lumiflex®

Electronics for Automation

Safety Light Curtains

DIALOG

LIGHT CURTAIN

Fitting and Operating Instructions

Edition: 12-96/I
Order No.: 600901

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Foreword

These fitting and operating instructions are intended to provide the user of DIALOG safety light curtains with the basic knowledge required to operate them correctly and safely. This manual is supplied with every unit. It contains important information for the operator of the machine fitted with safety light curtains and is to be kept available by the machine.

This does not affect safety requirements based on applicable regulations, standards, provisions etc.

1 Introduction

The DIALOG safety light curtain together with the control unit BASIS constitutes an electro-sensitive protective device (ESPD).

It conforms with the requirements of VBG 5 and safety regulations ZH 1/281 and ZH 1/597. Regulations issued by the German industrial compensation insurance company so called "Berufsgenossenschaft".

Its range of application extends from protecting hands and fingers at danger points to making large danger areas safe.

The DIALOG safety light curtain can also be used to control production processes.

The dangerous machine movement is enabled automatically by the control unit BASIS after the sensing field has been interrupted once or twice (by the manual insertion or removal of work pieces).

By using the single break or double break control function of the safety light curtain high efficiency is achieved due to minimun cycle times but giving maximum safety to the operator.

2 Description of Unit

2.1 General

The DIALOG safety light curtain consists of a DT transmitter and a DR receiver. An optical sensing zone is created between transmitter and receiver.
The BASIS control unit provides the receiver with supply voltage and contains the machine control interface (Figure 2-1).

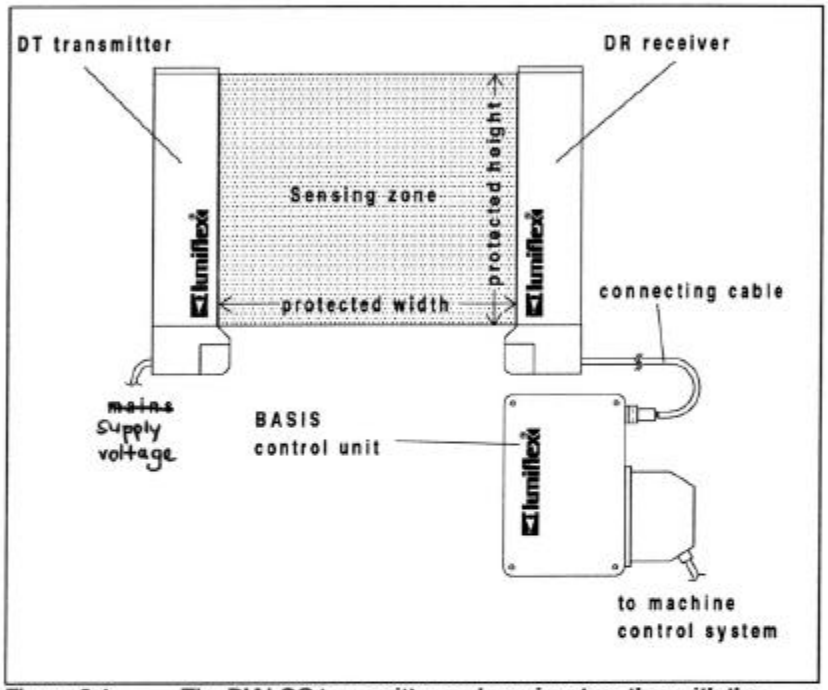


Figure 2-1 **The DIALOG transmitter and receiver together with the BASIS control unit form an electrosensitive protective device (ESPD).**

The DIALOG sensing zone consists of several infrared light beams arranged in a row. The infrared light is transferred from the transmitter to the relevant point of the receiver, thus giving rise to an invisible "light curtain". The interruption of one or more light beams by an intruding object releases a switching command ("Machine Stop!") (Figure 2-2).

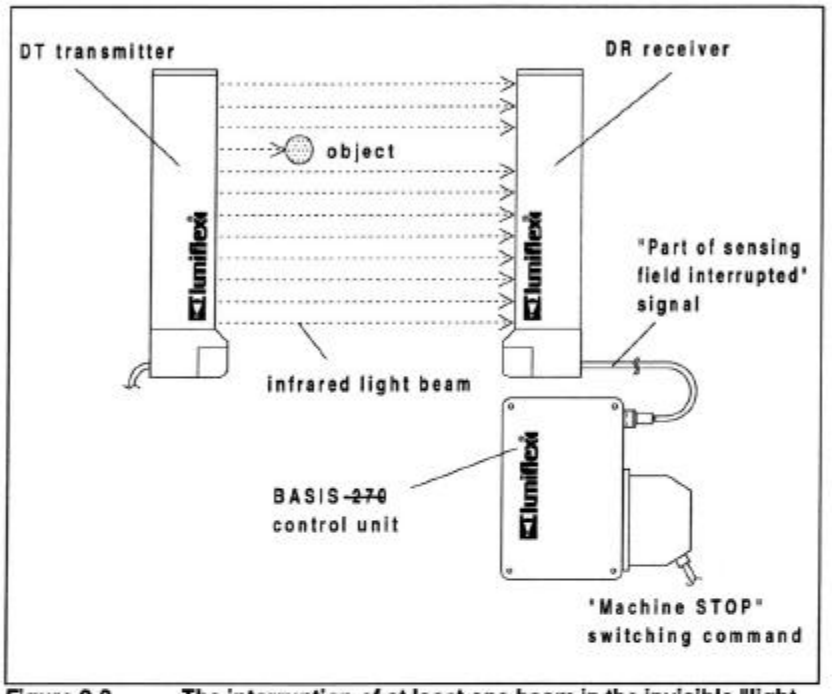


Figure 2-2 **The interruption of at least one beam in the invisible "light curtain" gives a stop signal**

2.2 Features

- Classification: electrosensitive protective device (Type 4 ESPD, internal self-checking).
- Transmitter/receiver principle
- Sturdy industrial casing
- Slim design
- Easy-to-replace protective glass fronts.
- Easy assembly thanks to functional fastening components.
- No moving parts
- Mains connection only required for transmitter
- Partial removal of sensing field possible
- Self-diagnosis thanks to micro-controller technology
- Long operating life.
- Highest possible immunity to stroboscopic flashes
- Wide range
- Fast response time
- Numerous protected heights available due to modular design

2.3 Design options

For the safe detection of fingers, hands and arms, DIALOG is available in three different designs with the object sensivity sizes of 14 mm, 30 mm and 40 mm (Figure 2-3).

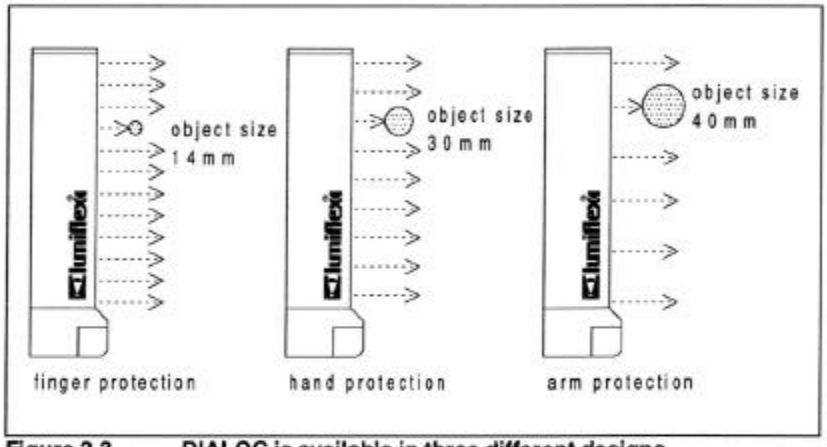


Figure 2-3 DIALOG is available in three different designs.

The individual designs differ in their maximum protected width and height and in price.
The following table shows which sensing field sizes are available for each particular design.

Type	Object sensivity size	Max. protected width	Max.protected height
D 214 to D 1414	14 mm	4 m	1,4 m
D 230 to D 2830	30 mm	10 m	2,8 m
D 240 to D 3440	40 mm	18 m	3,4 m

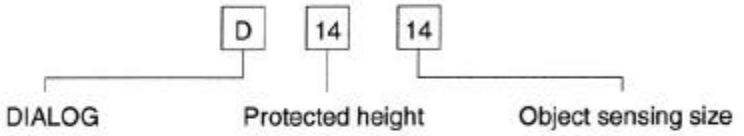
Table 2-1

2.4 Type specification

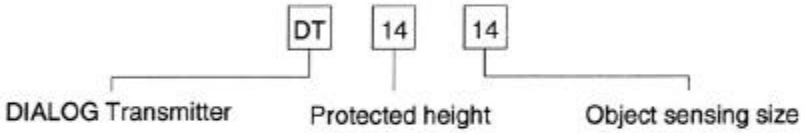
Example: D 1414

The whole unit consisting of a transmitter and receiver is designated by D followed by a series of digits.D stands for DIALOG and the following digits indicate the approximate protected height and the resolution (object sensing size).

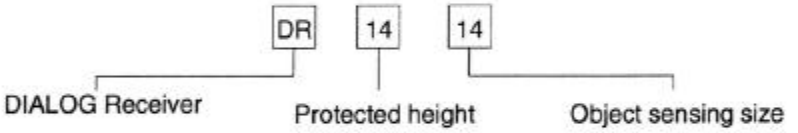
The designation D 1414 indicates a DIALOG light curtain with a protected height of 1400 mm and an object sensing size of 14 mm.



The transmitter is denoted by DT and a series of digits.
T stands for transmitter.



Similarly the receiver is denoted as follows:



2.5 Working principle

The individual infrared light sources in the transmitter are lit up one after the other in a switching sequence of 64 µs per light source. The infrared light is given a special identification key making the unit virtually immune to the effects of extraneous light sources such as sunlight, room lighting, stroboscopic lamps etc.

The DR receiver synchronises optically with the transmitter by means of this identification key and activates its individual receiving elements in the same switching sequence as the transmitter.

The electrical signal "sensing zone free" is transferred from the receiver to the BASIS 270 control unit only when all light beams with sufficient intensity and the correct identification key have been received.

3 Safety information

The DIALOG safety light curtain is internal self-checking. Malfunctions which could affect safety are detected and lead to a cut-out command.

The development and manufacture of DIALOG safety light curtains follow universally recognised technical principles. Users are thus effectively protected providing the equipment is used as prescribed.

Persons outside the DIALOG sensing field cannot be detected! Therefore, it must be ensured that a machine or facility is operated only when there is no-one in the danger area. For relevant information see Chapter 4.

DIALOG does not protect against injuries from flying objects (e.g. work pieces and tools). Additional protective devices must be fitted, where appropriate. For relevant information see Chapter 4.

Production processes may only be directed by using DIALOG at non-passable entry and exit openings.

4 Application regulations

The relevant statutory and official regulations apply with regard to the use of DIALOG safety light curtains. These regulations vary depending on the type of application. Information can be obtained from the authorities responsible for accident prevention in your branch of industry (e.g. industrial compensation insurance companies).

The DIALOG must be fitted in such a way that danger points can be reached only through the sensing zone. If this is not ensured, additional protective systems are to be installed. If mechanical protective devices are installed for this purpose, they must either be fixed (mounted with a special tool or welded) or their positions must be monitored automatically if they are required to open.

4.1 Requirements for the machine to be safeguarded

Safety light curtains do not protect against machine failure! Control of the downstream machine must be so designed that the safety light-grid curtain's switching command is processed appropriately and failsafe.

The machine's control system and drive must, in each operating phase, permit an immediate and stepless interruption of the dangerous movement.

The BASIS control unit must be connected to the machine's control system in two separate channels. For connection examples see "Connection and operating instructions for BASIS control unit".

In addition, the equipment-specific safety rules apply.

When mounted on metal-working presses, the control system must meet the requirements of the "Safety rules for control systems on powered metal-working presses, ZH 1/457 in Germany and PM 41 in the UK".

