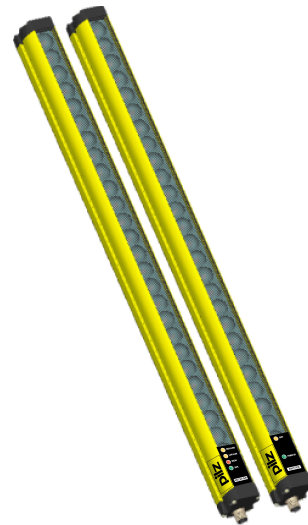




## **PSEN op2H**

**Safety light curtains with infrared beams**



**OPERATING MANUAL**

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**826002342 rev.B**

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## 1. GENERAL INFORMATION

### 1.1. General description of the safety devices

Safety light curtains from the PSEN op2H series are optoelectronic safety devices. They secure work areas in which operating personnel can come into contact with moving parts of machinery, robots and automated systems in general, which present a risk of physical injury. Safety light curtains in the PSEN op2H series are designed as safe Type 2 systems for accident prevention in accordance with applicable international standards, in particular:

- |                            |  |
|----------------------------|--|
| <b>EN 61496-1</b> : 1997   | Safety of machinery: Electrosensitive protective equipment. Part 1: General requirements and tests.  |
| <b>prEN 61496-2</b> : 1997 | Safety of machinery - Electrosensitive protective equipment. Part 2: Particular requirements for equipment using active optoelectronic protective devices. |

The device, which consists of a transmitter and a receiver housed in robust aluminium profiles, secures the protected area by generating an infrared protected field, defined by the height and width of that protected field.

Both the control and evaluation logic are located inside the two units; the electrical connection is made via M12 connectors, which are positioned underneath the profiles. The transmitter and receiver are synchronised optically, the two units do not have to be connected directly to each other.

The infrared beams are controlled and monitored via a microprocessor, which provides the user with information about the operating status of the light curtain via LED indicators (see Ch. 7, "Diagnostic functions").

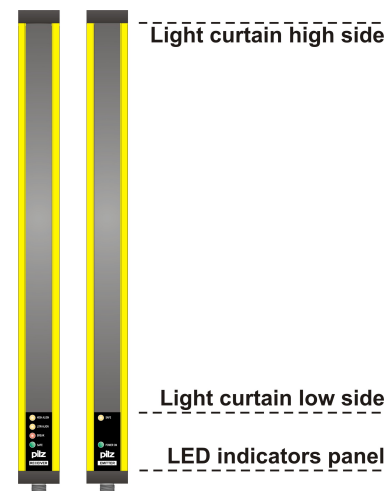


Fig. 1

Two yellow LEDs simplify the alignment of the two units during installation (see Ch. 5 “Alignment”).

As soon as an object, a limb or the operator’s body interrupts the beams sent by the transmitter, the signals at both outputs (OSSD) immediately switch from High to Low and the machine connected to the corresponding OSSDs is stopped.

***NB:*** *This manual uses the following abbreviations as defined in the applicable standards:*

<b><i>AOPD</i></b>	<b><i>Active optoelectronic protective device</i></b>
<b><i>ESPE</i></b>	<b><i>Electrosensitive protective equipment</i></b>
<b><i>MPCE</i></b>	<b><i>Machine primary control element</i></b>
<b><i>OSSD</i></b>	<b><i>Output signal switching device (switching output)</i></b>
<b><i>TX</i></b>	<b><i>Transmitting device</i></b>
<b><i>RX</i></b>	<b><i>Receiver</i></b>

Some sections or paragraphs in this manual contain information of particular importance to those using or setting up the device.

These sections are highlighted using the following symbols:



Detailed notes and descriptions of specific features on the PSEN op2H safety devices, designed to explain their operation more clearly.

Specific installation guidelines.



This warning must be heeded! It warns of a hazardous situation that could lead to serious injury and death and indicates preventive measures that can be taken.

This manual contains all the information required for the selection and operation of the PSEN op2H safety devices.

Specialised knowledge of safety issues is required to integrate a safety light curtain correctly on power-driven machinery.

As this manual is unable to provide such information in full, please contact the technical service department at PILZ for any information about the operation of the PSEN op2H safety light curtains and the safety regulations relating to correct installation (see Ch. 8 “Regular checks and maintenance”).

1.2. How to select a safety device

Three characteristic features should be taken into account when selecting a safety light curtain:

- **Resolution**, depending on the part of the body requiring protection. Safety light curtains in the PSEN op2H series have a resolution of 30mm, which is suitable for hand protection.

R = 30mm      Hand protection



The resolution (R) of a device is understood to be the minimum size an opaque object must be in order to obscure at least one of the beams that form the sensing area.

As shown in Fig. 2, the resolution depends exclusively on the geometrical properties of the lenses, the diameter and the centre distance; it is independent of the ambient and operating conditions of the light curtain.

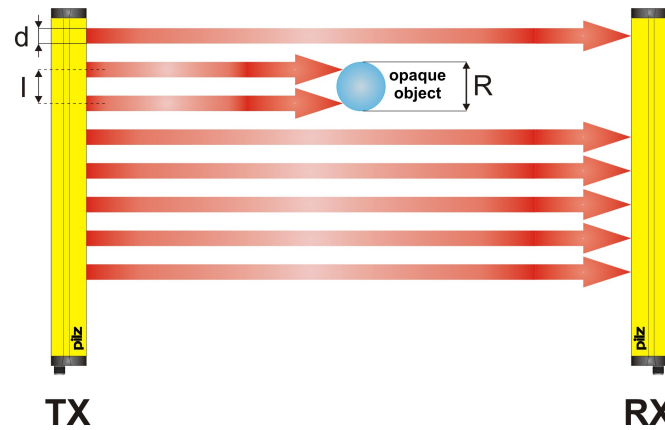


Fig. 2

The resolution can be calculated using the following formula:

$$R = l + d$$

- **Height of the protected area**

Here it is important to distinguish between the “Height of the sensing area” and the “Height of the protected area” (Fig. 3).

- The height of the sensing area is the distance between the upper limit of the first lens and the lower limit of the last lens.
- The height of the protected area is the effective protected area, in which an opaque object whose size is greater than or equal to the resolution of the light curtain will safely obscure the beam.

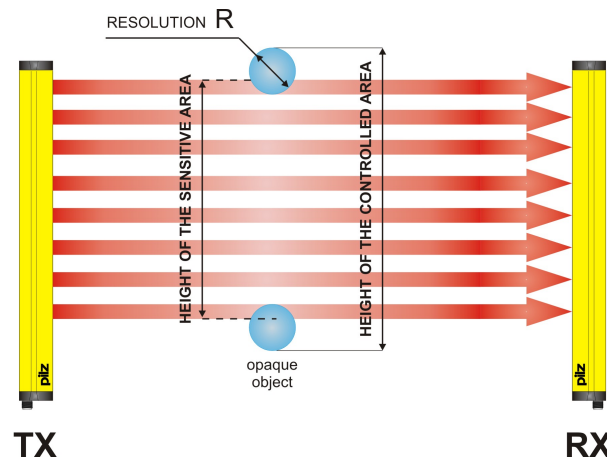


Fig. 3

- **Safety distance**


Great care must be taken when calculating the distance at which the safety device should be positioned in relation to the hazardous machinery. (Please see Ch. 2, “*Installation*”, for details of how to calculate the safety distance.)

