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# Product Description

## 1. Proper use

The HELIO-STROB is a stroboscope (light flashing instrument) for industrial applications. This instrument is used to produce snapshots of sequences which, due to the rapidity with which they proceed, are not perceivable by the human eye.



Please note that operating the instrument in explosion hazardous environment is strictly forbidden.

Appropriate use also includes reading and understanding these operating instructions and complying with the information given in them, especially the safety information. This also includes carrying out all the inspection and maintenance work at the specified intervals.

The operation of stroboscopes may cause failure or interferences of nearby radio devices or radio service. In this case, suspend the operation of the instrument. As a basic principle, keep the operation of the instrument as short as possible.

To avoid personal injury or damage to the equipment, only qualified, trained and authorised personnel should operate the HELIO-STROB.

Safe operation cannot be assured if the HELIO-STROB is not used in accordance with the above definition of appropriate use.

The user, not the producer, shall assume any liability related to any personal injury or material damage resulted from the inadequate use of the instrument.

## 2. Scope of supply / Design

### 2.1 Scope of supply

The standard scope of supply consists of the following components:

- Control unit
- Hand-held lamp incl. flash tube and connecting cable
- Allen wrench 2.5 mm
- Power connecting cable
- Operation manual

Please check if the scope of supply is complete!

### 2.2 Design

The instruments are designed and manufactured according to acknowledged safety rules and the current state of the art.

The basic design of HELIO-STROB consists of the following components:

|  |   |
|--|---|
| Case (control unit)                      | Rugged aluminum case with adjustable unit handle            |
| Case (hand-held lamp)                    | Metal case with tripod connector and unit handle            |
| Power supply                             | 110V / 230V 50-60 Hz, adjustable by voltage selector        |
| Operation                                | Function keys and adjusting knob                            |
| Display                                  | Five-digit seven-segment display                            |
| Connection control unit / hand-held lamp | Cable length 2m (standard)<br>Cable connections (pluggable) |
| Signal input / output                    | Diode female connector                                      |

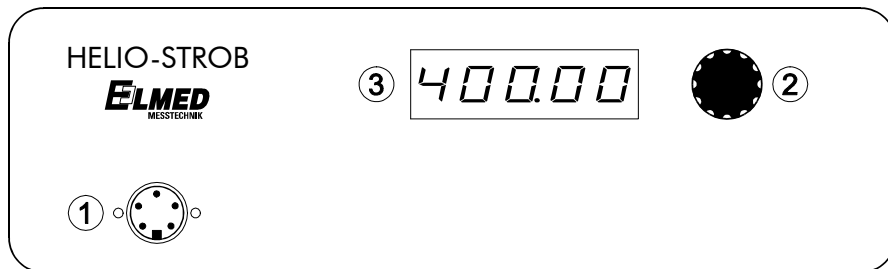


To avoid personal injury and damage to the equipment, repairs must be performed only by professionally trained technicians authorised by ELMED.

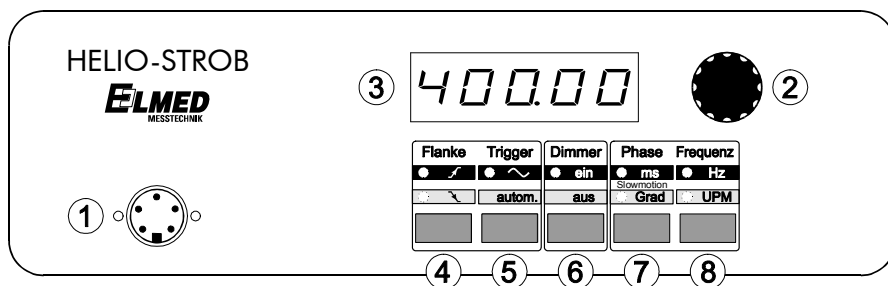
Take special care when opening the device and/or the hand lamp, since it is then possible to touch parts carrying a voltage that is considerably higher than the supply voltage.

