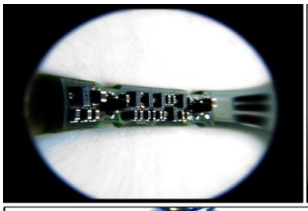
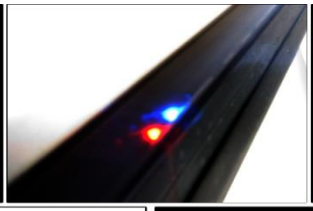
FEIG ELECTRONIC

SENSORS
Intelligent Door Management

Assembly instructions

Installation, commissioning, utilization and maintenance

TST LGB

Length Variants
-A / -B / -C / -D / -E

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Den Hinweisen auf Seite 2 dieses Handbuchs ist Folge zu leisten.

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Follow the instructions on page 2 of this manual.

FR ATTENTION! IMPORTANTES INDICATIONS DE SÉCURITÉ!
Les instructions de la page 2 de cette notice de montage doivent être observées strictement.

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Prestare attenzione alle note alla pagina 2 delle presenti istruzioni di montaggio.

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Volg de instructies op pagina 2 van deze handleiding op.

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ATTENTION

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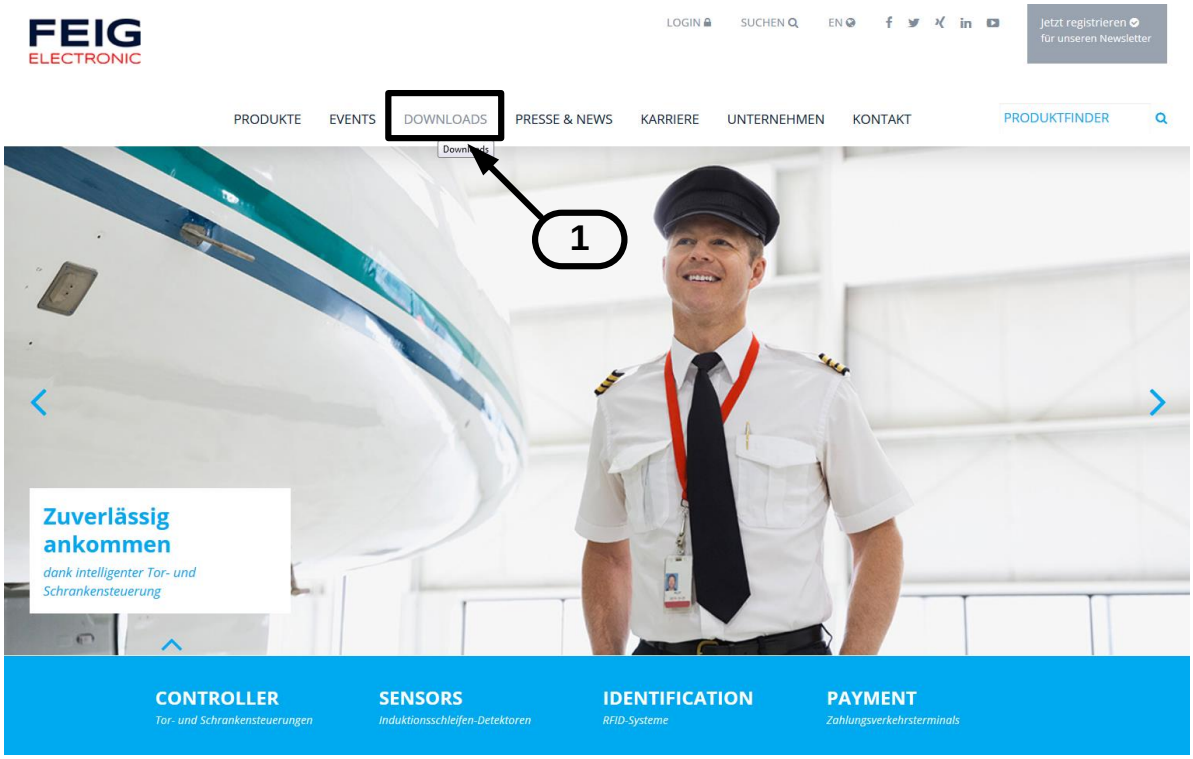
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Notes

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This edition renders all previous editions invalid.
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These assembly instructions are aimed specifically at the commissioning engineers of the door-line light curtain **TST LGB** of FEIG ELECTRONIC GmbH. The installation, start-up and maintenance of the safety device may only be completed by qualified persons in accordance with safe working procedures and as per the instructions of the distributor of the machine (here: the door).

The distributor of the machine is solely responsible for the completeness of the operating instructions for the machine (in this case the door). The installation instructions for the gate-line light curtain shall be supplied in one of the languages of the European Community that is accepted by the manufacturer of the machine where the sensor must be installed.

The assembly instruction shows only a small part of the applicable functions does not contain any warranty of any characteristics. Advanced functions and descriptions of individual door functions are available from the extended descriptions.

To the best of our knowledge, we believe that the accumulation of the information compiled in this document is valid. FEIG ELECTRONIC GmbH does not warrant the accuracy or completeness of the information in this document. FEIG ELECTRONIC GmbH will not be held liable for consequential damages arising as the result of incorrect or incomplete information.

Since it is impossible to avoid mistakes despite our sincerest efforts, we are always grateful if these are pointed out.

The installation recommendations provided in this document are based on favourable conditions. FEIG ELECTRONIC GmbH assumes no responsibility for the proper operation when the unit is utilized under non-intended conditions.

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General information about this document

Language of the original instructions

German

Validity and product designations

These assembly instructions describe the following product variants and are only valid for these:

TST LGB in the length variants -A / -B / -C / -D / -E

The following characters are used in the functional description to point out the different danger zones and useful hints.

⚠ATTENTION

Indicates that a potential risk to persons exists, if the procedure is not carried out as described.

⚠ WARNING

Indicates a risk to safety device.

Indicates information that is important for the operation of the safety equipment or the door.

Indicates useful information that is relevant but not essential for the use of the TST LGB.

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1 General description and intended use

The door-line light curtain TST LGB described below, is a protection device for power operated doors and gates in the EN 12978 purposes, or a non-contact safety device (BWS Typ 2) in accordance with EN 61496-2.

⚠ATTENTION

When utilized in accordance with the assembly instructions, the TST LGB may be used as exclusive safety device (protection level E) as indicated by EN 12453 on doors and gates with automatic operation and operation by not-instructed persons.

These assembly instructions describe the sole use of the TST LGB as exclusive protection device (protection level E) on the door in the system with a door controllers of FEIG ELECTRONIC GmbH.

When applied in accordance with the intended use, the TST LGB monitors the range below the door`s edge of motor-operated, industrial or commercial doors and thus protects persons and objects against the door starting.