4.2 Fitting regulations

The safety light curtain must meet the following fitting regulations:

1. The danger points may be reached only through the sensing zone (Figure 4-1).

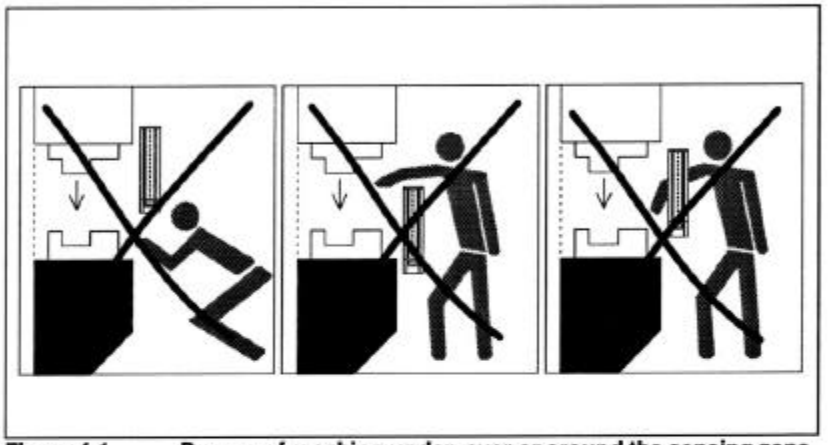


Figure 4-1 Danger of reaching under, over or around the sensing zone

2. A sufficient safety distance must be maintained between the sensing zone and the nearest danger point (Figure 4-2) and

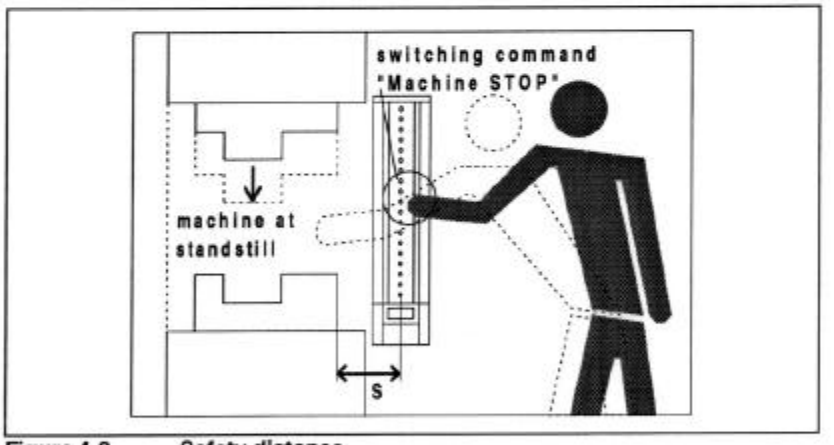


Figure 4-2 Safety distance

the dangerous movement must have come to a standstill before the danger point has been reached. The safety distance S is calculated on the basis of the formula given in Chapter 7.1.1.

3. No-one is allowed to stand between the sensing field and the danger points (Figure 4-3).

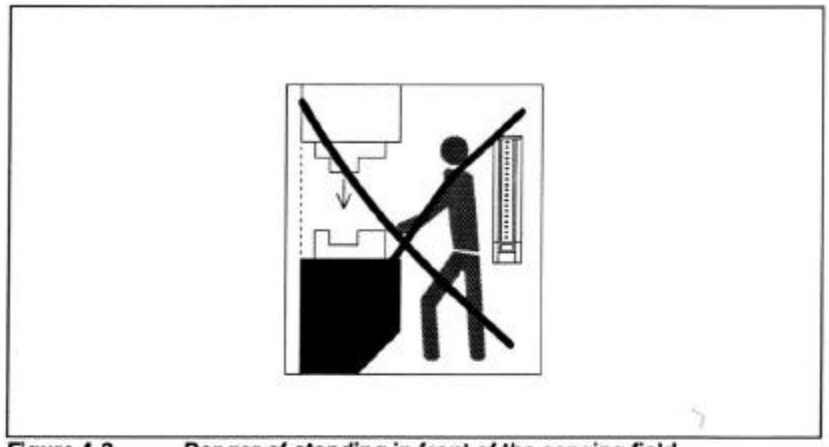


Figure 4-3 Danger of standing in front of the sensing field

4.2.1 Making danger points safe

The fitting regulations cited in 4.2 must be complied with. Specific stipulations with regard to the provision of safeguards and combinations with other protective equipment can be found in the equipment-specific stipulations (norms).

When mounting on metal-working presses, the "Safety rules for contactless protective equipment on powered metal-working presses, ZH 1/281, PM 41" must be complied with.

4.2.2 Making danger areas safe

The fitting regulations in 4.2 must be complied with. Specific stipulations with regard to the provision of safeguards and combinations with other protective equipment are contained in the equipment-specific stipulations. When used in automatic production systems, "the safety requirements for automatic production systems, VDI (Association of German Engineers) 2854" must be complied with. Figure 4-4 shows an example of application.

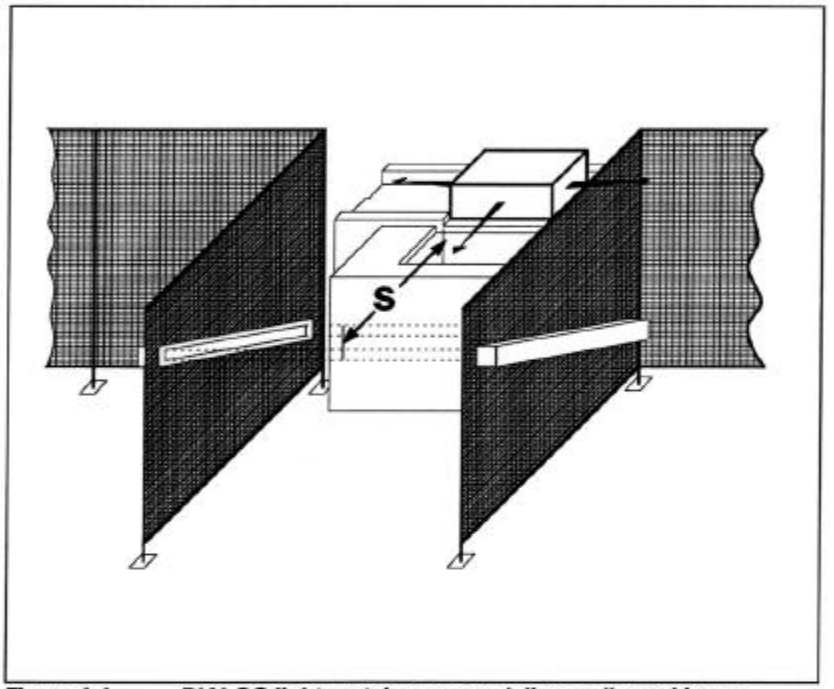


Figure 4-4 **DIALOG light curtain, arranged diagonally, making an area safe**

Initian of production processes by a light-curtain (single break or double break) is only allowed on non-walkable entry & exit areas.

The start of the first dangerous motion after switching on (start interlock), and the start of the first dangerous motion after a protective device has responded (restart interlock), can only be performed by activating a control device.

This control device must be so mounted that it cannot be operated from the danger area and the whole danger area can be adequately surveyed from where the device is mounted.

Figure 4-5 shows the use of a DIALOG light curtain for the area guarding under an elevator.

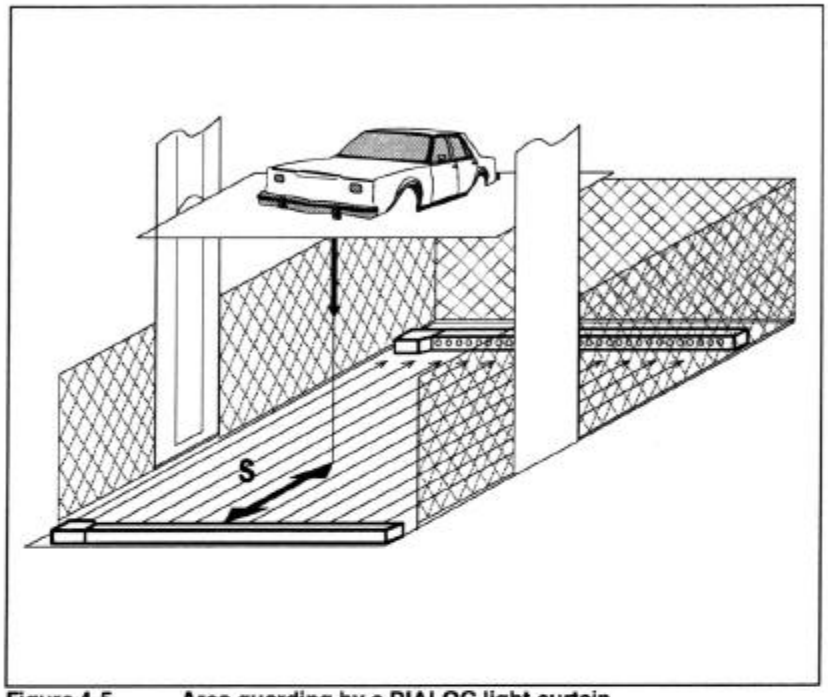


Figure 4-5 **Area guarding by a DIALOG light curtain arranged horizontally**

5 Selecting a DIALOG safety light curtain

Proceed as follows when selecting a DIALOG safety light curtain:

1. Looking up the applicable regulations, norms and provisions for the particular use intended.

The relevant authorities and industrial compensation insurance companies will give assistance here.

2. Determine the DIALOG protected width required.

The width of the sensing field corresponds to the width of the area to be made safe. The width of the DIALOG's sensing zone must be so selected that danger points can only be reached through the sensing zone (Figure 5-1).

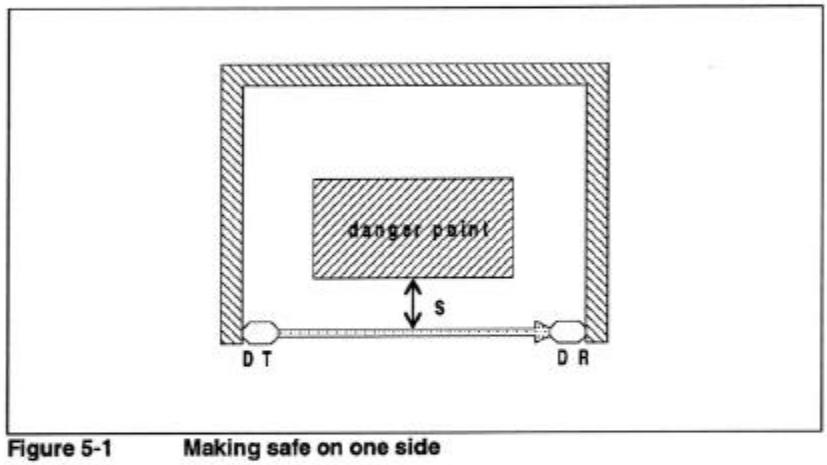


Figure 5-1 Making safe on one side

Areas whose width exceeds the maximum protected widths of the individual DIALOG designs (4 m, 10 m and 18 m) can also be made safe by combinations of DIALOG safety light curtains (Figure 5-2).

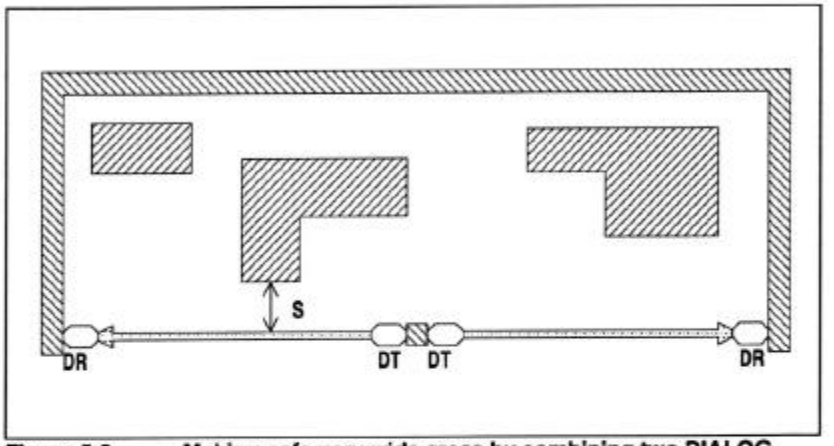


Figure 5-2 **Making safe very wide areas by combining two DIALOG safety light curtains.**

Figures 5-3 and 5-4 show further application examples in plan view.