## 2.3 Operation instructions

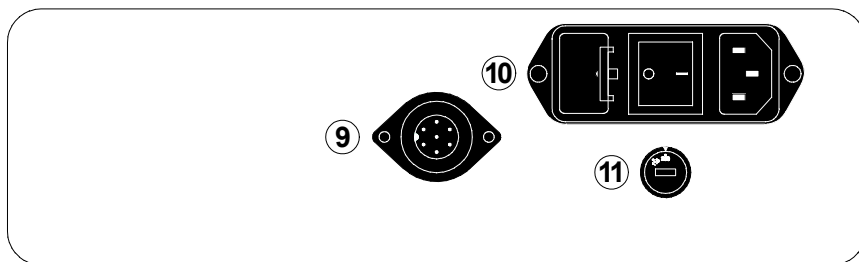
### 2.3.1 Controls – front panel ALPHA



### 2.3.2 Controls – front panel BETA / BATA A2



### 2.3.3 Controls – rear panel



## 2.3.4 Controls – hand-held lamp



### **3. Functional description**

Stroboscopes (Greek strobos = rotation, skopein = observe) are used to make snapshots of sequences which due to their rapidity are not perceivable by the human eye.

For the observation of rapid movements, whether with the human eye or with a camera. Thanks to their designs the HELIO-STROB series offers numerous possibilities. A robust, service-friendly metal twinshell case with "stand/handle" and a separate hand lamp provide maximum flexibility and open up new possibilities for applications in the field of the visualisation of movement sequences and vibration processes. For any requirement there is the optimal solution. Besides the precise internal triggering, external or – depending on the version – mains triggering are available. Thanks to the microprocessor technology any change between high-precision tuning and a frequency change in large steps is possible.

## 4. Technical data

| Instrument type  | HELIO-ALPHA  | HELIO-BETA   | HELIO-BETA A2  |
|--|--|--|--|
| Power supply   | 115/230 VAC<br>50/60 Hz<br>(switchable)                                | 115/230 VAC<br>50/60 Hz<br>(switchable)                                | 115/230 VAC<br>50/60 Hz<br>(switchable)                                |
| Power consumption  | approx. 80 W   | approx. 80 W   | approx. 80 W   |
| Twin-shell metall case with handle / stand               | 280 x 240 x 80 (mm)  | 280 x 240 x 80 (mm)  | 280 x 240 x 80 (mm)  |
| Weight   | approx. 2.3 kg<br>(control unit)<br>approx. 1.5 kg<br>(hand-held lamp) | approx. 2.3 kg<br>(control unit)<br>approx. 1.5 kg<br>(hand-held lamp) | approx. 2.3 kg<br>(control unit)<br>approx. 1.5 kg<br>(hand-held lamp) |
| Light source   | quartz flash tube plug-in,<br>installed in separate<br>hand-held lamp  | quartz flash tube plug-in,<br>installed in separate<br>hand-held lamp  | quartz flash tube plug-in,<br>installed in separate<br>hand-held lamp  |
| Internal control of the flash rate by                    | twist knob and<br>digital display                                      | twist knob and<br>digital display                                      | twist knob and<br>digital display                                      |
| External control of the flash rate by                    | oscillator,<br>pos. Impulse 5 to 30V                                   | oscillator,<br>pos. Impulse 5 to 30V                                   | oscillator,<br>pos. Impulse 5 to 30V                                   |
| Frequency range in Hz / r.p.m.                           | -<br>60 - 24000 r.p.m.   | 1 - 400 Hz /<br>60 - 24000 r.p.m.                                      | 1 - 400 Hz /<br>60 - 24000 r.p.m.                                      |
| Measured value display                                   | digital, 5-digit<br>7-segment display, red,<br>character height 13mm   | digital, 5-digit<br>7-segment display, red,<br>character height 13mm   | digital, 5-digit<br>7-segment display, red,<br>character height 13mm   |
| Display in Hz / r.p.m.                                   | no / yes   | yes / yes  | yes / yes  |
| Measuring range switching                                | automatic  | automatic  | automatic  |
| Measurement duration                                     | 0.33 s (min. 1 period)   | 0.33 s (min. 1 period)   | 0.33 s (min. 1 period)   |
| Resolution of the display                                | 1 r.p.m.   | 1 r.p.m. / 0.01 Hz   | 1 r.p.m. / 0.01 Hz   |
| Phase shifting   | no   | yes  | yes  |
| Display in degrees / ms                                  | -  | yes / yes  | yes / yes  |
| Range degrees / ms                                       | -  | 0° - 540° / 0 - 650 ms   | 0° - 540° / 0 - 650 ms   |
| Resolution degrees / ms                                  | -  | 0,1° / 0,01 ms   | 0,1° / 0,01 ms   |
| External triggering                                      | yes<br>works adjusted to negative flank, positive flank on request     | yes<br>trigger flank freely adjustable with switch                     | yes<br>trigger flank freely adjustable with switch                     |
| Light output<br>range 1<br>range 2<br>range 3<br>range 4 | 0,4 Ws<br>0,1 Ws<br>-<br>-   | 0,4 Ws<br>0,1 Ws<br>-<br>-   | 1,4 Ws<br>1,1 Ws<br>0,4 Ws<br>0,1 Ws                                   |
| Light intensity at 50 cm distance                        | max. 2700 Lux  | max.2700 Lux   | max. 6600 Lux  |
| Overall power  | 50 W   | 50 W   | 50 W   |
| Operating temperature                                    | 0°...+40°C   | 0°...+40°C   | 0°...+40°C   |
| Storage temperature                                      | -20° ... +60°C   | -20° ... +60°C   | -20° ... +60°C   |
| Air humidity   | 80% relative air humidity at 30°C                                      | 80% relative air humidity at 30°C                                      | 80% relative air humidity at 30°C                                      |