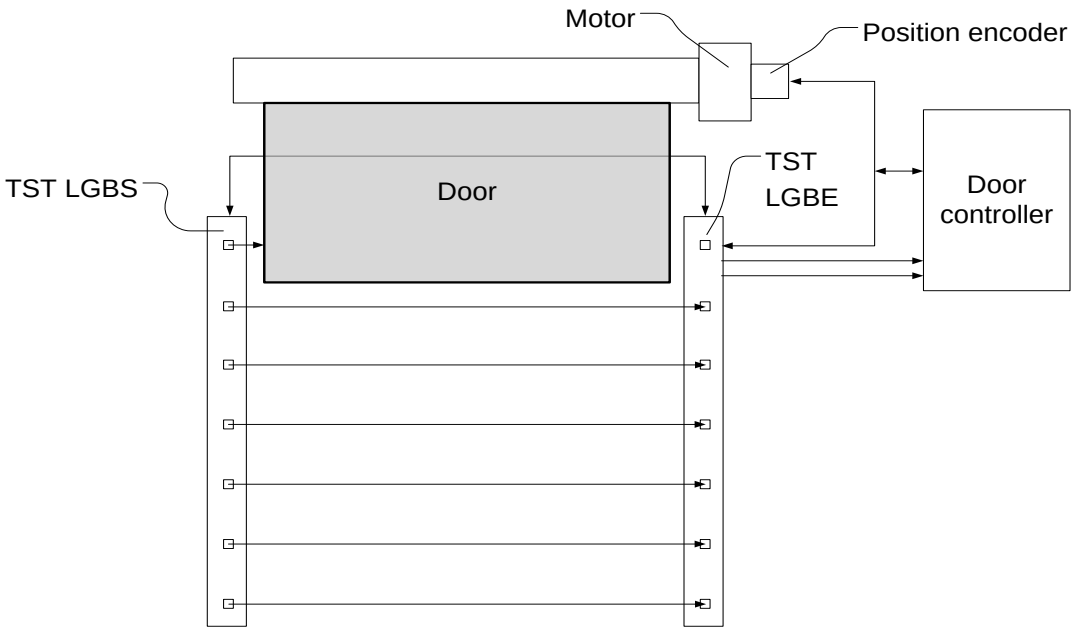


Figure 1: Light curtain in door system

The TST LGB transmission and receiving unit form a light curtain lattice system, as the TST LGB sends IR impulses, which are received and assessed by the TST LGB receiver.

TST LGB transmitter and receiver are installed in opposite sides of the door frame.
An interface also connects the TST LGB receiver to the door controller and a position detector.
The interface of the door controller configures the parameters, diagnoses and tests the TST LGB.
On basis of position data returned by a position detector mounted onto the door's shaft, the TST LGB can determine the position of the door`s edge.
With the aid of this information, the door movement is extremely safe, precise and protected from being manipulated.

2 Safety information

⚠ATTENTION

Failure to follow the safety instructions can lead to health risks, or even damage to the door system.

Observe the following important safety information as well as the installation and connection information when the controller is being commissioned and/or operated.

In accordance with the EC Machinery Directive, only qualified personnel will be permitted to install or attach the drive unit onto doors or drive units intended for doors. In this respect, the safety requirements of the entire door (machine) must match the options to meet these safety requirements of the controller.

Inappropriate integration of the safety device into the door system – e.g. due to incorrect parameters or installation – pose substantial risks that the door will be operated without sufficient safety precautions.

Commissioning of this safety equipment is prohibited until it was properly attached to a door that conforms to the EC Machinery Directive and for which an EC declaration of conformity in accordance with Annex II of the Directive was obtained.

The following information describes standard applications that may not necessarily match the actual application. The actual application is provided by the manufacturer of the door as part of the overall documentation or as part of the **operating instructions** of the door.

Any assembly, installation, commissioning and maintenance work must be carried out by qualified personnel. In particular, the following rules must be observed: VDE 0100, EN 50110, EN 60204, EN 60335 incl. part 103, fire prevention regulations, safety regulations and the relevant regulations that apply to industrial doors (EN12453, EN12978) as well as machine safety (EN ISO 13849, EN 62061)

This device is not intended for use by persons (including children) with limited physical, sensory or mental abilities or with a lack of experience and / or knowledge, unless they are supervised by a person responsible for their safety or if they have received instructions regarding the use of the device. Children should be supervised to ensure that they do not play with the device. Keep remote controls away from such persons.

The safety information in this document makes no claim to completeness. Please contact to your supplier if you have any questions about the product.

The manufacturer has carefully checked this document for accuracy; however, no guarantee is offered with regard to completeness and accuracy.

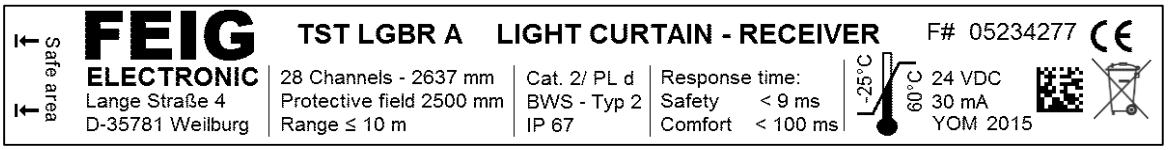


Figure 2: Name plate

At the end of the products life cycle, disposal is subject to statutory provisions.

