

technical information

Light curtain bar pairs



status: 2010-12-08 (preliminary copy)

Find everything about light curtain bar pairs in this document:

- resolutions of 5...112 mm
- monitoring heights of 35...5784 mm
- 4 sections
- 9 mounting options (mechanics)
- optional types
- segmentation

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light curtain bar pairs

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Subject to change without notice.

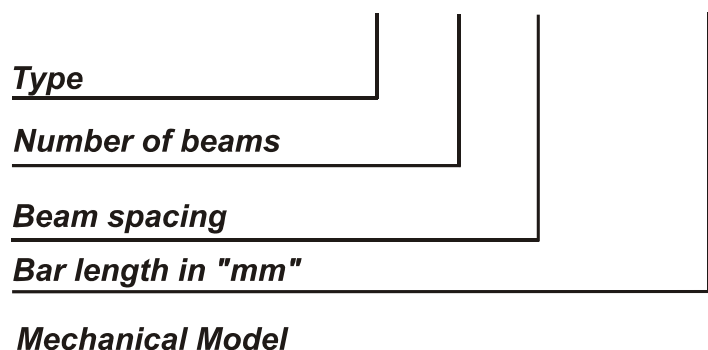
No responsibility is taken for the correctness of this information.

Your suggestions for corrections or improvements are welcome!

Light curtain bar pair consisting of receiver- and transmitterbar					
Type			Number of beams/Resolution	Mechanics	Options
LA	LI	LG	Choose the most suitable resolution from 5 to 112 mm.	Choose from 4 sections and 8 mounting options.	Specification code (AC) <ul style="list-style-type: none"> • colour • cable length • cable exit • ...
Choose your light curtain type based on the needs of your application.					
page AL 4			page AL 5	page AL 8	page AL 16

Exemplarily type designation:out

LI 32/25 - 840 |



Only 4 steps to your individual light curtain bar pair!

A1	A2	A3	A4	A5	A6	A7	A8
----	----	----	----	----	----	----	----

Colour of rods:

- 0 standard
- N naturally anodized
- S black anodized
- B plate-finished aluminium

Cable length in "dm"

- 000 standard (4m) = 040

Cable outlet

- 0 standard (face site)
- H backward
- F side looking

Options for optical or shielding

- 0 standard (relative range about 100%)
- 1 reduced range (relativ range about 25%)
- 2 on request (special LEDs)

Front cover

- 0 standard, PVC, red transparent
- S PMMA, black
- G glass plate
- F with peelable protection foil

Cable type

- 0 standard, according light curtain type
- C with M12 connector
- W with Wago connector
- M with M8 connector at the bars type LA

light curtain bar pairs


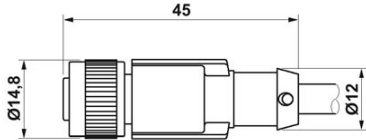

Bar variations

Overview

Type	Control unit ¹	Max. number of beams	Description
LA	integrated	128	Inexpensive system for simple applications, switching output, parameterisable, optical synchronisation, 24 Vdc
LG	LVM	250	Versatile solution for obstacle recognition; sensitivity is adjustable. 230 Vac
LI	LVX, LVE	up to 600	The standard device used for measuring! The multiplicity of interfaces facilitates straightforward connections.

Connector standard type

Connection is realised by fix mounted wiring cable (standard length 4 m). The connector pin assignment is listed in the technical information for the control unit.

LG		screwable round pin plug. e.g. receiver (coupling) 
LI		pluggable clamp make Phönix CombiCon non-interchangeable coded
LA		Core cable ends

Beams

Beam spacing

Beam spacing	Module
	5
10 mm	10
12,5 mm	12,5
25 mm	25
27,94 mm	28
50 mm	50
55,88 mm	56
94 mm	94
100 mm	100
111,76 mm	112

¹ Please notice the technical information for control units!

Monitoring heights

Monitoring height: Distance between first and last beam in mm (rounded).

Preferential types are bold.

a: beam spacing; n: number of beams

$$\ddot{U}H = a \times (n-1)$$

No. of beams (n)	Beam spacing (a)									
	5	10	12,5	25	27,94	50	55,88	94	100	111,76
4						150	168	282	300	335
5						200	224	376	400	447
6						250	279	470	500	559
7				150	168	300	335	564	600	671
8	35	70	88	175	196	350	391	658	700	782
9								752	800	894
10						450	503	846	900	1006
11						500	559	940	1000	1118
12						550	615	1034	1100	1229
13						600	671	1128	1200	1341
14						650	726	1222	1300	1453
15				350	391	700	782	1316	1400	1565
16	75	150	188	375	419	750	838	1410	1500	1676
17								1504	1600	1788
18						850	950	1598	1700	1900
19						900	1006	1692	1800	2012
20						950	1062	1786	1900	2123
21						1000	1118	1880	2000	2235
22						1050	1173	1974	2100	2347
23				550	615	1100	1229	2068	2200	2459
24	115	230	288	575	643	1150	1285	2162	2300	2570
25								2256	2400	2682
26						1250	1397	2350	2500	2794
27						1300	1453	2444	2600	2906
28						1350	1509	2538	2700	3018
29						1400	1565	2632	2800	3129
30						1450	1621	2726	2900	3241
31				750	838	1500	1676	2820	3000	3353
32	155	310	388	775	866	1550	1732	2914	3100	3465
33								3008	3200	3576
34						1650	1844	3102	3300	3688
35						1700	1900	3196	3400	3800
36						1750	1956	3290	3500	3912
37						1800	2012	3384	3600	4023
38						1850	2068	3478	3700	4135
39				950	1062	1900	2123	3572	3800	4247
40	195	390	488	975	1090	1950	2179	3666	3900	4359
41								3760	4000	4470
42						2050	2291	3854	4100	4582
43						2100	2347	3948	4200	4694
44						2150	2403	4042	4300	4806
45						2200	2459	4136	4400	4917

light curtain bar pairs

No. of beams (n)	Beam spacing (a)									
	5	10	12,5	25	27,94	50	55,88	94	100	111,76
46						2250	2515	4230	4500	5029
47				1150	1285	2300	2570	4324	4600	5141
48	235	470	588	1175	1313	2350	2626	4418	4700	5253
50						2450	2738	4606	4900	5476
51						2500	2794	4700	5000	5588
52						2550	2850	4794	5100	5700
53						2600	2906	4888	5200	5812
54						2650	2962	4982	5300	
55				1350	1509	2700	3018	5076	5400	
56	275	550	688	1375	1537	2750	3073	5170	5500	
58						2850	3185	5358	5700	
59						2900	3241	5452	5800	
60						2950	3297	5546		
61						3000	3353	5640		
62						3050	3409	5734		
63				1550	1732	3100	3465			
64	315	630	788	1575	1760	3150	3520			
66						3250	3632			
67						3300	3688			
68						3350	3744			
69						3400	3800			
70						3450	3856			
71				1750	1956	3500	3912			
72	355	710	888	1775	1984	3550	3967			
74						3650	4079			
75						3700	4135			
76						3750	4191			
77						3800	4247			
78						3850	4303			
79				1950	2179	3900	4359			
80	395	790	988	1975	2207	3950	4415			
82						4050	4526			
83						4100	4582			
84						4150	4638			
85						4200	4694			
86						4250	4750			
87				2150	2403	4300	4806			
88	435	870	1088	2175	2431	4350	4862			
90						4450	4973			
91						4500	5029			
92						4550	5085			
93						4600	5141			
94						4650	5197			
95				2350	2626	4700	5253			
96	475	950	1188	2375	2654	4750	5309			
98						4850	5420			
99						4900	5476			
100						4950	5532			

