

# Flashing lights 10 joules/5 joules



## Series PB 2000

The series of flashing lights is designed for top- and lateral mounting on plant equipment and machine tools. In the development of the topmounting flashing light it was a matter of complying with all customer requirements in terms of appearance and high technological standard of reliability. The net result is visible in a number of minor details.



Protective system



Ambient temperature

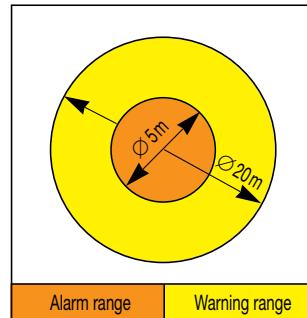
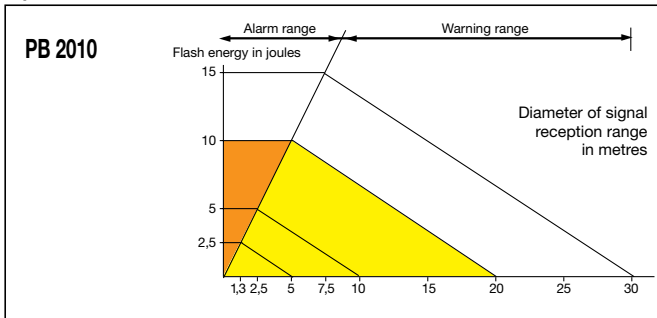


Storage temperature

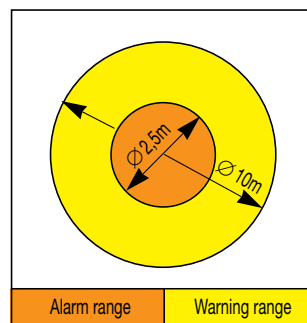
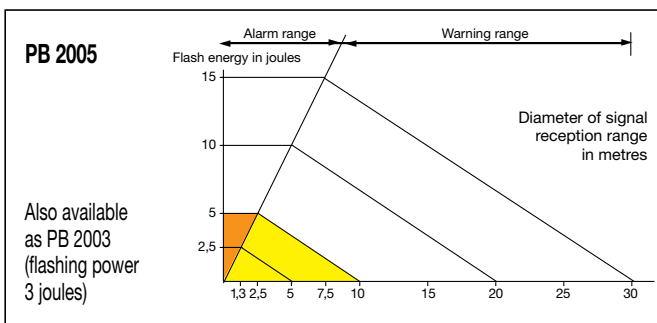


Relative humidity

## Optical data:



Light intensity (DIN 5037):	
clear	118 candela
white	83 cd
yellow	79 cd
amber	65 cd
red	16 cd
green	32 cd
blue	15 cd



Light intensity (DIN 5037):	
clear	44 candela
white	31 cd
yellow	33 cd
amber	26 cd
red	9 cd
green	28 cd
blue	8 cd

Flashing sequence:	1 Hz = 60 flashes/min
Service life:	after 8 x 10 <sup>6</sup> flashes still 70% light emission
Duty cycle:	100%

