)
G	O:Gong up/down door 1, O:Gong up/down door 2, O:Arrival gong in car, O2:Travel direction in car
T	O:Door open text in car, O:Door closes (visual/acoustic signal in car)
A	O:Car position (FP) door 1, O:Car position (FP) door 2, O:Car position (FP) in car
K	O:Full load, O:Overload
G	O:Acoustic signal in car
a	IO:Landing call door 1, IO:Landing call door 2
i	IO:Car selection like car call door 1, IO:Car selection (FKSel) car call door 2 IO:Car call
I	O:Car call
G	O:Group data packet not recognised
b	IO:Start
T	O:Emergency stop (car), O:Emergency stop (pit)
b	I:Landing control off, I:Check brake 1, I:Check brake 2, I:Check brake 3, I:Check valve 1, I:Check valve 2, I:Check drop protection, IO Start
v	I:Full load
y	I:Overload
b	I:Zero load, I:Half load
U	O:Travel signal(2), O:Travel signal in car, O:Travel signal(1)
K	O:Penthouse active (landing)
b	I:Block doors in control cabinet, IO:Block start-up in control cabinet
j	IO:Car fan button
K	O:Special travel (Sf) 0 active, O:Special travel (Sf)1 active, O:Special travel (Sf) 2 active, O:Special travel (Sf) 3 active, O:Special travel (Sf)4 active, O:Special travel (Sf) 5 active, O:Special travel (Sf) 6 active
f	I:Fire emerg. (BF) terminated, I:Firemen mode (FW) key in landing/control cabinet I:Firemen mode (FW) key in car
K	O:Fire emergency (BF) active
S	O_Release voice output
l	I_Car light sensor
T	O:Text firemen mode (FW) O:Fire emerg. landing reached

K	O:Firemen mode (FW) active
e	I:Evacuation travel (EF), I:Release evacuation,
K	O:Car in evacuation landing
E	O:Evacuation travel indicator active
K	O:Shut-down (ABS) mode active
m	I:Fire emerg. (BF) indicator door 1, I:Fire emerg. (BF) indicator door 2,
R	O:LiSA bus switch-over in group
T	O:Text fire emerg. active, O:Text evacuation travel (EF) active
h	I:Evacuation travel (EF) upwards
K	O:Collective fault, O:Emergency call suppression, O:Car in zone (flush), O:Out of operation
G	O:Landing gong UP door 1, O:Landing gong UP door 2, O:Landing gong DOWN door 1, O:Landing gong DOWN door 2
K	O:Regulator remote tripping, O:Passenger release ZÜS mode
a	IO:Landing call door 1, IO:Landing call door 2
B	O:Emerg. call active
R	O:Bode relay
U	O:Relevelling speed Vn
I	O:Inspection active
R	O:Recall active
N	O:System in NORMAL operation
S	O:Special travel 0 active, door 2, O:Special travel 1 active, door 2, O:Special travel 2 active, door 2 O:Special travel 3 active, door 2, O:Special travel 4 active, door 2, O:Special travel 5 active, door 2 O:Special travel 6 active, door 2
H	O:Car position is above set value H1 O:Car position is below set value H2
D	O:Change of direction
S	O:Counterweight limiter
G	O:Reset speed limiter
u	I:Installation up
d	I:Installation down
g	O:Acoust. acknowledgem. car calls
z	O:Travel counter, O:Travel counter up, O:Travel counter down
R	I:Recall
u	I:Recall up
d	I:Recall down
L	I:Shaft light
S	O:Reset safety light curtain of hinged doors
s	I:Reset safety light curtain of hinged doors
e	I:GSM/emergency call system ready
k	I:Reset fold-away apron DS1,
s	I:No standby
s	I:Start standby mode
c	I:Clock travel 1 in control cabinet, I:Clock travel 2 in control cabinet, I:Clock travel 3 in control cabinet, I:Clock travel 4 in control cabinet, I:Clock travel 1 in car, I:Clock travel 2 in car, I:Clock travel 3 in car, I:Clock travel 4 in car, I:Clock travel 1 in landing, I:Clock travel 2 in landing, I:Clock travel 3 in landing, I:Clock travel 4 in landing,

C	O:Clock travel 1 active, O:Clock travel 2 active, O:Clock travel 3 active, O:Clock travel 4 active, O:Clock travel 1 active DS1, O:Clock travel 2 active DS1, O:Clock travel 3 active DS1, O:Clock travel 4 active DS1, O:Clock travel 1 active DS2, O:Clock travel 2 active DS2, O:Clock travel 3 active DS2, O:Clock travel 4 active DS2,
i	I:Inspection on (pit)
u	I:Inspection up (pit)
d	I:Inspection down (pit)
s	I:Emergency stop (pit)
O	O:Inverter reset
K	O:Hinged support
l	O:Shaft light
i	I:Inspection (fixed IO)
u	I:Inspection up (fixed IO)
d	I:Inspection down (fixed IO)
f	I:Inspection fast (fixed IO)
l	I:Shaft light (fixed IO)
t	I:Emergency stop car (fixed IO)
E	O:Emergency light car (up to SW V2.026B fixed IO)
L	O:Car light (fixed IO)
F	O:Car fan (fixed IO)
b	I:Emergency release bottom
J	O:Loading / door stop
h	I:Evacuation travel downwards
i	IO:Car calls
g	IO:Visitor control DS1
G	O:Speed limiter
t	I:Set time to 3 o'clock
I	O:Inspection active 2, O:Inspection active 3
g	I:Hazmat transport in landing, I:Hazmat transport in car
G	O:Hazmat transport
g	IO:Visitor control DS1
O	O:Out of operation DS1 different lift in group O:Out of operation DS2 different lift in group
H	O:Car here DS1 in group, car here DS2 in group
G	O:Landing gong DS1 in group, O:Landing gong DS2 in group, O:Travel continue gong DS1 up in group, O:Travel continue gong DS2 up in group, O:Travel continue gong DS1 down in group, O:Travel continue gong DS2 down in group,
a	Car selection up DS1, car selection up DS2, Car selection down DS1, car selection down DS2,
i	IO:Car call in group DS1 lift 1, IO:Car call in group DS1 lift 2, IO:Car call in group DS1 lift 3, IO:Car call in group DS1 lift 4, IO:Car call in group DS1 lift 5, IO:Car call in group DS1 lift 6, IO:Car call in group DS1 lift 7, IO:Car call in group DS1 lift 8, IO:Car call in group DS2 lift 1, IO:Car call in group DS2 lift 2, IO:Car call in group DS2 lift 3, IO:Car call in group DS2 lift 4, IO:Car call in group DS2 lift 5, IO:Car call in group DS2 lift 6, IO:Car call in group DS2 lift 7, IO:Car call in group DS2 lift 8,

s	I:Test ext. safety circuit
L	O:Landing call present DS1, O:Landing call present DS2
H	O:Warning signal for animals DS1, O:Warning signal for animals DS2
s	I:Sabbath function on
S	O:Display Sabbath DS1, O:Display Sabbath main landing, O:Display Sabbath in car
I	O:Activate door override
c	I:Clock travel 1 start, I:Clock travel 2 start, I:Clock travel 3 start, I:Clock travel 4 start, I:Clock travel 1 end, I:Clock travel 2 end, I:Clock travel 3 end, I:Clock travel 4 end
S	O:Car calls off with Sabbath, O:Landing calls off with Sabbath
R	O:Add. locking magnet DS1, O:Add. locking magnet DS2
t	I:Scrolling text 2
O	O:Shaft VO active
U	O:Shaft VU active
F	O:Enable car/landing call door 1, O:Enable landing call door 1 O:Enable car call door 1, O:Enable car/landing call door 2, O:Enable landing call door 2 O:Enable car call door 2
r	I:Delete error
A	O:Deceleration control speed below limit O:Deactivates VZ control during acceleration
a	I:Deceleration circuit monitoring I:Dropout control for decel. monitoring circuit
h	I:Special test
e	I:Input for EEML (fixed IO)
e	I:Earthquake horizontal, I:Earthquake vertical, I:Earthquake counterweight, I:Earthquake reset
r	I: PSB ready
a	I:Automatic release
A	O:Automatic request, O:Automatic operation (OAB)
m	I:Manual release

M	O:Manual request, O:Manual operation (OHB)
i	I:Command from PSB
m	I:Manual request in car
b	I_Bypass on, I:Bypass off
B	O:Door in bypass
u	I:Overtemperature U3, I:Overtemperature U4, I:Overtemperature U5
R	O:Landing call enabled DS1, O:Landing call enabled DS2
t	I:Overtemperature travel
T	O:Overtemperature travel
s	I:Switch-off command (impulse), I:Operation command (impulse)
e	I:Seismics warning, I:Seismics triggered
a	I:Seismics ready
T	O:Test seismics
r	I:Reset inspection (pit)
s	I:Emergency stop (machine room)
	Fields highlighted in grey are not completely implemented yet

3.7 Address range of inputs and outputs

An ION32 I/O module is plugged on the processor board the 32 I/Os if which can be tapped using the connectors XK10-XK13 on the processor board. (Cf. Figure 2)

XK10: I/O 1 - 8 XK11: I/O 9 - 16
XK12: I/O 17 - 24 XK13: I/O 25 - 32

Processor board inputs of the "variable" tape can be set to different inputs (e.g. to the I/O16) in the input/output configuration.
But: changed inputs will then not be shown in the usual positions in the signal status window. For the input has been changed!

