

# Operating instructions

## Safety Light Array SB4-I

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# 1 INTRODUCTION

## 1.1 General Information Regarding this Document

This document is intended to serve as a set of operating instructions for personnel which has been authorized and commissioned by the machine manufacturer or operating company to connect the safety device, integrate it into the machine, start it up, configure it and maintain it in accordance with the specified stipulations.

Due to the fact that they describe the operation of a safety device, these operating instructions are of a binding nature.

The wenglor safety device with the designation "Light Array" is described in these operating instructions.

## 1.2 Function and Use for Intended Purpose

The light curtain monitors the safety field between the transmitter and the receiver. If the safety field is penetrated by an obstruction, a switching command is triggered. This switching command may prevent initialization of a hazardous machine motion, or may stop an action which has already been started.

Use of the light curtain is only permissible if:

- Hazardous motion can be stopped by electrical means using the light curtain's safety output
- Adequate detection of possible obstruction is assured with existing resolution

## 1.3 Brief Explanation of Function- and Operating Modes

### Cascading

Safety devices can be series connected such that they all drive a single safety output in order to monitor several safety fields simultaneously. Cascaded safety devices demonstrate the same performance characteristics as a single safety device.

### Contactors Monitoring

An operating mode for which switching performance of the contacts at an external relay is dynamically monitored. The contacts must close fully within a specified period of time.

### Fix Blanking

This operating mode is required for applications including objects which continuously protrude into the safety field, thus interrupting specific light beams originating from the safety light curtain. Intrusions into any other point within the safety field cause the output to switch and stop hazardous motion.

### Reduced Resolution

This function reduces the resolution electronically. Thus objects that are smaller than the selected resolution don't deactivate the safety output. The function can also be used to prevent machining chips from interfering with correct functioning of the Safety Light Array.

### Restart Inhibit

A function which prevents a machine from starting up automatically after it has been switched on. The machine can only be enabled by activating an acknowledgement key.

### Safety Operating Mode

In this operating mode, the switching outputs are disabled when the safety field is penetrated. The switching outputs are automatically enabled after penetration of the safety field is ended.

### Safety Output – OSSD (Output Signal Switching Device)

The output of the contactless safety device which is connected to the machine controls. The safety output is deactivated when the safety field is interrupted.

### Signal Output

A semiconductor output for auxiliary functions without safety monitoring.

### Start-Up Inhibit

This function is activated along with the „Restart Inhibit Function“. When power supply is switched on (e.g. after a power failure), the safety outputs (OSSD) remain in the off state. Acknowledgement is accomplished by activating an acknowledgment key.

## 1.4 Explanation of symbols



Points up suggestion and tips, which simplify the handling of the safety light barrier.



Points at a measure to prevent a concrete danger.



Points at functions, which can only be configured by means of software (PC).

## 2 DESCRIPTION OF THE SAFETY DEVICE

### 2.1 General

The light curtain monitors the safety field between the transmitter and the receiver. If the safety field is penetrated by an obstruction, a switching command is triggered. This switching command may prevent initialization of a hazardous machine motion, or may stop an action which has already been started.

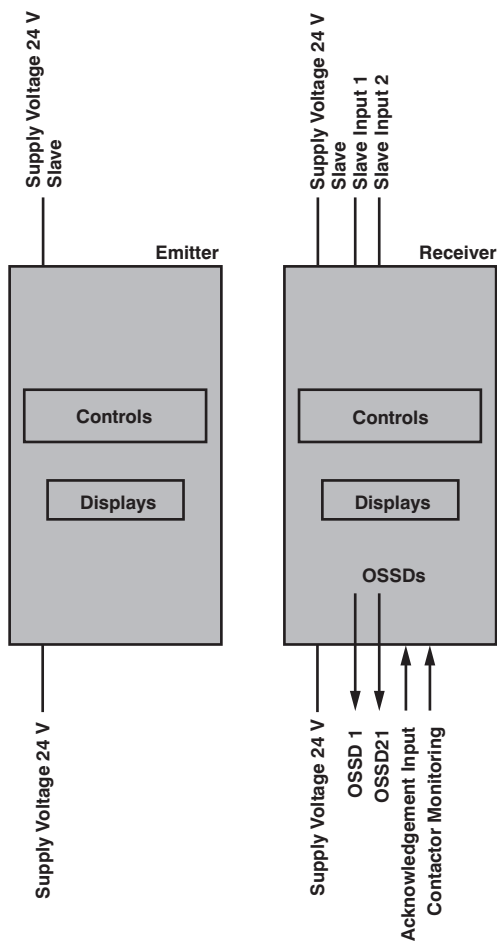
Use of the light curtain is only permissible if:

- Hazardous motion can be stopped by electrical means using the light curtain's safety output
- Adequate detection of possible obstruction is assured with existing number of beams and selected beam clearance.
- Use of a type 4 light barrier is permissible

### 2.2 Features

- Safety device per EN 61496-1
- TÜV approval
- Body protection with a beam clearance of 300, 400 or 500 mm
- Visible red light
- PNP semiconductor safety outputs
- PNP signal output

- Fix Blanking
- Electronically reduced resolution
- Simple cascading
- Serial interface with visualization program
- Restart inhibit
- Monitoring of external relays
- Muting (optional)
- Relay unit (optional)
- Coding

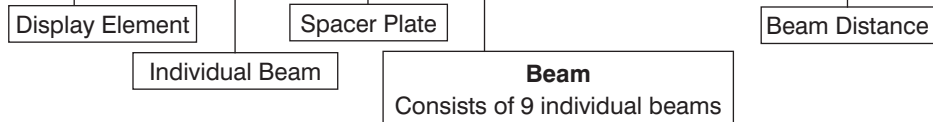


## 2.3 Layout

### Receiver



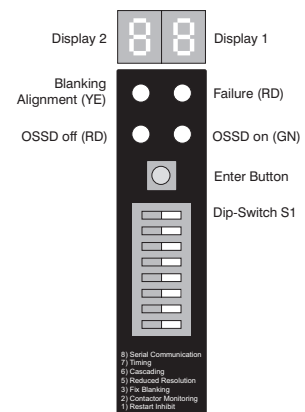
### Emitter



## 2.4 Control and Display Elements

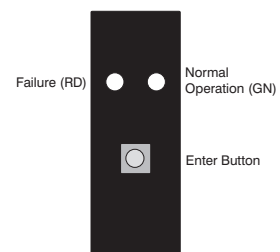
### Receiver

Display Element	Function
Alignment-/Blanking LED (YE)	Alignment / fix blanking display
Failure-LED (RD)	Error display
OSSD off (RD)	OSSD status display
OSSD on (GN)	OSSD status display
Display 1	Display of the selected function or operating mode
Display 2	Display of the selected function or operating mode
Dip-Switch	Selection of functions and operating modes
Enter Button	Acknowledgment of a selection



### Emitter

Display Element	Function
Failure-LED (RD)	Error display
Normal Operation (GN)	Power supply indicator
Enter Button	Acknowledgment of a selection

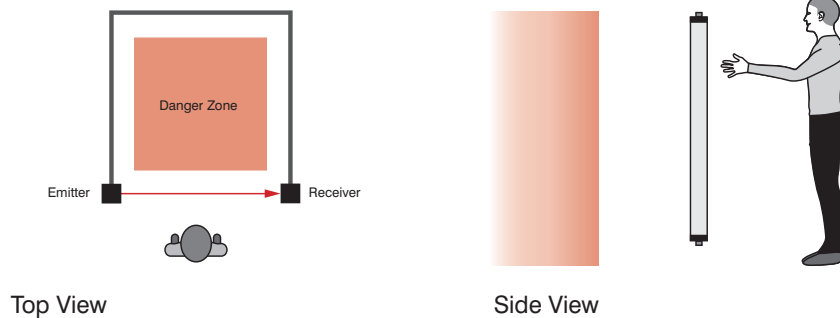


## 2.5 Applications Examples

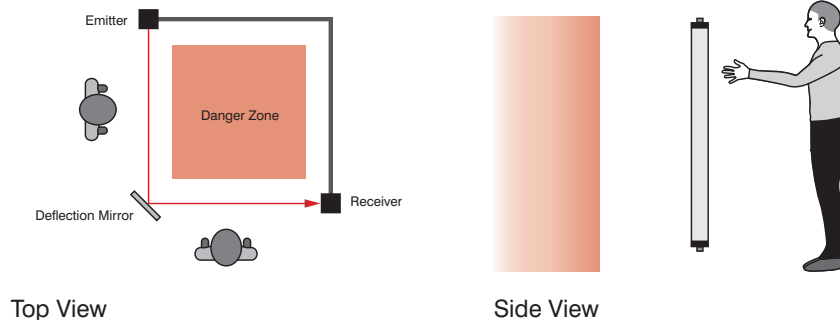
### Safety protection at:

- Presses
- Saws
- Textile machinery
- Transfer lines, assembly lines
- Packaging machines
- Woodworking machines

#### 1<sup>st</sup> example: restricting access and securing specific areas



#### 2<sup>nd</sup> example: use with path-folding mirrors



## 3 INSTRUCTIONS FOR USE AND SAFETY PRECAUTIONS

### 3.1 General Instructions for Use and Safety Precautions

Observe the following points in order to assure safe use of the Safety Light Array for its intended purpose. Applicable national and international requirements apply to installation and use of the Safety Light Curtain, as well as to initial start-up and periodic technical testing, in particular:

- Machinery directive 2006/42/EC
- Use of work equipment directive 89/655/EEC
- Accident prevention regulations and safety rules
- Other relevant safety regulations

The manufacturer of, and the company who operates the machine at which the Safety Light Curtain is used must, on their own initiative, agree upon and adhere to all applicable safety regulations and rules in cooperation with the responsible authorities. It is absolutely essential to adhere to all directions included in these operating instructions, in particular the inspection procedures.



Contactless safety devices may only be used at power operated machinery whose controls can be electrically influenced such that hazardous motion can be stopped immediately in all operating phases.

Additional measures may be necessary in order to assure that the ESPE does not malfunction or fail in a dangerous fashion due to other types of light which are used in the respective application (e.g. resulting from the use of cordless controllers on cranes, emission due to welding sparks or the effects of stroboscope light).

Testing must be performed by an expert prior to initial start-up of the ESPE. Testing must establish flawless interaction of the ESPE together with the controls of the power operated machinery, and correct installation in accordance with these safety precautions.

Testing must be conducted by qualified persons, or persons who have been authorized and engaged specifically to this end, and must be documented in a fashion which can be readily retraced at any point in time.

The cascading terminals on the sensor and the receiver may only be used to connect additional Light Arrays. Connection of other power consumers is impermissible.

Changes to device configurations may impair the respective devices' protective functions. For this reason, the effectiveness of the safety device must be retested each time its configuration is changed. The person who makes the change is also responsible for assuring that the safety function of the device is maintained.

The operating instructions must be made available to the operator of the machine at which the Safety Light Array is used. The machine operator must receive instruction from qualified persons, and must be required to read the operating instructions.

**The following standards must be observed during use of the light curtain:**

EN ISO 13855	Machine safety: arrangement of safety devices in consideration of approach speeds of body parts
EN ISO 14121-1	Machine safety: guidelines for assessing risks
EN 292, parts 1 and 2	Machine safety: basics and guidelines
EN ISO 13857	Machine safety: Safety distances to prevent hazard zones being reached by upper and lower limbs
EN 349	Machine safety: Minimum gaps to avoid crushing of parts of the human body
EN ISO 13850	Machine safety: emergency stop devices
EN 1088	Machine safety: Interlocking devices associated with guards
EN ISO 13849-1	Safety related parts of control systems Part 1, General principles for design

All specified data make reference to the following revision level: 2<sup>nd</sup> quarter 2010.

Technical changes to the product described herein, printing errors and/or any possible incompleteness of this product description may not be construed as cause for asserting any legal claims whatsoever against wenglor sensoric gmbh.

### 3.2 Securing the Danger Zone

The danger zone must be secured by means of the light curtain alone, or by means of the light curtain in combination with additional mechanical safety devices. Walking around the safety field at the side, as well as stepping over and/or under the safety field must be prevented in any case. It must be impossible to approach the point of danger without passing through the safety field.

The safety field is located between the line at which light is emitted at the emitter and the line at which light is received at the receiver. The boundaries of the safety field are obvious on the devices.

### 3.3 Calculating Safety Clearance

Calculation of safety clearance S is based upon the EN ISO 13855 standard. However, if any special directives and standards apply to the respective machine, these must be taken into consideration as well. Each contactless safety device must be mounted such that stepping or reaching into the danger zone is precluded. If required, this may also be accomplished by means of additional, mechanical safety devices.

Safety clearance S is the minimum distance in mm, measured from the danger zone to the safety field, and is calculated per EN ISO 13855 as follows:

$$S \text{ [mm]} = ( K \text{ [mm/s]} \times T \text{ [s]} ) + C \text{ [mm]}$$

S = minimum clearance in mm, measured from the danger zone to the safety field

K = approach speed in mm per second

T = t<sub>1</sub> + t<sub>2</sub> = total response time in seconds

t<sub>1</sub> = safety device response time in seconds

t<sub>2</sub> = machine or process over-travel time in seconds

C = additional clearance depending upon beam clearance/resolution in mm

#### Over-Travel Time T

Due to the fact that interrupting the safety field during hazardous motion does not result in immediate stopping of the machine, over-travel time T must be taken into consideration. The distance between the safety field and the point of danger must thus be large enough to assure that the point of danger cannot be reached until hazardous motion has come to a standstill.

Total over-travel time T is the sum of maximum response time of the contactless safety device (t<sub>1</sub>) and maximum over-travel time of the hazardous motion (t<sub>2</sub>). Machine over-travel time must be determined by means of repeated measurement prior to initial start-up, and each time the machine is retooled (set up).

The response time of the ESPE depends upon the height of the safety field (see table).

Type Designation (for Transmitter and Receiver)	Beam Clearance	Number of Beams	Number of Individual Beams	Response Time
SB4-50lx050C1	500 mm	2	18 Beams	5,7 ms
SB4-40lx080C1	400 mm	3	27 Beams	8,2 ms
SB4-30lx090C1	300 mm	4	36 Beams	10,0 ms

### Approach/Reach-In Speed Constant K

Amongst other factors, safety clearance depends upon the maximum reach-in or walking speed of the person penetrating the safety field.

### Safety Margin C

Safety margin C depends upon the respective resolution of the light curtain.

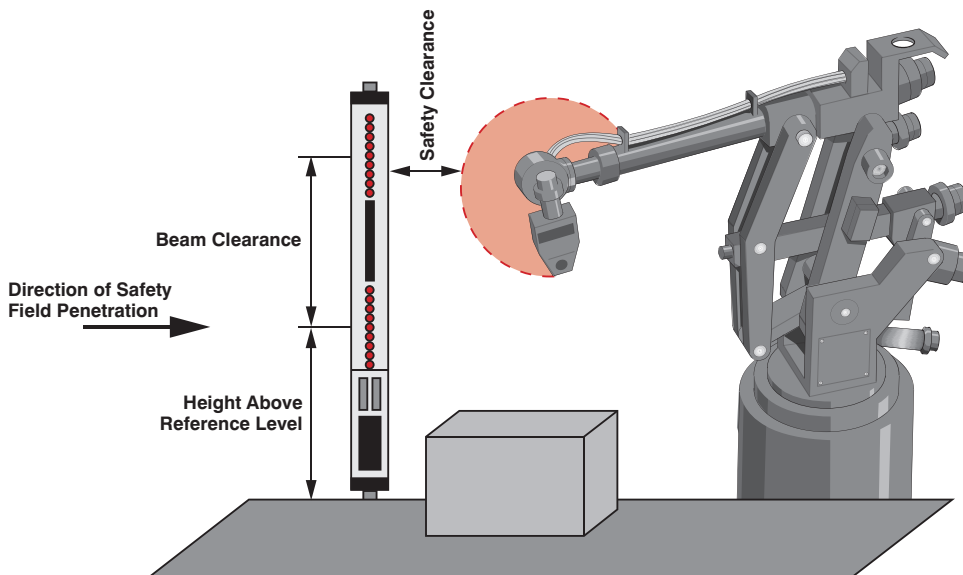
### Perpendicular Approach to the Safety Field

The following applies for an ESPE with a resolution or beam clearance of greater than 40 mm:

$$K = 1600 \text{ mm/s}$$

$$C = 850 \text{ mm (standard arm range)}$$

$$S = (1600 \text{ mm/s} \times T) + 850 \text{ mm}$$



The number of utilized beams is based upon the EN ISO 13855 standard in consideration of the relevant level C standard.

