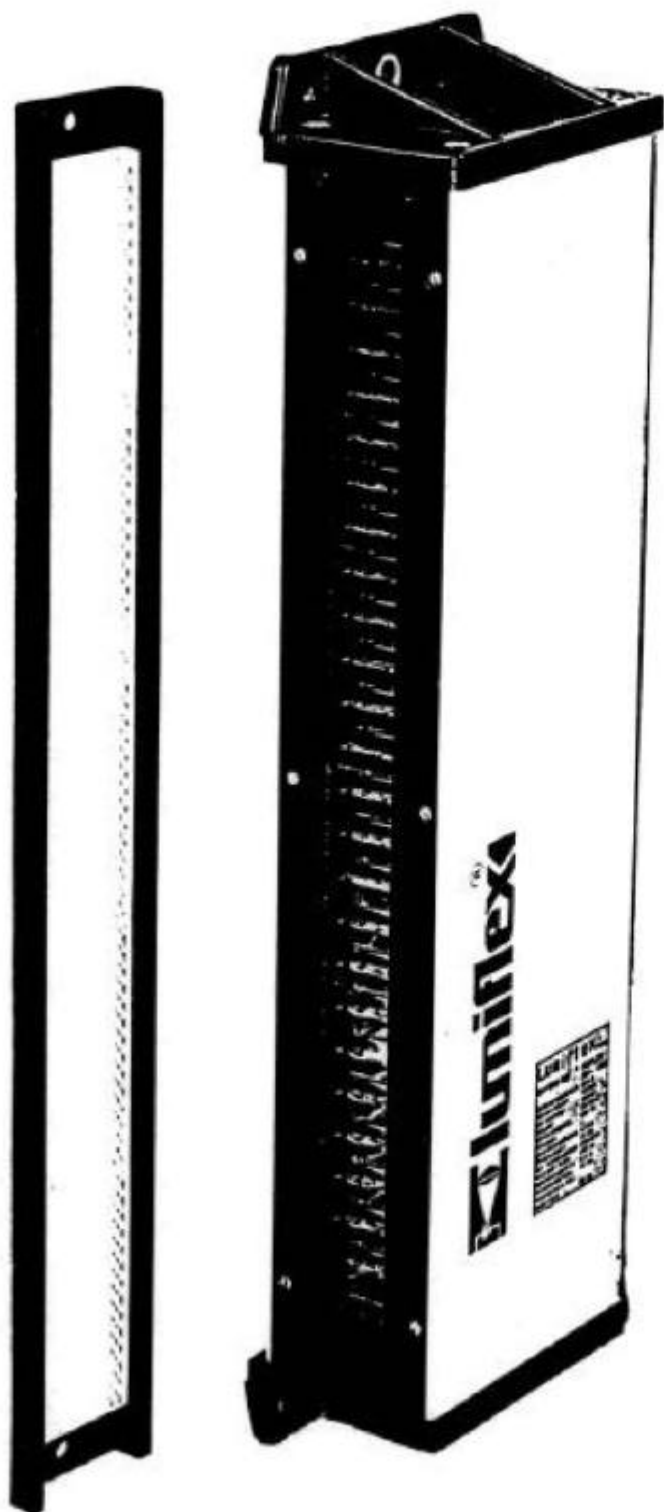


Safety Light Curtains

REFLEX
LIGHT CURTAINS



**Fitting and
Operating
Instructions**

Autorisations

Germany
Fachausschuß
Eisen und Metall III
Stresemannstraße 43
D-40210 Düsseldorf 1

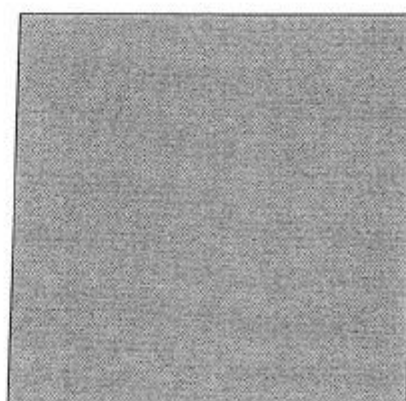
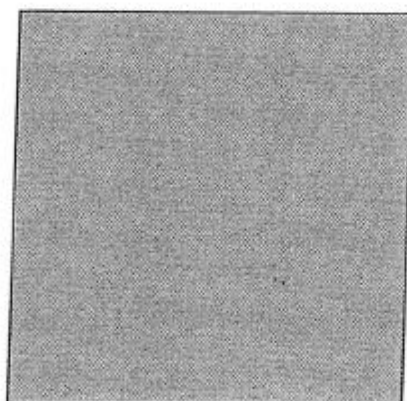
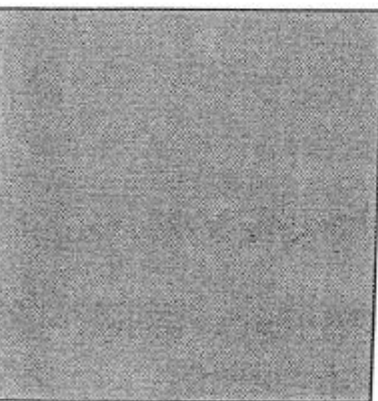
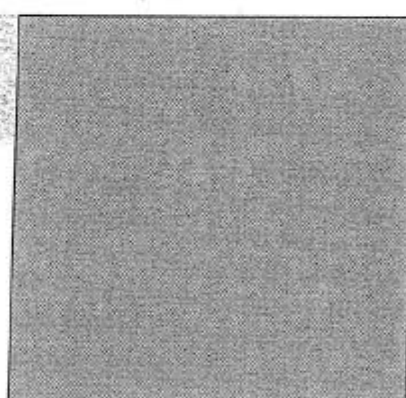
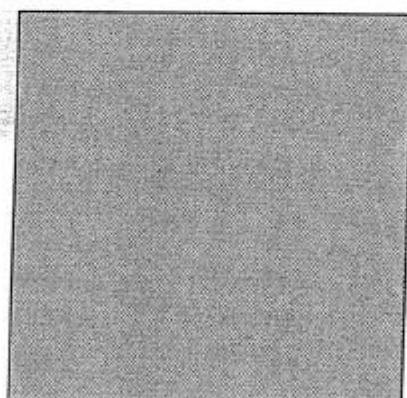
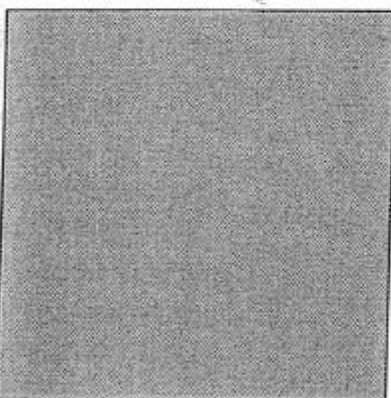
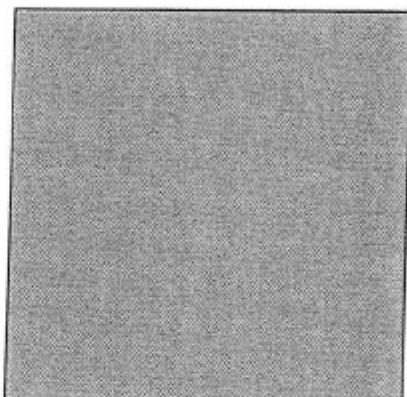
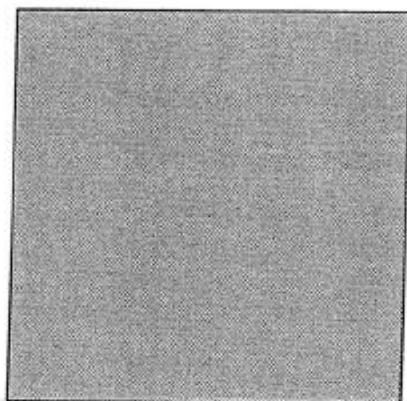


Table of Contents

	Foreword	1-1
1	Introduction	1-1
2	Description of Unit	2-1
2.1	General	2-1
2.2	Features	2-2
2.3	Design Options	2-3
2.4	Specification	2-5
2.5	Working Principle	2-6
3	Safety Information	3-1
4	Application Regulation	4-1
4.1	Requirements for the Machine to be Safeguarded	4-1
4.2	Fitting Regulations	4-2
4.3	Making a Danger Points Safe	4-3
5	Selecting a REFLEX Safety Light Curtain	5-1
6	Scope of Supply and Order Details	6-1
7	Fitting	7-1
7.1	Fitting Regulations	7-1
7.1.1	Safety Distance	7-1
7.1.2	Minimum Distance to Deflecting Surfaces	7-2
7.1.3	Fitting Position	7-4
7.1.4	Information on Combining REFLEX Safety Light Curtains ..	7-6
7.2	Mounting the Equipment	7-7
7.2.1	Mounting the Optical Component	7-7
7.2.2	Mounting the Reflector	7-8
8	Electrical Connection	8-1
8.1	Optical Component	8-1
8.2	BASIS-270 or ULS-5 Control Unit	8-2
9	Initial Operation	9-1
9.1	Display Elements of REFLEX Optical Component	9-1
9.2	Checks before First Time Start-Up	9-2
9.2.1	Supply Voltage	9-2
9.2.2	Bridging the Test Input at BASIS-270 or ULS-5 for Alignment Process	9-2
9.3	Switching on Power and Alignment of REFLEX Optical Component and Reflector	9-2
9.3.1	Switching on Power	9-2
9.3.2	Aligning the Optical Component and Reflector	9-3

10	Troubleshooting and Fault Rectification	10-1
11	Checks	11-1
11.1	Checks before Initial Operation	11-1
11.2	Daily Inspection	11-1
11.3	Annual Checks	11-2
12	Maintenance	12-1
12.1	Cleaning	12-1
12.2	Replacing the Exit Window	12-1
13	Servicing	13-1
14	Appendix	14-1
14.1	Technical Data	14-1
14.2	Dimension Drawings	14-3
14.3	Accessories	14-8
14.3.1	Deflecting Mirror	14-8
14.3.2	Deflecting Mirror Support (free-standing)	14-9
14.3.3	Connecting Cable REFLEX - BASIS-270 or ULS-5	14-10
14.3.4	Test Stick for Daily Inspection	14-10
14.4	Spare Parts	14-10

Foreword

These "Fitting and Operating Instructions" are intended to provide the user basic knowledge required for correct and safe operation. This manual is supplied with every unit. It contains important information for the operator of the machine equipped with a safety light curtain and is to be kept available at the machine.

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

1 Introduction

The REFLEX safety light curtain together with the BASIS-270 or ULS-5 control unit forms an **electro-sensitive protective device (ESPD)**.

It conforms with the requirement of VGB 5 and safety regulations ZH 1/281 and ZH 1/597, issued by the German industrial compensation insurance company named "Berufsgenossenschaft".

The REFLEX suits especially for hand and finger protection when the protected width is limited, and for applications where the space on one side of the sensing zone only allows for the size of a reflector.

The REFLEX safety light curtain may not only serve as a protective device but also as a control of production processes.

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

By using the "Single break" or "Double break" control function of the REFLEX safety light curtain, high efficiency is achieved due to minimum cycle times combined with a maximum on freedom in movement and on safety to the operator.

2 Description of Unit

2.1 General

The REFLEX safety light curtain consists of an optical component and a reflector. An optical sensing zone is created between the optical component and the reflector.

Two different control units BASIS-270 or ULS-5 are available to provide suitable supply voltage and the machine control interface (Figure 2-1).

The ULS-5 interface to the machine control system is functionally and pin compatible to the interface of its predecessor ULS-4 (belongs to ULG../1 optical component). The BASIS-270 control unit is equipped with extended integrated safety control functions (see BASIS-270 "Connecting and Operating Instructions").