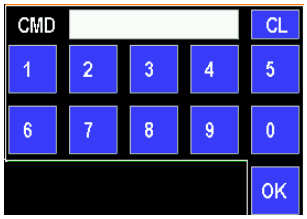
Signal	TYPE	Description	Origin	Address input
RUE	fixed	Recall	LiSA21 PB	P.45
RAU	fixed	Recall UP	LiSA21 PB	P.46
RAB	fixed	Recall DOWN	LiSA21 PB	P.47
U1	variable	Overtemperature 1	LiSA21 PB	P.49
U2	variable	Overtemperature 2	LiSA21 PB	P.50
DM	fixed	Alarm	LiSA21 PB	internal
LL	variable	Car light voltage input	LiSA21 PB	internal
SL	variable	Shaft light input	LiSA21 PB	Further input possible with bus module.

The free relay on the relay board is addresses as follows:

Name	TYPE	Description	Origin	Address input
K41	fixed	Free relay	LiSA21 RB	R.1

3.8 Operation via command level

The following table provides an overview of possible input commands which can be entered using the "CMD" button at the bottom of the display. Each command input must be confirmed using the "OK" button. "CL" serves to delete the entry. Pressing the "CMD" button again closes the input area.



Command overview

CMD	Action	Description	Info
1	Open door 1	Door 1 is opened regardless of the door open permission.	
2	Open door 2	Door 2 is opened regardless of the door open permission.	
3	Close door 1 and door 2	The doors are closed.	
4	Show DCP information	Indication of DCP information in the status text window	
5	Door blocking on/off	Doors are blocked or released.	Varying status
6	Switch off landing control	Enables or disables the landing control. No calls in the landings are accepted	Varying status
7	Call simulation	Serves to simulate car and landing calls. The controller processes the calls.	
8	Recall control on / off	Serves to simulate the recall control by means of the software. Safety circuit equipment will not be jumpered.	Varying status
9	OC Test	This causes a short interruption of the safety circuit by the OC contact in LiMAX33CP	Only with LiMAX33CP

01	Initialise modem	If a modem is connected and configured in the menu, it can be re-initialised.	
44	Show (relative) absolute encoder values	If enabled, the absolute encoder values are displayed in the controller status window relative to the lowest landing.	
45	Show (actual) absolute encoder values	If enabled, the actual absolute encoder values are displayed in the controller status window (value on magnetic tape).	
91	Enable or disable phase monitoring	The 3 phases - connected to the relay board - are checked in terms of signal and direction. The parameter switches the phase monitoring off/on.	Varying status
97	DCP: Send / do not send package I7.	Package I7 provides the inverter with the estimated path value for the upcoming travel.	Varying status
98	Enable or disable battery monitoring	The battery connected to the processor board is charged, discharged and checked. The parameter switches the phase monitoring off/on.	Varying status
99	DCP: Send / do not send package I9.	Package I9 provides the inverter with the exact path value for the upcoming travel.	Varying status

CMD	Action	Description	Info
100	Teach-in (impulse method)	Starts the teach-in from the lowest landing with the impulse method set	Vu and SM must be present, otherwise an error message is tripped
1xx	Car call for landing xx	The lift is called to landing xx. The car calls of a selective second door side follow those of the first door side.	15-OK = car call for landing 5, door side 1 *Assumption: 10 landings, selective:* 115-OK = car call for landing 5, door side 2
2xx	Upwards landing call for landing xx	Makes an upwards landing call, depending on the call release. For a selective second door side, add the maximum number of landings to the landing.	25* = upwards landing call for landing 5
3xx	Downwards landing call for landing xx	Makes a downwards landing call, depending on the call release. For the selective second door side, add the maximum number of landings to the landing.	35* = downwards landing call for landing 5
401	Relay test	Checks all relay outputs as well as travel signal outputs to the frequency inverter	
403	Display SD/USB data	Displays any folders and files available on the SD/USB.	
404	Display test	Checks the LiSA bus displays	
405	I/O test	Checks the IO16 cards on the processor board for functioning	
600	Save data	Saves the parameters and settings in the internal flash memory and on the SD card or the USB flash drive in the root of the lift directory.	
601	Data transmission to displays	All set display characters per landing are transmitted to the displays connected to the LiSA bus.	
603	Special indication	Displays important information on the display, like distances between landings, door and check times	
6060	Controller restart	Restart of the control computer is enforced.	
691	Backup - save all data in a folder on SD/USB	Saves the current lift software, the errors in chronological order (log file) as well as the parameters to a separate folder (SAVExyz) on the SD/USB.	
692	Display backup folder	Displays all complete backups (folders) on the SD card	

CMD	Action	Description	Info
692xxx	Complete recovery (lift software, parameters, saved errors)	Restores the data saved on the SD/USB. For this purpose, the folder index (3-digit number) must be entered.	If the parameters have been saved in folder SAVE_003, enter 692003*
693xxx	Restore parameters from folder	Restores the parameters saved on the SD/USB - for this purpose, the folder index (3-digit number) must be entered.	If the parameters have been saved in folder SAVE_005, enter 693005*
694xxx	Restore log files from folder	Restores the log files saved on the SD/USB - for this purpose, the folder index (3-digit number) must be entered.	If the parameters have been saved in folder SAVE_002, enter 694002*
695xxx	Restore software from folder	Restores the software saved on the SD/USB - for this purpose, the folder index (3-digit number) must be entered.	If the software has been saved in folder SAVE_006, enter 695006*
697	Lift software backup	Backs up the current lift software on the SD/USB if no current backup is available yet.	File name in the root of the SD card e.g. lisa001.bin
698	Current software version	Displays the current software version	Indication on the status page
698xxx	Restore lift software	Restores the software saved on the SD/USB in the root - for this purpose, the file name index (3-digit number) must be entered.	Restore software with suffix 001 using 698001*
700	Delete UCM error / UCM test	Deletes the current UCM error	The UCM test mode can only be enabled if the car is in the zone and no UCM error is present
701	Travel to upper final limit switch	Car travels to upper final limit switch (also required for ZÜS test)	
702	Travel to lower final limit switch	Car travels to lower final limit switch (also required for ZÜS test)	
703	ZÜS test mode		
704	UCM valve test	Triggers an UCM valve test for hydraulic systems which, in case of successful test, must shut down for UCM fault.	
7xxx	Call parameter page	Enter page number (three digits) to go to the associated parameter page	
7xxyy	Call simulation between landings	Call simulation between determined landings. 7xxyy: Lift travels between landing xx and yy.	
800	Delete error	Deletes the current error	Note: This command must only be applied by competent staff!

CMD	Action	Description	Info
8xxy	Set I/O at the landing bus module Set I/O at processor board	Landing bus: xx is the address of the bus module (between 00 and 63) Processor board xx: - 64 relay outputs - 65 frequency inverter output - 66 1 IO16 module connection - 67 2 IO16 module connection - 68 3 IO16 module connection - 69 4 IO16 module connection y is the I/O number (1 to 8)	
08xxY	Set I/O at the car bus module	Car bus: xx is the address of the bus module (between 00 and 63) y is the I/O number (1 to 8)	
9xxY	Reset I/O	Deletes the I/O number. See structure of 8xxy	
09xxY	Reset I/O	Deletes the I/O number. See structure of 08xxy	
052	Shaft light on/off	Switches the shaft light on/off	
208207	Reference point top landing	Sets a reference point in the top landing	
208206	Reset AWG zero	Sets the absolute encoder zero to the current position	
800010	Reset emergency release	Prerequisite: input from emergency release board enabled	

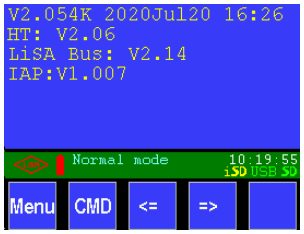
3.9 Backup and recovery

3.9.1 General

LiSA21 provides the possibility to save software, parameters and error memories on a micro-SD card or USB flash drive as well as to restore software and parameters.

3.9.2 Software version query

Query the software version using [CMD 698 -> OK].



The software version VX.XX is then displayed on the status page in line 1.
The second line shows the version of the handheld terminal, the third line the bus driver version, the fourth line the version of the boot loader.

3.9.3 Backup on SD card/USB

Backing up the data is useful before you carry out any tests, change any settings or replace any hardware (the processor board).
The backup can be selected using Tools -> Data/Software -> Backup or called directly using the command [CMD -> 7016 -> OK].
See also Manual part B / Tools / Backup.
Here you can choose between two menu items: Complete to SD card or Complete to USB drive.
By selecting these menu items, the entire controller data are stored on a USB flash drive or an SD card and can be restored on the same or different hardware.

Complete to SD card

This item is active if a valid SD card is plugged on the LiSA21 controller board. By selecting it, all parameters, the log files, the software, the processor IAP and the currently created parameter text file are stored in a backup folder with date and time on the SD card. The main folder has the name of the lift ID saved under lift info (if assigned).
After activating the button, a bar for the different backups appears on the screen several times and an “OK” button on the lower screen for a short time at the end in order to have time to read the information on the screen.

Complete to USB drive

This item is active if a valid USB flash drive is plugged on the LiSA21 controller board.
The backup procedure is the same as described above for the SD card.
Note: SD card and USB drive must have FAT32 as file system and must only have one partition!