## 5. General features

### 5. General features

This unit ...

- ... attains its high, very **constant brightness** by modern switching power supply technology.
- ... is easy to use with **automatic range switching**.
- ... achieves the **high precision** of its frequency and phase shifting due to the applied microprocessor technology.
- ... ensures safe operation by an integrated **monitoring function**.
- ... allows the user to work rationally with its **convenient** and **simple operation**.
- ... allows use in numerous applications due to the **internal and external triggering**.
- ... is equally suitable for **industrial use** and for **laboratory applications**.
- ... bears the CE symbol.

#### Typical applications:

- Observation of rapidly occurring processes, whether with the human eye or with a camera.
- Speed measurements on rotating objects without using reflex brands.
- In high-speed photography / film, to get shots with as little motion blur as possible.



## EC Declaration of Conformity

It is herewith confirmed that the product listed below

HELIO-STROB ALPHA, BETA, BETA A2

meets the safety requirements within the scope of the conformity evaluation procedure of the related competent authority, which are defined in the regulation 2004/108/EG of the European Council for the approximation of laws of the member states with respect to electromagnetic compatibility. The same applies to the provisions of the law on electromagnetic compatibility of instruments (EMVG) as of 9 November 1992. This declaration applies to all units that are manufactured in accordance with the appropriate manufacturing documentation which is part of this declaration. For the evaluation of products regarding the electromagnetic compatibility relevant harmonised standards have been used.

DIN EN 61000-6-1

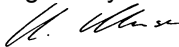
DIN EN 61000-6-3

**Design-engineering modifications that have such significant effects on the technical specifications and the proper use defined in this operation manual so as to change the instrument considerably shall nullify this declaration of conformity.**

This declaration shall be legally binding for the manufacturer.

ELMED Dr. Ing. Mense GmbH, Heiligenhaus

signed by



Claudia Mense

Managing Director

Heiligenhaus, 11.10.2011

# General Safety Instructions

## 1. Explanation of safety symbols used in this manual

The following symbols are used in this manual:

- Safety symbols call attention to adjoining safety notes.
- Instruction symbols indicate important information that should be strictly observed.

This symbol indicates that non-observance could lead to dangers.



This symbol indicates information to be used for a better understanding of processes.