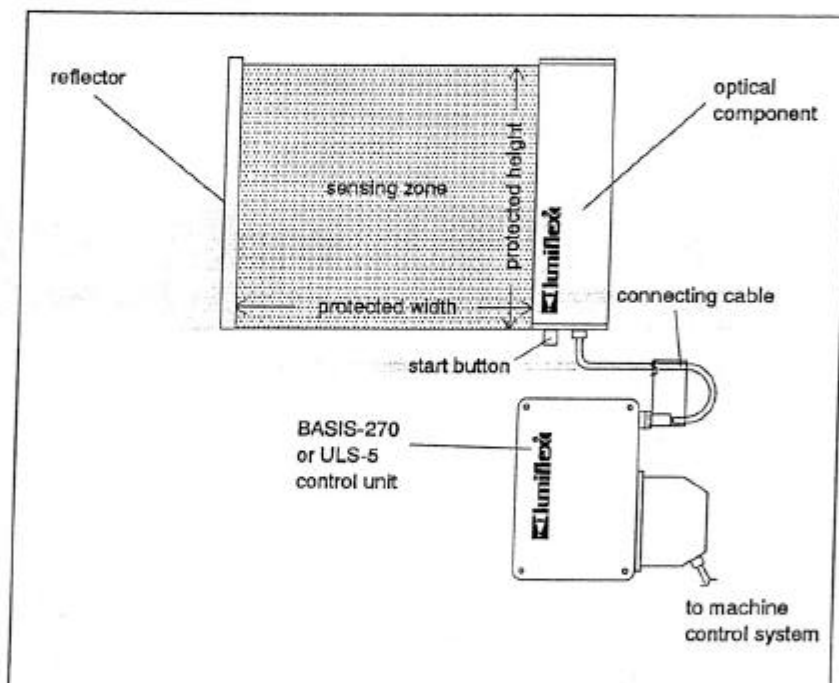


Figure 2-1 The REFLEX optical component and reflector together with the control unit (BASIS-270 or ULS-5) form an electro-sensitive protective device (ESPD)

The REFLEX sensing zone consists of several infrared light beams arranged in rows. The beams are transmitted from the optical component's senders and reflected back to the optical component's receivers, thus, giving rise to an invisible "light curtain". The interruption of one or more light beams by an intruding object leads to the switching command "Machine stop!" (Figure 2-2).

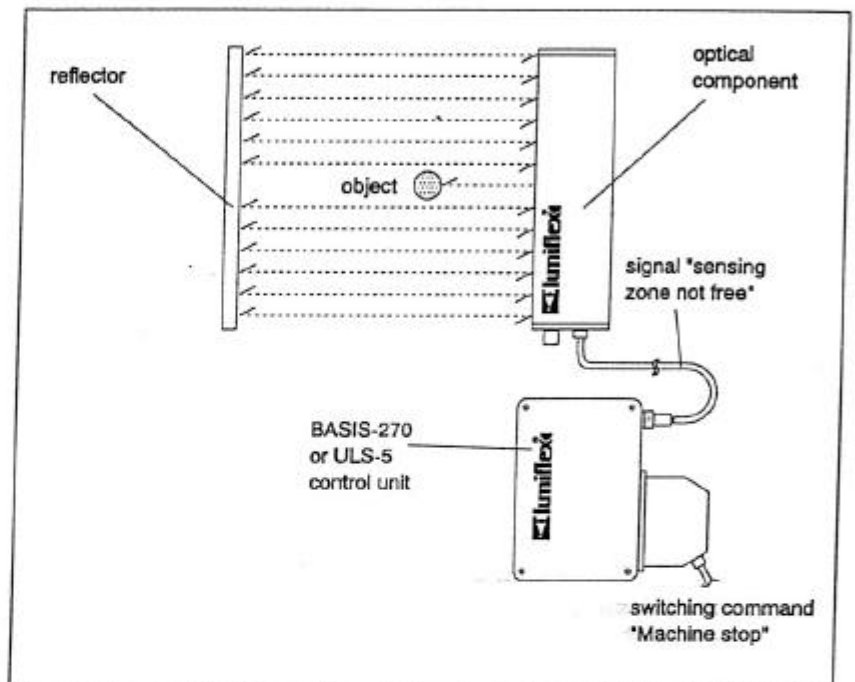


Figure 2-2 The interruption of at least one beam of the invisible "light curtain" leads to the switching command "Machine stop!".

2.2 Features

- Classification: electro-sensitive protective device (Type 4 ESPD, internal self checking)
- Reflex principle, connection on one side only
- Sturdy industrial casing
- Replacable exit window
- Easy installation
- No moving parts
- High resolution
- Partial removal of sensing zone possible
- Fast response time
- Numerous protected heights available

2.3 Design Options

For suitable adaption to different protective heights REFLEX optical components are available in various sizes. The following Table 2-1 shows the available sizes and the corresponding protective heights.

optical component	protective height
RX-200	215 mm
RX 300	315 mm
RX 400	415 mm
RX 500	519 mm
RX 600	620 mm
RX 700	721 mm
RX 800	822 mm
RX 900	923 mm
RX 1000	1024 mm
RX 1100	1125 mm
RX 1200	1226 mm
RX 1300	1327 mm
RX 1400	1428 mm

Table 2-1

For each optical component a suitable reflector with or without cover glass is available.

The second dimension of the sensing zone, the protective width results from the distance between the optical component and the reflector.

Using REFLEX safety light curtains, protective widths from 0.4 m to 4.5 m can be arranged.

Technical reasons cause a reduction of resolution with increasing protective width. Table 2-2 shows the relationship between range of protective width and resolution (smallest object size to be surely recognized).

protective width	object size
0,4 - 1 m	14 mm (finger)
1,0 - 1,5 m	20 mm (hand)
1,0 - 2,5 m	30 mm (hand)
2,5 - 4,5 m	40 mm (arm)

Table 2-2

2.5 Working Principle In the optical component a row of infrared light sources and a row of infrared sensors are located at a short distance to each other.

The individual infrared light sources light up one after the other in a switching sequence of 50 s per light source controlled by a shift register. If an object interrupts one of the beams, the sequential cycle stops at this position as long as the object is in the sensing zone.

The electrical signal "sensing zone free" is transferred from the optical component to the BASIS-270 or ULS-5 control unit only when all light beams are received with sufficient intensity.

3 Safety Information

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

The development and manufacture of REFLEX safety light curtains follow universally recognized technical principles. Users are thus effectively protected, presumed the equipment is used as prescribed.

Persons outside the sensing zone 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.

REFLEX light curtains do not protect against pieces flying away (e.g. work pieces, tools). If necessary additional mechanical protection device must be considered. For information see Chapter 4.

Production processes may only be directed by using REFLEX safety light curtains at non-passable entry or exit openings.

4 Application Regulation

The relevant statutory and official regulations apply with regard to the use of REFLEX 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 REFLEX 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 devices must be installed. If mechanical protective devices are installed for this purpose, they must either be fixed (mounted with a special tool or welded) or, if they are required to open, their position must be monitored automatically.

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 designed that the safety light curtain's switching command is processed appropriately and failsafe.

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

The BASIS-270 or ULS-5 control unit must be connected to the machine's control system via **two separate channels**. For connection examples see "Connecting and Operating Instructions" of BASIS-270 or ULS-5 control unit.

In addition, the equipment-specific safety rules apply.

When mounted on metal-working presses, the machine 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 point must be reachable only through the sensing zone (Figure 4-1).

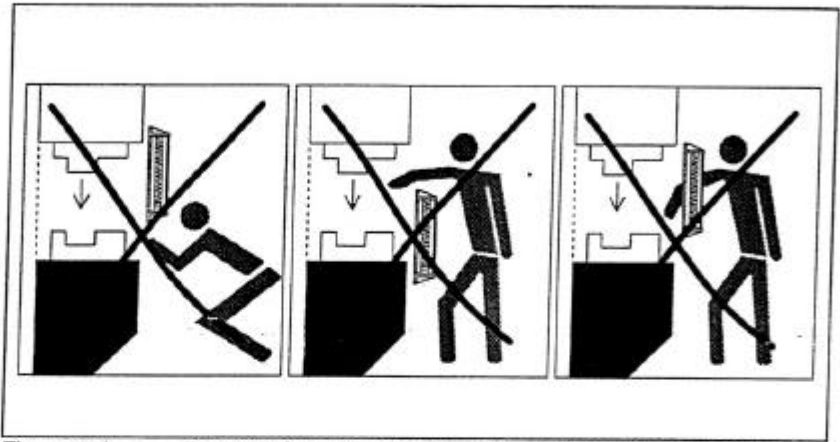


Figure 4-1 Danger of reaching under, over or around the sensing zone

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

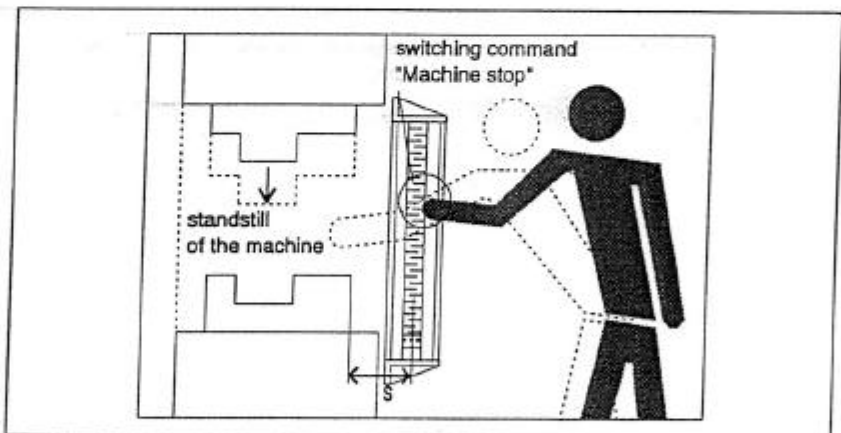


Figure 4-2 Safety distance

the dangerous movement must have come to a standstill before the danger point can be 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 zone and the danger point (Figure 4-3).

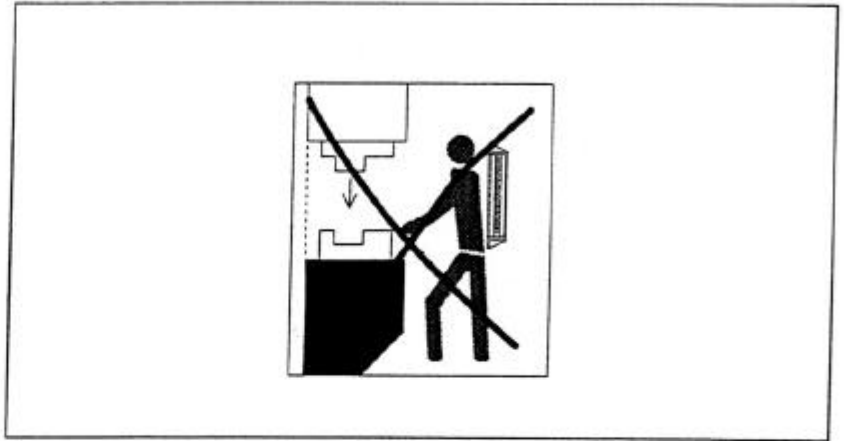


Figure 4-3 Danger of stepping-behind the sensing zone

4. Stepping-behind the sensing zone may be prevented by a second REFLEX safety light curtain in horizontal position (Figure 4-4).



Figure 4-4 Stepping-behind protection using a second REFLEX in horizontal position

4.2.1 Making a Danger Point Safe

The fitting regulations cited in 4.2 must be considered. 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 contact-less protective equipment on powered metal-working presses, ZH 1/281, PM41" must be followed.

