ALGE-TIMING

Version-E12-12-06

Photocell PR1aW

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

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!

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 PR1aW

complies with the following standards/normative documents and in case of intended use complies with the basic requirements of R&TTE 1999/5/EC:

Telecommunication (TC)terminal device
Short Range Device

Applied harmonized standards…

EN 60950-1: 2006 + A11:2009EMC: EN300328 V1.71
EN 301489-1 V1.8.1 2008
EN 301489-3 V1.4.1 2002
EN55022:2006+A1:2007
EN55024:1998+A1:2001+A2:2003
EN61000 3-2:2006
EN61000 3-3:1995+A1:2001+A2:2005

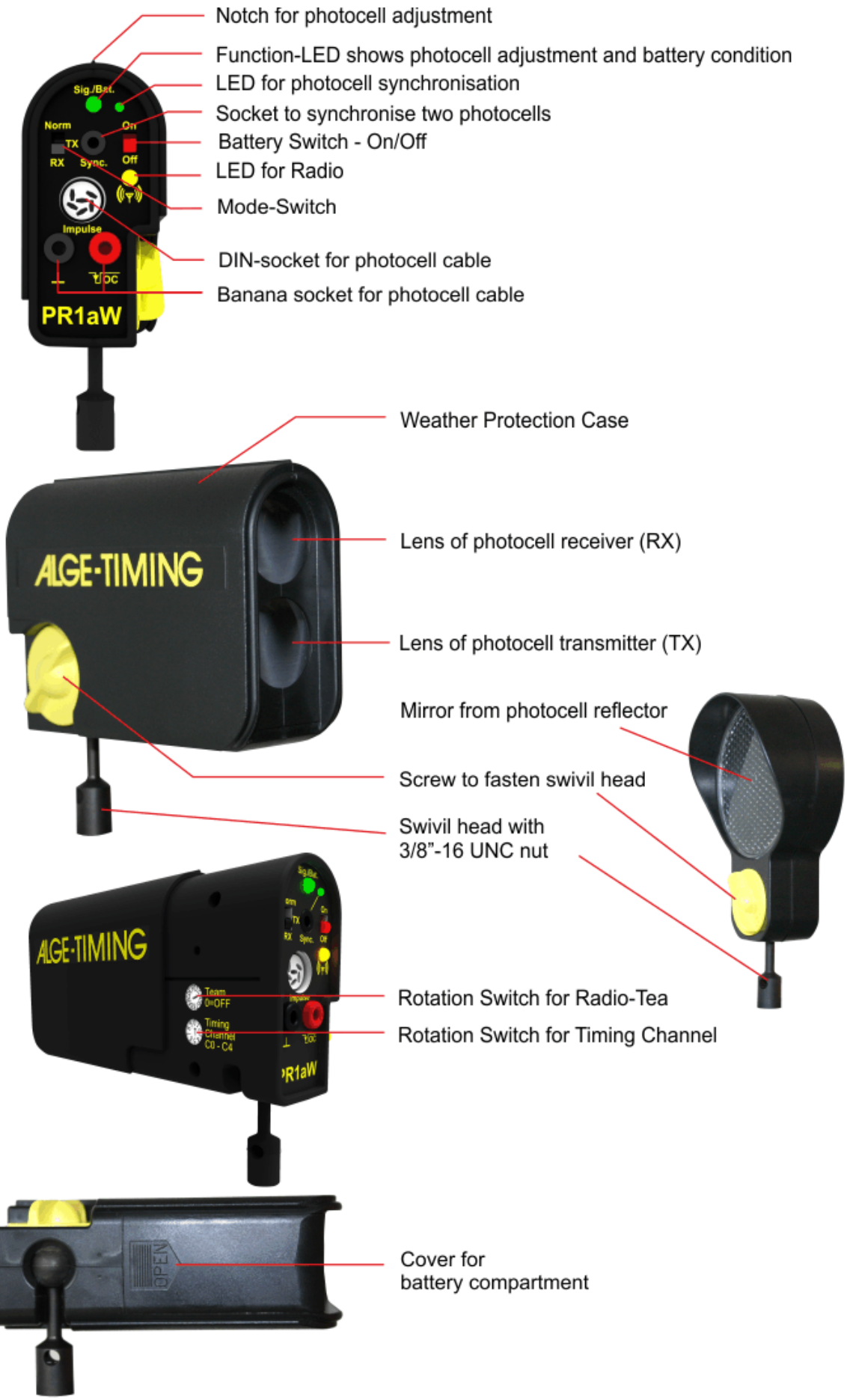
Additional Information:
The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC, also the EMC Directive 2004/108EG and accordingly carries the CE-marking.