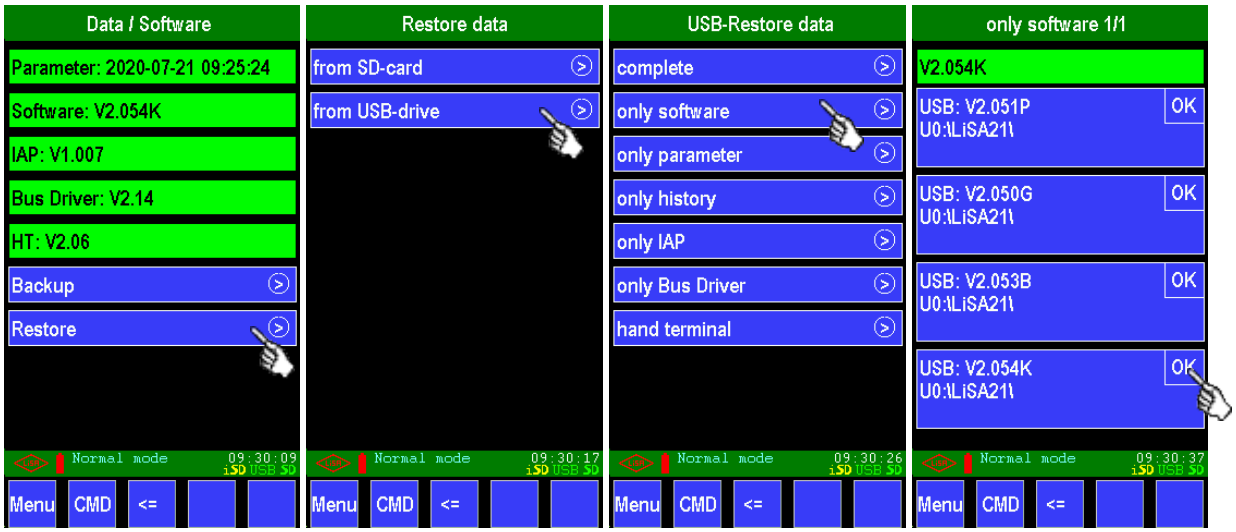
3.9.4 Data recovery

The data recovery can be selected using Tools -> Data/Software -> Recovery or called directly using the command [CMD -> 7017 -> OK].

See also Manual part B / Tools / Recovery.
Here, too, you can choose between two menu items: From SD card or From USB stick
The menu items are active if an SD card or a USB flash drive has been recognised on the processor board. If a storage medium is selected, you can select again which software is to be restored.
You can choose between:

- Complete: LiSA20/21 software, LiSA IAP (boot loader) and parameters. The history is maintained.
- Only software: Only LiSA20/21 software, everything else remains unaffected.
- Only parameters: Recovery of the saved parameters, everything else remains unaffected.
- Only history
- Only IAP: Only the processor boot loader is restored.
- Only bus driver
- Handheld terminal: Only the software of the handheld terminal is restored, all other software is maintained. Do not disconnect the handheld terminal during the update!

If several files are available for the respective recovery or update, they are displayed in different folder and can be selected or executed directly.



Example: Loading the software version V2.054K from USB

Folder structure (applies to SD card and USB drive):

- If no data is contained on a storage medium, a folder called “LISA21” is automatically created in the root for an action (e.g. backup, save parameter). This folder is the reference for any data!
- If the lift ID has been assigned, any data of the current lift are stored in this sub-folder. If the lift ID is empty, there is no subdivision into another folder.
- Backups are stored with the current date and time. The format is “YYMMDD_HHMMSS“, i.e. always with two digits year-month-day_hour-minute-second. The backup folder is below the lift ID folder.
- Naming conventions:
  Abbreviations:
  - SW: Software
  - DRV: Driver
  - IAP: In-Application Programming = boot loader
  - HT: Handheld terminal

- Software naming conventions:

Description	File name
LiSA21 software for main processor	LiSA21SW_V#_###X.bin
LiSA21 IAP software for main processor	LiSA21SWIAP_V#_###.bin
LiSA21 software for bus driver processor	LiSA21SWDRV_V#_##.bin
Handheld terminal software	HTSW_V#_##.bin

3.10 Software update

Updating the software entails risks and should therefore only be carried out using these instructions and by trained staff. Faulty updating can destroy the lift controller. Therefore carefully read the information provided in the following and contact the
hotline: +49 (0) 8076 91 87 – 222 in case of any questions.

Note: If the controller is already in operation, put it out of operation first. Make sure that the car is empty and change the operating mode.
There are several possibilities:
- Recall mode by activating the recall switch in the control cabinet
- Out-of-order mode by turning off the master switch
It must be ensured in any case that the car cannot move due to landing or car calls, as this would disturb or even render the updating procedure impossible.
Disabling the landing control is not sufficient.

Preconditions:

The following aspects must be complied with to be able to carry out a software update:
micro-SD card or USB drive 2.0 available, formatted FAT32, max. size 64 GB
software available (Lisa.bin)
PC, notebook or netbook must be available to copy new files.

3.10.1 Updating the software

In order to carry out an update it is sufficient to have the current files available on a USB flash drive, for instance. The files must be in a folder called “LiSA21” in order to apply them in the data recovery as described under section 3.9.4.
The “recovery” menu item can be found at Tools -> Data/software -> Recovery
or can be called directly using the command [CMD -> 7017 -> OK].
See also Manual part B / Tools / Recovery.

3.11 Backup

After successful commissioning it is recommended to carry out a backup of all data.
Use Menu -> Tools -> Data/Software -> Backup -> -> Complete to SD card
to store all parameters, the software for LiSA21, handheld terminal and boot loader on the SD card.

4. Installation and connection

4.1 General information

Important notes on safety at work

Before the LiSA controller is put into operation in the control cabinet, you must by all means read the operating instructions and keep them at hand for future reference.
The installation and commissioning of the LiSA controller must only be carried out by instructed persons or accordingly trained experts.
As a basic principle you must leave any maintenance and repair works to the service team of Schneider Steuerungstechnik GmbH or a qualified expert.
The safety regulations of the relevant professional associations must be met by all means.

Warning: Before carrying out any work on the lift system ensure that the system is disconnected from voltage! Safeguard against any unauthorised or unintended switch-on of the power supply by suitable measures (remove fuses, place a warning sign, cordon off the area, assign a guard with the supervision of the safety measures, if required).

Before installation

Check the delivered items for transport damages. Any transport damages must immediately be communicated to the forwarding agent or Schneider Steuerungstechnik GmbH.
Unpack the LiSA controller / control cabinet.
Check the delivered items for completeness.
Compare the delivered components with the enclosed packing slip. Check your order by means of the delivery slip. In the event of discrepancies please contact Schneider Steuerungstechnik GmbH immediately.

Note: The travelling cables are supposed to hang for 24 hours prior to be used, therefore install the travelling cable first before you start the mounting in the machine room.

When pulling in the travelling cable, it must not be twisted or kinked by any means!

4.2 Installation and connection in the control cabinet

4.2.1 EMC-compliant installation

- Lay control cables and power cables separately.
- Provide connected inductors (e.g. brake magnets, interlock magnets, door motors, etc.) with suitable interference suppressors.
- Use shielded cables for control signals from frequency inverters. Apply the shield single-sidedly and extensively.
- Use shielded cables for connections to the motor, brake resistor, braking chopper and speedometer. Apply the shield double-sidedly and extensively.
- For further information on EMC-compliant installation please refer to our EMC instruction sheet.

4.2.2 Installing the control cabinet

The control cabinet is fixed onto the wall using the mounting holes or brackets in the corners of the control cabinet. The component box for the control cabinet contains an accessory pack with mounting clips, dowels and the appropriate screws.

4.2.3 Connecting the main supply

After fixing the control cabinet you must now establish connection to the master switch. If supply of the master switch is provided on site, you must only establish a connection between master switch and controller. If there is an internal master switch, you can connect the supply directly in the control cabinet.

The supply is connected to the terminals L1, L2, L3, N1 and PE (five-wire cable). If necessary, the main supply is connected directly to the master switch.

4.2.4 Connecting the light supply (LL)

If a separate wire is provided for car light and shaft light, it must be connected to the terminals LL, N2 and PE in the control cabinet. If no separate wire is provided, you must jumper the terminals N1 and N2 as well as L1 and LL in the control cabinet.

Caution: Do not yet activate the controller at this point of time. The machine installation should be completed first.

4.2.5 Connecting the drive

Installing a rope drive (2 speeds or regulated):

- Motor cables
  - 2*4 wires in case of 2-speed systems
  - 1*4 wires in case of 1-speed systems
  - 1*4 shielded wires in case of systems with frequency inverter
- brake cable (service brake or holding brake)
- PTC thermistor cable (shielded)
- if required: supply cable for the forced ventilation system
- if required: supply cable for brake lifting monitoring and/or brake shoe wear monitoring (shielded)
- in case of regulated systems cables to the speedometer (shielded), if necessary

Installing a hydraulic power unit

Depending on the components used, it normally consists of:

- motor supply cable
- valve supply cable
- PTC thermistor cable (shielded)
- supply cable for the minimum pressure and overload switch contacts (shielded)

4.3 Installation and connection in the shaft

4.3.1 Installation travel

On delivery, LiSA controllers are equipped with a jumper inserted between the MFA installation travel input and –H. This jumper is labelled with the inscription

"remove jumper only after end of installation"

The result is:

- switching to normal operation is only possible by removing the jumper
- in systems with absolute encoder the pulse / encoder errors monitoring is switched off, i.e. the inspection or installation mode is possible without restrictions even if the absolute encoder is not installed or initialised
- travel with recall control is not possible

Caution: During the entire installation procedure, the inspection travel must remain turned on!

If you must jumper any safety circuit equipment (e.g. for not being installed), please insert jumpers (e.g. from terminal 4 to 9 and 11 to 14).

Caution: Use (yellow/green) earth wires to jumper the safety circuits and leave long and noticeable wires in order not to accidentally forget a jumper in the control cabinet after installation.

Warning: Never jumper any emergency stop switch!!

4.3.2 Installing the shaft selection

First install the reader on the car or in the car panel using the provided bracket (see the following figures). The direction arrow of the reader points **upwards**. Ensure an accurately vertical installation. Check this by means of a bubble level. Now mount the magnetic tape holder on the shaft ceiling (figure).

