

# Photocell PR1a



ALGE-TIMING

Manual

## Important Information

### General

Before using your **ALGE-TIMING** device read the complete manual carefully. It is part of the device and contains important information about installation, safety and its intended use. This manual cannot cover all conceivable applications. For further information or in case of problems that are mentioned not at all or not sufficiently detailed, please contact your **ALGE-TIMING** representative. You can find contact details on our homepage [www.alge-timing.com](http://www.alge-timing.com)

### Safety

Apart from the information of this manual all general safety and accident prevention regulations of the legislator must be taken into account.

The device must only be used by trained persons. The setting-up and installation must only be executed according to the manufacturer's data.

### Intended Use

The device must only be used for its intended applications. Technical modifications and any misuse are prohibited because of the risks involved! **ALGE-TIMING** is not liable for damages that are caused by improper use or incorrect operation.

### Cleaning

Please clean the outside of the device only with a smooth cloth. Detergents can cause damage. Never submerge in water, never open or clean with wet cloth. The cleaning must not be carried out by hose or high-pressure (risk of short circuits or other damage).

### Liability Limitations

All technical information, data and information for installation and operation correspond to the latest status at time of printing and are made in all conscience considering our past experience and knowledge. Information, pictures and description do not entitle to base any claims. The manufacturer is not liable for damage due to failure to observe the manual, improper use, incorrect repairs, technical modifications, use of unauthorized spare parts. Translations are made in all conscience. We assume no liability for translation mistakes, even if the translation is carried out by us or on our behalf.

### Disposal

If a label is placed on the device showing a crossed out dustbin on wheels (see drawing), the European directive 2002/96/EG applies for this device.

Please get informed about the applicable regulations for separate collection of electrical and electronical waste in your country and do not dispose of the old devices as household waste. Correct disposal of old equipment protects the environment and humans against negative consequences!



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## Declaration of Conformity

We declare that the following products comply with the requirements of the listed standards.

We, **ALGE-TIMING GmbH**  
**Rotkreuzstrasse 39**  
**A-6890 Lustenau**

Declare under our sole responsibility, that the:

### Photocell PR1a

is in conformity with the following standard(s) or other normative documents(s):

Safety: EN 60950-1:2006 + A11:2009

EMC: EN55022:2006+A1:2007  
EN55024:1998+A1:2001+A2:2003  
EN61000 3-2:2006 + A1:2009 + A2:2009  
EN61000 3-3:2008

**Additional Information:**

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC, also the EMC Directive 2004/108EG and accordingly carries the CE-marking.

Lustenau, 10.02.2010

ALGE-TIMING GmbH



Albert Vetter  
(General Manager)



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## 1 General

The photocell PR1a combines highest precision and performance with smallest dimensions.

### 1.1 Functionality

The photocell transmitter sends a modulated light beam in infrared range. The receiver monitors the light beam for disruptions. In case of a disruption of the infrared beam the receiver releases a pulse. For multipurpose use the photocell can be operated in three different operation modes: reflection photocell, transmitter and receiver.

### 1.2 Photocell Features

- Releasing accuracy 1/10.000 second
- Diversity of types:
  - Reflection photocell
  - One-way photocell for large distances
- Large photocell range:
  - Reflection photocell approx. 25 m
  - Transmitter and receiver photocell more than 150 m
- Variable supply of the photocell:
  - Battery operation
  - Supply from **ALGE** timing device
  - External supply from 4 to 18 VDC
- Battery condition indication with LED (green, yellow, red)
- Indication of the photocell alignment with LED (green, yellow, red)
- Synchronisation of two photocells (main and backup), to prevent interferences
- Setting of dead time (approx. 20 ms to 2 s /factory setting = 20 ms)

### 1.3 Types of photocell

According to its type the photocell can consist of the following parts:



Photocell PR1a



Reflector PR1a-Ref



Mounting bracket BBG



Tripod TRI128



Photocell cable 001-10



Photocell cable 001-30

**Additional photocell accessory:**

- Carrying case for photocell(s) and/or other accessory
- Two-core photocell cable with banana plug (different lengths)
- Cable reel with two-core steel cable with banana plug and/or banana socket
- Lengths: KT120 (120 m), KT150 (150 m), KT300 (300 m), KT500 (500 m)
- Charging set including 4 NiMH rechargeable batteries for photocell
- Reflector with centered screw hole (for mounting at wooden pole)
- Reflector with adhesive tape (for fixed reflector)
- Synchronisation cable for 2 photocells 163--5

**1.3.1 Reflection photocell PR1a-R:**

In case transmitter and receiver are in one case, we refer to a reflection or two-way photocell. The light beam is aimed from transmitter to a reflector. The reflector works like a mirror and reflects the light beam to the receiver.