No. of beams (n)	Beam spacing (a)						
	5	10	12,5	25	27,94	50	55,88
101						5000	5588
102						5050	5644
103				2550	2850	5100	5700
104	515	1030	1288	2575	2878	5150	5756
106						5250	
107						5300	
108						5350	
109						5400	
110						5450	
111				2750	3073	5500	
112	555	1110	1388	2775	3101	5550	
119				2950	3297		
120	595	1190	1488	2975	3325		
127				3150	3520		
128	635	1270	1588	3175	3548		
135				3350	3744		
136	675	1350	1688	3375	3772		
143				3550	3967		
144	715	1430	1788	3575	3995		
151				3750	4191		
152	755	1510	1888	3775	4219		
159				3950	4415		
160	795	1590	1988	3975	4442		
167				4150	4638		
168	835	1670	2088	4175	4666		
175				4350	4862		
176	875	1750	2188	4375	4890		
183				4550	5085		
184	915	1830	2288	4575	5113		
191				4750	5309		
192	955	1910	2388	4775	5337		
199				4950	5532		
200	995	1990	2488	4975	5560		
207				5150	5756		
208	1035	2070	2588	5175	5784		
215				5350			
216	1075	2150	2688	5375			
223				5550			
224	1115	2230	2788	5575			
231				5750			
232	1155	2310	2888	5775			
240	1195	2390	2988				
248	1235	2470	3088				
256	1275	2550					
264	1315	2630					
272	1355	2710					
280	1395	2790					
288	1435	2870					
296	1475	2950					

light curtain bar pairs

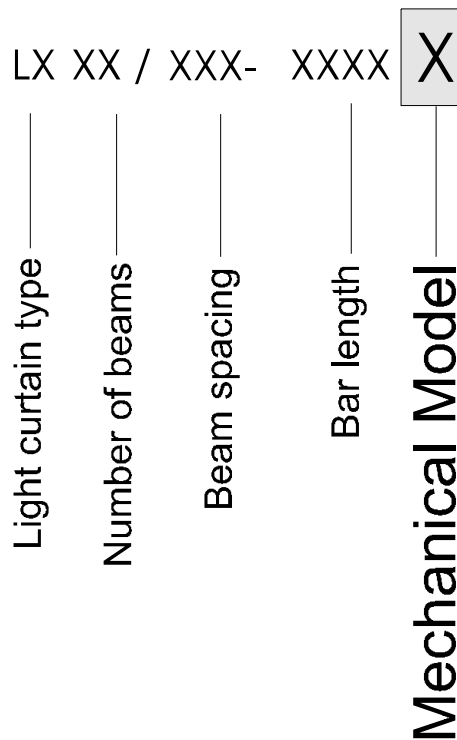
Mechanics

With the required number of beams and the beam spacing, the mechanical design of the bars can be defined on the basis of the following tables.

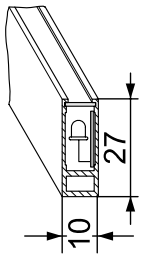
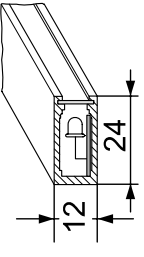
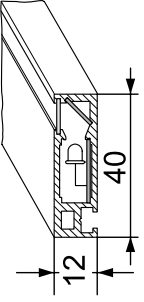
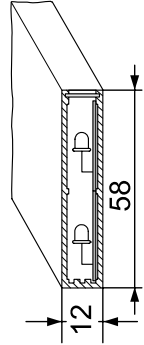
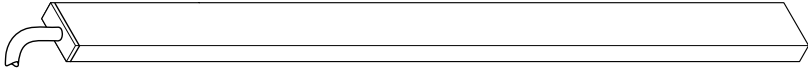
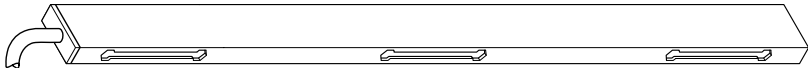
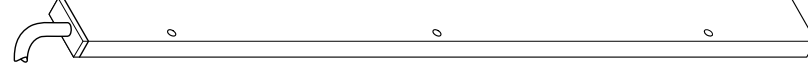
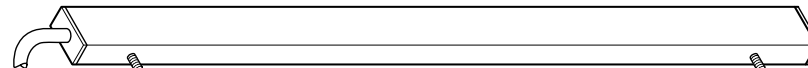
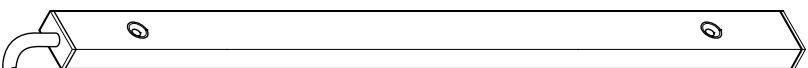
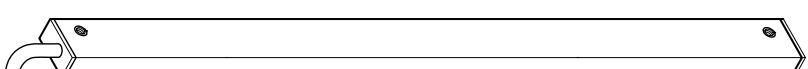
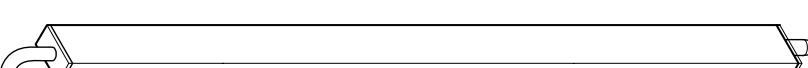
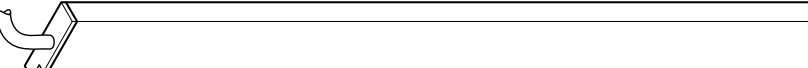
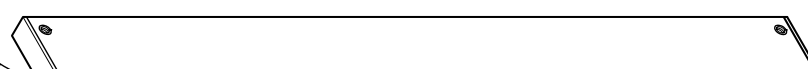
For special models don't hesitate to contact us!

Combinations

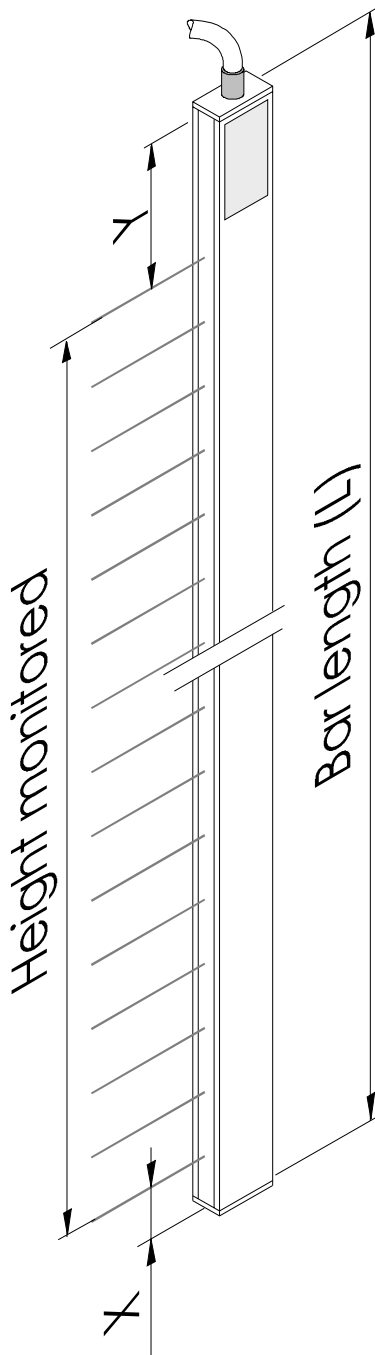
Mechanic	Typ of bar			Beam spacing		
	LG	LA	LI	5	10 u. 12,5	25 ... 112
N	X	X	X		X	X
L	X	X	X		X	X
Q	X	X	X		X	X
I	X	X	X		X	X
H	X		X		X	X
M	X		X		X	X
A	X	X	X			X
F	X		X		X	X
T	X	X	X	X		