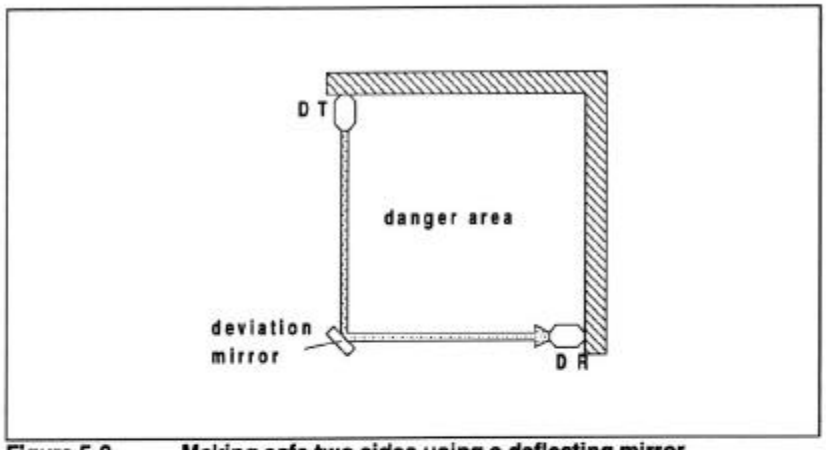


Figure 5-3 **Making safe two sides using a deflecting mirror**

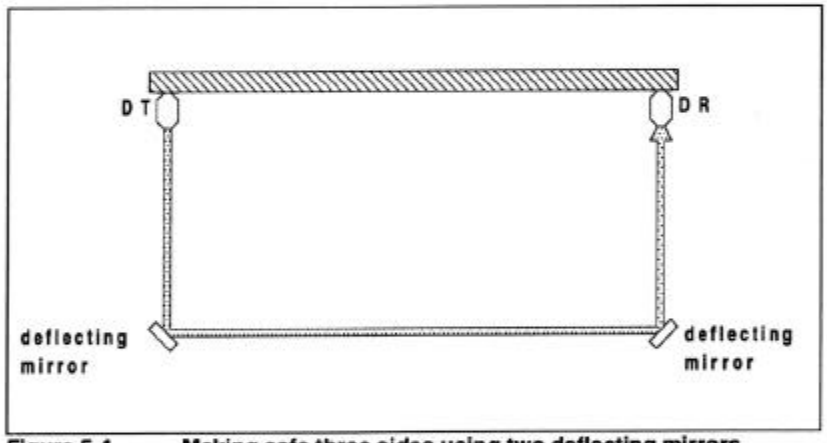


Figure 5-4 **Making safe three sides using two deflecting mirrors**

When using deflecting mirrors, the maximum protected width of the individual DIALOG designs is reduced in accordance with the following table.

Typ	Reduction per deflecting mirror
D 214 to D 1414	0,7 m
D 230 to D 2830	1,7 m
D 240 to D 3440	3,0 m

Table 5-1

3. Determining the DIALOG protected height required.

The DIALOG protected field height must be so selected that the danger points can be reached only through the sensing zone (Figure 5-5).

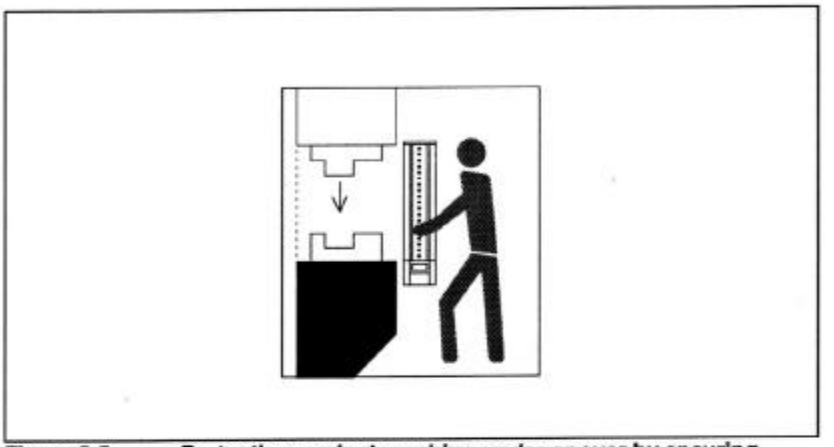


Figure 5-5 **Protection against reaching under or over by ensuring adequate protected height**

Areas whose height exceeds the maximum protected heights of the individual DIALOG designs (1414 mm, 2830 mm and 3340 mm) can also be made safe by combinations of DIALOG safety light curtains (Figure 5-6).

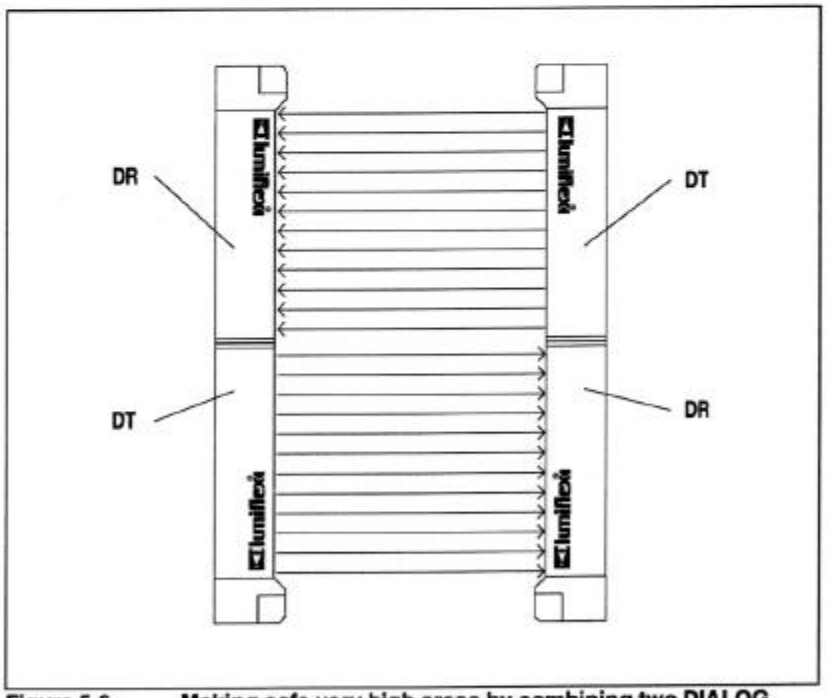


Figure 5-6 **Making safe very high areas by combining two DIALOG safety light curtains.**

4. Selecting DIALOG design options

Once protected height and width have been determined, select a design option on the basis of the following table 5-2 (object sensivity size 14 mm, 30 mm or 40 mm).

The individual designs differ in maximum protected width and height and in price. The design with an object sensivity size of 40 mm is cheaper than the 14 mm design with the same protected height as it contains far fewer light beams.

However, note that when mounting the 30 mm and 40 mm designs, thanks to an appropriate allowance, a somewhat larger safety distance must be complied with than with the 14 mm design (see 7.1.2 Safety distance).

Object sensivity size	Max. protected width	Max. protected height
14 mm	4 m	1,4 m
30 mm	10 m	2,8 m
40 mm	18 m	3,4 m

Table 5-2

5. Determining the unit type using selection tables 5-3, 5-4 and 5-5

The response time cited in the selection tables is the sum of the DIALOG and BASIS response times.

Selection table for 14 mm object sensivity size

Protected height (mm)	Response time (ms)	Unit type D	Order No.
218	21	214	528402
320	22	314	528403
422	23	414	528404
524	23	514	528405
626	24	614	528406
728	25	714	528407
830	26	814	528408
932	26	914	528409
1034	27	1014	528410
1136	28	1114	528411
1238	29	1214	528412
1340	30	1314	528413
1442	30	1414	528414

Table 5-3

Selection table for 30 mm object sensivity size

Protected height (mm)	Response time (ms)	Unit type D	Order No.
218	20	230	528415
422	21	430	528417
626	22	630	528419
830	23	830	528421
1034	23	1030	528423
1238	24	1230	528425
1442	25	1430	528427
1646	26	1630	528429
1850	26	1830	528431
2054	27	2030	528433
2258	28	2230	528435
2462	29	2430	528437
2666	30	2630	528439
2870	30	2830	528441

Table 5-4

Selection table for 40 mm object sensivity size

Protected height (mm)	Response time (ms)	Unit type D	Order No.
218	20	240	528442
422	21	440	528444
626	21	640	528446
830	22	840	528448
1034	23	1040	528450
1238	23	1240	528452
1442	25	1440	528454
1646	25	1640	528456
1850	25	1840	528458
2054	26	2040	528460
2258	27	2240	528462
2462	27	2440	528464
2666	28	2640	528466
2870	29	2840	528468
3074	29	3040	528470
3278	30	3240	528472
3482	30	3440	528474

Table 5-5

6 Scope of Supply and Order Details

An order for a DIALOG safety light curtain must contain the following details:

- Number of pieces
- Unit type
- Length of connecting cable to BASIS

Example:

1 DIALOG safety light curtain Type D 1440 with
1 1.5 m connecting cable
1 BASIS control unit

The DIALOG scope of supply comprises the following components:

1 DT transmitter
1 DR receiver
2 Mountings
1 Connecting cable (0.5, 1.5 or 3 m)
1 Assembly kit with accessories to fasten the transmitter and receiver in the mounting
1 suitable test piece for daily checks
1 set of fitting and operating instructions for DIALOG safety light curtains

7 Fitting

7.1 Fitting regulations

7.1.1 Safety distance

The safety light curtain must be fixed at a certain distance from the danger point, at the safety distance (see Fig. 4-2, page 4-2.).

The safety distance is so measured that the dangerous movement has already come to a standstill when the sensing zone has been entered, before the danger point can be reached.

The safety distance depends on the safety light curtain's response time, the machine's stopping time and the operator's hand speed. It is calculated according to the following formula:

$$S = v \times (t_{stopping} + t_{ESPD}) + Z$$

It must, however, be 100 mm at least, even if purely theoretically a lower value is produced.

S	=	Safety distance between the ESPD's (electro-sensitive protective device) sensing field and the nearest danger point (in mm).
v	=	Operator's hand speed. Set a minimum value of 1.6 mm/ms.
$t_{stopping}$	=	Stopping time of the equipment from the time of the ESPD's switching command "Machine Stop" to the standstill of the dangerous movement. When calculating the machine's stopping time, the operating conditions which lead to the maximum stopping time must be taken into account (e.g. largest tool, stop command at the time of the greatest tool speed). The value obtained by repeated measurements is entered in the formula in ms.
$t_{(ESPD)}$	=	Response time of the ESPD consisting of the DIALOG safety light curtain and the BASIS control unit (in ms). This value is shown in selection tables 5-3, 5-4 and 5-5.
Z	=	Allowance on safety distance (in mm). The allowance is based on the resolution (object sensivity size) of the safety light curtain. Table 7-1 below shows the allowances currently to be complied with in Germany.

Allowances for vertical fitting (recommended in accordance with the accident prevention regulation for powered equipment)

Object sensivity size in mm	Allowance Z in mm
14	0
14-30	130
30-45	230
45-80	850 (arm's length)

Table 7-1

When the DIALOG light curtain is mounted horizontally, an allowance of 1.2 m (arm's length + stride length) must be taken into account.

7.1.2 Minimum distance to reflective surfaces

The aperture angle of the DIALOG optics is +/- 2 degrees. Reflective surfaces within the transmitting and receiving beam can lead to the reflective surfaces reflecting the object and thus to the object not being detected (Figure 7-1).

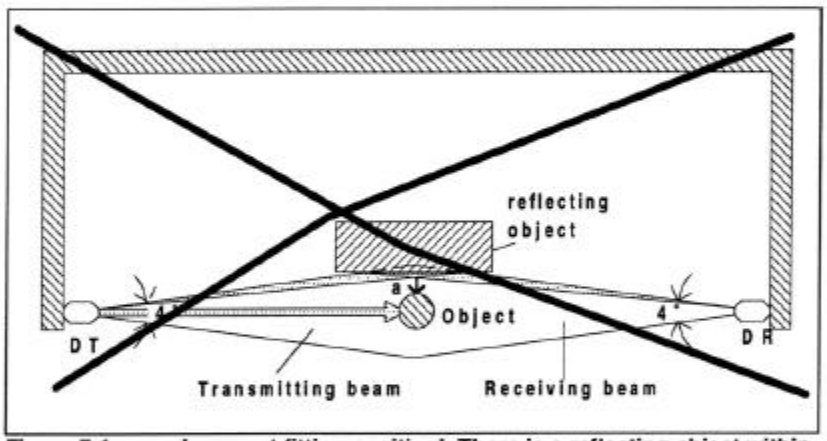


Figure 7-1 **Incorrect fitting position! There is a reflecting object within the transmitting and receiving beam. An intruding object will not be detected!**

Therefore, minimum distance "a" must be maintained between the reflective objects and the optical axis (Figure 7-2).

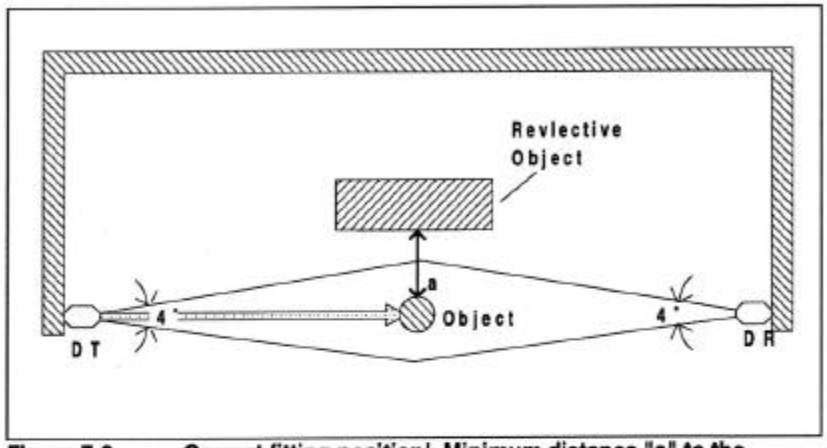


Figure 7-2 **Correct fitting position! Minimum distance "a" to the reflective surfaces is maintained.**

The minimum distance increases as the distance between the transmitter and the receiver (protected width) increases. The graphic chart in Figure 7-3 shows this relationship.