Range: approx. 25 m

Photocell set: 1 x PR1a, 1 x PR1a-Ref, 2 x BBG, 1 x 001-10 (10m)

**1.3.2 Reflection photocell PR1a-RT:**

Same as reflection photocell PR1a-R, without mounting brackets BBG but with tripods and 30 m photocell cable.

Range: approx. 24 m

Photocell set: 1 x PR1a, 1 x PR1a-Ref, 2 x TRI128, 1 x 001-30 (30 m)

**1.3.3 One-way photocell PR1a-d:**

The one-way photocell consists of separate transmitter and receiver. The light beam is aimed directly from transmitter to receiver.

Range: more than 150 m

Photocell set: 2 x PR1a, 2 x BBG, 1 x 001-10 (10 m)

**1.3.4 One-way photocell PR1a-dT:**

Same as one-way photocell PR1a-d, without mounting brackets BBG but with tripods and 30 m photocell cable.

Range: more than 150 m

Photocell set: 2 x PR1a, 2 x TRI128, 1 x 001-30 (30 m)

## 2 Operating Modes

The photocell can be used in different operating modes.

- Reflection photocell
- Transmitter photocell TX
- Receiver photocell RX

### 2.1 Reflection Photocell – NORM

The reflection photocell PR1a sends from the transmitter an infrared light beam that is reflected by the reflector and analyzed by the receiver. The maximum range of the photocell is 25 m (distance between photocell and reflector).

**This photocell requires the following parts:**

- Photocell PR1a (Switch setting NORM)
- Reflector PR1a-Ref



## 2.2 One-way Photocell

For a working photocell set a transmitter PR1a (switch setting TX) and a receiver PR1a (switch setting RX – see below) is needed. The transmitter sends an infrared light beam to the receiver. The maximum range is approx. 150 m.

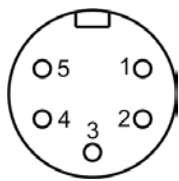
## 3 Power Supply

The photocell can be supplied in different ways. The easiest supply is carried out with the included cable 001-10 (or 001-30) directly from the ALGE timing device.

In case the photocell is far away from the timing device it can also be supplied externally (4 – 18 VDC) or with batteries (2 x AA battery in photocell).

**Current consumption:** battery with 2,5 VDC: 20 - 46 mA  
 timing devices 5 Vstab: 9 - 20 mA

### Connector pin assignment DIN socket:



- 1..... signal output
- 2..... signal output
- 3..... ground
- 4..... external supply (input 4 - 18 VDC)
- 5..... external supply (+5VDC stabilized – e.g. from ALGE timing devices)

### 3.1 External supply from ALGE timing devices

For a supply from the ALGE timing device use the photocell cable 001 (red) and/or 002 (green). The ALGE timing device supplies a stabilized voltage of 5 VDC (pin 5).

#### ATTENTION:

The cable length is limited to approx. 100 m as otherwise the voltage drop would be too high.

### 3.2 External Supply

The photocell can be supplied by pin 4 (4 – 18 VDC) and pin 3 (ground). This is primarily of advantage when several photocells have to be supplied by cable over large distance.

### 3.3 Internal Battery

The photocell can also be supplied by internal batteries (2 x AA battery).

#### The following types of batteries can be used:

- Alkaline battery:** Ideal in case the photocell is not used very often.
- NiMH rechargeable batteries:** Rechargeable batteries that are optimal in case the photocell is used daily. These batteries have a long operating time with very low temperatures.
- NiCd rechargeable batteries:** Not recommended for use in photocell.





**Switch on internal battery**

The battery in the photocell is switched on with switch (on/off).

**3.3.1 Insert Batteries**

The battery cover is underneath the photocell

Press cover slightly inside and pull forward

**Attention:**

Mind the polarity of the batteries! (sticker inside)



**3.3.2 Operating Time of Batteries**

The operating time of the photocell depends on different factors. Most importantly is what kind of battery is used. The operating time becomes less with each additional photocell pulse. Also important is whether the photocell is used as reflection photocell (transmitter and receiver) and/or as transmitter or receiver.

Reflection photocell		
Battery type	1 Pulse per minute	
	-20°C	20°C
Alkaline Battery – 2,8 Ah	approx. 17 h	approx. 77 h.
NiCd rechargeable b. - 1,1 Ah	approx. 11 h	approx. 28 h
NIMH rechargeable b. - 2,7 Ah	approx. 57 h	approx. 70 h

If the photocell PR1a is used as a transmitter it almost has the same operating time as in reflection photocell mode; for a receiver it is three times higher as for the reflection photocell.