5 Selecting a REFLEX Safety Light Curtain

Proceed as follows when selecting a REFLEX safety light curtain:

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

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

2. Determine the REFLEX protected height required.

The protective height must be selected in consideration of reaching the danger points solely through the sensing zone (Figure 5-1).

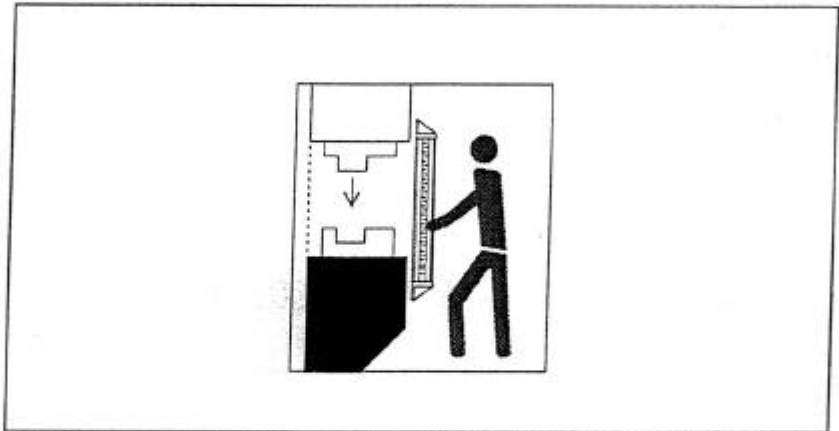


Figure 5-1 Protection against reaching under or over by sufficient protecting height

3. Determine the type of optical component using the Table 5-1.

The response time listed in the Table 5-1 is a summary of reaction times of the REFLEX optical component and the BASIS-270 or ULS-5 control unit.

protected height (mm)	response time (ms)	Type RX -
215	23	200
315	24	300
415	24	400
519	25	500
620	25	600
721	26	700
822	26	800
923	27	900
1024	27	1000
1125	28	1100
1226	29	1200
1327	29	1300
1428	30	1400

Table 5-1

4. Determine the REFLEX protected width required.

The width of the sensing zone corresponds to the width of the area to be made safe. This width must be selected that danger points can solely be reached through the sensing zone (Figure 5-2).

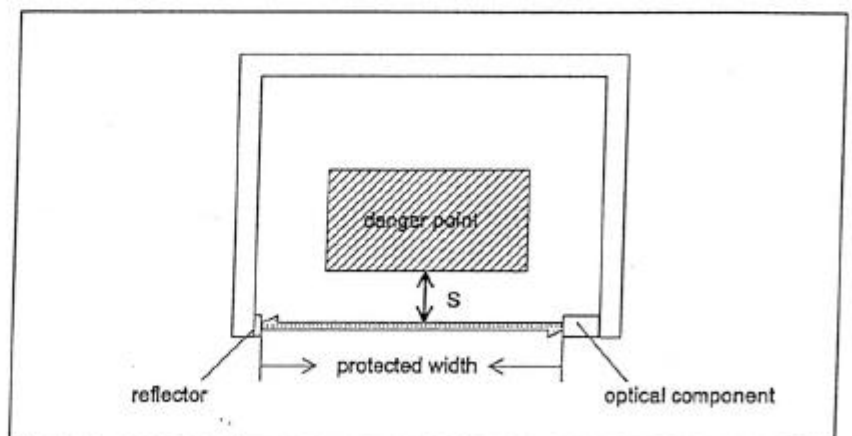


Figure 5-2 Making a danger point safe on one side

By combination of REFLEX safety light curtains larger areas which exceed the maximum protected width of a single REFLEX can be made safe (Figure 5-3).

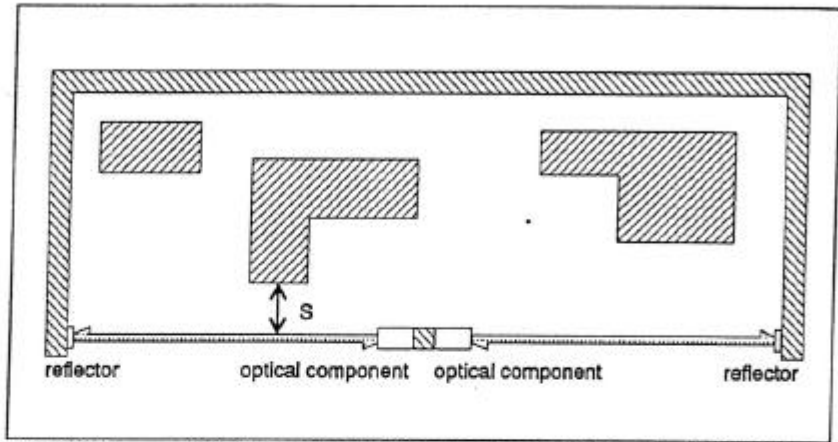


Figure 5-3 Making safe very wide areas by combining two REFLEX safety light curtains

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

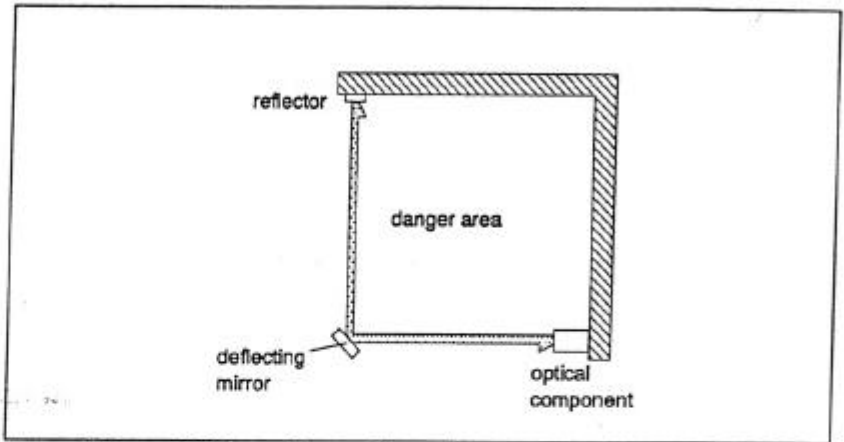


Figure 5-4 Making safe two sides using a deflecting mirror

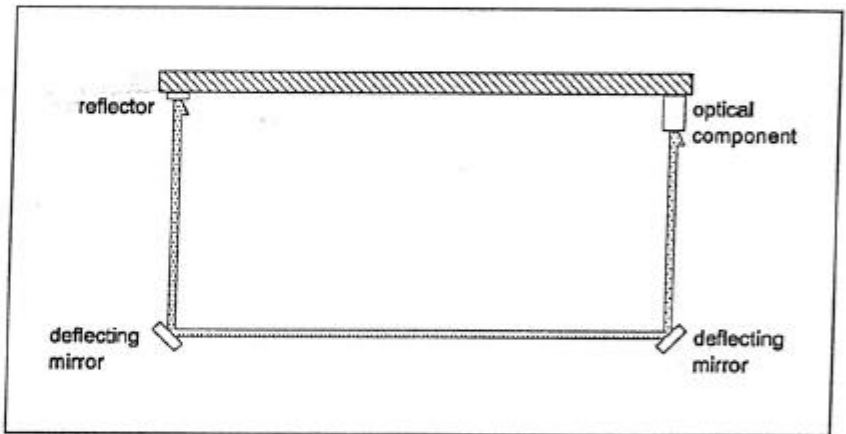


Figure 5-5 Making safe three sides using two deflecting mirrors

When using deflecting mirrors the maximum protected width of the safety light curtain is reduced in accordance with the following Table 5-2:

max. protective width	deflecting mirror (s)	reduced protective width
4,5 m	1	4,0 m
4,5 m	2	3,5 m

Table 5-2

5. Determine the type of reflector

According to the selected protective width the type of reflector has to be determined.

For protective widths up to 1 m the small type reflector R-xxxS is sufficient (up to appr. 800 mm protected height).

For protective widths more than 1 m the wide type reflector R-xxxB is necessary.

At hostile environments the wide glass covered reflector R-xxxG is recommended for all distances.

REFLEX
Safety Light Curtains
R-xxxS
R-xxxB
R-xxxG

6 Scope of Supply and Order Details

An order for a REFLEX safety light curtain should contain the following details:

- Number of pieces
- Unit type
- Side where the optical component is mounted:
Right side mounted (component right, reflector left) or
Left side mounted (component left, reflector right)
- accurate protected width on site
(REFLEX is subject to be adjusted to the correct protected width before delivery)
- Type of reflector
- Type of control unit (BASIS-270 or ULS-5)
- Length of connecting cable between REFLEX and control unit (0.5m; 1.5m or 3m)

Example:

- 1 REFLEX safety light curtain type RX-1400
for right side mounting protective width 2.4 m
- 1 Connecting cable 1.5 m
- 1 Reflector type R-1400 G
- 1 BASIS-270 control unit

The REFLEX scope of supply comprises the following components:

- 1 REFLEX optical component as ordered
- 1 Connecting cable as ordered
- 1 Reflector as ordered
- 1 Control unit as ordered
- 1 Suitable test stick for daily inspection
- 1 REFLEX "Fitting and Operating Instructions"
- 1 Suitable "Connecting and Operating Instructions" for the ordered control unit

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 determined by dangerous machine movement coming to a standstill before the danger point can be reached through the sensing zone.

The safety distance depends on the safety light curtain's response time, the stopping time of the machine after receiving the stopping command and the operator's grip velocity. It is calculated by the following formula:

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

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 zone and the respective danger point (in mm).

v = Operator's grip velocity. Set a minimum value of 1.6 mm/ms.

t_{stopping} = Machine stopping time from receiving the ESPD's stopping switching command "Machine stop!" until standstill of the dangerous movement. When measuring the machine stopping time, the most unfavourable operating conditions must be taken into account (e.g. largest tool, stopping command at the time of maximum tool speed). The largest value (not the average!) obtained by repeated measurements is entered into the formula in ms.

t_{ESPD} = Response time of the ESPD consisting of the REFLEX ESPD safety light curtain and the BASIS-270 or ULS-5 control unit in ms. This value depends on the protected height and is shown in Table 5-1.

Z = Addition on safety distance in mm. The addition is based on the resolution (finger, hand, arm) of the safety light curtain according to Tables 2-2 in combination with Table 7-1 (showing the current additions complying with the regulations in Germany).

Addition for **vertical** fitting (recommended in accordance with the accident prevention regulations for powered equipment).

Object sensitivity in mm	Addition Z in mm
14	0
> 14-30	130
> 30-45	230
> 45-80	850 (arm's length)

Table 7-1

When mounting the REFLEX safety light curtain **horizontally**, an addition of 1.2 m (arm's length + stride length) must be considered.

7.1.2 Minimum Distance to Deflecting Surfaces

The aperture angle of the REFLEX light beams is +/- 2 degree. A shining surface close to the optical path can cause deflection and thus surrounding an object intruding into the sensing zone (Figure 7-1).