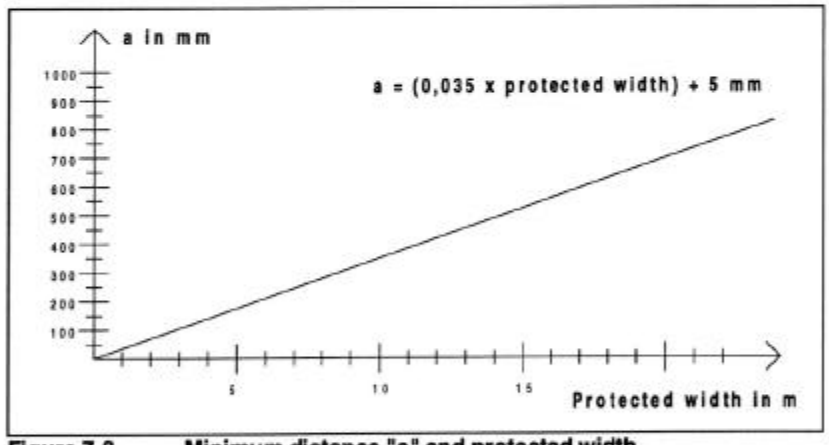


Figure 7-3 **Minimum distance "a" and protected width**

7.1.3 Fitting position

Caution: When fitting the DIALOG light curtain, you must ensure that the transmitter and receiver are fixed in the same direction. This means that the electrical connections must point in the same direction (Figure 7-4).

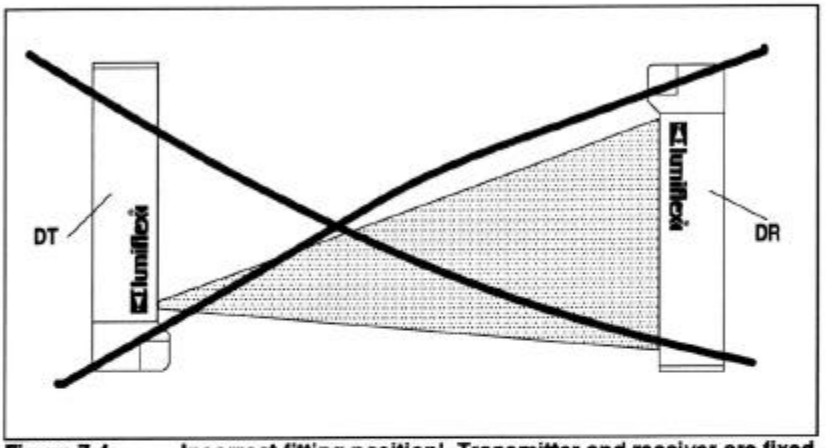


Figure 7-4 **Incorrect fitting position! Transmitter and receiver are fixed in opposite directions.**

To ensure that the transmitter's light beams hit the receiver exactly, the transmitter and receiver must be mounted in parallel and at the same height. The alignment tolerance for the transmitter and receiver is +/- 2 degrees (Figure 7-5).

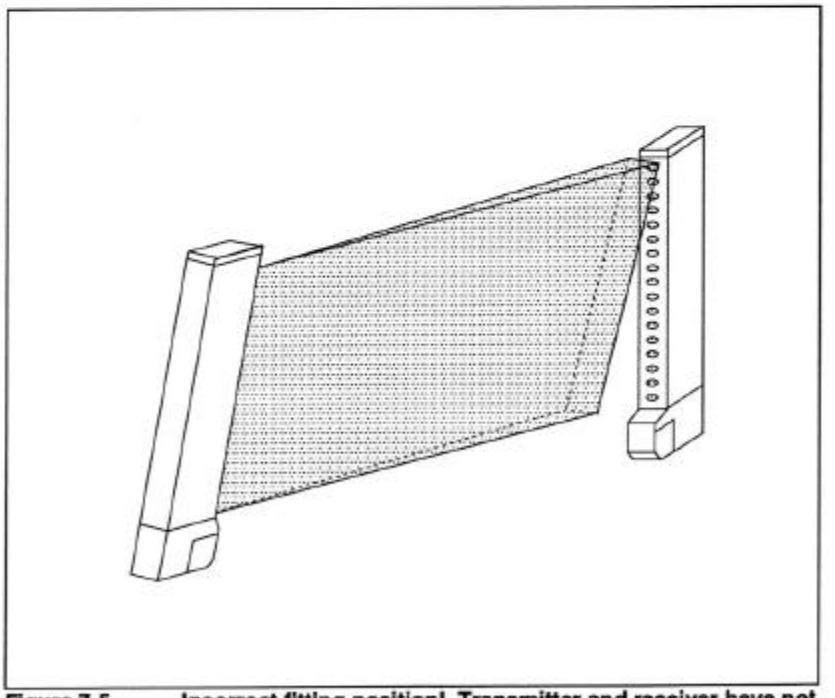


Figure 7-5 **Incorrect fitting position! Transmitter and receiver have not been fixed in parallel or are misaligned.**

7.1.4 Information on combining DIALOG safety light curtains

When combining DIALOG safety light curtains, mutual influence must be excluded (Figures 7-6, 7-7, 7-8 and 7-9).

The light beam of the transmitter belonging to the one unit must not hit the receiver of the other unit. This is achieved by the unit components being fitted in opposite directions.

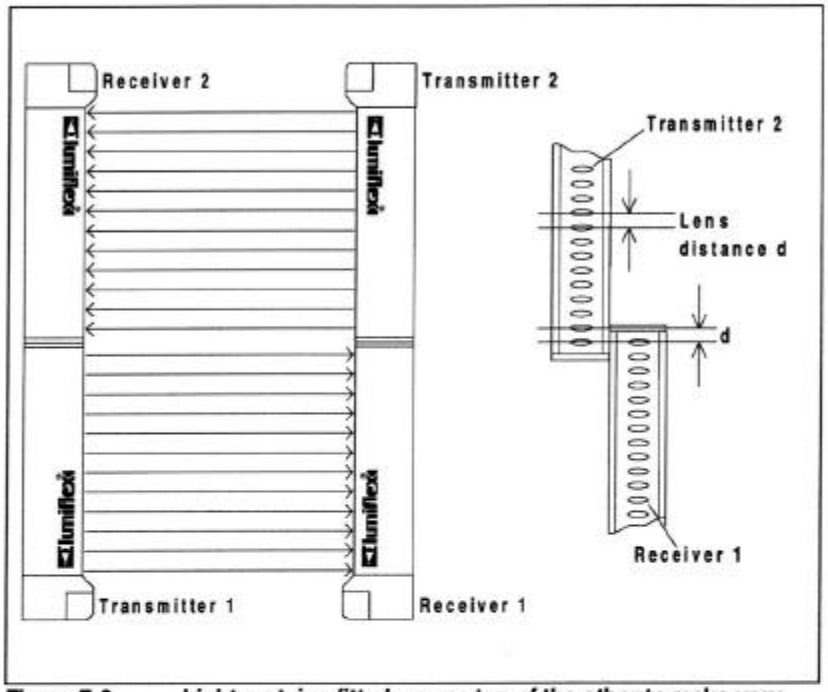


Figure 7-6 **Light curtains fitted one on top of the other to make very high areas safe**

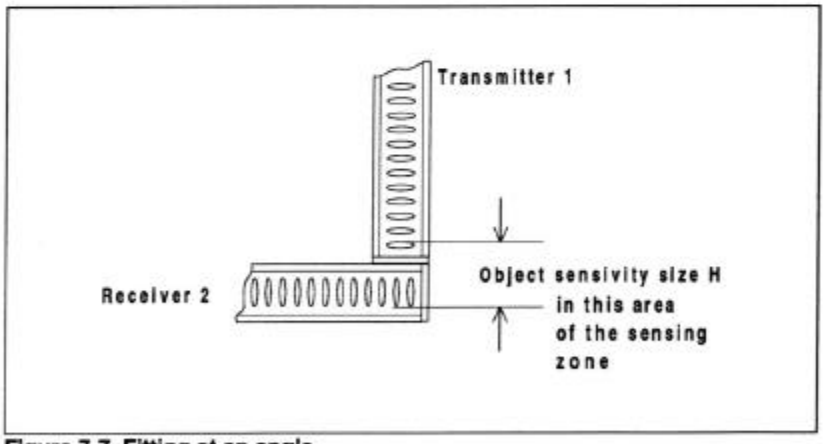


Figure 7-7 Fitting at an angle

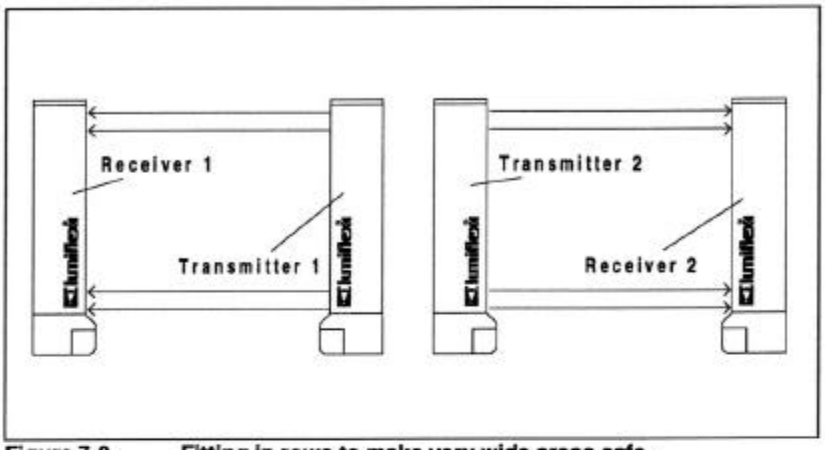


Figure 7-8 Fitting in rows to make very wide areas safe.

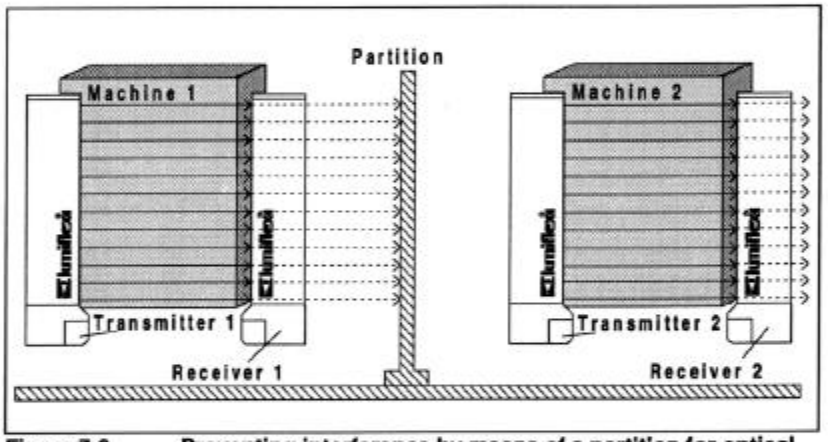


Figure 7-9 Preventing interference by means of a partition for optical screening when machines are adjacent and transmitter and receiver mounted in the same direction.

7.2 Mounting the equipment

The scope of supply for the DIALOG safety light curtain includes two mounts, one for the transmitter and one for the receiver.

The mount consists of two fitting angles and a slip-on rectangular pipe as the joining element. The dimensions of the fixing holes are shown in Figure 7-10.

