

Light Screens LV...M

Light Screens series LV...M are used to count and detect any type of small objects. They have a gapless sensing area. An object passing through is detected independent of its position and orientation. Objects having complex shape (for example rings and springs) don't result in multiple counts. It is possible to reliably detect spheres with minimum 0.6mm diameter.

Selective Sensitivity

The sensitivity can be gradually adjusted to the size of the objects to be detected. Objects corresponding to the selected sensitivity level are reliably detected. The detection of four times smaller pieces is safely suppressed.

High Reliability of Operation

The continuous contamination of the optics during operation is constantly monitored, and, within its allowed range, does not influence functionality. Especially, the selected sensitivity level is not compromised.

The light screen signals operational readiness, as long as the maximum allowable degree of contamination is not exceeded, and the sender and receiver power necessary to guarantee reliable operation is not too low, respectively. An early warning signal indicates, that the optics of the light screen has soon to be cleaned. In addition to a continuous internal function check, it is monitored that no object stays longer than allowed in the sensing field.



Available Models

Sensor and control electronics combined in one housing:

- Standard versions with sensing area sizes from 100mm x 50mm up to 400mm x 400mm available.
- 9-pin D-sub connector for power supply and communications.
- D-Sub connector located either on the front profile or on the cover of the housing.
- Selection of the sensitivity level either by mode switch or digital inputs.



Sensor and control electronics separately:

- For applications with limited space available.
- Minimum sensing area size: 30mm x 30mm.
- Control electronics and sensor are connected by a up to 1.5m long round cable.
- Sensor with high-strength cable gland on front profile or D-Sub connector on the housing cover.
- 9-pin D-sub connector on control electronics unit for power supply and communications.
- Selection of the sensitivity level either by mode switch or digital inputs.



Flexible Interface

The output of the switching function and the monitoring signals is realized by galvanically isolated optocouplers. The mode of signal output can be flexible adapted to the user needs by jumpers.

Sensitivity

Five sensitivity levels are available for object detection. Objects, whose smallest extension correspond to the selected level, are detected. The light screen does not detect objects, whose largest extension is four times smaller than the selected level.

Depending on the model, the sensitivity level can be selected either by use of a mode switch, or by two digital inputs (binary coded). Three levels can be selected by mode switch, four by digital inputs. The assignment of a sensitivity level to the position of the mode switch or, respectively, the binary coded selection is arbitrary selectable (please refer to chapter "Configuration").

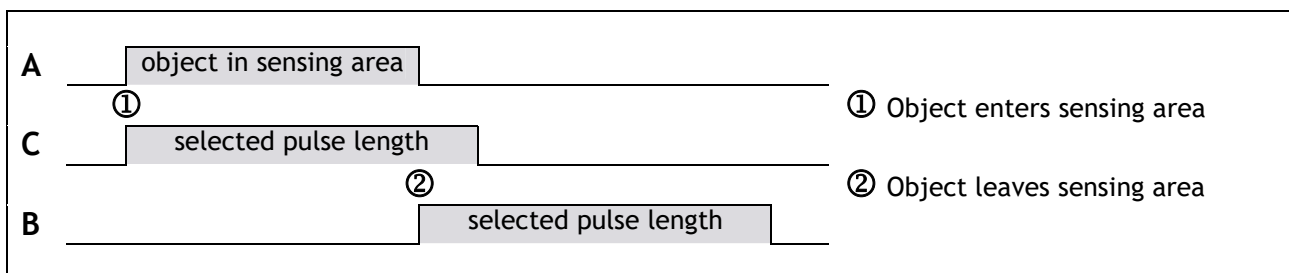
Operational Conditions

Protection class:	IP53
Permissible ambient temperature:	0 °C to +50 °C

Maximum Ratings for Object Detection

Minimum time an object must remain in the sensing area:	0.5ms
Maximum time an object is allowed to remain in the sensing area:	1s
Minimum distance between two successive objects:	1mm
Minimum required time interval between successive parts:	0.5ms

Available Switching Functions (A, B, C)



The switching function mode (A or B or C), as well as the pulse length at switching functions B or C are selectable (please refer to chapter “Configuration”). With selected switching function B or C, there is no registration of a repeated release or, respectively, interruption of the sensing field.