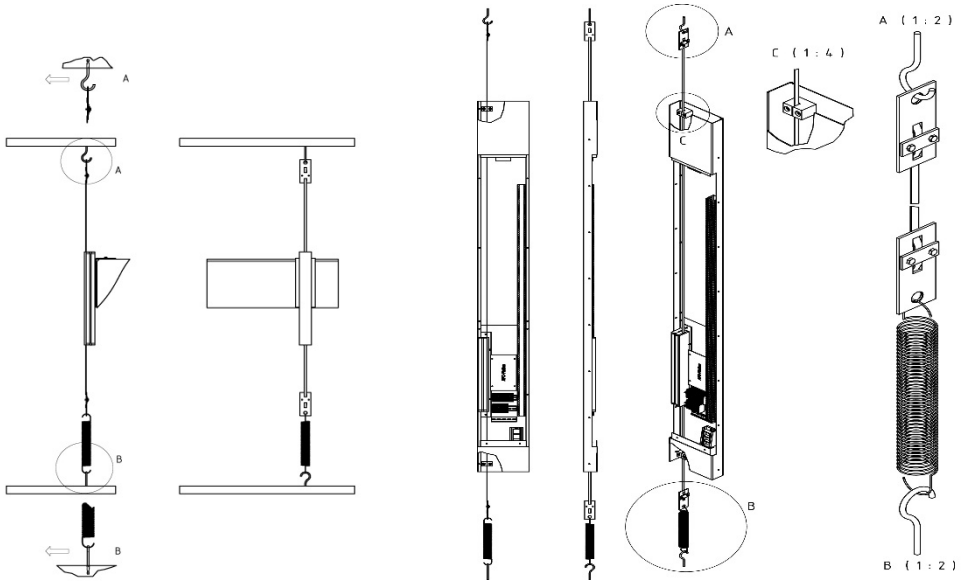


Figure 10: Shaft selection

Please observe that the steel side of the magnetic tape must slightly touch the plastic guide during operation. Now attach the magnetic tape to the tape holder. The direction arrow of the magnetic tape points upwards.

Hold the packaging containing the magnetic tape with the opening facing upwards and travel downwards in inspection mode.

In this way the magnetic tape is pulled out of the box. Cut off the magnetic tape at the corresponding length in the lowest position (fixing in the shaft pit), untwist it and feed it through the reader (magnetic side = reader side). Now fix the hook for the tension spring in the shaft pit. Please observe again that the steel side of the magnetic tape must slightly touch the plastic guide during operation.

Use a plumb to check the magnetic tape installation in order to make sure that the required deflection is provided independently of the lift car position. Attach the magnetic tape to the tape holder and hook in the tension spring. Please observe that the tensile force is approx. 3 - 5 kg (corresponding to an elongation of 5 cm).

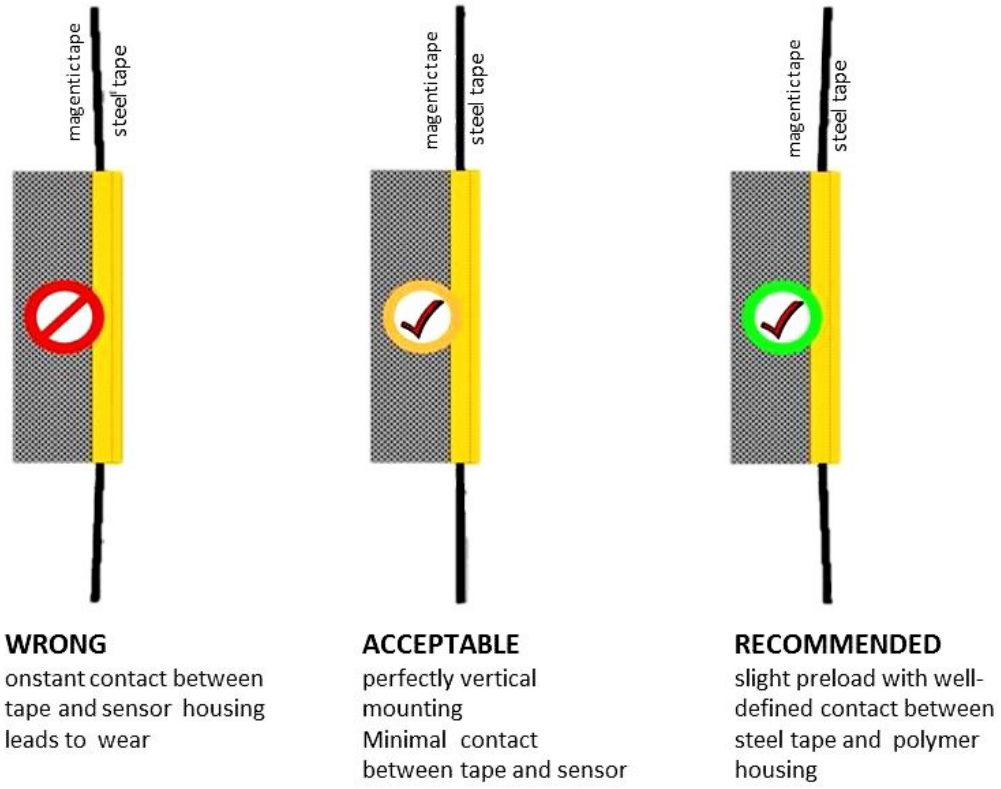


Figure 11: Magnetic tape run

4.3.3 Magnetic switch for zone 2 (only with LiMAX2M):

Mount the magnetic switch in the rail area using the provided fixture. The distance between magnet and switch is supposed to be 8 - 10 mm. Select the polarity of the magnets in such a way that the switch is closed in the zone. The magnets are arranged symmetrically to the zone centre.

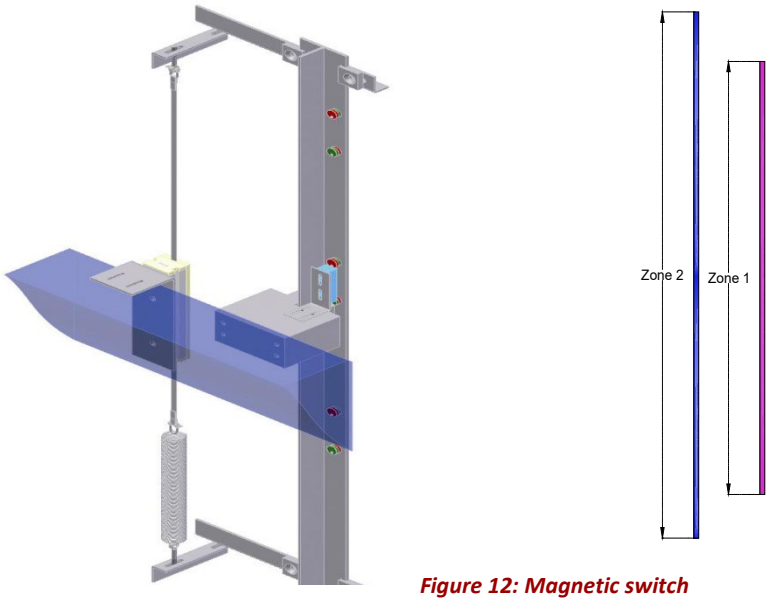


Figure 12: Magnetic switch

Due to the requirements of EN81-20, (UCM = unintended car movement) and the associated certification, the zone length (Z1) must usually be 100 to 140 mm. Due to the signal sequence required for the safety circuit (consisting of relays K5, K6 and K7), the zone length Z2 must at least be 20 mm larger than zone length Z1 (= rail length) defined by parameter. Controllers which have to meet the requirements of EN81-20 are delivered with a zone length Z1 (= rail length) of 100 mm by default. Therefore, zone length Z2 should at least be 120 mm. Recommended magnet distance for EN81 -20:

adjusted rail length (mm)	**100**
magnet distance (mm)	140

(up and down always the half to the zone centre)

Recommended magnet distance if EN81-20 is not required:

adjusted rail length (mm)	**50**	**100**	**200**	**300**	**400**	**500**
magnet distance (mm)	100	200	300	400	500	600

(up and down always the half to the zone centre)

Note: According to EN81, the zone magnets must be glued on. The required glue is included in the delivery.

The zone switch is connected to the APO16 via the terminal block XK3-6 (SU/UP) and -H.
With APO15 the zone switch is connected to the terminal block XK1-4 (SZ) and -H.

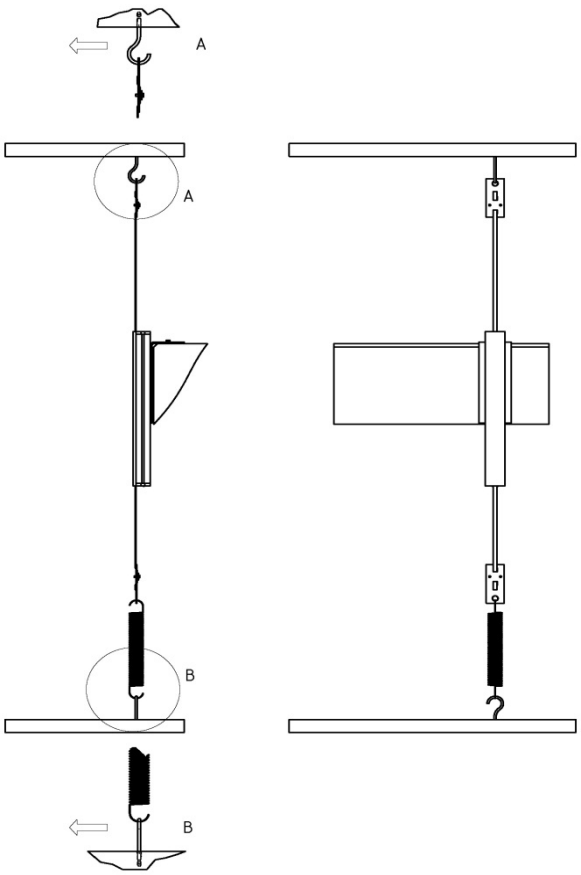
4.4 Shaft selection

In the following, "shaft selection" refers to counting the landings, initiating the deceleration, and stopping (levelling of the system).