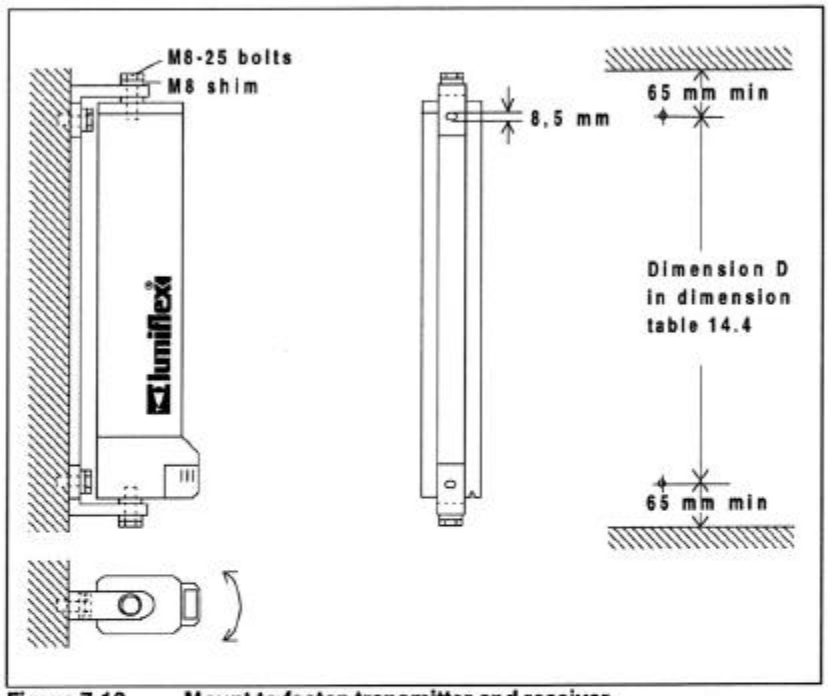


Figure 7-10 Mount to fasten transmitter and receiver

Tips on subsequent attachments:

- Read through Chapters 4 and 7 and comply with attachment regulations
- (Slip the mount onto the transmitter and receiver)
- Comply with the safety distance to the next danger point
- Measure the height above ground and drill the fixing holes
- Screw down the mounts at one end; using a spirit level determine the vertical or horizontal position of the mounts; drill lower fastening holes
- Fasten mounts with screws
- Insert the transmitter and receiver in the mounts and fasten using screws provided

8 Electrical connection

8.1 DT transmitter or DTL

Before making the connection, check whether the local supply voltage corresponds to the details given on the type plate. Connect up the supply voltage in accordance with Figure 8-1 at the sleeve insert of the plug provided.

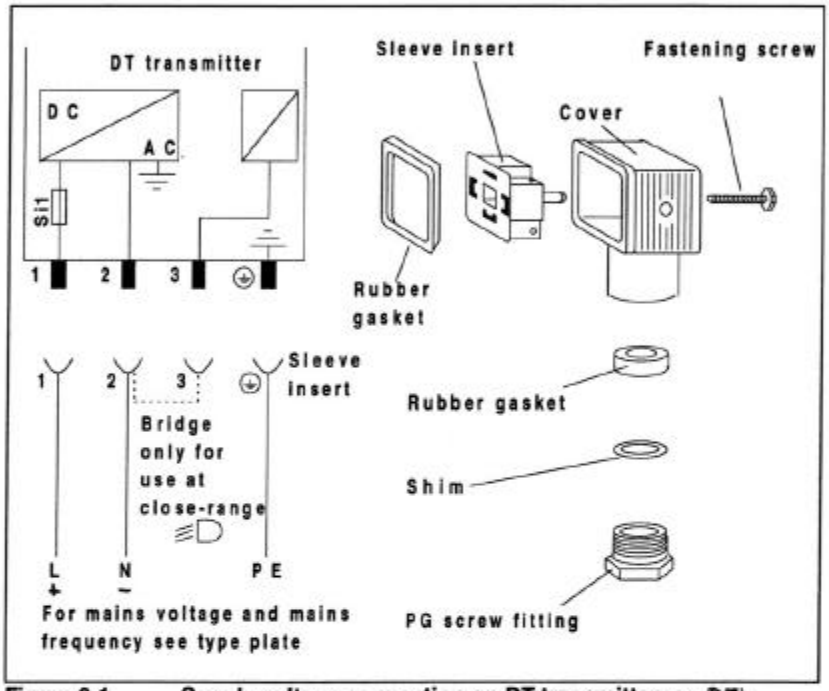


Figure 8-1 Supply voltage connection on DT transmitter or DTL

To prevent overdriving of the receiver at small protected widths, the quantity of light emitted by the transmitter must be reduced (dimming symbol on transmitter display). This is achieved by a wire bridge between connection 2 and 3 of the sleeve insert.

Table 8-1 below shows with which protected widths this wire bridge has to be used.

Bridge 2-3 is required for:

Object sensivity size	14mm	30mm	40mm
Protected width	0 - 0,8m	0 - 2m	0 - 3m

Table 8-1

Connection tips:

Caution: The type of enclosure is only guaranteed if the connection conforms to specification and the rubber gaskets are fitted correctly.

- Remove the rubber gasket on the front of the plug
- Unscrew the fastening screw
- Remove the sleeve insert by applying pressure to the screw bushing at the rear
- Lead the cable through the PG gland fitting
- Bare the insulated conductors and connect as per Figure 8-1
- Where appropriate use bridge 2-3 (see Table 8-1)
- Insert the sleeve insert and tighten PG gland fitting
- Slip on rubber gasket and tighten screw
- Pull off transmitter's cover in forward direction and plug in connector plug
- Tighten fastening screw and snap on cover. If the place where the plug is fitted is not accessible from underneath, the transmitter must be removed from the mount in order to tighten the fastening screw.

8.2 DR Receiver:

Connection tips:

- Pull off receiver cover in forward direction
- Plug in the 90° offset plug of the connecting cable and tighten coupling ring
- Snap on cover

8.3 BASIS 270 control unit

Connection tips:

- Plug in connecting cable to DR receiver and tighten coupling ring
- Do not fail to comply with the "Connection and operating instructions for the BASIS control unit" to produce a reliable connection to the machine controls!

9 Initial Operation

9.1 Display elements in transmitter

There are three display elements (LEDs) to be seen in the DT transmitter's display panel (Figure 9-1).

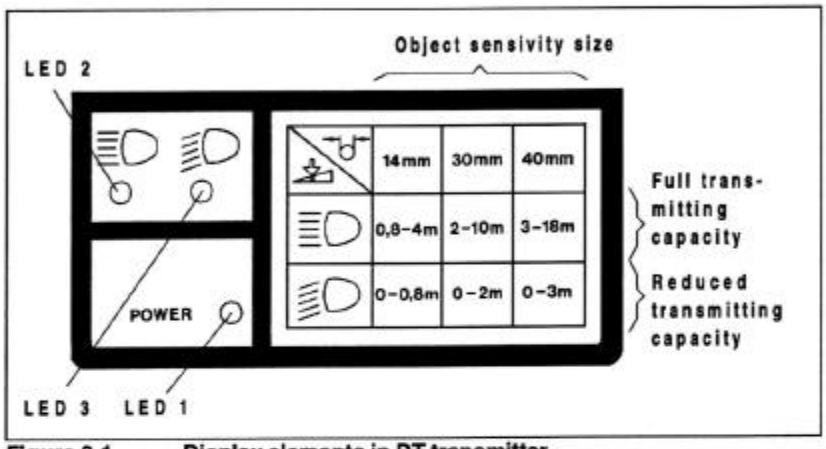


Figure 9-1 **Display elements in DT transmitter.**

Table 9-1 below shows the function and significance of the displays:

LED No.	Colour	State	Meaning
1	red	ON	Supply voltage availlable
		OFF	No supply voltage
2	red	ON	Full transmitting capacity
		OFF	Reduced transmitting capacity
3	red	ON	Reduced transmitting capacity
		OFF	Full transmitting capacity

Table 9-1

9.2 Display elements in receiver

The receiver's display panel has two large display elements to indicate the control state of the output relays in BASIS and six small display elements to indicate the DIALOG's internal system states (Figure 9-2).

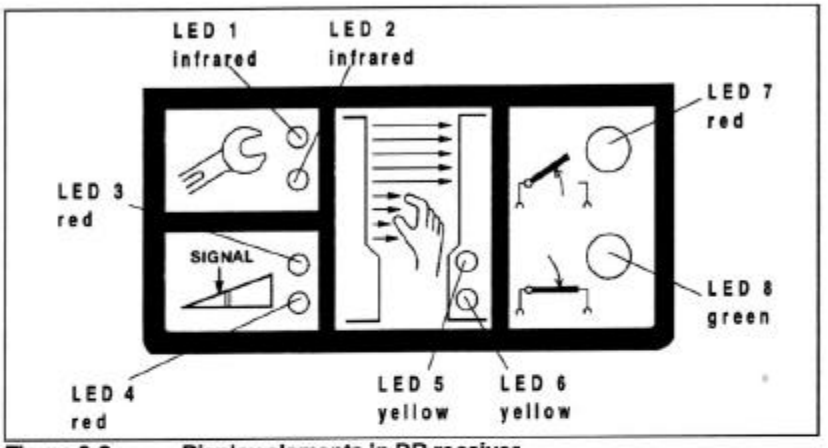


Figure 9-2 Display elements in DR receiver

Meaning and function of displays in relation to the control state of the output relays in BASIS (Table 8-2):

LED No.	Colour	State	Meaning
7	red	ON	Relay dropped out, Switching command "Machine Stop"
		OFF	Relay closed. Switching command "Release" or no supply voltage
8	green	ON	Relay closed. Switching command "Release"
		OFF	Relay dropped out, Switching command "Machine Stop" or no supply voltage

Table 9-2

Display elements for DIALOG's internal system states (Table 9-3):

LED No.	Colour	Function
1	infrared	Led diagnostic channel I Optical diagnostic interface to external diagnostic device DIATEST (LUMIFLEX Order No. 529010
2	infrared	LED diagnostic channel II, see channel I
3	red	LED service channel I Soiling indicator and alignment aid (as well as display for messages from internal monitoring circuit)
4	red	LED service channel II, see channel I
5	yellow	LED sensing zone state channel 1 indicates whether there is an object in the sensing field or the quantity of light received is too small.
6	yellow	LED sensing zone state channel II, see channel I

Table 9-3

9.3 Checks before switching on for first time

9.3.1 Supply voltage

Before switching on for the first time, check whether the local supply voltage corresponds with the details on the type plates of the DT transmitter and the BASIS control unit.

9.3.2 Bridging the test input on BASIS for the aligning process

Note: When aligning the transmitter and receiver, it is vital that there is no external test request at the test input of BASIS.

An external test request (also called cyclical testing) simulates an object in the DIALOG's sensing zone. The displays in the receiver indicate an "object in the sensing zone" during the test request regardless of the actual state of the sensing zone.

During the aligning process, test input 3-4 must therefore be bridged on the 24-pin connector plug of BASIS.

9.4 Switching on power and aligning transmitter and receiver

9.4.1 Switching on

Once the supply voltage has been switched on, LED 1 lights up in the transmitter's display panel ("Supply voltage available"). In addition, either LED 2 or LED 3 lights up, depending on whether full or reduced transmitting capacity has been set (see Chapter 8.1). The transmitter is working

In the receiver's display panel, the LEDs 3,4 and 5,6 light up briefly after switching on and go out if the equipment has been fitted in accordance with 7.1.3, complying with the alignment tolerance (+/- 2 degrees). In this case alignment is no longer necessary.

If LEDs 3,4 (service LEDs) and 5,6 (sensing zone state LEDs) do not go out, either there is an object in the sensing zone or the transmitter and receiver have not been aligned correctly.

9.4.2 Aligning transmitter and receiver

Some control and monitoring functions are built into the BASIS) which influence the state of the switching output and can produce the switching command "Machine Stop" even when the sensing zone is free.

For this reason, only pay attention to the yellow LEDs 3,4 for the state of the sensing zone during the aligning process and the red service LEDs 5,6 for fine adjustment.

The transmitter and receiver have been optimally aligned when these LEDs have gone out. It may be that the large red LED 7 remains lit signalling "Machine Stop" because of certain input signals at BASIS 270.

The yellow LEDs 3,4 serve as an alignment aid for rough adjustment and the red LEDs 5,6 as an alignment aid for fine adjustment.

For reasons of component tolerance, the two separate channels of the DIALOG receiver have minor differences in terms of sensitivity and therefore the state of LEDs 5 and 6 often varies. Hence, it is normal operating practice for channel I, for example, to signal "soiled" (LED 5 is constantly lit or flickering), whilst channel II still has sufficient operating power (LED 6 not lit).

In order to align the transmitter and receiver, loosen the fastening screws in the mounts and equipment until the mounts become movable. Proceed as follows:

1. Bring the transmitter's mount into the basic position (depending on application this can either be the vertical or the horizontal) and fasten.
2. By turning the transmitter in the mount, align it with the receiver and fasten it.
3. Turn the transmitter in the mount until LEDs 3,4 and 5,6 go out. (If these LEDs do not go out at any point in the turning range, alignment of the mount is also required) .
4. Turn beyond this point until the LEDs light up again.
5. Now turn back and fasten the receiver in the centre of this range (Figure 9-3).

