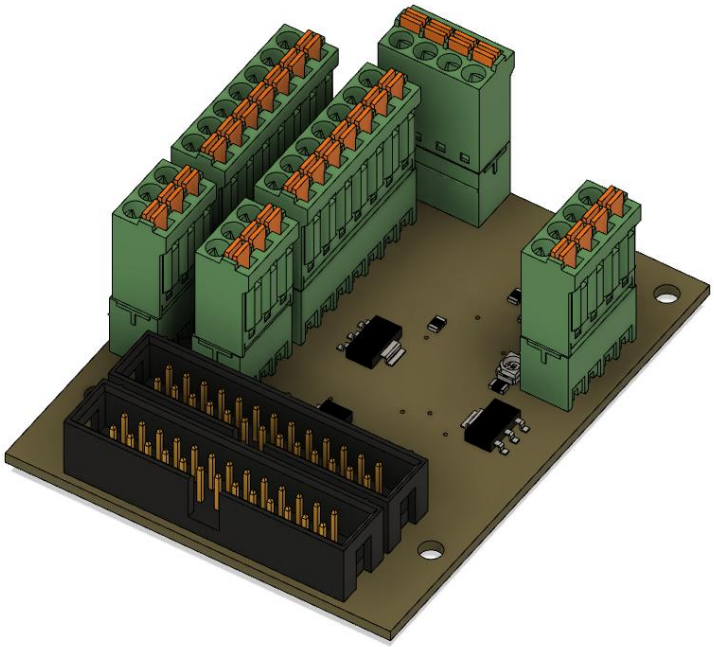
Manual

for the device series

TSG Expansion board
IO card for electronically coupled door drives



Documentation history

No.	Ver.	Status	Editor
1	1.0	15.9.23	AL
2	1.1	24.1.25	AL

Langer & Laumann Ing.-Büro GmbH
Wilmsberger Weg 8
48565 Steinfurt
Germany
Tel.: +49 (2552) 92791 0

www.lul-ing.de
info@lul-ing.de

File: 1.20.92671 TSG V4 Erweiterungsplatine IO-Karte elektronische Kopplung_1.1_en.docx
Print date: 19/09/2025 15:34:00

Table of Contents

1 About this manual

1.1 General

This manual must be read carefully before the TSG door control unit is installed and commissioned. Chapter 2 General safety regulations/page 5 must be observed. Keep the manual within easy reach for future reference.

This manual is intended to facilitate installation and commissioning of the TSG door control unit and its components. This manual contains important information on the safe and correct installation and commissioning of the TSG door control unit.

This manual applies to the TSG door control unit from hardware version V4 and software version V4.60.29.

Observing this manual helps to avoid dangers, repair costs and downtimes, and increases the reliability and service life of the TSG door control unit.

In addition to this manual, the regulations for accident prevention and environmental protection applicable in the country of use and at the place of use must be observed. This manual only describes the door control modules supplied by Langer & Laumann Ing.-Büro GmbH. Refer to the user information provided by the manufacturer or supplier for information relating to the door control components not manufactured and supplied by Langer & Laumann Ing.-Büro GmbH.

For reasons of clarity, this instruction manual does not contain all detailed information relating to all types of the product and cannot take into account every conceivable case of installation, operation or maintenance.
If further information is required or specific problems are encountered, which are not described in detail in this instruction manual, please contact us by telephone:
+49 (2552) 92791 0.

1.2 Explanation of symbols

WARNING:
Indicates a potential imminent danger that can result in serious injuries or death.

CAUTION:
Indicates a potential danger that can result in minor injuries. This sign also warns of potential property damage.

NOTICE:
Indicates actions to be taken and other useful information.

2 General safety regulations

The TSG door control unit is only intended for the automatic operation of horizontally and vertically moved sliding doors or guards. The manufacturer accepts no liability for use other than the defined purpose. The TSG door control unit carries dangerous electrical voltages and controls movable mechanical parts. Failure to observe the instructions in this instruction manual may result in death, serious bodily injury or considerable damage to property.

The TSG control unit is built according to the state of the art and recognised safety regulations and is only intended for normal industrial use. If used for any other purpose, the manufacturer must be consulted in any event, otherwise no liability will be accepted for personal injury or damage to property. Use for any other purpose is considered improper and may result in personal injury to the user or third parties as well as damage to the system.

WARNING:
When operating electrical devices, certain parts of these devices carry dangerous voltages. Failure to observe the operating instructions can result in serious injury or damage to property! The warnings in this manual must be observed in any event. When commissioning the TSG, door movements cannot always be influenced from the outside. During commissioning, an authorised person must stand at the door to keep other persons away from the door. The permissible forces and energies must be checked by the specialist carrying out the work after commissioning the door.

