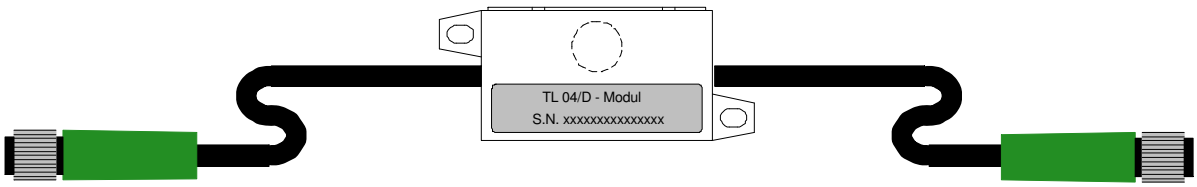
Light Curtain TL04
D-Version

Documentation



Design registered by German Patent and Trade Mark Office.

Version
TL-D-01
23.10.2015

The documentation is part of the system and must be stored in the switching cupboard of the escalator. (Safety regulations)

RLS Wacon GmbH
Eduard-Ahlborn-Strasse 1
31137 Hildesheim
Germany

☎ +49 5121 / 28 126 0
+49 5121 / 28 126 20
www.rls-wacon.de
info@rls-wacon.de

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Light Curtain TL04
D-Version

- **No functional deterioration through weathering**
- **Not sensitive to external light sources**
- **Up to 99 sensor modules per light curtain**
- **No adjustments necessary**
- **Optional distance between modules**
- **Minimal installation costs**
- **Fault location system in central unit**
- **Low power consumption**
- **Continuous use without wearing**
- **Protected to IP 67**

General Information

The passenger detection system (PDS) TL04 serves to monitor stationary escalators and moving floors.(Ready to start).

Due to the high dynamics (typically 30dB), the system operates safely in extreme environmental conditions.

The PDS is only sensitive to its own transmitted infrared signals. The function will, therefore, not be disturbed even if sunlight falls directly on the receivers.

The modules can easily be connected by standard industrial connectors (M12-system).
Adjustment of the modules is not necessary.

Up to 99 sensors can be operated with one central unit

The distance between transmitters and receivers can be up to 1.5 meters.

The minimum distance between the optical axes (module to module) is optional and limited only by the physical dimensions of the modules. The required minimum spacing of 75 mm in France can be achieved without problem.

The maximum distance between the optical axes is set by the cable length of 400 mm.
The PDS is suitable for permanent operation without restriction.

Due to the very low transmitter output, no faults should occur as a result of ageing.

RLS Wacon GmbH
Eduard-Ahlborn-Strasse 1
31137 Hildesheim
Germany

Technical Data

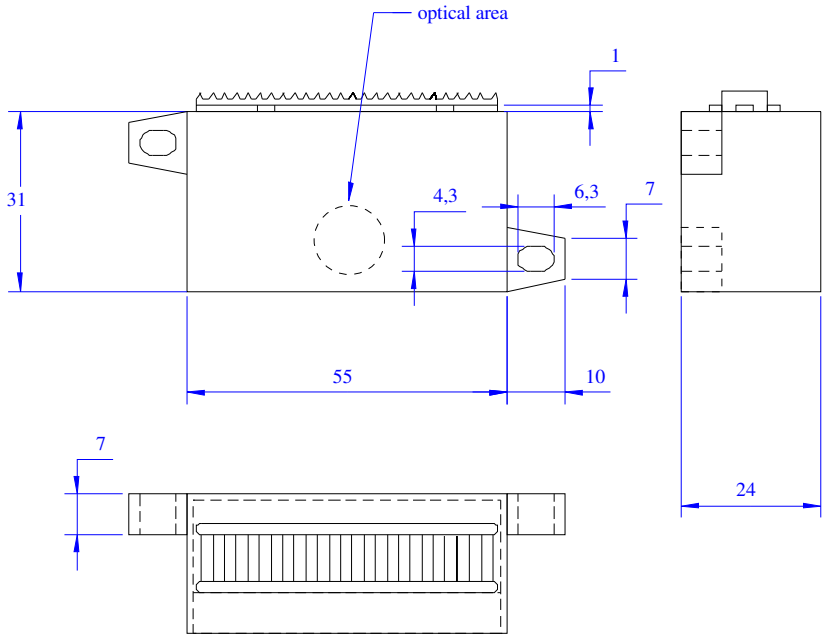
Light Curtain

Interval between transmitter and receiver	0 to 1,5 m; inside 0 to 4 m
Interval between optical axes	optional
Permissible de-adjustment of the optical axis, (Tx)	max. 22°
Permissible de-adjustment of the optical axis, (Rx)	max. 30°
Permissible working temperature range	-25°...65° C
Type of protection	IP 67
Dimensions of the modules (W x L x D)	55 x 34,6 x 24,5 mm
Regulations	EN 115-1:2008/FprA1:2009 EN 12015:2004/prA1:2007 EN 12016:2004+A1:2008

