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Light barrier with counter

11207-30

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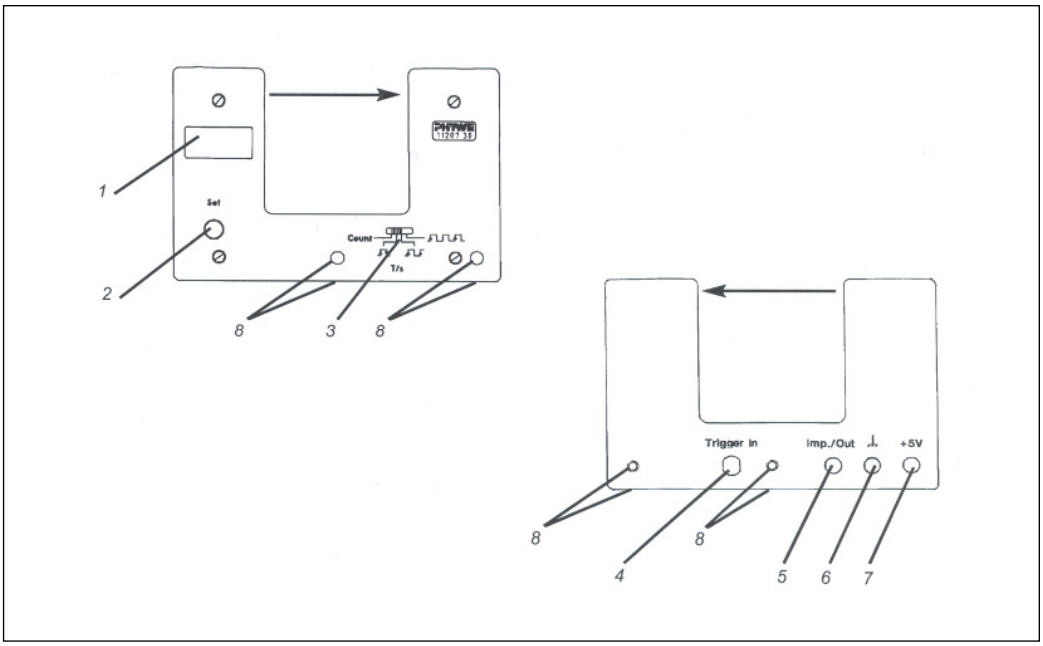

Fig. 1: Light barrier with counter 11207-30.

Operating instructions

CE The unit complies with the corresponding EU guidelines.

CONTENTS

1 SAFETY PRECAUTIONS

Attention!

- Carefully read these operating instructions completely before operating this instrument. This is necessary to avoid damage to it, as well as for user-safety.
- Only use the instrument for the purpose for which it was designed.
- Only use the instrument in dry rooms in which there is no risk of explosion.
- Protect the instrument from dust, moisture and vapours. Only clean it in voltage-free state with a slightly moistened, lint-free cloth. Aggressive cleaning agents and solvents are unsuitable.
- Do not open the unit.
- Do not connect any other pieces of equipment other than those specified to the instrument.
- The optical path is composed of non-visible infrared radiation. Do not look into the emitter (optical path).

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2 PURPOSE AND DESCRIPTION

The Light Barrier with Counter combines the characteristics of a precision fork type light barrier with the function of an electronic timing and counting device.
Only a very narrow beam impinges on the receiver which is recessed in a small hole to give full protection against extraneous light. This means that an object with an effective diameter of less than d = 1 mm, positioned anywhere in the beam, is sufficient to reliably cut off the light to the receiver. Close to the receiver hole, a diameter of d = 0.3 mm is sufficient.
The device is ready for operation immediately after applying the operating voltage („switch-on").
The trigger sensitivity is optimally set automatically after switch-on and each time the SET button is pressed. If objects inside an absorbing medium are to be detected, e.g. between two glass plates of a cuvette, the sensitivity must be readjusted by pressing the SET button (or switching off then on) after positioning the absorber in the fork.
Any evaluation device, e.g. a digital counter, can be connected to the output of the light barrier.

3 FUNCTIONAL AND OPERATING ELEMENTS

1 Four-figure digital display

2 SET button

3 Operating mode switch
1. Pulse counting
2. Time measurement when light gap is blocked
3. Time measurement between two light-gap blockages
4. Time measurement between the first and third blockage (i.e. duration of a pendulum swing).

4 Input socket (BNC) for externally starting and/or stopping the time measurement in mode 2, 3 and 4 (Detailed description under 4.6)

5 TTL output (4 mm socket) for controlling peripheral equipment (Detailed description under 4.5)

6 *Ground connection (4 mm socket).*
Acts as reference contact for TTL output 5 and power supply connection 7

7 *Power supply connection (4 mm socket).*
Required voltage +5 V ± 5 % with respect to ground connection 6.

8 *Threaded sockets*
for screwing in the post supplied with the barrier. A total of seven threaded sockets (M6) are available.