WARNING:
The door drive must be installed so that entanglement hazards (e.g. installation of guards on motor shaft, pulley, toothed belt) are prevented.

WARNING:
When operating a vertically guided door, it must be ensured that no uncontrolled movements can occur in the event of failure of the TSG. This can be prevented by using counterweights for example. A structural safeguard against cable breakage must be provided. After commissioning the door, the installation must be checked by the engineer carrying out the work.

2.1 Delivery

Check that all components have been delivered based on the delivery note and manual. At the same time, visually inspect the delivery for damage. When unpacking, check the following:

- whether there is any visible mechanical damage to the components,
- whether the supplied cables are of the required length.

CAUTION:
Electrostatic discharges, mechanical stress, moisture and dirt can damage or destroy electronic assemblies.

Electronic assemblies must be left in their original packaging until installation.

Any transport damage must be reported to the forwarding agent immediately.
Any missing components must be reported to the supplier immediately.

2.2 Safety and accident prevention regulations

In addition to the instructions in this instruction manual, please also observe the statutory safety and accident prevention regulations. The persons responsible for the safety of the system must ensure the following:

- Only appropriately qualified personnel may work on and with the TSG door control unit.
- All personnel working with the TSG door control unit must be familiar with all warnings and measures provided in this manual for the installation, operation and use of the TSG door control unit.
- Unqualified staff must not be allowed to work on the TSG door control unit.
- Personnel must be familiar with first aid measures and local life-saving equipment.

2.3 Qualified personnel according to VDE 0105

Qualified personnel are those persons who, on the basis of their training, experience, instructions received and knowledge of relevant standards, regulations, accident prevention rules and operating conditions, have been authorised by the person responsible for the safety of the installation to carry out the required activities.

2.4 Exclusion of any warranty in the event of modifications or conversions

The TSG door control unit must always be disconnected from the mains voltage before any intervention in the electrical or mechanical part of the system. Unauthorised modifications or conversions to or in the TSG door control unit, its components or accessories automatically exclude any warranty. These safety instructions do not claim to be complete. The manufacturer accepts no liability for damage or malfunctions that may result from failure to observe this instruction manual.

WARNING:
Unauthorised modifications to the drive system and the installation of non-original spare parts will invalidate the manufacturer's liability for any resulting damage.

2.5 Safety contacts

The relay outputs of the TSG door control unit must not be used as safety contacts in the safety circuit of a higher-level or otherwise installed control!

WARNING:
In the event of an emergency stop or emergency shutdown of a higher-level or otherwise installed control system, it must be ensured that the TSG door control unit does not make any unintended, dangerous or uncontrolled door movements.

2.6 Further important safety instructions

The customer, engineer and/or installer of the TSG door control unit and its components is responsible for its correct and safe use. It must be ensured that all national and local laws and regulations concerning the safety of power-operated doors as well as the relevant national health and safety regulations are observed.
Langer & Laumann Ing.-Büro GmbH is not responsible for accidents and/or consequential damage that may result from the operation or use of the TSG door control unit and its components. Our maximum obligation and warranty are limited to reimbursement of the cost of the product sold.
Langer & Laumann Ing.-Büro GmbH makes no specifications or suitability recommendations for specific safety door concepts. The customer, engineer and/or installer of the TSG door control unit must decide whether the drive is suitable for a particular use. Langer & Laumann Ing.-Büro GmbH also accepts no responsibility for damage or injury resulting from modifications to the drive, including changes to software parameters. Langer & Laumann Ing.-Büro GmbH employees are not authorised to change these conditions without the written consent and legally binding signature of the responsible authorities.

3 Area of application of the TSGsystem

The TSG V4 device with the expansion cards "IR module" and "IO card for electronically coupled door drives" is used to control a vertical car door.
The TSG V4 device with the expansion card "IR module" is used to control a vertical landing door.
The expansion board is integrated in the TSG electronics at the L&L works. Assembly or disassembly for any other purpose is not permitted.

The manufacturer accepts no liability for use for any other purpose than that specified.