3 Length variants

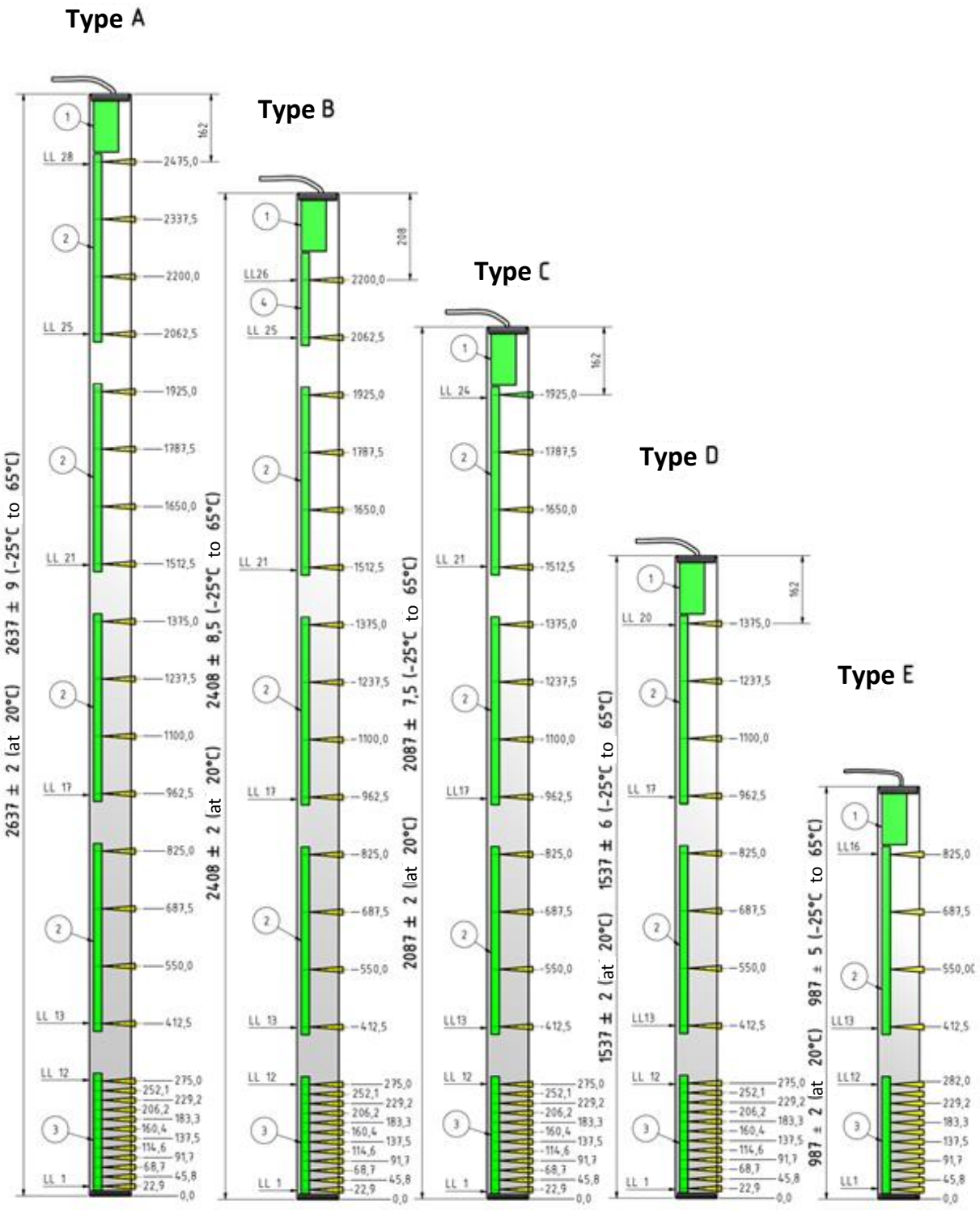


Figure 3: Length variants

⚠ATTENTION

The TST LGB variants must be selected in such a way that up to 2.50 m of the headroom of the door is supervised.

4 Installation

The following accessories are provided for mounting the light curtain:

Table 1: **Available mounting accessories**

Mounting kit TST KASK-LGB-A-A (consisting of the following articles)
Light curtain bracket set (8 pieces) LGxASK
Wiring board TST RLGxA-A
Connection cable for transmitter TST KKAB-M12A4-15
Connecting cable for receiver TST KKAB-M12A8-5

4.1 Dimensions of the light curtain

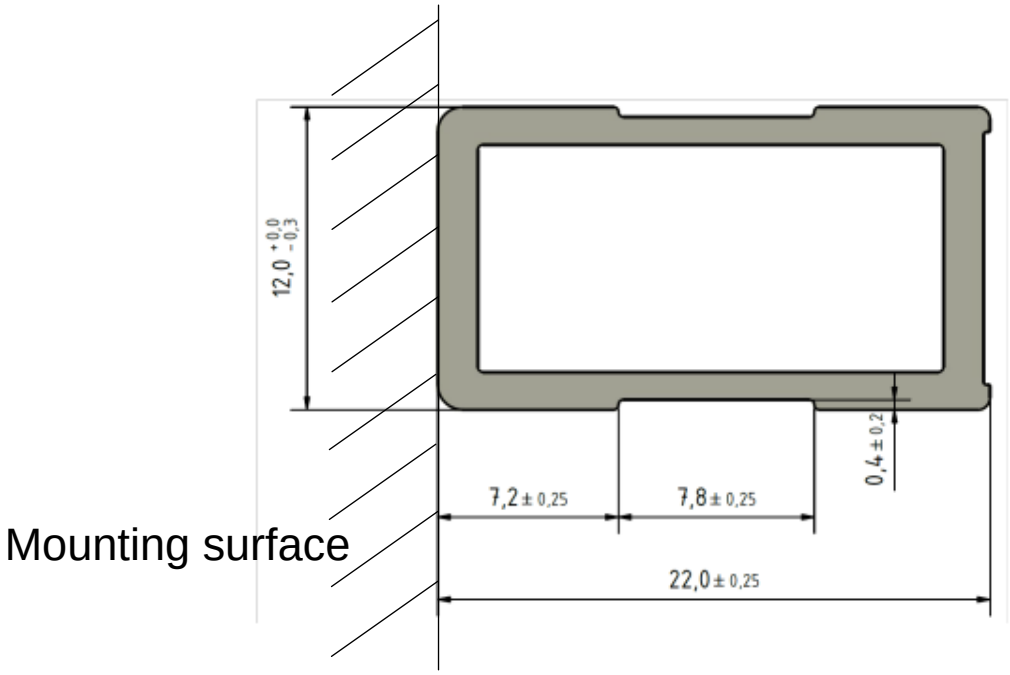


Figure 4: Outside dimensions

4.2 Safety instructions for installation

⚠ATTENTION

To utilize the unit as exclusive safety device for the door (protection level E) the TST LGB must be installed at the center of the door frame.
The lower end of the TST LGB must be installed at floor level.

⚠ **To operate correctly, transmitter and receivers must lie opposite each other without misalignment and they shall not be rotated horizontally or vertically or be twisted in themselves.**

⚠ **For the assembly the profiles can be clamped. Avoid deformations by clamping. Clamping locations are necessary at least at the ends and spaced every 900 mm.**

⚠ **The light outlet plane is recognized by the protective foil and/or by slightly protruding edges. The connecting cable must be located at the top.**

⚠ **The receiver side is to be installed on the side that is oriented away and protected from the sun and/or against direct exposure to sun light.**

⚠ **It must be avoided that ambient light incident on the receiver.**
Such as. an opposite-mounted transmitter of an additional light curtain.

⚠ **The door`s closing edge at the transition between two neighbouring light beams must cover both. Accordingly, the mask at the door panel must be 170 mm above the door`s edge and at least 12 mm wide.**

⚠ **After installation, remove the protective plastic foil from the transmitters and receivers.**

4.3 Mounting the light curtain

⚠ Requirements for assembly

- The brackets are intended for use in sectional doors
- Align the light curtain exactly along the side of the door panel
- Align the brackets as linear as possible
- Do not twist, bend or twist the light curtain
- Use the supplied mounting accessories (see Table 1: **Available mounting accessories**)
- Alternative screws: thread diameter 4 mm and flat head
- Not permissible screws: countersunk screws

1. Drill holes in the door frame at the intended distances (see Table 2: **Bracket positions in relation to floor level**).

Table 2: **Bracket positions in relation to floor level**

Type	Total length [mm]	L1 [mm]	L2 [mm]	L3 [mm]	L4 [mm]
LGB-A	2637	103	900	1700	2500
LGB-B	2405.5	103	800	1550	2250
LGB-C	2084	103	700	1350	1950
LGB-D	1537	103	750	1400	---
LGB-E	984	103	850	---	---