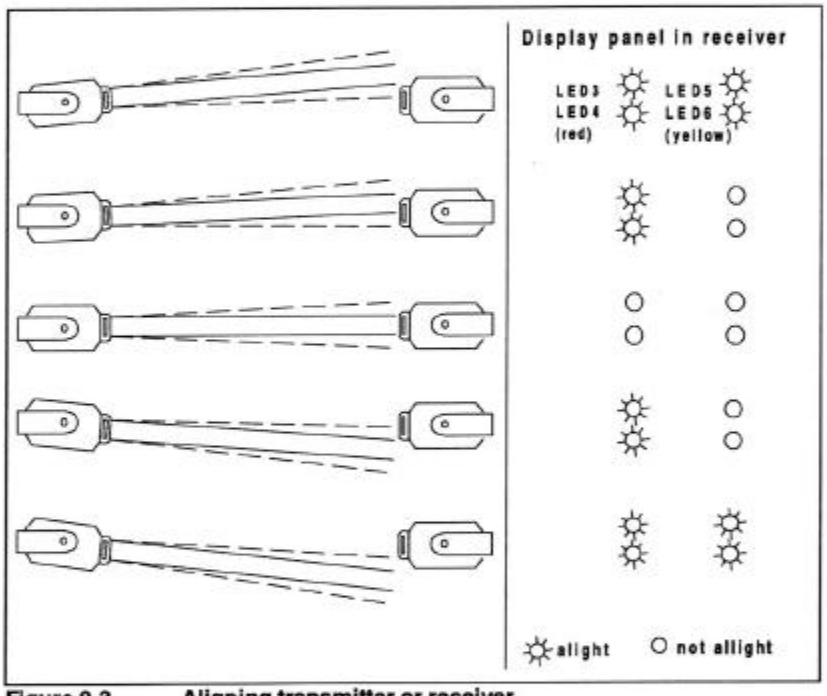


Figure 9-3 Aligning transmitter or receiver

6. By swinging the receiver's mount, align the receiver parallel to the transmitter until LEDs 3,4 and 5,6 go out.
7. Swing beyond thispoint until the LEDs light up again.
8. Now swing back again and fasten the receiver's mount in the centre of this range.
9. If the red LEDs 5,6 in the receiver's display panel do not go out, align the transmitter with the receiver in accordance with steps 3 to 8.

10 Troubleshooting and fault rectification

Malfunctions can often have relatively simple causes. Table 10-1 below provides instructions on locating faults and rectifying them. If this does not work, contact the LUMIFLEX after-sales service or the relevant factory representative.

Note: Do not touch electrical connections when the equipment is open or switched on!

Symptom	Possible Cause	Check/Remedy
All displays in transmitter and receiver will not light	– No supply voltage	– Turn on main machine switch Check lead fuse – Check lead fuse
LEDs in transmitter will not light up	– No supply voltage Connecting lead defective – Fuse Si 1 in transmitter faulty	– Check mains voltage at connector plug – Unscrew transmitter bottom casing, check Si 1 and replace if need be (pico fuse M0.5A)
LEDs in receiver will not light up	– Connecting cable to BASIS not plugged in or defective – No BASIS supply voltage – Fuse Si 1 on BASIS printed circuit defective – Power pack in BASIS faulty	– Check cable plug/tighten coupling ring, unplug cable at both ends and measure resistance (wiring 1:1) – Check mains voltage at connector plug – Open casing cover, check Si 1 and replace if need be (pico fuse M1.6A) – If available replace BASIS with a substitute device and check functions

Table 10-1 (page 1 of 3)

Symptom	Possible Cause	Check/Remedy
LED 7 (red) and LEDs 5, 6 (yellow) and LEDs 3, 4 (red) in receiver lit constantly	– Transmitter/receiver maladjusted	– Clean, adjust
	– Circuit at test input 3, 4 of BASIS open	– Check
	– Type of operation switch for "Guard Only", "Single Break", "Double Break" is between two operating modes	– Move switch to desired operating mode
	– Transmitter set to full transmitting capacity and min. distance to receiver not complied with (see Table 8-1)	– Put bridge in transmitter plug (see Fig. 8-1)
LED 7 (red) in receiver lit constantly	– In operating mode A: Test intrusion into sensing zone after mains switched on not yet carried out	– Intrude into any part of sensing zone and release again
	– In operating mode B: Control device for start interlock and restart interlock not yet activated	– Activate control device
	– In operating mode B: Control device constantly depressed	– Check
	– External relay monitoring activated (Br1 to 2-3 in BASIS)	– Check wiring of input 6, 8 of BASIS or replace defective relay
	– Input 6, 8 is disconnected or an external relay did not release	

Table 10-1 (Page 2 of 3)

Symptom	Possible Cause	Check/Remedy
Control state display in transmitter changes from green back to red shortly after the control device has been activated	– Extern relays will not start up	– The circuit connected at external relay monitoring input must have opened approx. 100 ms after control command "Release".
	– External relay monitoring input 6, 8 on BASIS bridged.	– Check fuses Si 2 Si 3 and Si 4, if need be replace
		– Check external fuse of extern relays
LED 8 (green) in transmitter lit constantly/one or both LEDs 3, 4 (red) flicker or also lit	– Transmitter/receiver maladjusted	– Optimise adjustment
	– Equipment dirty	– Clean covering panes
Red LEDs 3, 4 flashing in particular pulse sequence/LED 7 (red) lit constantly	– Internal monitor switch has found fault	– Switch off supply voltage from transmitter/BASIS and switch on again. If the flashing sequence reoccurs, note no. of pulses between longer intervals and notify LUMIFLEX after-sales service or relevant factory representative.

Table 10-1 (Page 3 of 3)

11 Checks

Safety light curtains, like all safety devices, are effective only when used correctly and when they are not damaged or manipulated improperly.

Regular checks increase the operating safety and reliability of the protective device.

11.1 Checks before initial operation

Caution:

Safety light curtains fulfil their protective function only when they are installed in accordance with the fitting instructions and interact correctly with the machine control system.

Therefore, we recommend (not only for metal-working presses in PM 41, ZH 1/281) that the equipment be inspected before initial operation by an expert from LUMIFLEX.

11.2 Daily inspection

At the start of production or during a shift change, the person in charge must guide the test piece (for object size see type plate) about in the middle between transmitter and receiver slowly through the whole sensing zone (Figure 11-1). If in the process the green display diode lights up even if only at one point, his superior must be notified immediately and work on the machine halted.

After each tool change check whether the whole danger area is protected and the safety distance is maintained.

Only through these checks can damage or any manipulation of the protective device be detected in good time.

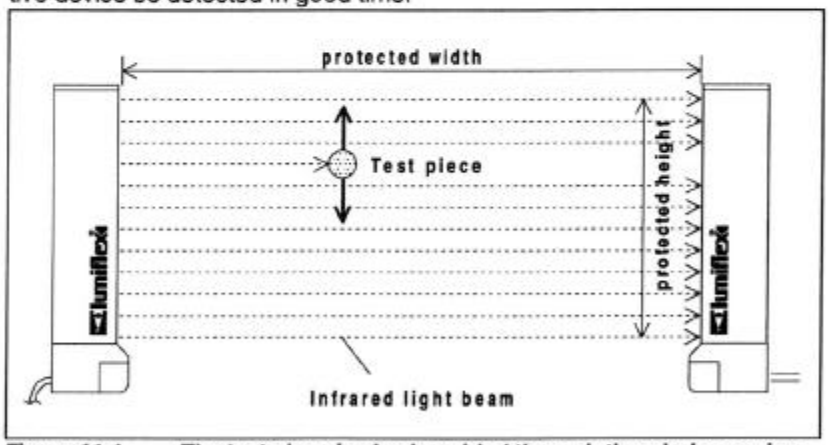


Figure 11-1 The test piece is slowly guided through the whole sensing zone

11.3 Annual check

During the annual check, perfect functioning, the state of the components and the interaction of the safety light curtain and the machine control system are checked.

The results of the check are confirmed in a report and on a test certificate.

This check must be carried out by an expert from LUMIFLEX or by an employee of the machine operator who has been trained by LUMIFLEX.

For this purpose, LUMIFLEX offers a maintenance contract and training on LUMIFLEX's or the customer's premises.

12 Maintenance

12.1 Cleaning

The covering panes in the transmitter and receiver must be cleaned regularly depending on how dirty they are. The soiling display LEDs in the receiver's display panel light up to indicate when cleaning is required.

The transmitter and receiver covering panes are made of optical glass. They are to be cleaned as normal window panes.

12.2 Replacing the protective glass fronts

It is easy to replace the DIALOG's protective glass fronts. The unit does not have to be detached or opened.

The tool required is an ordinary spatula which should have a blade of at least 5 cm in width.

1. Insert the spatula in the groove between the casing and the snap-on strip and gradually remove the snap-on strip from the casing by lever action (Figure 12-1).

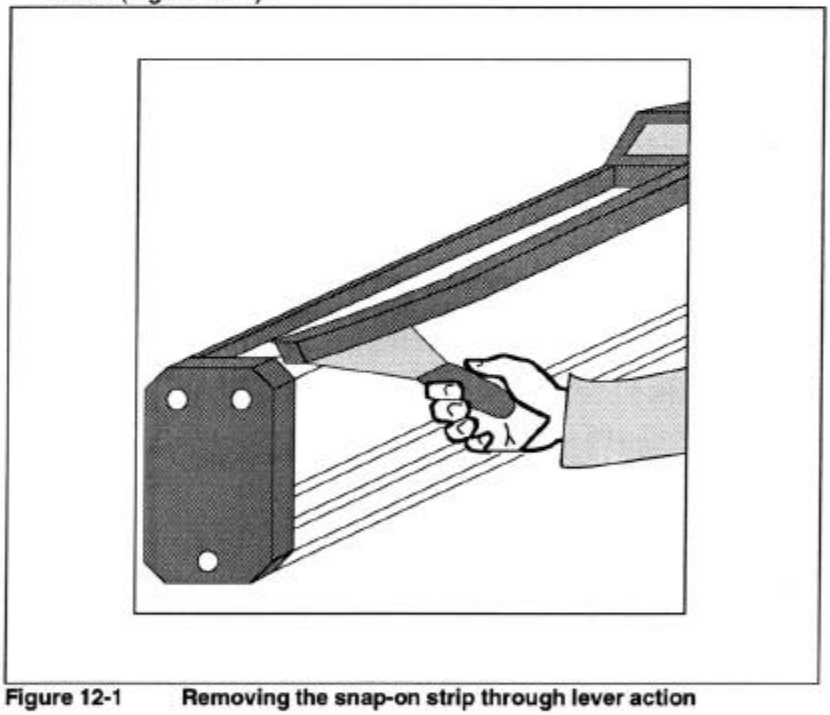


Figure 12-1 Removing the snap-on strip through lever action

2. Remove the faulty covering pane and remove any fragments with a vacuum cleaner.

3. Insert new pane with the rubber gasket facing downwards in the direction of the optics.

4. First tilt the snap-on strip slightly, lay it against the glass pane and with a little pressure insert the locking edge of the snap-on strip into the groove between the pane and the casing (Figure 12-2).

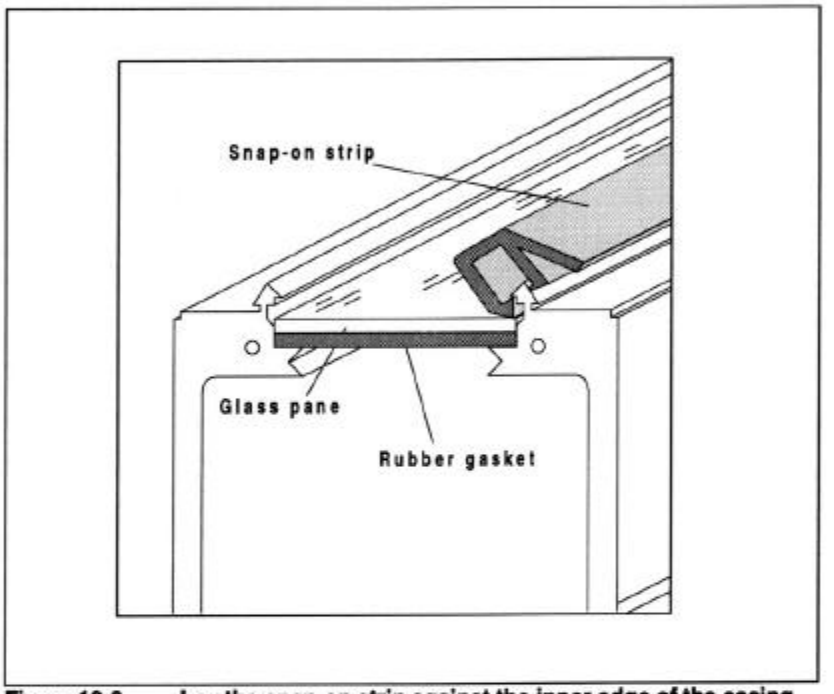


Figure 12-2 Lay the snap-on strip against the inner edge of the casing

5. Now gradually secure this snap-on strip with the locking edge and by applying pressure push onto the casing until it locks into place (Figure 12-3).