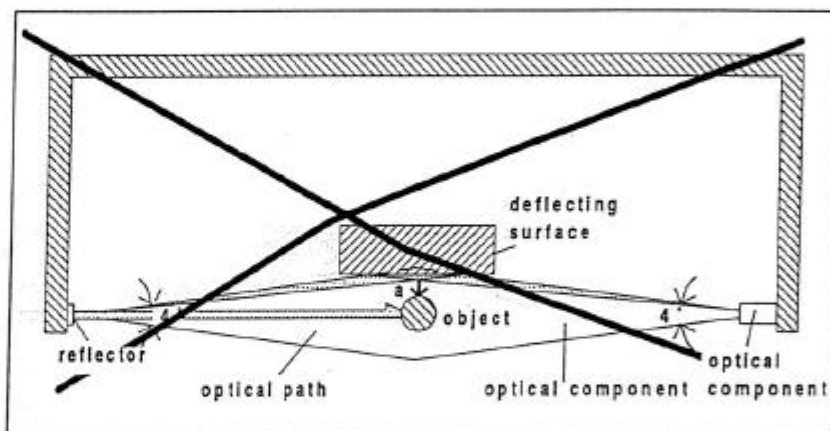


Figure 7-1 Incorrect fitting position! There is a deflecting surface too close to the optical path. An intruding object will not be detected!

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

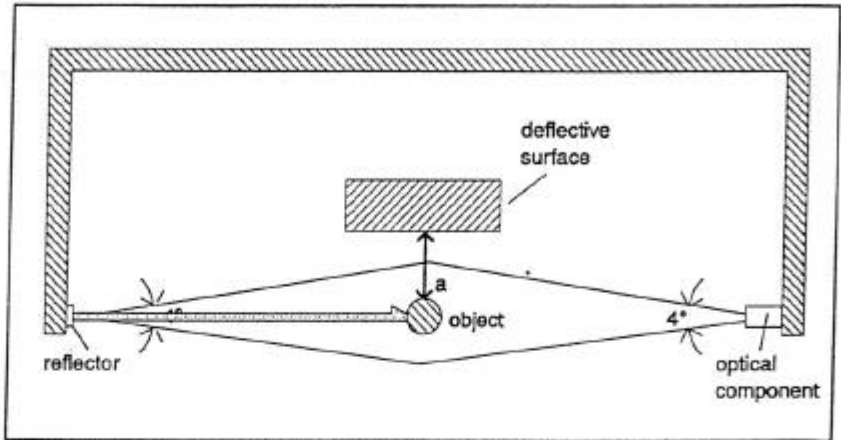


Figure 7-2 Correct fitting position! Minimum distance "a" to a deflecting surface is maintained

The required minimum distance between the optical path axis and a deflecting surface increases with the distance of the optical component reflector. The graphic chart in Figure 7-3 shows the relationship.

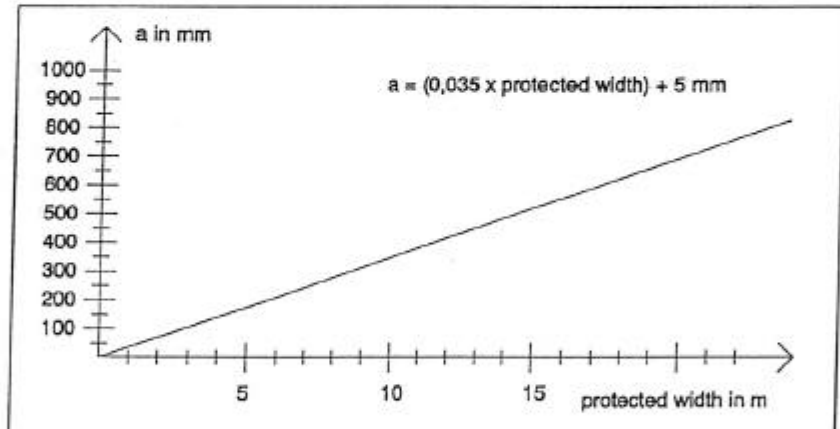


Figure 7-3 The minimum distance "a" increases with the protected width

7.1.3 Fitting Position. According to the intended position of the sensing zone the REFLEX light curtain can be mounted in vertical, horizontal or any inclined position.

Independend of the chosen position, it must be ensured that the optical component and the reflector are mounted in parallel (Figure 7-4).

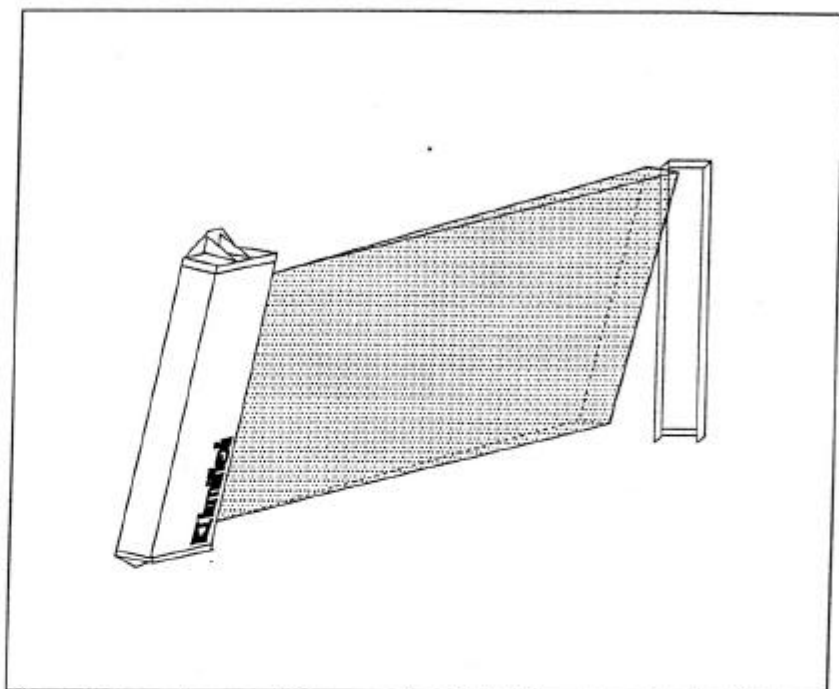


Figure 7-4 Incorrect fitting position. Optical component and reflector have not been fixed in parallel position.

In addition, it must be ensured that the reflector is mounted symmetrically to the position of the exit window of the REFLEX optical component. The center of the reflector must correspond exactly with the center of the exit window to assure pitching in of all of the light beams (Figure 7-5).

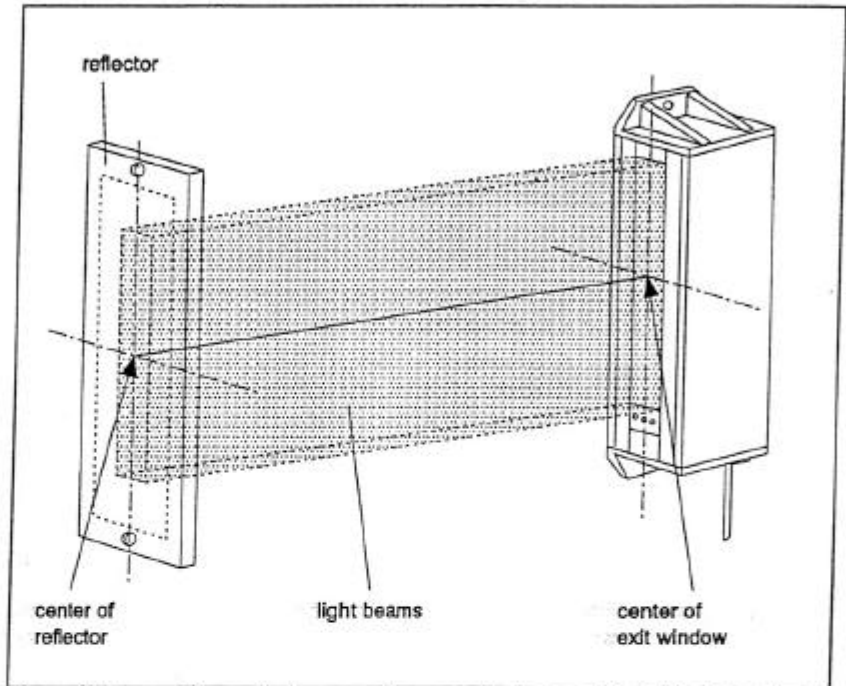


Figure 7-5 The reflector must be mounted symmetrically to the exit window

7.1.4 Information on
Combining
REFLEX Safety
Light Curtains

When combining REFLEX safety light curtains, mutual influence must be avoided (Figures 7-6 and 7-7).

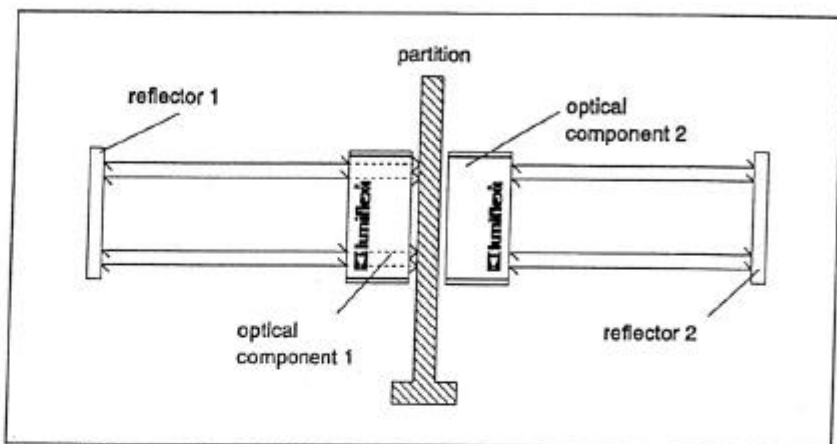


Figure 7-6 Two REFLEX safety light curtains mounted in series with a partition in between to prevent interference

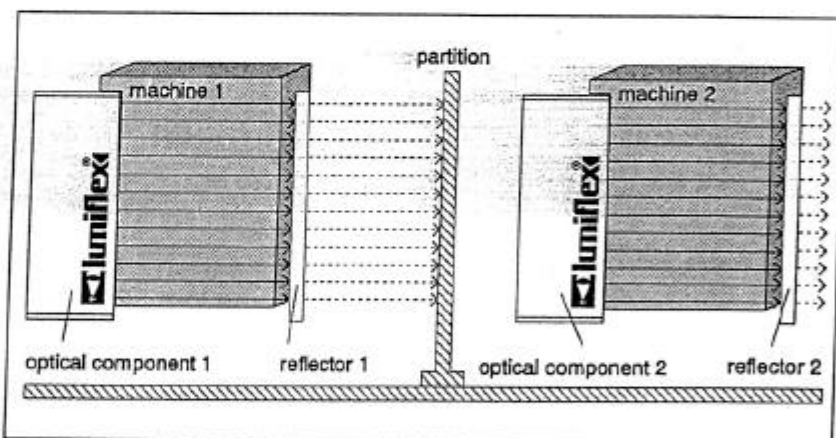


Figure 7-7 Preventing interference by means of a partition when the optical components are mounted in same direction

7.2 Mounting the Equipment

- 7.2.1 **Mounting the Optical Component** Three 9 mm drill holes on the side parts of the REFLEX optical component serve for mounting (Figure 7-7).

For easy adjustment M6 pin screws are located inversally to the mounting drill holes.