These operating instructions apply equally for the equipment versions HELIO-STROB ALPHA, BETA and BETA A2. Chapters and sections which do **not** apply to all equipment types are marked.

Example:

ALPHA                BETA                        BETA A2           

The chapter/section applies only to the equipment versions BETA and BEAT A2.

## 2. User's due diligence

The HELIO-STROB has been developed and manufactured in consideration of hazard analyses and in compliance with the relevant harmonized standards as well as the additional technical specifications. Therefore, the HELIO-STROB is a state-of-the-art instrument and offers a maximum of safety.

This safety can be achieved only if all required safety precautions have been taken. Subject to due diligence, the user of this instrument shall plan such precautions and supervise their execution.

The user shall particularly ensure that

- the HELIO-STROB is used properly (see chapter Product description)
- the instruments are operated only if in perfect, fully functional condition
- the complete operation instructions are legible and available at the place where the instrument is used.
- the instruments are operated only by adequately qualified and authorised personnel which is regularly trained in all aspects related to occupational health and safety; this personnel knows and follows the operation instructions, especially the relevant safety regulations contained therein.
- all safety and warning labels are clearly legible and none of them are removed from the instrument.

### 3. Special hazards



In case of **users with a neurological proneness to epileptic seizures**, the light effects produced by a stroboscope may cause photo induced epilepsy. Users with such predisposition must not use stroboscopes!



#### **Safety precautions for persons with active implants**

When using a stroboscope an influence on active implants (e.g. pacemakers) cannot be excluded with certainty. For safety reasons we recommend to exclude users with active implants from working with a stroboscope. Persons with active implants are to be instructed in this regard.

### 4. Basic rules on safety precautions



Within professional organizations the employer / entrepreneur has to inform the employees / insured workers about the possible hazards related to their work and the safety precautions to be applied. This shall include the current findings regarding hazard avoiding procedures and eyelid protective reflexes.




- Do not look into the flash tube directly and unprotected as this could be dangerous for the eyes – especially over longer periods of time.
- Due to dazzle effects caused by the flashlight at short distances, the ability to see may be disturbed in such manner as to make orientation impossible.
- Flashlights shall not be directed to the eyes of other persons.

## 5. Basic safety measures

The basic safety guidelines and regulations of the corresponding professional associations and organisations shall apply.

Before starting up the HELIO-STROB, check that the controller, the hand lamp and all the connected cables are undamaged and in perfect working condition. Likewise check that all the plug connections have been properly connected (e.g. locking).

|   |   |
|---|---|
|  | <p>Take special care when changing the flash tube.</p> <p>The flash tube gets very hot in use – danger of burns.</p> <p>Before touching the flash tube to change it, let it cool down and take the following safety measures:</p> <ul style="list-style-type: none"><li>Switch off the stroboscope</li><li>Disconnect the controller from the mains (by pulling out the mains power cable)</li><li>Remove the plug of the hand lamp cable from the controller</li><li>Allow the flash tube to cool down for at least 5 minutes before removing the reflector housing.</li></ul> |
|---|---|

## 6. Requirements concerning the operating personnel

The HELIO-STROB may only be used by persons who have suitably been instructed and authorised. These persons must have read and understood the operating instructions, and in particular the section “Safety and warning information”, and then act accordingly.

They must have been instructed in the basic principles of health and safety at work and accident prevention.

### Initial startup

In order to prevent injury or damage when starting up the HELIO-STROB, it is essential to comply with the following points:

- The device may only be started up by suitable qualified persons and with due regard for the safety information given here.



Do not use any parts that have been damaged!

### 1. General steps to take when starting up



The HELIO-STROB is designed for power systems types TN-C and TN-S.



These power supply types provide for the immediate switch-off of the supply voltage if a contact occurs between supply voltage and grounded components of the instrument.

If operated within power systems other than the above, the user shall be liable for the electric safety.

Prior to switching on the instrument, check the correct setting of the voltage selector ⑪.

The value set by the voltage selector ⑪ must coincide with the level of the supply voltage.

the voltage selector ⑪ causes damage to the instrument.