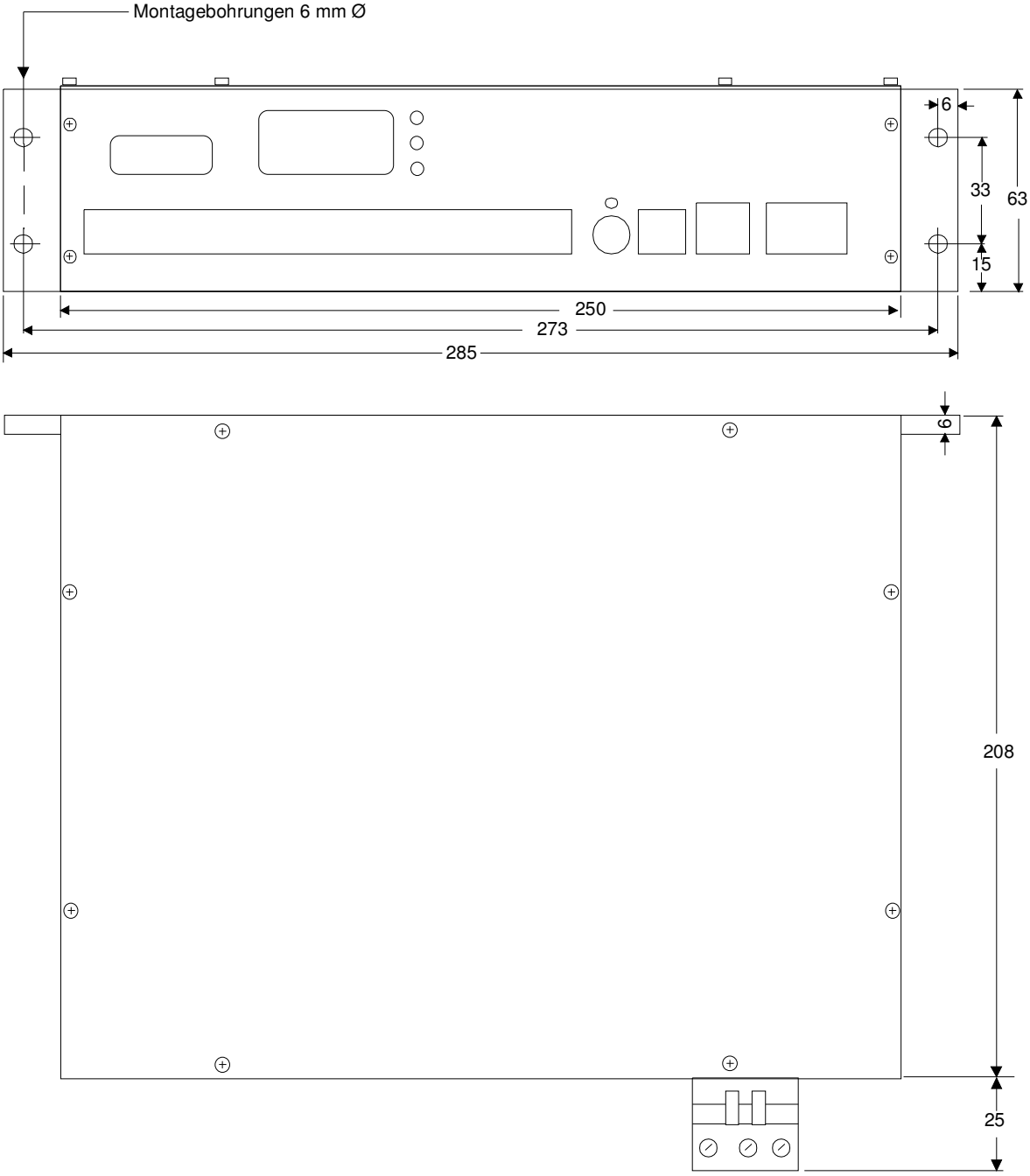
Central unit *TLCU*

Length of light curtain per central unit	1...99
Max. permissible switching current of the O/P relays	2 A
Supply voltage	110 to 265VAC , 40...60 Hz
Power consumption (99 modules)	Typically 50 VA
Maximum Output rating (relais)	250 V AC, 6 A
Type of protection	IP 20
Case dimensions(W x H x D)	285 x 64 x 208 mm
Overall dimensions, including connecting plugs (W x H x D)	285 x 66 x 235 mm
Regulations	EN 115-1:2008/FprA1:2009 EN 12015:2004/prA1:2007 EN 12016:2004+A1:2008

Module Housing (without cable)