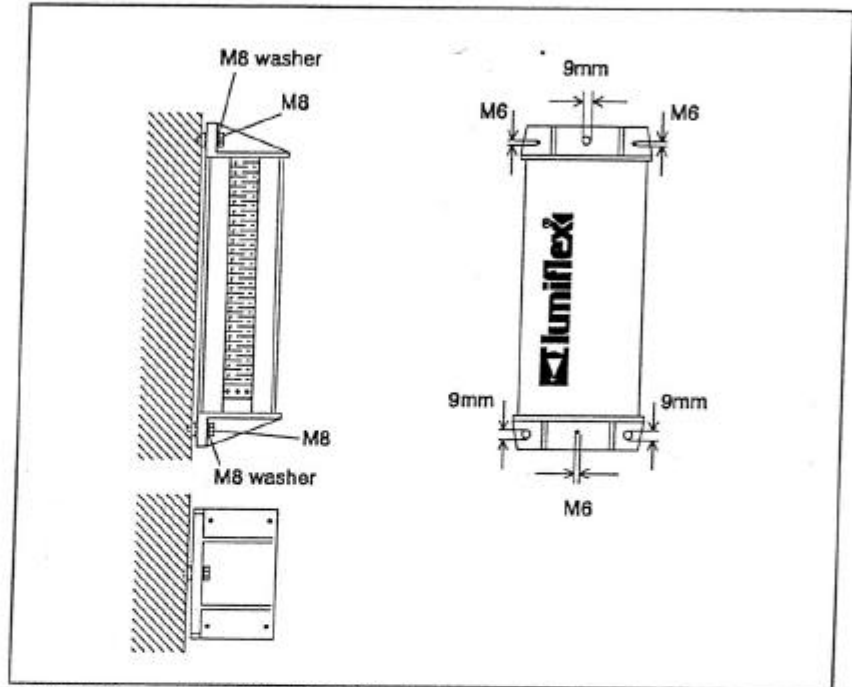


Figure 7-8 Mounting the optical component

The positions of the drill holes are determined in Figure 14-1 and the related Dimension Table 14-1.

7.2.2 Mounting the Reflector

Due to the diverge optical light path, the lengths of the reflectors are larger than the lengths of the associated optical component's exit windows (see Figure 7-5).

The cross position of the reflector is not critical, to say the light beams must not pitch in by a precise 90 degree angle. The reflector's technology allows for a diviation of $\pm 5^\circ$.

The position of the mounting drill holes are shown in Figures 14-4 to 14-6 and the related Dimension Tables 14-2 to 14-4.

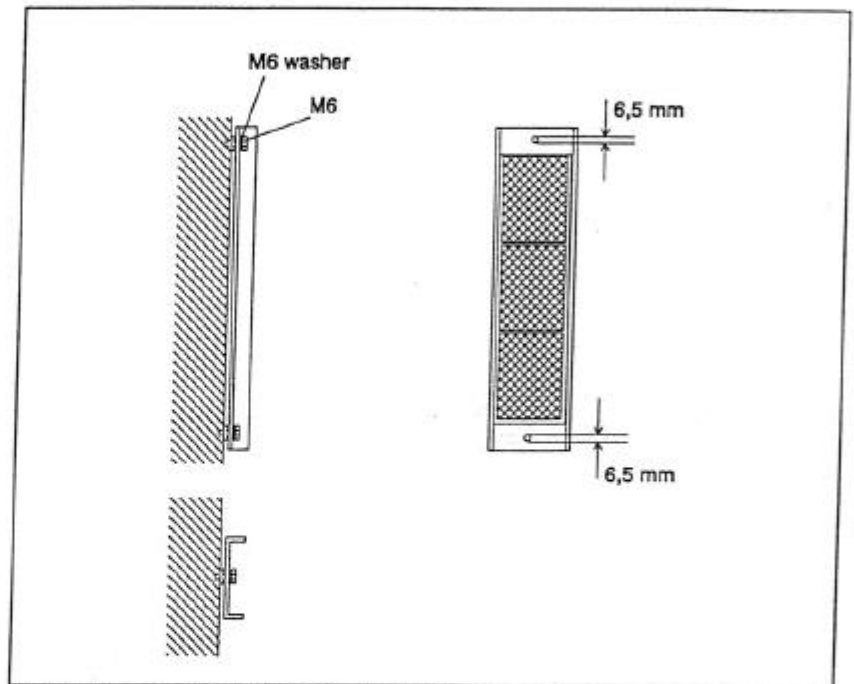


Figure 7-9 Mounting of the reflector

8 Electrical Connection

8.1 **Optical Component** The connection of the REFLEX optical component to the BASIS-270 or ULS-5 control unit is made by the provided 6-pin connecting cable (see Figure 2-1). After plug-in tighten the coupling ring.

8.2 **Control Unit BASIS-270 or ULS-5**

Connection tips:

- Plug-in the connecting cable from the REFLEX optical component into the 6-pin socket and tighten the coupling ring.
- In order to connect to supply voltage and to machine control system do not fail to comply with the "Connecting and Operating Instructions" of the respective control unit BASIS-270 or ULS-5.

9 Initial Operation

- 9.1 **Display Elements of the REFLEX Optical Component** At the optical component's display field three display elements (LEDs) are available for status indication (Figure 9-1).

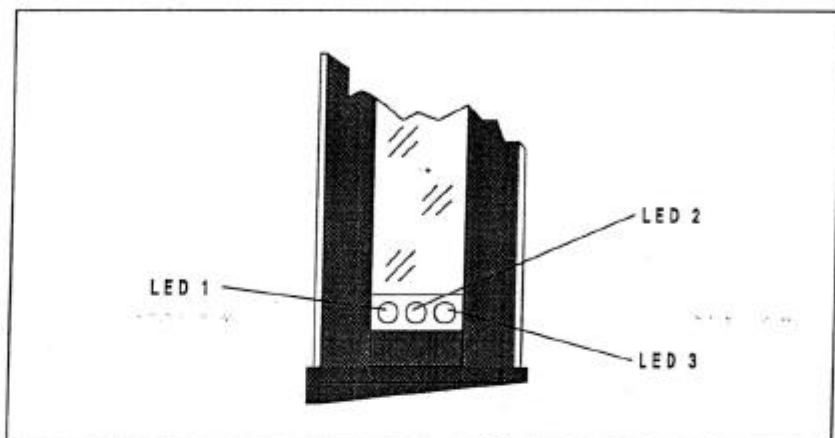


Figure 9-1 The display elements of the optical component

The red and the green LED indicate the switching output state of the connected control unit BASIS-270 or ULS-5.

The following Table 9-1 shows the meaning of the display elements:

LED No.	Colour	State	Meaning
1	red	on	Make contacts open, break contacts closed
		off	Make contacts closed, break contacts open
2	green	on	Make contacts closed, break contacts open
		off	Make contacts open, break contacts closed
3	yellow	on	Sensing zone interruption or optical component and reflector misaligned
		off	Sensing zone free, optical component and reflector adjusted

Tabel 9-1

9.2 Checks before First Time Start-Up

9.2.1 Supply Voltage Before switching on for the first time, check whether the local supply voltage corresponds with the details on the label of the control unit BASIS-270 or ULS-5.

9.2.2 Bridging the Test Input **Note:** When aligning the optical component and reflector, it is vital that there is no external test request input to the BASIS-270 or ULS-5 control unit.

An external test request (also called cyclical testing) simulates an object in the sensing zone of the REFLEX safety light curtain. The display elements of the optical component indicate "sensing zone not free!" for the duration of the test request regardless of the actual state of the sensing zone.

During the aligning process, the test input on pins 3 and 4 at the 24-pin connector of BASIS-270 or pins 12 and 13 at the 16-pin connector of ULS-5 must be bridged.

Caution: For applications with an external test request (cyclical testing) or when using the types of operation "Single break" and "Double break", remove the bridge after alignment.

9.3 Switching on Power and Aligning Optical Component and Reflector

9.3.1 Switching on Power Switch on supply voltage and operate the REFLEX optical component start button (see Figure 2-1).

9.3.2 Aligning Optical Component and Reflector

Once the supply voltage has been switched on, the position of the light beams must be checked.

If the yellow LED is switched on, the received light energy is not sufficient. The reason may be incorrect alignment (Figure 9-2).

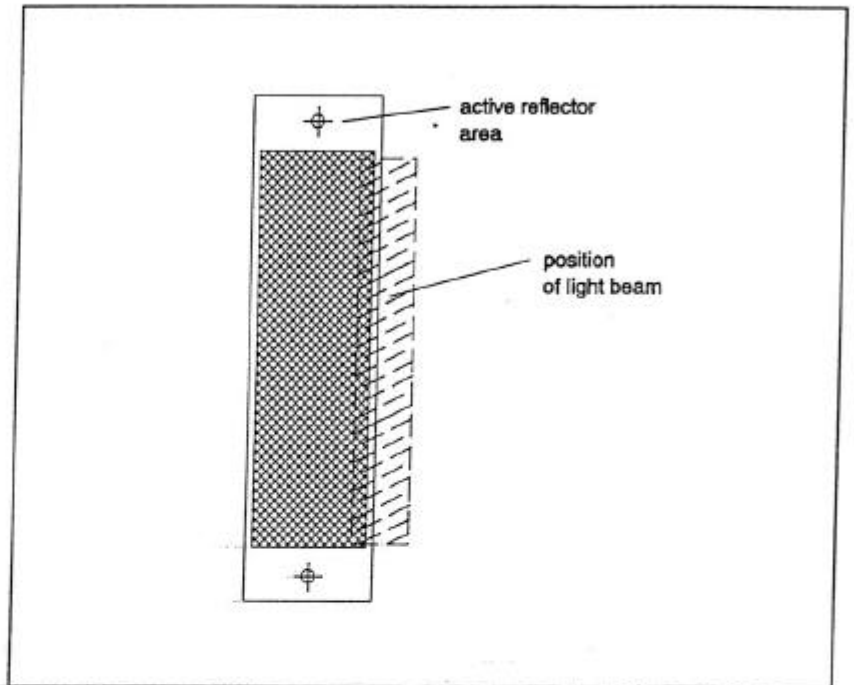


Figure 9-2 Optical component and reflector are misaligned. The light beams hit the active reflector area only partially.

In order to align the optical component, loosen the fastening screws until the equipment becomes movable.

1. Turn the optical component to one side until the light beams surely do not meet the reflector. The yellow LED is switches on.
2. Slowly turn back the equipment until the yellow LED switches off.
3. Turn beyond this point until the yellow LED switches on again.
4. Now turn back and fasten the optical component at the center of the this range (Figure 9-3).