Lustenau, 19.10.2012

ALGE-TIMING GmbH

Albert Vetter

Albert Vetter
(General Manager)


Notch for photocell adjustment
Function-LED shows photocell adjustment and battery condition
LED for photocell synchronisation
Socket to synchronise two photocells
Battery Switch - On/Off
LED for Radio
Mode-Switch
DIN-socket for photocell cable
Banana socket for photocell cable
Sig./Bat.
Norm
On
TX
RX
Sync.
Off
Impulse
PR1aW
Weather Protection Case
ALGE-TIMING
Lens of photocell receiver (RX)
Lens of photocell transmitter (TX)
Mirror from photocell reflector
Screw to fasten swivil head
Swivil head with
3/8"-16 UNC nut
Team
0=OFF
Timing
Channel
C0 - C4
Rotation Switch for Radio-Tea
Rotation Switch for Timing Channel
OPEN
Cover for
battery compartment

Contents

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. The photocell can send the timing impulse by cable or radio.

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)
- Indication for radio function
- Rotation switch to adjust the timing channel for radio use
- Rotation switch to adjust the radio frequency
- Synchronisation of two photocells (main and backup), to prevent interferences
- Setting of delay time (approx. 20 ms to 2 s /factory setting = 20 ms)

1.3 Photocell Sets

According to the photocell set it can consist of the following parts:

Photocell PR1a

Reflector PR1a-Ref

Mounting bracket BBG

Mounting bracket B-S1

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 PR1aW-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 PR1aW, 1 x PR1a-Ref, 2 x BBG, 1 x 001-10 (10m)

1.3.2 Reflection photocell PR1aW-RT:

Same as reflection photocell PR1aW-R, without mounting brackets BBG but with tripods and 30 m photocell cable.

Range: approx. 24 m
Photocell set: 1 x PR1aW, 1 x PR1a-Ref, 2 x TRI128, 1 x 001-30 (30 m)

1.3.3 One-way photocell PR1aW-dT:

Same as one-way photocell PR1aW-d, without mounting brackets BBG but with tripods and 30 m photocell cable.

Range: more than 150 m
Photocell set: 2 x PR1aW, 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 PR1Wa sends from the transmitter an infrared light beam that is reflected by the reflector and analized by the receiver. The maximum range of the photocell is 25 m (distance between photocell and reflector).

This photocell requires the following parts:

- Photocell PR1Wa (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 PR1aW (switch setting RX – see below) is needed. The transmitter sends an infrared light beam to the receiver. The maximum range is approx. 150 m. The receiver photocell must be the one with integrated radio, since the receiver photocell will send the impulse to the timing device.

3 Power Supply

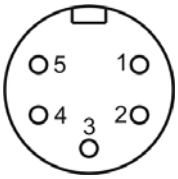
The photocell can be supplied in different ways. The easiest supply is carried out with the included cable 001-10 (or 001-30) directly from the ALGE timing device.

In radio mode the photocell must be supplied with batteries (2 x AA battery in photocell).

Current consumption without battery: battery with 2,5 VDC: 20 - 46 mA
timing devices 5 Vstab: 9 - 20 mA

Current consumption with battery: battery with 2,5 VDC: 40 - 90 mA
timing devices 5 Vstab: 18 - 40 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 is 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.

Battery Type	Photocell without Radio		Photocell with Radio	
	1 impulse per minute		1 impulse per minute	
	-20°C	20°C	-20°C	20°C
Alkaline Battery - 2,8 Ah	apporx. 17 h	apporx. 77 h	apporx. 9 h	apporx. 30 h
NiCd rechargeable - 1,1 Ah	apporx. 11 h	apporx. 28. h	apporx. 6 h	apporx. 14 h
NiMH rechargeable - 2,7 Ah	apporx. 57 h	apporx. 70 h	apporx. 28 h	apporx. 35 h

If the photocell PR1aW 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 LED-Operating Mode Indication

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 aligend	No indication
permanently green	Photocell optimally aligend	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