The minimum and maximum heights specified in the table may not be exceeded or fallen short of respectively.

Beam heights for securing areas in accordance with EN ISO 13855:

Number of Beams	Beam Clearance in mm	Height Above Reference Level in mm
4	300 mm	300, 600, 900, 1200
3	400 mm	300, 700, 1100
2	500 mm	400, 900

### Example:

Selected parameters: safety device with 300 mm beam clearance and 4 beams, vertical installation

### Assuming

machine over-travel time	$t_2 = 20 \text{ ms}$
Safety Light Array response time SB4-30IE090C1	$t_1 = 10 \text{ ms}$
Approach speed	$K = 1600 \text{ mm/s}$

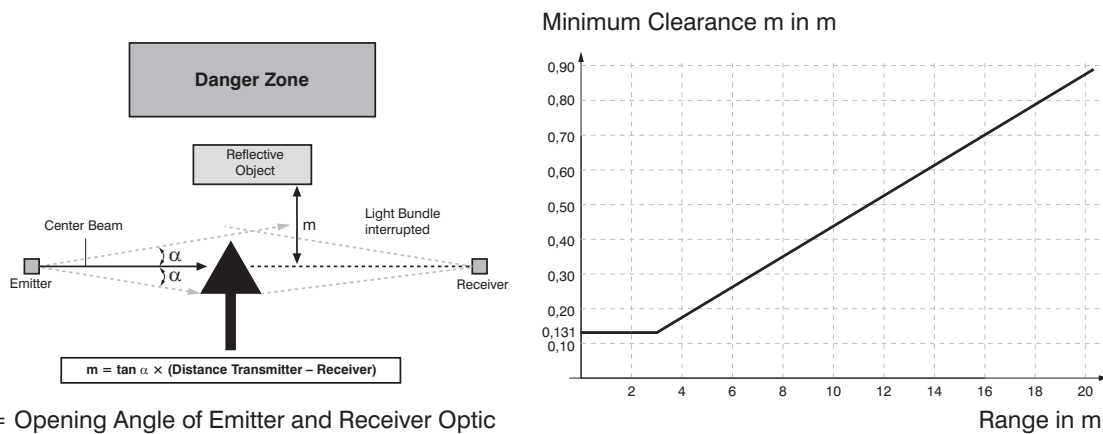
### Safety clearance

Safety clearance S	$= K \times T + C$
	$= K \times (t_1 + t_2) + C$
	$= 1600 \text{ mm/s} \times (0,01 \text{ s} + 0,02 \text{ s}) + 850 \text{ mm}$
	$= 898 \text{ mm}$

## 3.4 Minimum Clearance to Reflective Surfaces

If reflective surfaces are located within the aperture angle between the transmitter and the receiver, reflection may result which could cause an obstruction to go undetected. For this reason, a minimum clearance **m** between reflective objects and the optical axis must be maintained.

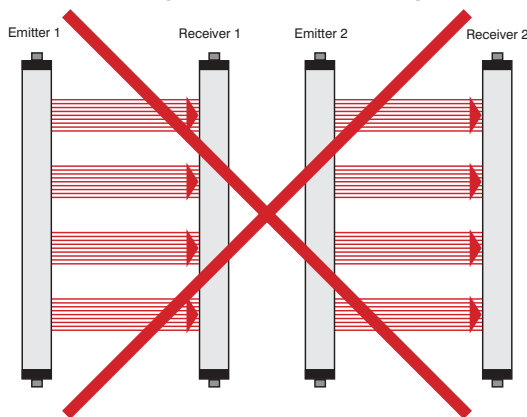
Beam angles are taken from the IEC 61496-2 standard. They represent worst case values. Actual values are lower.



$\alpha$  = Opening Angle of Emitter and Receiver Optic  
 $\alpha = \pm 2,5^\circ$

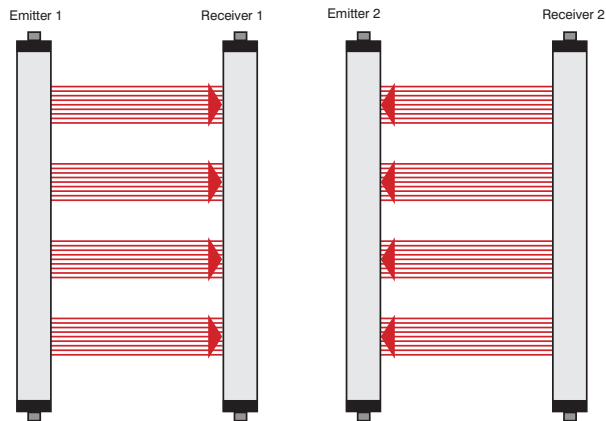
## 3.5 Avoidance of Reciprocal Influence Amongst Several Light Barrier Systems

If a receiver is located within the beam path of a neighboring emitter, reciprocal influence of the sensor function may occur, thus resulting in erroneous switching and failure of the safety function.



In order to assure error-free operation of several light barrier systems at a single machine (i.e. several Connector Units with their respective Safety Light Barriers), the receiver may only be exposed to light from the emitters of the same light barrier system. In order to assure that this is the case, a non-parallel arrangement (see figure) or a lateral clearance of at least  $2 \times m$  should be used (see section 3.4).

Shielding from neighboring sensor systems, for example through the use of partitions, may also prevent reciprocal influence.



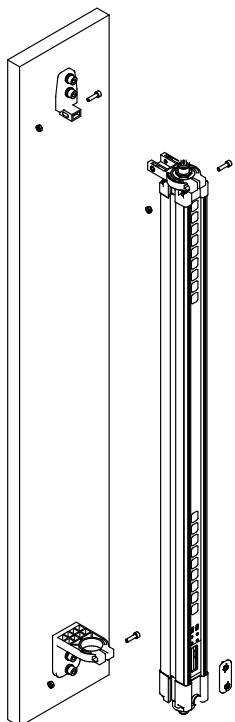
## 4 CONNECTION AND INSTALLATION TO THE MACHINE

### 4.1 Installation

There are three options for mounting the emitter and the receiver.

- Attachment with BEF-SET-33 (included)
- Attachment with BEF-SET-18 (System Components)
- Attachment with BEF-SET-36 (installation in safety column)

#### Mounting with the BEF-SET-33

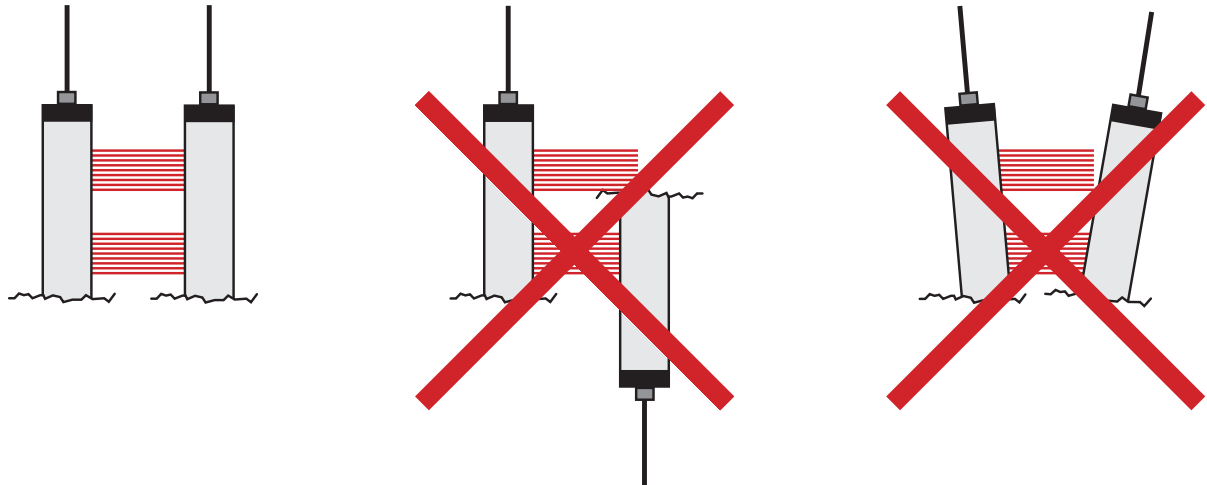


First secure the mounting clamp to the Light Array with the screws. The screws should remain accessible after mounting. In this way, the Light Array can be adjusted at a later point in time. The Light Array is then attached to the machine etc. with the BEF-SET-33. Avoid excessively small (minimal protection against vibration) or large (possible damage to the retainer) tightening torques for the mounting components. The mounting screws and nuts are not included in the scope of delivery.

The safety function is independent of the installation position. As long as the specified instructions are adhered to, the Light Arrays can be mounted as desired (e.g. upside down).

In order to assure flawless functioning of the Light Array, the two matched components (transmitter and receiver) must be aligned to one another.

It is advisable to mount the light curtain for initial start-up such that alignment can still be adjusted to an adequate extent. wenglor offers accessories which allow for easy adjustment.



The controls must be accessible for initial start-up and maintenance. These are located on the side from which the beam is emitted (emitter), or the side at which the beam is received (receiver).

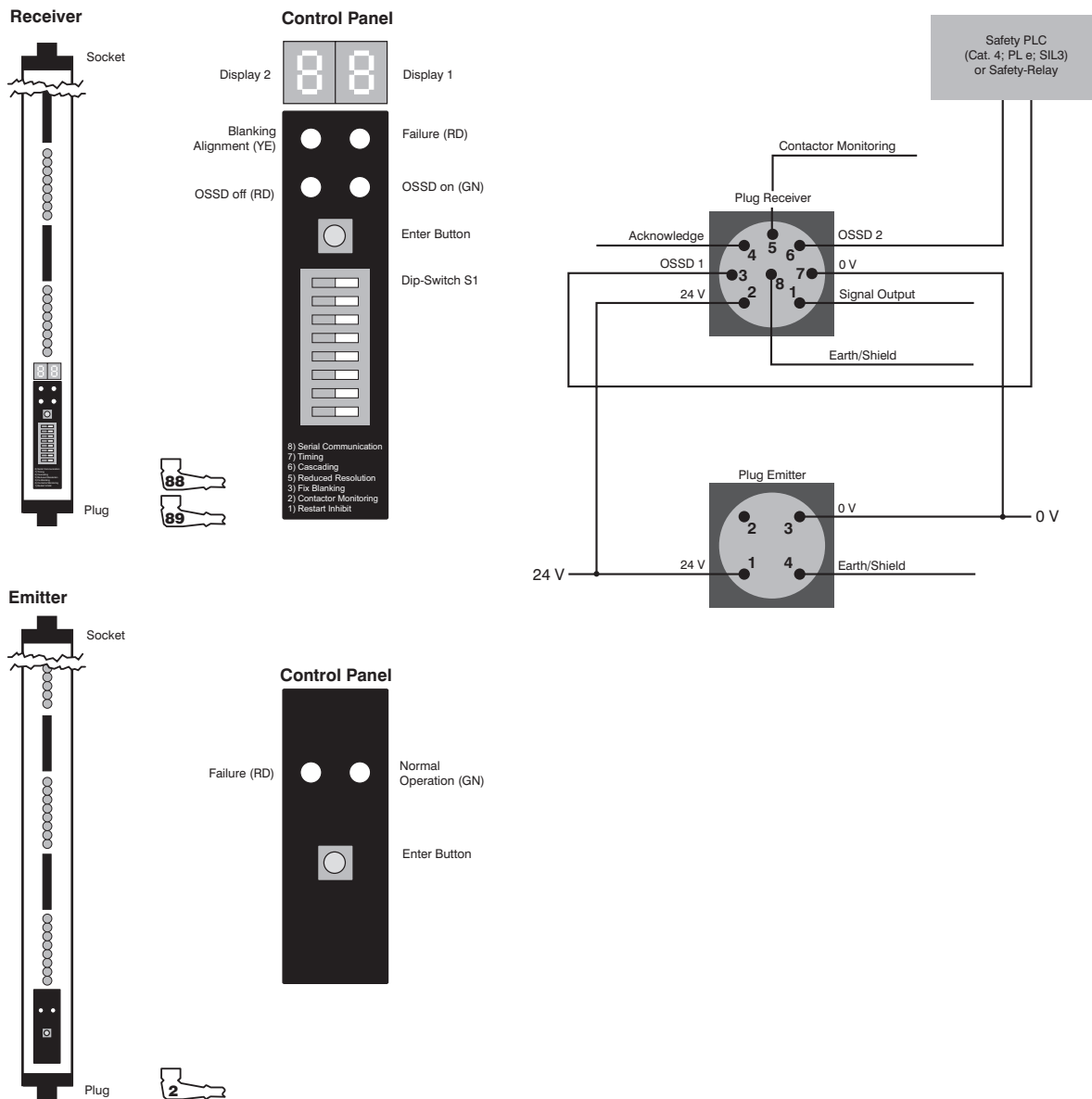
Space requirements for mounting and dismantling depend upon the type of utilized System Components.

The machine controls must be connected to the light curtain 's safety output either directly or via the PLC (Cat. 4 PLe, SIL3). General safety regulations and all applicable standards and mechanical engineering directives must be observed as well. Two-channel redundant wiring to the controls of the hazardous machine must be adhered to strictly.

24 V DC supply voltage must be fed to the light curtain from a PELV power pack.

## 4.2 Connection to the Machine

### Basic Schematic Diagram



### Connector Pin Assignments for Safety Operation Mode

Required system components:

1 × transmitter, 1 × receiver

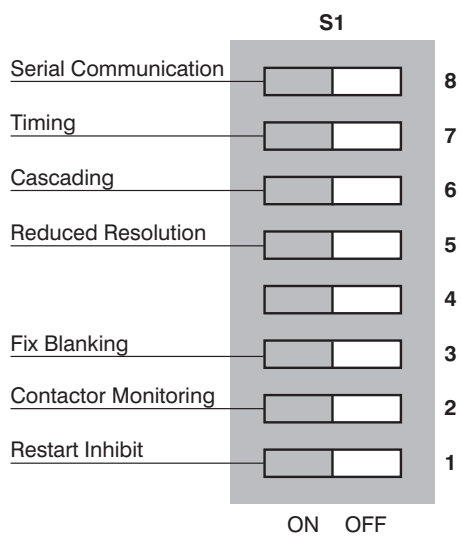
1 × connector cable for transmitter

1 × connector cable for receiver

From		To
Transmitter Wiring		
Pin 1	24 V DC	24 V DC supply voltage
Pin 2	Unused	
Pin 3	0 V	0 V supply voltage
Pin 4	Earth/shield	Operational earth

Receiver Wiring		
Pin 1	Signal output	Free
Pin 2	24 V DC	24 V DC supply voltage
Pin 3	OSSD1 output	PLC or relay
Pin 4	Acknowledge	Free
Pin 5	Contactor monitor	Free
Pin 6	OSSD2 output	PLC or relay
Pin 7	0 V	0 V supply voltage
Pin 8	Earth/shield	Operational earth

#### DIP Switch Settings: Receiver



### 4.3 Default Settings

The Safety Light Array offers various types of functions without any additional devices. The following table provides an overview of possible functions, as well as the product's respective default settings.

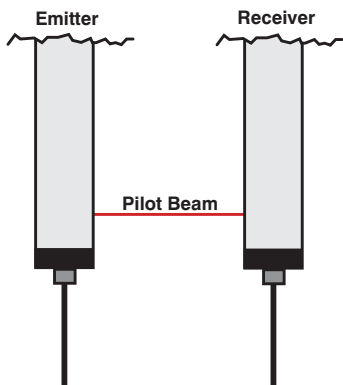
Characteristic/Function Type	Default Settings
DIP-Switch	Position: OFF
Safety Operating Mode	Active
Start-Up inhibit and Restart Inhibit	Not active
Contactor Monitoring	Not active
Fix Blanking	Not active
Reduced Resolution	Not active
Cascading	Not active



## 5 LIGHT ARRAY OPERATION

### 5.1 Adjustment

The purpose of adjustment is to accurately set the Light Array receiver to the required range. Adjustment must be performed after mechanical installation of the light curtain. After the Light Array has been adjusted, it immediately switches to the respectively selected operating state as soon as supply voltage is applied.

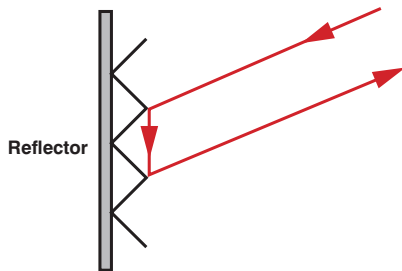


The pilot beam is used to synchronize the light curtain. It is the closest beam to the display and may not be continuously interrupted.