4 Technical data

4.1 Overview

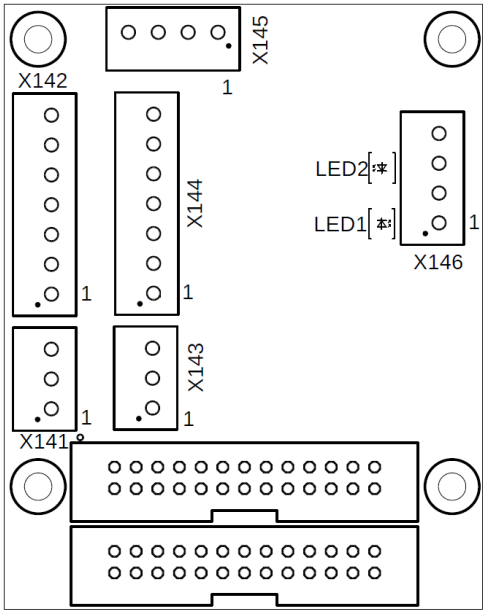


Figure 1: Overview IO card for electronically coupled door drives

X141: Connection TX module light curtain 1
X142: Connection RX module light curtain 1

X143: Connection TX module light curtain 2
X144: Connection RX module light curtain 2

X145: Light curtain signal output

X146: Connection to Kronenberg modules

LED 1: On = Car door unlocked
Off = Car door locked

LED 2: On = Lock landing door
Off = Unlock landing door

4.2 Terminal assignments

Table 1: TSG expansion board X141 – TX module light curtain 1

X141 connection light curtain 1 TX module (3-pin spring-loaded connector)**:**			
1	Supply TX module	24 [Vdc]/0.2A max for X141.1 & X142.1 to-gether	Memco E-10 series: red
2	Reference potential TX module	0 [Vdc]	Memco E-10 series: black
3	Internal communication signal light curtain 1		Memco E-10 series: white

Table 2: TSG expansion board X142 – RX module light curtain 1

X142 connection light curtain 1 RX module (7-pin spring-loaded connector)**:**			
1	Supply RX module	24 [Vdc]/0.2A max for X141.1 & X142.1 to-gether	Memco E-10 series: red
2	Reference potential RX module	0 [Vdc]	Memco E-10 series: black
3	Internal communication signal Light curtain 1		Memco E-10 series: white
4	RX module supply	24 [Vdc]	Memco E-10 series: **green**
5	RX module output signal - Open when light curtain interrupted - Closed when light curtain not interrupted	24 [Vdc]	Memco E-10 series: **blue**
6	RX module diagnostic NC contact		Memco E-10 series: purple
7	RX module diagnostic COM contact		Memco E-10 Series: orange

Table 3: TSG expansion board X143 – TX module light curtain 2

X143 connection light curtain 2 TX module (3-pin spring-loaded connector)**:**			
1	Supply TX module	24 [Vdc]/0.2A max for X143.1 & X144.1 to-gether	Memco E-10 series: red
2	Reference potential TX module	0 [Vdc]	Memco E-10 series: black
3	Internal communication signal light curtain 2		Memco E-10 series: white

Table 4: TSG expansion board X144 – RX module light curtain 2

X144 connection light curtain 2 RX module (7-pin spring-loaded connector)**:**			
1	Supply RX module	24 [Vdc]/0.2A max for X143.1 & X144.1 to-gether	Memco E-10 series: red
2	Reference potential RX module	0 [Vdc]	Memco E-10 series: black
3	Internal communication signal Light curtain 1		Memco E-10 series: white
4	RX module output signal - Open when light curtain interrupted - Closed when light curtain not interrupted	24 [Vdc]	Memco E-10 series: **blue**
5	RX module supply	24 [Vdc]	Memco E-10 series: **green**
6	RX module diagnostic NC contact		Memco E-10 series: purple
7	RX module diagnostic COM contact		Memco E-10 series: orange

Table 5: TSG expansion board X145 – Light curtain signal output

X145 connection (coded 4-pin spring-loaded connector):			
1	Supply functional contacts light curtains	24 [Vdc]	from TSG V4 X1.6
2	Feedback functional contacts light curtains	0 - 24 [Vdc]	to TSG V4 X1.3
3	Supply diagnostic contacts light curtains	24 [Vdc]	from lift control
4	Feedback diagnostic contacts light curtains	0 - 24 [Vdc]	to evaluation input of lift control

Table 6: TSG expansion board X146 – door locks

X146 connection (coded 4-pin spring-loaded connector):			
1	"Lock landing door" signal to Kronenberg WPM module	0 -24 [Vdc]	"+" Kronenberg WPM module
2	Reference potential of "Lock landing door" signal	0 [Vdc]	"-" Kronenberg WPM module
3	Feedback "Car door unlocked" via contact H1 from car door lock	0 - 12 [Vdc]	H1 Kronenberg "DLF1 MO"
4	Supply contact H1 of car door lock	12 [Vdc]	H1 Kronenberg "DLF1 MO"