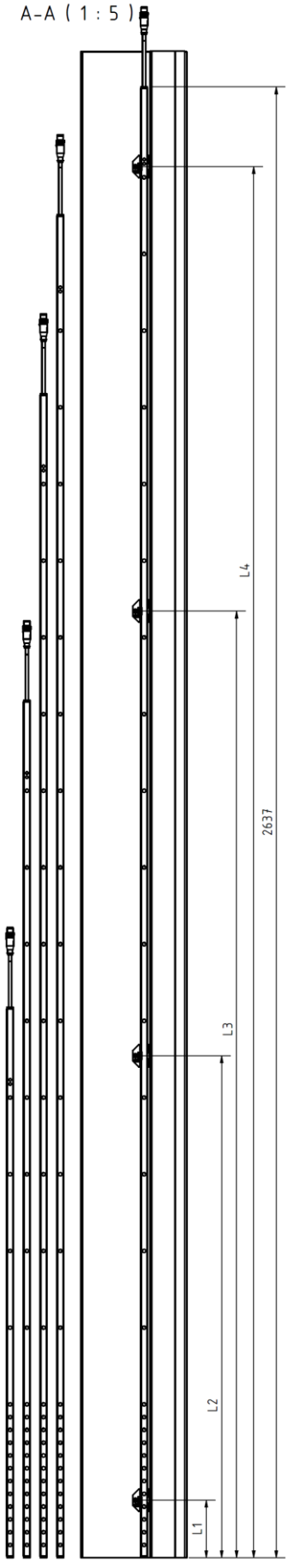


Figure 5: Bracket positions for light curtains

2. Most light curtains can be mounted directly along the door rail.

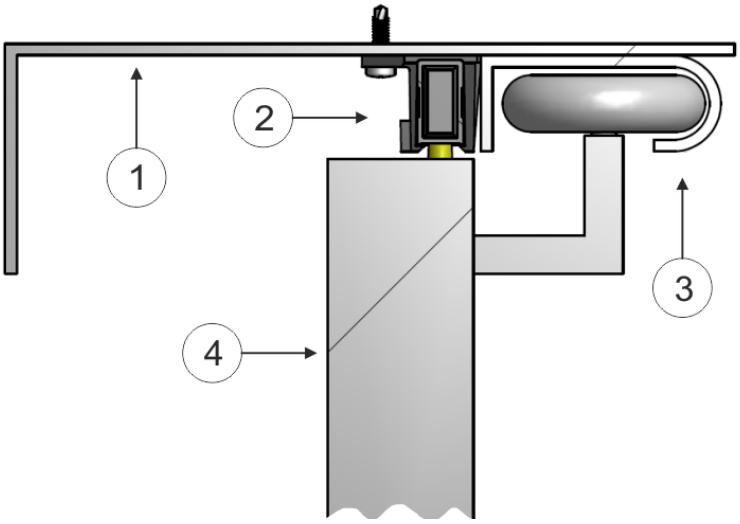


Figure 6: Door frame top view

Table 3: Door frame top view

Position	Designation
1	Door frame
2	Light curtain with bracket
3	Door rail
4	Door panel

3. Mount the brackets to the door frame using the screws provided.

4. Press the light curtain into the brackets.

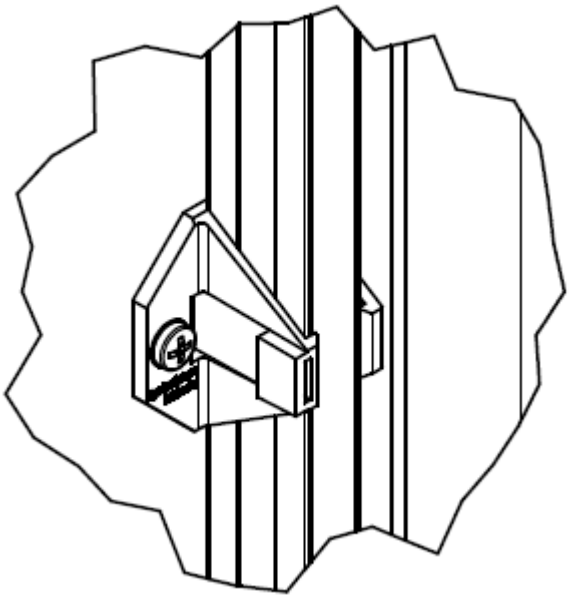


Figure 7: Mounting the light curtain

5 Electrical connection

⚠ WARNING

- **Wiring shall only take place when the power has been removed.**
- **To maintain EMC guidelines, the length of the power cables may not exceed 30 m.**

Table 4: **Recommended connectors**

Receiver	Plug connector	M12, 8 pole coupling
	Number of conductors Conductor cross section	8 0.25 mm²
Transmitter	Plug connector	M12, 4 pole coupling
	Number of conductors Conductor cross section	4 0.25 mm²

