CONTENT

V. 11/2019

PRODUCT DESCRIPTION

1. Proper use

The HELIO-STROB micro2 is an LED stroboscope (light flashing instrument) for industrial applications. This instrument is used to produce snap-shots of sequences which, due to the rapidness they proceed, are not perceivable by the human eye.
More information on www.elmedgmbh.com

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.

It's prohibited to operate the instrument in explosionhazardous environments.

2. Design

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

Metal case	ABS (UL 94 HB) RAL 9002
Power supply	2 x AA alkaline / LR6 / NiMH
Light source	3 x ultra-bright red LED (CREE)
Operation	Membrane keyboard
Measured value display	digital (7-segment display)

3. Function description

The HELIO-STROB micro2 provides the following functions:

- phase shifting up to 360°
- alternative display of Hz (fps) and RPM (fpm)
- frequency selection by fast search mode (auto repeat)
- frequency divider and multiplier
- memory function
- adjustable flash duration
- external triggering

4. Technical specifications

Power supply	2 x AA alkaline (LR6) or 2 x AA NiMH accumulator (HR6)
Power consumption	60 – 1500 mA depending on operation mode
Metal case dimensions	140 x 62,7 x 38 (mm)
Weight	175 g
Light source	3 x ultra-bright LED (CREE)
Internal flash rate control	adjustable by membrane keyboard
External flash rate control	5 – 30 V (TTL compatible) positive / negative flank, adjustable
Frequency range	1 – 2000 Hz / 60 – 99999 fpm
Measured value display	digital, 5-digit 7-segment display, character height 8 mm, red
Display in fpm / Hz	yes / yes
Measuring time	0,33 s (min.1 period)
Display resolution	up to 0,01 fps / 0,1 fpm
Phase shifting	in degrees
Degree range	0 – 360°
Degree resolution	0,1°
Special functions	integral frequency multiplication / division (on internal trigger) automatic flash duration adjustment or set-up power save mode memory function
Light intensity	max. 3800 Lux (@ 50 Hz / 20 cm)
Radiation angle	19° or 42° (s. battery compartm.)
Precision	0.005 % ± 1 digit
Operating temperature	0° … +40°C
Storage temperature	-20° … +60°C
Air humidity	80% relative air humidity at 30°C
Protection class	IP40

NiMH accumulators are not to be deeply discharged. To prevent this, the optical warning ACCU appears in the display and the device is automatically shut off. The same applies to standard batteries.

EC Declaration of Conformity

It is herewith confirmed that the product listed below

HELIO-STROB micro2

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.

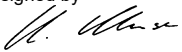
DIN EN 61000-6-1
DIN EN 61000-6-3

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, 28th August 2012

General safety instructions

1. User's due diligence

The HELIO-STROB micro2 has been developed and manufactured in consideration of hazard analysis and in compliance with the relevant harmonised standards as well as the additional technical specifications.
Therefore, the HELIO-STROB micro2 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 micro2 is used properly (see chapter Product description).
- the instruments are operated only if in perfect, fully functional condition.
- the complete operating 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 non of them are removed from the instrument.

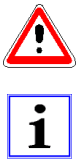
2. Special hazards

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

Safety Guidelines for people wearing active implants
When using stroboscopes, an influence of active implants (e.g. pacemakers) cannot be completely excluded. For safety reasons we recommend that people wearing active implants are excluded from working with stroboscopes. Persons wearing active implants have expressively to be instructed in this regard.

3. Basic rules on safety precautions

- Do not look into the LED-radiation directly and unprotected as this could be dangerous for the eyes – especially over longer periods of time.
- Due to the dazzle effects caused by the LED at short distances, the ability to see may be disturbed in such manner as to make orientation impossible.
- LED-radiation shall not be directed to the eyes of other persons.
- Do not use any strongly focussing optical devices to look at the light beam.



Within professional organisations 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.

Ultra bright LED radiate a similar bundled light as laser. Accordingly, the same regulations shall apply for LED – especially for distances below one meter – as for laser. However, due to the general large radiation divergence and the laminar source expansion, performance LED do not have similar potential for danger as the bundled laser radiation.

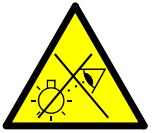
4. Explanation of safety symbols used in this manual

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.

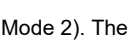
This symbol warns he user against staring into the light source.



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

Operation

1. General Information

	The functions shall be operated by pressing the keys of the membrane keyboard. Some of the keys have more functions. The diverse functions are differentiated by colour. ▪ The main functions are assigned blue marked areas. To activate main functions press the relevant key. ▪ The set-up controls are assigned green symbols. For activation of the unit press the on / off key. Subsequently - within approx. 2 seconds - press the relevant key ▪ The special commands are assigned grey symbols. To activate a special command switch to the function mode by shortly pressing function key  , subsequently press the relevant command key. By pressing the key combination once again you return to the main functions.
	Key for switching on / off and for activation of the setup control. After switching on, the instrument flashes with the last set frequency. The current value will be saved when switching off the instrument.
	30 s after switching on the instrument, the display light automatically dims for energy saving. It will take a quarter of the settable operating time until the display switches to the ‘standby’ - mode (display switch-off). The time up to the complete automatic switch-off shall be selected by using the function  (see Mode 2). The ‘standby’ - mode is indicated by a red dot flashing at the lower right corner as a “reminder”. Reactivate the display by pressing any key (except for the on / off key).