Monitoring Functions

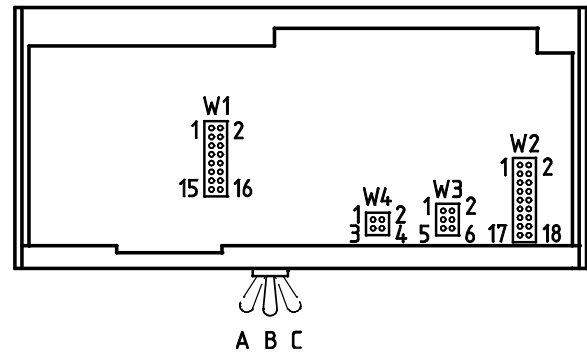
Monitoring 1:	The monitoring signal is active, when the transmit or receive power available for the operation of the sensing area has fallen below the internally predetermined warning limit. If the optics is dirty, the transmit and receive power can be increased again by cleaning.
Monitoring 2:	The monitoring signal is active, as long as: <ul style="list-style-type: none"> • the sender and receiver power necessary to guarantee reliable operation is not too low • the light screen has not detected an internal malfunction • the maximum time an object is allowed to remain in the sensing field is not exceeded

Selectively, the monitoring signals are output in either positive or negative logic (please refer to chapter “Configuration”).

Configuration

After removing the cover of the control unit, jumper blocks W1, W2, W3, and W4 are accessible for configuration purposes. All necessary information can be found in the following tables.

Jumper	Meaning
“on“	jumper placed
“off“	no jumper



Block W2: Assignment of binary code, or, respectively, mode switch position to sensitivity level

Binary Code, or resp. Mode Switch Position	Jumper Block W2				
	Level 1	Level 2	Level 3	Level 4	Level 5
Binary Code 01, or resp. position A	1-2 on	3-4 on	5-6 on		
Binary Code 10, or resp. position B		7-8 on	9-10 on	11-12 on	
Binary Code 11, or resp. position C			13-14 on	15-16 on	17-18 on

If binary code 00 is applied, level 1 is always selected.

Example: In position A, level 1 should be selected, in position B level 3, and in position C level 5:
Jumper 1-2, 9-10 und 17-18 must be placed. All other jumper must be removed.

Block W1: Polarity Setting of Switching Signals

Switching Signal	Jumper Block W1	
	Output in Positive Logic	Output in Negative Logic
Monitoring 1	1-2 on, 3-4 off	3-4 on, 1-2 off
Monitoring 2	5-6 on, 7-8 off	7-8 on, 5-6 off
Switching function (A or B or C)	9-10 on, 11-12 off	11-12 on, 9-10 off

Blocks W1 and W4: Selection between switching function A or B or C

Switching Signal	Jumper Block W1	Jumper Block W4
Switching function A	13-14 on, 15-16 off	don't care
Switching function B	15-16 on, 13-14 off	3-4 on, 1-2 off
Switching function C	15-16 on, 13-14 off	1-2 on, 3-4 off

Block W3: Setting of pulse length of switching functions B and C

Pulse Length	Jumper Block W3
10ms	1-3 on, 2-4 off, 5-6 on
20ms	1-3 off, 2-4 on, 5-6 on
30ms	1-3 on, 2-4 on, 5-6 off

Factory settings for jumper blocks W1, W2, W3, W4:

Please refer to sheet 499.027.62/x “Steckbrückeneinstellungen / Jumper settings“

Models with Integrated Control Unit: Variants



Variant WF:

- Selection of the sensitivity level by use of a mode switch on the front profile
- Connector X1 located on front profile



Variant SF:

- Selection of the sensitivity level by use of digital inputs on connector X1
- Connector X1 located on front profile

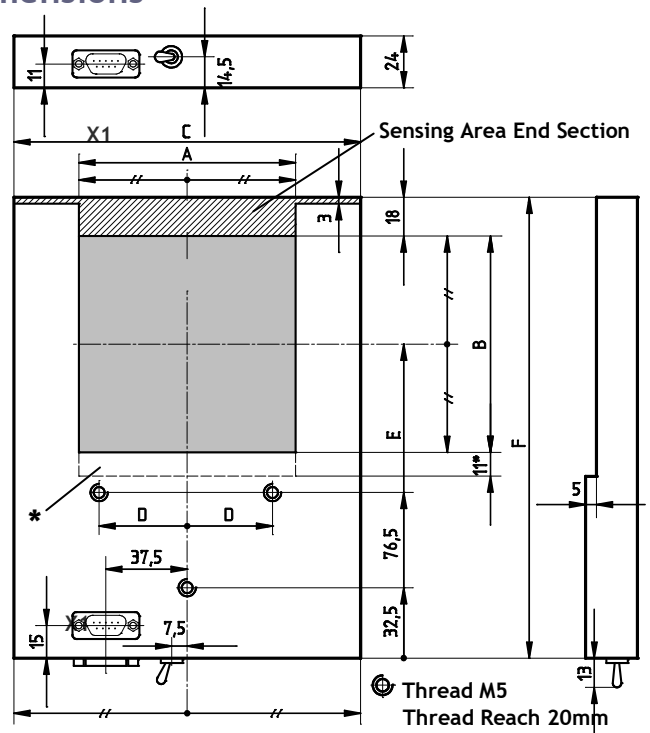


Variant SG:

- Selection of the sensitivity level by use of digital inputs on connector X1
- Connector X1 located on housing cover

Models with Integrated Control Unit: Dimensions

Sensing Area in mm x mm	Dimensions in mm					
	A	B	C	D	E	F
100x100	100	100	160	40	145	213
100x200	100	200	160	40	195	313
150x100	150	100	210	65	145	213
200x100	200	100	260	65	145	213
250x100	250	100	310	90	145	213
300x100	300	100	360	115	145	213
100x50	100	52	160	40	121	165
150x50	150	52	210	65	121	165
150x150	150	150	210	65	170	263
200x200	200	200	260	65	195	313
250x250	250	250	310	90	220	363
300x200	300	200	360	115	195	313
400x400	400	400	460	165	295	513



With mounted or removed sensing area end section, the sensitive field equals to the window A x B.

With removed sensing area end section (“U-Shaped”), the sensitivity is not well-defined in the section between sensing area and the end of the “U-Shape”.

* This range is not covered at devices in version SG with sensing area size 100mm x 50mm.

In the drawing, both possible positions of connector X1 are shown. Also illustrated is the mode switch, whose presence depends on the light screen type.

Installation Instructions

The three M5 threads (⊕) accessible on the bottom of the device must be used for mounting. The maximum thread length is 20mm.

To prevent impurity such as dust from penetrating inside the device, it is absolutely necessary that the opening of the middle thread is closed during transport and after mounting. For this reason, a screw is already inserted in the middle mounting thread on delivery.

The sensing area end section increases the stability of the fork. The light curtain can be converted from a frame to a “U-Shape” by removing the sensing area end section. It is important, that the two screws, by which the sensing area end section is mounted on the fork, are reattached after removing the sensing area end section, as they contribute significantly to the stability of the fork.

Models with Integrated Control Unit: Type Overview

Designation	Sensing Srea in mm x mm	Sensitivity Levels in mm					Variant
		Level 1	Level 2	Level 3	Level 4	Level 5	
LV100/50M	100x50	1	2	4	8	16	SG
LV100/50M1	100x50	0.6	1	2	4	8	WF
LV100/50M2	100x50	0.6	1	2	4	8	SF
LV100/50M3	100x50	1	4	8	16	32	SG
LV100/50M4	100x50	0.6	1	2	4	8	SG
LV100M	100x100	1	2	4	8	16	WF
LV100M1	100x100	1	2	4	8	16	SF
LV100M2	100x100	1	4	8	16	30	SF
LV100M3	100x100	1	2	4	8	16	SG
LV100M4	100x100	4	8	16	24	48	SF
LV100M5*1	100x100	1	2	4	8	16	SF
LV100/200M	100x200	2	4	8	16	32	WF
LV150M	150x100	1	2	4	8	16	WF
LV150M1	150x100	1	2	4	8	16	SF
LV150M2	150x100	1	4	8	16	30	SF
LV150M3	150x100	8	16	32	48	56	SF
LV150M4	150x100	1	2	4	8	16	SG
LV150M11*1	150x100	1	2	4	8	16	SF
LV150ME*2	150x100	1	2	4	8	16	WF
LV150/50M2	150x50	1	2	4	8	16	SG
LV150/50M3	150x50	0.6	1	2	4	8	WF
LV150/50M4	150x50	0.6	1	2	4	8	SF
LV150/150M	150x150	2	3	6	12	24	WF
LV150/150M1	150x150	2	3	6	12	24	SF
LV150/150M2*1	150x150	2	3	6	12	24	SF