Overview Profiles for Light Curtains

Cross - Section		Naturally anodized					Naturally anodized			
		N	L	Q	I		H	M		
Color	Naturally anodized									Naturally anodized
Code	N	L	Q	I	H	M	A	F	T	
Max. Length		4000 mm		6000 mm	1500 mm	900 mm	2500 mm	3000 mm	2500 mm	2500 mm
										

Bar length



$$L = \ddot{U}H + X + Y$$

(rounded up to entire 10 mm)

Dimension Y (minimum)

Typ LG and LI:

	5	10...12,5	25...28	50...56	94...112
N	-	38,5	45,0	70,0	130,0
L	-	38,5	45,0	70,0	130,0
Q	-	38,5	45,0	70,0	130,0
I	-	38,5	45,0	70,0	130,0
H	-	48,5	55,0	80,0	140,0
M	-	24,5	31,0	56,0	116,0
A	-	38,5	45,0	70,0	130,0
F	-	38,5	45,0	70,0	130,0
T	17,5	-	-	-	-

Typ LA (with integrated control unit):

	5	10...12,5	25...28	50...56	94...112
N	-	153,5	160,0	185,0	245,0
L	-	153,5	160,0	185,0	245,0
Q	-	153,5	160,0	185,0	245,0
I	-	153,5	160,0	185,0	245,0
A	-	153,5	160,0	185,0	245,0
T	67,5	-	-	-	-

With relay: additional 20 mm!

Dimension X

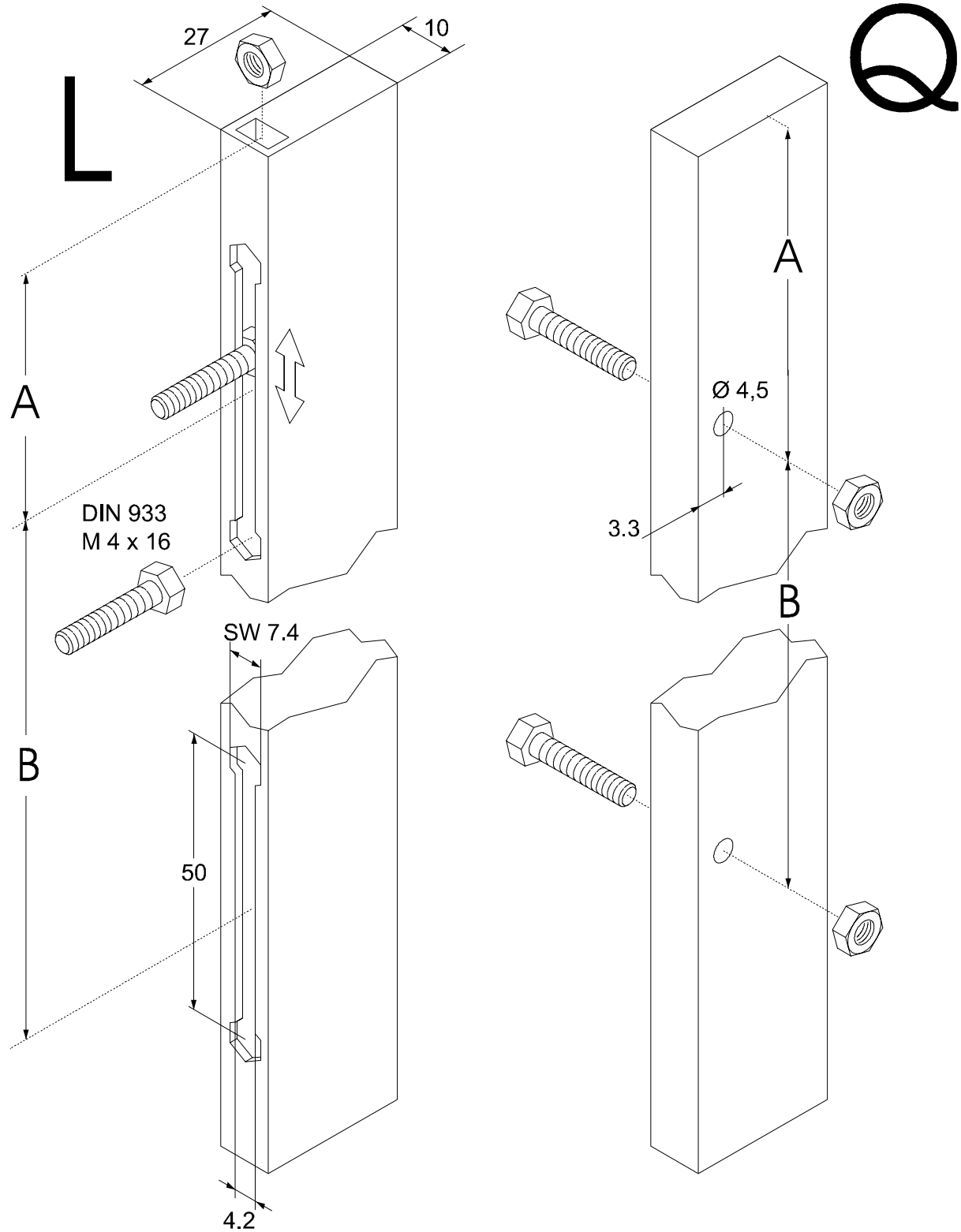
	5	10...12,5	25...112
N	-	13,5	20,0
L	-	13,5	20,0
Q	-	13,5	20,0
I	-	13,5	20,0
H	-	55,5	62,0
M	-	24,5	31,0
A	-	13,5	20,0
F	-	13,5	20,0
T	17,5	-	-

Tolerance of beam position ± 2 mm.

Dimensions are mm.

Longer bars are possible, but cause extra charge.

Mechanics N, L, Q (profile 10x27)