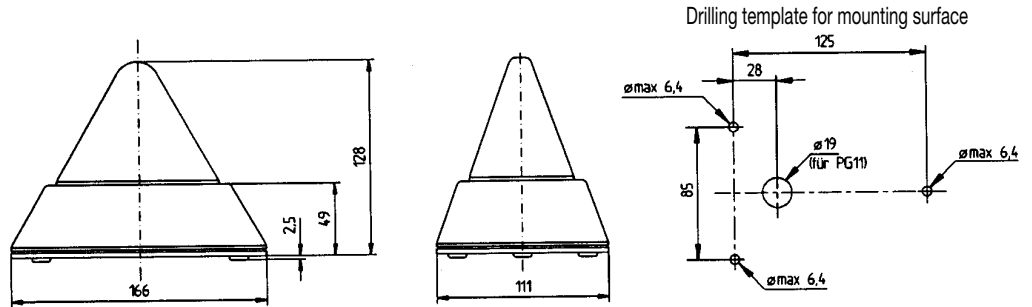
## Electrical data: **AC** 50 Hz/60 Hz

Nominal voltage	Electrical data	PB 2010	PB 2005
230V	Voltage range: Rated current:	185V ... 255V 0,11A	185V ... 255V 0,055A
110V	Voltage range: Rated current:	90V ... 135V 0,22A	90V ... 135V 0,11A
42V	Voltage range: Rated current:	35V ... 50V 0,33A	35V ... 50V 0,18A
24V	Voltage range: Rated current:	20V ... 30V 0,58A	20V ... 30V 0,22A
127V	Voltage range: Rated current:		110V ... 148V 0,115A
48V	Voltage range: Rated current:		40V ... 54V 0,16A
12V	Voltage range: Rated current:		9V ... 15V 0,65A

## **DC**

Nominal voltage	Electrical data	PB 2010	PB 2005
12V	Voltage range: Rated current: Rated power:	10V ... 15V 1,1A 13,2W	10V ... 15V 0,51A 6,1W
24V	Voltage range: Rated current: Rated power:	18V ... 30V 0,55A 13,2W	18V ... 30V 0,23A 5,6W
48V	Voltage range: Rated current: Rated power:	40V ... 60V 0,3A 14,4W	40V ... 60V 0,15A 7,2W
60V	Voltage range: Rated current: Rated power:	50V ... 72V 0,21A 12,6W	50V ... 72V 0,12A 7,5W
80V	Voltage range: Rated current: Rated power:	64V ... 96V 0,15A 12,8W	64V ... 96V 0,10A 8,4W

**Technical data  
and dimensions:**



<b>Mechanical data:</b>	
Cable gland	PG 11, from the side or below
Weight of the AC version	300 g PB 2010 / 275 g PB 2005
Weight of the DC version	360 g PB 2010 / 310 g PB 2005
Material Globe	Acrylic glass, PMMA
Material Housing	ABS, light-grey, similar to RAL 7035
Material Base	ABS, light-grey, similar to RAL 7035
	PCB made of fibre-glass reinforced epoxy resin for thermic and mechanical protection. PCB dip-varnished to protect against moisture. Flash tube fastened with stainless steel clamp to prevent shock and vibration.
<b>Standard:</b>	
Ambient temperature	-30 °C ... +55 °C
Storage temperature	-40 °C ... +70 °C
Relative humidity	90%
Protective system	IP 55 (EN 60529 by vertical/horizontal installation)

**Special version:**



**Accessories:**



**Approvals:**



**Sample order:**

Model: PB2010    Voltage: 230VAC    Globe colour: RED    Special version: 30 flashes/min.    Accessories: Protective cage    Approvals: GL

**Conformity to standard:**

The optical properties of flashing lights comply with the European standard DIN EN 842, which is published under the title: **“Machine safety – visual alarm signals”**.

Requirements of the standard DIN EN 981, published under the title:

**“Machine safety – system of acoustic / visual alarm signals and information signals”** can be met.

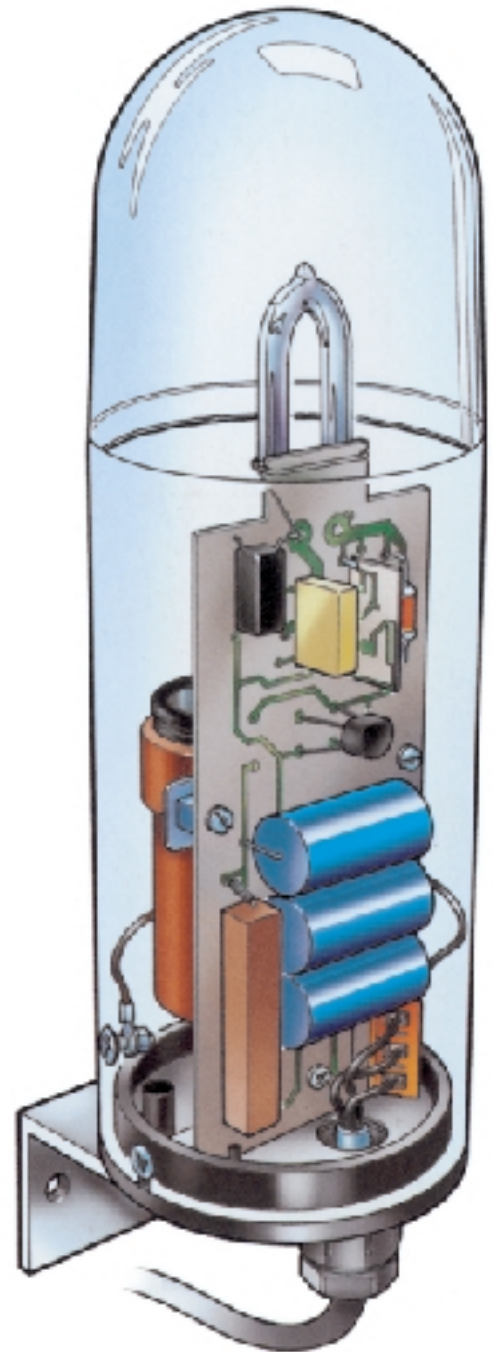
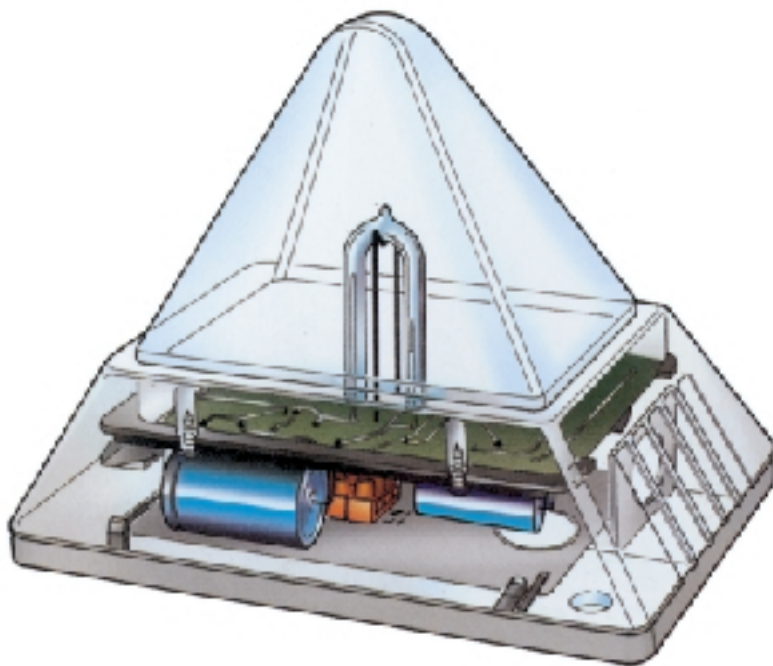
The colour “red” as emergency signal and “yellow” as a warning signal comply with the requirements of IEC 73 / DIN EN 60073 / VDE 0199, published under the title:

**“Coding for display devices and control components using colours and supplementary means”**.

References to visual alarm devices can be found in the following standards:

- EN 60825-1      Radiation safety of laser devices defined by IEC 825 and DIN-VDE 0837
- DIN 14675      Fire alarm systems, design of
- DIN 54113      Regulations for radiation protection applicable to technical operation of X-ray equipment up to 500 kV

# Flashing light technology



Flashing lights are designed to emit periodic intensive flashes of light. They can warn, attract attention or simply display status. The advantages of an electronic arrangement over traditional electro-mechanical Allround flashing lights:

- Long service life for the flash tube
- No wear-and-tear parts, therefore, no maintenance
- Compact design
- High degree of mechanical stability
- small, space-saving housing
- Low weight
- Low energy consumption due to high efficiency
- Intensive light reflexes

Every electronic component in every flashing light is already artificially aged during manufacture to enable us to detect failure at an early stage. Our standards of quality are based on the principle that all components are subjected to a 100% final inspection. The result

is consistent product quality that is reflected in service. Statistics show a rate in the promille range.