### 1.3. Typical application areas

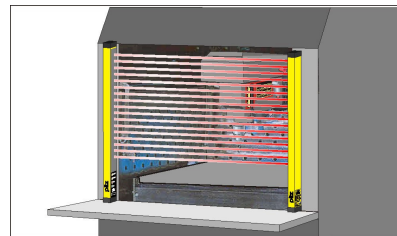
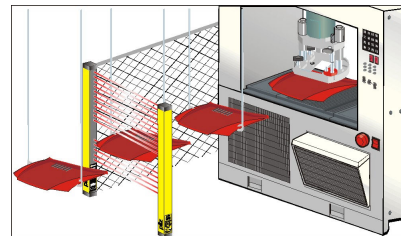
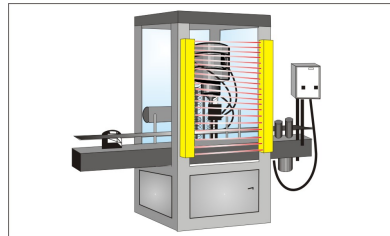
Safety light curtains from the PSEN op2H series can be used in all areas of automation where it is necessary to control and guard access to danger zones.

In particular they are used to stop the hazardous movement of mechanical parts on:

- Automatic machinery
- Packaging, handling and storage machinery
- Textile processing, woodworking and ceramic processing machinery
- Automatic or semi-automatic assembly lines
- Automated high-bay racking

 With food industry applications, please contact customer services at PILZ to check whether the light curtain's housing material can withstand the chemical substances that may be used in the production process.

The following illustrations provide an overview of some of the main application areas:



#### 1.4. Safety information



For the proper, safe use of the safety devices in the PSEN op2H series, the following guidelines must be followed:

- It must be possible to control the machine stop electrically.
- The control system must be able to stop the hazardous machine movement immediately at any stage of the operating cycle.
- The light curtain and its respective electrical connections must be installed by qualified personnel, in line with the guidelines stated in the relevant chapters (see *Ch. 2, 3, 4, 5, 6*).
- The light curtain must be positioned in such a way that the danger zone cannot be accessed without interrupting the beams (see *Ch. 2 "Installation"*).
- Personnel working in the danger zone must be appropriately trained with regard to the operation of the safety light curtain.
- The TEST button must be positioned outside the danger zone in such a way that operating personnel have a complete view of the danger zone during all test operations.

## 2 INSTALLATION

### 2.1. Precautionary measures when selecting and installing the device



- Make sure that the category guaranteed by the safety device from the PSEN op2H series (Type 2) matches the risk assessment for the machinery that is to be monitored, as defined in the standard EN 954-1.
- The outputs (OSSD) on the ESPE must be used as machine stop devices and not as command devices (the machine must have its own START command).
- The dimensions of the smallest object to be detected must not be less than the resolution level of the device.
- The environment in which the ESPE is installed must comply with the technical details stated for the PSEN op2H light curtain series in Ch. 9.
- Avoid installing the device, particularly the receiver, close to intense and/or flashing light sources.
- Avoid strong electromagnetic interference as this can adversely affect the proper operation of the device.
- Smoke, mist or dust within the operating environment can reduce the range of the safety device by up to 50%.
- Sudden temperature fluctuations beyond freezing point can cause condensation to form on the surface of the lenses, adversely affecting the proper operation of the safety device.
- Install and replace emitter and receiver only in pairs. Emitter and receiver have the same serial number.

## 2.2. General information on positioning the device

For effective protection it is necessary to proceed very carefully when positioning the device; in particular, the device must be installed in such a way that the danger zone cannot be accessed without interrupting the protected field.

To exclude the possibility of the machine being accessed from above or below (Fig. 4a), it is necessary to install a light curtain of sufficient length to completely cover access to the danger zone (Fig. 4b).

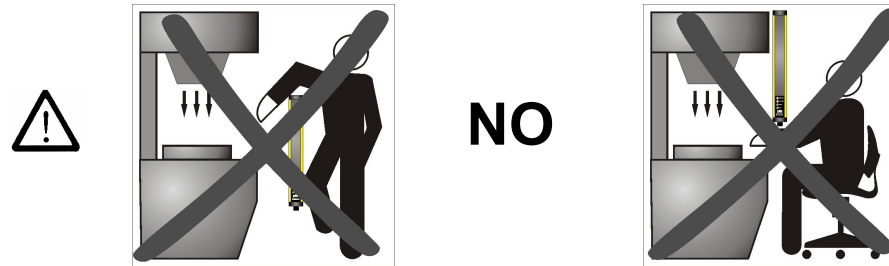


Fig. 4a

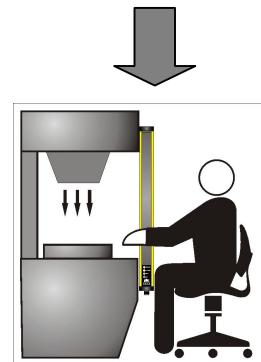


Fig. 4b

English

Also, under normal operating conditions, it must not be possible to start the machine until the operator is outside the danger zone. If it is impossible to install the light curtain in immediate proximity to the danger zone, a second light curtain must be installed, aligned horizontally, to exclude access from the side, as shown in Fig. 5b.

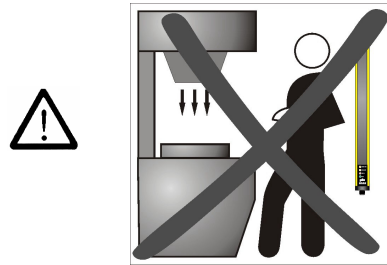


Fig. 5a

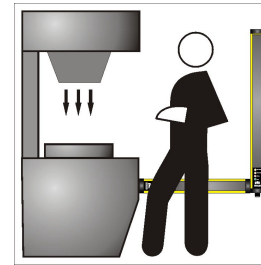


Fig. 5b



If the installation position of the safety device still enables an operator to access the danger zone without detection, an additional mechanical barrier must be installed to prevent this happening.

### 2.2.1. Minimum safety distance

The safety distance of the safety device should be such that the operator cannot reach the danger zone until the movement of the hazardous machine part has come to a standstill (see Fig. 6).

According to the standards EN 999, 775 and 294, this distance depends on four factors:

- 1 ESPE reaction time (time it takes for the signal at the OSSD contact to switch from High to Low once the beams have successfully been interrupted).
- 2 Machine's overrun time (time it takes for the machine to come to a standstill once the ESPE reaction time has elapsed).
- 3 Resolution of the ESPE.
- 4 Approach speed of the object requiring detection.