You can choose between two different absolute encoder systems:

- LiSA absolute encoder LiMAX2M (standard)
- LiSA safety reader LiMAX33CP (with integrated safety functions)

These systems consist of a magnetic tape in the shaft and a reader fixed to the car. The magnetic tape contains a type of barcode indicating the car position with an accuracy of +/- 1 mm. Systems in which the lift travels with open doors in the zone area require a magnetic switch to generate the second zone signal for the safety circuit. Alternatively you can use a safety reader (LiMAX33CP) which already comprises the functions of the magnetic switches.
The magnetic tape is fed through the reader in order that the maximum distance between reader hall sensors and magnetic tape is 1 mm.



This technology allows for speeds of up to 10 m/s, with minimum noise generation. The magnetic tape is fixed to a holder in the top of the shaft and stretched in the shaft pit using a tension spring with 3-5 kg.
The magnetic tape data are permanently read by a reading unit (reader) and transmitted to the LiSA21 (PB). The signals received are directly processed by LiSA21 and at the same time, various discrete signals are created, e.g. to switch the safety circuit.

You can choose between two readers to be used.
- The standard reader (LiMAX2M) only consists of a reading unit and is connected to the LiSA21 via a serial interface (RS422).
- The safety reader (LiMAX33CP) additionally contains safety functions detailed in EN81-20 and shaft components such as limit switches and zone switches. If you use this variant, the magnetic switches for zone 2, for instance, are also omitted. This reader is connected to the controller via the CAN open bus.

a) Standard reader LiMAX2M

The transfer rate is 19200 bit/s.
Connection to the controller is established by single wires in the travelling cable or, in case of a movable controller, directly to LiSA21.

The reader signals are transmitted to the LiSA21 processors via the RS422 interface. The processors are therefore provided with the absolute car position and, due to the landing distances registered during setup and zero, they can control the car motion.
Signals required for the safety circuit are emulated. These are:

- Bottom inductor switch (SGU) (in case of double reader)
- Centrical inductor switch (SGM)
- Top inductor switch (SGO) (in case of double reader)

LiSA21 furthermore emulates the following discrete signals:

- top slow-down switch (VO)
- bottom slow-down switch (VU)
- pulses (1000 pulses/m)

Two independent zone signals (Z1, Z2) are always required for travelling and/or relevelling with open doors within the zone; they are evaluated by the safety circuit on LiSA21 RB.
Z1 = zone signal 1: SGM
Z2 = zone signal 2: SGO/SGU. This zone must be a few mm longer than zone 1, i.e. zone signal 1 must always be received a few milliseconds after zone signal 2 when approaching.

Zone signal 2 (Z2) is usually generated by an additional switch connected to LiSA21 by means of the travelling cable.

Setting the zero and the landings

Proceed as follows to set the absolute encoder zero and the landing distances:

1. Park the car in a flush position in the lowermost landing
2. Deactivate the installation travel; the following settings are only possible in inspection or normal mode
3. In the “Setup” menu, call up the parameter “Reset AWG zero” and confirm with “yes”.
4. Check and/or enter the values of the landing heights in the “Setup” menu -> Landing heights. If the values are unknown you can travel to the respective landing, the current absolute encoder value is displayed in the status indication at the handheld terminal.
5. Travel between the landings, set the deceleration values in order that the step is virtually zero when approaching.
6. Check the flush position, if required correct the settings.

b) Safety reader LiMAX33CP

The LiMAX33CP is a magnetic tape-based shaft information and safety system which covers the following functions:

- measurement of the car position
- various safety functions detailed in EN81.20
- not safety-relevant functions, e.g. door zone signalling in case of emergency rescue

The basic configuration of LiMAX33CP with all relevant data of the system must be carried out by Schneider Steuerungstechnik. Then the required settings (teach-in) are made on site via the LiSA controller.

Note: The safety functions provided by LiMAX33CP are very comprehensive, and further information is required for the set-up. Therefore please refer to the respective manual appendix for the configuration of the LiMAX33CP in conjunction with a LiSA controller.

5. Regulatory compliance, testing

5.1 Approaching and levelling with open doors

Systems which approach or level with open doors require additional components to jumper the door contacts.

Note: The following description up to section 5.1.2 inclusively only applies to systems equipped with a LiMAX2M absolute encoder. These safety functions are integrated in the LiMAX33CP therefore the safety circuit on the LiSA21 is no longer required.

In case of systems with LiMAXM please check whether the LiSA controller is equipped

- with 3 safety relays K5, K6, K7 (on the LiSA21 RB) and the relay K40,

- an additional magnetic switch, and
- whether the jumper branch for the door contacts (see wiring diagram "safety circuit") is wired accordingly. Connection of terminal OT (on the LiSA21 RB) with terminal 94 (beginning of doors in the safety circuit).

5.1.1 Purpose and function of the safety circuit

Pursuant to EN81-20 5.12.1.4, the gates enabling the car to travel with open shaft doors and car doors in the unlocking zone by overriding the door contacts
must either be safety switches or be designed in such a way that they comply with the requirements for safety circuits under 5.11.2.3.
LiSA controllers are equipped with a safety circuit located on the LiSA21 RB for this purpose.

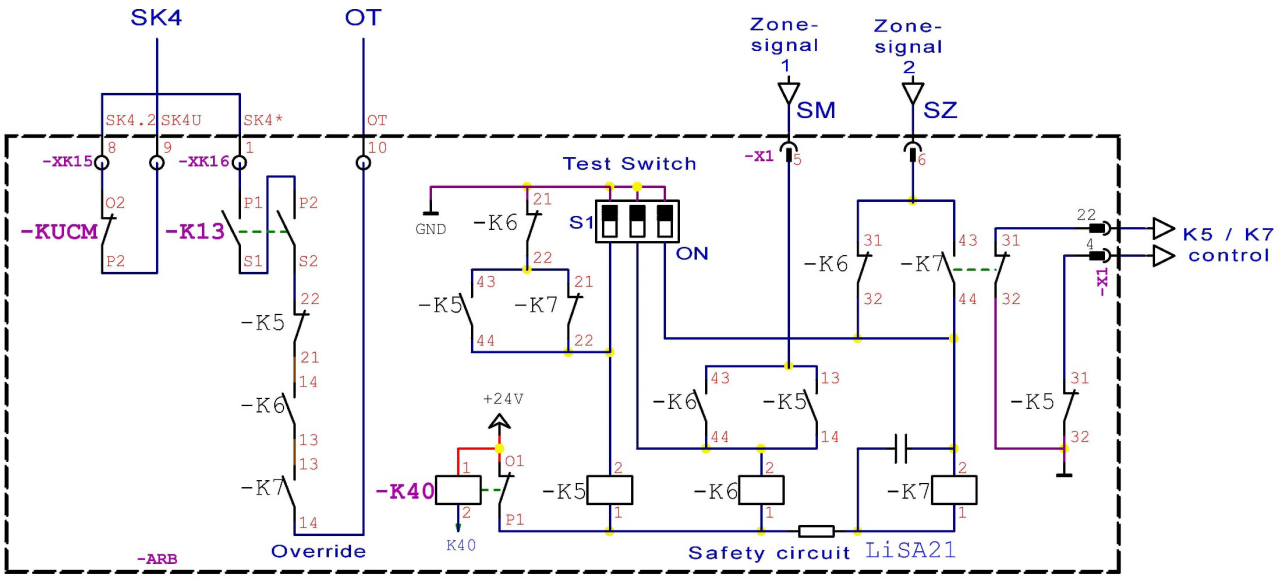


Figure 13: Wiring diagram of safety circuit

In addition, a relay (K40) is used to mute the safety circuit when passing any landings. In this way, the unnecessary operation of the safety circuit and the associated noise generation during the travel is dropped.
Another function of relay K40 is to switch off the safety relays when the inspection control or recall control is activated.

Functional routine:

Switching on the supply voltage:

After applying the supply voltage, K5 pulls in first. This is only possible if K6 and K7 and K40 have de-energised. In this way, all 3 gates in the jumper branch between terminal OT and K5:22 on the LiSA21 are opened.

Note: If the muting of the safety relays is activated, you have to carry out a travel in order to reach the state described above.

Approaching the zone:

Outside the zone and when passing any landings, K40 is energised. Only when reaching the target landing, K40 is de-energised and K5 can be energised, K6 and K6 remain de-energised.
When zone signal 2 (Z2, magnetic switch) arrives, K7 is activated. As K6 is de-energised, K7 pulls in. As soon as zone signal 1 (Z1) is put out by the absolute encoder, K6 also pulls in. As a consequence, K5 is de-energised and the jumper circuit of the door contacts is closed if the La relay (K11) has pulled in.
Compliance with the maximum approaching speed (< 0.8 m/s according to EN81-20 5.12.1.4c) is checked by means of the absolute encoder data. If it does not fall below this value, the doors are not opened.

Leaving the zone:

When zone signal 1 (Z1) is switched off after leaving the zone, K6 is de-energised. K7 remains energised until zone signal 2 (Z2) is also switched off after leaving zone 2, K40 is energised again.

Moving in the zone (levelling)

If the safety circuit works correctly, K6 and K7 are energised after approaching, K5 is de-energised, the jumper circuit is open as the K13 relay (slow) is de-energised.
When a step is detected (> max. step to levelling), the levelling is initiated and K13 is energised. Therefore the jumper circuit closes and the lift can level with open doors.
Compliance with the maximum levelling speed (< 0.3m/s according to EN81-20 5.12.1.4d) is checked by means of the absolute encoder data. If it is exceeded, the levelling is immediately terminated by switching off all contactors.