- Connect the hand lamp and the control unit.  
Plug in the plug of the hand lamp cable into the corresponding socket ⑫ at the front of the control unit and then lock it in place. Turn the switch for the hand lamp so that it is ready for operation.
- Connect the control unit to the mains power.  
Plug in the plug of the mains cable into the corresponding socket ⑩ at the back of the control unit and connect the earthing contact plug of the mains cable to the mains socket.
- Switch on the device at the mains switch ⑩ at the back of the control unit. After performing a short self-test the unit loads the last values that were set for frequency / r.p.m., phase angle, etc. The current settings can be read from the display and the LEDs. The HELIO-STROB is now ready for operation.
- By pressing the switch on the back panel of the hand lamp the flash frequency is activated or interrupted.



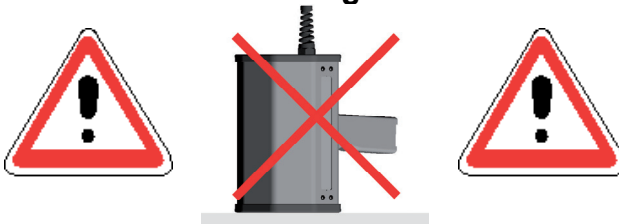
In order to protect the hand lamp from thermal destruction, the flash generation is automatically interrupted at the maximum operating temperature. After a cooling period the hand lamp switches on automatically.

### Depositing of the hand lamp:

#### Correct!



#### Wrong!



## 2. Funktional description

### 2.1 Adjusting the frequency / speed (internal clock)

ALPHA             BETA             BETA A2

“Internal operation“ is indicated on the display ③ by the steadily lit decimal point. The desired frequency / speed can be adjusted with the twist knob ②. The internal microprocessor controls the function of the twist knob according to the speed of rotation:

|                 |                                |
|-----------------|--------------------------------|
| rapid rotation: | rapid change in large steps    |
| slow rotation:  | fine adjustment in small steps |

ALPHA             BETA             BETA A2

“Internal operation“ is indicated on the display ③ by the steadily lit decimal point. This mode is selected by pressing the key ⑧. Pressing the key ⑧ again changes the display from Hz to r.p.m. (or vice versa). The desired frequency/speed can be adjusted with the twist knob ②. The internal microprocessor controls the function of the twist knob according to the speed of rotation:

|                 |                                |
|-----------------|--------------------------------|
| rapid rotation: | rapid change in large steps    |
| slow rotation:  | fine adjustment in small steps |



## 2.2.1 Adjusting the phase shift (standard)

ALPHA       BETA       BETA A2       Slow Motion

The HELIO-STROB is equipped with phase shifting, which is available with both an internal and external clock. This mode is activated by pressing the key ⑦. The desired phase value can be adjusted with the twist knob ②. Pressing the key ⑦ again changes the display ③ from degrees to milliseconds (or vice versa) depending on the initial setting.

A corresponding display or a correspondingly lit LED indicates the setting. The LED which indicates the setting “Phase in ms” blinks as soon as a value is set in “ms” which represents a phase angle greater than 360°.

### Note:

As the value “phase in ms” directly depends on the adjusted frequency, it is not constant. The reason for this is that the period becomes shorter with an increasing frequency.

## 2.2.2 Adjusting the phase shift together with slow motion (optional)

ALPHA       BETA       BETA A2       Slow Motion

The HELIO-STROB is equipped with phase shifting, which is available with both an internal or external control. This mode is activated by pressing the key ⑦. The desired phase value in ms can be adjusted with the twist knob ②. The LED which indicates the setting “Phase in ms” blinks as soon as a value is set in “ms” which represents a phase angle greater than 360°.

By pressing the key ⑦ again, the slow motion function is activated. A corresponding message is shown on the display. A lit LED provides for the suitable overview.

### Note:

As the value “phase in ms” directly depends on the adjusted frequency, it is not constant. The reason for this is that the period becomes shorter with an increasing frequency.