**4 Operating Mode Indication with LED**

The LED of the photocell indicates several operating modes:

LED	Operating mode NORM	Operating mode RX	Operating mode TX
permanently red	Photocell misaligned	Photocell misaligned	No indication
permanently yellow	Photocell not optimally aligned	Photocell not optimally aligned	No indication
permanently green	Photocell optimally aligned	Photocell optimally aligned	No indication
blinking red	Battery empty – replace	Battery empty – replace	Battery empty – replace
blinking yellow	Battery near empty – replace soon	Battery near empty – replace soon	Battery near empty – replace soon
blinking green	Battery full	Battery full	Battery full

## 5 Alignment of Photocell

### 5.1 Reflection Photocell

- Screw mounting brackets BBG to wooden pole and/or position tripods TRI128
- Screw photocell and reflector to mounting brackets and/or tripods
- Align mirror of reflector straight to photocell
- Switch operating mode to <NORM>
- Switch on photocell:
  - Batteries: Switch to <On>
  - Supply from timing device: connect cable of timing device with photocell (red cable 001-xx or green cable 002-xx), switch on timing device
  - External supply: connect external supply to photocell
- Operating mode LED must flash red
- Locate the reflector with the alignment notch
- Align the photocell until the operating mode LED flashes green
- After 5 seconds the operating mode LED has to blink green (indicates that the battery and/or supply is okay). In case the LED blinks orange or red the battery should be replaced or the supply must be checked.
- After each photocell pulse the operating mode LED flashes green for several seconds (indication for good photocell reception) before the battery condition is indicated again.

### 5.2 One-way Photocell

- Screw mounting brackets BBG to wooden pole and/or position tripods TRI128
- Screw photocells to mounting brackets and/or tripods
- Align photocells to each other
- Check if the operating mode is <NORM>. If not, switch to this position.
- Switch on photocells:
  - Batteries: Switch to <On>
  - Supply from timing device: connect cable of timing device with photocells (red cable 001-xx or green cable 002-xx), switch on timing device
  - External supply: connect external supply to photocells
- Operating mode LED must flash red
- Locate the other photocell with the alignment notch
- Align the photocell until the operating mode LED flashes green
- After 5 seconds the operating mode LED has to blink green (indicates that the battery and/or supply is okay). In case the LED blinks orange or red the battery should be replaced or the supply must be checked.
- Switch operating mode of transmitter photocell to TX - LED has to blink green, if supply is okay.
- Switch operating mode of receiver photocell to RX – LED works like the one of the reflection photocell.
- After each photocell pulse the operating mode LED of the receiver photocell flashes green for several seconds (indication for good photocell reception) before the battery condition is indicated again.
- **Attention:** The timing device has to be connected to the receiver photocell.

### 5.3 Setting of Dead Time

We recommend to set the dead time, if possible, at the timing device. At the factory, the dead time of the photocell is set to the least dead time (20 ms).

The dead time can be set with a screwdriver between 20 and 2000 ms. For this, you first have to pull out the weather protection.

**Definition of dead time:**

The dead time is the time during which the photocell is blocked after a photocell pulse. It starts at that point when the light beam is no longer disrupted. This is necessary to prevent multiple releases.

With this potentiometer the dead time can be set between 20 and 2000 ms



### 5.4 Synchronisation of two Photocells

For using two photocells in parallel as system A and B, they should be synchronized. By synchronization one photocell sets the cycle for the infrared pulses. By this it is guaranteed that the photocells do not interfere each other. Connect cable 163--5 to both photocells. The LED of the photocell that sets the synchronisation cycle flashes.

## 6 Weather protection

The weather protection can be pulled out. With pulled out weather protection the lenses are protected from snow and rain. If the photocell is used on a glacier it is essential to pull out the weather protection. Otherwise the increased UV radiation can cause interferences.

**Attention:**

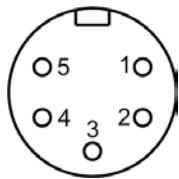
Direct solar radiation through the lense into the photocell has to be prevented by all means. Direct solar radiation through the lense can damage the photocell (burning glass effect).



## 7 Technical Data

Range with reflector:	0.5 to 25 meter
Range with transmitter and receiver:	0 to over 150 meter
Pulse output:	NPN Transistor, Open Collector, activ low
Maximum output load:	max. 250mW max. 14V max. 100mA
Reaction time:	300 $\mu$ s, 1 ms set permanently
Pulse length:	20 bis 2000 ms adjustable (dead time)
Dimensions (without ball joint):	approx. 118 x 87 x 44 mm
Weight PR1a:	approx. 0.3 kg
Weight PR1a-Ref:	approx. 0.2 kg
Switch:	On/Off switch for battery
Selector switch:	for Norm, TX and RX
Power supply:	from <b>ALGE</b> timing device: 5 VDC stabilized external supply: 4 - 18 VDC internal battery: 2 x AA batteries
Power consumption:	battery with 2.5 VDC: 20 - 46 mA timing device with 5 Vstab: 9 - 20 mA

### Connector pin assignment DIN socket:



- 1..... signal output
- 2..... signal output
- 3..... ground
- 4..... external supply (input 4 - 18 VDC)
- 5..... external supply (+5VDC stabilized – e.g. from **ALGE** timing devices)

Subject to changes

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