The degree of alignment appears at the display during alignment.

**The necessary degree of alignment depends on the distance between transmitter and receiver (see table on page 18). If the necessary degree of alignment has been achieved, this value must be accepted by means of the Enter key.**

#### 5.1.1 Using the Aligning Tool RF



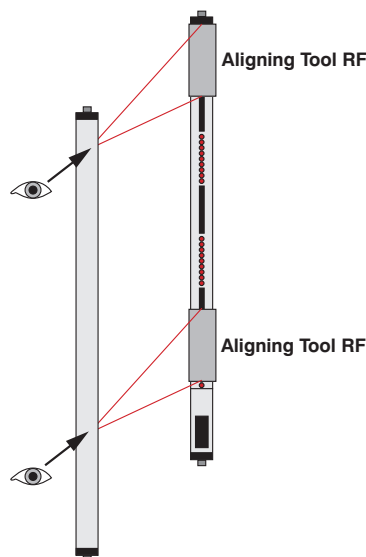
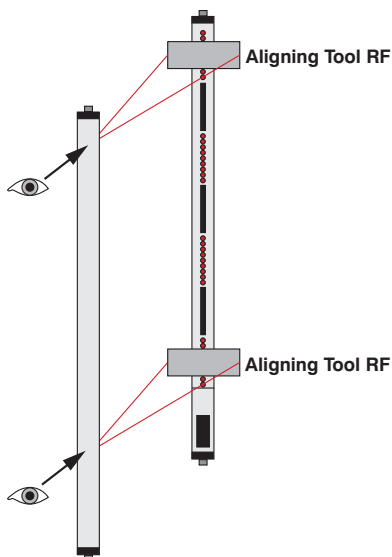
The RF aligning tool is extremely helpful thanks to the use of visible red light.

The function of the aligning tool is based upon the principle of a reflector.

The arriving light beam is reflected back in exactly the same direction from which it originated.

#### Procedure:

- Position the aligning tools at the top and bottom in front of the receiver.
- Observe the aligning tools from the transmitter (look from the transmitter to the receiver).
- Adjust the transmitter such that the reflected spot is situated at the centre of the respective RF aligning tool.

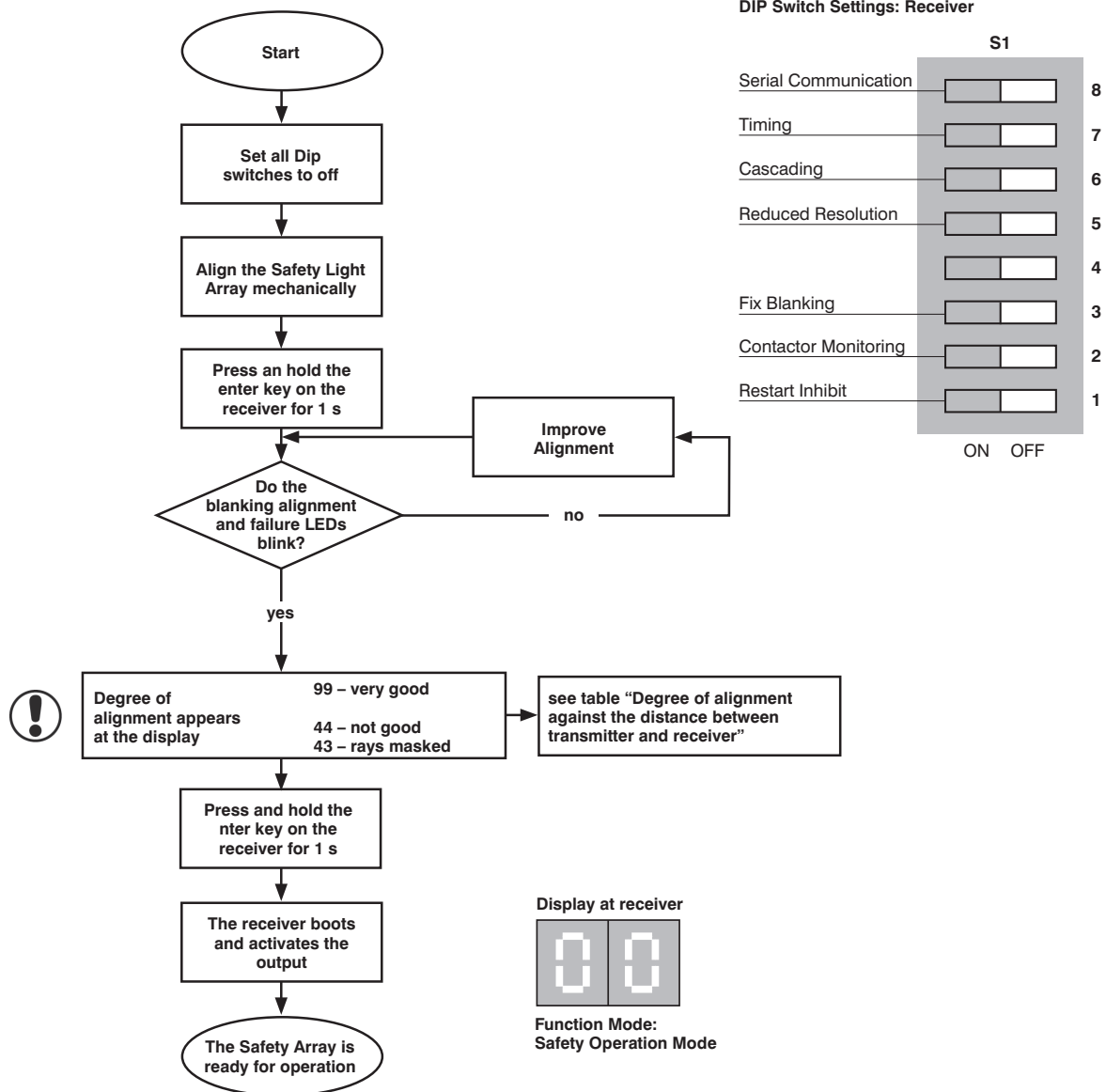


### 5.1.2 Using the SZ0-LAH1 Aligning Tool

The Laser Aligning Tool simplifies alignment of the safety device over great distances.

The same procedure is used as described under “Using the RF Aligning Tool”, except that in this case highly visible laser light is used.

### 5.1.3 Adjustment Procedure



Distance transmitter – receiver			Degree of alignment
Without tilted mirror	With 1 tilted mirror	With 2 tilted mirrors	
≤ 3 m	≤ 2,7 m	≤ 2,4 m	96 imperatively necessary
3...20 m	2,7...18 m	2,4...16 m	96, 78, 68, 56 preferred
			> 43 necessary

Tab.: Degree of alignment against the distance between transmitter and receiver



#### The following must be observed:

The safety field's pilot beam may not be continuously interrupted.

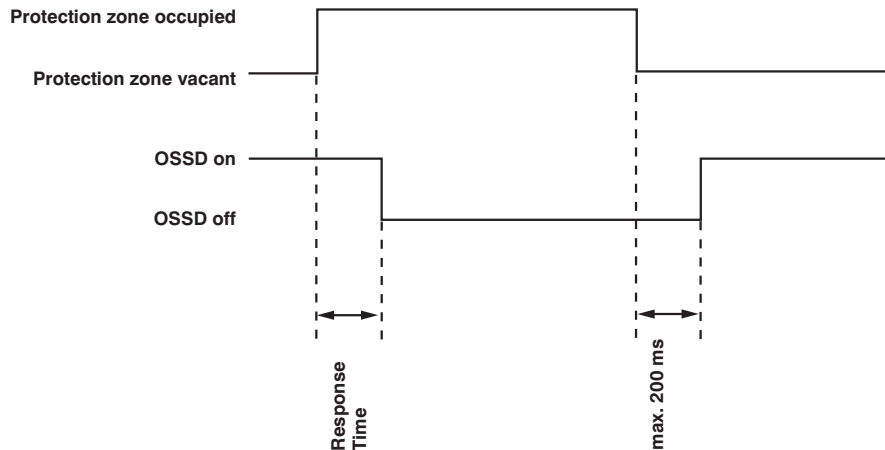


The adjustment procedure must be repeated each time the device is remounted (e.g. change in operating range).

## 5.2 Function Modes

### 5.2.1 Safety Operating Mode

This function type is preselected at the factory. When the Safety Light Array is set up in accordance with section 5.1.3, the device is in the safety operating mode.



### 5.2.2 Restart Inhibit and start-up inhibit

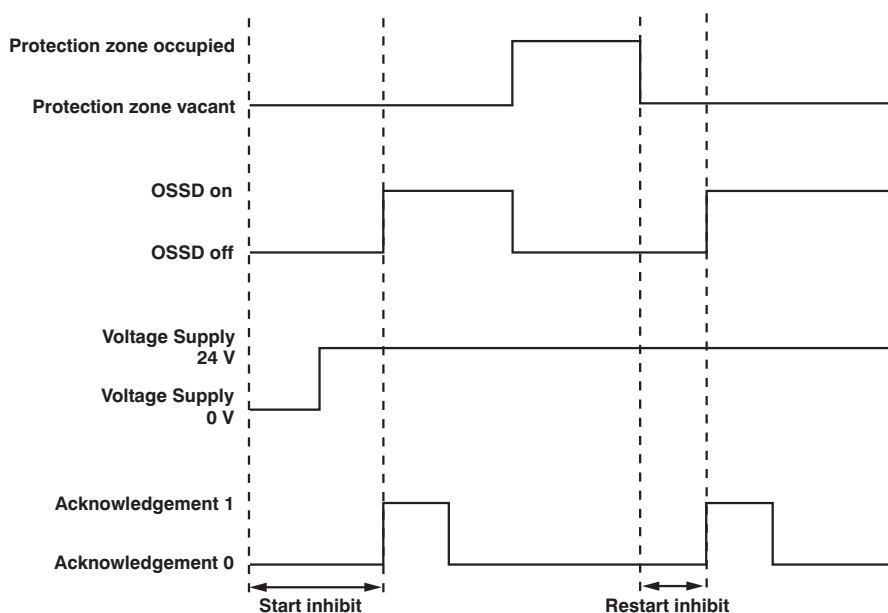
After correct adjustment, the Light Array is ready for operation. If restart inhibit is active, the machine is not re-enabled after the safety field has been interrupted until the acknowledgement button has been activated.

If the restart inhibit function has been activated, start-up inhibit is active as well. This means that the machine, or the Light Array, must be enabled by means of the acknowledgement button when the machine is first switched on. If the Restart Inhibit function is combined with the operation mode Fix Blanking or Reduced Resolution, first configure the respective operation mode, then activate the function.

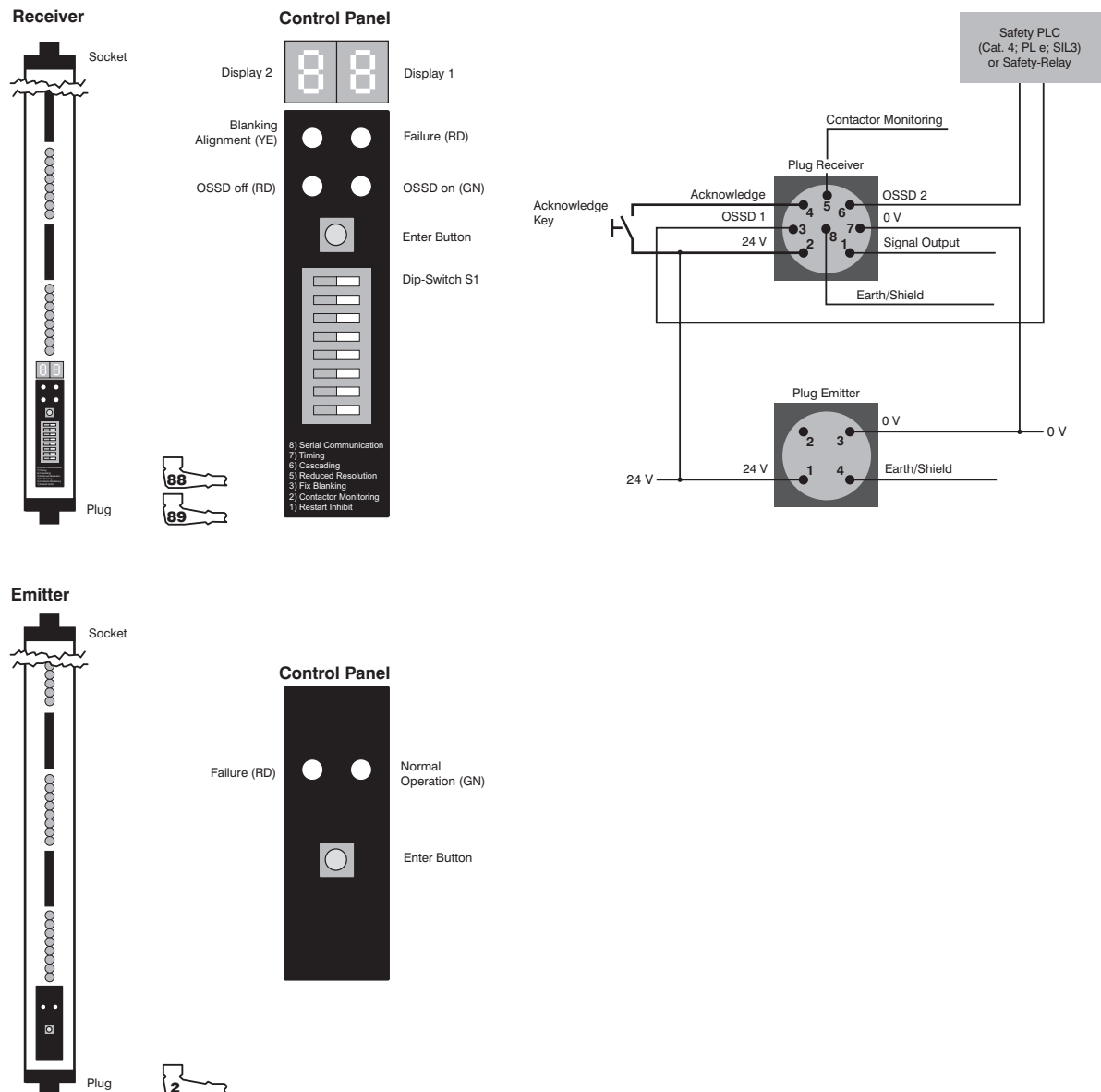
The acknowledgement button has to be mounted in order that the whole danger zone can be seen while pressing the acknowledgement button.

Acknowledgement must originate from outside of the protected area, from a location at which the protected area and all of the effected working area can be clearly observed.

The button for the acknowledgement input may not be accessible from inside the protected area.



### Schematic Diagram, Restart Inhibit



### Connector Pin Assignments for Function Type Restart Inhibit

Required system components:

- 1 × transmitter, 1 × receiver
- 1 × external pushbutton or PLC contact
- 1 × connector cable for transmitter
- 1 × connector cable for receiver

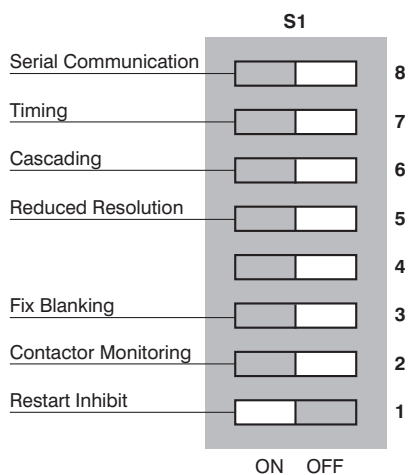
From		To
<b>Transmitter Wiring</b>		
Pin 1	24 V DC	24 V DC supply voltage
Pin 2	Unused	
Pin 3	0 V	0 V supply voltage
Pin 4	Earth/shield	Operational earth

Receiver Wiring		
Pin 1	Signal output	Free
Pin 2	24 V DC	24 V DC supply voltage
Pin 3	OSSD1 output	PLC or relay
Pin 4	Acknowledge	Pushbutton (normally open), 24 V DC
Pin 5	Contactor monitor	Free
Pin 6	OSSD2 output	PLC or relay
Pin 7	0 V	0 V supply voltage
Pin 8	Earth/shield	Operational earth

### Setup Procedure

If the function type is combined with an operating mode, the operating mode must first be set up. The Start-Up inhibit (restart inhibit) function is then activated by appropriately setting the restart inhibit DIP switch.