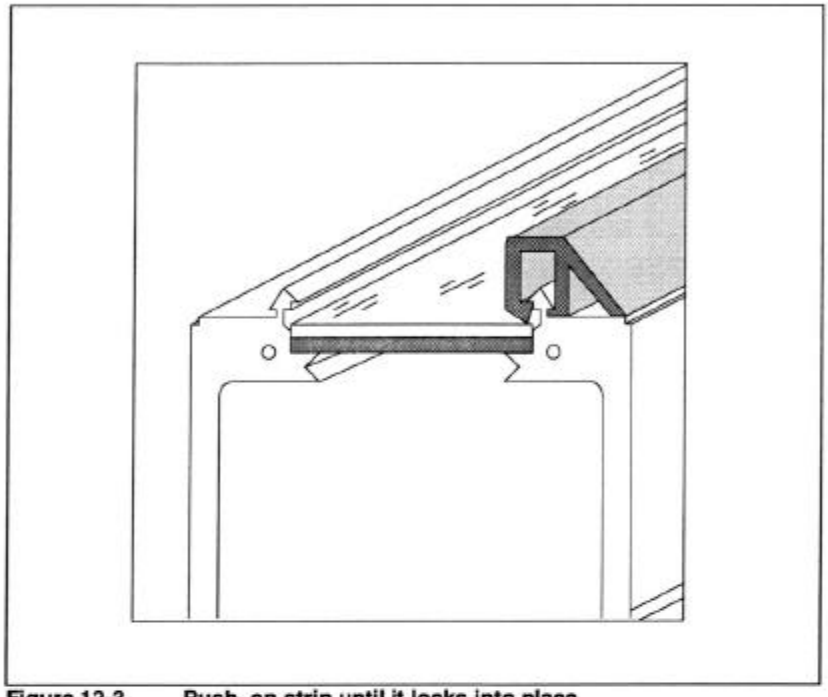


Figure 12-3 Push on strip until it locks into place

6. Attach second snap-on strip in accordance with 4. and 5.

12.3 Replacing the circuit breaker in the transmitter

The following tools are required:

- 1 screw driver with a flat 3 to 4 mm wide blade
- 1 open-end wrench 13 mm wide
- 1 hexagon allen key 4 mm wide

1. Loosen fastening screw of connector plug and remove plug.

2. Loosen allen screws and remove transmitter from mount.

3. Unscrew allen socket screws in bottom section, remove bottom section carefully and unplug flat strip cable from bottom section (Figure 12-4).

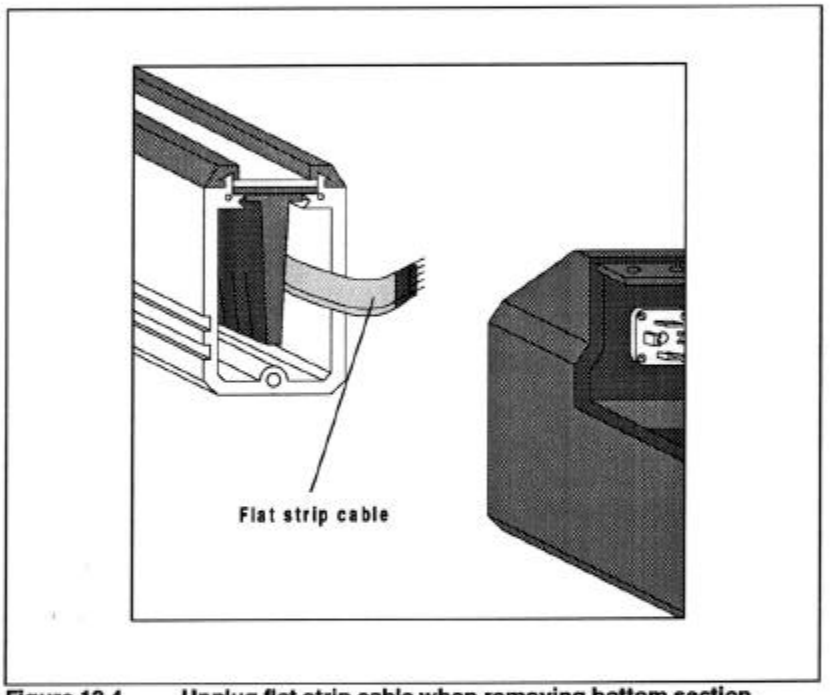


Figure 12.4 Unplug flat strip cable when removing bottom section

4. Unscrew the fuse cover with the screw driver. Take out the faulty fuse and insert the new miniature fuse M0.5 A.

5. Plug in flat strip cable again and slip on bottom section. In doing so ensure that the flat strip cable's plug is not plugged in out-of-line. The mechanical interlock must engage. Slightly tighten allen socket screws. Before fastening the screws, check rubber gasket fit. The gasket must be flush with the casing surfaces on all sides. It must not be dislocated (Figure 12-5).

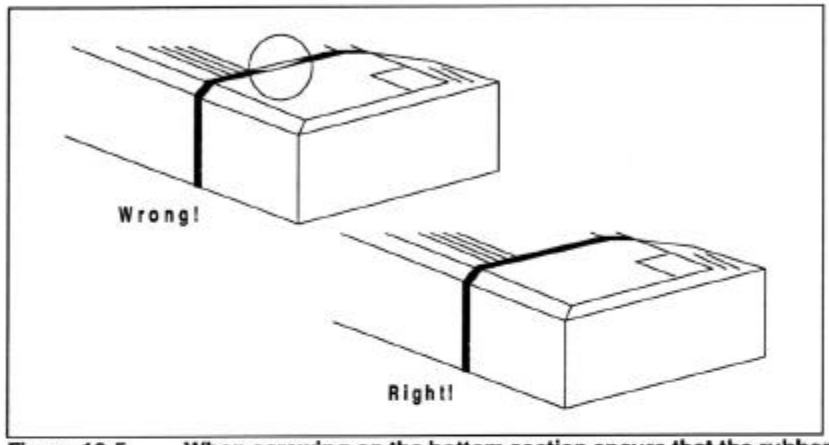


Figure 12-5 **When screwing on the bottom section ensure that the rubber gasket fits properly**

6. Tighten hexagon socket screws evenly, mount equipment again and retighten connector plug's fastening screw.

13 Servicing

Our technical after-sales service offers the following services:

- Checking and inspection of unit before initial operation
- Maintenance contract for annual maintenance in Germany
- Maintenance contract for annual maintenance outside Germany
- After-sales service in Germany
- After-sales service outside Germany
- Training either on LUMIFLEX's or the customer's premises
- Fast delivery of spare parts and quick repairs.

14 Appendix

14.1 Technical data

Common data for the DIALOG transmitter and receiver

Design, type Object sensivity size, resolution Protected height Protected width	D 214 to D 1414 14 mm, finger protection 218 to 1442 mm 0 to 4 m
Design, type Object sensivity size, resolution Protected height Protected width	D 230 to D 2830 30 mm, hand protection 218 to 2870 mm 0 to 10 m
Design, type Object sensivity size, resolution Protected height Protected width	D 240 bis D 3440 40 mm, hand protection 218 ... 3482 mm 0 ... 18 m
Classification Response time (Including BASIS [illegible])	Type 4 ESPD, internal self checking 20 to 30 ms depending on protected height (see section Tables 5-3, 5-4 and 5-5)
Type of enclosure Weight	IP 65 See 13.3 DIALOG safety light curtain dimension table
Colour Ambient operating temperature Storage temperature Interference immunity	Yellow RAL 1021 and anthracite RAL 7016 0°C to 50°C -25°C to 70°C Interference supressed as per VDE 843, IEC 801 Intensity IV
Mains buffering at rpm	10 ms

Table 14-1

DT transmitter

Supply voltage	100 V (-10%) ... 240 V (+10%) AC *
Frequency	47 ... 63 Hz
Power input	6 VA
Class of protection	1
Aperture angle of optics	+/- 2°
Type of light	infrared, pulsed
Light transmitter	GaAlAs-IR-diodes
Average service life	100 000 h
Wavelength	approx. 880 nm
Half-value width	approx. 80 nm
Number of beams	12 ... 168 beams depending on design and protected height
Display elements	LEDs
Inputs	Choice between full and reduced transmitting capacity thanks to jumper in connector plug
Connector plug	3-pol + PE as per DIN 43650-A Type Hirschmann GDM 3009
Cable bushing	PG 9 (Cable diameter 4,5 ... 7 mm)
Connection type	Screw terminal up to max 1,5s qmm

Table 14-2

DR receiver

Supply voltage	15 V DC (-10%/+15%) from BASIS
Power input	18 Watt
Aperture angle of optics	+/- 2°
Sensors	Silicon photodiodes
Relative spectral sensitivity	800 ... 1100 nm
Number of beams	12 ... 168 depending on design and protected height
Display elements	LEDs
Connector plug (Connecting cable ready-made)	8-pol as per DIN 45326 Type Binder series 723

Table 14-3

There are no volatile materials with a silicon content in the equipment.

* Supply voltage DTL 21-45 V DC ± 10% or 20-35 V AC ± 10%, 48-62 Hz

14.2 Dimension drawings

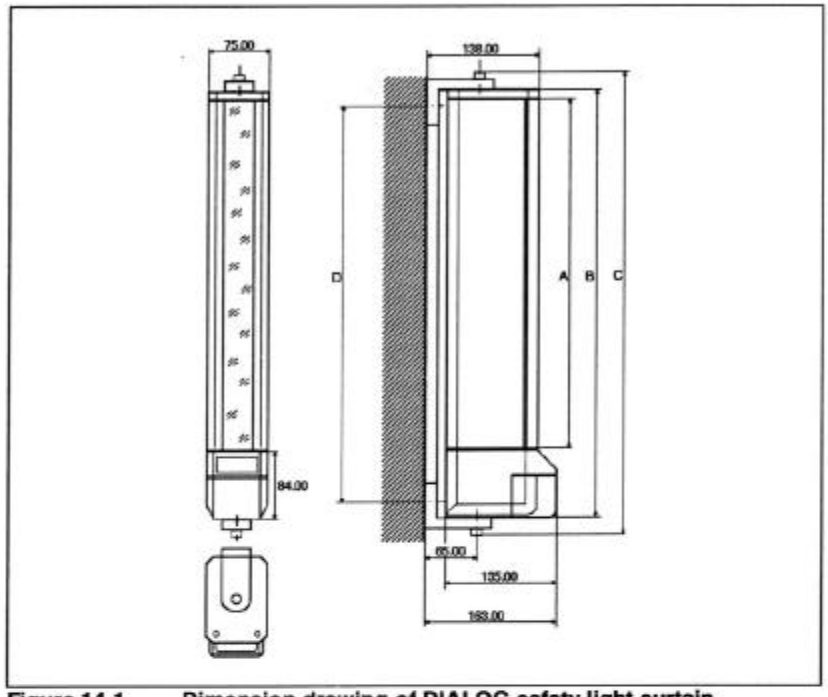


Figure 14-1 Dimension drawing of DIALOG safety light curtain

14.3 Dimension table of DIALOG safety light curtain

Typ DT-DR-	Object sensi-vity size [mm]	Order No.		A [mm]	B [mm]	C [mm]	D [mm]	Weight DT, DR, [kg]
		Trans-mitter DT	Re-ceiver DR					
214	14	528202	528302	218	315	351	275	2,8
314	14	528203	528303	320	417	453	377	3,5
414	14	528204	528304	422	519	555	479	4,2
514	14	528205	528305	524	621	657	581	4,9
614	14	528206	528306	626	723	759	683	5,7
714	14	528207	528307	728	825	861	785	6,4
814	14	528208	528308	830	927	963	887	7,1
914	14	528209	528309	932	1029	1065	989	7,9
1014	14	528210	528310	1034	1131	1167	1091	8,6
1114	14	528211	528311	1136	1233	1269	1193	9,3
1214	14	528212	528312	1238	1335	1371	1295	10,1
1314	14	528213	528313	1340	1437	1473	1397	10,8
1414	14	528214	528314	1442	1539	1575	1499	11,5
230	30	528215	528315	218	315	351	275	2,8
430	30	528217	528317	422	519	555	479	4,2
630	30	528219	528319	626	723	759	683	5,7
830	30	528221	528321	830	927	963	887	7,1
1030	30	528223	528323	1034	1131	1167	1091	8,6
1230	30	528225	528325	1238	1335	1371	1295	10,1
1430	30	528227	528327	1442	1539	1575	1499	11,5
1630	30	528229	528329	1646	1743	1779	1703	13,0
1830	30	528231	528331	1850	1947	1983	1907	14,5
2030	30	528233	528333	2054	2151	2187	2111	15,9
2230	30	528235	528335	2258	2355	2391	2315	17,4
2430	30	528237	528337	2462	2559	2595	2519	18,8
2630	30	528239	528339	2666	2763	2799	2723	20,3
2830	30	528241	528341	2870	2967	3003	2927	21,8