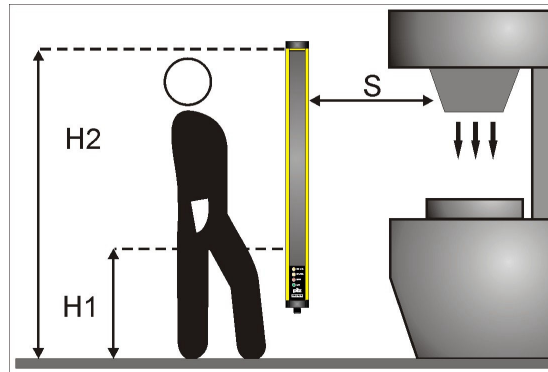


Fig. 6

The formula for calculating the safety distance is as follows:

$$S = K (t_1 + t_2) + C$$

where:

- S** = Minimum safety distance in mm between the protected field and the danger zone
- K** = The speed at which the object requiring detection (body or parts of the body) approaches the danger zone, in mm/s
- t<sub>1</sub>** = ESPE reaction time in seconds (Ch. 9 "Technical details").
- t<sub>2</sub>** = Machine's overrun time in seconds
- d** = The resolution of the safety device.
- C** = **8 (d - 14)** for a safety device with a resolution ≤ 40mm  
= **850 mm** for a safety device with a resolution > 40 mm

**Note:** The value of K is:

**2000 mm/s, if the value calculated for S is  $\leq 500$  mm**

**1600 mm/s, if the value calculated for S is  $> 500$  mm**

If it is possible to access the danger zone from above and below (Fig. 6) and the devices used have a resolution of  $>40$  mm, the upper beam must be positioned at a height of  $\geq 900$  mm (H2), starting from the reference plane (e.g. base of the machine), and the lower beam must be positioned at a height of  $\leq 300$  mm (H1).

Where the light curtain must be installed horizontally (Fig.7), the distance between the danger zone and the most distant optical beam must equal the value calculated using the following formula:

$$S = 1600 \text{ mm/s } (t_1 + t_2) + 1200 - 0.4 H$$

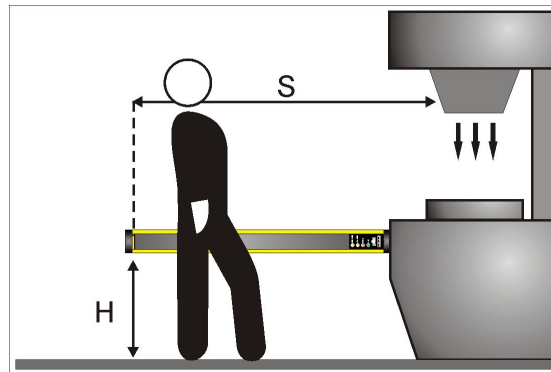
where:

**S** = Minimum safety distance in mm between the protected field and the danger zone

**t<sub>1</sub>** = ESPE reaction time in seconds (Ch. 9 "Technical details").

**t<sub>2</sub>** = Machine's overrun time in seconds

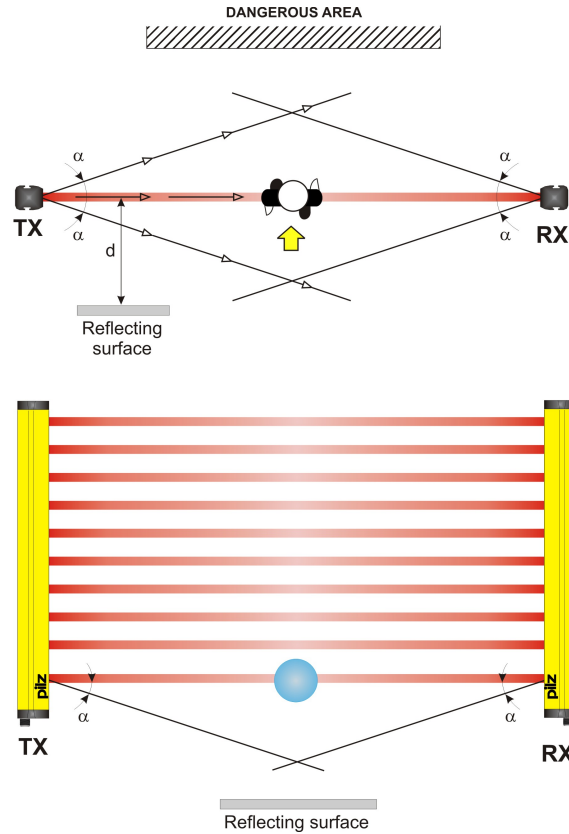
**H** = The height of the beams above the floor. This height must always be less than 1000 mm.



**Fig. 7**

2.2.2. *Minimum distance from reflective surfaces*

Reflective surfaces close to the light beams emitted from the safety device (whether above, below or to the side), may cause passive reflections and adversely affect detection of the object within the protected area (Fig. 8).



English

Fig. 8



Improper installation could mean that a protected field is interrupted without detection, resulting in serious injury.

So, when installing the device close to reflective surfaces (metal walls, floors, ceilings or workpieces), it is vital that the minimum distance in relation to reflective surfaces is maintained, as shown in the diagram in Fig. 9.

This minimum distance depends on:

- The range between the transmitter (**TX**) and receiver (**RX**)
- The maximum open angle of the light beams emitted by the transmitter, in particular:
  - 10° for Type 2 ESPE ( $\pm 5^\circ$  to light axis)

The values for the minimum distance in relation to the operating range can be taken from the illustration in Fig. 9.