5.1.2 Checking the safety circuit

In order to check the safety circuit, the LiSA21 RB provides three DIL switches (K5, K6, K7). Flipping one DIL switch (e.g. K6) means that the associated relay cannot be de-energised. The next movement will result in a safety circuit failure and therefore make the system go out of operation. Associated error codes: Error 5, error 6 is displayed on the handheld terminal.

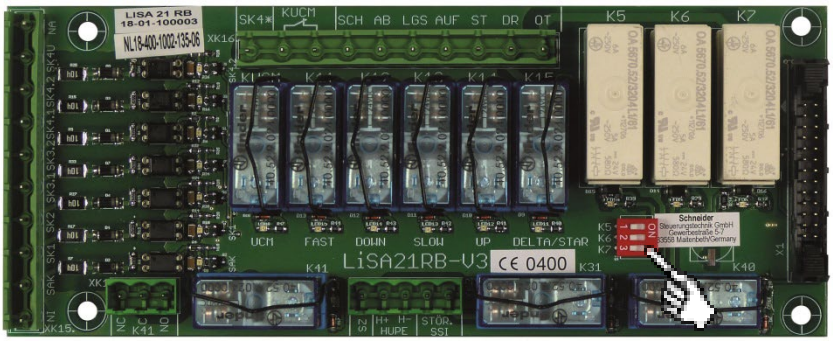


Figure 14: Relay board with DIL switches for checking

Operating the DIL switch S1-[3] energises K5. This generates an error message immediately.

➔ Error 006 Safety relay K5 always energised

Operating the DIL switch S1-[2] keeps K6 closed. You must first make the lift travel. As a consequence, K5 cannot pull in.

➔ Error 005 Safety relay K5 is not active

Operating the DIL switch S1-[1] keeps K7 closed. You must first make the lift travel. As a consequence, K5 cannot pull in.

➔ Error 005 Safety relay K5 not active

Controller behaviour in the event of safety circuit error:

Rope-traction lifts: It remains in the landing approach last in the out-of-operation mode. The door are opened and closed again.

Hydraulic lifts: It is lowered to the bottom landing and remains there in the out-of-operation mode. The door are opened and closed again.

5.1.3 Bypass switch

Since the introduction of EN81-20, a bypass switch is required according to sec. 5.12.8.1 to override the car and shaft door contacts. This switch mainly serves to track errors.
A warning buzzer and a flashing light under the car must be activated whenever the car travels with the bypass switch turned on.
Car door contacts and shaft door contacts must not be overridden at the same time.
The effect of normal operation as well as the movement of automatic doors must be prevented when the bypass is turned on. You can only travel in inspection or recall mode.
During an inspection, pressing a direction button initiates the closing process of automatic doors pursuant to sec. 5.12.1.5.2.1 Inspection Control.

Note: A door closing limit switch (NO) is required in the car door. In order to be able to move during inspection or recall, it must be closed.

Bypass switch:

Position 0: Normal travel

- No contacts overridden, normal travel possible without restrictions

Position 1: Car door overridden

- The car door(s) contact in the safety circuit (SK3) is overridden.
- Only inspection travel and recall are possible.
- When pressing the travel buttons for inspection or recall, the buzzer and the flashing light under the car are activated.

Position 2: Shaft doors overridden

- The interlock contact of the shaft doors in the safety circuit (SK4) is overridden.
- Only inspection travel and recall are possible.
- When pressing the travel buttons for inspection or recall, the buzzer and the flashing light under the car are activated.

Position 3: Hinged door contact overridden (only for hinged doors)

- The contact of the hinged shaft doors in the safety circuit (SK2) is overridden.
- Only inspection travel and recall are possible.
- When pressing the travel buttons for inspection or recall, the buzzer and the flashing light under the car are activated.

Bypass PCB:

For simplification and space saving, the Bypass PCB can be used instead of the bypass switch.
In this case, the selection between normal travel and the contacts to be bridged is realized using a jumper.
Position 1 is provided for normal travel, position 2 to override the car doors and position 3 to override the shaft doors.

The override functions for car and shaft doors are identical with those provided by the bypass switch. However, there is no possibility to override any hinged-door contacts on the Bypass PCB.

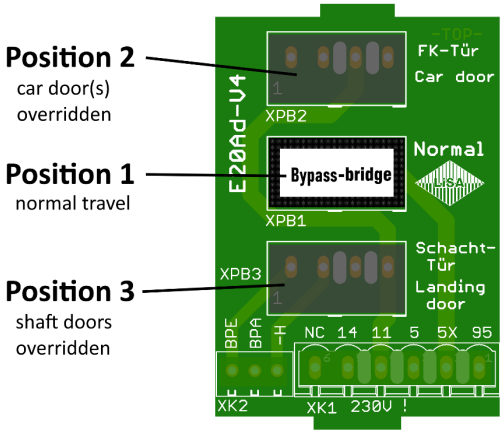


Figure 15: Bypass board

5.2 UCM

The safety device against unintended car movement required according to EN81-20/5.6.7 has been certified for LiSA21 by means of type approval certificate NL 18-400-1002-135-06 Rev.-.
For further information please refer to the LiSA21RB V3 UCM description.
The following explanations and checks only apply to systems equipped with a standard reader (LiMAX2M). If a safety reader with integrated safety functions (LiMAX33CP) is used, the UCM monitoring is realised in this way.

5.2.1 Functional description of the UCM

“The system must be able to detect UCM and to stop and hold the car."
The drive control in LiSA21 controllers depends on the safety circuit end (see figure 16). It means that in case of open doors no main contactors are able to pull in and that unintended car movement can therefore be excluded.

In lifts travelling with open doors (approaching, levelling), the door contacts are jumpered in the zone. Errors in control or drive can lead to uncontrolled movement of the car with open doors. When leaving the zone, all contactors are de-energised as the door override is removed. Uncontrolled car movement is therefore limited to zone length / 2 + response distance + stopping distance and must not exceed the value specified in EN81-20 5.6.7.5.

In LiSA21 controllers the zone length is defined by the "rail length / zone length" parameter and can directly be modified using the controller. When changed, this value is
saved in the flash memory of the processor.

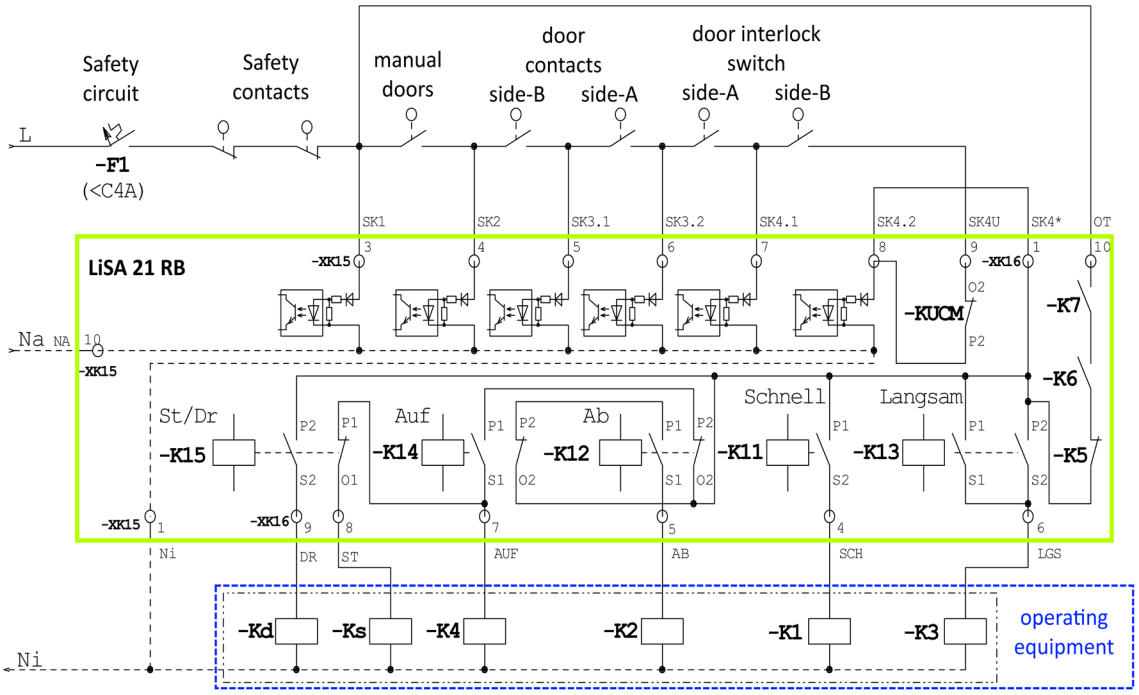


Figure 16: Safety circuit

Operating principle of the UCM control by LiSA21:

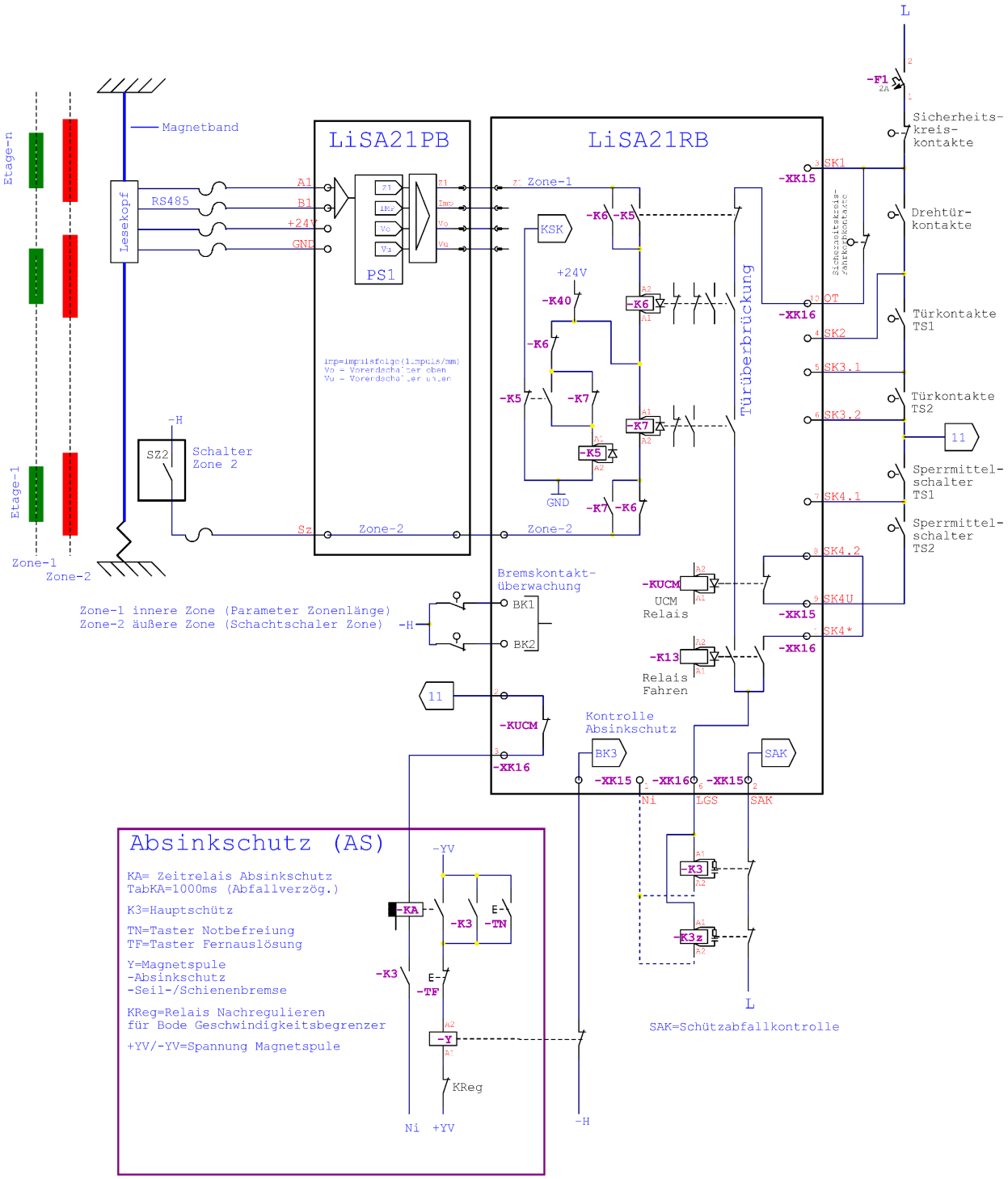


Figure 17: Schematic diagram - UCM control

If the zone 2 (Z2) and zone 1 (Z1) signals are applied simultaneously, the safety circuit on the LiSA21-RB board will override the door contacts. If the car leaves Z1 and the safety circuit is not closed (= doors open), an emergency stop is triggered.
The car is safely stopped

- by the engine brake in gearless drives

- by triggering the speed limiter (GB) or a rope or rail brake in drives with gears
- by closing an approved A3 valve in hydraulic drives.

As the controller simultaneously detects that the safety circuit is open, it detects an unintended car movement and changes to the out-of-order state.
Returning to normal operation is only possible by entering the defined code [700] in the entry mode.

In this way the two cases where
- the car quickly moves away from the zone, and where
- the car "sneaks away" from the zone

are detected by the UCM control.

Another way of controlling is the monitoring of the speed as long as the car moves within zone 1.
If the current speed exceeds the UCM test speed (vUCM conrol), an emergency stop is triggered.

Comment: the speed monitoring is not part of the type approval certificate.

5.2.2 Checking the UCM

In order to check the behaviour of controller and drive in the UCM case there is a test function.
There are three ways to test the behaviour of the system in the UCM case:

1. Test under normal conditions
2. Test under worst case conditions
3. Test of the speed
4. Test of the brake shoe monitoring (valve monitoring)

It eventually depends on the responsible testing agency which test is used, with the test under normal conditions being the most likely.

On 1.) Test under normal conditions
Test criterion: leaving the zone with closed doors.
This test serves to check the behaviour of the entire lift system when the car leaves zone 1 at normal speed and it comes to a UCM case.

Comment: The test is carried out with closed doors, the interruption of the safety circuit at SK4 has the same effect as if the doors were open when leaving the zone.
The test under normal conditions can be used for all lift types.

Test procedure:

- The car is parked with closed door without load in the second last landing
  Note: In case of hydraulic lifts, it can be parked in any landing above the lowest one.
- Activate the parameter “UCM” in the ZÜS test menu.
- Enter a command to the last landing on the controller
  Note: In case of hydraulic lifts enter a travel command to the landing below

Comment: The test call causes the system to start. The opened NO contact of KUCM supplies the travel contactors via the jumper circuit and the NO contact of the K23 relay (travelling) .

Additional measures for the functional test using the fall-arresting device as braking element:
If the fall-arresting device is to act as braking element, you must

- disconnect the supply voltage for the KA relay before starting the travel (this may automatically be done by the KUCM relay) and
- release the brakes immediately before starting the test in order that the braking process is exclusively effected by the fall-arresting device.
- without releasing the bakes if it seems appropriate, e.g. in systems with large payload, to carry out a less radical test. This makes the service brakes already apply before the fall-arresting device can take effect.

Note: In case of electrically applied brakes, they are lifted after turning on the ZÜS test/rescue switch using the brake release button or, in case of mechanic operation, using the brake release lever.

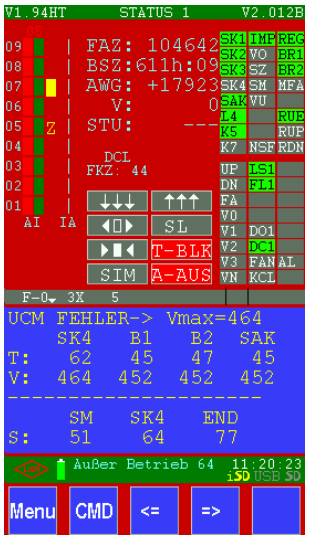
Hydraulic lifts with the down valves as braking elements do not require any additional measures for the UCM case. In stead of the brake or fall-arresting device, the valves are switched off when leaving the zone.

A UCM error is entered into the error log and the handheld terminal displays the following measured values until reset.
These measured values are only for information regarding deceleration times, speeds and distances, however they allow for conclusions about the sensor and actuator quality.
The braking device quality of the actuator itself can only be evaluated from the resulting distance to the flush position.

The events at a glance:
All events refer to the time when detected by the processor.

- SK4: interruption at the end of the safety circuit
- B1: brake 1 input on the processor board (brake 1 applied)
- B2: brake 2 input on the processor board (brake 2 applied)
- SAK: contactor monitoring input on the relays board (all travel and brake contactors de-energised)
- SM: zone 1 left
- END: car stopped after UCM
- T(ms): line indicating the time from leaving zone 1 to detecting the incident
- V(mm/S): speeds at the time of the respective incident
- S(mm): distance travelled after starting

Note: The brake response times (brake 1/2 applied) can only be displayed if the brakes are monitored by LiSA21. If the brakes are monitored by the inverter, only the stopping distance can be evaluated.



SK4 event (SK4 interruption detected):
T = 62ms: time from leaving the zone to detecting that SK4 is off.
V = 464 mm/s: speed when SK4 is off
S= 64 mm: distance travelled when SK4 is off

B1 event (brake 1 applied):
T = 45ms: time between leaving the zone and closing the contact of brake 1
V = 452 mm/s: speed when brake 1 applies.

B2 event (brake 2 applied):
T = 47ms: time between leaving zone 1 and closing the contact of brake 2
V = 452 mm/s: speed when brake 2 applies.

SAK event (contactors de-energised):
T = 45ms: time between leaving zone 1 and closing the contactors

SM event (leaving zone 1):
S = 51mm: distance travelled from the start to leaving zone 1

END event (UCM completed):
S = 77mm: distance travelled from start to standstill of the car

Vmax measured value:
speed maximum during UCM.

Comment: The measured values for the test under normal conditions do of course not represent the worst case scenario. However they allow for a calculatory approximation to it.

On 2.) Test under worst case conditions
Test criterion: leaving the zone with closed doors in the worst case
This test is only possible for rope-traction lifts with inverter, currently only for certain manufacturers. The required inverters have a signal input, the activation of which makes the inverter carry out the next travel under worst case conditions, i.e. at largest possible acceleration.

Additionally a parameter serves to specify the torque in the inverter at which the test is to be carried out.
Torque = 0: The power unit is switched off an all travel signals are put out. The car moves away.

Torque > 0: Depending on the selected direction, all travel signals are put out and the motor is (uncontrolledly) driven with the specified torque.
The test procedure is analogous to the one described under 1.), with the difference that the worst case signal is applied at the UCM inverter input before entering the travel command.

On 3.) Test of the speed:
Test criterion: monitoring the speed in the zone
If the car speed falls below 300 mm/s when approaching the landing, the system will recognise any movement in the zone at a speed larger than that specified by the parameter "vUCM control" (= triggering speed vA) as UCM case.
In this way the criterion to detect the UCM case is essentially tightened.
Test procedure:

- Set parameter "vUCM control" to a value that will certainly be exceeded when starting within the zone, e.g.: 200 mm/s.
- Enter a travel command at the controller.

Note: Calling the test is not necessary.