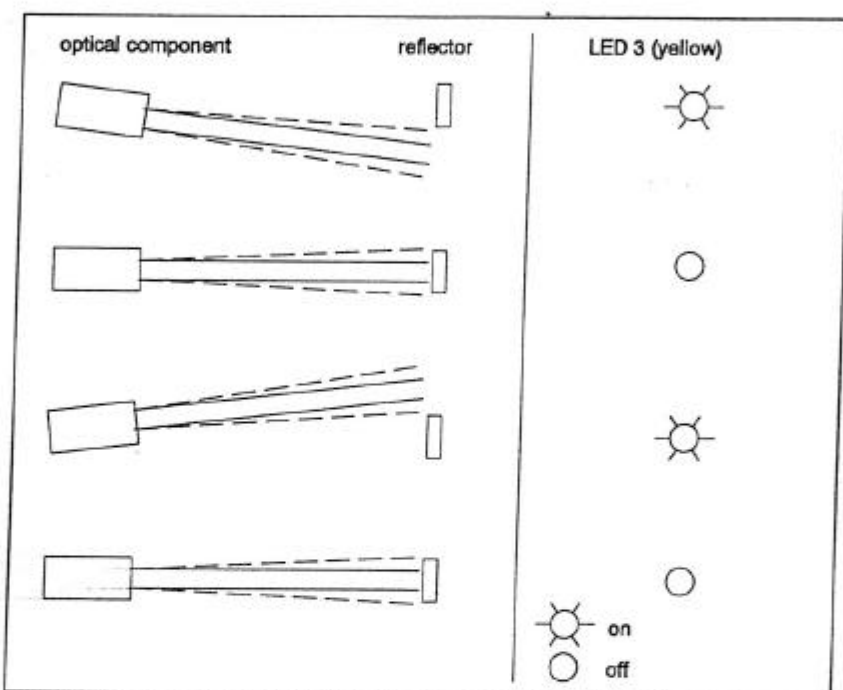


Figure 9-3 Alining the REFLEX optical component and the receiver

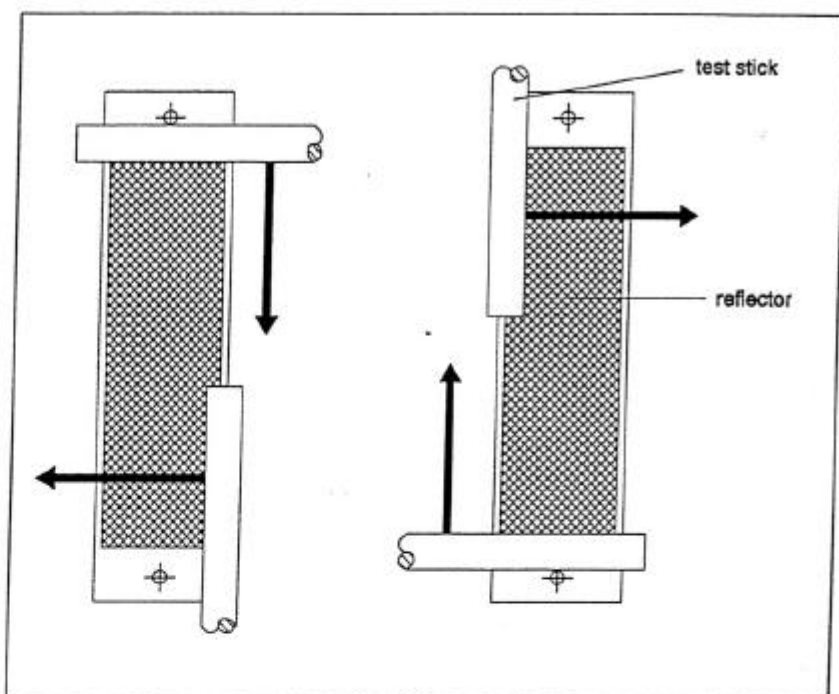


Figure 9-4 Checking the alignment with test stick. As soon as the test stick reaches the borders of the invisible light beams the yellow LED switches on.

5. The provided test stick may be used for checking the position of the light beams on the reflector.
6. Figure 9-5 shows the symmetrical position of the light beams on the reflector. The alignment is finished.

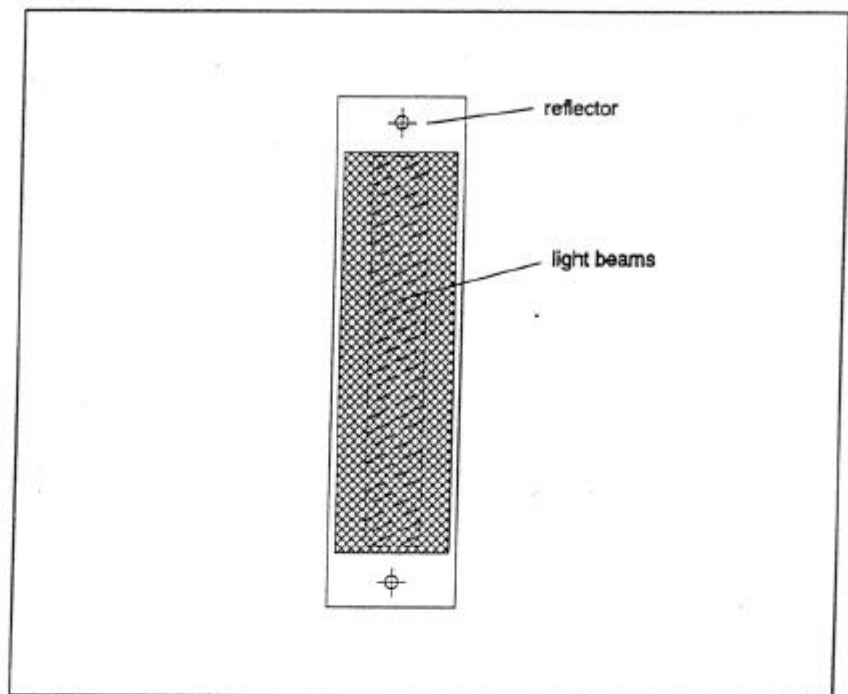


Figure 9-5 Symmetrical position of the light beams on the reflector.

7. Adjust the three M6 pin screws and lock with mounting screws.

- 10 Troubleshooting and Fault Rectification** Malfunctions often have relatively simple causes. Table 10-1 below provides instructions on locating faults and rectifying them. If this does not work, contact LUMIFLEX service department or the authorized factory representative.

Caution: Do not touch electrical connections when the equipment is open and switched on!

Symptom	Possible Cause	Check/Remedy
All LED's of the optical component will not light (red, green, yellow)	- Connecting cable to BASIS-270 or ULS-5 not plugged in or defective.	- Check plugs and tighten coupling ring, deplug cable on both ends and measure with an Ohm-meter (equal pin numbers)
	- Supply voltage of BASIS-270 or ULS-5 is missing	- Check supply voltage at the connector
	- Fuse Si 1 on BASIS-270 printed board or ULS-5 printed board defective.	- Open casing cover check Si 1 and replace if needed (BASIS-270: M 1.6 A ULS-5: M 0.4 A)
	- Power pack in BASIS-270 or ULS-5 faulty	- If available replace BASIS-270 or ULS-5 with a substitute device and check functions

Table 10-1 (page 1 of 4)

Symptom	Possible Cause	Check/Remedy
LED 1 (red) and LED 3 (yellow) of the optical component lights constantly	<ul style="list-style-type: none"> - Object in the sensing zone - Electronic in the optical component not yet started (start interlock) - Optical component and reflector misaligned - Reflector dirty or frosted - Exit window of the optical component dirty or frosted - Circuit at test input 3,4 of BASIS-270 or 12-13 of ULS-5 open 	<ul style="list-style-type: none"> - Remove object - Operate "Start" button - Align optical component and reflector - Clean or replace the reflector - Clean or replace the exit window - Check

Table 10-1 (page 2 of 4)

Symptom	Possible Cause	Check/Remedy
LED 1 (red) of the optical component lights constantly	<ul style="list-style-type: none"> - Type of operation switch in intermediate position - The cycle memory of the control unit expects intrusions into the sensing zone "Single break" 1 time "Double break" 2 times - Connecting cable ULS-5 not plugged in right or defective 	<ul style="list-style-type: none"> - Move switch to desired position - Intrude into any part of the sensing zone and release again - Check plugs and tighten coupling ring, deplug cable on both ends and measure with an Ohm-meter (equal pin numbers)

Table 10-1 (page 3 of 4)

Symptom	Possible Cause	Check/Remedy
LED 2 (green) of the optical component lights but the machines does not start	<ul style="list-style-type: none"> - Fuse (make contact 1) of the BASIS-270 or ULS-5 printed board defective - Fuse (make contact 2) of the BASIS-270 or ULS-5 printed board defective - Connection to break contact, make contact 1 or make contact 2 interrupted - Relay contacts in the control unit faulty 	<ul style="list-style-type: none"> - Open cover of the control unit check and if needed replace fuse - Open cover of the control unit check and if needed replace fuse - Check connections - Replace relay or complete set of relays (see "Connecting and Operating Instructions" of the selected control unit)

Table 10-1 (page 4 of 4)

11 Checks

REFLEX safety light curtains, like all safety devices, are effective only when used correctly and when they are neither damaged nor manipulated improperly.

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

11.1 Checks before Initial Operation

Caution:

REFLEX safety light curtains fulfil their protective function only when they are installed in accordance with these "Fitting and Operating Instructions" and when interacting correctly with the machine control system.

Therefore, it is recommended (not only for metal-working presses in PM 41, ZH 1/281) that the equipment is inspected before initial operation by a LUMIFLEX employee.

11.2 Daily Inspection

At the daily start of production or at shift changes, the person in charge must guide the provided test stick (for object size see label) in front of the reflector slowly through the entire sensing zone (see Figure 11-1). If in that process of inspection the green LED lights up, even at one point only, his or her superior must be notified immediately and work on the machine halted.

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

Only by these checks damage or any improper manipulation of the protective device will be detected early.

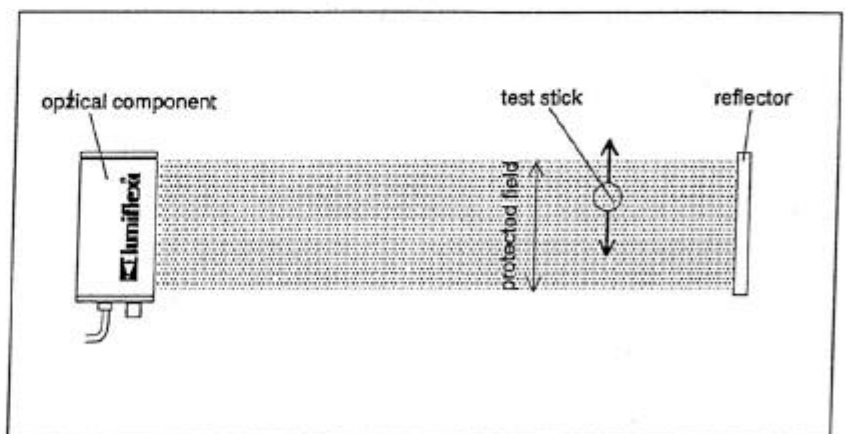


Figure 11-1. The test stick must be guided slowly through the entire sensing zone.

11.3 Annual Check

The annual check verifies the correct function and the condition of the REFLEX safety light curtain's components and their proper interaction with the machine control system.

The check results are reported in a record and certified by a label to the REFLEX optical component.

This check must be carried out by a LUMIFLEX employee or by an educated person trained by LUMIFLEX.

LUMIFLEX offers both, maintenance contracts and training sessions on LUMIFLEX's or customers premises.

12 Maintenance

12.1 Cleaning

The exit window of the optical component and the reflector's surface must be cleaned regularly.

The exit window of the optical component is made of glass and has to be cleaned like normal window planes.

The uncovered reflector with its acrylic surface has to be cleaned carefully with soft material in order to avoid scratches.

12.2 Replacing the Exit Window

The REFLEX exit window is easy to replace by unsewing the cover frame.

A screw driver with a blade of appr. 4 to 5 mm is needed.

1. Loosen eight screws (M3) and remove cover frame (Figure 12-1).

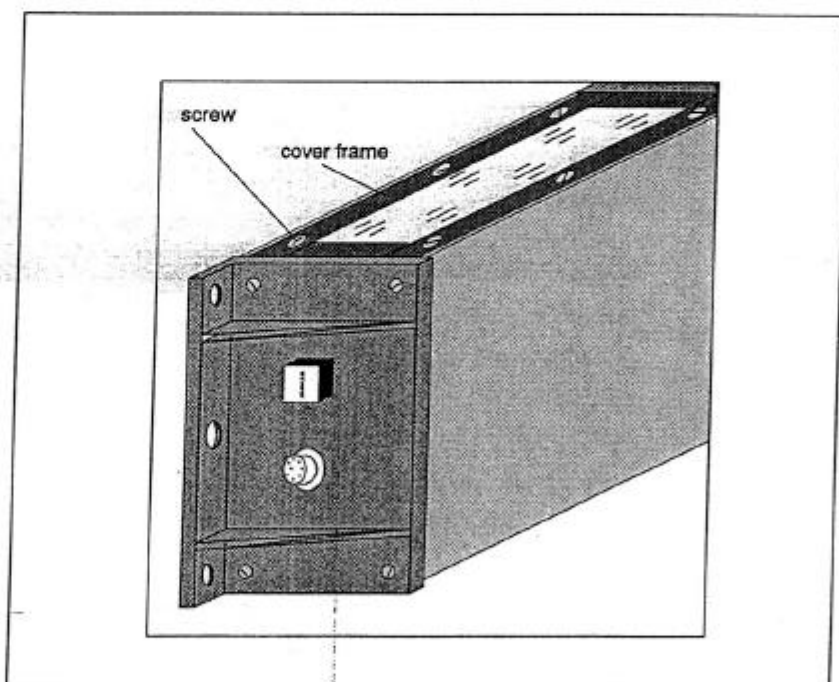


Figure 12-1 Removal of cover frame

2. Remove damaged exit window and any fragments by a vacuum cleaner.
3. Insert new exit window (Figure 12-2).
4. Screw on cover frame.