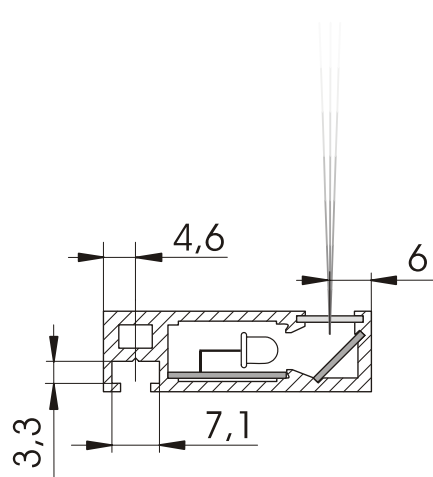
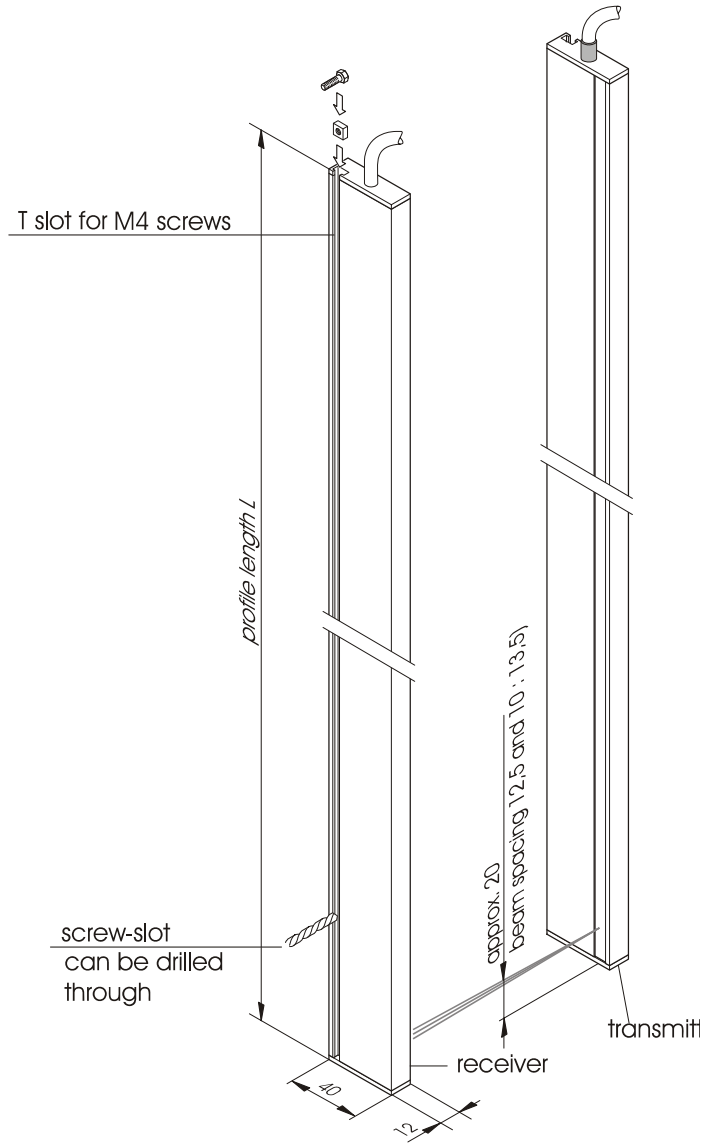
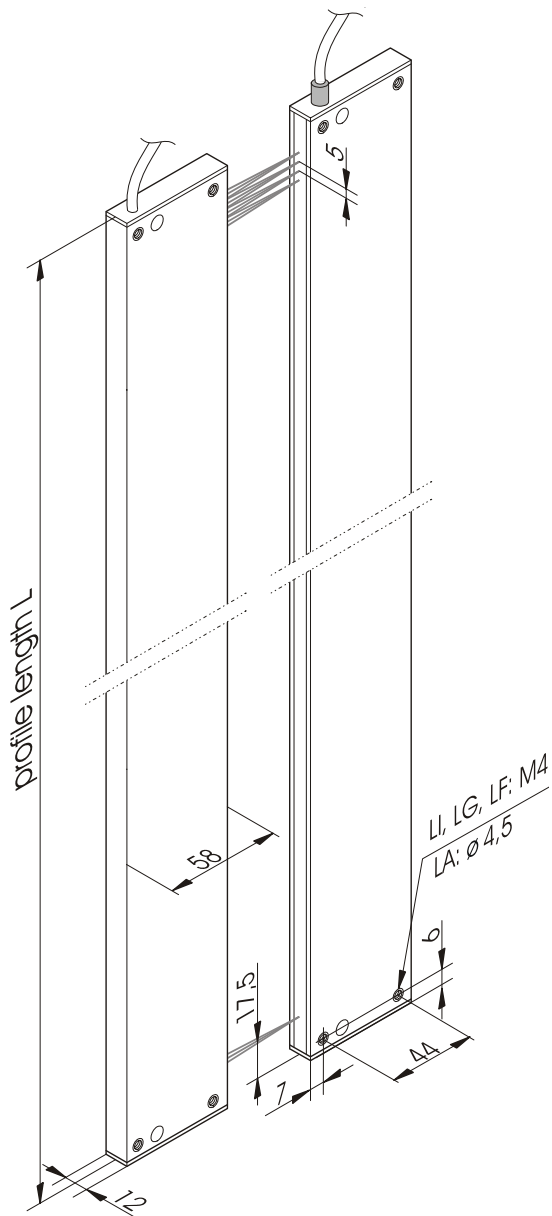


Note for type N: without machining

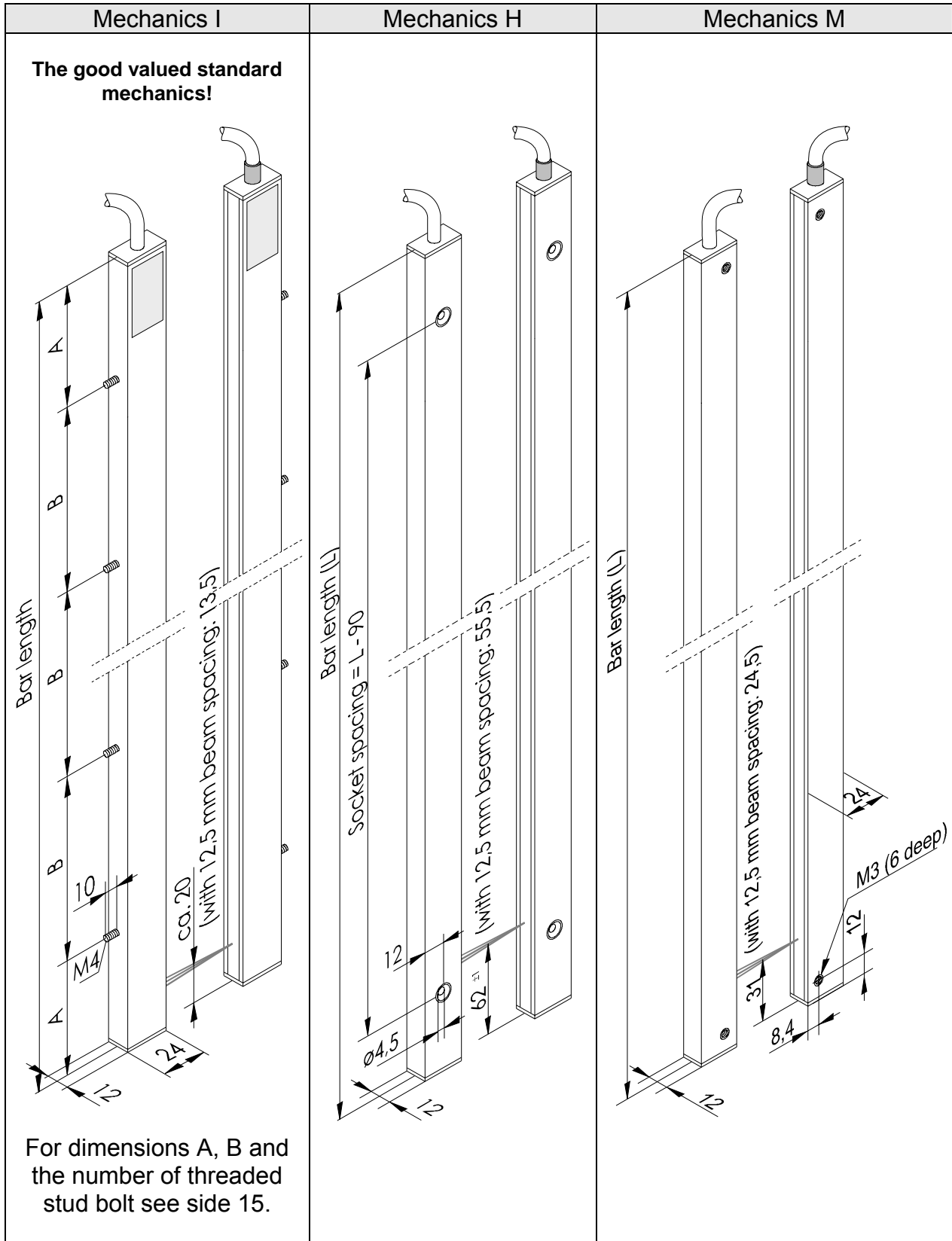
Special design with free positioning of the fastening elements is possible on request.
Dimension A and B, Number of bohr holes/slots can be seen on side 15.