Central Unit TLCU - Dimensions



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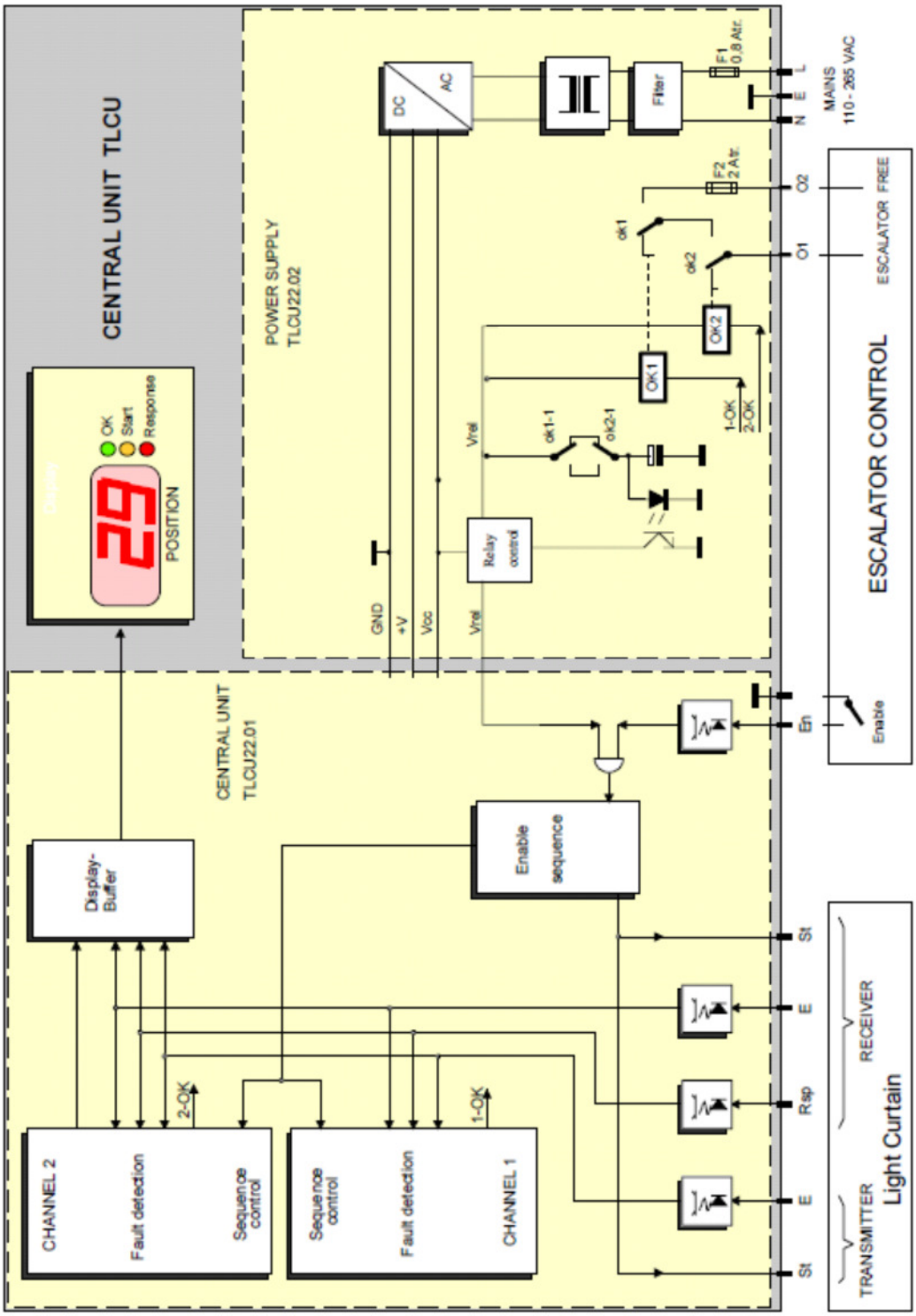
Eduard-Ahlborn-Strasse 1
31137 Hildesheim
Germany

Schematic diagram of central unit



Technical Description

Introduction

The **Passenger Detection System** is made up of the following:

Central unit TLCU
Transmitter modules TLX22-D (black label
Receiver modules TLR22-D (red label)

An adaptor- cable serves as interface between first module of the light curtain and the central unit. The modules only have to be pushed into the balustrade-profile but may also be screwed to avoid dislocation. Installation is possible from both sides of the balustrade-profile. Please note that installation from the back requires holes / cut-outs in the profile. The modules are fitted with a rubber strip to prevent slipping.

Disconnected connectors must at all costs, be protected from dirt and moisture! Before plugging in, care should be taken to ensure that the area is free of dirt and water contamination and that there are no bent pins in the connectors.
The module may then be plugged in. Please ensure that the connectors are screwed correctly.
The optic-window on the module should be kept free of dirt, grease and the like. Scratching should be avoided.

ATTENTION! If 1 module is disconnected, the entire PDS will not function!

Central unit

The central unit contains the power supply for the light curtain and evaluates information fedback from the modules.
Connection to the central unit is through removable plugs. Connection to the light curtain is through two 7 core screened cables.
The central unit accommodates a built in self monitoring and fault diagnosis system which locates the first interrupted light barrier or faulty module in the curtain.
The location number is displayed on a 2 digit / 7 segment LED display in the front panel of the central unit.
The fault evaluation circuit has two parallel channels for reliability. The output to the escalator control is switched through two in line horizontal relay contacts with positive contact action (OK1/OK2).
The output relays OK1, OK2 are energized under no-fault conditions and when the detection field is uninterrupted. The contacts are then closed.. The contacts are protected by a 2 A slow blow fuse (F3).
A failsafe circuit de-energizes the output relays in the event of a divergence between the two channels. This can only occur in the unlikely event of an internal fault. In this case the red “FAIL“ LED will light and remain on.
Activation of the PDS through the escalator control can be achieved by a simple, potential free relay contact (rating max. 30mA) across the “Enable“ connection socket on front panel. For permanent operation, this input should be bridged with a wire link.

Light Curtain

A detection field is generated between a line of transmitters and receivers
Each first module is connected to an adaptor-cable. The adaptor-cable is a screened, 7 core cable (typically 4 metres long).. The end should be screw-clamped into the appropriate terminal connector in the terminal box or central unit.
Transmitter and receiver labels are individually colour coded i.e. black = Tx; red = Rx.
Further on there is a plastic-clip mounted at the transmitter-cables.
Only modules with the same colour code should be connected together.
The inter-changing of Tx and Rx modules will simply cause a systems failure but no permanent damage.