Table 7: X21 – Connection data

X141-X146 Connection properties:	
Conductor cross-section rigid/flexible (min./max.) (Insulation stripping length: 7[mm])	0.14 / 1.5 [mm²]
Flexible conductor cross-section with end sleeve without plastic sleeve (min./max.)	0.25/1.5 [mm²]
Flexible conductor cross-section with end sleeve with plastic sleeve (min./max.)	0.25/0.5 [mm²]
Conductor cross-section AWG (min./max.)	28/16
2 flexible conductors with the same cross-section with TWIN-AEH with plastic sleeve (min./max.)	0.5/0.5 [mm²]
AWG according to UL/CUL (min./max.)	30/14
Tightening torque (min./max.)	0.22Nm/0.25Nm
Only use copper cables for connection. The cable insulations must be designed for a max. temperature of 60°C for UL-compliant operation.	

5 Configuration and functional description of the system

WARNING:
When operating electrical devices, certain parts of these devices carry dangerous voltages. Failure to observe the operating instructions can result in serious injury or damage to property! The warnings in this manual must be observed in any event. When commissioning the TSG, door movements cannot always be influenced from the outside. During commissioning, an authorised person must stand at the door to keep other persons away from the door. The permissible forces and energies must be checked by the specialist carrying out the work after commissioning the door.

5.1 Configuration

The TSG V4 electronics must be parameterised for the respective function. The TSG V4 electronics are parameterised as master on the car and as slaves on the landing doors.

Table 8: Setting parameter hA

Parameter	Meaning	Value
hA	Optical transceiver unit **Master**-mode (car) Optical transceiver unit **Slave**-mode (landing door)	27 28

NOTICE:
If the parameter hA is set to the same value for both TSG V4 electronics, no communication can be established between them.

If the parameter hA=27 or hA=28 is set, the following parameters are automatically changed in the TSG:

- **c0 = 01** (there must be at least 1cm reduced speed when opening)
- **b4 = 00** (activation of the reversing function if an obstacle is detected in closing direction must be initiated by the higher-level control system)
- **bd = 99** (if an obstacle is detected, the door reverses fully to the open position)
- **h3 = 02** (the connection of a light curtain to terminal X1.3 is expected with the "low active" function:
  - Light curtain not interrupted => 24 V DC on X1.3
  - Light curtain interrupted => 0V DC on X1.3)

  If there are no light curtains installed on the slave devices, input X1.3 must be connected to terminal X1.6.

5.2 Functional description

The following terminals and assemblies are described in Chapter "5.3 Electrical connection".

5.2.1 Open door in normal operation

1. Car travels to the destination floor.

2. The TSG V4 electronics in the car communicate with the TSG V4 electronics on the landing side (IR). The TSG V4 electronics on the landing side take over the parameter settings for forming the operating curve from the TSG V4 electronics in the car.
   Communication can be verified via LEDs on the optical transceiver unit. LED3 (yellow) is on during communication. LED4 (green) flashes. The function of the IR module is described in the manual "1.20.92670 Documentation TSG Contactless Synchronisation_V1.3_en".

3. The car door lock is unlocked by the lift control, whereby the N/O auxiliary contact H1 of the car door lock "DLF1 MO" is closed.

4. The car door lock "DLF1 MO" is unlocked, contacts H1 are closed, contact H1 is interrogated via terminals X146.3 and X146.4 on the "IO card for electronically coupled door drives". When contact H1 is closed, a signal to unlock the landing door is sent via terminal X146.1 on the "IO card for electronically coupled door drives" to the Kronenberg WPM module. The Kronenberg WPM module unlocks the landing door.

5. When the landing door is unlocked, the N/O contact (H1) of the landing door lock (DLF1/7) is closed. The closed contact pair H1 supplies 24 V DC to input X1.1 of the TSG V4 electronics on the landing door side.

6. The car door and landing door are now unlocked and opened by the TSG V4 electronics until the doors are fully open or as long as the "open door" signal is present.

7. The lift control activates the "open door" signal, which is applied to terminal X1.1 on the TSG V4 electronics in the car.

   The doors remain in the open position as long as both TSG V4 electronics are communicating and no close request is present.

5.2.2 Close door in normal operation

1. The "close door" signal is applied to terminal X1.2 of the TSG V4 electronics in the car. The TSG V4 electronics in the car sends the signal to the TSG V4 electronics in the landing door.

2. The doors start to close simultaneously. If at least one light curtain is interrupted while the doors are closing, the doors open fully. If the "close door" signal is still present and all light curtains are free again, the doors close again.

3. When both doors have closed and operation of the car is requested, the car door is locked via the car door lock "DLF1 MO".

4. The car door lock "DLF1 MO" is operated directly by the lift control system. The N/O auxiliary contact H1 of the car door lock "DLF1 MO" is opened, see Chapter 5.3 Electrical connection.