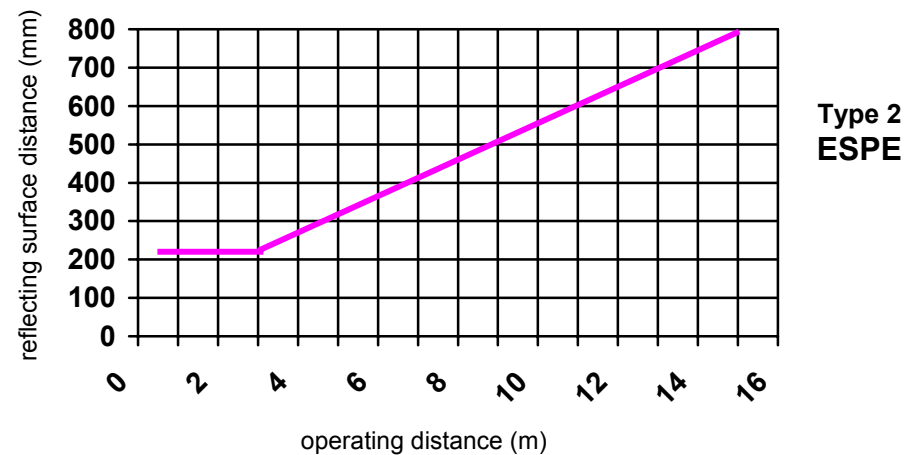


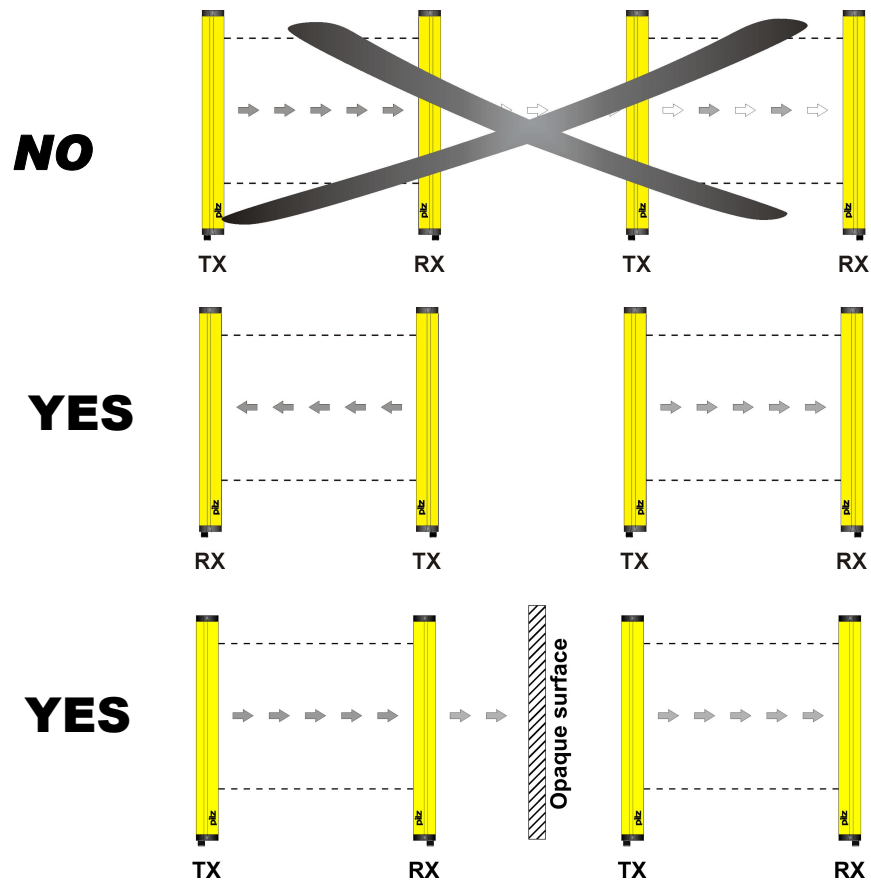
Fig. 9

2.2.3. *Installing several adjacent safety light curtains*

If it is necessary to install several safety devices in adjacent areas, you will need to ensure that the transmitter on one device cannot interfere with the receiver on another.

To prevent this, the devices will need to be installed conversely or must be separated via screening (opaque surface).

Fig.10 gives an example of an installation that could lead to interference, plus two correct installations.



English

Fig. 10

#### 2.2.4. Use of deviating mirrors

Deviating mirrors can be used to monitor danger zones where access is possible from various sides.

Fig. 11 illustrates a potential solution for monitoring three different access sides using two deviating mirrors positioned at an angle of 45° to the light curtain.

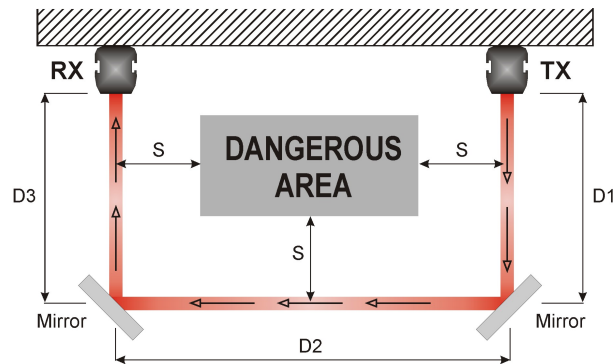


Fig. 11

Please note the following when using deviating mirrors:

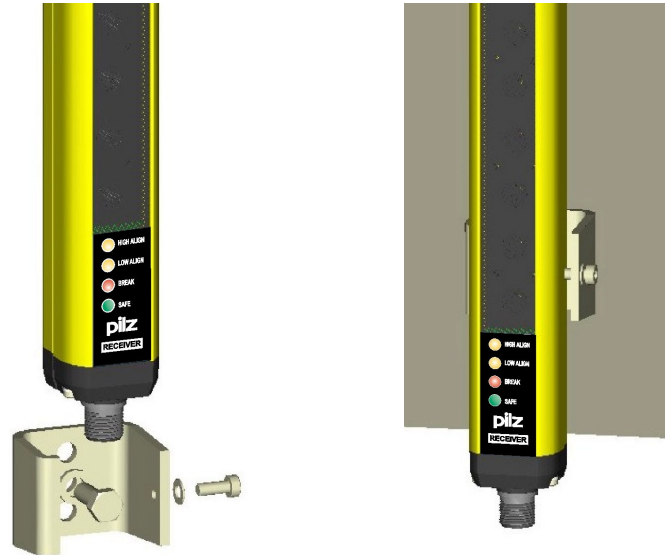
- The alignment of the transmitter and receiver is particularly critical when you use deviating mirrors; just a slight lateral displacement of the mirror is enough to lose the alignment.
- The minimum safety distance (S) must be maintained on all access sides.
- Use of a deviating mirror reduces the effective operating range by about 15%. If two or more deviating mirrors are used, the range will be reduced still further (for more details please refer to the technical specifications for the specific mirror).
- Never use more than three mirrors per device.
- Any dust or dirt on the mirror's reflective surface will drastically reduce the operating range.

### 3. MECHANICAL ASSEMBLY

The transmitter (TX) and receiver (RX) must be assembled so that the respective optical surfaces are arranged parallel to each other and the connectors are positioned on the same side. The distance between the transmitter and receiver must be within the operating range of the model you are using (see type label or Ch.9, "Technical details").

Align the devices precisely, following the guidelines given in Ch. 5, "Alignment".

Use the supplied angle bracket to attach the device, as shown in Fig. 12.



English

Special L-brackets are available on request for installations that require no large mechanical adjustments during alignment (see Fig. 13).

Adjustable brackets enable the units to be inclined by  $\pm 5^\circ$  and are also available on request.

Where applications are subject to particularly strong vibration we recommend the use of angle brackets with vibration dampers.

The drawing and table below indicate the recommended fixing points in relation to the length of the light curtain.

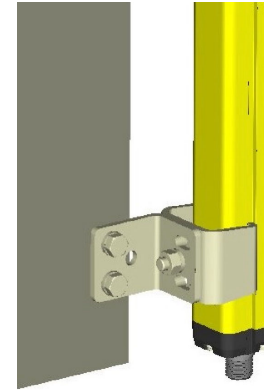
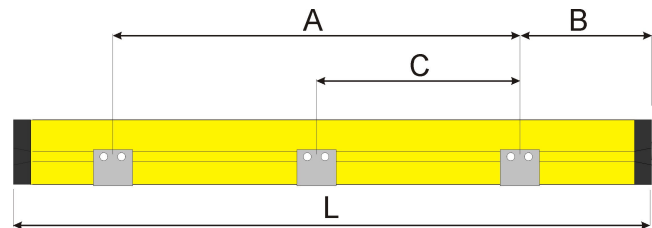


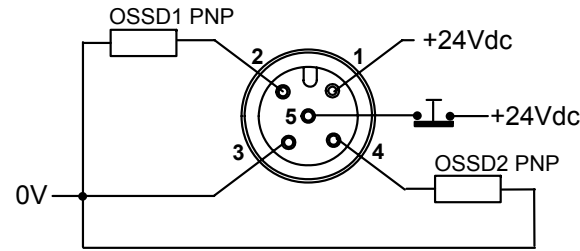
Fig. 13



MODEL	L (mm)	A (mm)	B (mm)	C (mm)
PSEN op2H-30-015	212	72	70	-
PSEN op2H-30-030	359	179	90	-
PSEN op2H-30-045	506	286	110	-
PSEN op2H-30-060	653	373	140	-
PSEN op2H-30-075	800	460	170	-
PSEN op2H-30-090	947	547	200	-
PSEN op2H-30-105	1094	654	220	-
PSEN op2H-30-120	1241	841	200	420
PSEN op2H-30-135	1388	988	200	494
PSEN op2H-30-150	1535	1095	220	547

#### 4. ELECTRICAL CONNECTIONS

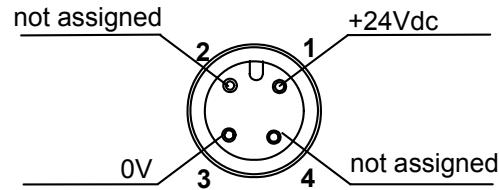
All electrical connections to the transmitter and receiver are made via an M12 connector, located on the bottom of both the units. The receiver uses 5-core cable and the transmitter 4-core cable.