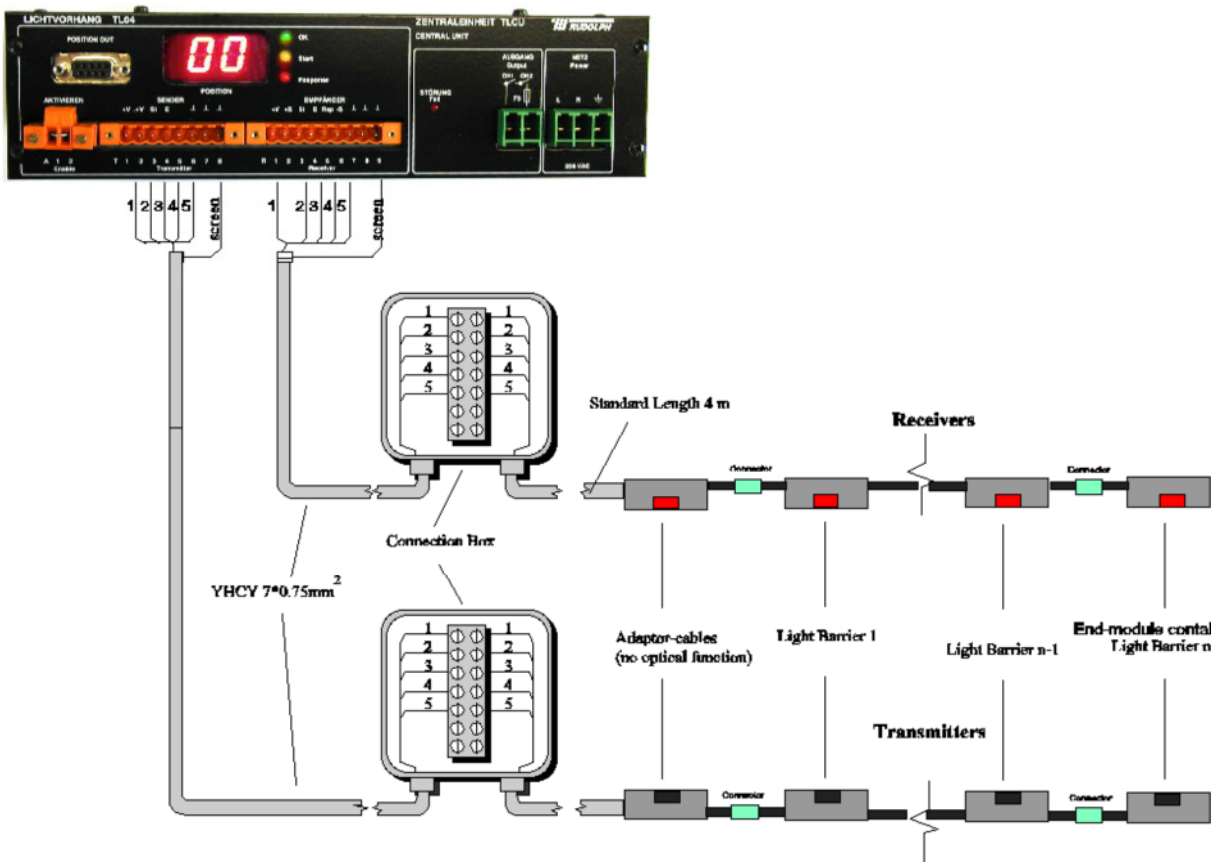
RLS Wacon GmbH
Eduard-Ahlborn-Strasse 1
31137 Hildesheim
Germany

Installation
Installation is made extremely easy.
Both adaptor cables must be at the same end of the escalator and can be connected to the central unit. A terminal box for connecting the light curtain to the central unit should be mounted here.
The terminal box (not supplied with the system), should conform to IP66
Transmitter and receiver can be distinguished by the colours of the serial-numbers: - Tx = black / Rx = red. The modules should then be pushed in the balustrade-profile at the marked places and can be screwed if wanted.
At the end of the light curtain an optically active end-module has to be mounted.

Installation of 2 light curtains in long escalators
When using more than 99 light barriers the light curtain has to be split. The first half is mounted from the upper end, the second half from the bottom of the escalator.
The transmitters of both light curtains are installed on opposite sides of the escalator. This way, an interaction of both light curtains can be avoided.

Wiring
The screened, halogen free, 7 core cables between the central unit and the adaptor-cable are fed through the cable entry grommet of the terminal box at the end of the escalator. These connection cables are connected by means of screw terminal connectors inside the terminal box.
The wiring of the terminal box must be carried out according to IP 66.
The power supply compensates voltage drops of up to 2 volts along the line from the central unit to the receiver terminal box. Conductors of 0.75 mm^2 cross sectional ares (csa) are sufficient for leads up to 30 metres.

The length of leads having a csa of 0.75 mm^2 and feeding a light curtain of 99 optic modules should not exceed 30 metres.
The use of unscreened cables is not permitted!



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31137 Hildesheim
Germany

For longer lengths of cable, the following formula should be used::

n * l / 2800 = < 1

n = number of modules in the curtain, l = length of connecting lead in metres.