### DIP Switch Settings: Receiver



### Display at Receiver



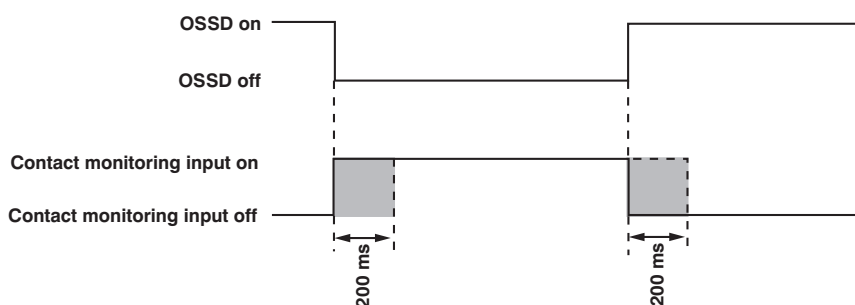
Function Mode:  
Restart Inhibit

### 5.2.3 Contactor Monitoring

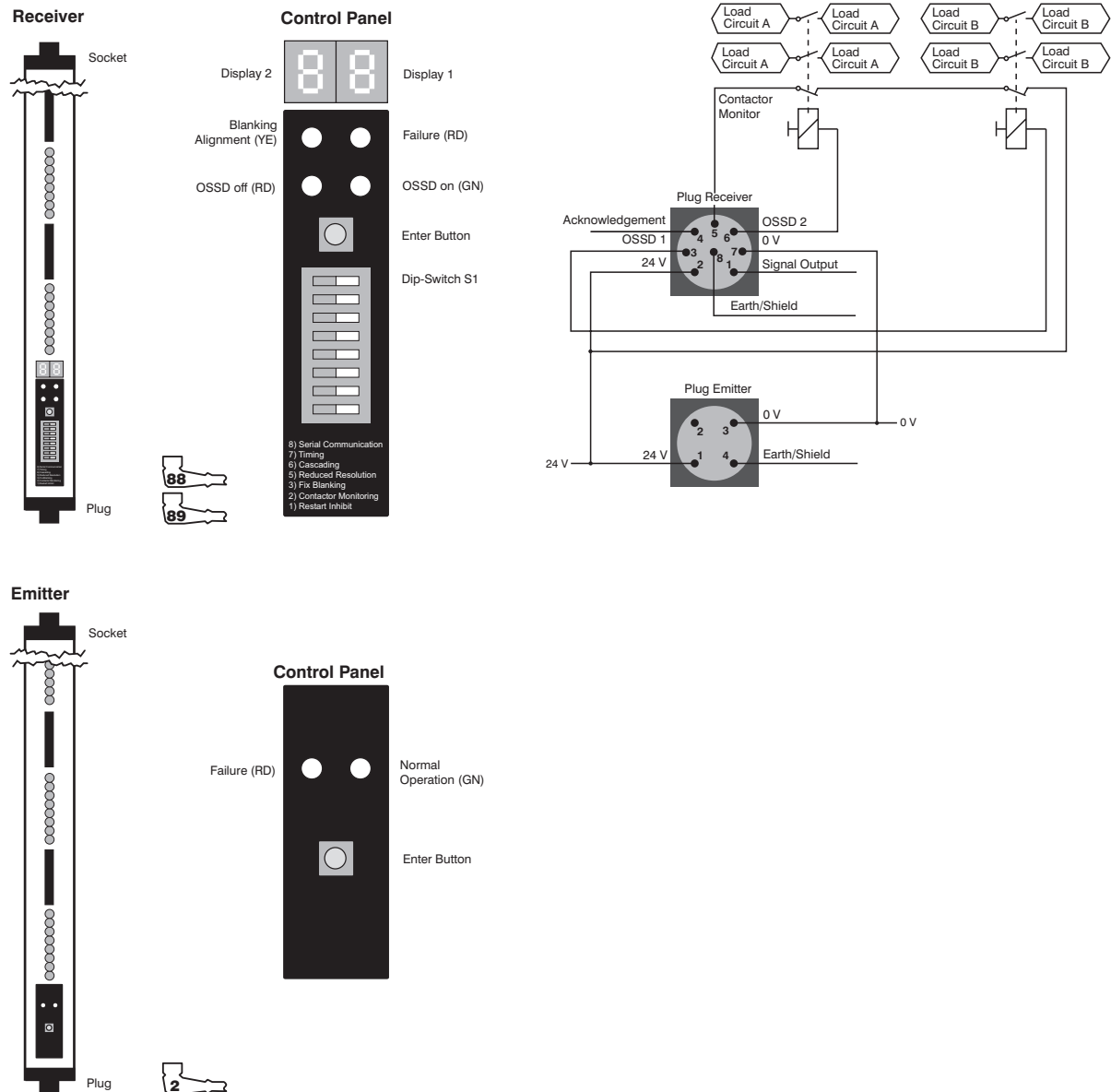
The contactor monitoring function ascertains whether or not externally connected contactors are switched within the specified period of time. The contactor monitoring input is monitored for a low flank to this end. Switching time may not exceed **200 ms**. This function only provides for additional safety if positively driven external contactors are utilized.

24 V are returned to the contactor monitoring input via an available NC contact at the external contactor.

If the Contactor Monitoring function is combined with the operation mode Fix Blanking or Reduced Resolution, first configure the respective operation mode, then activate the function.



### Schematic Diagram, Contactor Monitoring



### Connector Pin Assignments for Function Type Contactor Monitoring

Required system components:

- 1 × transmitter, 1 × receiver
- 1 × relay unit/external, positively driven relay
- 1 × connector cable for transmitter
- 1 × connector cable for receiver

From		To
<b>Transmitter Wiring</b>		
Pin 1	24 V DC	24 V DC supply voltage
Pin 2	Unused	
Pin 3	0 V	0 V supply voltage
Pin 4	Earth/shield	Operational earth

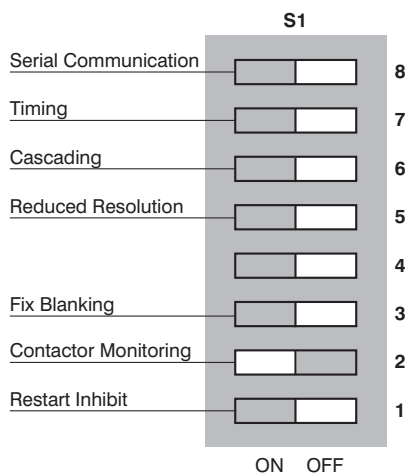
Receiver Wiring		
Pin 1	Signal output	Free
Pin 2	24 V DC	24 V DC supply voltage
Pin 3	OSSD1 output	PLC or relay
Pin 4	Acknowledge	Free
Pin 5	Contactor monitor	24 V via contactor (NC contact)
Pin 6	OSSD2 output	PLC or relay
Pin 7	0 V	0 V supply voltage
Pin 8	Earth/shield	Operational earth

24 V are returned to pin 5 via an available NC contact in the contactor monitoring mode.

### Setup Procedure

If the function type is combined with an operating mode, the operating mode must first be set up. The Contactor monitoring mode is then activated by appropriately setting the Contactor monitoring DIP switch.

### DIP Switch Settings: Receiver



### Display at Receiver



Function Mode:  
Contactor Monitoring

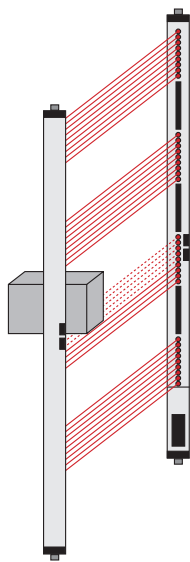
## 5.3 Functions

All of the blanking options described below influence reliable recognition of objects by the Light Array. Before using a blanking option, always check to make sure it is permissible.

### 5.3.1 Fix Blanking

Various applications which make use of Safety Light Array necessitate that certain objects protrude into the safety field during the entire duration of operation. In order to accommodate operating conditions of this sort, certain beams (which are always obstructed) can be blanked. If these blanked beams are not obstructed, the safety output cannot be activated.

#### 5.3.1.1 Principle



A fixed object is always located at the same position within the safety field.

The beams which are obstructed by this object can be blanked.

There is a limit to the number of beams which can be blanked:

**Up to ¼ of the total number of beams**

Example: SB4-30lx090C1

Number of beams: 4

Number of individual beams: 36

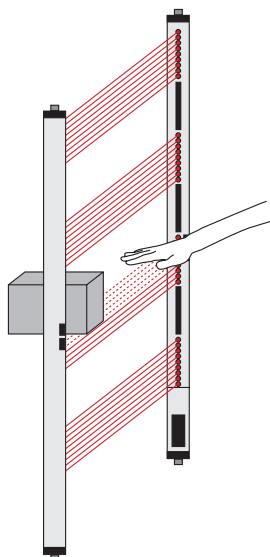
¼ of the total number of beams: 9

→ Up to 9 individual beams may be blanked.

The blanked beams must be identified with the included blanking stickers.

If the object is removed from the path of a blanked beam, the safety output is switched immediately.

Fig.: Beams obstructed by the object can be blanked, and must be identified!

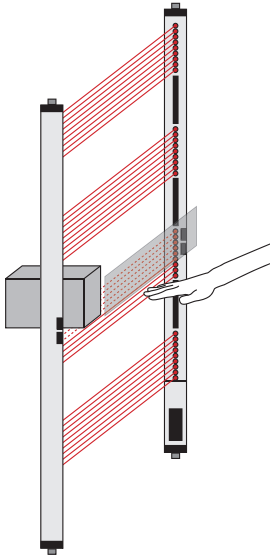


**Impermissible:**

In this case it would be possible to access the point of danger via the object's "shadow"!

Fig.: Danger of reach-in through the object's shadow



**Permissible:**

If beams have been blanked, other precautions must be implemented which preclude any access to the point of danger via the object's shadow (mechanical curtain).

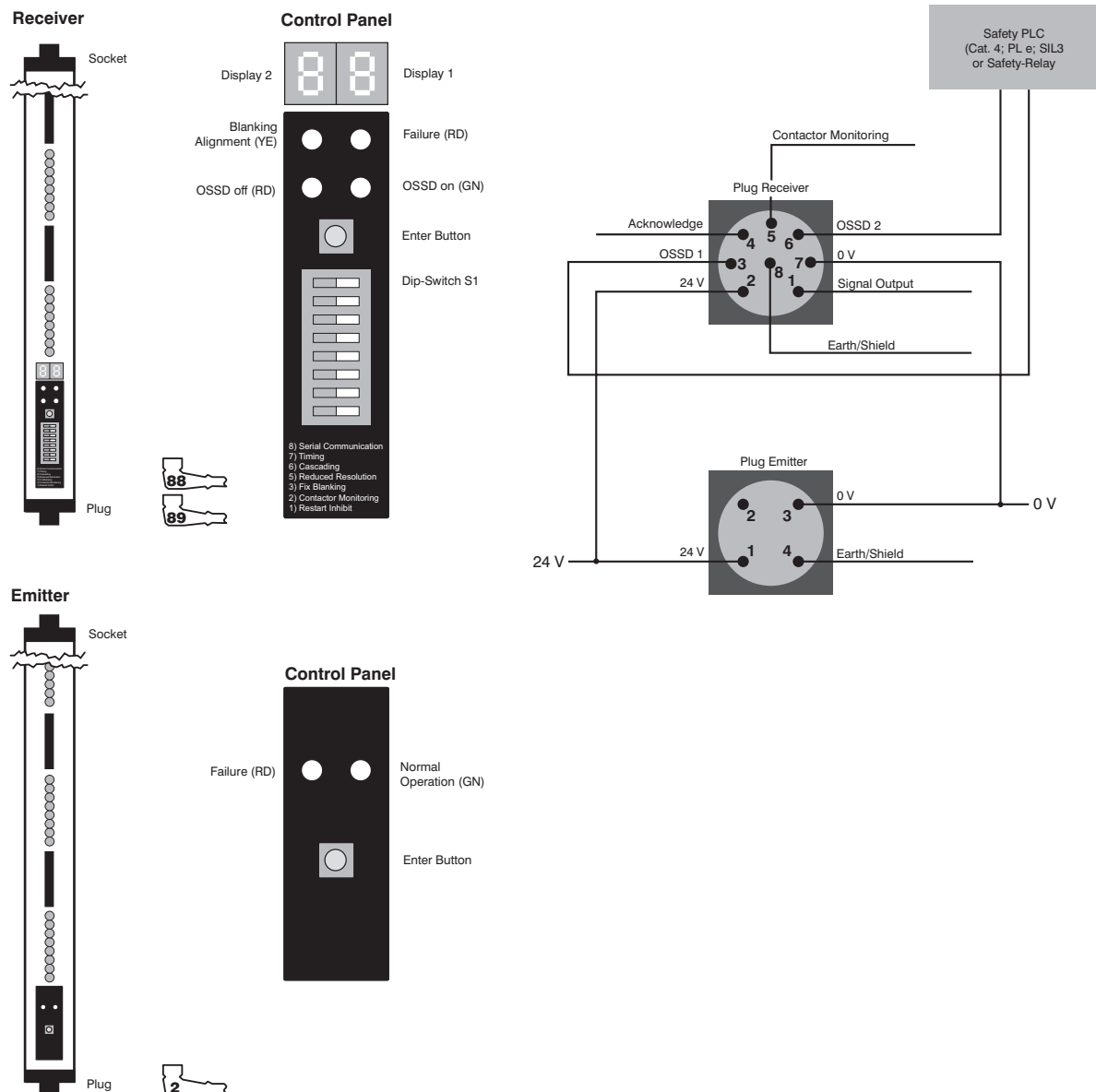
**Please observe the following:**

The "restart inhibit" and "contactor monitoring" functions can be activated as required in the fix blanking operating mode.

**The first beam must not be blanked.**

Fig.: Mechanical barricade - reach-in only possible above the blanked beams!

### Schematic Diagram, Fix Blanking



### Connector Pin Assignments for Safety Operation with Fix Blanking

Required system components:

- 1 × transmitter, 1 × receiver
- 1 × connector cable for transmitter
- 1 × connector cable for receiver

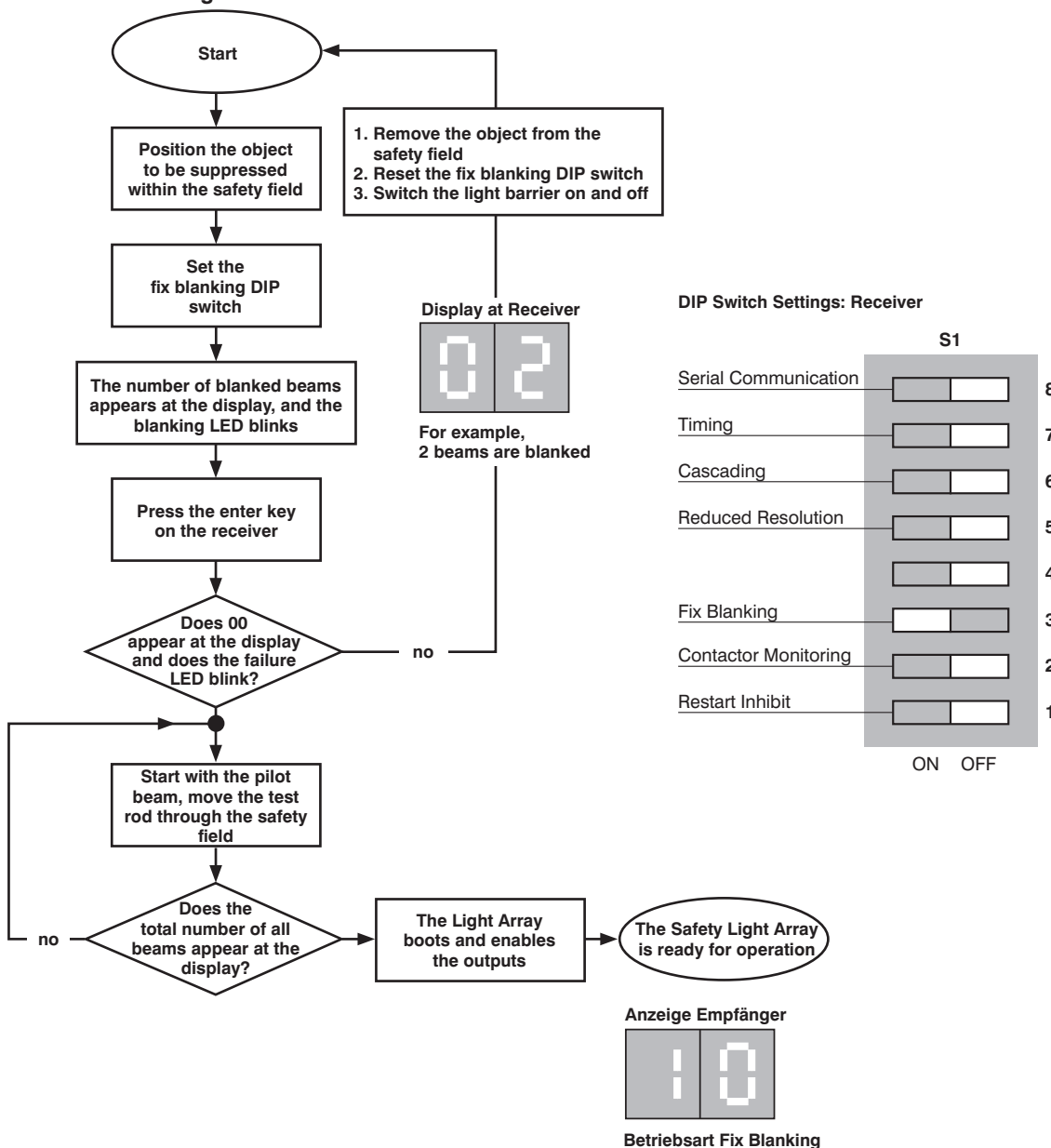
From		To
<b>Transmitter Wiring</b>		
Pin 1	24 V DC	24 V DC supply voltage
Pin 2	Unused	
Pin 3	0 V	0 V supply voltage
Pin 4	Earth/shield	Operational earth

Receiver Wiring		
Pin 1	Signal output	Free
Pin 2	24 V DC	24 V DC supply voltage
Pin 3	OSSD1 output	PLC or relay
Pin 4	Acknowledge	Free
Pin 5	Contactor monitor	Free
Pin 6	OSSD2 output	PLC or relay
Pin 7	0 V	0 V supply voltage
Pin 8	Earth/shield	Operational earth



Up to 25 % of the beams, but no more than 20 beams in all, can be blanked in the fix blanking operating mode.