**RECEIVER (RX):**

- 1 = brown = +24 Vdc
- 2 = white = OSSD 1
- 3 = blue = 0 V
- 4 = black = OSSD 2
- 5 = gray = TEST (see note)\*

\* = Automatic START TEST/RESET function



**TRANSMITTER (TX):**

- 1 = brown = +24 Vdc
- 3 = blue = 0 V

English

#### 4.1. Notes on connections

To ensure the correct operation of the PSEN op2H safety device, please note the following:

- Under no circumstances should the connection cables come into contact with or be laid in proximity to cables that generate strong electromagnetic interference (e.g.: motor feeds, inverters etc.); these could compromise the device's ability to function.
- Multicore cables may not be used to connect the outputs of more than one light curtain.
- The TEST input should be connected to the supply voltage of the receiver (RX) on the ESPE via a button with a N/C contact. The test should be performed manually (by pressing the button) at least once a day in order to check the proper operation of the safety device.
- If the TEST input is connected to 0 VDC when the ESPE is switched on, the safety curtain will switch to guard mode (BREAK condition) (see Ch. 7 "Diagnostic function").



- The TEST button must be positioned in such a way that the operator has a clear view of the protected area when test procedures are in progress (see Ch. 6 "START mode").
- With protection class 3, earthing of the transmitter and receiver is not permitted; SELV/PELV power supplies must be used.
- If evaluation devices or a supply voltage are connected without safe separation, the light barrier must be operated in protection class 1. In this case, the transmitter and receiver must be labelled with the protective earth symbol and must be earthed using a special screw. Both are supplied with the unit. The special screw replaces one of the cover screws.



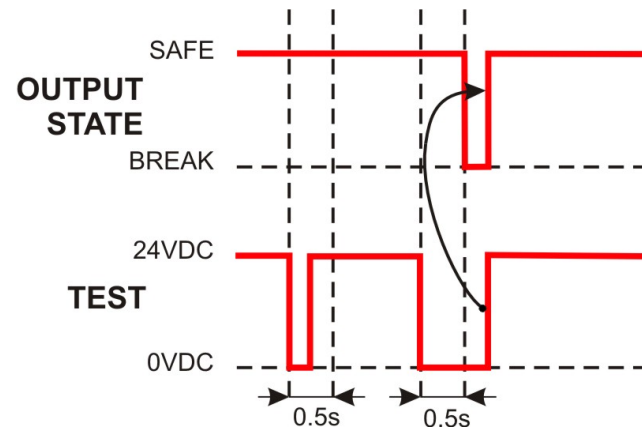
connect to  
earth reference

#### 4.2. Timing diagram for the TEST function

The functionality of the light curtain outputs is automatically tested every 0.5 s during the normal operating cycle.

The TEST function can also be activated by pressing the button; when activating the TEST, the button must be held down for at least 0.5 seconds, as illustrated in the timing diagram below.

##### **AUTOMATIC VERSION**



English



- Under no circumstances should safety outputs OSSD1 and OSSD2 be wired in series or in parallel (Fig. 15, 16, 17); both must be used separately, as shown in Fig. 14. Should one of these two configurations be used in error, a malfunction will occur (see Ch. 7, "Diagnostic function").

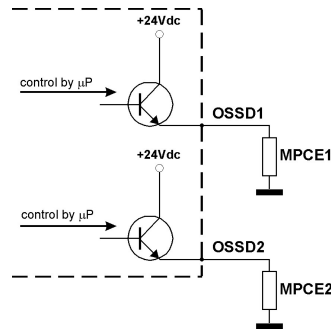


Fig. 14

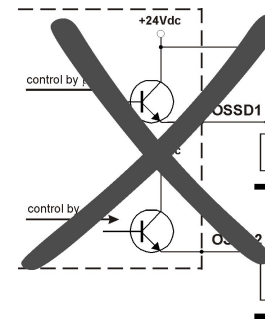


Fig. 15

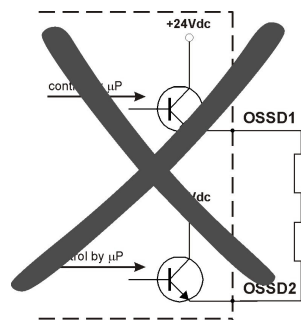


Fig. 16

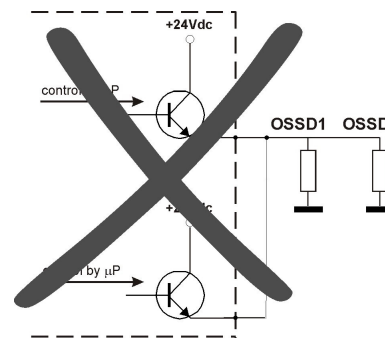
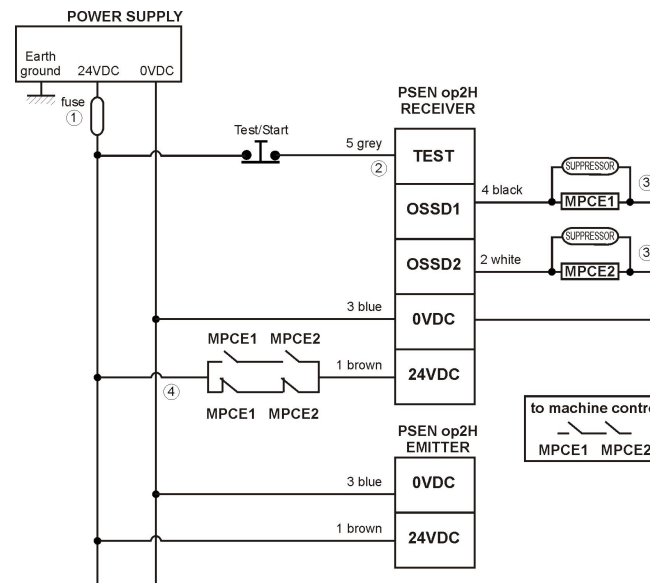


Fig. 17

The following diagram shows the connection options for a PSEN op2H safety light curtain with positive-guided relays (MPCE).



English

- ① Fuse; not provided
- ② In normal mode, the TEST input must be connected to +24 Vdc via a button with a N/C contact. If this line is not connected or is connected to 0 Vdc, the safety light curtain will switch to guard mode (BREAK).
- ③ The relay coil must be fitted with appropriate suppression elements.
- ④ If the protected field is interrupted and one of the contacts remains closed (contact welding), the supply voltage with the wiring shown above is interrupted and the second contact shuts the machine down.

### 5. ALIGNMENT





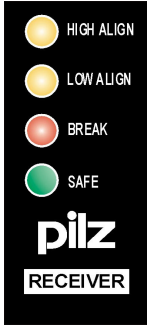
The transmitter and receiver must be aligned to ensure the proper function of the device.

Perfect alignment is achieved when the optical axes of the first and last beam from the transmitter meet the optical axes of the corresponding elements on the receiver.

Two yellow LEDs on the SF2 receiver, "HIGH ALIGN" and "LOW ALIGN", simplify the alignment process. In normal mode the LEDs indicate the function status of the safety light curtain, as shown below.