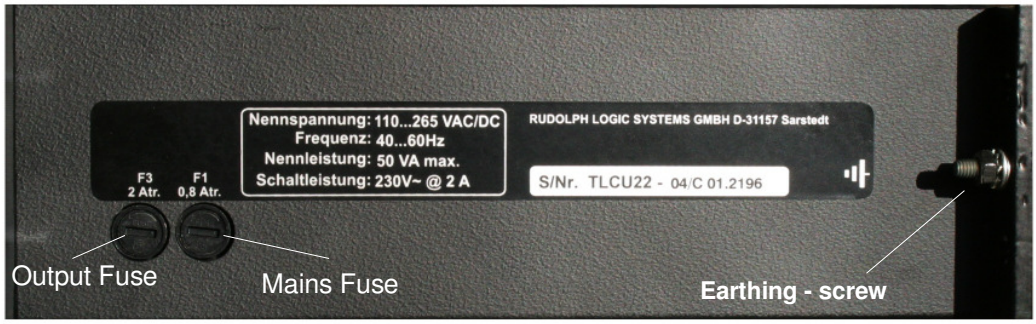
If the result is greater than 1, then csa must be doubled!
Both 7-core connecting leads are connected into the screw-clamp connectors in the central-unit. The 8 pole connector is for the transmitter and the 9 pole one for the receiver. The screens of both leads **must** be connected here.

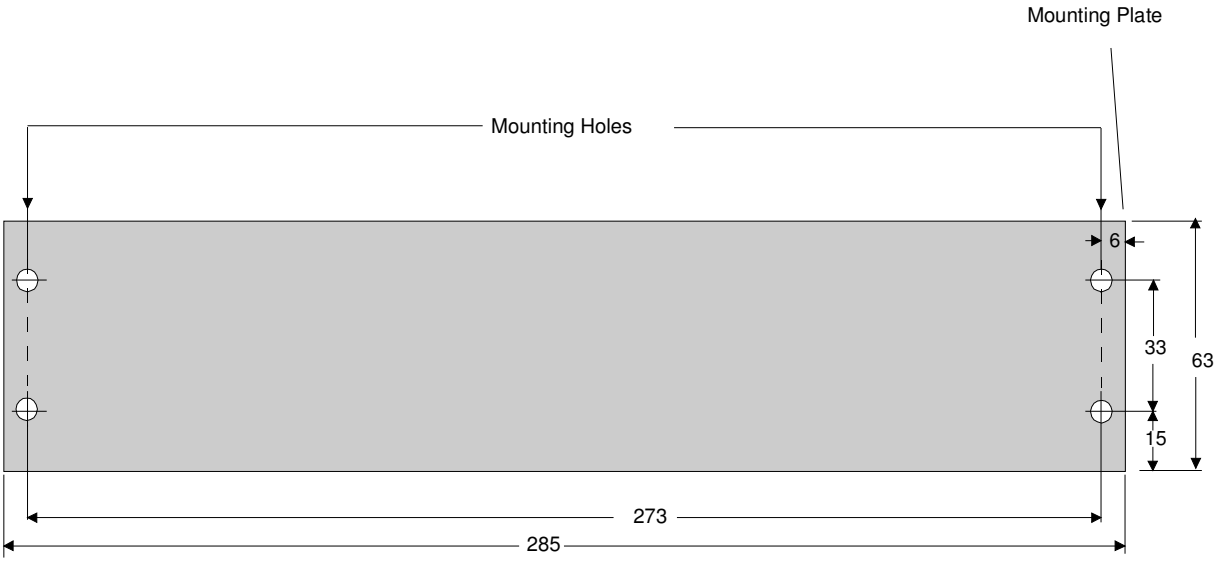
The screen of the leads must be connected to the central unit.
Do not connect the screens in the terminal box.

The input “Enable“ only carries low-tension (nom.12v/30mA) and can be connected to the escalator control by a 2-core cable. For permanent operation, this input should be bridged with a wire link.

The mains-in circuits are set up for an operating voltage from 110 to 265 VAC @ 40 to 60 Hz.
The mounting position of the central unit is optional.

Before connecting to the mains and the escalator control (OK1/OK2)
the casing must be earthed to the central earthing using the earthing screw
on the right hand side of the central unit!





Rear view

Connecting the Central unit

The 2-pole connector "ENABLE" (AKTIVIEREN)

Pin-Nr.	Signal-Name	Signal	Bemerkung
A1 A2	EN GND	Activate input Ground	The PDS is inactive when these terminals are not connected!
Activation from the escalator control : A1 with A2 controlled by means of potential free relay contact. **Long term use:** A1 and A2 bridged.			

The 8-pole connector "Transmitter" (SENDER).