5. Contact H1 is interrogated via terminals X146.3 and X146.4 on the "IO card for electronically coupled door drives"; the open contact H1 is detected via terminal X146.3. The signal applied to terminal X146.1 subsequently drops to 0V, whereupon the Kronenberg WPM module ceases to function and the landing door is locked.

6. If no operation of the car door is requested, the car can stop at a floor with the doors closed but not locked, according to EN81-20.

5.2.3 Inspection, access to car from floor

1. Car is not level.
2. Manual unlocking of the landing door from the outside via the emergency release.
3. The landing door opens automatically for several seconds and stops.
4. The landing door can subsequently be pushed open manually.
5. After about 20 seconds, the landing door closes automatically.
6. Closing can be interrupted by blocking the door or interrupting the light curtain; the landing door does not reverse.
7. Manual unlocking of the lift door from the outside via the emergency release.
8. The car door can subsequently be pushed open manually.
9. When the close door signal is applied, the car door starts to close.
10. Closing can be interrupted by blocking the door or interrupting the light curtain; the car door does not reverse.

5.2.4 Inspection, opening landing door from the landing

1. Car is not level.
2. Manual unlocking of the landing door from the landing by operating the unlocking mechanism on the Kronenberg "DLF1 MO" on the landing door.
3. The landing door opens automatically for several seconds and stops.
4. The landing door can subsequently be pushed open manually.
5. After about 20 seconds, the landing door closes automatically.
6. Closing can be interrupted by blocking the door; the landing door does not reverse.