- If you use the photocell in the radio mode please check if you have full batteries in the battery compartment.
- Adjust with rotation switch used Radio Team (same radio team as other network members).
- Adjust with rotation switch the timing channel (e.g. start impulse = 0, finish impulse = 1).
- Screw mounting brackets BBG to wooden pole and/or position tripods TRI128
- Screw photocell and reflector on mounting brackets 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

- If you use the photocell in the radio mode please check if you have full batteries in the battery compartment.
- Photocell Receiver: Adjust with rotation switch used Radio Team (same radio team as other network members).
- Photocell Receiver: Adjust with rotation switch the timing channel (e.g. start impulse = 0, finish impulse = 1).
- Screw mounting brackets BBG to wooden pole and/or position tripods TRI128
- Screw photocells on mounting brackets 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.

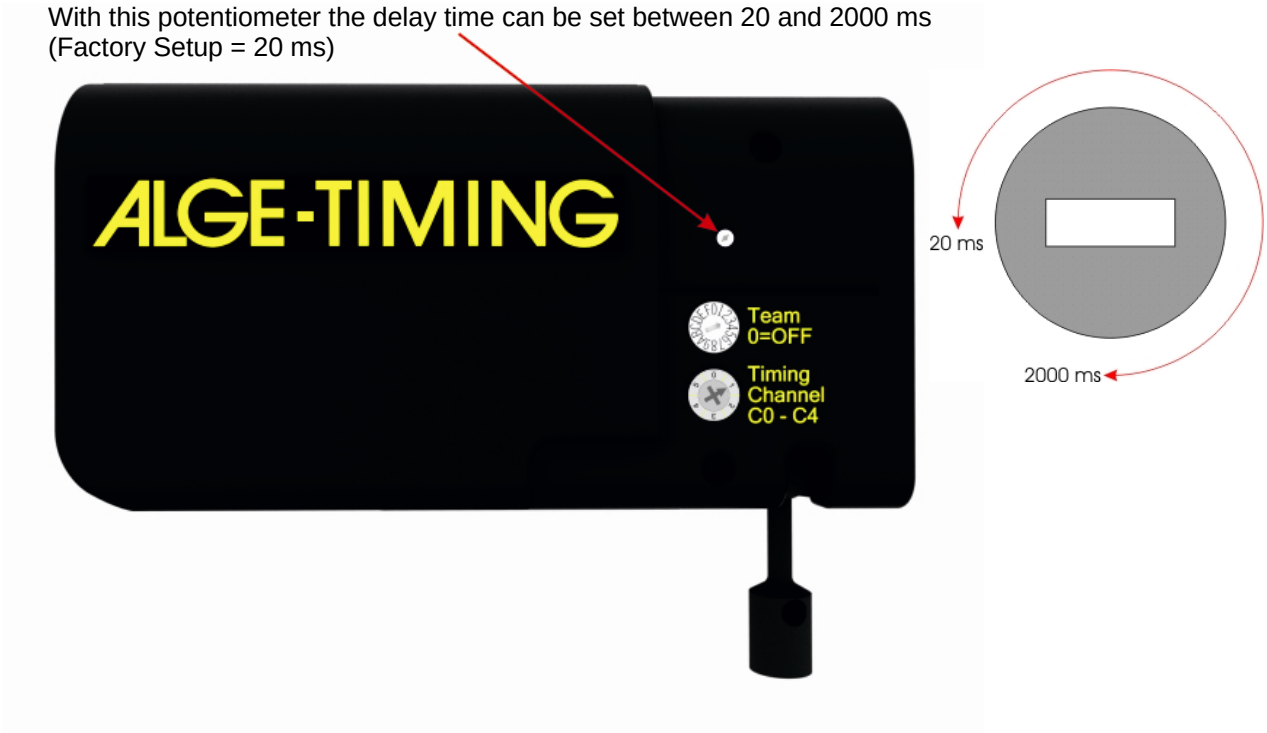
- Switch operating mode of receiver photocell to RX – LED works like the one of the reflection photocell.
- After each photocell pulse the operating mode LED of the receiver photocell flashes green for several seconds (indication for good photocell reception) before the battery condition is indicated again.
- **Attention**: The timing device has to be connected to the receiver photocell.

5.3 Setting of Delay Time

We recommend to set the delay time, if possible, at the timing device. At the factory, the delay time of the photocell is set to the minimum which is 20 ms.