Mechanics F, sidelooking

Mechanics T for 5 mm beam spacing



Mechanics I, H and M (profile 12x24)



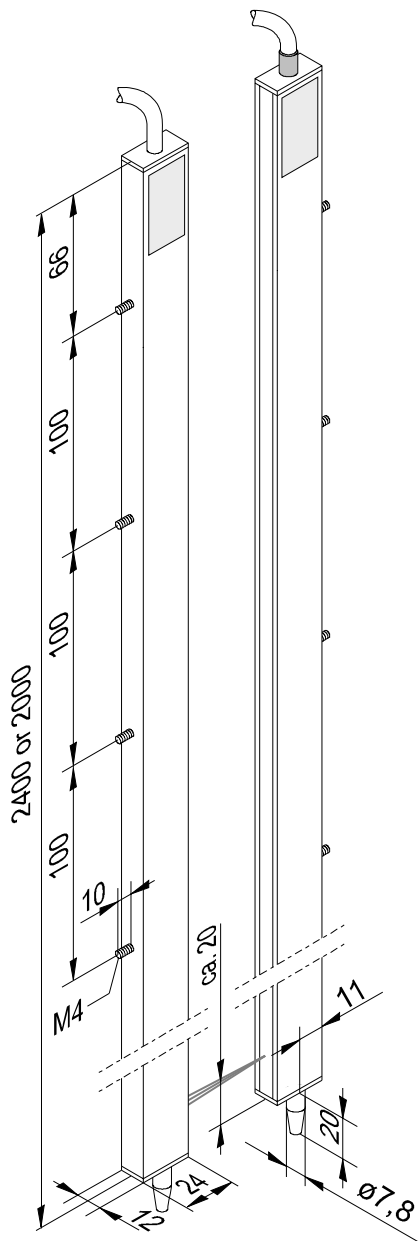
light curtain bar pairs

Mechanics “A” for elevators

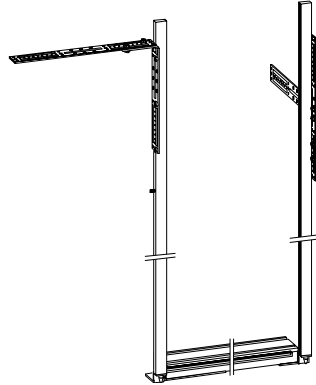
The proven fastening system at elevators: Enables a fast and easy detached mounting at the door frame or doorsill.

Features:

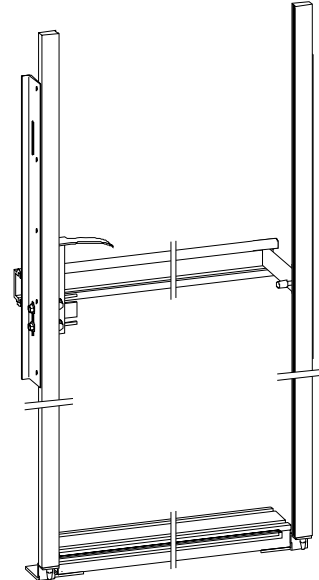
- 4xM4-threaded stud bolts at the top
- Tenon at the bottom
- Preferential length: 2000 or 2400 mm
Minimum length see page 10: $L=ÜH+X+Y$; maximum 2500 mm



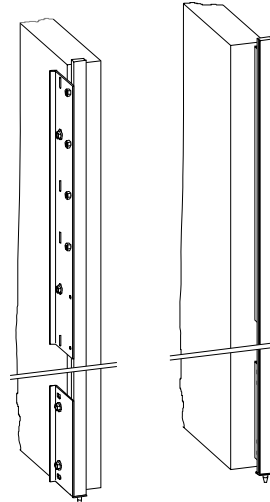
Installation kit Combi:



Installation kit Sematic



Installation kit Meiller

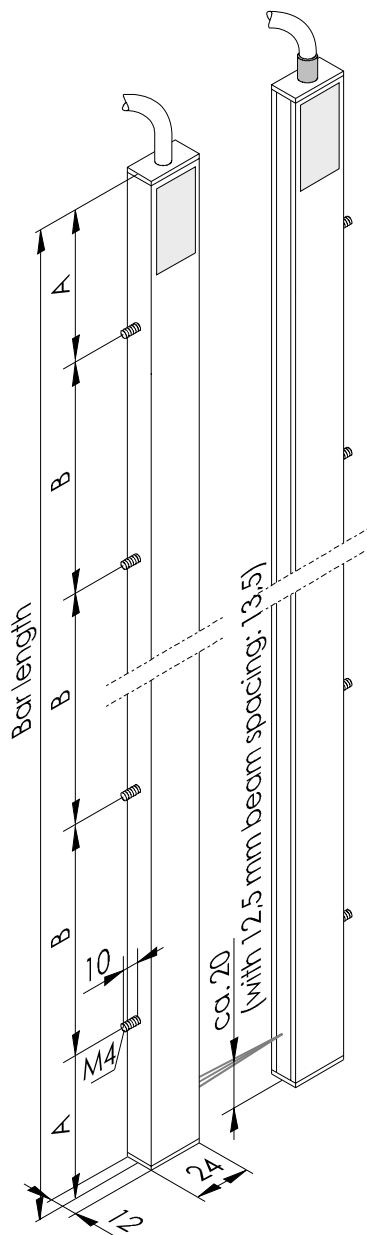


Spacing and number of fastening elements

Mechanics	fastening elements	section
I	M4x10 threaded stud bolts	12x24
L	Slot hole	10x27
Q	Cross-hole	10x27

Possible special models:

- different length of the threaded stud bolts
- different position of the fastening elements



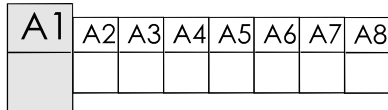
bar length (L)	spacing (B)	quantity (z)
120...140	90	2
141...250	100	2
260...350	200	2
360...500	300	2
510...620	400	2
630...660	500	2
670...750	600	2
760...890	700	2
900...950	800	2
960...1100	400	3
1110...1250	500	3
1260...1450	600	3
1460...1550	400	4
1560...1850	500	4
1860...2060	600	4
2070...2350	500	5
2360...2450	520	5
2460...2750	600	5
2760...2890	500	6
2900...2950	520	6
2960...3140	700	5
3150...3350	600	6
3360...3560	800	5
3570...3860	700	6
3870...4030	520	8
4040...4300	900	5
4300...4570	700	7
4580...4850	500	10
4860...5130	800	7
5140...5250	700	8
5260...5450	520	11
5460...5650	600	10
5660...5850	800	8

formula of dimension "A":

$$A=0,5x(L-Bx(z-1))$$

Options

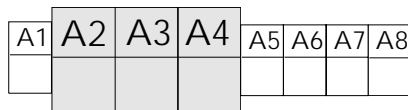
Bar colour



A 1	description
0	standard (natural anodised; mechanics F: blank)
N	natural anodised
B	blank
S	black anodised
R	powder coating in RAL colours
...	additional colours on request

Cable length

... in "dm" example:

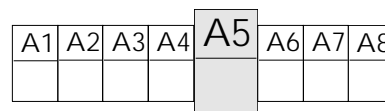


A 2,3,4	description
000	standard (4 m)
005	0,5 m
100	10 m
150	15 m

Note:

- For longer cable use preferably transmitter side
- Maximum-length: 20 m with LVM
25 m with LVX, LVE
30 m for LA
- Tolerance for connector cables: $\pm 1\%$, minimum ± 1 cm
- Please contact our technical support if you want to:
 - Make changes at the connector cable (e.g. lengthening; use different connectors).
 - Use two Light curtain bar pairs on one control unit with more than 4 m connector cable each bar pair.