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Designation	Sensing Area in mm x mm	Sensitivity Levels in mm					Variant ^{*3}
		Level 1	Level 2	Level 3	Level 4	Level 5	
LV150/150M3	150x150	2	3	6	12	24	SG
LV200M	200x100	1	2	4	8	16	WF
LV200M1	200x100	1	2	4	8	16	SF
LV200/50M1	200x50	1	2	4	8	16	SF
LV200/150M	200x150	2	3	6	12	24	WF
LV200/150M1	200x150	2	3	6	12	24	SF
LV200/200M	200x200	3	6	12	24	48	WF
LV200/200M1	200x200	3	6	12	24	48	SF
LV250M	250x100	1	2	4	8	16	WF
LV250M1	250x100	1	2	4	8	16	SF
LV250/250M	250x250	5	10	20	40	80	WF
LV250/250M1	250x250	5	10	20	40	80	SF
LV300M	300x100	2	4	8	16	32	WF
LV300M1	300x100	2	4	8	16	32	SF
LV300/200M	300x200	4	8	16	32	64	WF
LV300/200M1	300x200	4	8	16	32	64	SF
LV300/200M12 ^{*1}	300x200	4	8	16	32	64	SF
LV400/400M	400x400	8	16	32	64	128	WF
LV400/400M1	400x400	8	16	32	64	128	SF
LV400/400ME ^{*2}	400x400	8	16	32	64	128	SF

Explanations

^{*1} Application-specific special models:

LV100M5 and LV150/150M2: Configured to account for about 20% static coverage of the sensing field (e.g. for operation with a construction within the sensing area, that is used to guide the parts to be detected by the light screen).

LV150M11: Increased the max. time an object is allowed to remain in the sensing field to 10s.

LV300/200M12: Increased the max. time an object is allowed to remain in the sensing field to 2s.

^{*2} LV150ME, LV400/400ME:

Variant for use as ejection control at punches and presses. Monitoring the ejection of manufactured parts out of the mold area, in order to release the machine cycle ("Mold Protection").

^{*3} Please refer to chapter "Models With Integrated Control Unit: Variants" on the previous page.

On request, other application-specific designs can be realized.

Models with Separated Control Unit: Variants

Sensors



Variant S:
With connector X3 on housing cover



Variant K:
With high-strength cable gland on front profile

Control Units



Variant LVA:

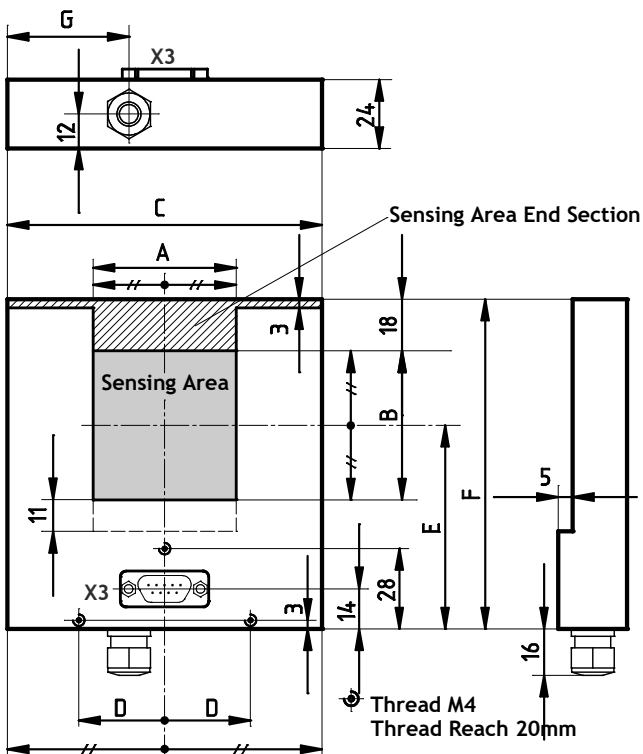
- Selection of the sensitivity level by use of digital inputs on connector X1
- Connector X1 located on front profile