5.1 Wire assignment of the light curtain

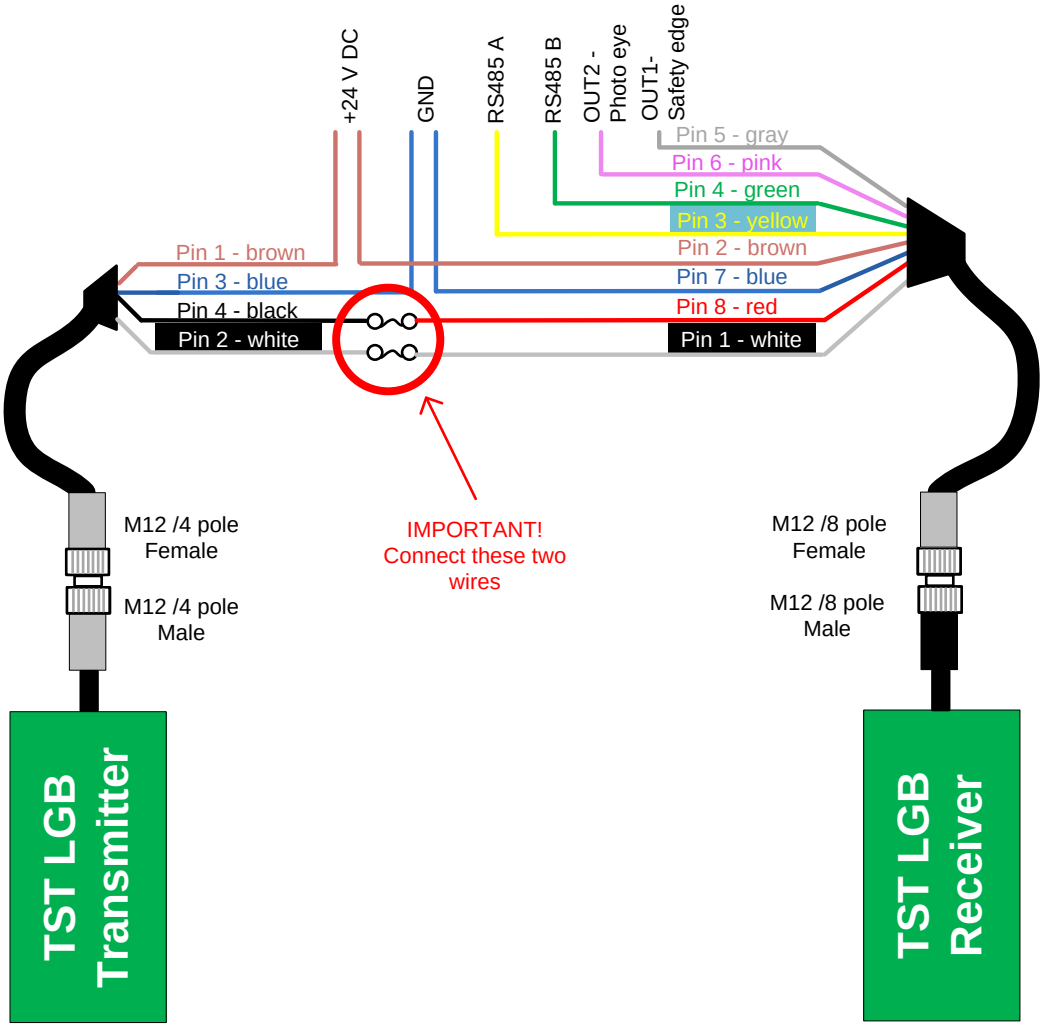


Figure 8: Wire assignment for the light curtain

5.2 Wiring diagrams for the wiring board RLGxA

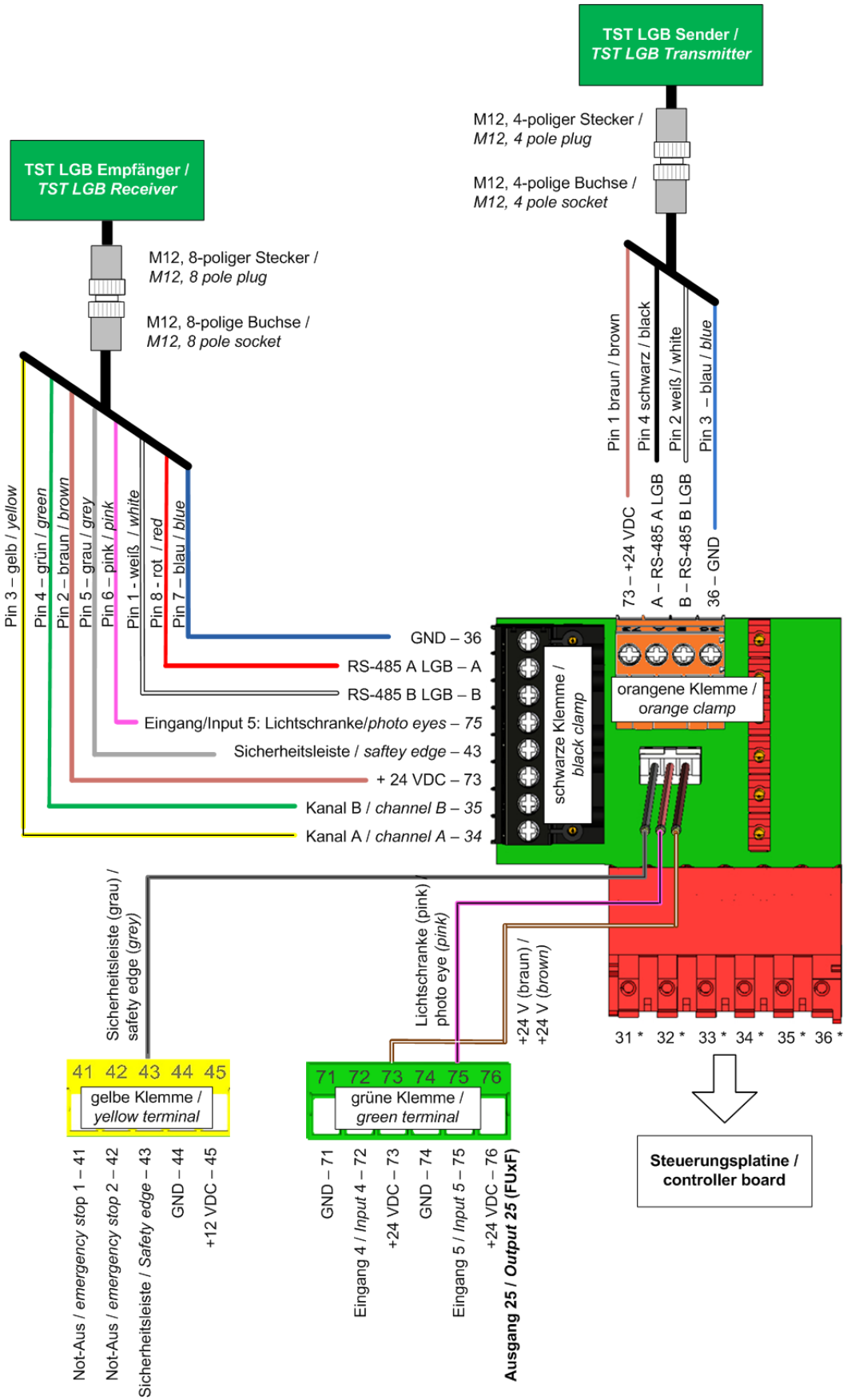


Figure 9: Wiring diagram for the light curtain

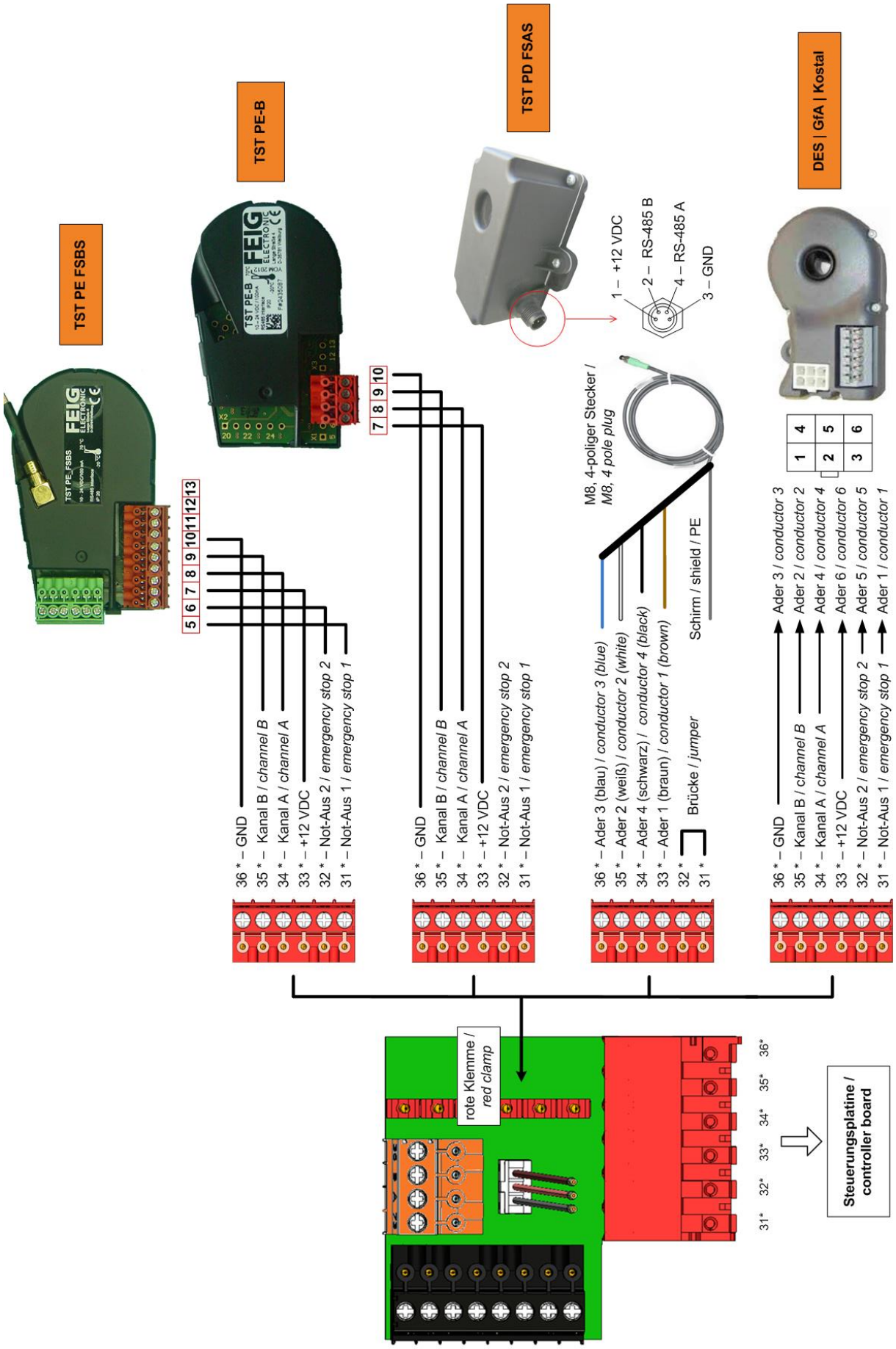


Figure 10: Wiring diagram for position encoders

5.3 Connecting the RLGxA wiring board to the controller

The TST RLGxA wiring board is a connection distributor which facilitates the connection of the TST LGB light curtain with the door controller. For this purpose, the red terminal block of the wiring board is plugged onto the red pin strip of the controller board (connection for the position encoder).