### 2.2.3 Slow Motion (optional)

ALPHA       BETA       BETA A2       Slow Motion

By means of the slow motion function the entire motion sequence of a test object can be observed. The slow motion function is available with both internal and external clock.

In order to activate this function, press the key ⑦ twice. When the function is activated, both LEDs are lit. With the twist knob ② you can set the desired slow motion effect. The adjustment range of the corresponding beat frequency is between 0.01 and 5 Hz.

The slow motion effect for the HELIO-STROB is based on the continuously increasing number of degrees of the phase shift. Thus the best possible image quality in every single observation phase is ensured.

**Note:**

In case the beat frequency is set higher than the flash frequency, the exceeding of the limit value is indicated by the blinking of the LEDs.

## 2.3 Control by external clock

An external trigger signal can be supplied at the socket ① “External clock“, with the frequency at which the stroboscope is to flash. The unit switches automatically to external mode when the external trigger signal is supplied. This mode is indicated on the display ③ by a flashing decimal point.

When an external trigger signal is supplied, it must be observed that the signal level and frequency **do not** rise above or fall below the permissible limits of the HELIO-STROB. When the permissible limits are maintained, the stroboscope follows the external clock.

Please also observe in the ADDITIONL INFORMATION item 2 “Problems and remedies“ and in the PRODUCT DESCRIPTION item 5 “Technical data“.

ALPHA                          BETA                                  BETA A2      

The unit can be returned to “internal mode“ by interrupting the connection to the external trigger and then briefly operating the twist knob ②.

ALPHA                                  BETA                                  BETA A2      

The unit returns to “internal mode“ when no trigger signal is detected for 3 seconds at the external input ①.

When “external triggering“ is used, the function “Flank“ is activated. The current setting is indicated by an LED.

The “Flank“ function is described in detail in item 2.5.6.

External trigger signals slower than 1 Hz are not indicated on the display; instead, the display blinks. External signals from 1 – 400 Hz are indicated on the display, the decimal point blinks. At frequencies > 400 Hz, the display blinks. The unit does not flash.

The facility of triggering the HELIO-STROB with an external signal < 1 Hz and the settings which must be made to cause an external signal to immediately trigger the stroboscope are described in 2.5.6.

## 2.4 Mains synchronous triggering

ALPHA                       BETA                       BETA A2

When the key ⑤ is pressed, the unit switches to the trigger mode “mains synchronised”. With this setting, the frequency of the mains supply is used as a trigger signal.



This trigger mode is recommended for the observation of objects moving synchronously with the mains supply. This also applies within limits to movements which represent a multiple or a fraction of the mains frequency. The selection of the trigger mode “mains synchronised” is indicated by an LED. The “Flank” function simultaneously becomes active.

The “Flank” function is described in detail in 2.5.6.

## 2.5 Flank

ALPHA                       BETA                       BETA A2

The trigger flank selection function is automatically activated in the trigger modes “mains synchronised” and “external clock”. The current setting can be seen by an LED. Changes in the setting are made by pressing the key ④.


|          |   |  |
|----------|---|--|
| Function |  | the flash tube flashes at a change in the trigger signal from “0” to “1” |
| Function |  | the flash tube flashes at a change in the trigger signal from “1” to “0” |

In item 2.3 it was explained that the HELIO-STROB can also be triggered by an external signal slower than 1 Hz. To achieve this, press the key ④, **without** an active external signal. The unit is now manually switched to the “external clock” mode and now also reacts to frequencies slower than 1 Hz. In this mode, the unit does not switch automatically to “internal mode”. The unit settings described above must also be made if an intermittent external trigger signal is to trigger the stroboscope immediately.

There is no implemented choice of the trigger flank for the “internal mode”.

## 2.6 Power control - dimmer

ALPHA  BETA  BETA A2

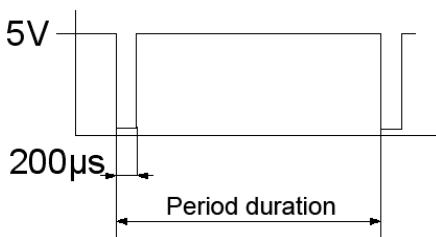
Upon pressing the “dimmer” key  the minimum brightness level is adjusted – independently of the respective frequency. This offers the possibility to work within the entire frequency range with the same brightness.