#### 5.1. Correct alignment procedure (Automatic START)

#### FUNCTION STATUS

		SAFE status	BREAK status		
Yellow	 HIGH ALIGN	OFF	ON	OFF	OFF
Yellow	 LOW ALIGN	OFF	ON	ON	OFF
Red	 BREAK	OFF	ON	ON	ON
Green	 SAFE	ON	OFF	OFF	OFF
		- Normal mode - No beams interrupted	- Units not aligned - Top not aligned - Upper beam interrupted	- Bottom not aligned - Lower beam interrupted	- Units aligned, but at least one beam (excl. upper and lower beam) is interrupted

Once the mechanical assembly and the electrical connections have been completed as described in the previous sections, the light curtain can be aligned as described below:

- On the transmitter (TX), ensure that the green LED "POWER ON" and the yellow LED "SAFE" are lit. This confirms that the transmitter is operating correctly.
- Check that the light curtain's protected area is clear.

- Make sure that the status of the receiver (RX) is one of the following:
- BREAK Status: Green LED "SAFE" is unlit and red LED "BREAK" is lit. The display on the two yellow LEDs "HIGH ALIGN" and "LOW ALIGN" is insignificant.  
-> the units are not aligned.
- SAFE Status: Green LED "SAFE" is lit and red LED "BREAK" is unlit. The two yellow LEDs "HIGH ALIGN" and "LOW ALIGN" are both unlit.  
-> the units are aligned.
- Follow the steps below to align the units:
  - A** Hold the receiver steady and align the transmitter so that the upper yellow LED "HIGH ALIGN" goes out, confirming that the first upper beam has been aligned.
  - B** Rotate the transmitter until the lower yellow LED "LOW ALIGN" also goes out.

**NOTE: Make sure that the green LED SAFE is permanently lit.**

- C** With a few small adjustments, define the area in which the LED "SAFE" permanently lights up green; do this first with one unit and then with the other. Place both units in the centre of this area.
- Use the angle bracket to firmly secure both the units.
- Make sure that the green LED on the receiver is lit (light beams are clear, "SAFE" operating status) and that this switches to red if just a single beam is interrupted (detected object, "BREAK" operating status).
- Perform this test using a cylindrical "test rod" intended for this purpose; its diameter should correspond to the resolution of the device (30mm).

**NOTE: If you pass the test rod from top to bottom along the length of the whole sensing area, at any distance from either unit, the LED "BREAK" must be permanently lit red, without interruption.**

We recommend that you perform this test daily.

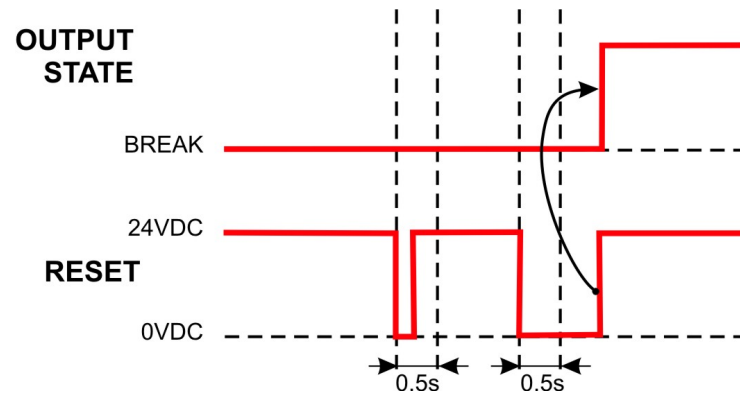
## 6. START MODE

If the beams between the receiver and transmitter are interrupted by an opaque object, the OSSD outputs will switch and the safety contacts will open ("BREAK" operating status).

There are two different ways to restart normal ESPE mode (close safety contacts, "SAFE" operating status), depending on the device model:

- **Automatic START:** After the protected field has been interrupted, the ESPE returns to normal mode as soon as the detected object has been removed from the protected field.

### *TIMING DIAGRAM FOR THE RESET FUNCTION*



Schematics of both operating modes are shown in Fig. 18.

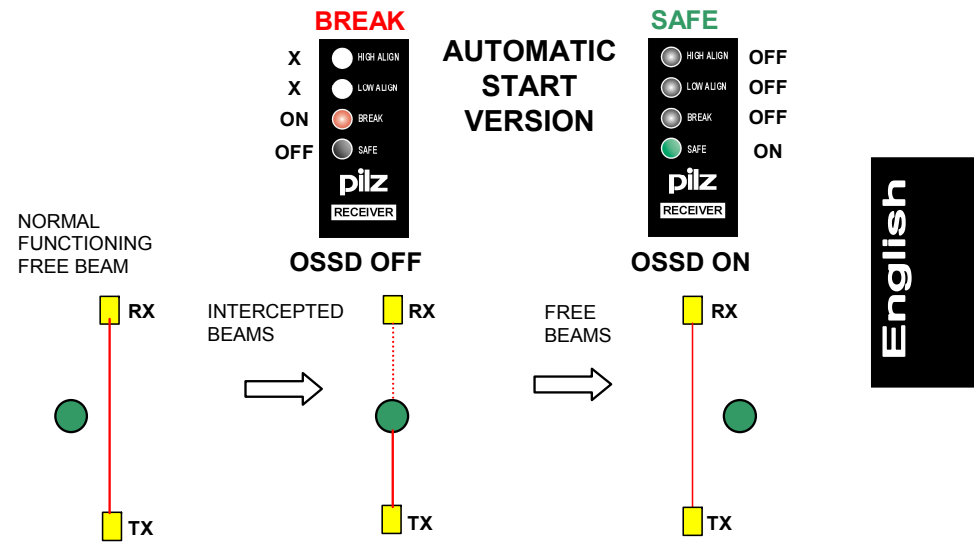


Fig. 18

X = in this mode, it is insignificant whether these LEDs are on or off.

## 7. DIAGNOSTIC FUNCTION

### 7.1. Function indicators

4 LEDs on the receiver and 2 LEDs on the transmitter provide the user with information about the operating status of the SAFEasy device. (Fig. 19).

- **LED SAFE/BREAK:**
- **GREEN LED SAFE is lit;** indicates that the transmitter and receiver are aligned and the protected field is clear. The outputs are ON.
- **RED LED BREAK is lit;** indicates that the transmitter and receiver are not aligned or an object is breaking the protected field. The outputs are OFF.
- **LED HIGH ALIGN: (yellow) is unlit;** indicates optimum alignment between the last transmitter optic and the corresponding receiver optic (top beam on the device).
- **LED LOW ALIGN: (yellow) is unlit;** indicates optimum alignment between the first transmitter optic and the corresponding receiver optic (bottom beam on the device).

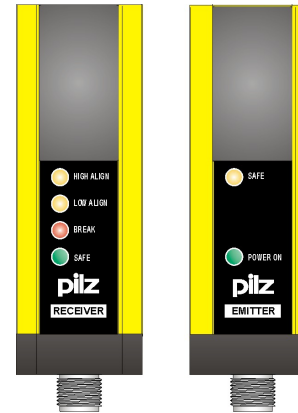


Fig. 19






The key to the LEDs on the transmitter (**TX**) is as follows.

- **LED SAFE (yellow): is lit;** indicates that the unit is transmitting correctly.
- **LED POWER ON (green): is lit;** indicates that power supply to the device is correct.