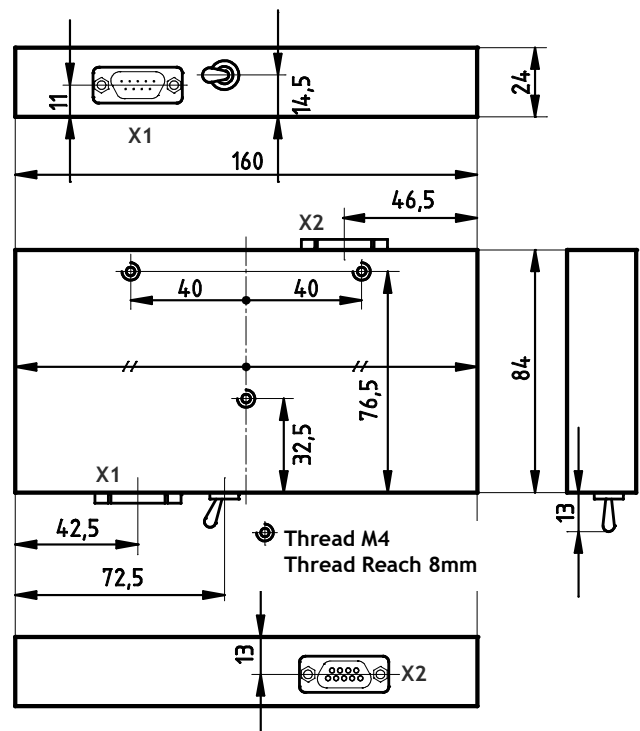
Variant LVB:

- Selection of the sensitivity level by use of a mode switch on the front profile
- Connector X1 located on front profile

Models with Separated Control Unit: Dimensions



Both possible sensor variants S and K are shown in the drawing.



Illustrated is the mode switch, whose presence depends on the light screen variant.

Sensing Area in mm x mm	Dimensions in mm						
	A	B	C	D	E	F	G
30x30	30	30	90	30	58	91	35
50x50	50	52	110	30	71	115	45
50x200	50	200	110	30	145	263	45
100x50	100	52	160	40	71	115	70

With mounted or removed sensing area end section, the sensitive field equals to the window A x B.

With removed sensing area end section (“U-Shaped”), the sensitivity is not well-defined in the section between sensing area and the end of the “U-Shape”.

Installation Instructions

The three M4 threads (⊕) accessible on the bottom of the sensor and the control unit must be used for mounting. The maximum thread length is 20mm in the sensor, and 8mm in the control unit.

To prevent impurity such as dust from penetrating inside the control unit, it is absolutely necessary that the openings of the three threads are closed during transport and after mounting. For this reason, screws are already inserted in the three mounting threads on delivery.

The sensing area end section increases the stability of the fork. The light curtain can be converted from a frame to a “U-Shape” by removing the sensing area end section. It is important, that the two screws, by which the sensing area end section is mounted on the fork, are reattached after removing the sensing area end section, as they contribute significantly to the stability of the fork.

Models with Separated Control Unit: Type Overview

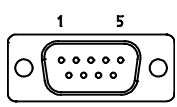
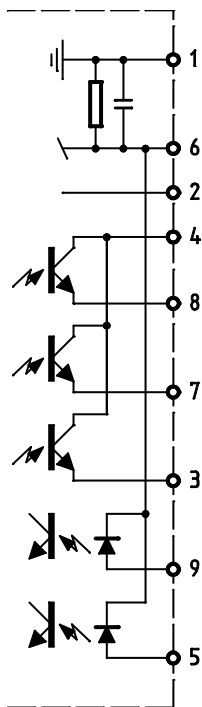
Designation	Sensing area in mm x mm	Sensitivity Levels in mm					Sensor Variant*
		Level 1	Level 2	Level 3	Level 4	Level 5	
LVE30/30M with LVA11	30x30	1	2	4	8	16	S
LVE30/30M with LVA12	30x30	0.6	1	2	4	8	S
LVE50/50M with LVA21	50x50	0.6	1	2	4	8	S
LVE50/50M1 with LVB21	50x50	0.6	1	2	4	8	K
LVE50/50M1 with LVB31	50x50	1	2	4	8	16	K
LVE50/200M with LVA21	50x200	2	4	8	16	32	S
LVE100/50M with LVA31	100x50	1	2	4	8	16	S

* Please refer to chapter “Models With Separated Control Unit: Variants“ on the previous page:

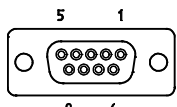
Sensor variant S: With connector on housing cover