Cable outlet



A 5	0	H	F
description	standard, front side	"backward"	"side looking"
draft			

Range

The range of our light curtain bars essentially depends on our control units. Please take notice of the corresponding specification.

The „relative switching threshold“ relates to the standard light curtain bars ex construction date March 2001.

Range/Mechanics

mechanics	relative range
F	70%
T	80%
others	100%

Options for transmitter bars

A1	A2	A3	A4	A5	A6	A7	A8

A 6	relative range	example range for LVX*
1	25 %	> 60 mm
8	40 %	> 100 mm
7	53 %	> 180 mm
0	100 %	250 to 6000 mm
6	114 %	< 7000 mm
3	124 %	< 7500 mm
5	130 %	< 8000 mm
4	137 %	< 8300 mm
9	156 %	< 9300 mm
2	on request (special-LED)	

*Values are measured extrema, the limits have to be tested in the application. Preferential types are bold. LA/LC and relative range >100%: Intensive tests are necessary. Please contact our technical support.

Options for receiver bars

A1	A2	A3	A4	A5	A6	A7	A8

A 6	receiver cable
N	single shielded
0	double shielded ¹

Options for display bars

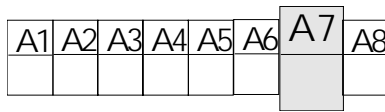
A1	A2	A3	A4	A5	A6	A7	A8

A 6	description
0	red LED
G	green LED

¹ standard type for LI ex October 2006, all other ex April 2007.

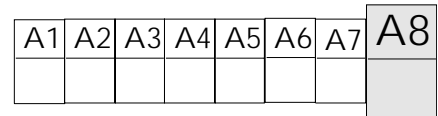
light curtain bar pairs



Front cover



A 7	description
0	standard: PVC, red transparent
S	PMMA, black
G	Glass plate
W	PMMA, white diffuse
F	PVC, red transparent with peelable protection foil

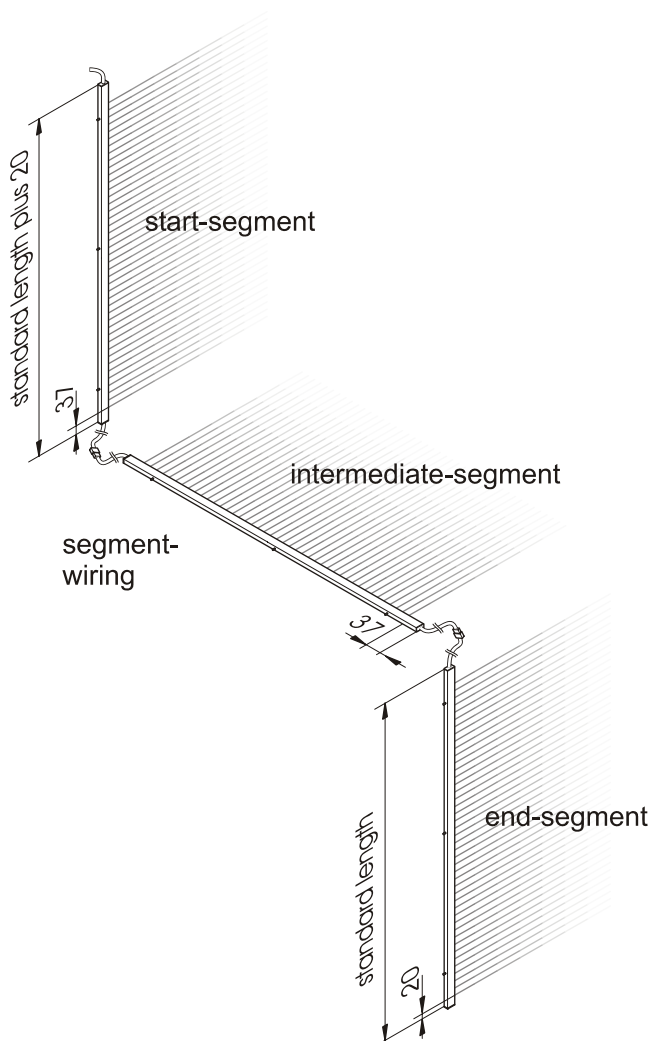
Cable type



A 8	bar type			description
	LA	LI	LG	
0	X	X	X	standard, according to light curtain type. (see "Bar variations")
H	X	X	X	non-halogen; cable casing PUR; Schleppflex; cable diameter 6,0 ±0,3 mm
C	X	X	-	M12 connector with 0,75 m connector cable. 
A	X	-	-	with Combi-Con connector.
W	X	-	-	with Wago connector.
D	X	-	-	with diode connector
M	X	-	-	M8 connector (4-pole at transmitter and receiver bar) 
B	-	X	-	preassembled M12 fitting and CombiCon, e.g. for control unit type LVB

For detailed specification please contact our technical support!

Segmentation



Note:

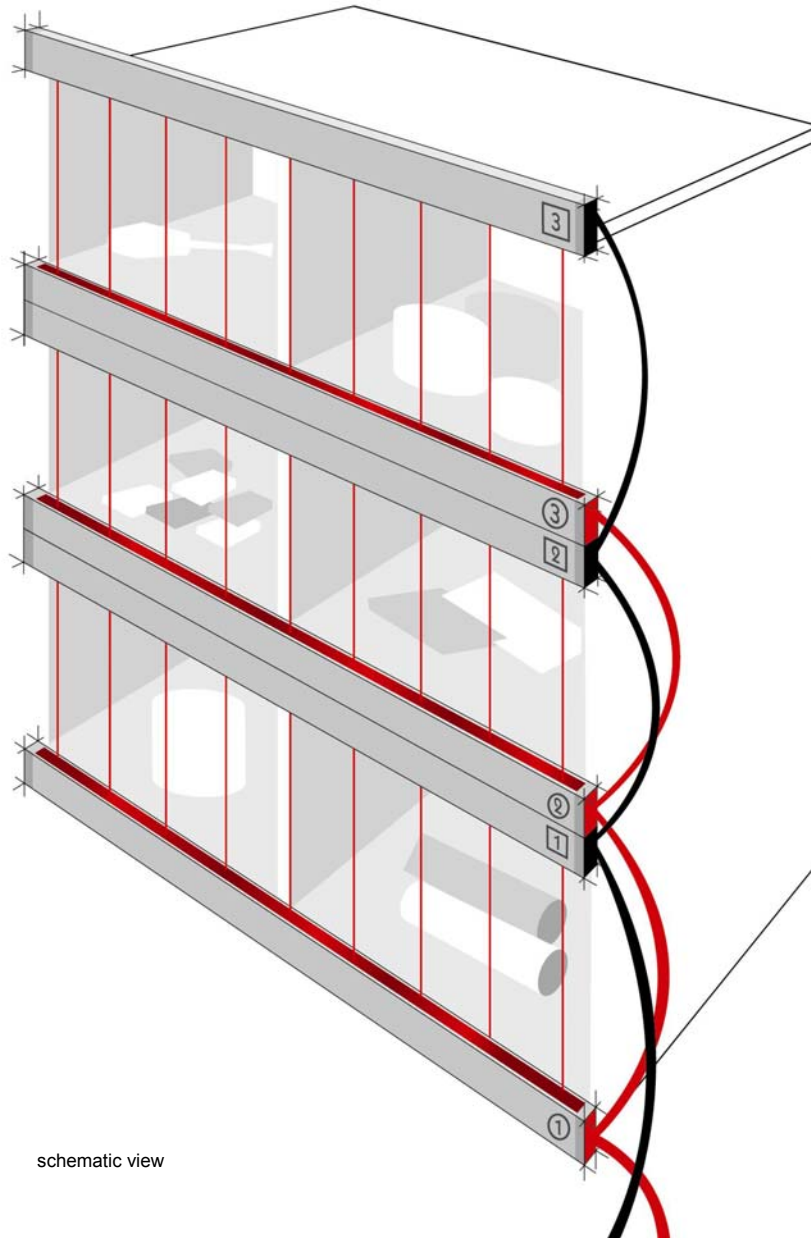
- The overall wire length (length of all segment cable plus length of the wiring cable) is limited to 10 m.
- The ranges within a segmented light curtain are allowed to differ up to 1.4. At greater variety the relative range has to be adjusted (see AL 17).
- For start- and intermediate segment use preferential types only!
- The pluggable bar segments are connected with M12 circular connectors on the segment wiring.
- Wire length between two segments is limited to max. 1 m.
- Only use transmitter or receiver bars in a segment row. Mixing up could damage the electronics!