### 5.3.1.2 Fix Blanking Procedure



**The following must be observed:**

The safety field's pilot beam may not be continuously interrupted.

### 5.3.1.3 Calculating Safety Clearance

Safety clearance is calculated with the same method used for a non-blanked Safety Light Array. Mechanical curtains must be utilized in order to assure that fix blanked beams cannot be penetrated.

When this operating mode is used, beam clearance in accordance with EN ISO 13855 must always be adhered to (see also section 3.3).

### 5.3.2 Reduced Resolution

Safety Light Array resolution can be reduced with the help of the reduced resolution function. As opposed to Light Arrays with mechanically reduced resolution, electronically reduced resolution provides for significantly greater functional reserves. This is due to the fact that objects which are smaller than the selected resolution do not cause the safety output to switch where electronically reduced resolution is utilized.

The required resolution is configured by means of teach-in with the desired objects.

Resolution is set such that the objects can pass through the safety field at any point without causing the safety output to switch. With the help of the table, the displayed value can be converted to the resulting resolution in order to determine safety clearance.

#### 5.3.2.1 Principle

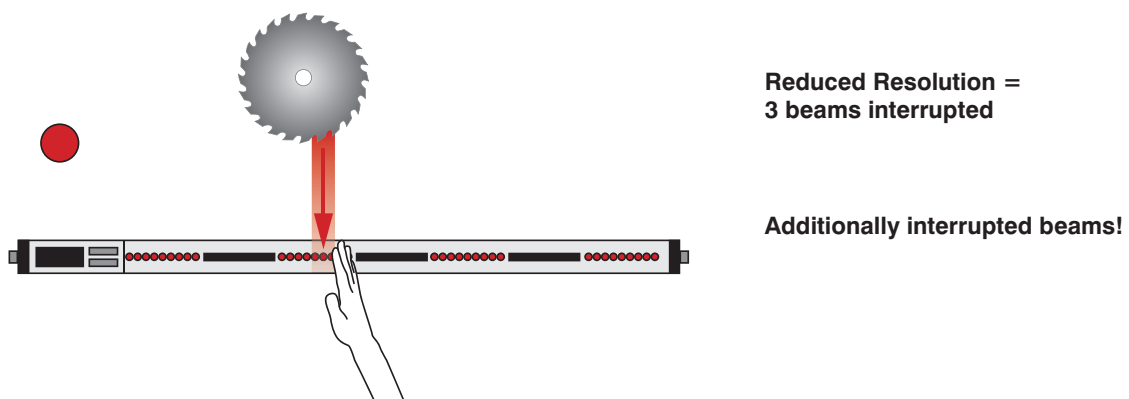
A certain number of adjacent beams can be interrupted with reduced resolution without causing the safety output to switch (see table). Light curtain resolution is thus changed.

In this way, objects which are smaller than the reduced resolution value can be passed through the safety field



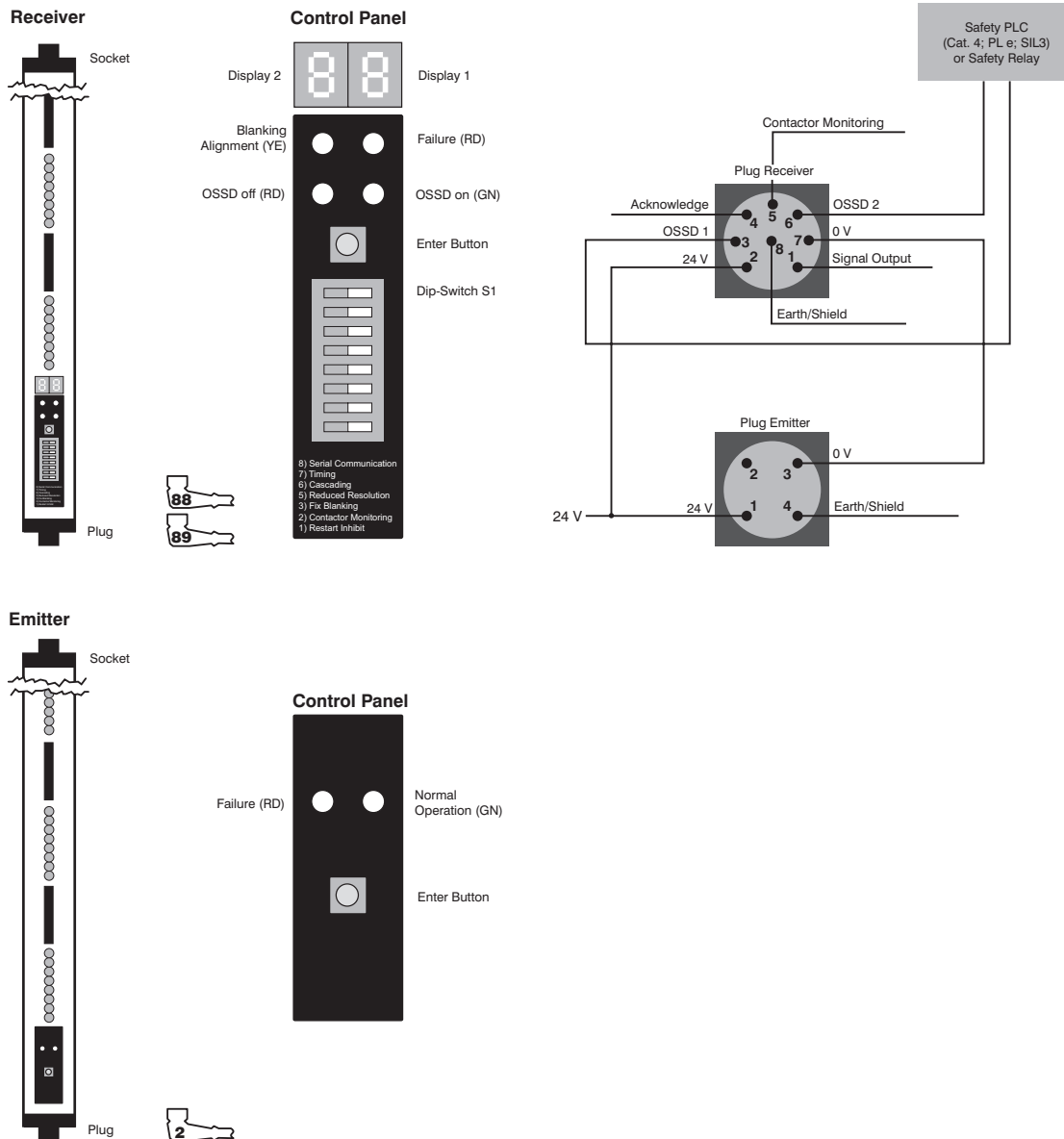
If an object which is larger than the selected resolution passes through the safety field (e.g. intrusion), the safety output is switched!

**Safety Light Array resolution is identical to electronically reduced resolution in the “reduced resolution” operating mode (see table).**



Number of muted beams	Resolution d of the test object
0 (full resolution)	30 mm
1	47 mm
2	64 mm
3	81 mm
4	98 mm

### Schematic Diagram, Reduced Resolution



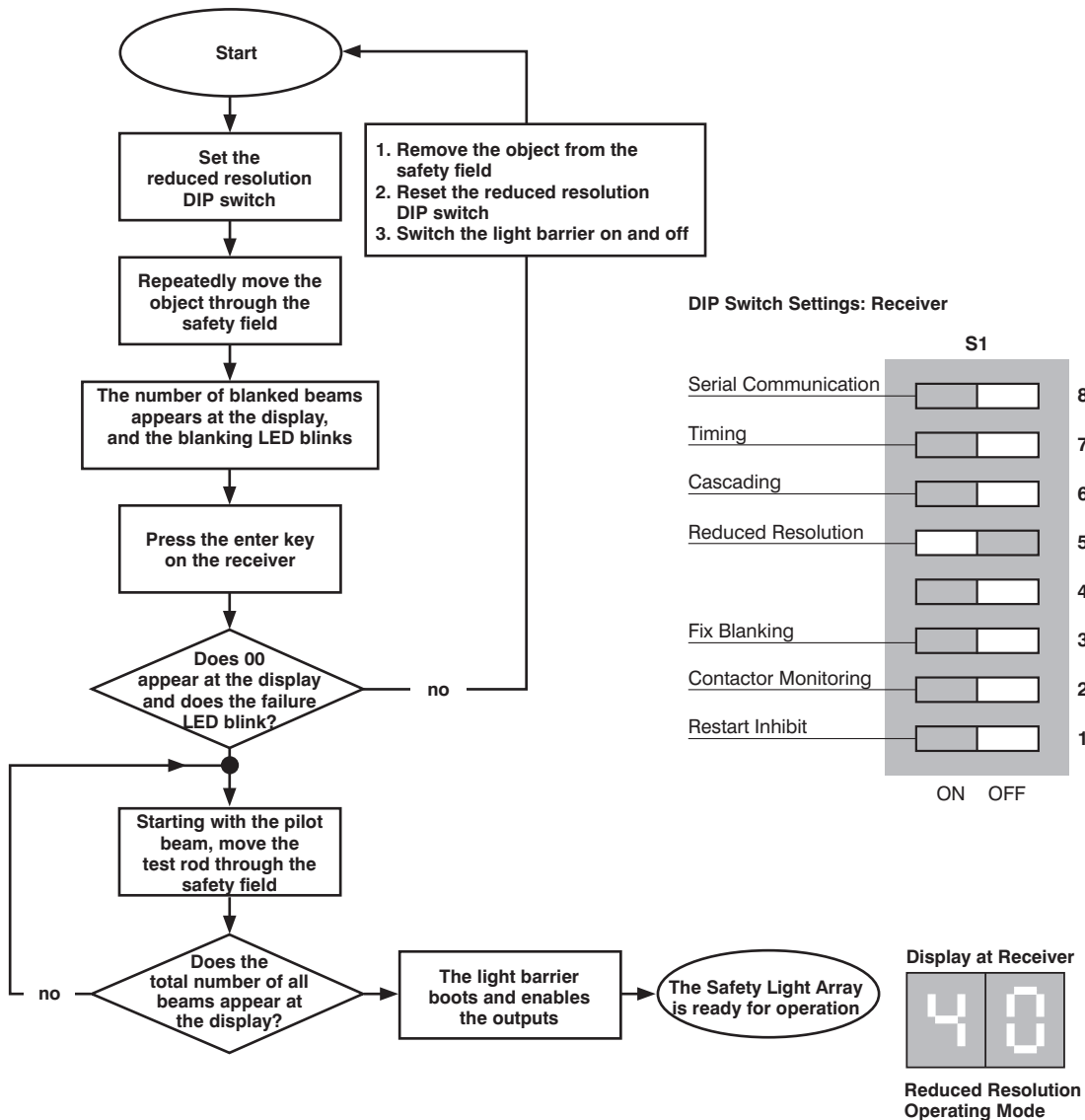
### Connector Pin Assignments for Safety Operation with Reduce Resolution

Required system components:

- 1 × transmitter, 1 × receiver
- 1 × connector cable for transmitter
- 1 × connector cable for receiver

From		To
<b>Transmitter Wiring</b>		
Pin 1	24 V DC	24 V DC supply voltage
Pin 2	Unused	
Pin 3	0 V	0 V supply voltage
Pin 4	Earth/shield	Operational earth
<b>Receiver Wiring</b>		
Pin 1	Signal output	Muting indicator muting terminal
Pin 2	24 V DC	24 V DC supply voltage
Pin 3	OSSD1 output	PLC or relay
Pin 4	Acknowledge	Free
Pin 5	Contacteur monitor	Free
Pin 6	OSSD2 output	PLC or relay
Pin 7	0 V	0 V supply voltage
Pin 8	Earth/shield	Operational earth

### 5.3.2.2 Reduced Resolution Procedure



### 5.3.2.3 Calculating Safety Clearance

Safety clearance is calculated with the same method used for a Light Array with full resolution.

## 5.4 Cascading

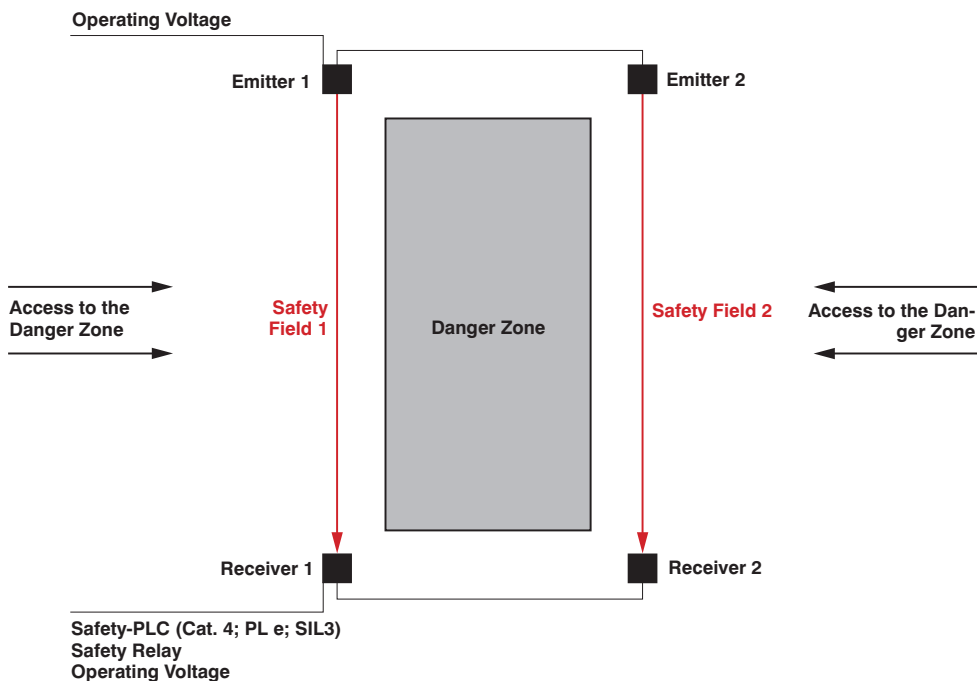
Neighboring danger zones can be secured by means of cascading. The fact that both safety fields act upon a single common safety output is an important advantage which facilitates connection to the machine. If the Cascading function is combined with the operation mode Fix Blanking or Reduced Resolution, first configure the respective operation mode, then activate the function.

### 5.4.1 Principle

By interconnecting several receivers, they can be linked such that they all act upon a single safety output.