Pin-Nr.	Signal-Name	Signal	Kabelfarbe / Kabelnummer
T1	+V	Supply voltage	Rosa 1
T2	+V	Supply voltage	Braun 2
T3	Start	Start-Signal	Grün 3
T4	REND	End-Signal	Gelb 4
T5		not used Masse	Weiß 5
T6	GND	Ground	Grau 6
T7	GND	Ground	Blau 7
T8	GND	Ground	Cable screen

Belegung der 9-poligen Klemmleiste „EMPFÄNGER" für die Empfänger-Kette

Pin-Nr.	Signal-Name	Signal	Kabelfarbe / Kabelnummer
R1	+V	Supply voltage +Sense	Rosa 1
R2	+S	Start-Signal	Braun 2
R3	Start	End-Signal	Grün 3
R4	REND	Response -Signal	Gelb 4
R5	RESP	-Sense	Weiss 5
R6	-S	Ground	Grau 6
R7	GND	Ground	Blau 7
R8	GND	Ground	not used
R9			Cable screen

RLS Wacon GmbH
Eduard-Ahlborn-Strasse 1
31137 Hildesheim
Germany

Green, 2-pole connector "Output" (Ausgang) .

The "escalator free" signal to the escalator control is achieved through relay contacts OK1/OK2. These contacts are protected from overload by a 2A, slow blow fuse. Max. rating 250 V AC, 6 A.

Green, 3 pole connector "Power" (NETZ).

The unit is set up for a mains supply of between 110 and 265 VAC @ 40 to 60 Hz . The maximum power consumption should not exceed 50 VA . The mains fuse (F1) is an 800mA slow blow fuse. The casing must be earthed, through the screw provided, to the central earth.

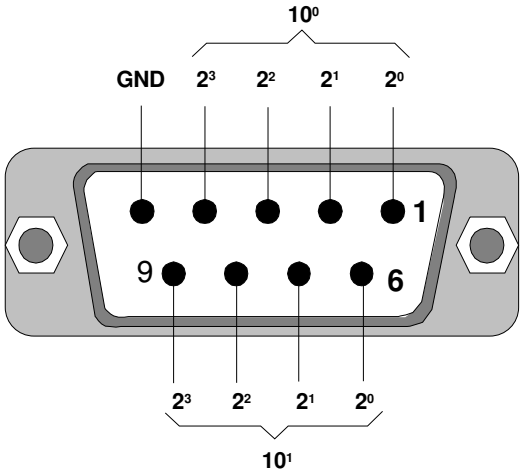
The 9-pole D-Connector „POSITION OUT"

Pin-Nr.	Signal	Bemerkung
1	2^0	1. Decade
2	2^1	1. Decade
3	2^2	1. Decade
4	2^3	1. Decade
5	GND	
6	2^0	2. Decade
7	2^1	2. Decade
8	2^2	2. Decade
9	2^3	2. Decade

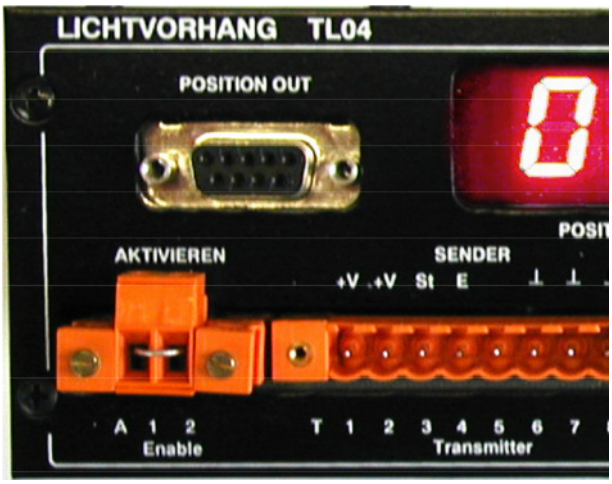
The counter o/p of the 2 digit, 7 segment display is available from the 9-way socket "POSITION OUT".
The o/p driver IC is an Octal-CMOS-Latch 74C374 with 12V supply voltage.

Output information:
2 Decades in BCD-Format. (0=LLLL, 9=HLLH)

Logik-Pegel:
L= OV (<1V)
H=12 V(>11 V)
max. o/p current: 8 mA (sink / source)



9-pol. D-connector in the Central unit



Function of the Operating and Indicating Elements

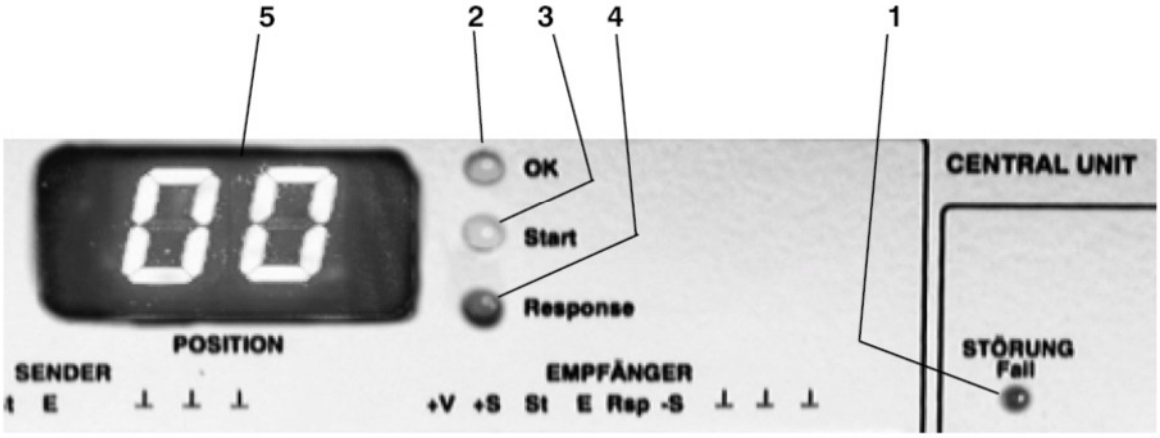
1) Red LED „Fail“
After mains failure or in the event of an internal failure of the central unit, the OK output relays de-energize.
This is indicated by the lighting of the red LED „Fail“.
If the LED does not extinguish itself after the mains have been re-applied there is a serious defect in the central unit.