Take notice of the red marking on the transmitter segment bars!

light curtain bar pairs

Parallel arrangement

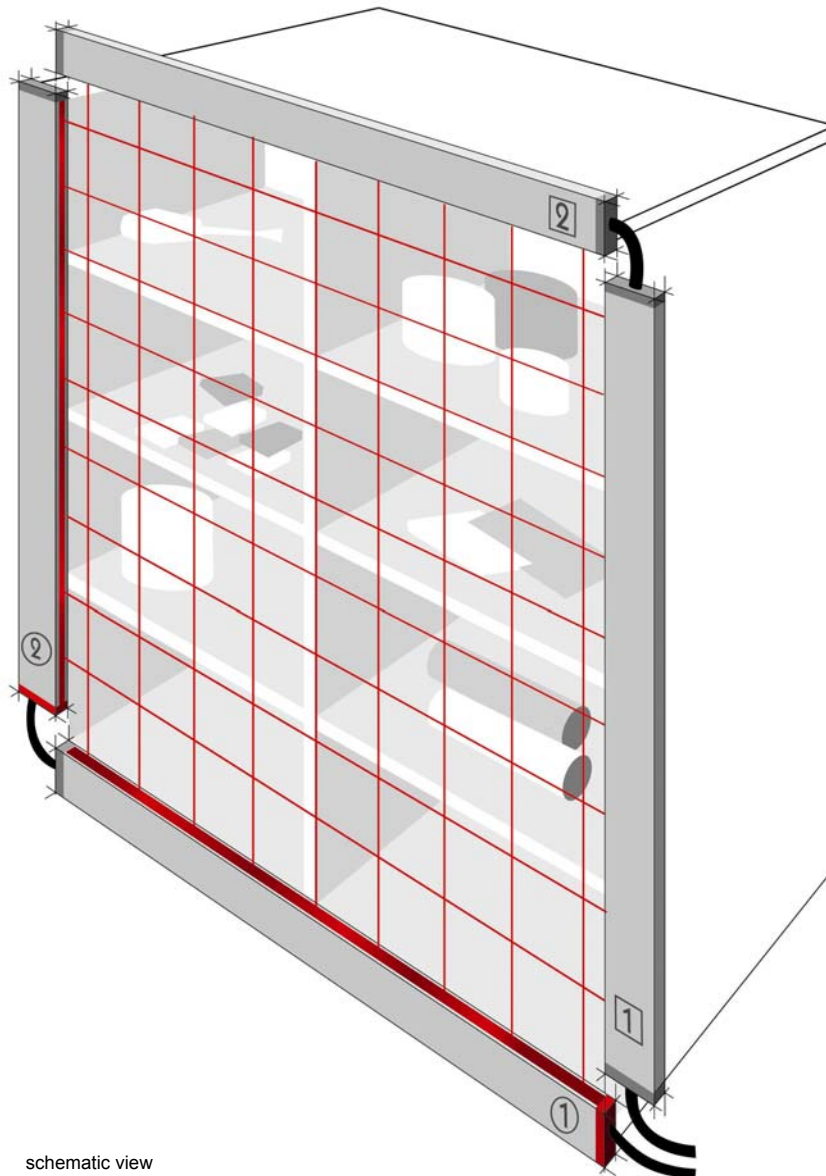
For monitoring a removal, e.g. from a rack, the following arrangement arises. For signalling the right removing area, up to 6 display bars can be implemented.



- Used Transmitter: 2 Segment -ZBxxx
 1 Segment -LIxxx
- Used Receiver: 2 Segment -ZBxxx
 1 Segment -LIxxx
- xxx: length of the segment wiring in cm.
- Used control unit: LVE, LVX

Frame arrangement

Often used for measuring object dimensions, but also used for access monitoring at racks, which don't allow a parallel arrangement.



schematic view

Used Transmitter

1 Segment -ZSxxx

1 Segment -Llxxx

Used Receiver:

1 Segment -DSxxx

1 Segment -RRxxx

xxx: length of the segment wiring in cm.

Used control unit:

LVE, LVX

light curtain bar pairs

Options for start and further segments

beam sequence	Standard	inverted
	beam 1	
	beam 2	
	beam 3	
	beam 4	beam 4
		beam 3
		beam 2
		beam 1

Options and additional length of the bars

option	cable exit	inversion	X-value ¹	Y-value
ZSxxx		-	x+20	y
YSxxx		X	y	x+20
ZBxxx		-	x	y
YBxxx		X	y	x+20
Only for end segment				
Llxxx		-	x	y
Klxxx		X	y	x+20

xxx: length of the segment wiring in cm. Maximum 1m permitted.

Interchanged segment sequence

The beam counting starts with the second segment.

beam sequence	segment 1	segment 2	segment 1	segment 2
	standard	standard	standard	inverted
	DS	RR	DS	QR
	beam 9	beam 1	beam 9	8
	10	2	10	
	11	3	11	
	.	.		
	.	.		3
	.	.		2
		8		beam 1

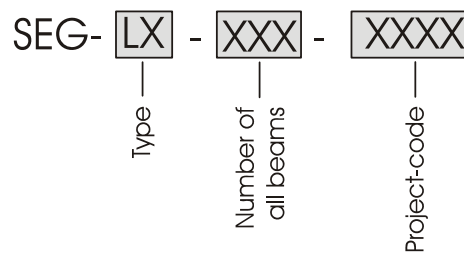
¹ see draft on page AL 11

Options and additional length of the bars

option	cable exit	inversion	X-value ¹	Y-value
DSxxx		-	x+20	y
CSxxx		x	y	x+20
DBxxx		-	x	y
CBxxx		x	y	x+20
Only for end segment (with interchanged segment sequence)				
RRxxx		-	x	y
QRxxx		x	y	x+20

xxx: length of the segment wiring in cm. Maximum 1m permitted.