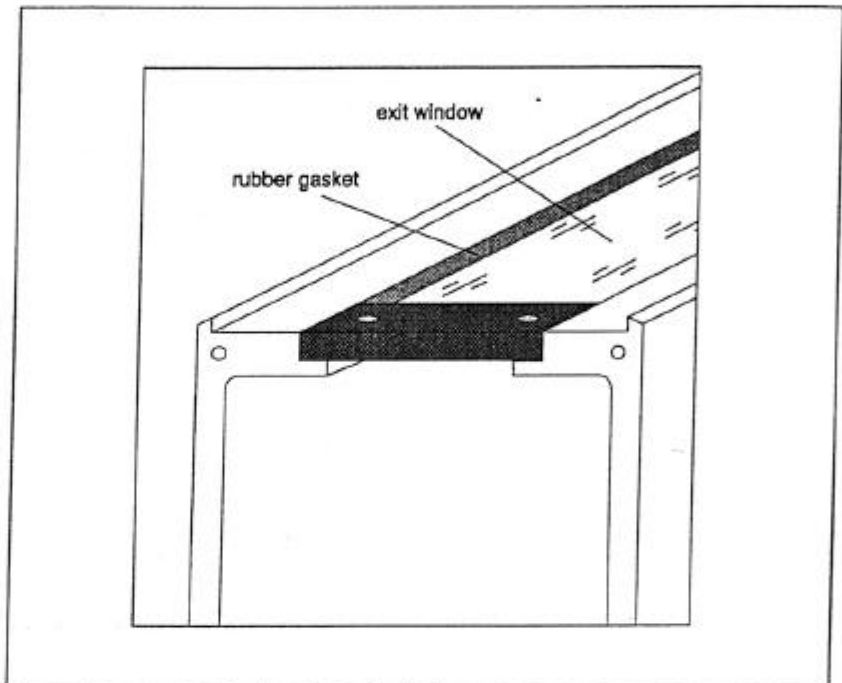


Figure 12-2 Replacing the exit window

13 Servicing

Our service department offers the following services:

- Checking and inspection of unit before initial operation
- Maintenance contract for annual verification
- After sales service
- Training either at LUMIFLEX's or at customer's premises
- Fast delivery of spare parts and quick repairs

14 Appendix

14.1 Technical Data

Design, Typ	RX-200 to RX-1400
Protected heights	215 mm to 1428 mm (see Dimension Table 14-1)
Protected width	0,4 to 6 m
Object sensitivity, resolution	Depending on protected width 14 mm to 40 mm (see Table 2-2)
Classification	Type 4 ESPD, internally self checking
Response time including control unit	23 to 30 ms depending on protected height (see Table 5-1)
Supply voltage	24 V DC provided by the control unit
Aperture angle of optics	$\pm 2^\circ$
Light sources	GaAlAs-IR diodes infrared, pulsed
Average lifetime	100 000 h
Wavelength	Apr. 940 nm
Sensors	Silicium photo diodes
Relative spectral sensitivity	800 to 1100 nm
Display elements	LEDs
Connector plug to control unit (ready-made connecting cable)	6-pin as per DIN 45322
Enclosure rating	IP 65
Weight	See Dimension Table 14-1
Dimensions	See Dimension Table 14-1
Casing width	90 mm
Casing height	141 mm
Colour	Yellow RAL 1021 and anthracite RAL 7016
Mounting position	Optional
Ambient operating temperature	0° to 55° Celsius
Storage temperature range	-25° to 70° Celsius
Interference immunity	Interference suppressed as per VDE 843, IEC 801 Intensity IV

Table 14-1 (page 1 of 2)

Optional
Control Unit

Design, Type	BASIS-270 (including intergrated safety functions) ULS-5 (low-cost version)
Dimensions	See Dimension Drawings 14-2 or 14-3

Table 14-1 (page 2 of 2)

Reflectors

Design, Type	R-200S to R-800S small open design R-200B to R-1400B wide open design R-200G to R-1400G wide closed design glass protected
Dimensions	See Figures 14-4 through 14-6 and related Dimension Tables.

Table 14-1 (page 2 of 2)

14.2 Dimension Drawings

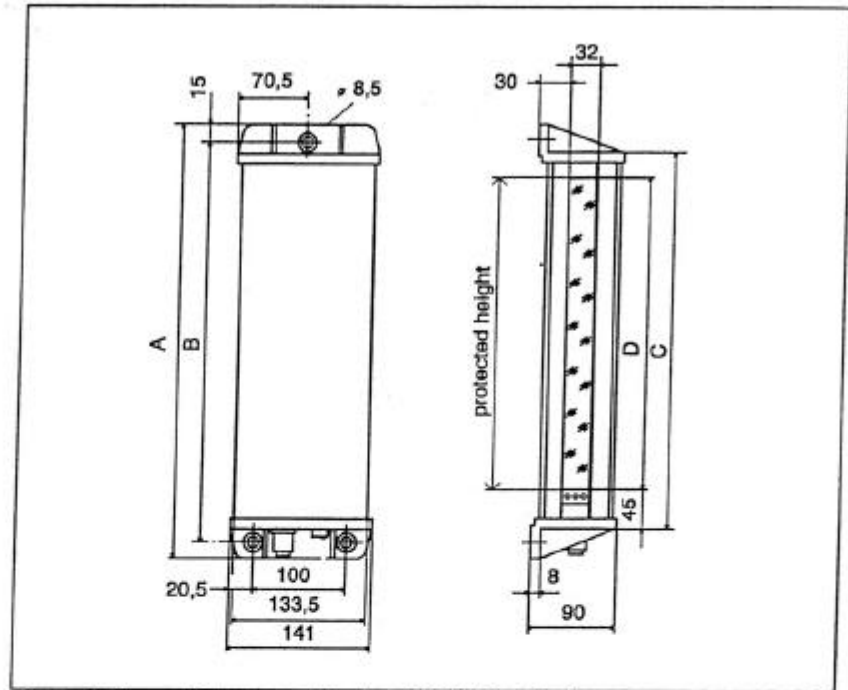


Figure 14-1 Dimension drawing REFLEX optical component

Dimension table
REFLEX optical
component

Type	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)
RX - 200	340	310	290	215	3,1
RX - 300	440	410	390	315	3,9
RX - 400	540	510	490	415	4,7
RX - 500	644	614	594	519	5,5
RX - 600	745	715	695	620	6,3
RX - 700	846	816	796	721	7,1
RX - 800	947	917	897	822	8,1
RX - 900	1048	1018	998	923	8,9
RX - 1000	1129	1119	1099	1024	9,7
RX - 1100	1250	1220	1200	1125	10,5
RX - 1200	1351	1321	1301	1226	11,3
RX - 1300	1452	1422	1402	1327	12,1
RX - 1400	1553	1523	1503	1428	12,9

Table 14-1

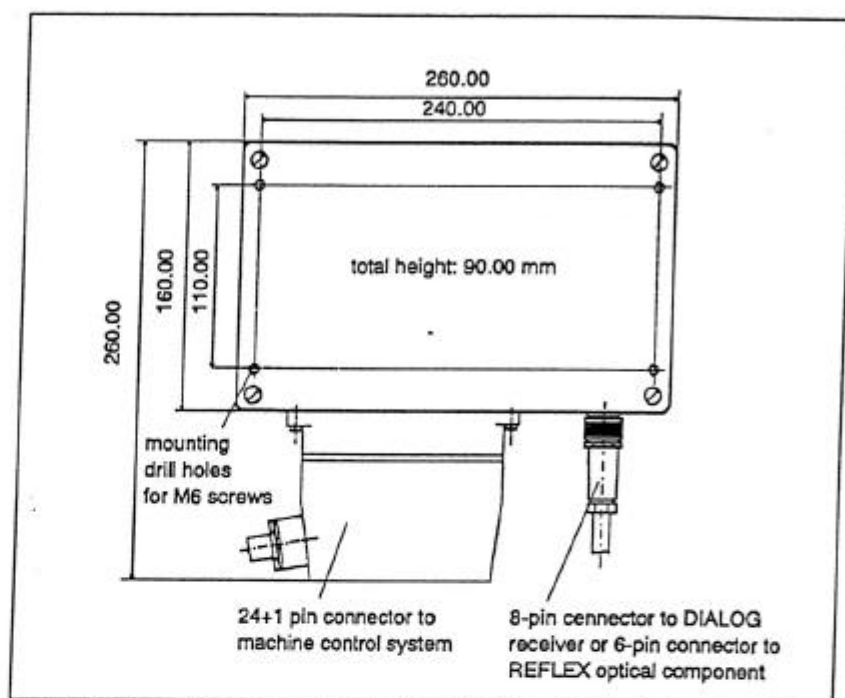


Figure 14-2 Dimension drawing BASIS-270 control unit

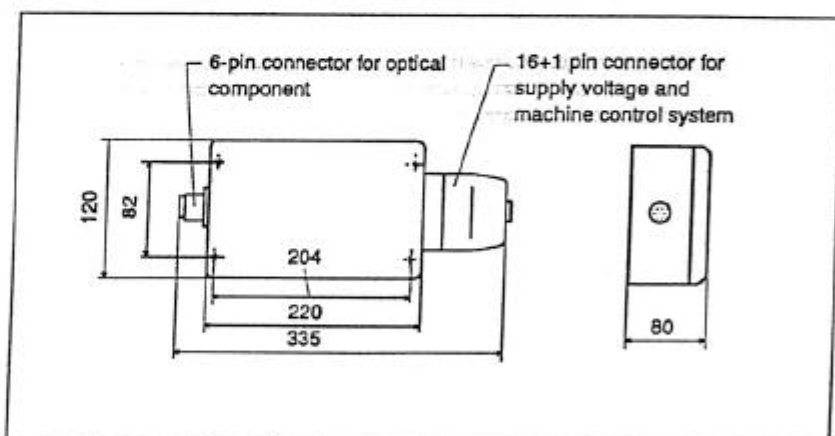


Figure 14-3 Dimension drawing ULS-5 control unit

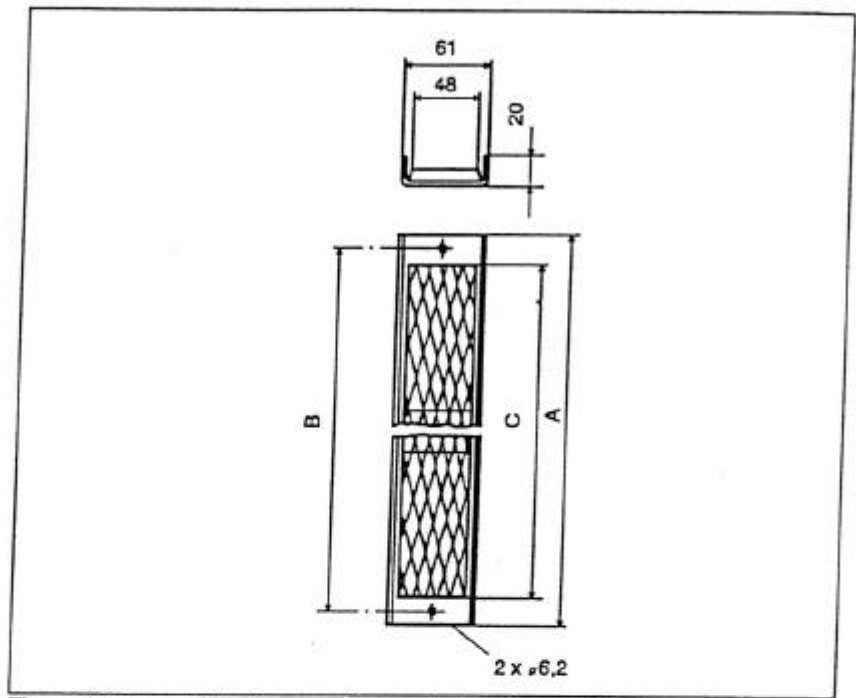


Figure 14-4 Reflector, small open design (protected width 0.4 to 1 m)