The delay time can be set with a screwdriver between 20 and 2000 ms. To reach it you have to pull out the weather protection first.

Definition of delay time:
The delay 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.



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 does 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

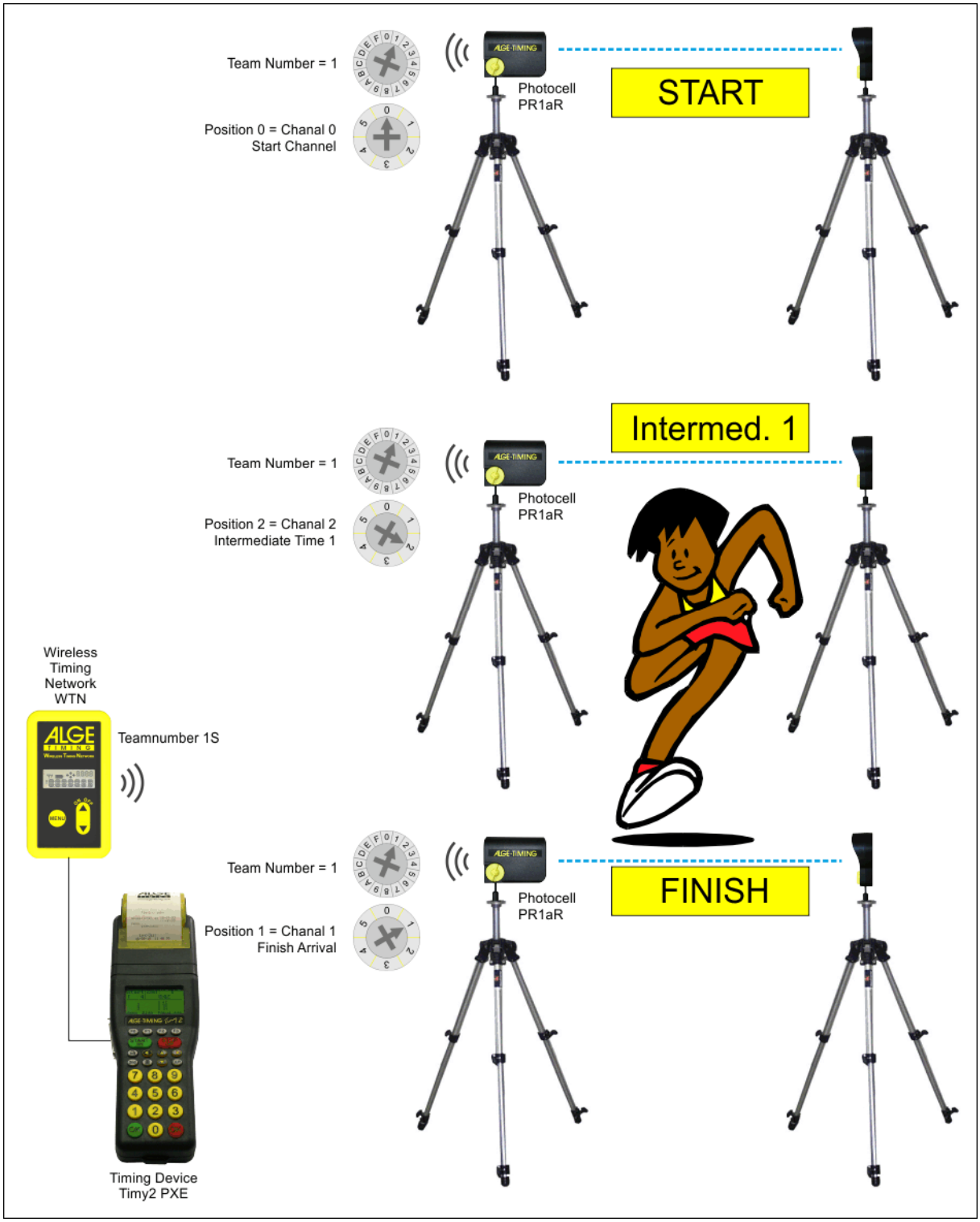
The weather protection can be pulled out. With pulled out weather protection the lenses are protected from snow and rain. If the photocell is used on a glacier it is essential to pull out the weather protection. Otherwise the increased UV radiation can cause interferences.