4 HANDLING

The light barrier is supported suitable to the measurement task being undertaken. The following is, for example, suitable as a power supply:
Power supply 5 V DC / 4 A with 4 mm plugs A (11077-99). No separate power supply unit is required if the light barrier is operated in conjunction with the following devices:

Universal Counter	13601-99
Timer 4 – 4	13604-99
Timer 2-1	13607-99
Cobra4 Sensor-Unit Timer/Counter	12651-00

For all operation modes:
Firstly, select the desired operation mode with switch *3* and then press the SET button. Make sure that the light barrier is not blocked while you press the SET button. Only then is a previously selected operation mode concluded. The pressing of the SET button always prepares a measurement process. This process must be carried out before a new selection of operation mode can be undertaken.

4.1 Pulse counting

— Set the operating mode switch *3* in the position „Count".
— Press the SET button.
The light barrier counts the number of light blockages..

4.2 Time measurement during light blockage

— Set the operating mode switch in the position
"  ".
— Press the SET button.
After pressing the SET button, three digits are visible, the unit is prepared for measurement.
The duration between two light blockages is measured and displayed. Measurement range: 0 to 9.999 s. A new measurement is only possible after pressing „SET".

4.3 Time measurement between two light blockages

— Set the operating mode switch in the position „  "
— Press the SET button.
After pressing the SET button, three digits are visible, the unit is prepared for measurement.
The duration between two light blockages is measured and displayed. Measurement range: 0 to 9.999 s. A new measurement is only possible after pressing „SET".

4.4 Time measurement between the first and third blockage

— Set the operating mode switch *3* in the position
"  "
— Press the SET button
After pressing the SET button, four digits are visible, the unit is prepared for measurement. The duration between the first and third blockage is measured and displayed. Measurement range: 0 to 9.999 s. Renewed measurement is possible only after repressing the SET button.

4.5 Control of external measurement instruments

TTL-output *5* is intended for the control of external measurement instruments. If the operating mode switch is in

the "count" or "  " mode, the electrical state of the control output during blockage of the light barrier is 0 (i.e approx. 0 V). When the light barrier is not blocked, the control output is 1 (i.e. > 3.6 V). In this way, external measurement instruments can be controlled .

In the operating modes "  " and "  "
the electrical state of the control output changes with the first blockage from 1 to 0 and with the last blockage from 0 to 1.

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4.6 Triggering of the light barrier

If the operating mode switch is set to Position 2, 3 or 4, then the light barrier with counter can also be controlled by a second light barrier. The control output of the second light barrier is connected to the socket 4 "Trigger in". Start and stop are now triggered by both light barriers in the same manner. This arrangement is particularly suitable for track experiments. If the second light barrier with counter is also 11207-30, then its operating mode switch must be set to "count" or

„ ▲ ▼ “ (Additional BNC adapter (07542-26) required).

5 NOTES ON OPERATION

This high-quality instrument fulfils all of the technical requirements that are compiled in current EC guidelines.
This instrument is only to be put into operation under specialist supervision in a controlled electromagnetic environment in research, educational and training facilities (schools, universities, institutes and laboratories).
This means that in such an environment, no mobile phones etc. are to be used in the immediate vicinity. The individual connecting leads are each not to be longer than 2 m.

The instrument can be so influenced by electrostatic charges and other electromagnetic phenomena that it no longer functions within the given technical specifications. The following measures reduce or do away with disturbances:
Avoid fitted carpets; ensure potential equalization; carry out experiments on a conductive, earthed surface, use screened cables, do not operate high-frequency emitters (radios, mobile phones) in the immediate vicinity.

Should a black-out failure occur, briefly break the connection to the supply voltage and then carry out a restart.

6 TECHNICAL SPECIFICATIONS (typical for 25°C)

Operating temperature range	5 ... 40°C
Relative humidity	< 80%
Width of fork	70 mm
Wavelength of emitted radiation	approx. 950 nm (infrared)
Trigger sensitivity matching	automatic optimisation of the trigger point
Max. operating frequency	25 kHz
Minimum darkening period	20 µs
Signal rise time	0.6 µs
Output (two 4mm sockets)	continuously short-circuit proof
Time measurement	
Measurement range	0 ... 9.999 s
Resolution	1 ms
Pulse counting	
Measurement range	0 ... 9999 pulses
Limiting frequency	25 kHz
Operating voltage (stabilised)	5 V ± 5%
Current consumption	approx. 130 mA
Reverse-polarity protection of the operating voltage	unlimited in time
Temperature range	5 ... 45°C
Thread for mounting	M6
Post length*	125 mm

* Further threaded posts with other lengths available on request.

7 WASTE DISPOSAL

The packaging consists predominately of environmentally compatible materials that can be passed on for disposal by the local recycling service.

Should you no longer require this product, do not dispose of it with the household refuse.
Please return it to the address below for proper waste disposal.

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