Sensor variant K: With high-strength cable gland on front profile

Connection Diagram to Connector X1



Plugs X1 and X3

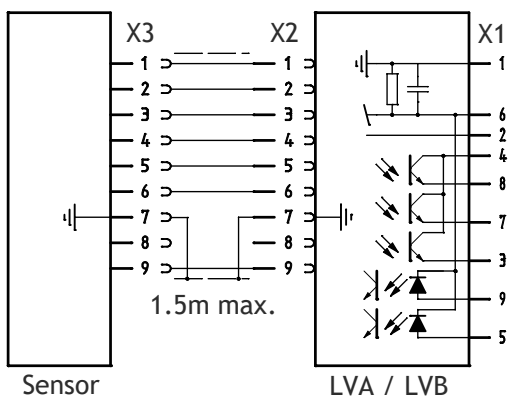


Socket X2

Connector X1 (all models)		
Pin	Assignment	
1	Screen (The shield must be connected at both ends to the corresponding device housings).	
6	Ground (0V)	
2	Power supply	
4	Common switching voltage for optocoupler outputs (pins 3, 7, and 8)	
8	Switching function	Optocoupler outputs
7	Monitoring 1	Positive logic: The transistor is conducting in the active state
3	Monitoring 2	Negative logic: The transistor is disabled in the active state
9	Bit 2 ⁰	Variant without mode switch: Optocoupler inputs for binary coded selection of the sensitivity level
5	Bit 2 ¹	

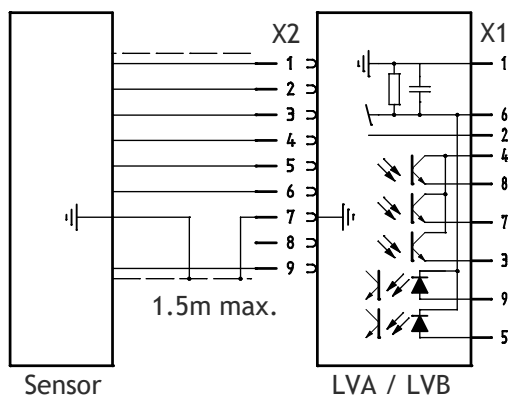
Characteristics	
Maximum cable diameter:	7mm
Maximum lead cross section:	0.4mm ²
Maximum length sensor cable (X2-X3)	1.5m
Optocoupler outputs pins 3, 7, and 8: Optocoupler switching voltage pin 4:	Operating voltage: 10V..30V Maximum load per output: 100 mA Isolation voltage: 5000V _{rms}
Optocoupler inputs pins 5 and 9:	Operating voltage: 24V (18V..30V) Positive threshold level: 15V Negative threshold level: 5V Isolation voltage: 5000V _{rms} V
Power supply:	24V DC (18V..30V), 85mA max. 24V AC +-10%, 190mA max.

Connection Diagram to Models with Separated Control Unit



Sensor

LVA / LVB



Sensor

LVA / LVB

Sensor variant S: with D-sub connector X3

Sensor variant K: with high-strength cable gland

Sensors with high-strength cable gland are delivered with assembled cable to the control unit (length 1.5m).

Safety

Intended Use

The Light Screen LV...M is a sensor used to count and detect any type of small objects. Use the device only for the purpose stated in this documentation. At all times, the light screen may only be used within the limits of the prescribed and stated technical data and operating conditions.

Particularly, the light curtain is not suitable for following applications: Underwater, in areas exposed to explosion, in hot (more than +50 °C) or cold (less than 0 °C) areas, at condensing atmospheric humidity and in areas with sparking.

The light screen must not be used in safety applications, in particular not for protection against personal injury. It must not be used as a safety component according to the EU Machinery Directive.

In the case of non-intended use, modification or manipulation, any warranty will be void, as well as any responsibility or liability of OPTRONIC AG for any damage or consequential damage caused hereby.

Only use OPTRONIC AG original accessories or accessories recommended by OPTRONIC AG. Please read the documentation carefully before using the device.

The operator of the installation in which the light screen is integrated, is responsible for compliance with national and international safety and accident prevention regulations (for example EN292, EN60204).

Safety Instructions

General Safety Instructions to Protect Yourself Against Physical Damage

The notes on how the power supply has to be realized must be followed. No other type of power supply than that described in this manual may be used.

All cables must be routed in such a way that no one can step on or trip over them.

Work on electrical equipment is a safety risk and must be specially secured. Therefore, the light screen must be installed and connected in voltage-free state by a specialist. The machine must be switched off and protected against being switched on again.

General Instructions to Avoid Damage to the Unit

In the event of a faulty connection with other devices, or in the event of a faulty supply, there is a risk that the light screen will be damaged. Read the relevant instructions before connecting and read the documentation before commissioning.

Your Satisfaction is Our Primary Goal



OPTRONIC AG was founded 1961 as company for development, manufacturing, as well as marketing of optoelectronic devices.

Nowadays, the service offering of OPTRONIC AG covers solutions for special requirements in the field of industrial control and sensor systems, as well as customer specific hardware and software development.



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