## Design of flashing lights and their principle of operation

From an electronic point of view, flashing lights are designed much the same as photographic flash units. The flash tube is placed in parallel to a storage capacitor. Electronic charging circuitry boosts the capacitor's voltage to approx. 310 Volt.

At regular intervals, an electronic sync generator transmits an HV impulse to the ignition wire in the flash tube to ionize the gas inside the tube. The energy contained inside the storage capacitor is discharged into the flash tube, where it is converted into extremely bright flashes of light.

During the time until the next firing impulse, the storage capacitor is electronically recharged. The energy stored for each individual flash of light is calculated according to the following formula:



- $E = \frac{1}{2} \times C \times U^2$
- E = Flash energy (Joules)
- C = Flash capacity of capacitor (Farad)
- U = Charging voltage (Volt)

In the course of discharge inside the tube, an arc of light forms between the electrodes and subjects the electrode material to substantial wear.

Although very hard metals such as tungsten are used for making electrodes, the process wears away the metal at varying degrees (depending on the metal) and leaves a dark coating in the flash tube. It is considered as given when the light emission is reduced by 30%. The tube is then not defective, but electronic instruments detect measurably increased darkness.

The flash tubes are filled with a mixture of inert gases with a Xenon content of over 90%.

The light emitted is mainly in the blue spectral region, with sufficient intensive flanking reaching into the red region.

All electronic components are mounted on an fibre-glass reinforced epoxy resin PCB and dip varnished to protect against moisture. Electrical connection is made using a terminal capable of accommodating cables with a cross-section of up to 1.5 mm<sup>2</sup>.

The globes on the flashing lights are made of extremely impact-resistant polycarbonate and acrylic glass. The basic material is colourless; various colour pigments are added during manufacture. The flash of light covers the whole spectrum of colour. Correspondingly coloured globes act as a filter and allow only one colour to exit. Colour pigments consist of very complex mixtures; this results in differences in the candela values.

DIN IEC 73/VDE 0199 allocates the following significance to red, amber and green:

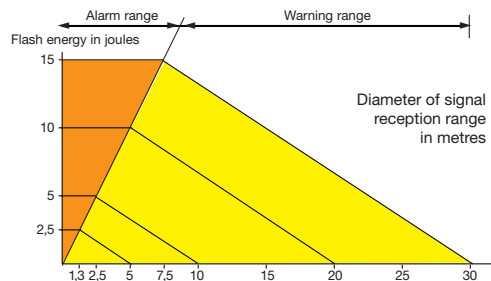
- Red is emergency signal for danger or alarm
- Yellow is a warning to invoke caution
- Green denotes safety

**Alarm range**

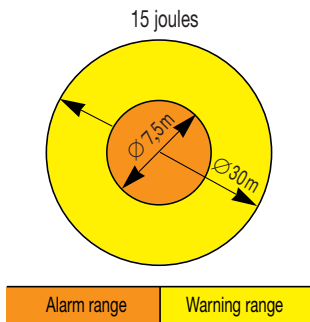
Alarm area. Signal reception area, in which physical disturbance is caused. Visual warning devices draw attention directly or by means of reflection. Acoustic alarms are perceived directly.

**Warning range**

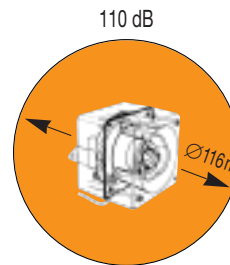
Warning area. Signal reception area, in which warning devices draw attention by means of job-specific changing direction of view, by reflection or disharmonious perception. Visual warning devices should be backed up by acoustic alarms and vice versa.



Schematic relationship between alarm and warning areas in ratio to flash energy.