7.2. Error messages and diagnostics



The LEDs that display the function can also be used to show operators the main causes of a device failure or defect.

**RECEIVER:**

Fault	Checks/remedy
 <p>Yellow blinking Red blinking OFF</p>	<p>Check the output connections.</p> <ul style="list-style-type: none"> <li>- If a capacitive load &gt; 0.1µF is generated, contact PILZ customer services.</li> <li>- Hold the TEST button down for at least 0.5 s (see Ch. 6 "Timing diagram for the RESET function").</li> <li>- If the fault continues, contact PILZ customer services.</li> </ul>
 <p>Yellow blinking OFF OFF</p>	<ul style="list-style-type: none"> <li>- Hold the TEST button down for at least 0.5 s (see Ch. 6 "Timing diagram for the RESET function").</li> <li>- If the fault continues, contact PILZ customer services.</li> </ul>
 <p>OFF Yellow blinking OFF OFF</p>	<ul style="list-style-type: none"> <li>- Check the alignment of both devices.</li> <li>- Hold the TEST button down for at least 0.5 s (see Ch. 6 "Timing diagram for the RESET function").</li> <li>- If the fault continues, contact PILZ customer services.</li> </ul>
 <p>Yellow ON Red ON Green ON</p>	<ul style="list-style-type: none"> <li>- Switch the device off and then on again; ensure that the TEST input is connected to the supply voltage via a button via a N/C contact.</li> </ul>
 <p>OFF OFF OFF OFF</p>	<ul style="list-style-type: none"> <li>- Power supply failure. Check the connections, check that the supply voltage value is correct.</li> </ul>

English

**Transmitter:**

Fault	Checks/ remedy
 <p>Yellow blinking OFF</p>	<ul style="list-style-type: none"> <li>- Transmitter is not working. Check the connections, check that the supply voltage value is correct.</li> <li>- If the fault continues, contact PILZ customer services.</li> </ul>
 <p>OFF OFF</p>	<ul style="list-style-type: none"> <li>- Power supply failure. Check the connections, check that the supply voltage value is correct.</li> </ul>

## 8. REGULAR CHECKS AND MAINTENANCE

Qualified personnel must carry out the following checks regularly.  
Ensure that:

- The SAFEasy device switches to an OFF state when the check with the test rod is carried out, and remains in the BREAK condition as the rod is passed across the whole protected field.
- The SAFEasy device switches to an OFF state when the TEST button is operated (red LED BREAK is lit – signal at the OSSD outputs switches from High to Low - monitored machine switches to a safe condition).
- The reaction time at a machine stop, incl. ESPE reaction time and machine overrun time, is within the limits defined through the calculation of the safety distance (see Ch. 2 “Installation”).
- The minimum safety distance between the danger zone and the protected field on the PSEN op2H is in accordance with the details stated in Ch. 2 “Installation”.
- Nobody can access and remain in the danger zone between the SAFEasy device and the hazardous machine parts.
- The danger zone cannot be accessed from any unprotected area.
- There is no visible damage to the SAFEasy device and/or the external electrical connections.
- The interval between such checks depends on the respective application and on the conditions under which the light curtain is operated.

### 8.1. Maintenance

Safety light curtains in the PSEN op2H series require no particular maintenance, except for cleaning the optical covers  
Moist cotton cloths should be used for cleaning.



**We recommend that you do not use:**

- Alcohol or solvents,
- Cloths made of wool or synthetic material.

## 8.2. General information and useful data



Safety devices are only beneficial if they are installed correctly, in accordance with the regulations.

If you find that you do not have the necessary expertise to install the safety devices correctly, please contact our technical support.

The devices are protected against short circuit through blow-out fuses. Should a short circuit occur, the system will be interrupted.

The fuses and both devices should be returned to the technical service department at PILZ.

Faults that result in an interruption to the supply voltage may cause the outputs to open temporarily, but do not adversely affect the safe operation of the light curtain.

Install and replace emitter and receiver only in pairs.

Emitter and receiver have the same serial number.

Guideline for repair: Always send both emitter **and** receiver for repair.

*(During repair, both units are programmed with the current software version).*

## 9. TECHNICAL DETAILS

Supply voltage:	24 Vdc $\pm$ 20% (SELV/PELV)
Current consumption transmitter (TX):	50 mA max. / 1 W
Current consumption receiver (RX):	90 mA max. (without load) / 2.5 W
Outputs	2 PNP outputs Short circuit protection max: 1.4 A at 55°C min: 1.2 A at 0°C
Output current (for all loads):	500 mA max. (at a single output)
Output voltage ON min.:	Vdc - 1 V
Output voltage OFF max.:	0.2 V
Leakage current:	0.65 mA
Capacitive load (pure):	100 nF max
Resistive load (pure):	60 $\Omega$ min.
Reaction time:	24 ms at maximum length (See table: "Available models")
Transmitter, wavelength:	Infra-red (880 nm)
Resolution:	30 mm
Operating range:	0.2...15 m
Category:	Type 2
Operating temperature:	-0...+55 °C
Storage temperature:	-25...+70 °C
Humidity:	15...95 % (non-condensing)
Protection class:	Class 1 / Class 3 (** see note)
Protection type:	IP65 (EN 60529)
Ambient brightness:	IEC-61496-2
Vibration:	Amplitude 0.35 mm, frequency 10 ... 55 Hz, 20 sweeps for all axes; 1 octave/min., (EN 60068-2-6)
Shock resistance:	16 ms (10 G) 1.000 shocks for all axes (EN 60068-2-29)
Reference standards:	EN 61496-1; prEN 61496-2
Housing material:	Varnished aluminium (yellow RAL 1003)
Material of upper and lower cover:	PBT
Lens material:	PMMA
Connections:	4-pin M12 connector on TX 5-pin M12 connector on RX
Cable runs:	50 m max. * (at 100 nF capacitive load and Vdc = 24 V) 12-core (in accordance with EN 50044, EN 60947-5-2) Core $\varnothing$ = 32 x 0.1mm, external $\varnothing$ = 5 mm
Weight:	1 kg max/m of overall height

\* = The same specifications must be met if a longer cable is used.

** Protection class	Class 1	Class 3
Protective earth	Mandatory	Not permitted
Symbol for protective earth	Mandatory	Not permitted
Protection through low voltage power supply (SELV and PELV)	Recommended	Mandatory

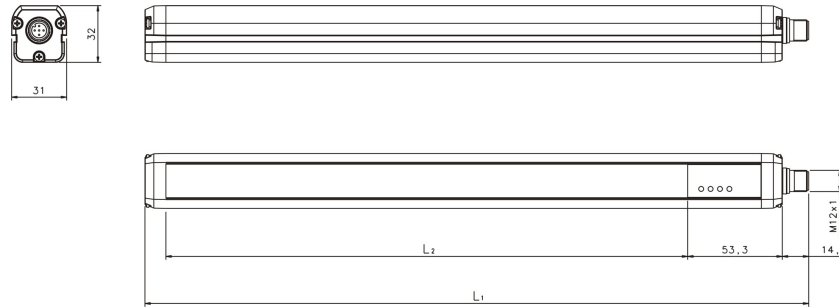
## 10. LIST OF AVAILABLE MODELS

Model	Length of sensing area (mm)	Length of protected area (mm)	No. of beams	Reaction time (ms)	Resolution (mm)	Operating range (m)
PSEN op2H-30-015	147	187	8	14	<b>30</b>	<b>0.2...15</b>
PSEN op2H-30-030	294	334	16	15		
PSEN op2H-30-045	441	481	24	16		
PSEN op2H-30-060	588	628	32	17		
PSEN op2H-30-075	735	775	40	18		
PSEN op2H-30-090	882	922	48	19		
PSEN op2H-30-105	1029	1069	56	20		
PSEN op2H-30-120	1176	1216	64	22		
PSEN op2H-30-135	1323	1363	72	23		
PSEN op2H-30-150	1470	1510	80	24		