- **The Safety Light Array with the same number of beams may not be cascaded with each other.**
- **Response time is increased by 1 ms per additional receiver.**
- It is not advisable to cascade more than 5 devices.
- **A minimum clearance of 2 m between Safety Light Arrays must be maintained in order to prevent interactive influence amongst the utilized light curtains (see section 3.4). Even if interactive influence occurs, system safety is nevertheless maintained in any event.**
- **In the operation mode „cascading“ the Safety Light Array have to be encoded.**

### 5.4.2 Cascading Procedure



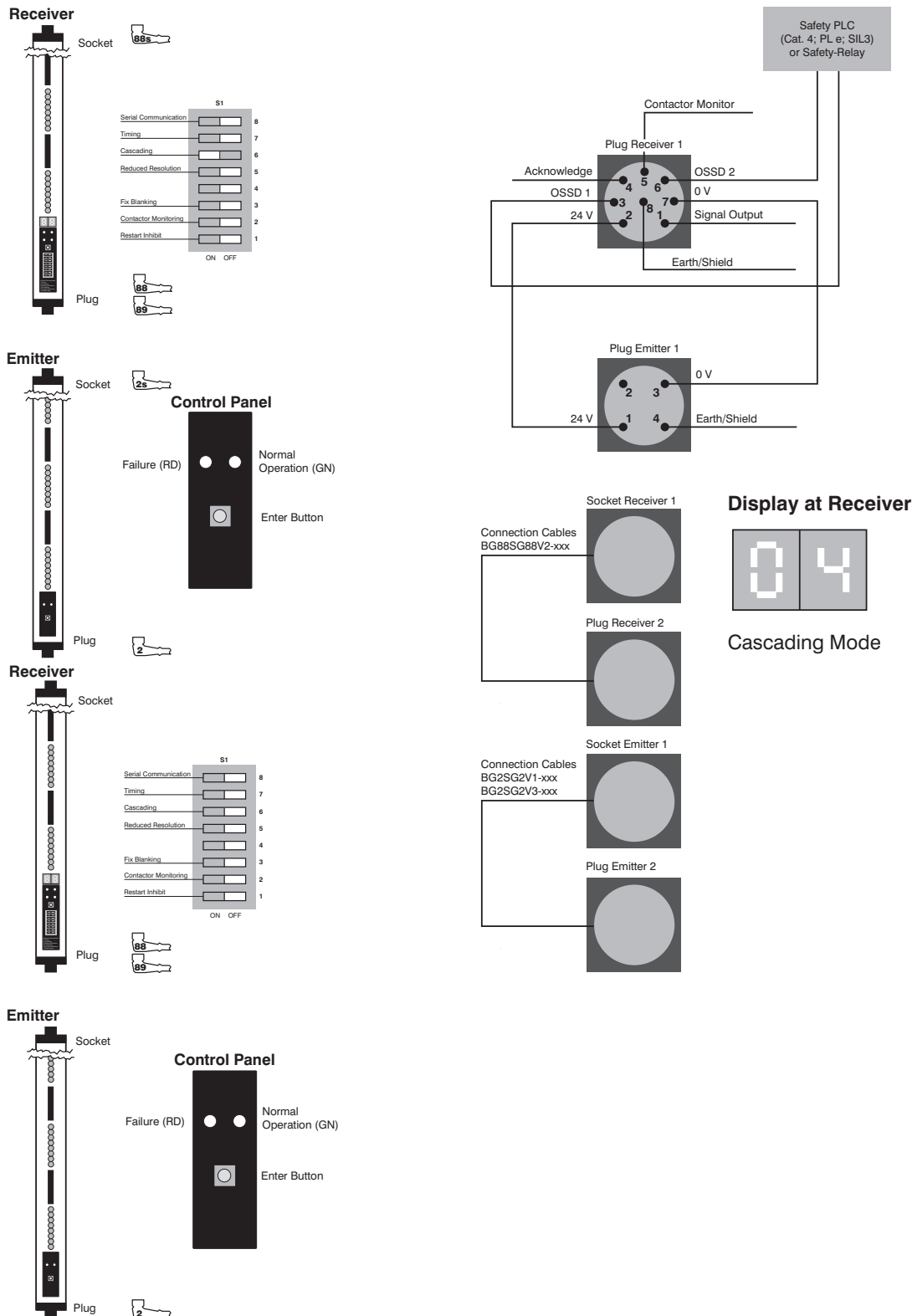
- The **safety output** at receiver 1 is active, and is connected to the machine in accordance with applicable regulations.
- The **cascading DIP switch** is set at receiver 1.

- **The cascading DIP switches are set at all downstream receivers as well, except for the last receiver in the series.**

- Obstructions at all safety fields, or system errors, act upon the single common safety output and cause it to switch.
- Individual settings at each given Light Array (e. g. Reduced Resolution, Fix blanking etc.) only effect the respective Light Array itself - not all cascaded curtains. However, if the safety output of any given Light Array is switched, the common safety output at the first Light Array is switched as well!
- To inhibit manipulations at the DIP Switch, it is lockable (see also section 6.3, „Connection to a PC“).
- Attention, the operation mode contactor monitoring must only be set at the receiver 1.
- The cascading cables may not exceed a length of 10 meters each.



## Schematic Diagram, Cascading



### 5.4.3 Functions

	Receiver 1	Receiver 2	Effect on common output
Restart Inhibit	activated		Must be acknowledged after penetration into safety field 1/2.
		activated	Must be acknowledged after penetration into safety field 2.
	activated	activated	Not reasonable, because an interference of safety field 2 has to be acknowledged twice.
Contactor Monitoring	activated		Downstreamed contactor of receiver 1 is controlled.
		activated	Monitoring of the downstreamed contactor not possible.
Fix Blanking Reduced Resolution	activated		Acts upon common output. The function affects safety field 1 only. Connection of an external warning indicator lamp isn't possible.
		activated	Acts upon common output. The function affects safety field 2 only. Connection of an external warning indicator lamp isn't possible.
	activated	activated	Acts upon common output. The function affects both safety fields, but the warning indicator lamp does not indicate the status of safety field 1.

### Connector Pin Assignments for Safety Operation with Cascading

Required system components:

2 × transmitters, 2 × receivers

1 × connector cable for transmitter

1 × connector cable for receiver

1 × connector cable

From		To
<b>Transmitter Wiring</b>		
Pin 1	24 V DC	24 V DC supply voltage
Pin 2	Unused	
Pin 3	0 V	0 V supply voltage
Pin 4	Earth/shield	Operational earth
<b>Receiver Wiring</b>		
Pin 1	Signal output	Muting indicator muting terminal
Pin 2	24 V DC	4 V DC supply voltage
Pin 3	OSSD1 output	PLC or relay
Pin 4	Acknowledge	Free
Pin 5	Contactor monitor	Free
Pin 6	OSSD2 output	PLC or relay
Pin 7	0 V	0 V supply voltage
Pin 8	Earth/shield	Operational earth

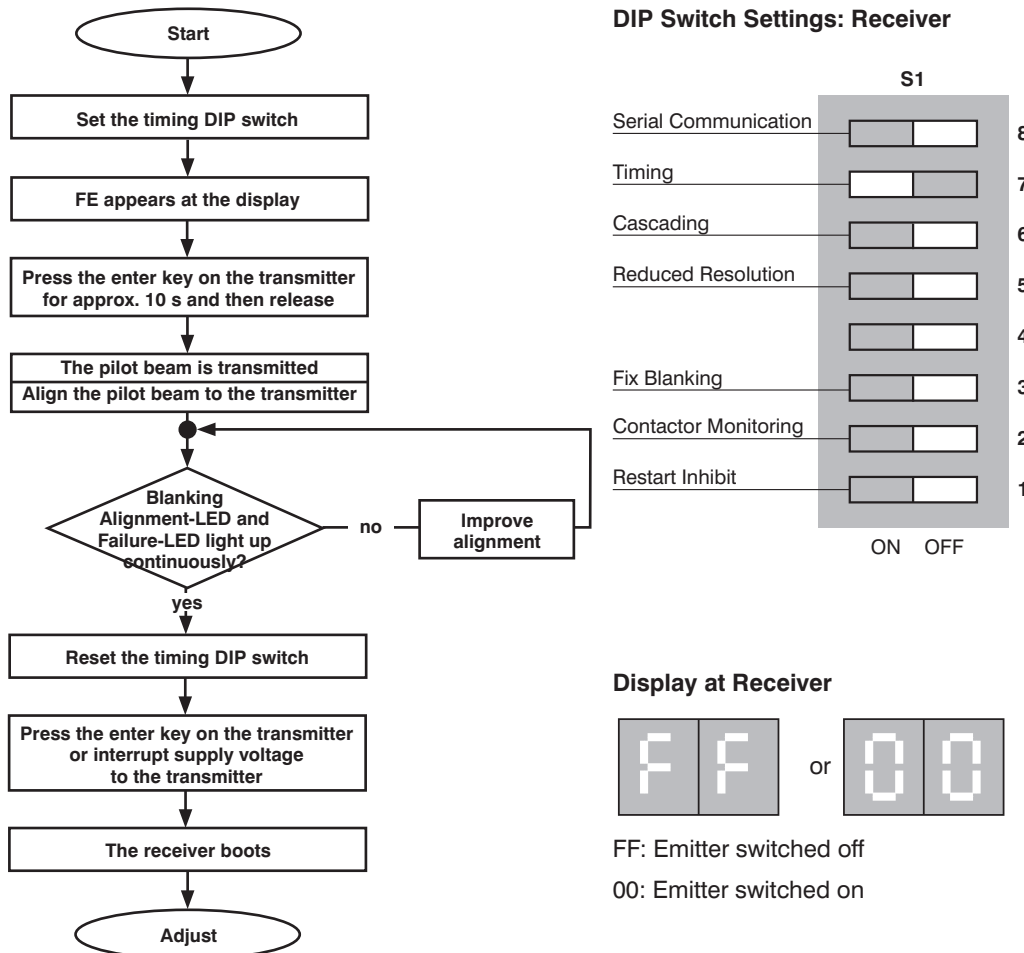
Connector cable from socket 2 at receiver 1 to socket 1 at receiver 2

Connector cable from socket 4 at transmitter 1 to socket 3 at transmitter 2

#### 5.4.4 Coding

In case of cascading of several Light Arrays the single pairs of Light Arrays have to be coded.

By this is assured that the transmitter just influences its suiting receiver. The coding has to be done as follows:



In order to reset the standard coding (delivery status) the following procedure has to be operated:

Same procedure as above, but only press and hold the enter key on the emitter for a duration of 1 to 3 seconds.

The red error indicator must not light up while the enter key is being pressed and held. If the red error indicator lights up, the enter key has been pressed and held too long.

## 6 EXPANDING THE LIGHT ARRAY SYSTEM

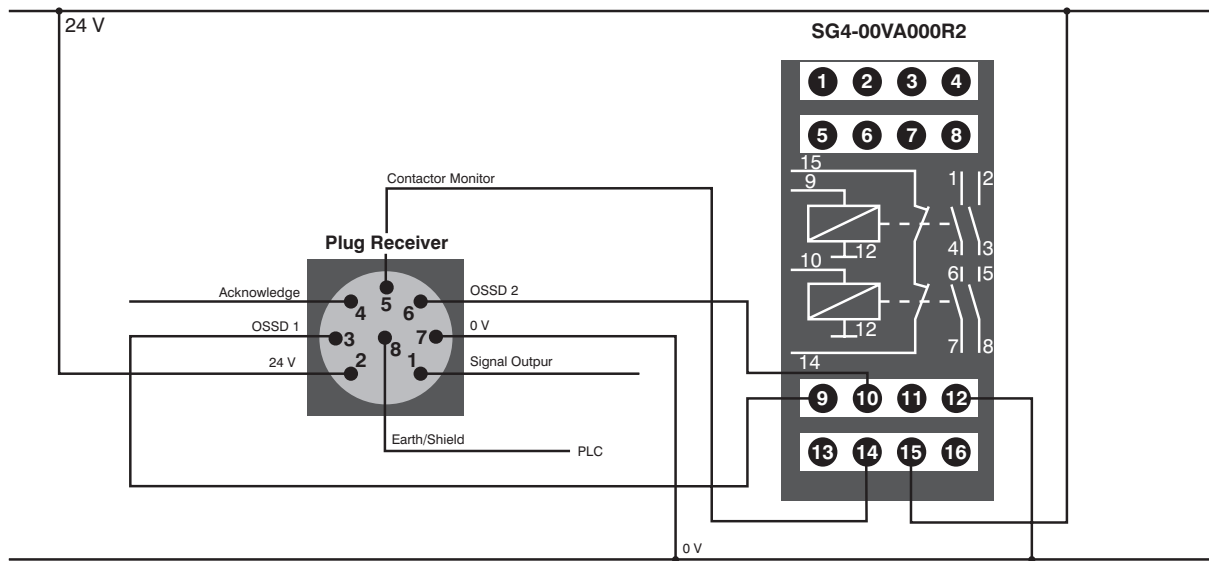
### 6.1 Relay Unit

The SG4-00VA000R2 relay unit is equipped with two failsafe floating relay outputs. The terminals are connected to the load circuit. The use of a spark arrester significantly increases the service life of the relay contact. Two-channel redundant wiring must also be observed when the relay unit is utilized. Both contacts must be used for load current control.



**Response times are increased by 8 ms when the relay unit is used**

### Schematic Diagram, Relay Unit Connection



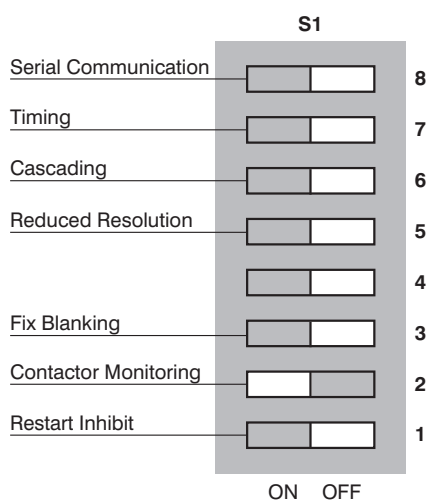
### Relay Unit Terminal Assignments

Required system components:

- 1 × transmitter, 1 × receiver
- 1 × cable
- 1 × connector cable
- 1 × relay unit

From	Function	To
<b>Relay Unit Connections</b>		
Terminal 1	NO 13	Machine contact
Terminal 2	NO 23	Machine contact
Terminal 3	NO 24	Machine contact
Terminal 4	NO 14	Machine contact
Terminal 5	NO 43	Machine contact
Terminal 6	NO 33	Machine contact
Terminal 7	NO 34	Machine contact
Terminal 8	NO 44	Machine contact
Terminal 9	OSSD 1	Pin 3 socket 1 (receiver)
Terminal 10	OSSD 2	Pin 6 socket 1 (receiver)
Terminal 11		unused
Terminal 12	0 V	Pin 7 socket 1 (receiver)
Terminal 13		unused
Terminal 14	Contacteur monitor	Pin 5 socket 1 (receiver)
Terminal 15	24 V	Pin 2 socket 1 (receiver)
Terminal 16		unused

#### DIP Switch Settings: Receiver



## 6.2 Muting Module

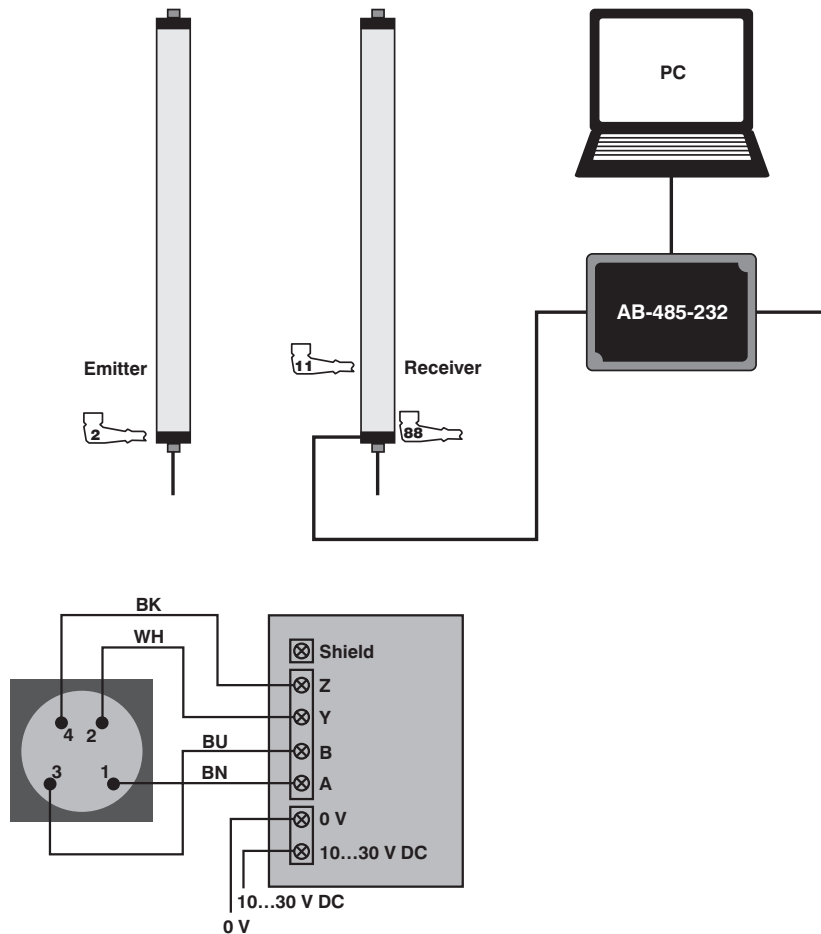
The PMUT-X1P add-on module allows for muting mode operation with the Light Array. Certain objects can be passed through the safety field without switching the safety output in muting mode. For example, material can be fed through the safety field, although reach-in or step-in is nevertheless detected. The muting module allows different types of muting and cyclic operation modes. The use is described in the operating instruction of the muting module.