Dimension table
of reflectors,
small design

Type	A (mm)	B (mm)	C (mm)
R 200 S	340	320	295
R 300 S	430	410	390
R 400 S	530	510	490
R 500 S	625	605	585
R 600 S	720	700	685
R 700 S	820	800	780
R 800 S	1015	995	975

Tabelle 14-2

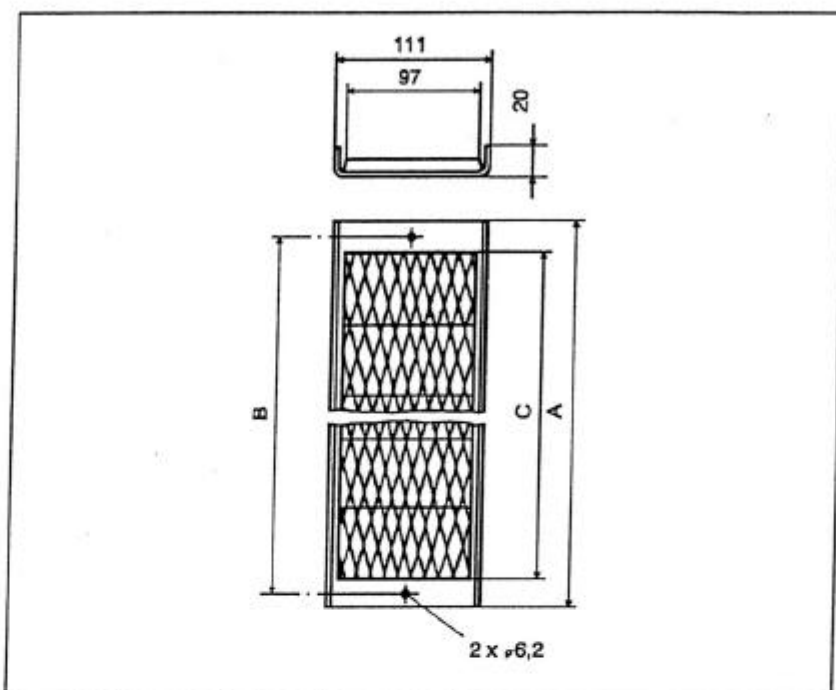


Figure 14-5 Reflector, wide open design
(protected width more than 1 m)

Dimension table
of reflectors,
wide design

Type	A (mm)	B (mm)	C (mm)
R 200 B	380	360	335
R 300 B	480	460	430
R 400 B	580	560	530
R 500 B	675	655	625
R 600 B	810	790	770
R 700 B	905	885	865
R 800 B	1000	980	960
R 900 B	1100	1080	1055
R 100 B	1195	1175	1150
R 1100 B	1290	1270	1250
R 1200 B	1435	1415	1395
R 1300 B	1580	1560	1540
R 1400 B	1720	1700	1680

Table 14-3

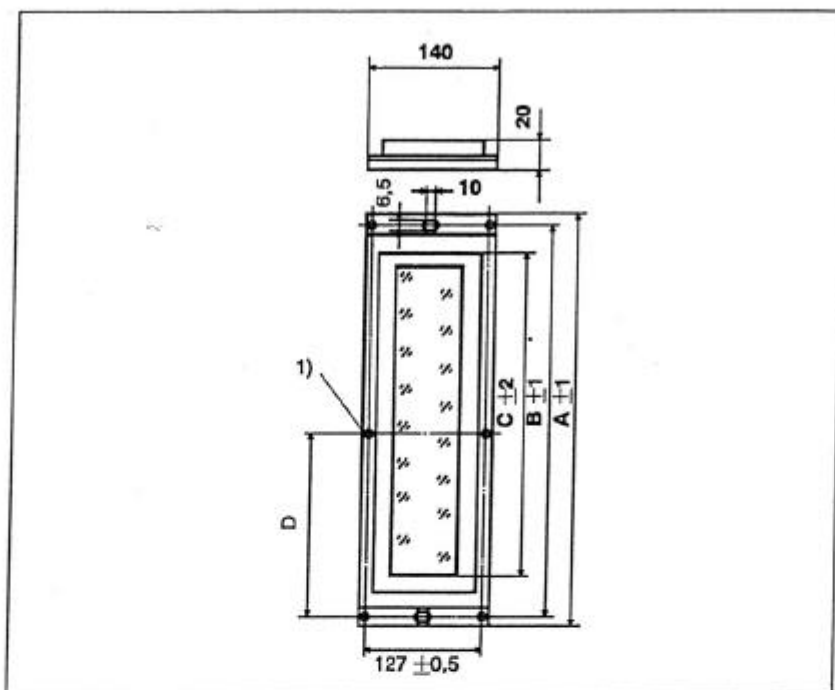


Figure 14-6 Reflector, wide closed design with glass protection

Dimension table
for reflectors,
wide closed design
with glass
protection

Type	A (mm)	B (mm)	C (mm)	D (mm)
R 200 G	410	395	320	-
R 300 G	510	495	420	-
R 400 G	610	595	520	-
R 500 G	725	710	605	-
R 600 G	840	825	750	-
R 700 G	940	925	850	-
R 800 G	1030	1015	940	-
R 900 G	1125	1110	1040	-
R 1000 G	1235	1215	1140	607,5
R 1100 G	1325	1305	1230	652,5
R 1200 G	1475	1455	1380	727,5
R 1300 G	1610	1590	1515	795
R 1400 G	1710	1690	1615	845

Table 14-4

14.3 Accessories

14.3.1 Deflecting Mirror

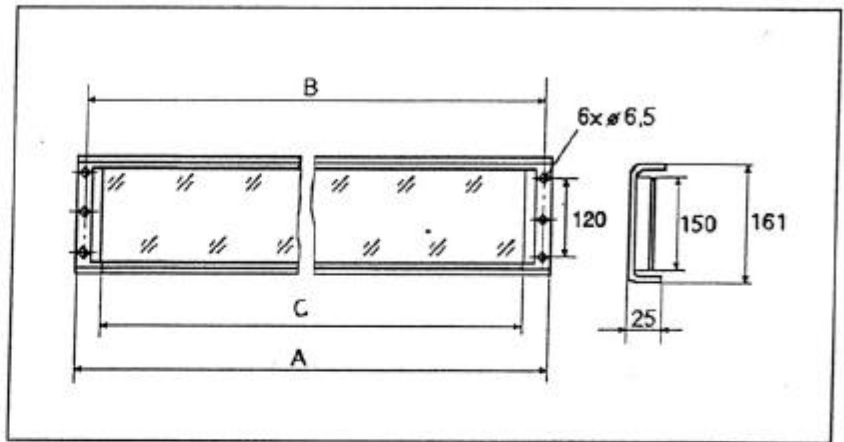


Figure 14-7 Dimension drawing deflecting mirror

Note: Tension-free mounting of deflecting mirrors is important.

Dimension table
of deflecting
mirrors

Type	Part 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 500/150	524965	695	675	625
S 600/150	524970	810	790	740
S 700/150	524941	900	880	830
S 800/150	524980	1000	980	930
S 900/150	524981	1100	1080	1030
S 1000/150	524985	1195	1175	1125
S 1100/150	524990	1290	1270	1220
S 1200/150	524995	1435	1415	1365
S 1300/150	525000	1580	1560	1510
S 1400/150	515001	1720	1700	1650

Table 14-5

Other deflecting mirrors on special order.

14.3.2 Deflecting Mirror Support (free-standing)

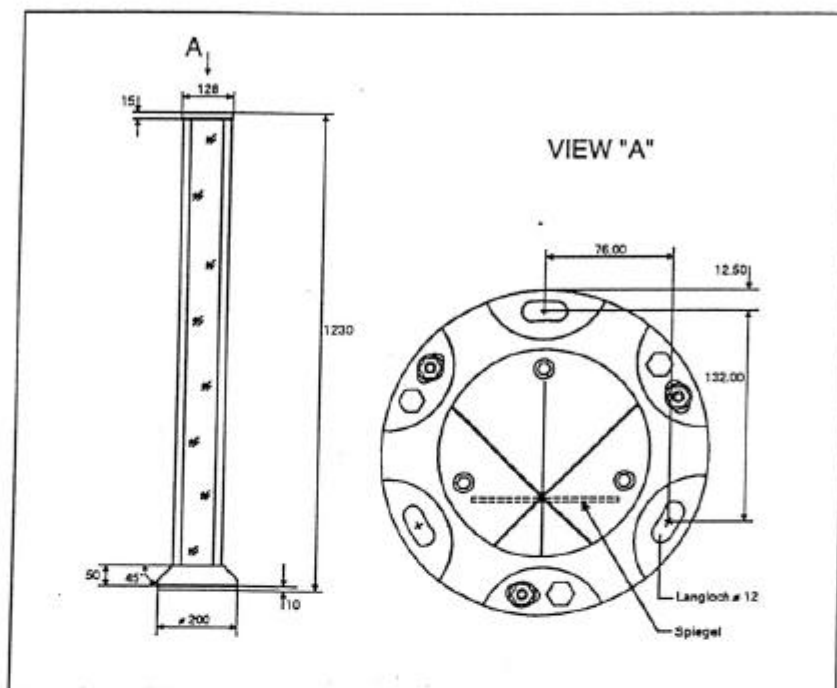


Figure 14-8 Deflecting mirror support

Deflecting mirror supports are available in different heights on request.

14.3.3 Connecting Cable REFLEX Optical Component to BASIS-270 or ULS-5 Control Unit

This cable is intended to connect the REFLEX optical component and either the BASIS-270 or the ULS-5 control unit. It is available in three different lengths. The control unit should be fitted on the machine near to the REFLEX optical component.

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

Length	Part No
0,5 m	529061
1,5 m	529065
3 m	529063

Table 14-6

14.3.4 Test Stick for Daily Inspection

Designation	Part No
Test stick 14 mm	530010
Test stick 30 mm	530040
Test stick 40 mm	530050

Table 14-7

14.4 Spare Parts

Exit window with rubber gasket

Exit window for type	Part No
RX - 200	408402
RX - 300	408403
RX - 400	408404
RX - 500	408405
RX - 600	408406
RX - 700	408407
RX - 800	408408
RX - 900	408409
RX - 1000	408410
RX - 1100	408411
RX - 1200	408412
RX - 1300	408413
RX - 1400	408414

Table 14-8

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: **REFLEX with control unit BASIS-270/BASIS-50 or ULS-5**

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 Compatibility (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. 95701, 95703, 95705, 95707, 95709, 95711, 95713, 95715, 95717, 95719, 95721, 95723, 95725, 95727, 95729, 95731, according to protected height and control unit)**

Munich, Nov 30, 1995



Greißl
Managing Director

Archives

.....
Safety Component-No.