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 Radio Function

The ALGE Wireless Timing Network WTN is a compact radio system for timing and is equipped with the most updated technology. The photocell PR1aW has a WTN-radio module built in and is fully compatible with the WTN

A radio network consists of two or more devices of the WTN series. In such a network every device communicates with every other device inside the network.



The network is designed in such a way that you can transmit data to a display board (e.g. ALGE GAZ or D-LINE), serial RS232 data (e.g. to a PC) and timing impulses at the same time.

When designing the Wireless Timing Network the ALGE development team concentrated on features that make ALGE devices unique, but also on features that stand for ALGE products: easy operation, highest reliability, rugged casing. Up-to-date technology, integrated in a solid case, results in exceptional features.

Attention: Before using the device make sure that you are allowed to operate it in your country. The radio power output must be adjusted so that it is legal to use it in the country you operate it in.

The quality of the network status for a WTN system is crucial. Before you start to use the WTN network check the connection quality of every WTN device used in the system. In order to work in a stable network every WTN should show at least a good connection quality (the radio indication of the PR1aW should blink green).

7.1 Radio Power Output

The radio power output is adjusted to 10 mW. It can be adjusted between 10 mW and 100 mW. It is not possible to change the power output direct in the photocell. If you adjust the power output in another device of the network (e.g. Wireless Timing Network WTN), than it will set all devices in this network to the new adjusted power output (also as well the photocell PR1aW).

7.2 Switching the Radio Module On or Off

If you have the rotation switch on zero the radio is off. If you select other positions the radio is on and you have selected a certain team number (frequency).

7.3 Adjustment of Team Number

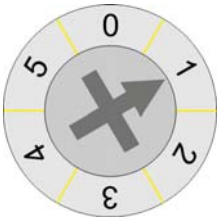
This function is to select the team number of a WTN system. You can select between 15 team numbers. There are 9 single teams (S) and 6 common teams (A). The factory setting is 1 (single mode).

Separate Teams <S> = SINGLE
Used for completely independent networks. If you operate two networks next to each other both networks work in this mode on different frequencies and do not communicate among each other.
Single = rotation switch 1, 2, 3, 4, 5, 6, 7, 8 and 9

Joint Teams <A> = ALL
Used for networks that work independently next to each other. If different A teams with the same radio channel are operated, the other A teams can be used for data transmission. The data of the other team however is not used (e.g. for two show jumping grounds that are next to each other).
All = rotation switch A, B, C, D, E and F

7.4 Adjustment of Timing Channel

For timing you can choose between 5 adjustable timing channels that are transmitted to the receiver. The factory setting: C1
Selection: C0, C1, C2, C3 or C4



Adjust the timing channel here

For ALGE-TIMING the following timing channe
0 = C0 = Start Channel
1 = C1 = Finish Channel
2 = C2 = Intermediate Time 1
3 = C3 = Intermediate Time 2 or Start Channel 2
4 = C4 = Intermediate Time 3 or Finish Channel 2

7.5 LED for Radio

The LED for the radio shows the communication status with other devices in the same network (device with the best reception).

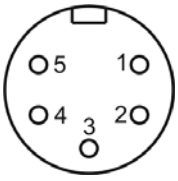
LED status	Function
off	radio off or on network
red blinking	very bad network reception
orange blinking	bad network reception
green blinking	good network reception

8 Technical Data

8.1 Photocell

Range with reflector:	0.5 to 25 meter	
Range with transmitter and receiver:	0 to over 150 meter	
Pulse output:	NPN Transistor, Open Collector, active low	
Reaction time:	300 µs, 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 PR1aW:	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 ALGE timing device: 5 VDC stabilized external supply: 4 - 18 VDC internal battery: 2 x AA batteries	
Power consumption without radio:	battery with 2.5 VDC: timing device with 5 Vstab:	20 - 46 mA 9 - 20 mA
Power consumption with radio:	battery with 2.5 VDC: timing device with 5 Vstab:	40 - 90 mA 18 - 40 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)

8.2 Built in Radio

Frequency:	2.4 GHz band (16 adjustable frequencies)
Power Output:	10 mW or 10 to100 mW (adjustable)
Timing Channels:	5 different timing channels (c0 (start), c1 (finish), c2, c3, c4)
Maximum Distance:	about 300 m at free sight

Subject to changes

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