### 6.3 Connection to a PC

The Light Array receiver is equipped with an RS 485 interface. The A485-232 adapter box can be used for connection to a PC. In order to activate the interface, the “serial communication” DIP switch must be set to the “on” position. B-wsafe host software allows for configuration and read-out of the Light Array. Operating instructions for the host software can be downloaded from the wenglor website at [www.wenglor.com](http://www.wenglor.com).

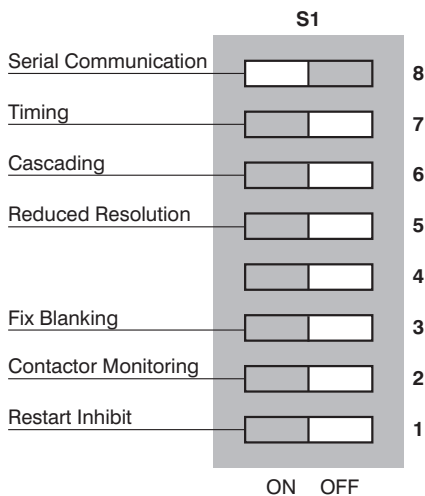
#### The instruction cover:

- Creation of various operating profiles
- Set-up of users with various authority levels
- Safety field visualization
- Configuration of fix blanking and reduced resolution characteristics
- Activation of restart inhibit, contactor monitoring and cascading
- Diagnosis
- Locking of the DIP switch

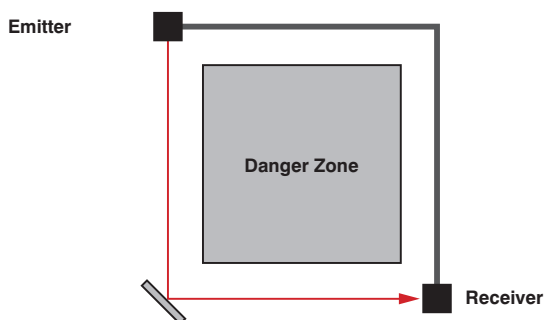


From	Function	To plug
<b>A485-232 Adapter Box Connection</b>		
Terminal A	Data cable	Pin 1 (BN)
Terminal B	Data cable	Pin 3 (BU)
Terminal Y	Data cable	Pin 2 (WH)
Terminal Z	Data cable	Pin 4 (BK)
Terminal 10...30 V	24 V	Supply Voltage
Terminal 0 V	0 V	Supply Voltage

### DIP Switch Settings: Receiver



## 6.4 Deflection Mirrors



The range of applications can be significantly expanded through the use of deflection mirrors.

Deflection mirrors are available in two different variants:

- Without housing: SLUxxxV1
- With safety column: SZ000EUxxxNN01

A danger zone can be secured at several sides using only one light curtain with the help of a wenglor deflection mirror. Range is reduced by approximately 10 % per utilized mirror.

SZ0-LAH01 special alignment optics can be used to simplify adjustment.

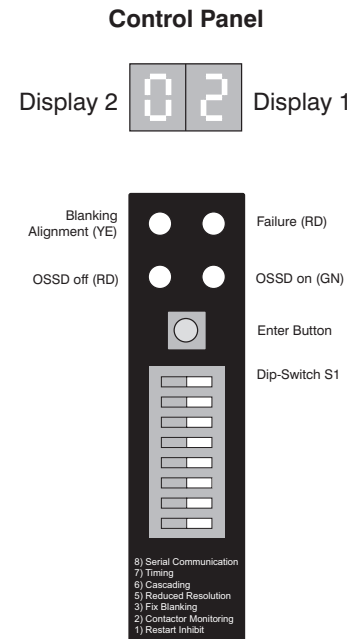
## 7 DISPLAY

### 7.1 Display of Operating Modes

During normal operation, operating modes and functions appear at the receiver's display. If any errors should occur, the error LED lights up and a corresponding error code is displayed. Additional information is read out at the setup LED. The output LED indicates the current output status.

Display 1	Restart Inhibit	Contactor Monitoring	Cascading
0			
1	Activated		
2		Activated	
3	Activated	Activated	
4			Activated
5	Activated		Activated
6		Activated	Activated
7	Activated	Activated	Activated

Display 2	Fix Blanking	Reduced Resolution	Interface
0			
1	Activated		
4		Activated	
5			Activated
6	Activated		Activated
9		Activated	Activated





## 7.2 Diagnostic information

Diagnostic Code	Cause	Remedy
FF**	No synchronisation, pilot beam is obstructed.	Free up the pilot beam or readjust the light barrier.
15, 45	Leakage of data in Safety Light Array	Encode anew, if necessary contact technical support
18, 48, 17, 47	Influence through ambient light, other sensor, overmodulation (Transmitter too close to receiver) or wrong coding.	Remove receiver from the cone of light of the interrupting sensor or encode Safety Light Array and set up new. *
19, 49	Leakage of data in Safety Light Array or wrong coding.	Encode anew, if necessary contact technical support.
1A, 4A	Leakage of data in Safety Light Array or wrong coding.	Encode anew, if necessary contact technical support.
1B, 4B	Connection to the contactor not duly, contactor switches to slow, contactor monitoring activated by mistake.	Contactor and cabling control. Push enter key receiver*
1C, 4C	Connection to the contactor not duly, contactor monitoring activated by mistake.	Contactor and cabling control. Push enter key receiver*
1D, 4D	Connection to slave safety barrier has broken down.	Check connection to slave, press the enter key on the receiver.
1F, 4F	Positive short at output, connection between the two outputs or excessive capacitive load.	Eliminate Short Circuit *
20, 50	Mistake at output	Contact technical support. *
22, 52	Short-circuit to ground at output or wrong coding.	Correct short-circuit to ground, ancode anew, if necessary contact technical support. *
23, 53	Working resistance not duly or wrong coding.	Encode anew, if necessary contact technical support.
06	Leakage of data in Safety Light Array.	Contact technical support.
FE**	Occurs during coding only.	Stop coding.

\* The error reset is executed by switching off the supply voltage of the receiver

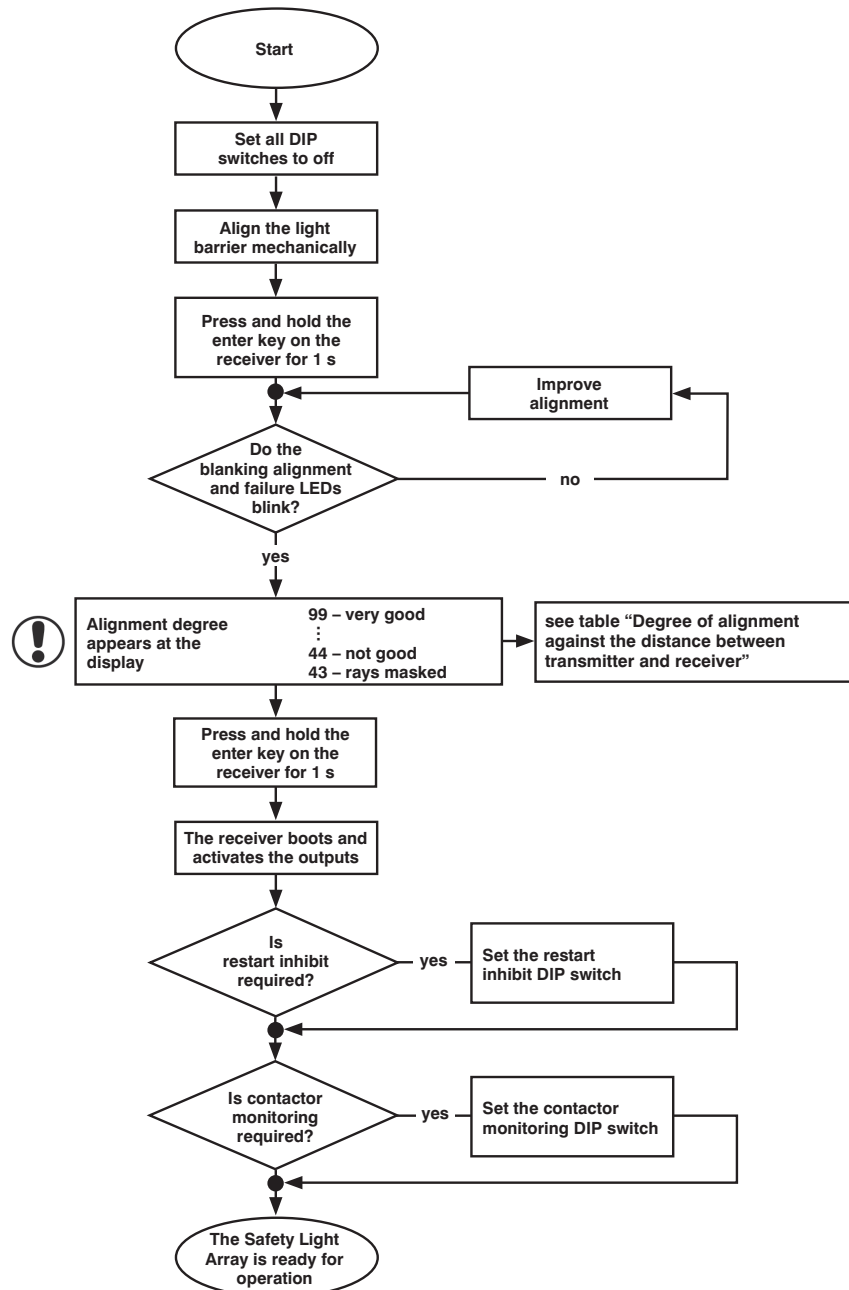
\*\* Error LED doesn't shine



### Do not operate in case of indeterminate malfunctioning

The machine must be shut down if the error cannot be unequivocally clarified or reliably eliminated.

## 8 CONDENSED START-UP INSTRUCTIONS



Distance transmitter – receiver			Degree of alignment
Without tilted mirror	With 1 tilted mirror	With 2 tilted mirrors	
≤ 3 m	≤ 2,7 m	≤ 2,4 m	96 imperatively necessary
3...20 m	2,7...18 m	2,4...16 m	96, 78, 68, 56 preferred
			> 43 necessary

Tab.: Degree of alignment against the distance between transmitter and receiver

## 9 INSPECTION INSTRUCTIONS

The inspections described below serve to confirm compliance with specified safety requirements set forth in national/international regulations, in particular the safety requirements included in the machinery directive and the directive concerning safety and health requirements for the use of work equipment (EC conformity).

The inspections also serve to detect influences which effect the device's protective action, as well as any other unusual ambient influences.

## 9.1 Inspection Prior to Initial Start-Up

Inspection prior to initial start-up, conducted by trained personnel, is intended to assure that the electro-sensitive protective equipment (ESPE), as well as any other safety components, have been correctly selected in accordance with local ordinances, and that they provide the required protection when used for their intended purpose.

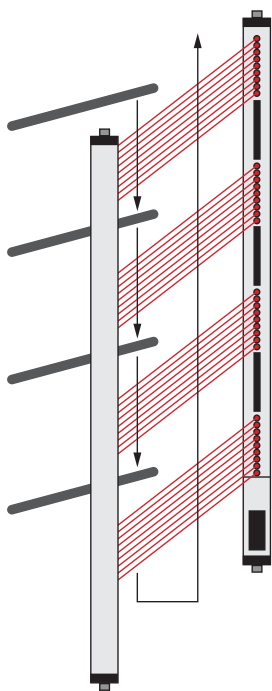
- Inspection of ESPE in accordance with local ordinances. Inspection for correct attachment of the safety device, correct electrical connection to the controller and effectiveness in all of the machine's operating modes.
- The same inspection requirements apply if the machine in question has been shut down for a lengthy period of time and after significant modifications or repairs, if these may influence safety in any way.
- Observe regulations regarding the training of operating personnel by experts before operators begin work. The company which operates the machine is responsible for training.

## 9.2 Daily Inspection and Maintenance of the Effectiveness of the Safety Device

Regular inspections must be completed in accordance with local ordinances. They serve the purpose of detecting changes to (e.g. over-travel time), or manipulation of the machine and the safety devices. National regulations, e.g. ZH 1/597, ZH 1/281, and machine-specific directives apply to the execution of daily inspections.

Daily inspections must be conducted by a person who has been authorized and engaged to do so by the company which operates the machine when work begins, and whenever a new shift is started.

The effectiveness of the ESPE must be tested with supply voltage to the ESPE switched on, and supply voltage to the hazardous motion of the machine switched off. Testing is conducted with the help of a suitable test rod, and never by manually reaching into the danger zone. The diameter of the test rod must not be larger than the resolution selected for the equipment. The test rods for the full resolution and fix blanking modes must have a diameter of 30 mm.



The safety field's upper and lower limits are obvious on the devices.

Each light beam between the emitter and the receiver must be inspected by obstructing each beam with the test rod. The test rod must be moved slowly through the safety field in accordance with the adjacent diagram.

The red "OSSD OFF" indicator on the receiver must be continuously lit as long as the safety field is penetrated.

Furthermore, it must be determined whether or not it is only possible for persons and individual limbs to enter the danger zone exclusively by passing through the safety field between the emitter and the receiver. The ESPE, as well as all utilized accessories (connector cables, mounting kit), must be inspected for wear, damage, excessive contamination and correct mounting. If any impairment of the device's safety function is detected during daily testing or during operation, all work at the respective machine must be immediately stopped.

## 10 ENVIRONMENTALLY SOUND DISPOSAL

The Light Array neither contains nor gives off any environmentally harmful substances. It consumes only a minimum of energy and resources.

### Disposal:

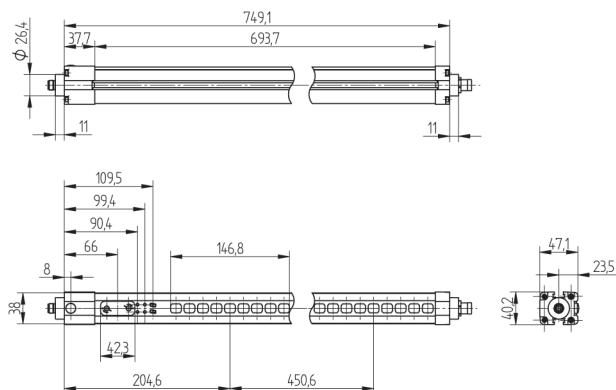
Light curtains which are no longer usable must be disposed of in accordance with all respectively valid, national waste disposal regulations. The light curtains' housings are made of aluminium, and can be disposed of at an appropriate recycling centre. All electronic components must be disposed of as special waste.

wenglor® sensoric gmbh does not accept the return of unusable or irreparable devices.