The RLGxA wiring board is suitable for the following products:

Table 5: Use of the RLGxA wiring board

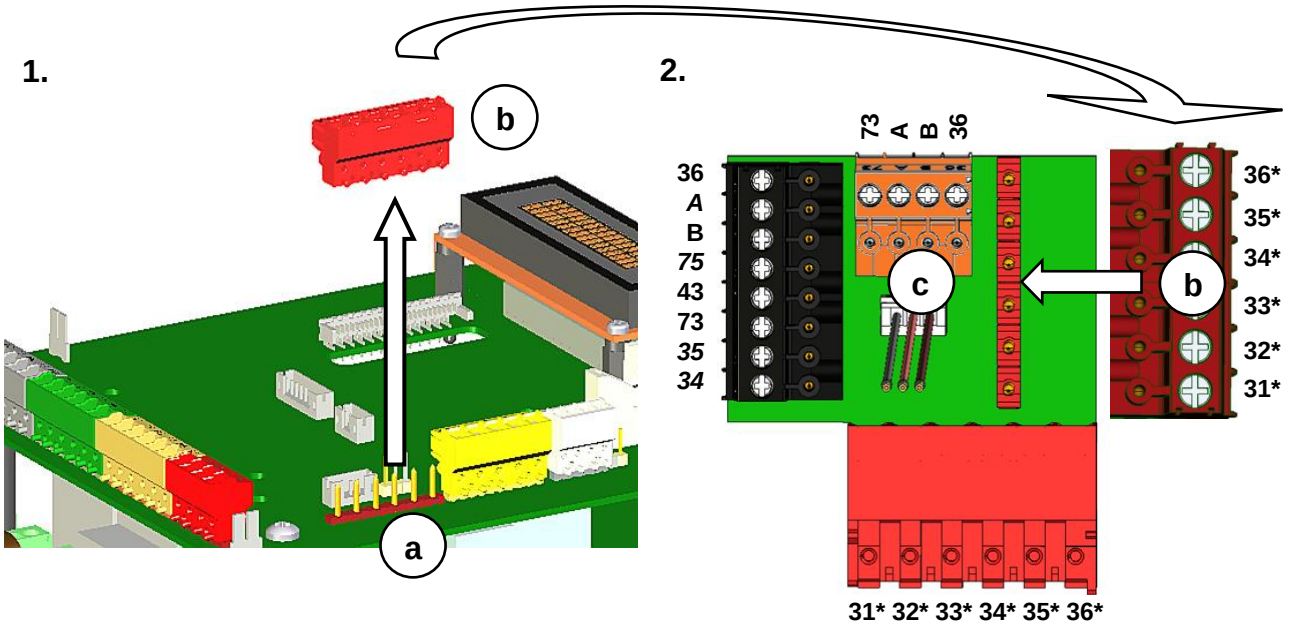
Product	Designation
Door controller	TST WU, TST FUZ2, TST FUxF
Light curtain	LGB
Position encoder	TST PD, TST PE [+ FSx], DES (GfA, Kostal)

⚠ ACHTUNG!

Read assembly instructions!
Observe the installation instructions of the devices used (door controller, sensors, etc.) and in particular the safety instructions mentioned therein.

⚠ ACHTUNG!

The contacts can bend!
Remove the terminal blocks before wiring and tightening the connection screws!



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see chapter "Wiring diagrams for the wiring board RLGxA**"**, page 15

4.

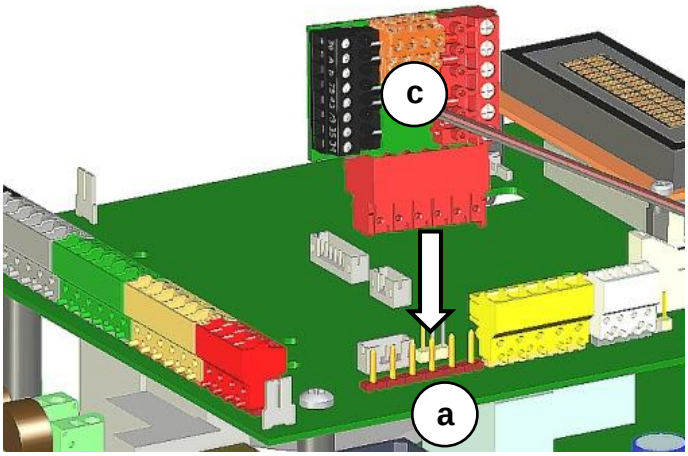

Figure 11: Connecting the wiring board

Table 6: Connecting the wiring board

Position	Designation
a	Pin strip for position encoder
b	Terminal block for position encoder
c	Wiring board RLGxA

Connecting the wiring board:

1. Remove the terminal block for the position encoder (**b**) from the controller board (see point **1**).

2. Connect the terminal block (**b**) to the wiring board (**c**) (see point **2**).

3. Connect the light curtain and position encoder to the wiring board.
(see chapter "**Wiring diagrams for the wiring board RLGxA**", page 15).

4. Plug the wiring board (**c**) onto the pin strip (**a**) (see point **4**).

6 Commissioning

Before the start-up of the safety device, the controller managing the door system must have been configured. Observe the assembly instructions of the respective door controller or the Application Note A.480 to configure the respective door controller with LGB.

⚠ WARNING

Before commissioning the controller, check that the electrical connections of the door controller system.

6.1 Setup assistant

The setup assistant checks the correct alignment of the TST LGB units to each.

The Set-up assistant starts after reaching or storing the upper end position. From here, error messages of the light curtain may prevent further commissioning of the door. In the event of an error, these must be eliminated before continuing.
(Potential errors: incorrect wiring or objects within the range that may be secured).

For the duration of the set-up procedure, the monitored area must be free from objects. To mask out the upper beams - see to 7.2 Manual blanking.

The alignment of the light curtain is determined by the beam signal quality.
If the beam signal quality is too low, the message F.601 is issued.
The error message may be acknowledged to continue the start-up despite bad beam signal quality. However, an entry is made into the error memory.

An error free check of the signal quality is necessary, since otherwise false signals may be triggered.

