



**Model Number**

**AL2016-P-1650/49/76a**

Elevator light grid  
with 5 m fixed cable

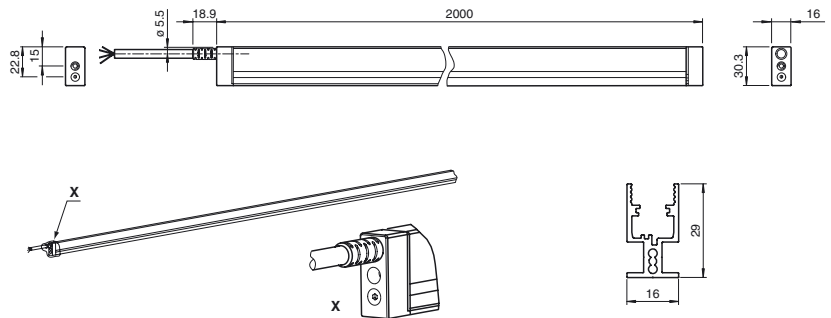
**Features**

- Long range light grid for detecting people and objects
- Thru-beam light grid with integrated controller
- Automatic beam crossing and beam suppression
- 7-segment display for status and service functions
- Mirroring proof
- Version with 16 mm wide profile
- Version with 20 mm beam spacing

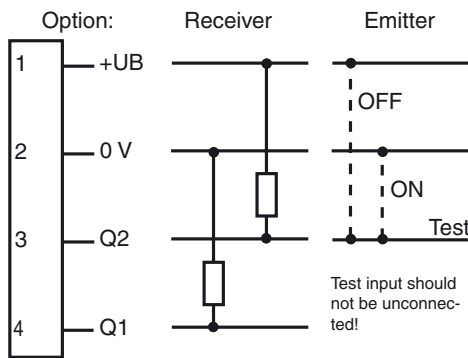
**Product information**

In a profile of only 12 mm or 16 mm, the AL20/AL40 light grids offer safety and convenience for elevator doors. Customized beam spacing, asymmetrical beam paths and automatic resolution adjustment ensure that even small objects are reliably detected. All functional units are directly integrated into the light grids. The special features include a 7-segment LED display activated by a magnet, which greatly facilitates installation and service work.

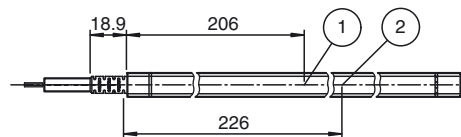
**Dimensions**



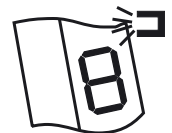
**Electrical connection**



**Indicators/operating means**



1	Reed relay/magnetic contact
2	7-segment display



The 7-segment LED display is activated for 15 min. with the magnet. The switching mode is also selected with the magnet. The LED indicates various states and codes.

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## Technical data

### General specifications

Effective detection range	0 ... 4000 mm
Threshold detection range	5600 mm
Light source	IREL
Light type	940 nm infrared
Field height	1605 mm
Chipping	automatically 3X/5X (depending on distance between transmitter/receiver)
Tuning-out of beam	Defective beams are faded out after 60 s. Deactivation of the light grid upon failure of 2 adjacent beams or more than 50 % of all beams
Beam spacing	lower range: 40 mm upper range: 88 mm
Number of beams	20 ... 94 (dynamic)
Angle of divergence	Emitter: > 20 ° , Receiver: > 10 °
Ambient light limit	16000 Lux
Accessories provided	Magnet

### Indicators/operating means

Function display	7-segment display in receiver display function can be activated: switching status, self test and alignment aid
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### Electrical specifications

Operating voltage	$U_B$	12 ... 30 V DC
Ripple		10 %
No-load supply current	$I_0$	< 150 mA

### Output

Switching type	light/dark on selectable programmable	
Signal output	1 PNP and 1 NPN, short-circuit protected	
Switching voltage	max. 30 V DC	
Switching current	200 mA	
Switching frequency	$f$	> 1 Hz
Response time		< 220 ms

### Ambient conditions

Ambient temperature	-10 ... 60 °C (14 ... 140 °F)
Storage temperature	-20 ... 75 °C (-4 ... 167 °F)

### Mechanical specifications

Protection degree	IP65
Connection	5 m fixed cable (appropriate for conveyor chains, according to UL E140404, 600 V rated insulation voltage, 90° C)
Material	
Housing	aluminum
Optical face	plastic
Mass	2000 g (device)

### Approvals and certificates

CE conformity	yes
CCC approval	Products with a maximum operating voltage of ≤36 V do not bear a CCC marking because they do not require approval.

## Functional principle

The AL20 series operates with 20 infrared light beams and the AL40 with 40 infrared light beams. With range of up to four meters, it is possible to achieve protection fields up to 1650 mm high, beginning from a height of 20 mm above ground level. The smaller beam gaps and asymmetrical beam paths near the ground ensure that even small objects, such as the tips of shoes, are securely detected.

The device consists of an emitter and receiver unit. The evaluation electronics and power supply are integrated into the devices. No additional external components are required for operation.

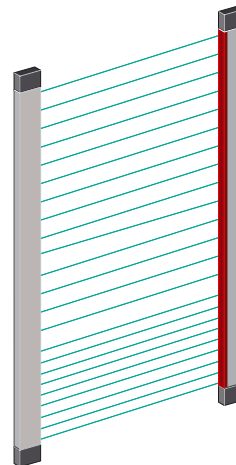
An automatic changeover from 5-way crossover to standard operating mode is integrated as a standard feature. In the event of a distance of more than 0.7 m between the emitter and receiver, the light grid selects the "1-to-5 crossover" operating mode. Every receiver evaluates the beams of 5 emitters in this mode. The 5-way crossover increases the resolution to 194 beams for the AL40 and to 94 beams for the AL20. The result is a dense and high-quality beam network, almost like a curtain.