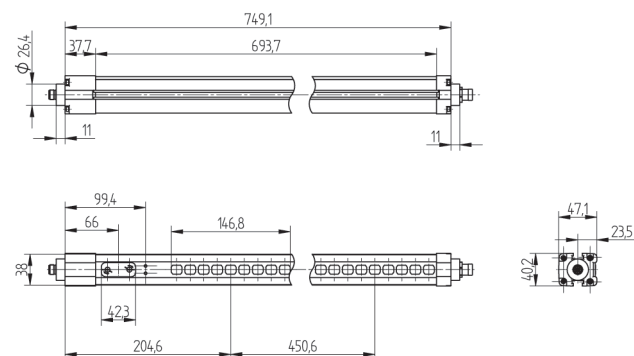
## 11 DIMENSIONS AND WEIGHTS

### 11.1 SB4-50IE050C1/SB4-50IS050C1

Type Designation	Protection Zone Height	Weight
SB4-50IE050C1	500 mm	1,25 kg
SB4-50IS050C1	500 mm	1,25 kg



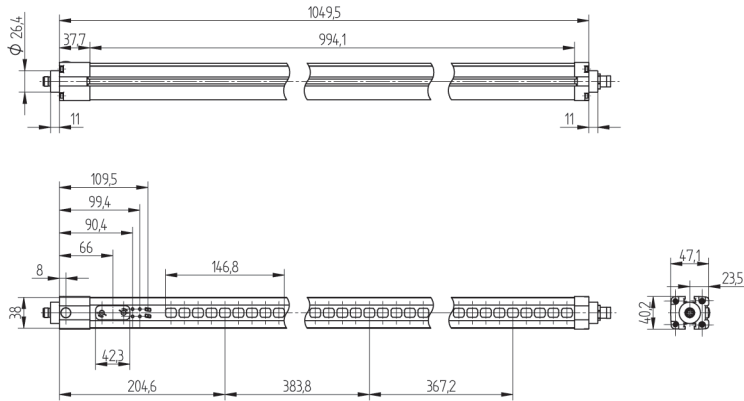
Receiver SB4-50IE050C1



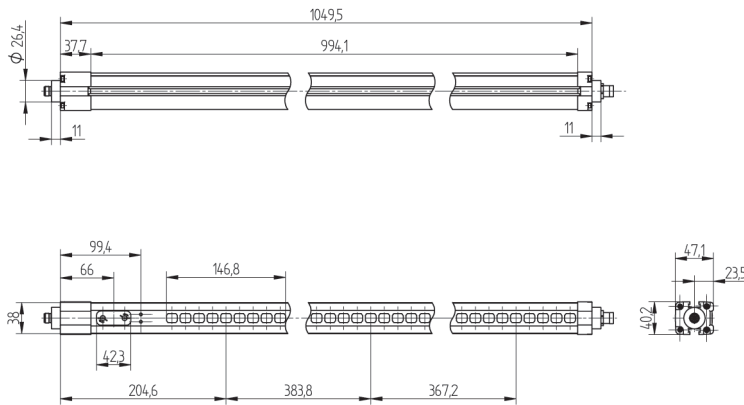
Emitter SB4-50IS050C1

## 11.2 SB4-40IE080C1/SB4-40IS080C1

Type Designation	Protection Zone Height	Weight
SB4-40IE080C1	800 mm	1,70 kg
SB4-40IS080C1	800 mm	1,70 kg



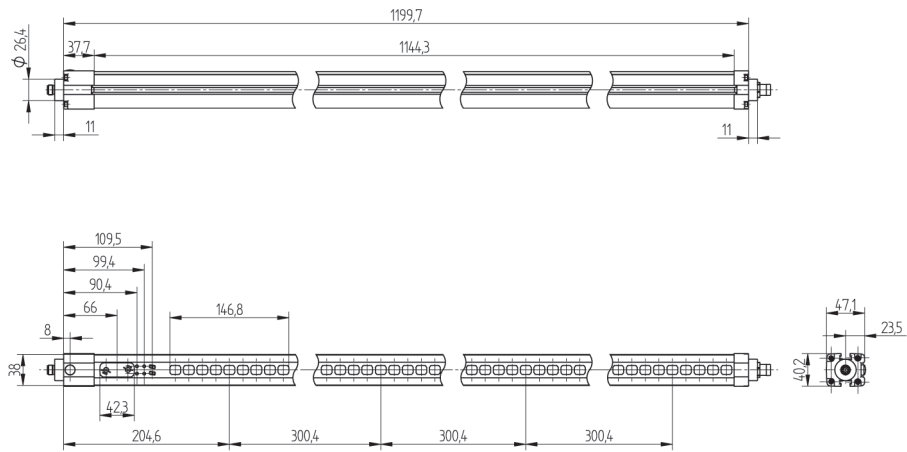
Receiver SB4-40IE080C1



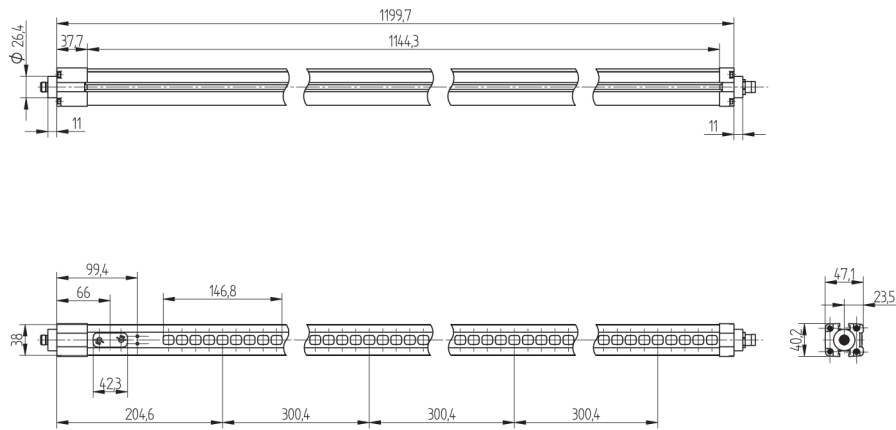
Emitter SB4-40IS080C1

## 11.3 SB4-30IE090C1/SB4-30IS090C1

Type Designation	Protection Zone Height	Weight
SB4-30IE090C1	900 mm	1,95 kg
SB4-30IS090C1	900 mm	1,95 kg

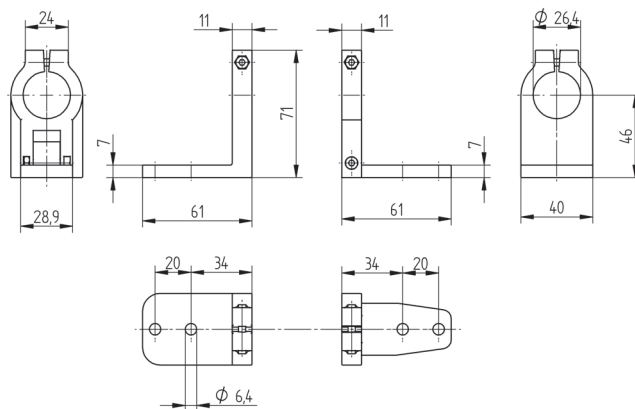


Receiver SB4-30IE090C1



Emitter SB4-30IS090C1

## 11.4 Mounting Bracket BEF-SET-33



## 12 TECHNICAL DATA

### 12.1 Safety Light Array

<b>Type</b>	Type 4 per IEC 61496-2
<b>Performance Level</b>	Cat. 4 PL e per EN ISO 13849-1:2008
<b>PFHd</b>	$3,08 \times E-8$ 1/h
<b>Service life TM</b>	20 years
<b>Beam clearance</b>	SB4-30: 300 mm SB4-40: 400 mm SB4-50: 500 mm
<b>Range</b>	0,5...20 m
<b>Opening angle</b>	+/-2,5°

#### Protection Zone Heights and Response Time

Type Designation (for emitter and receiver)	Protection Zone Height	Number of Individual Beams	Response Time
SB4-50lx050C1	500 mm	18 Beams	5,7 ms
SB4-40lx080C1	800 mm	27 Beams	8,2 ms
SB4-30lx090C1	900 mm	36 Beams	10,0 ms

#### Supply Voltage

Receiver	24 V DC +/-10 % 6 W, PELV per EN 50178
Emitter	24 V DC +/-10 % 6 W, PELV per EN 50178

<b>Fuse</b>	1,5 A
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#### Outputs

Safety Outputs	2 x Semiconductor, PNP
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#### Output Current

with ohmic, inductive load	2 x 300 mA
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Max. voltage in off state	< 1 V
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Max. voltage drop in on state	< 2 V
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Max. residual current	< 2 mA
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#### Max. capacitive load (Load Current 0 mA)

OSSD1	< 80 nF
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OSSD2	< 20 nF
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Max. capacitive load (Load Current 300 mA)	< 1 µF
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#### Max. ohmic cable resistance

between OSSD and load	< 1 Ω
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Signal Output	1 x Semiconductor, PNP / 200 mA
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Short Circuit Protection	yes
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Overload Protection	yes
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#### Interface

Specification	RS-485
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Baud rate	9600 Baud
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Protocol	8 N1
<b>Contact monitoring input</b>	
Max. changeover time	200 ms

### Electrical Connection

Emitter	M12 (S2) 4 × 0,25 mm <sup>2</sup>
Receiver	M12 (S80) 4 × 0,25 mm <sup>2</sup>
Emitter	M8 (S7) 4 × 0,12 mm <sup>2</sup>
Protection Class	III

Protection	IP67
Dimensions	39 mm × 48 mm × depth
Ambient temperature	−20 °C...50 °C
Storage temperature	−25 °C...70 °C
Relative humidity	95 %
Vibration resistance	5 g/10 Hz/55 Hz according IEC 60068-2-6
Shock resistance	10 g/16 ms according IEC 60068-2-29

## 12.2 System Components

### 12.2.1 Relay Unit SG4-00VA000R2

Output	2 × 2 NO
OFF-Delay	8 ms
<b>Contact load</b>	
Max. switching capacity	1500 VA/AC
Voltage/Current/Switching Cycles B10d	250 V AC/4 A/180 000
	24 V DC/4 A/1 400 000
	24 V DC/2 A/3 000 000
Mechanical Service Life	10 000 000 Cycles
Recommended spark arrestor	load circuit 110 V...230 V, R = 220 Ω, C = 0,22 μF
	load circuit 24 V...48 V, R = 22 Ω, C = 0,22 μF
Dimensions	114,5 × 99 × 22,6 mm
Conductor cross-section	0,2...2,5 mm <sup>2</sup>
Protection	IP20
Mounting	35 mm top-hat rail per EN 60715
Fuse Required	4 A delay fuse
Contact Resistance	≤ 100 mΩ/1 A/24 V DC
	≤ 20 Ω/10 mA/5 V DC
Minimum Load	5 V/10 mA



### 12.2.2 Adapter Box A485-232

Voltage Supply	10...30 V, 2,4 W at 24 V
Dimensions	35 × 65 × 50 mm
Protection	IP65
Mounting	35 mm top-hat rail per EN 60715

### 12.2.3 Laser Alignment Aid SZ0-LAH1

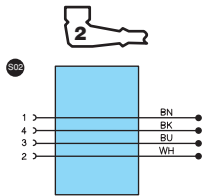
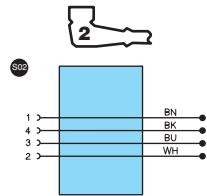
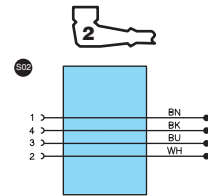
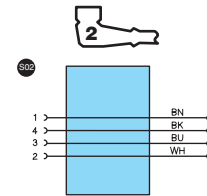
Voltage Supply	3 V (2 × 1,5 AA battery)
Light Source	Laser (red)
Laser Class	2

### 12.2.4 Mounting Elements

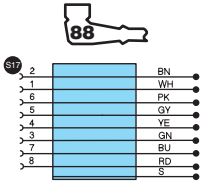
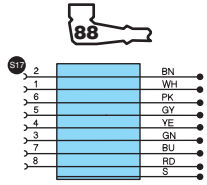
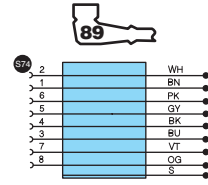
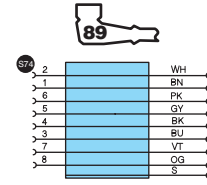
BEF-SET-18	for T-Notch
BEF-SET-36	for mounting inside the Protection Housing

### 12.2.5 Connection Line

M12 × 1, 4-pin

Length	Angle Plug		Straight Plug	
	PVC	PUR	PVC	PUR
				
2 m	S29-2M	—	S23-2M	S23-2MPUR
5 m	S29-5M	S29-5MPUR	S23-5M	S23-5MPUR
10 m	S29-10M	—	S23-10M	S23-10MPUR

M12 × 1, 8-pin

Length	Straight Plug	Angle Plug	Straight Plug	Angle Plug
			PUR	
				
2 m	S88-2MPUR	S88W-2MPUR	ZAS89R201	ZAS89R202
5 m	—	S88W-5MPUR	ZAS89R501	ZAS89R502
10 m	S88-10MPUR	S88W-10MPUR	ZAS89R601	ZAS89R602
20 m	S88-20MPUR	—	ZAS89R701	—

### 12.2.6 Connection Cables

**M12 × 1, 4-pin**

Length	Straight Plug	
	PVC	PUR
2,0 m	BG2SG2V1-2M	BG2SG2V3-2M

**M12 × 1, 8-pin**

Length	Straight Plug
2,0 m	BG88SG88V2-2M

**12.2.7 Interface Cable**

Length	Straight Plug
10 m	S11-10M

## 13 CHECKLIST

This checklist is intended to provide assistance during initial start-up. It does not eliminate the need for testing before initial start-up, or for periodic tests conducted by appropriately trained persons.

<b>1. Standards and Directives, ESPE Selection</b>		
Are the safety precautions based upon the directives/standards which are applicable for the machine?	Yes	No
Are the utilized directives and standards listed in the declaration of conformity?	Yes	No
Is the safety device in compliance with the required safety level?	Yes	No
<b>2. Safety Clearance</b>		
Has safety clearance been calculated in accordance with the valid formulas for securing points of danger, and in consideration of resolution, ESPE response time, response time of any utilized safety interface and machine over-travel time?	Yes	No
Has machine over-travel time been measured, specified, documented (at the machine and/or in the machine's documentation) and adapted to the ESPE installation setup.	Yes	No
Has the safety clearance between the point of danger and the safety field been adhered to?	Yes	No
<b>3. Access to the Point of Danger</b>		
Is it only possible to access the point of danger via the ESPE's safety field?	Yes	No
Is it assured that persons are unable to remain within the danger zone unprotected (e.g. by means of mechanical protection against side-stepping, or by means of cascading), and are the implemented measures protected against manipulation?	Yes	No
Have additional mechanical protective measures been installed which prevent reaching under, over or around the safety field, and are they protected against manipulation?	Yes	No
<b>4. Installation</b>		
Have the components of the ESPE been correctly attached and secured against loosening, shifting and rotation after adjustment?	Yes	No
Is the external condition of the ESPE and all associated accessories flawless?	Yes	No
Has the control device for resetting the ESPE been correctly installed outside of the danger zone, and is it functional?	Yes	No
<b>5. Incorporation into the Machine</b>		
Have the safety outputs (OSSDs) been incorporated into the downstream machine controls in accordance with the required controller category, and have they been connected in accordance with the wiring diagrams?	Yes	No
Are the switching elements which are controlled by the ESPE (e.g. contactors, valves) monitored?	Yes	No
<b>6. Functionality</b>		
Is the ESPE effective during the entire duration of the machine's hazardous motion?	Yes	No
If a hazardous state has been initialized, is it stopped when the ESPE is switched off, if the operating mode or any of the function types are changed, or if switching to another safety device occurs?	Yes	No
Are the specified safety functions effective for each and every configuration?	Yes	No
Has the safety function been tested in accordance with the inspection instructions included in the operating instructions?	Yes	No

## 14 EC DECLARATION OF CONFORMITY

**This declaration applies to the following products:**

SB4-..IS...C1

SB4-..IE...C1

We confirm the conformity to the essential requirements of the european directives concerning Electromagnetic compatibility (2004/108/EC) and Machinery (2006/42/EC)

**The following standards have been used:**

EN 61496-1:2004 (Type 4)

EN ISO 13849-1:2008 (Cat. 4, PL e)

EN 61496-1/A1:2008 (Type 4)

EN 50178:1997

IEC 61496-2:2006 (Type 4)

EN 61000-6-4:2007

### Product description

Safety Light Array

Electro-Sensitive Protective Equipment

Safety component per 2006/42/EC annex IV

Serial Number: See rating plate

### Notified Body / Certificate Nr.

TÜV SÜD Product Service GmbH

Ridlerstraße 65

D-80339 München

NB Nr. 0123

Z10 11 02 40594 021

Dr. Alexander Ohl is authorized to compile the technical documentation.

This declaration is given for the manufacturer by:

Dr. Alexander Ohl

Leiter Forschung & Entwicklung / Head of Research & Development



Subject to change without notice. Translation of the Original Operating Instruction.

Status: February 2013