Table 14-4 **(Page 1 of 2)**

Type DT-DR-	Object sensivity size [mm]	Order No. Transmitter DT	Order No. Receiver DR	A [mm]	B [mm]	C [mm]	D [mm]	Weight DT, DR, [kg]
240	40	528242	528342	218	315	351	275	2,8
440	40	528244	528344	422	519	555	479	4,2
640	40	528246	528346	626	723	759	683	5,7
840	40	528248	528348	830	927	963	887	7,1
1040	40	528250	528350	1034	1131	1167	1091	8,6
1240	40	528252	528352	1238	1335	1371	1295	10,1
1440	40	528254	528354	1442	1539	1557	1499	11,5
1640	40	528356	528356	1664	1743	1779	1703	13,0
1840	40	528258	528358	1850	1974	1983	1907	14,5
2040	40	528260	528360	2054	2151	2187	2111	15,9
2240	40	528262	528362	2258	2355	2391	2315	17,4
2440	40	528264	528364	2462	2559	2595	2519	18,4
2640	40	528266	528366	2666	2763	2799	2723	20,3
2840	40	528268	528368	2870	2967	3003	2927	21,8
3040	40	528270	528370	3074	3171	3207	3131	23,2
3240	40	528272	528372	3278	3375	3411	3335	24,7
3440	40	528274	528374	3482	3579	3615	3539	26,1

Table 14-4 (Page 2 of 2)

14.4 Accessories

14.4.1 Deflection mirror

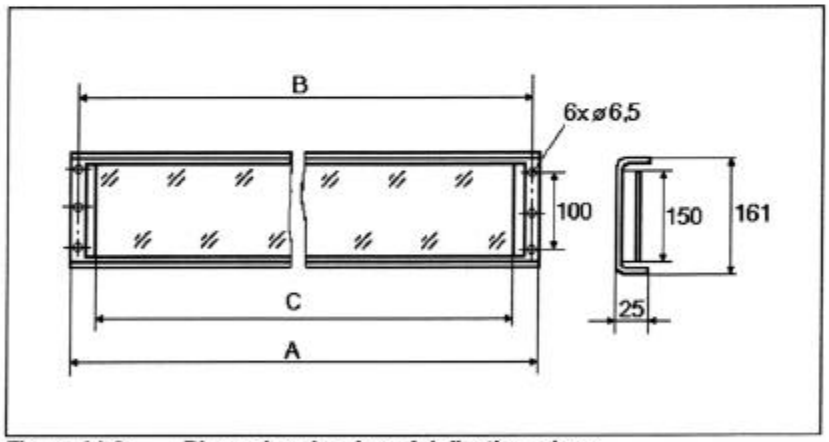


Figure 14-2 Dimension drawing of deflection mirror

The deflection mirror is to be fitted without stress.

Dimension table of deflection mirror

Type	Order No.	A (mm)	B (mm)	C (mm)
S 200/150	524940	380	360	310
S 300/150	524950	480	460	410
S 400/150	524960	580	560	510
S 600/150	524970	810	790	740
S 700/150	524941	900	880	830
S 800/150	524980	1000	980	930
S 1100/150	524990	1290	1270	1220
S 1300/150	525000	1580	1560	1510

Table 14-5

Other deflection mirrors on special order.

14.4.2 Deflection mirror support (free-standing)

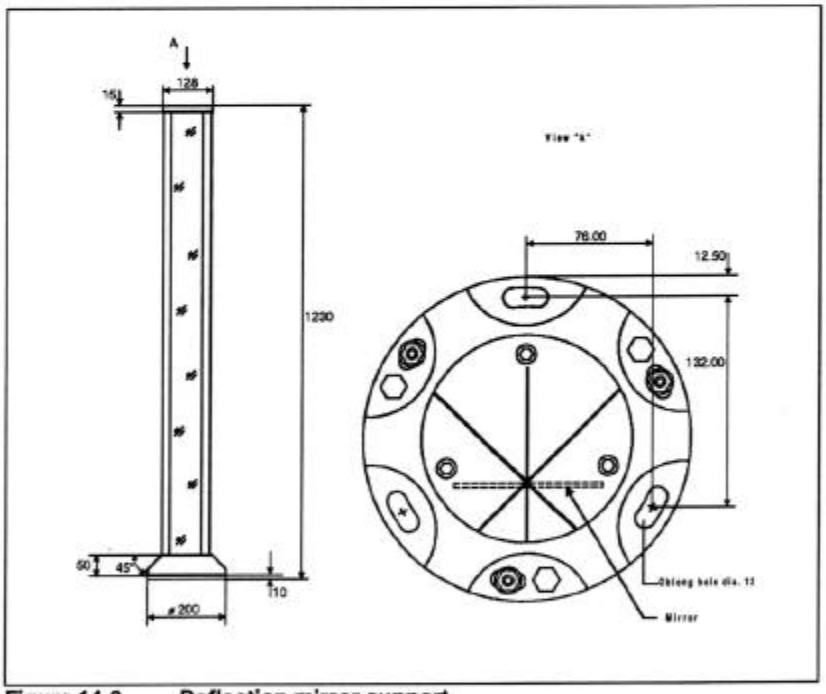


Figure 14-3 Deflection mirror support

Deflection mirror supports are available in different heights on request.

14.4.3 DIALOG/BASIS connecting cable

This cable is intended to connect the DIALOG light curtain and the BASIS control unit. It is available in three different lengths.
The BASIS should be fitted on the machine near the DIALOG receiver.

Depending on the installation site selected, the connecting cable required should be stated when ordering. A connecting cable is included in the DIALOG scope of supply.

Length	Order No.
0,5 m	529061
1,5 m	529065
3 m	529063

Table 14-6

14.4.4 Test pieces for daily checks

Designation	Order No.
Test piece 14 mm	530010
Test piece 30 mm	530040
Test piece 40 mm	530050

Table 14-7

14.5 Spare parts

Protective glass fronts with gasket and two snap-on strips

For unit type	Order No.	For unit type	Order No.	For unit type	Order No.
D 214	420240	D 230	420240	D 240	420240
D 314	420340	D 430	420440	D 440	420440
D 414	420440	D 630	420640	D 640	420640
D 514	420540	D 830	420840	D 840	420840
D 614	420640	D 1030	421040	D 1040	421040
D 714	420740	D 1230	421240	D 1240	421240
D 814	420840	D 1430	421440	D 1440	421440
D 914	420940	D 1630	421640	D 1640	421640
D 1014	421040	D 1830	421840	D 1840	421840
D 1114	421140	D 2030	422040	D 2040	422040
D 1214	421240	D 2230	422240	D 2240	422240
D 1314	421340	D 2430	422440	D 2440	422440
D 1414	421440	D 2630	422640	D 2640	422640
		D 2830	422840	D 2840	422840
				D 3040	423040
				D 3240	423240
				D 3440	423440

Table 14-8

Cover
(Cover for connector plug on transmitter and receiver)

Order No. 340000

Fastening screws
(8 hexagon screws M8-25 with shims for fastening the transmitter and receiver in their mounts)

Order No. 101891

15 Garantie, Guarantee, Garantie

D

Wichtiger Hinweis für den **Betreiber** dieses Gerätes:

Wenn Sie als **Betreiber** Ihrer mit diesem Sicherheits-Lichtvorhang ausgerüsteten Maschine uns die nachfolgende Antwortkarte **vollständig** ausgefüllt zurücksenden, verlängert sich die **Garantie auf 2 Jahre.**

Sie werden auch automatisch in unseren Info-Service aufgenommen. Über diesen erhalten Sie Informationen über Neuheiten und Applikationen unseres Sicherheitsgeräteprogramms.

Diese erweiterte Garantieleistung gilt nur für Gesamtsysteme, bestehend aus DIALOG und BASIS . Teil- und Ersatzteillieferungen sind davon ausgeschlossen.

GB

Important information for the operator of this equipment:

As the owner of this state of the art safety light curtain you will be pleased to note that by filling in the enclosed reply card and returning it to us you will extend your 1 year standard guarantee to two years.

You are then automatically included in our information service, through which you will receive information about innovations and applications within our range of safety equipment.

The extended guarantee applies only to complete systems, consisting of DIALOG and BASIS Partial and spare parts deliveries are not included.

F

Recommandation importante pour **l'utilisateur** de cet appareil

Si, en tant **qu'utilisateur** de votre machine équipée de cette barrière lumineuse de sécurité, vous nous renvoyez la carte-réponse **ci-après entièrement remplie**, votre **garantie sera prolongée à 2 ans.**

Vos coordonnées seront aussi enregistrées automatiquement par notre service Info. Celui-ci vous communiquera des notes d'information sur nos nouveautés et les applications des appareils de sécurité de notre gamme.

Les conditions de garantie étendue ne sont valables que pour des systèmes complets, composés de DIALOG et de BASIS . Les pièces détachées et leur livraison en sont exclues.

Absender (Sender, Expéditeur):
(Firmenstempel, firm stamp,
cachet de l'entreprise)

_____
_____
_____
_____
_____

TELEFAX - ANTWORTKARTE
ANSWER
REPONSE

Telefax-No.:

Deutschland: **(089) 570 13 86**
Other Countries: **••49-89-570 13 86**

☞ Bitte vollständig ausfüllen!!!

☞ Please fill in completely!!!

☞ SVP, veuillez remplir entièrement le questionnaire!!!

Firma

LUMIFLEX ELEKTRONIK
GMBH & CO. KG
Landsberger Str. 191

D - 8000 München 21

Erweiterte Garantieleistung 2 JAHRE ab Auslieferungsdatum
(Extended guarantee 2 years from the delivery date; Etendue de la garantie à 2 ans à partir de la date de livaison)

Firma (Firm; Société): _____ Ansprechpartner (Responding person;
Abteilung (Division; Service): _____ Correspondant): _____

Seriennummer DIALOG (Series number DIALOG; Numéro de série DIALOG)
Sender DT (Sender DT; Emetteur DT): _____ Empfänger DR (Receiver DR;
Seriennummer BASIS-270(Series number BASIS-270; Récepteur DR): _____
Numéro de série BASIS-270): _____
Hersteller der abgesicherten Maschine (Manufacturer of the protected machine;
Fabricant de la machine équipée d'une barrière lumineuse): _____

Bitte senden Sie mir Informationen zu den Serviceleistungen (Please send me information on the following service; Veuillez m'envoyer votre documentation concernant les prestations):

☐ Prüfen und Abnahme vor der Erstinbetriebnahme (Inspection and acceptance before the first initial operation; Contrôle et recette avant la première mise en marche)
☐ Jährliche Wartung
(Annual inspections, Maintenance annuelle)
☐ Schulung im Hause LUMIFLEX (Training courses by LUMIFLEX; Formation chez LUMIFLEX)

Ausgeliefert am
(Delivered on; Livré le): _____
(von LUMIFLEX auszufüllen; Filled in LUMIFLEX;
à compléter par LUMIFLEX)

EC Declaration of Conformity

according to EC Machinery Directive 89/392/EEC, Annex II C

We herewith declare,	LUMIFLEX ELEKTRONIK GmbH & Co KG Ehrenbreitsteiner Straße 44 80993 München

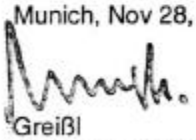
that the following described safety components in our delivered version complies with the appropriate basic safety and health requirements of the EC Machinery Directive 89/392/EEC based on its design and type, as brought into circulation by us. In case of alteration of the safety components, not agreed upon by us, this declaration will lose its validity.

Description of the Safety Component:	Safety Light Curtain
Safety Component Type:	**DIALOG with control unit BASIS-270/BASIS-50**
Serial Number:	see type plate
Safety Function:	Electro Sensitive Protective Device
Applicable EC Directives:	EC Machinery Directive (89/392/EEC) EC Low Voltage Directive (73/23/EEC) EC Directive of Electromagnetic Compability (89/336/EEC)
Applicable **Harmonized** Standards especially:	EN 292-1, EN 292-2, EN 60204-1
Applicable National Standards and other Technical Specifications, especially:	prEN 50100-1, prEN 50100-2, prEN 999 DIN V VDE 0801
Notified Body according to annex VII	SAQ Inspection Ltd Notified body No 409 Inspection North - Machine Technology Täby, Sweden

Responsible for:

- keeping documents according to annex VI, or
- checking for correct application of the appropriate harmonized standards and confirming the proper documents according to annex VI, or
- **EC type-examination (EC type-examination certificate no. M511-95)**

Munich, Nov 28, 1995



Greißl
Managing Director

Archives

.....
Safety Component-No.