After the error has occurred, "**UCMv error**" is entered into the error log and the following measured values are displayed:

- **Distance:** distance from the starting point at the time when the UCM case is recognised
- **Speed:** speed in mm/s when the UCM speed was detected
- **Deceleration:** here the times from start to recognition of UCM as well as from application of the brakes and contactor monitoring are listed
- **End:** distance to the landing with which the car stops

On 4.) Test of the brake shoe monitoring:
Test criterion: monitoring of the proper brake function
In gearless drives, the service brakes are used as a device to avoid unintended car movement. In order to check the proper functioning of the individual brake shoes, they are applied at standstill. To avoid that the car moves we recommend to apply the brakes separately.
In case of electrically released brakes you usually find the brake release buttons in the control cabinet or
rescue panel.

Note: In case of mechanically released brakes please observe the manufacturer's operating instructions.

Test procedure:
- The car is empty and within the zone, the doors are closed. Use the "ZÜS test/brake" switch or call up the menu item “UCM” in the ZÜS menu to switch off the landing control and block the doors.
- At standstill both brake shoes are de-energised; provided that the brake monitoring is realised by LiSA21 - not by the inverter - the electronic inputs for the brake shoe monitoring (BR1, BR2, [BR3]) are active (recognisable by the activated I/Os in the handheld terminal).
If you now release one brake shoe by hitting a brake release button (or mechanically), the associated input is switched off (the display goes off) and after 3s the controller detects an error of brake x (x = 1, 2 or 3).
The detected error is entered into the error log and the handheld terminal displays the information until reset.
- Then you carry out this test with the other brake shoes.
- Upon successful test procedure as described above, the functioning of the brake shoe monitoring contacts is clearly demonstrated.

In order to test the monitoring during the travel - i.e. in order to see whether all the brake shoes are applied and whether the controller evaluates this correctly - it is sufficient to carry out a regular travel and to wire a brake monitoring input at terminal Br1, Br2 or Br3 with minus (-H). The controller detects the error and goes out of operation by displaying the message "brake x" (x = 1, 2 or 3).

Alternatively the supply line of a brake shoe can be disconnected in order to prevent it from applying. However, this leads to strong strain on the brake shoes and the brake mechanics. In some circumstances, the inverter prematurely produces a fault.

5.3 Motor runtime monitoring (EN81-20/5.9.2.6/5.9.3.10)

The motor runtime monitoring is realised by the LiSA21 software. The "Travel monitoring time" parameter serves to specify the required time (according to EN81 = 45s).

5.3.1 Functional description of the motor runtime monitoring

The runtime is monitored by checking the car movement after putting out the travel signals. If the next landing has not been reached after the specified time, the travel is aborted and the system switches to the "out-of-order" state.
Resetting is only possible by hand (e.g. recall control, reset).

5.3.2 Checking the runtime monitoring

The ZÜS test menu provides the selection "Test travel monitoring time". If you select it, the next travel is effected with a travel monitoring time of 2s (see also Part B 2.2).

6. Appendix . /.

6.1 Operation and maintenance

When switching on the controller or connecting the display, the start screen appears. Using CMD you can enter commands as listed in 3.8.

Use the MENU button to change to the menu level.
The Status, Log, ZÜS test, Display and Rescue items described in Part B in the parameter description will help you to operate and maintain the system.

6.1.1 Replacement of components according to schedule

Due to mechanic stress and the natural ageing of the components it is recommended to replace any wearing and ageing components after the respective number of switching operations and/or years of operation at the latest.
As the number of switching operations of individual components is related to the number of travels of the lift, we recommend to use the number of travels readable at the LiSA as a deciding factor even if some components switch more often and some less often.

In the following a list of components affected:

Component	Switching operations	Operating time in years	Notes
3V lithium battery		5	Check voltage (= 3VDC) during every maintenance! Type used: CR1225
Backup battery		2	Check voltage (= 2x12VDC) during every maintenance, observe capacity (e.g. 1.2Ah, 2.1Ah) when replacing.
24V safety relay	100,000		Manufacturer DOLD Type: OA5670.52/3204L1/61
Preselection relays, door relays	500,000		
Main contactors, door contactors	500,000		

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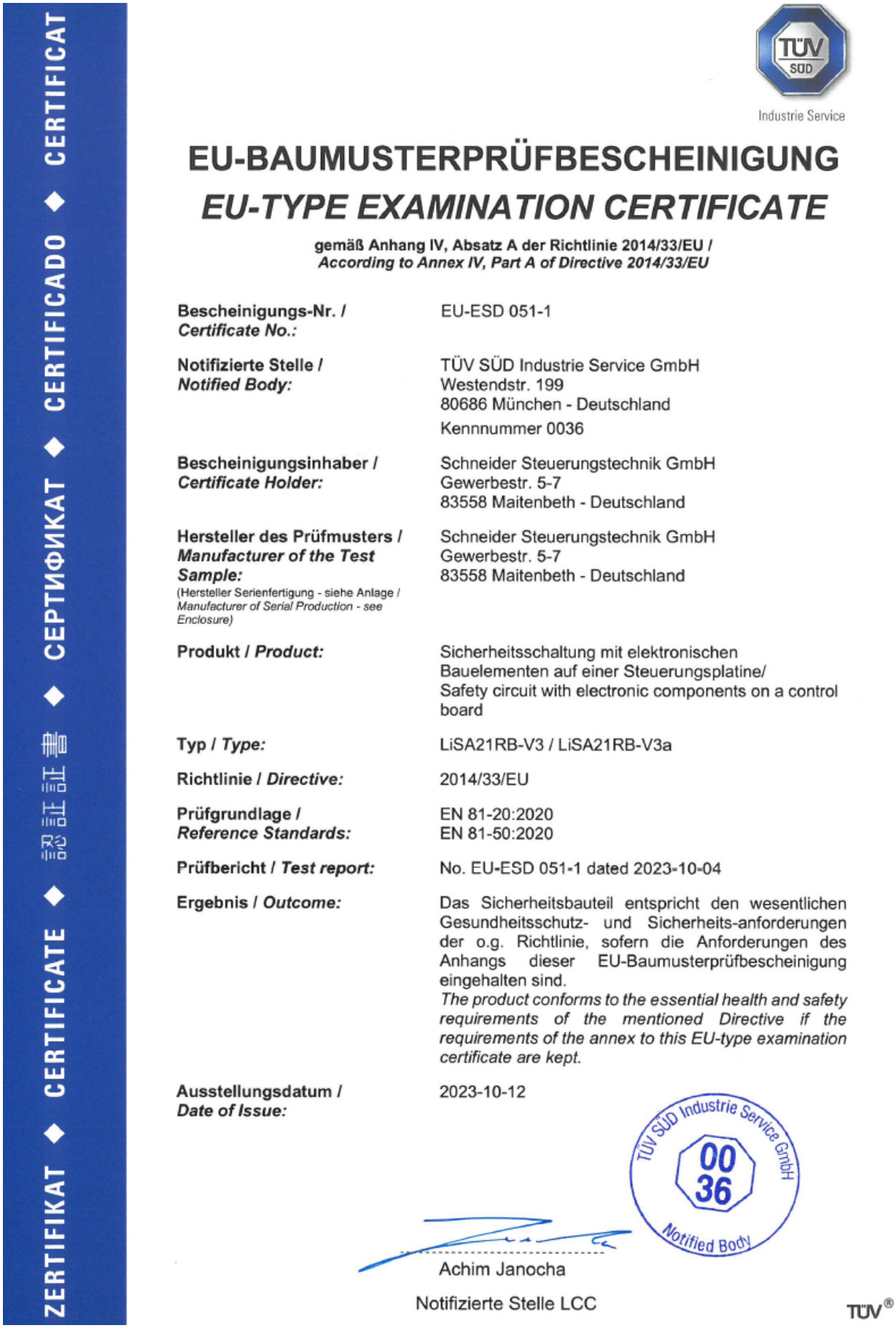
Figure 18: Type examination



ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service

EU-BAUMUSTERPRÜFBESCHEINIGUNG

EU-TYPE EXAMINATION CERTIFICATE

gemäß Anhang IV, Absatz A der Richtlinie 2014/33/EU /
According to Annex IV, Part A of Directive 2014/33/EU

Bescheinigungs-Nr. / ***Certificate No.:***	EU-ESD 051-1
Notifizierte Stelle / ***Notified Body:***	TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 München - Deutschland Kennnummer 0036
Bescheinigungsinhaber / ***Certificate Holder:***	Schneider Steuerungstechnik GmbH Gewerbestr. 5-7 83558 Maitenbeth - Deutschland
Hersteller des Prüfmusters / ***Manufacturer of the Test Sample:*** (Hersteller Serienfertigung - siehe Anlage / *Manufacturer of Serial Production - see Enclosure)*	Schneider Steuerungstechnik GmbH Gewerbestr. 5-7 83558 Maitenbeth - Deutschland
Produkt / ***Product:***	Sicherheitsschaltung mit elektronischen Bauelementen auf einer Steuerungsplatine/ Safety circuit with electronic components on a control board
Typ / ***Type:***	LiSA21RB-V3 / LiSA21RB-V3a
Richtlinie / ***Directive:***	2014/33/EU
Prüfgrundlage / ***Reference Standards:***	EN 81-20:2020 EN 81-50:2020
Prüfbericht / ***Test report:***	No. EU-ESD 051-1 dated 2023-10-04
Ergebnis / ***Outcome:***	Das Sicherheitsbauteil entspricht den wesentlichen Gesundheitsschutz- und Sicherheits-anforderungen der o.g. Richtlinie, sofern die Anforderungen des Anhangs dieser EU-Baumusterprüfbescheinigung eingehalten sind. *The product conforms to the essential health and safety requirements of the mentioned Directive if the requirements of the annex to this EU-type examination certificate are kept.*
Ausstellungsdatum / ***Date of Issue:***	2023-10-12

TÜV SÜD Industrie Service GmbH 00 36 Notified Body

Achim Janocha

Notifizierte Stelle LCC

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