2) Green LED „OK“
The green LED „OK“ indicates that the escalator is free. The output relay contacts 0K1/OK2 are closed and the escalator control receives the “escalator free“ signal.

3) Yellow LED „Start“
This LED indicates that the central unit is sending a start pulse to the modules.
For this, the central unit must be activated (A1/A2 connected).

4) Red LED „Response“
This LED indicates that the returning start pulses (response) have been received. If the the LED fails to light after the start LED, then there is a fault in light curtain and the “escalator free“ signal will not be activated.

5) 7-Segment-Display
The 2-digit display indicates the location of the first interrupted light barrier or the first defect module. If all is clear, the display will show **00** .
If the central unit is not activated, the display will show just the 2 decimal points.
These decimal points are also used to indicate on which side an error is to be found. The left dot indicates a fault on the transmitter side and the left, a fault on the receiver side.



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Eduard-Ahlborn-Strasse 1
31137 Hildesheim
Germany

Initial Set-up

After mounting the modules of the light curtain in the profile and connecting all cables,the PDS can be brought into operation by plugging in the mains supply. Installational adjustments are not necessary.

Start-up sequence
The central unit goes through a reset proceedure when the mains are applied. During the time out delay of approximately 2 seconds, the unit runs through an internal function test. The same delay of 2 seconds can occur through contact bounce of the **activate** relay.
During this period, the status of all indicators is irrelevant.

Switch-on procedure
If A1 and A2 are connected and the escalator is free of passengers when the power is applied, the display will show **00** and the LEDs **OK**, **Start** and **Response** will light.
The red LED **Fail** lights during the reset sequence and then goes out.

Reset and restart
The central unit can be reset or restarted by removing the mains for about 5 seconds during which time the **Fail** LED will light briefly, then slowly fade out. When the LED and the segmets of the display are completely out, the mains can be re-applied.

Activating the System
If the central unit is on but not activated (A1 /A2 not connected), the two decimal points of the 7-segment display will show.
When activated, the display digits will light and the decimal points will go out.
The yellow **Start** and the red **Response** LEDs light simultaniously.
When the unit has completed its test of all modules, the green **OK** LED will light up and the **OK** relays will pull in, thereby achieving the “escalator free“ signal to the escalator control.
The display shows **00** .

The condition remains until the detection field is interrupted or until the activate signal is removed.

The cycle time for the test can be calculated as follows:

t [ms]= n x 2,05 ms (n= length of curtain).

The OK relays drop out immediately if the central unit detects an interruption in the detection field, a defect module or if the activate contact is opened.

Interruption of the Detection Field
When the monitoring sequence reaches an interrupted light barrier, the **OK** LED goes out, the OK Relais deenergize and the digital display shows the position number. The “escalator free“ signal is immediately removed.
If more than one barrier is interrupted, only the position of the first will be shown.
If only one light barrier is interrupted, the effect of the missing response pulse will not be noticable in the reaction of the red **Response** LED. If all barriers are interrupted, the **Response** LED will not light at all.

Care and Maintenance
The PDS should be subjected to a thorough functions test during maintenance work on the escalator.
For a PDS in constant use, the interval between function tests should not exceed 3 months.
During the functions test, the maintenance personnel must carry out a visual inspection of the intire detection system.
Re-focusing work is not necessary.

Please note:
Dirt and scratched perspex covers reduce the light energy and lead to increased likelihood of failure due to wear and tear.
In order to maintain full operational capability, the perspex covers should be cleaned regularly and badly scratched covers should be replaced.

Only perspex covers authorized by RLS Wacon should be used!