In order to indicate the beam signal quality in the door controller, the set-up assistant may be activated with P.937 = 1. Parameter P.938 then offers an overview of the beam signal quality, divided into 3 ranges (top, center, bottom):

P	:	L	G	x		D	i	a	g	.				E
9	3	8	#	1	0	0	%	1	0	0	%	1	0	0	%
					Top				Center				Bottom		

Figure 12: LCD display – three ranges

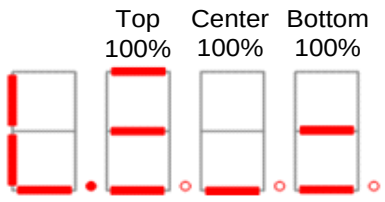

Figure 13: 7-segment display – three ranges

With foil “Open / Closed”, the beam signal quality of each individual beam can be called within this parameter:

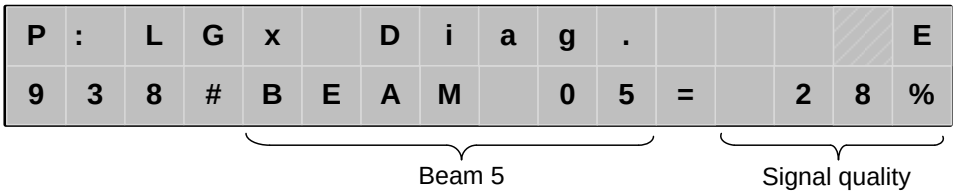

Figure 14: LCD display – individual light beam

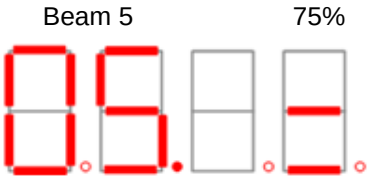

Figure 15: 7-segment display – individual light beam

In addition the LGB receiver displays the signal quality by LEDs:

Table 7: **Reception quality of the light beams**

LED red	**State**
off	All light beams are free and have good signal quality.
flashing (1 Hz)	All light beams are free but partially with bad signal quality.
flashing (5 Hz)	One light beam is occupied but otherwise good signal quality.
Flashing (10 Hz)	One light beam is occupied but otherwise bad signal quality.
on	Several light beams occupied.

In the case of improvement of the Light beam alignment between the TST LGB units the signal quality rises. With good quality, the fault F 601 acknowledges itself automatically and the start up procedure may be continued.

6.2 Light beam adjustment

After successful alignment the light beam adjustment is performed during the calibration of the door end positions automatically.

During the light beam adjustment, the TST LGB learns to recognize the reference positions of each light beam. For this purpose, the door is closed slowly in automatic mode.

ATTENTION

The light beam adjustment must take place under the supervision of a trained mechanic.

During the adjustment, the monitored zone must be free.

If light curtain units are exchanged, a new light beam adjustment is requested.

7 Functions

The TST LGB supports different operating modes. The main difference between modes is the manner that the door is being blanked.

⚠ATTENTION

To be able to use the TST LGB as sole safety unit (protection level E) in accordance with EN 12453 on doors and gates with automatic operation and for use by non-trained personnel the mode "intelligent blanking" must be used.

7.1 Intelligent blanking

In the "intelligent blanking“ mode, the light beams occupied by the door are blanked by their reference positions. Therefor Parameter P.433 must be “5”.

The light beams below the door’s edge monitors the danger zone. This area has a height of three light beams. These three light beams are scanned at a higher frequency than the lines of the object zone (see below). Fast scanning supports a response time of less than 10 ms to detect occupancy.
An assignment in the danger zone activates OUT 1.

With the appropriate parameter configuration, OUT1 results in a “hard stop“ of the door movement.

The remaining lines of beams below the danger zone are the object zone. These are scanned at a lower frequency resulting in somewhat slower response times as in the danger zone. These response times are below 100 ms.
An assignment in the object zone activates OUT2

With the appropriate parameter configuration, OUT2 results in a “Soft Stop" of the door movement. (Protecting the door’s mechanics).

7.2 Manual blanking of light beams

Manual blanking ranges of light beams can be utilized to deactivate these, beginning from the bottom and/or from the top.

⚠ATTENTION

Manual blanking may be used only within ranges that are not located in the door’s area of movement and that are not accessible to humans or objects.

- Blanking from the top: set parameter P.44B to light beams No. “0…. 8” or 0… 1180 mm.
- Blanking from below: set parameter P.44C to light beams No. “0…. 28” or 0… 2500 mm.

Parameter “0“ signifies no blanking.

8 Safety outputs

Occupations or error situations are supplied by two safety outputs OUT1 and OUT2.

The operation of the safety outputs and their connections are tested once per door cycle but no later than after 8 hours.

OUT1

Table 8:**Tristate mode**

OUT1	Output condition
open	Internal error.
0 Ω	Occupation of the danger zone
8,2 kΩ	Danger zone vacant

Table 9: **24 V digital mode**

OUT1	Output condition
open	Occupation of the danger zone
24 V	Danger zone vacant

ATTENTION

The 24V digital mode shall not be used as exclusive safety feature for the TST LGB application at the door.

OUT2

Table 10: Safety output 2

OUT2	Output condition
open	Occupation of the object zone
24 V	Object zone vacant

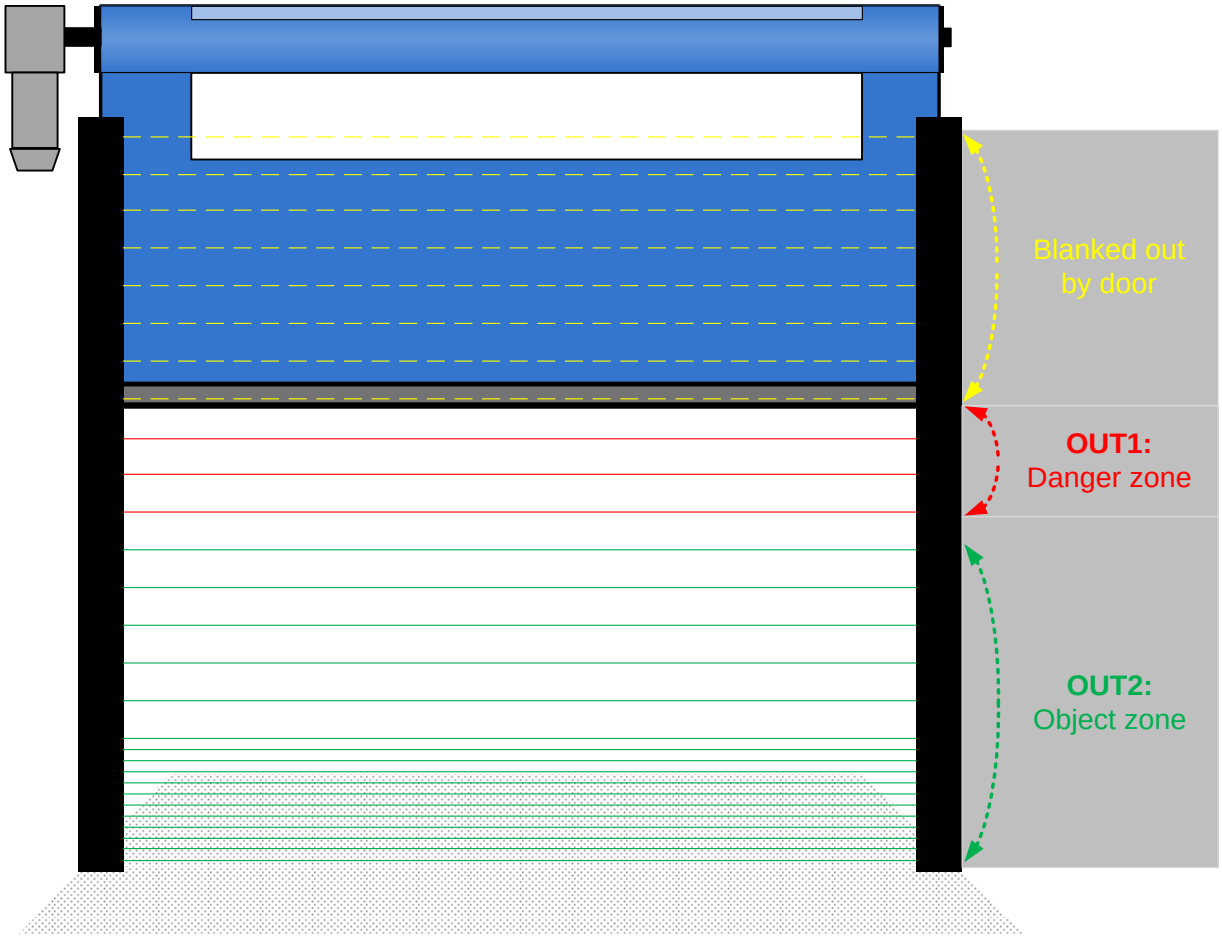

Figure 16: Different zones

By dividing the monitored zone in danger and object zone the door controller can respond accordingly to the detection of the different events. An assignment in the danger zone leads to a hard stop, an assignment in the object zone leads to a, the door mechanics protective, slow braking of the door.