Areas defined on the basis of spherical radiation of light show where warning devices are effective.



Signal reception area  
of acoustic radiation: 10.568 m<sup>2</sup>

An area defined on the basis of the spherical characteristics of acoustic radiation show where the acoustic signal is reliably perceived.

## Approvals

### Germanischer Lloyd



Germanischer Lloyd (GL) is an internationally recognized and worldwide independent organization that provides expertises for virtually all technical matters. It is committed to testing and certifying safety and quality.

### Register



The "Register" is an international association for technical classifications. Its sphere of operation is primarily in Eastern Europe. It is mainly concerned with technical tests for corrosion, vibration, shock and climatic changes.

### PTB Physikalisch-Technische Bundesanstalt



The Physical-Technical Federal Institute (PTB) is a test authority for material and calibration. Organized into several laboratories, it includes tests and approvals for explosionproof equipment. It operates according to the principles of the current CENELEC standards. The PTB is the authorized EC test institute in Germany.

### BWB

BUNDESAMT FÜR WEHRTECHNIK  
UND BESCHAFFUNG



The Federal Office for Military Technology and Procurement (BWB) manages and catalogues technical equipment for military defence. Attached to this office are military technology offices and arsenals, in which type-tests are conducted in accordance with defence material standards. The material is listed in the SAK catalogue.

### Verband der Schadenversicherer



The Association of Property Insurers (VdS) is a privately operated test institute founded by the insurance companies on a basis of mutual benefit. The insurers organized in the VdS recognize tested equipment as risk-reducing measures. For technical tests, the VdS attaches great importance to adherence to standards and durability in service.

### Schweizerischer Elektrotechnischer Verein



The Swiss Electrotechnical Association (SEV) is a test institute for material and calibration. Type-test are conducted prior to approval for the sale of technical products being granted by the Swiss Confederation inspectorate for High-Voltage Equipment, the appropriate authority for Switzerland.

# Key to pictograms:



Alternating current. From transmission, distribution and consumer networks. Suitable for 50 Hz and 60 Hz mains frequency. Tolerances and ratings according to DIN IEC 38.



Direct current. From power supply units, transformers and buffer batteries. Liberal voltage tolerances of up to 30%.



Operating temperature range. Maximum and minimum temperature values at which the technical data are guaranteed.



Storage temperature range. Maximum and minimum temperature values at which the equipment should not sustain mechanical damage. Electrical operation is not permitted.



Relative humidity. Relationship between absolute humidity and the potential maximum humidity at the same temperature. Expressed as percentage. At 90% relative humidity, moisture for a short period is admissible.



Protective systems according to DIN 40050/IEC 529. General information on the degree of protection the electrical equipment has against contact, foreign bodies and water. Units with IP 54 can be used in the open.



Telephone-call relay. An electronic unit is activated by the telephone call and bridges the subsequent interval in the call. This enables you to isolate flashing lights and acoustic alarms from a private telephone system.



Activation input with optocoupler 24V DC/2mA.



Flashing light for high voltage DC applications. Fields of application: DC railway, aluminium smelting, submarine engines.



Optional flashing sequence (Standard: 60 flashes/min).



Protective cage made of anti-corrosive metal. Active protection by contact or sabotage and for use in "severe" conditions.



External flashing light monitor. A glass-fibre cable is used to detect and monitor the flash of light. In the event of fault, alarm is given using a floating NCC.



Volume control for the DS 5 acoustic alarm. For optimum signal adjustment to suit ambient noise level and to prevent scare effect.



Acoustic alarm with ID light to provide visual backup. Imprint available according to original sample. For 12V DC and 24V DC acoustic alarms.



External sound patterns selection for controlling various sound patterns projected over lengthy distances.



Customized sound modification.

## Note on environment:

All Pfannenberg flashing lights and acoustic alarms are manufactured from substances that do not inhibit moistening, such as silicone or polytetrafluorethylene. In addition to this, the equipment contains neither cadmium, mercury, nickel, PCB, asbestos nor formaldehyde.