Type designation of the segment string



The project code stands for this table:

Description	Note
Wiring cable length (standard 4 m)	
Start segment	
No. of beams	
Modul configuration / beam spacings	
Profile lengths	
Mechanics	
Segment cabel length (standard 0,5 m), not pluggable!	Max. 1m permitted
Interim segment	
No. of beams	
Modul configuration / beam spacings	
Profile lengths	
Mechanics	
Segment cabel length (standard 0,5 m), not pluggable!	Max. 1m permitted
End segment	
No. of beams	
Modul configuration / beam spacings	
Profile lengths	
Mechanics	

¹ see draft on page AL11

light curtain bar pairs

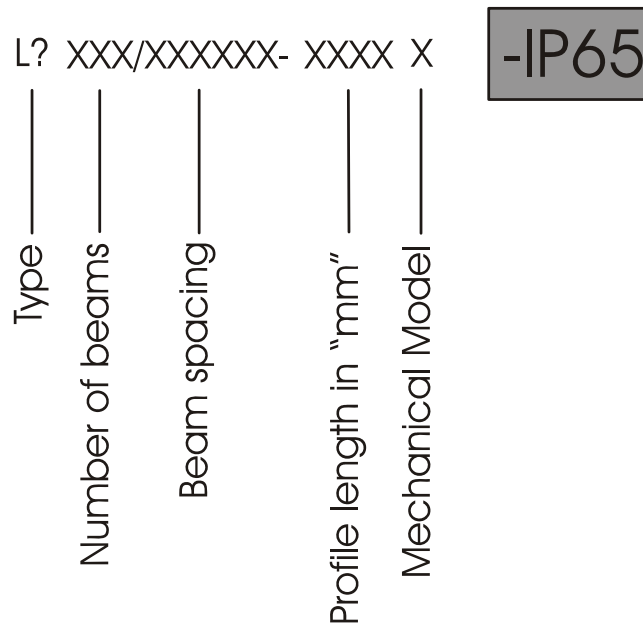
Protection class

Important notes:

- Protection class is specified for duly usage only.
- Pay attention to the Informations „Mounting Instructions for Light Curtain Bar Pairs“ and „Starting up control unit...“.
- Protection class can be affected by changes to the devices (e.g. removing labels, loosen a screw, trimming a stud bolt, drill through the housing). Due to keep warranty do not make any changes to the devices.

Optional:

Type	Note
-IP65	Protection class IP65 for bar pairs type LI Please note: For bar pairs type LG the connectors only have protection class IP20!
-IP65-ST	Only for bar pairs type LG with connectors for control units with option "-IP65".



Compendium/ Technical data Light curtain bar pairs

Detail	Description								
Mechanics	N	L	Q	I	H	M	A	F	T
Material	Aluminium, front-cover plastic red transparent								
Cross-section	10x27		12x24			40x12		12x58	
Color	natural anodised		natural anodised			blank		natural anodised	
Type of bar	LA, LG, LI		LA, LG, LI			LG, LI		LG, LI	
Max. profile lengths	4000		6000	1500	900	2000 2400	3000	2500	
Protection class of the bar pairs according DIN 40050	IP54		IP 54	IP20	IP20	IP 54	IP 54	IP 54	
Humidity	Up to 90 % relatively, non-condensing								
Temperature	-20°C... +40°C								
Illuminant	Infrared, app. 800 ...1000 nm Other wavelengths by request								
Allowed angular deviation	+/- 10° (between transmitter and receiver bar)								
Ambient light immunity	high ambient light immunity, avoid direct sunlight (DC light) towards the receiver bar								
Wiring cable	Fix mounted wiring cable, length 4 m (± 1%); PVC; for rigid mounting; q.v. chapter "Options"								
Interference resistance	Take notice of the technical information of the control unit								

Accessory / Adapter plugs

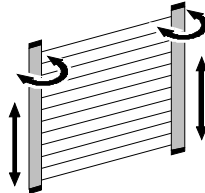
Type	Description
LILVM	Allow the connection of bars type LI to control unit LVM. Protection class IP00
LGSCAN	Allow the connection of bars type LG to control unit SCAN or LVX/LVE. Protection class IP00
M12LVX	Connector cable (set) with M12 connectors. For connecting a transmitter or receiver bar with option M12 to the control unit LVX or LVE.
FP-30-00012	Mounting kit for „isolated mounting“ of mechanics T
FP-30-00013	Mounting kit for „isolated mounting“ of mechanics I

Details for initial operation and service

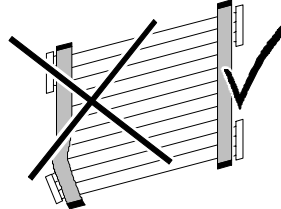
- Do the initial operation professionally and in accordance to our mounting instructions for light curtain bar pairs, the technical documentations and the relevant regulations.
Pay attention to an EMC-compatible handling of the shielded connector cable of our bar pair type LI and LG.

- The control unit must be off-circuit when connecting or disconnecting the bars!

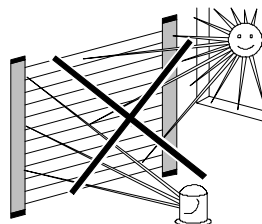
- It is generally not necessary to align the bars exactly. It should nevertheless be possible to adjust the bars in specific cases. The bars may also need to be moveable longitudinally.



- The monitored area between the transmitter and receiver bars must be clear of obstructions so that the bars can “see” each other.
- Assemble with the power supply disconnected. Do not expose the bars to stress.

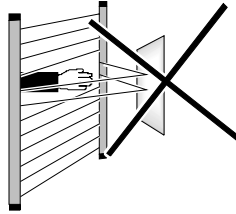


- Avoid ground loops: Bar pairs must have the same earth potential.
- Avoid the effects of external light sources (e.g., from flashlights or sunlight) on the receiver bar.

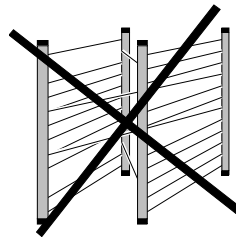


- Condensation, fog or smoke can impair the functioning of a light curtain.
- The front panel must not be scratched. It must be kept free of obstacles and it must be kept clean (do not use any cleaning agents containing solvents).

- Danger from reflective surfaces: Reflective surfaces in the area around the light curtain must be avoided. Otherwise obstructions will not be detected. Optical sensors can affect each other even by reflexions. This could affect the functionality of the devices.



- Avoid optical sensors from mutually affecting each other (e.g., other light curtains, light barriers).



- Use a test pin to check that the light curtain is working in the entire monitoring area.
- Connections must be done EMC-compatible.
Note: unshielded cable wires have to be shorter than 2 cm.
- Warranty and guarantee claims expire after any changes were made to the light curtains connector cable or the connectors itself!
- A potential differenz of 60V between the light curtain housing and the supply voltage may not be exceeded.
- Do not use any high-pressure cleaner or steam blaster on our devices.
- Attention for horizontal mounted bars:
Fluid on the front foil is able to interrupt the beams and after a long residence time it can enter the bar! There is no warranty to the protection class in this position!
Increased risk of contamination!



Important note:

The light curtains are not certified safety light curtains according EN 61496. They're no safty light curtain in terms of the EG-89/392/EWG including 93/44/EMW, appendix 4. Therefore, they must not be used so as not to endanger individuals.