9 Status indicator

In normal operating mode, the four LEDs on the TST LGB display the status of the TST LGB:

Table 11: **TST LGB transmitter**

LED green	**Status**
off	TST LGB disconnect from power
on	Voltage applied, unit faulty
flashing (0,5 Hz)	System running, no error
LED yellow	**Status**
off	TST LGBS without power/ no error
on	Not defined
flashing (0,5 Hz)	Internal error, testing not successful
flashing (5 Hz)	RS485 communication problem to TST LGB Receiver

Table 12: **TST LGB receiver**

LED blue	**Status**
off	TST LGBS disconnected from the power
On	Voltage applied, unit faulty
flashing (0,5 Hz)	System running, no error
LED red	**Status**
off	TST LGBE disconnected from power/ no fault / no occupation
on	Occupation (danger zone or object zone)
flashing (1 Hz)	Internal error, testing not successful

10 Maintenance

The aperture for the entry and exit of the beams of the TST LGB transmitter and receiver must be cleaned once per door maintenance interval.

⚠ **Scratching by coarse agents or dissolving due to cleaning agents containing solvents must be avoided at all cost.**

11 Technical Data

General	Overall length (H x B x T)	A: 2637 x 12 x 22 mm
		B: 2408 x 12 x 22 mm
		C: 2087 x 12 x 22 mm
		D: 1537 x 12 x 22 mm
		E: 987 x 12 x 22 mm
	Connection	M12 8/4 pole - Male
	Temperature range	Operation: -25...+60°C
		Storage:-40...+70°C
	Humidity	Up to 90% non-condensing
	Protection class	IP 67
	Weight A- Variant / per Unit	600 g
Detection	Range	Up to 10 m
	Reaction time	< 10 ms (Danger zone) < 100 ms (Object zone)
	Max. door closing speed	< 1.6 m/s
	Min. Increments	>= 2 Increments per 10 mm
	Resolution	up to 300 mm: 22.9 mm up to 2500 mm: 137.5 mm
Electronic data	Voltage	24 V DC ±10%
	Power consumption A- Variant	Transmitter: 50 mA Receiver: 30 mA
	Reverse polarity protection	Yes
	Short circuit protection	Yes
Optical System	Wavelength	850 nm
	Aperture angle (EAA)	± 5°
	Ambient light immunity	100 kLUX
	Laser class	1
I/O	Safety outputs	OUT1: tristate / 24V digital
		OUT2: 24V PNP – not isolated -
	Status indicator	LED
	Parameter configuration by:	Door controller TST FUZ2, FuxF or WU2
	Diagnostics by:	Door controller TST FUZ2, FuxF or WU2 and PC Tool
	Testing by:	Door controller TST FUZ2, FuxF or WU2
Standards	2006/42/EC – Machinery directives	
	2004/108/EC - EMC-directive	
	2006/95/EC – Low voltage directive	
	RoHS 2 directive	
	EN ISO 13849-1:2015	Cat 2/ PL d
	EN 12978:2003+A1:2009	
	IEC 61496-2:2006	
	EN 60335-1:2012-10	
	EN 61000-6-1:2007-10	
	EN 61000-6-2:2011-06	
	EN 61000-6-3:2012-11	
	EN 61000-6-4:2011-09	
	EN 60529:2014-09	IP 67
	DIN EN 12453:2000	Protection level E
	DIN EN 12445:2000	

12 Declaration of conformity

FEIG ELECTRONIC GmbH
Lange Straße 4
D- 35781 Weilburg

EG-Konformitätserklärung

nach EG-Maschinenrichtlinie 2006/42/EG, Anhang II A

Hiermit erklären wir, dass nachstehendes Sicherheitsbauteil

Bezeichnung	**Torlinien-Lichtgitter / Sicherheitseinrichtung**
Typ/Handelsbezeichnung	**TST LGB**
Artikel:	**TST LGB-A/-B/-C/-D/-E**

den einschlägigen Bestimmungen folgender Richtlinie entspricht:

Maschinenrichtlinie	2006/42/EG
EMV-Richtlinie	2004/108/EG
Niederspannungsrichtlinie	2006/95/EG
RoHS 2 Richtlinie	2011/65/EU

Angewandte Normen:

EN ISO 13849-1:2015	Sicherheit von Maschinen – Sicherheitsbezogene Teile von Steuerungen
EN 12978:2003+A1:2009	Türen und Tore – Schutzeinrichtungen für kraftbetätigte Türen und Tore – Anforderungen und Prüfverfahren
IEC 61496-2:2006	Sicherheit von Maschinen – Berührungslos wirkende Schutzeinrichtung Teil 2: Besondere Anforderung an Einrichtungen, die nach dem aktiven opto-elektronischen Prinzip arbeiten
EN 60335-1:2012-10	Sicherheit elektrischer Geräte für den Hausgebrauch und ähnliche Zwecke -Teil 1: Allgemeine Anforderungen (Teil 19.11.4)
EN 61000-6-1:2007-10	EMV: Fachgrundnorm – Störfestigkeit (Wohnbereich)
EN 61000-6-2:2011-06	EMV: Fachgrundnorm – Störfestigkeit (Industriebereich)
EN 61000-6-3:2012-11	EMV: Fachgrundnorm – Störaussendung (Wohnbereich)
EN 61000-6-4:2011-09	EMV: Fachgrundnorm – Störaussendung (Industriebereich)
EN 60529:2014-09	Schutzarten durch Gehäuse (IP-Code)
EN 12453:2000	Nutzungssicherheit kraftbetätigter Tore – Anforderungen
EN 12445:2000	Nutzungssicherheit kraftbetätigter Tore – Prüfverfahren

Bevollmächtigter für die Zusammenstellung der relevanten technischen Unterlagen:

Weilburg, den 24. April 2017

Dirk Schäfer, Technischer Leiter VTM

Eine Prüfung des Maschinentyps auf Übereinstimmung mit den Anforderungen der EG-Maschinenrichtlinie erfolgte durch die

TÜV NORD CERT GmbH
Langemarckstraße 20, D-45141 Essen
Notified Body ID. No.: 0044 - Reg.-No.: 44 205 13 132615

Diese Prüfstelle ist zuständig im Sinne von Anhang XI der EG-Maschinenrichtlinie!

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die mitgelieferte Produktdokumentation und insbesondere die darin enthaltenen Sicherheitshinweise sind zu beachten.

Die Inbetriebnahme des TST LGB wird so lange untersagt, bis dieses an eine FEIG ELECTRONIC Torsteuerung oder äquivalente Sicherheit angeschlossen und an ein Tor angebaut wurde und dieses Tor den Bestimmungen der EG-Maschinenrichtlinie entspricht.