This function can be chosen in all operation modes of the HELIO-STROB and is indicated by an LED.

## 2.7 Trigger output

The HELIO-STROB is equipped with a trigger output, to control different devices. The signal between pin 4 and pin 1 of the socket “external clock” corresponds to the TTL level. The period duration depends on the flash rate,  $T_{Low}$  is constant ( $200\mu s$ ).

Signal:



# Maintenance

## 1. Storage

- Protect the instrument from damage by properly storing it in a dry room.
- To avoid condensation see that the storage temperature is kept. Storage temp.: -20°C .... +60°C (warming time constant >10K/h)

## 2. Maintenance

According to the design, the HELIO-STROB is not susceptible to disturbance. However, the following should be basically observed:

- Do not throw the instrument and do not expose it to heavy shocks.
- Protect the device from potential damage
- Clean the instrument by using only a soft, lightly-moist cloth. Use only mild detergents.

## 3. Inspection / Calibration

To maintain the reliability and the high quality standard of the HELIO-STROB over a long period of time, the instrument should be inspected by the manufacturer each year.

During inspections, all instrument specific functions are checked. A PTB (Physikalisch-Technische Bundesanstalt, the German Bureau of Standards) traceable manufacturer certificate is available on request. The results of inspections shall be documented in inspection sheets and stored in a database.

## 4. Repairs / Disposal

Instruments which are damaged or do not perform according to their specifications shall no longer be used. To provide for a safe and functional instrument, only original spare parts shall be used for repair.



To dispose of the old instrument according to legal rules and provisions, please send the HELIO-STROB to the manufacturer.

If your instrument requires inspection / repair or disposal, please send the unit DAP to:

ELMED Dr.Ing. Mense GmbH  
Stroboscope-Service  
Weilenburgstr. 39  
D-42579 Heiligenhaus

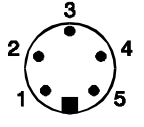


Proper execution of maintenance and repair is guaranteed only by the manufacturer or by qualified and authorised service centers.

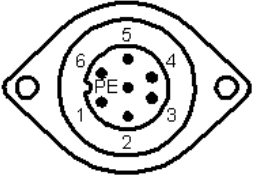
## Additional Information

### 1. Pin assignments

#### 1.1 Socket assignments “external clock”

| Socket  | Pin | Description          |
|---|-----|----------------------|
|  | 1   | 0 V (ground)         |
|   | 2   | +5 VDC               |
|   | 3   | 10-12 VDC            |
|   | 4   | Trigger output (TTL) |
|   | 5   | Clock input 5-30 V   |

#### 1.2 Hand-held lamp socket

| Socket   | Pin | Description      |
|--|-----|------------------|
|  | 1   | Anode voltage    |
|  | 2   | Not connected    |
|  | 3   | Ignition         |
|  | 4   | 115 / 230 VAC    |
|  | 5   | 115 / 230 VAC    |
|  | 6   | Cathode voltage  |
|  | PE  | Protective earth |



## 2. Problems and remedies

### **Problem:** No display, no flashing

| Possible cause/effect | Possible remedy    |
|-----------------------|--------------------|
| No cable connection   | Make connection    |
| Unit not switched on  | Switch the unit on |
| Mains fuse blown      | Replace the fuses  |

### **Problem:** Unit operates briefly and then switches off

| Possible cause/effect                    | Possible remedy   |
|--|---|
| Poor contact (loose connection)          | Check cable/plug  |
| Flash tube defective                     | Replace flash tube<br>(see 3. Replacing the flash tube)         |
| Flash tube in contact with the reflector | Insert flash tube centrally, replace silicone ring if necessary |