English

### 11. OVERALL DIMENSIONS

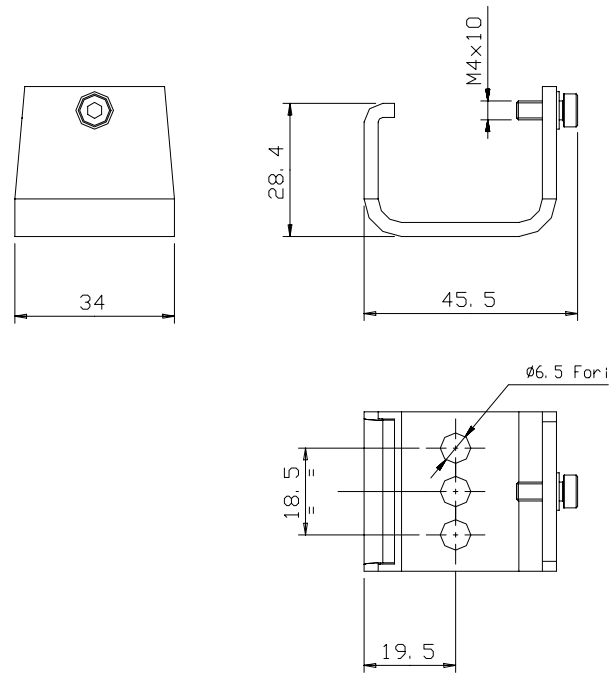
All dimensions are stated in mm.



MODEL	L <sub>1</sub>	L <sub>2</sub>
PSEN op2H-30-015	227	147
PSEN op2H-30-030	374	294
PSEN op2H-30-045	521	441
PSEN op2H-30-060	668	588
PSEN op2H-30-075	815	735
PSEN op2H-30-090	962	882
PSEN op2H-30-105	1109	1029
PSEN op2H-30-120	1256	1176
PSEN op2H-30-135	1403	1323
PSEN op2H-30-150	1550	1470

## 12. ACCESSORIES

### Angle bracket



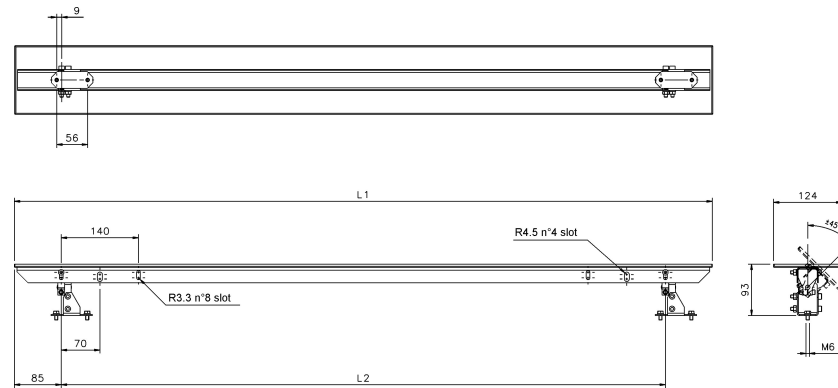
English

Also available:

MODEL	DESCRIPTION
Bracket kit PSEN 4	Angle bracket (4-part kit)
Bracket kit PSEN 4 anti vibr.	Anti-vibration brackets (4-part kit)
Bracket kit PSEN 4 adjust.	Adjustable brackets (4-part kit)

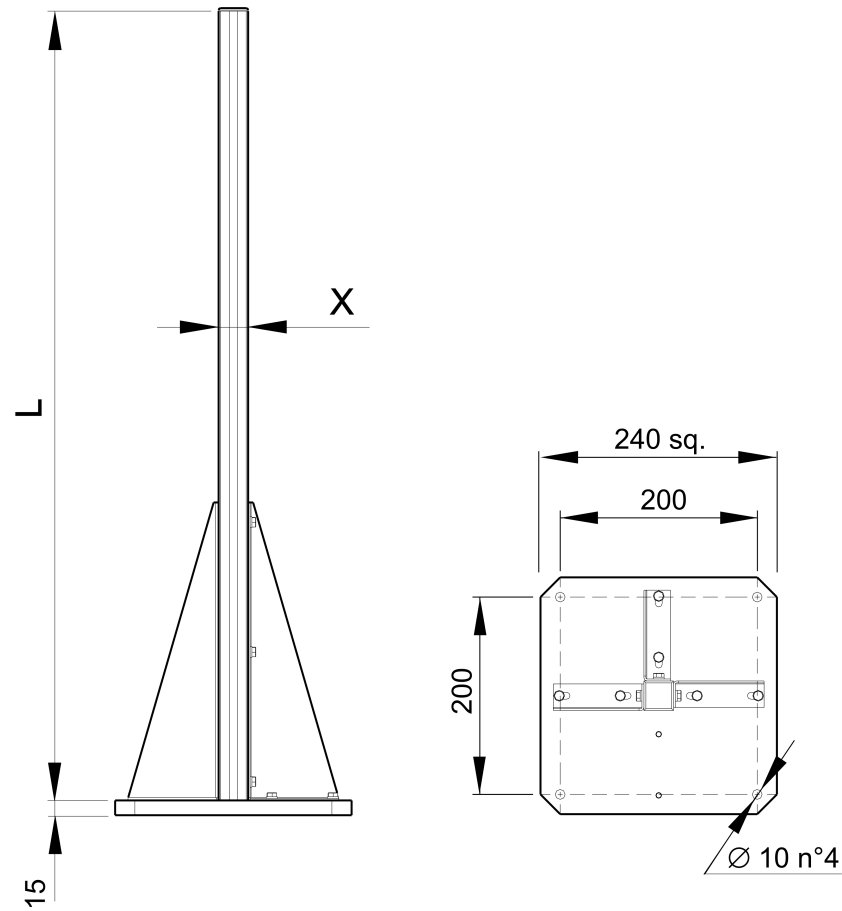
**Deviating mirrors**

MODEL	DESCRIPTION	L <sub>1</sub> (mm)	L <sub>2</sub> (mm)
Mirror 550mm	Deviating mirror H= 550 mm	554	384
Mirror 700mm	Deviating mirror H= 700 mm	704	534
Mirror 900mm	Deviating mirror H= 900 mm	904	734
Mirror 1000mm	Deviating mirror H= 1000 mm	1004	834
Mirror 1270mm	Deviating mirror H= 1270 mm	1264	1094



Floor brackets

MODELL	BESCHREIBUNG	L (mm)	X (mm)
Level 1000mm	Floor brackets H= 1000 mm	1000	30x30
Level 1200mm	Floor brackets H= 1200 mm	1200	30x30
Level 1500mm	Floor brackets H= 1500 mm	1500	45x45
Level 1800mm	Floor brackets H= 1800 mm	1800	45x45



English