The elevator light grid has a beam suppression system. If the lens becomes dusty or dirty, "defective" beams are automatically suppressed after 1 minute. The light grid as a whole is only deactivated if 2 adjacent beams or more than half of all the beams fail.

## Typical applications

- Secure and complete monitoring of elevator doors
- Monitoring of access systems and entrances

## Detection area



## Accessories

### OMH-PLV-PLP

Mounting bracket for light grids, for rear or side wall installation

### Deckel-Zapfen

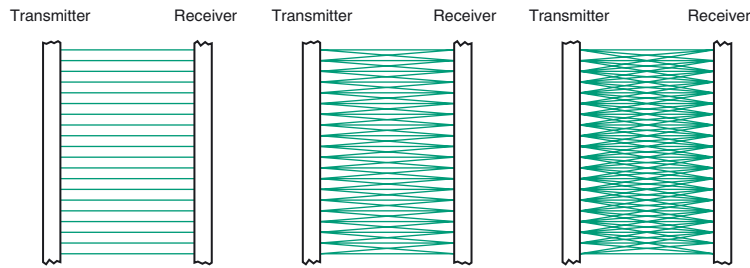
Mounting pivot for light grid AL20/AL40

### PS1/31

Power supply/Power supply module

Other suitable accessories can be found at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)

Both static and mobile operation are supported. Accordingly, the emitter and the receiver can be mounted on the stationary side walls, or one of the two components can be integrated directly into the movable door panel.



<b>Crossover</b>	1 (standard)	3-way (1-to-3)	5-way (1-to-5)
<b>Distance between transmitter and receiver</b>	< 700 mm	700 - 900 mm	> 1000 mm
<b>Max. number of beams</b>	20 (AL20) 40 (AL40)	58 (AL20) 118 (AL40)	94 (AL20) 194 (AL40)

**For setting**

**Programming light switching (L), dark switching (d)**

Light switching means that the outputs are active if no light beams are interrupted. With dark switching, the outputs are active in the case of an object being detected. This function can be affected with the Reed relay.

- The magnet must be held against the Reed contact for longer than 5 seconds.
- The LED display comes on and switches back and forth between the two switching types (L) and (d) once every 5 seconds.
- When the desired switching type is displayed, remove the magnet. The last switching type to be display will now be permanently stored and will still be displayed for about 1 to 2 seconds.
- After this procedure, the display goes off again.



display „L“



display „d“

**Self test**

The light grid attempts to detect defective beams (caused by tampering, dirt and dust) and to remove them from the evaluation. A self test is thus useful to verify how many beams are being used for evaluation.

- The magnet is held briefly (about 1 to 2 seconds) against the Reed contact. Now the light grid is in self test mode.
- First, the switching type (L, d) that is set is displayed for 2 seconds.
- In the next step, the crossed out beams used for the evaluation are displayed with "b" and 3 numbers in ascending order. 194 valid beams would appear as "b 1 9 4". A maximum\_ of 194 beams are evaluated for the 40-channel light grid; for a 20-channel light grid, the maximum number of beams is 94.
- After that, the functioning receivers (r) are also displayed with three-digit numbers. 40 functioning receivers are displayed with the sequence "r 0 4 0".
- In the next step, the functioning transmitters (t) are displayed. The sequence "t 0 4 0" indicates that all transmitters are functioning properly for a 40-channel light grid.
- The self test is automatically followed by the sensor adjustment aid and the detection display. This function is described in the next step.



display „b“



display „t“

Display of the numbers to be shown:



display „0“



display „1“



display „2“



display „3“



display „4“



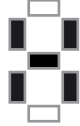
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display „5“    display „6“    display „7“    display „8“    display „9“

**Detection display**

The detection display is a function that follows automatically after the self test. This display remains active for about 10 minutes. This should be ample time to perform the adjustment and a function test. After this time, the display goes off. The self test mode can be used to reach a new display as often as is desired. The display is not visible in normal mode. This ensures that the installed light grid is as unintrusive as possible in normal operating mode. In our experience this approach reduces damage and attempts to tamper with the system. The meaning of all 7 LED's during this operating mode will now be described.

- If only one LED is lit, it would be difficult for the user to recognize what position was indicated within the 7-segment display without special measures. For this reason, two standing LED's remain permanently lit, one on the right and one on the left, to make it easy for users to orient themselves.
- The middle LED is the detection display. If this LED is lit, an object is detected, i.e. one or more light beams are interrupted. For technical reasons related to programming, a beam interruption is not displayed at the real speed.

**Premature switching off of the LED display**

Normally it does not cause any disturbance for the LED display to remain lit for 10 minutes after it has been activated. The LED display can be turned off immediately by interrupting the top light beam (AL20) or the second beam (AL40) for about 2 seconds. If the display goes off in the middle of the test, the beam described above has been interrupted for too long. The top light beam is at a distance of 37 cm from the upper end of the receiver (on the cable side).

**RESET function**

The light grid also contains various pieces of information when the power supply is interrupted. The RESET function gives the user the possibility of resetting all internal permanent memory units to the state they were in when the equipment left the factory. This state is dark switching. You can trigger a RESET by holding the magnet against the Reed contact for longer than 40 seconds.

**Test input**

You can turn off the light beams that are used for detection by applying a positive voltage within the range of +5V to UB+ to the test input, i.e. the outputs of the light grid will react as they do when an object is detected.



To reliably prevent interference (EMC, couplings), the test input should never remain unconnected to the circuit! If the test input is not required, it should be connected with UB-.