### **Problem:** No flashing, display and frequency adjustment in operation

| Possible cause/effect   | Possible remedy   |
|---|---|
| Flash tube defective  | Replace flash tube<br>(see 3. Replacing the flash tube) |
| Hand-held lamp not switched on                                | Press the switch on the hand-held lamp                  |
| No connection between the hand-held lamp and the control unit | Check the plug and cable                                |

### **Problem:** Flash sequence not periodic (intermittent ignition)

| Possible cause/effect                                      | Possible remedy   |
|--|---|
| Flash tube shows signs of ageing due to long period of use | Replace flash tube<br>(see 3. Replacing the flash tube) |

### **Problem:** Storage of the values for speed and phase angle in the memory does not work

| Possible cause/effect  | Possible remedy  |
|--|--|
| The unit is switched off too quickly after the values have been adjusted | Allow two seconds to expire between adjusting the values and switching off |

**Problem:** Display blinks and indicates minimum frequency, flash tube flashes

Possible cause/effect

External clock is lower than the lower limit of the range, the frequency cannot be displayed, the stroboscope flashes with the external clock

**Problem:** Display blinks and indicates maximum frequency, flash tube does not flash

Possible cause/effect

|   |   |
|---|---|
| External clock is faster than the maximum permissible frequency | Reduce the frequency of the external trigger signal |
|---|---|

**Problem:** Despite the supply of an external trigger signal, the unit does not switch to the external clock, the unit flashes with the internally generated clock



Possible cause/effect

|   |   |
|---|---|
| External signal is not detected                   | Check cable/plug<br>Compare the pin assignment of the plug with the "external clock" socket (see 1.1) |
| Signal level too low                              | Raise the input level (see 4.); if impossible, check whether a trigger adapter can be used            |
| Stroboscope was not switched to external mode yet | Press ④ key   |

**Problem:** Results of measurement do not conform with the expected result

| Possible cause/effect                   | Possible remedy        |
|---|------------------------|
| Measured object behaves not as expected | Check the object       |
| Operator error                          | Repeat the measurement |

### 3. Replacing the flash tube

|   |  |  |
|---|--|--|
|  | To avoid personal injury or damage to the equipment, install only approved flash tubes in this stroboscope. Unapproved flash tubes could cause a fire or explosion |  |
|---|--|--|

The flash tube is a consumable part that must be replaced sooner or later depending on the intensity of the usage. Unlike the glow lamp, in which a defect can be detected easily (burnout), the indication of a flash tube defect can be different:

- reduced brightness
- unsteady light (flickering)
- discoloured bulb jacket

To replace the flash tube, please proceed as follows:

- Switch the stroboscope off and pull out the power plug from the main socket.
- Disconnect the hand-held lamp by removing the hand-held lamp plug from the control component.
- If you have operated the flash tube before, you must wait for at least 5 minutes before executing the next steps for the flash tube to cool down.  
**Danger of burns!**
- Remove the surrounding edge protection and loosen the four mounting screws of the protective disk. Use the internal hexagon wrench included in the delivery scope for this purpose. The protective disk can now be taken out along with the reflector. Caution: For safety against electric shocks, the reflector is connected to the housing by means of an earthing cable. Do not disturb this connection!
- Take the old flash tube out of the insertion base by pulling the two facing stud bolts projecting from the base or on the installation ring.
- Take the new flash tube out of the packing. Avoid touching the lamp jackets with the fingers. Insert the flash tube into the base. While inserting the flash tube, touch only the stud bolts or the installation ring. The connecting points are arranged such that wrong polarity of the flash tube can be ruled out completely. Insert the new flash tube fully into the base; otherwise there may be reduced brightness or lack of uniformity in the light intensity.
- Install the protective disk containing the reflector properly by means of the four mounting screws. **Important!** Please check whether the flash tube is placed in the centre of the reflector cutout. Under no circumstances is the flash tube to be in contact with the reflector, as otherwise there can be **malfunctions!**

- Please also check the silicon ring in the reflector for damages; it provides protection against flashovers between flash tube and reflector.
- Finally, replace the edge protection on the hand-held lamp housing.