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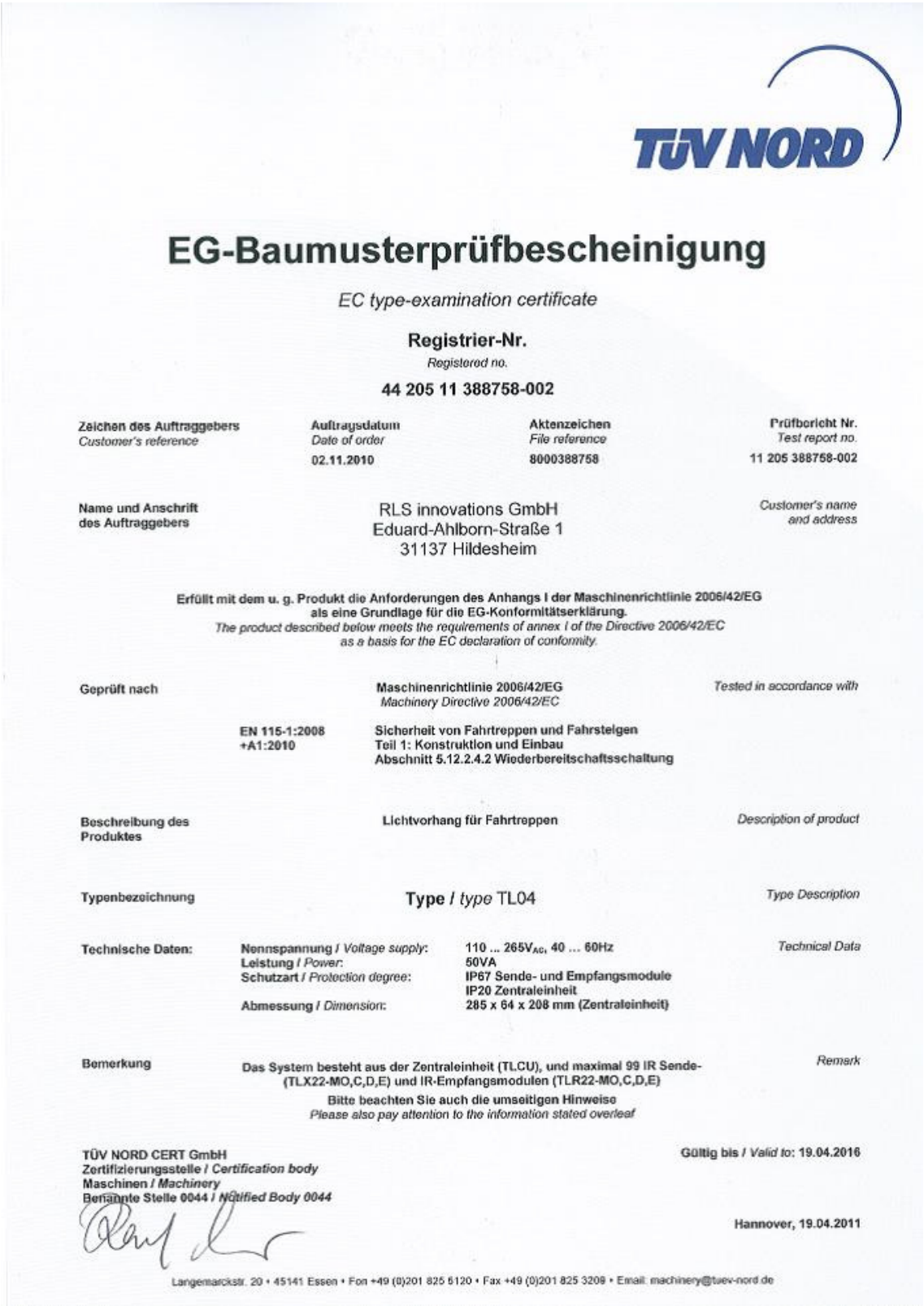
Eduard-Ahlborn-Strasse 1
31137 Hildesheim
Germany

Certificate



TÜV NORD

EG-Baumusterprüfbescheinigung

EC type-examination certificate

Registrier-Nr.
Registered no.

44 205 11 388758-002

Zeichen des Auftraggebers *Customer's reference*	Auftragsdatum *Date of order* 02.11.2010	Aktenzeichen *File reference* 8000388758	Prüfbericht Nr. *Test report no.* 11 205 388758-002

Name und Anschrift des Auftraggebers — *Customer's name and address*

RLS innovations GmbH
Eduard-Ahlborn-Straße 1
31137 Hildesheim

Erfüllt mit dem u. g. Produkt die Anforderungen des Anhangs I der Maschinenrichtlinie 2006/42/EG als eine Grundlage für die EG-Konformitätserklärung.
The product described below meets the requirements of annex I of the Directive 2006/42/EC as a basis for the EC declaration of conformity.

Geprüft nach — *Tested in accordance with*

Maschinenrichtlinie 2006/42/EG
Machinery Directive 2006/42/EC

EN 115-1:2008 +A1:2010
Sicherheit von Fahrtreppen und Fahrsteigen
Teil 1: Konstruktion und Einbau
Abschnitt 5.12.2.4.2 Wiederbereitschaftsschaltung

Beschreibung des Produktes — *Description of product*

Lichtvorhang für Fahrtreppen

Typenbezeichnung — *Type Description*

Type / *type* TL04

Technische Daten: — *Technical Data*

Nennspannung / *Voltage supply*:	110 ... 265V_{AC}, 40 ... 60Hz
Leistung / *Power*:	50VA
Schutzart / *Protection degree*:	IP67 Sende- und Empfangsmodule IP20 Zentraleinheit
Abmessung / *Dimension*:	285 x 64 x 208 mm (Zentraleinheit)

Bemerkung — *Remark*

Das System besteht aus der Zentraleinheit (TLCU), und maximal 99 IR Sende- (TLX22-MO,C,D,E) und IR-Empfangsmodulen (TLR22-MO,C,D,E)

Bitte beachten Sie auch die umseitigen Hinweise
Please also pay attention to the information stated overleaf

TÜV NORD CERT GmbH
Zertifizierungsstelle / *Certification body*
Maschinen / *Machinery*
Benannte Stelle 0044 / *Notified Body 0044*

Gültig bis / *Valid to*: **19.04.2016**

Hannover, 19.04.2011

Langemarckstr. 20 • 45141 Essen • Fon +49 (0)201 825 6120 • Fax +49 (0)201 825 3209 • Email: machinery@tuev-nord.de