5.3 Electrical connection

5.3.1 Use with 3x light curtains per door opening

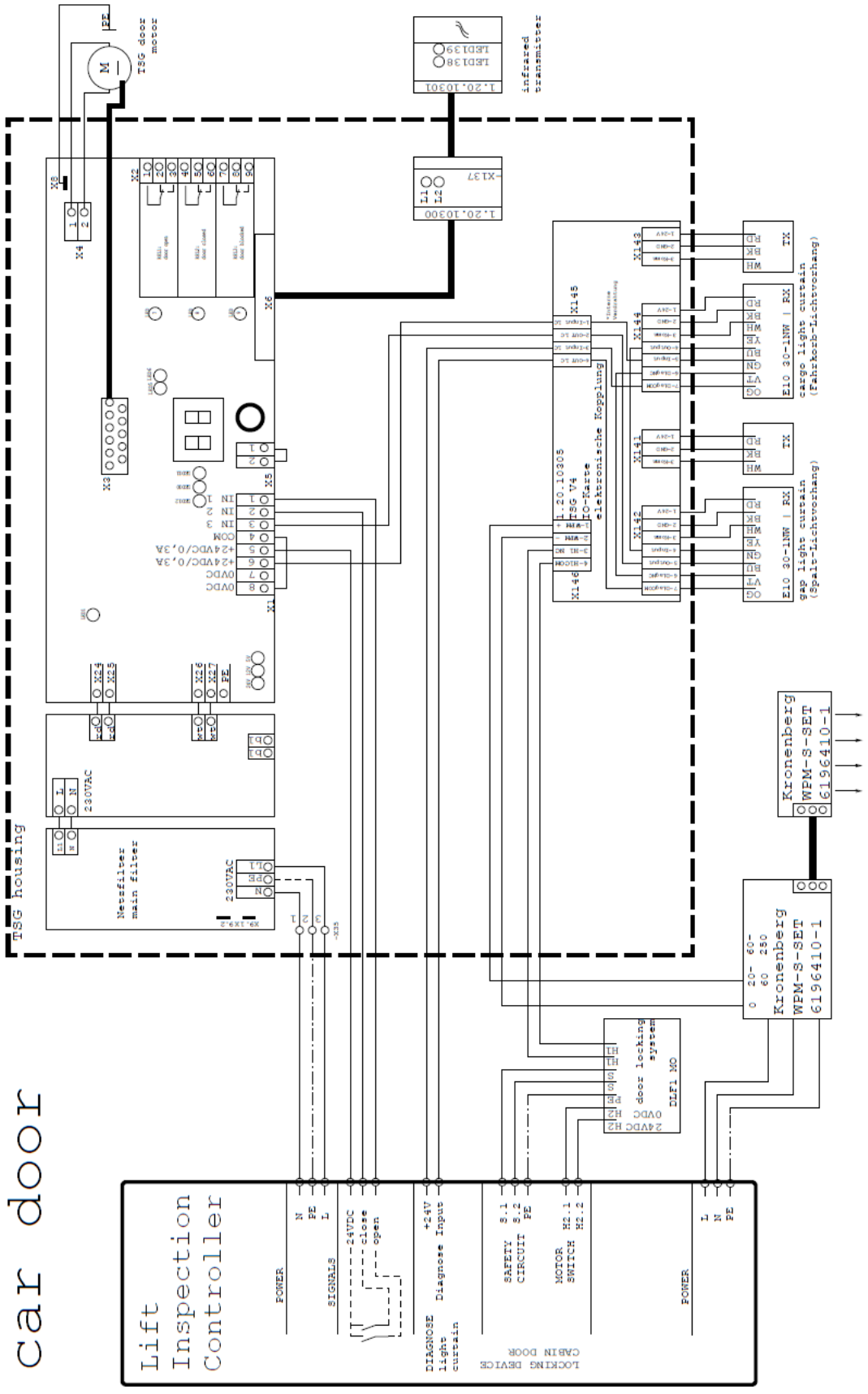


Figure 2: TSG V4 as car door, monitoring of 2x light curtains

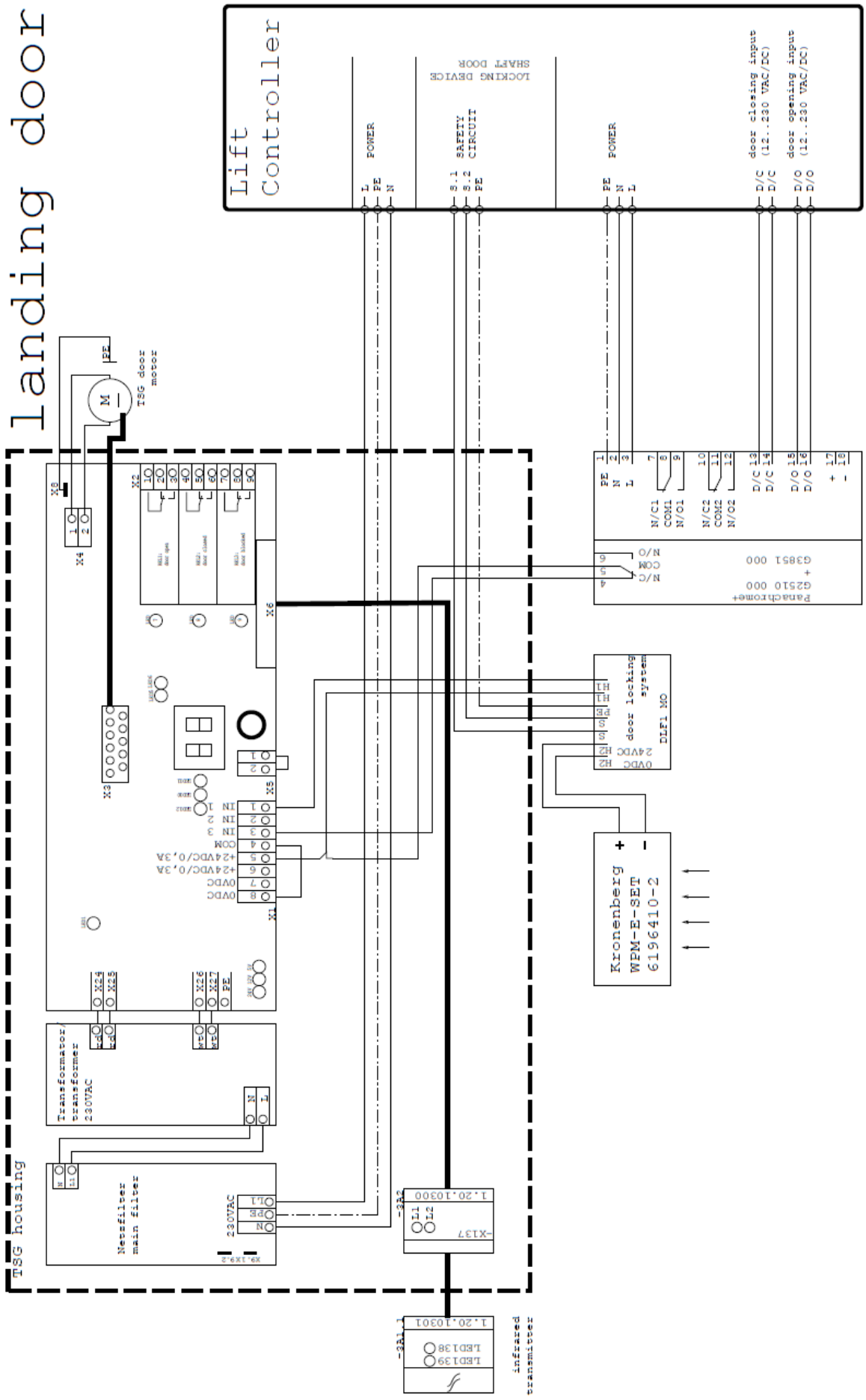


Figure 3: TSG V4 as landing door, monitoring of 1x light curtain

5.3.2 Use with 1x light curtain per door opening

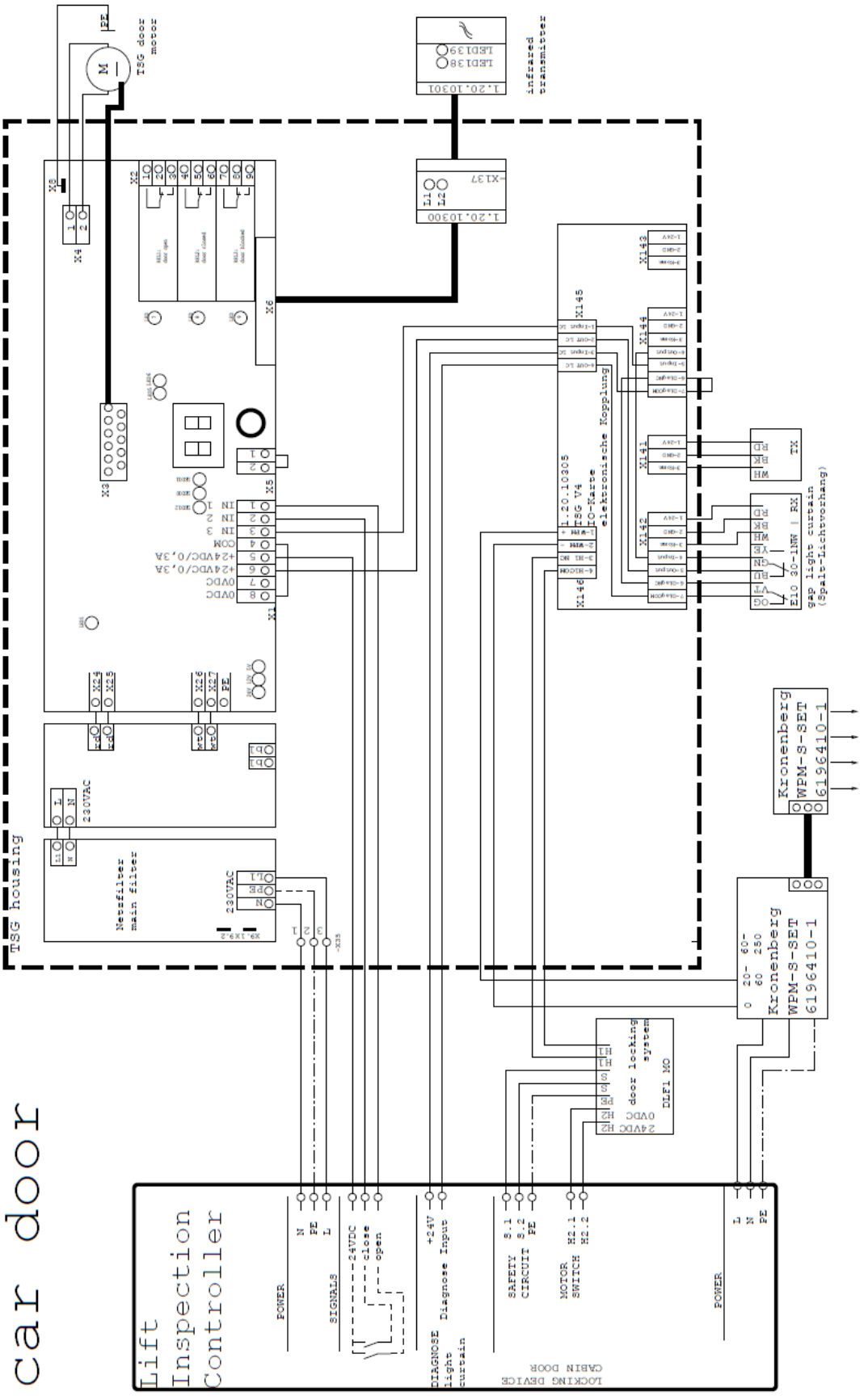


Figure 4: TSG V4 as car door, monitoring of 1x light curtain

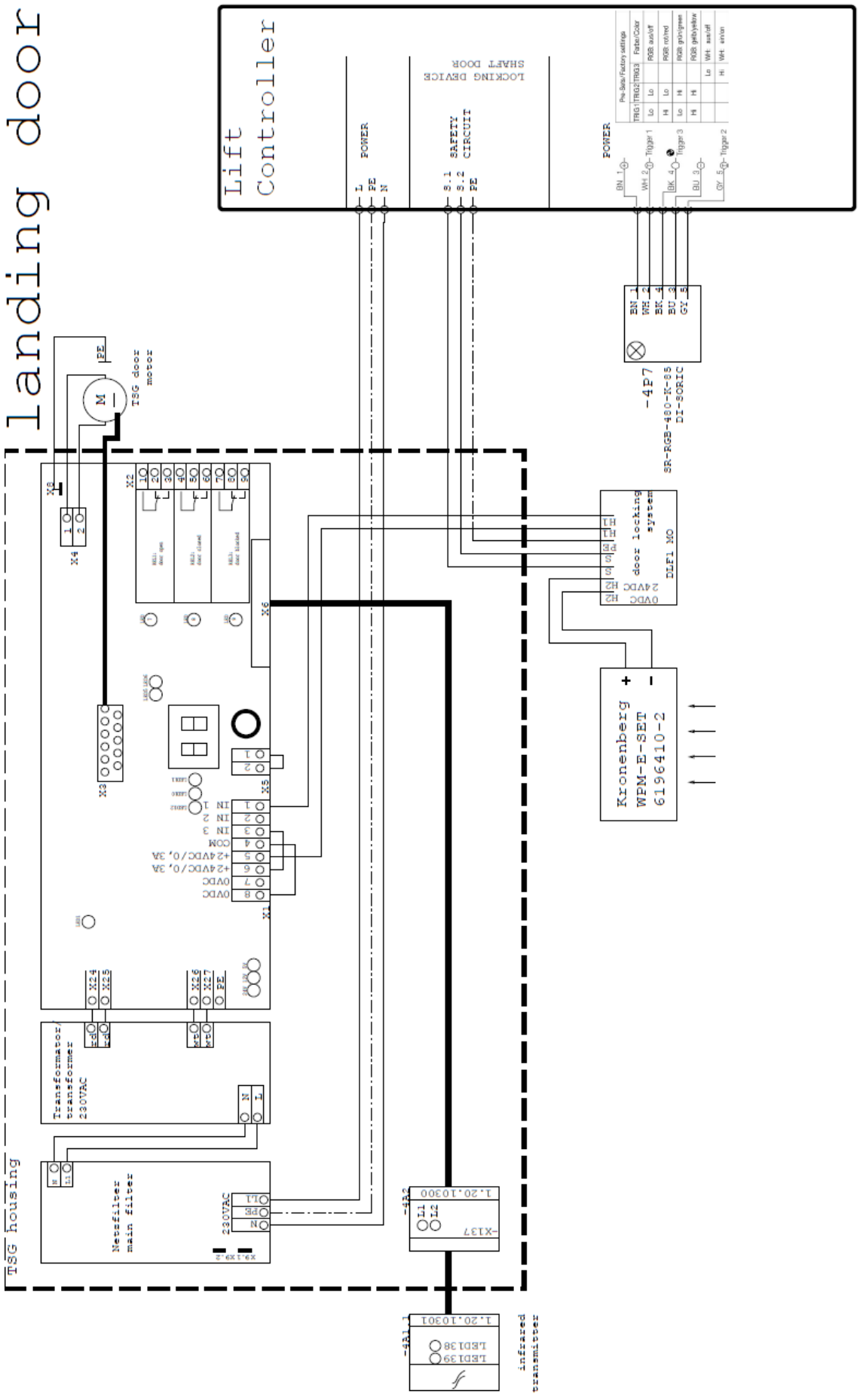


Figure 5: TSG V4 as landing door without connected light curtain

6 Maintenance and repair

Maintenance of L&L door drives is limited to a minimum due to their structural design. Components that are subject to operational wear and tear must be included in regular maintenance and repair measures.

WARNING:
During maintenance work, it is essential to ensure that the drive cannot be switched on and that no exposed parts can inadvertently be subject to electrical power. After completing these measures, the existing protective and safety devices must be reinstalled on the drive.

7 Disposal

The pertinent disposal regulations must be observed:

- Oil according to the Waste Oil Ordinance (e.g. no mixing of solvents, cold cleaners or paint residues)
- Separation of components for recycling according to:
    - Scrap iron
    - Electronic waste
    - Aluminium
    - Non-ferrous metal (worm gears, motor windings)

8 Contact

Langer & Laumann Ing.-Büro GmbH
Wilmsberger Weg 8
48565 Steinfurt
Germany
Tel.: +49 (2552) 92791 0

www.lul-ing.de
info@lul-ing.de