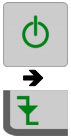
2. Main functions

	Key for switching on / off and for activation of the setup control. ▪ **Switch-on** ▪ **Switch-off** - 2 seconds after pressing or by double clicking
	Blue marked key areas e.g.  stands for: ▪ Changing the flash frequency ▪ Reading back stored frequencies Change the flash frequency in small steps (+/- 1 – applied to the last indication position) and large steps (+/- 50 – applied to the penultimate indication position) The absolute increment depends on the frequency range. If the selected key is kept pressed over longer time, the repeating function ‘repeat’ is activated.
	Increase flash frequency by 1 x increment
	Increase flash frequency by 50 x increments
	Decrease flash frequency by 1 x increment
	Decrease flash frequency by 50 x increment

M fps fpm →	Read back stored frequencies (max. 4) – by repeatedly pressing this key – in the storage sequence (see also F → → frequency entry)
i	Display indication adjusts to selected flash frequency by the decimal point. (number of decimal places)

3. Setup controls

i	Green symbols e.g. fps fpm setup controls For activation of the unit press the on / off key. Subsequently - within approx. 2 seconds - press the relevant key (green symbol). The unit will be switched off if no other button is pressed after activation of the on / off key.	
⏻ → fps fpm	Frequency indication (Hz) Indication [fps] – flashes per second Resolution: max. 2 decimal points (0.01 fps)	 (red LED indication)
⏻ → fps fpm	Frequency indication (fpm) Indication [fpm] – flashes per minute Resolution: max. 1 decimal place (0.1 fpm)	 (no red LED indication)

	Direct flash triggering by positive flank of the trigger signal	 (red LED indication)
	Direct flash triggering by negative flank of the trigger signal	 (red LED indication)
	Switching to external triggering (Standard mode: Direct flash triggering by positive flank of the trigger signal)	 (red LED indication)
	Switching to internal triggering: (triggering of the flash impulse)	 (**no** red LED indication)

Configuration of the trigger jack

Pin	Function	Colour
1	+ 10 VDC max. 50 mA (Output)	white
2	Trigger Input	green
3	0 V (GND)	brown

To facilitate the connection of external encoders to the trigger jack, the delivery includes a ready-made cable.

	To **activate the “key lock”** the unit must be switched on. The “key lock” is activated by simultaneously pressing the on / off key and the SAFE button.	
+	**Key lock** SAFE	Activate the same key sequence again **to unlock the keys** and switch on.
	The key lock prevents the unit from switching on accidentally. By activation of the key lock the instrument settings are saved and the HELIO-STROB micro2 is switched off. The unit may be switched on again only if you **unlock the keys**.	

4. Special commands

	Grey symbols e.g. Special commands To activate the special commands, switch to the function mode by shortly pressing function key F, subsequently press the relevant command key.	
F ➔	**Phase shifting*** Select between 0° and 360° by the up and down keys (▲/▼). Deactivate by repeating the key combination F ➔ . Store the selected value by pressing the on / off key in case of external triggering only.	red LED indication: Function is activated *see chapter „Definition of terms“

F →	**Store frequencies** See also:  Read back stored frequencies	Store frequently used frequencies (max. 4).
F → ÷	**Divide flash frequency** Activation, respectively deactivation of an equally increasing (2, 3, 4, 5...) division / multiplication of the initial frequency.	 red LED indication: Function is activated
F → ×	**Multiply flash frequencies**	
	Attention: To repeat division / multiplication activate ÷ respectively × **without pressing** F !! The respective division or multiplication factor is shortly displayed.	Any switch between ÷ and × is possible, no intermediate steps required. The initial value remains the basic reference value.

The function to divide / multiply the flash frequency serves the following applications:

- to find the appropriate frequency by the integral multiplication / division of the initial frequency (*1)
- to quickly reach the target frequency in case of significant frequency changes or ranges.

(*1) Example:

Multiplication × **11** – 22 - 33 – 44 – 55 - 66 [fps]...or

Division ÷ **300** – 150 – 100 – 75 – 60 [fpm]..or

With switch ÷ **300** – 150 – 100 × 150 – 300 [fpm]

F → ✳

Mode 1:
Flash duration

The selected flash duration determines the sharpness

Selection of the flash duration in µs (1 µs – 100 µs) alternatively:
in degrees (0.5° – 3,0°).

The alternatives are consecutively indicated within a minimal value of 0.5° and a maximal value of 100 µs.

Change duration by using the up and down keys (▲/▼).

Store by switching off and on.

	Mode 2: Select the time up to the complete switch-off of the unit. Repeated activation of key combination F ➔ ✳ leads through Mode 1, Mode 2 back to the frequency indication.	Operating time up to the complete automatic switch-off in minutes -- -- (no limitation) up to max. operating time of 30 min. Change switch-off time by using the up and down keys (▲/▼). Store by switching off and on.

Maintenance

1. Storage

If the HELIO-STROB micro2 is not used over more than four weeks, the following measures should be taken:

- Remove the battery from the instrument.
- Protect the instrument from damage by properly storing it in a dry room. Keep the instrument in the delivered hard shell instrument case.
- When using other packing materials only anti-static materials may be used. Statically charged packing materials may leed to malfunctions of the instrument.
- To avoid condensation see that the storage temperature is kept. Storage temp.: -20° C ... +60° C (warming time constant > 10 K/h).

2. Maintenance

According to the design, the HELIO-STROB micro2 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.
- Keep the instrument in the delivered hard shell instrument case.
- Clean the instrument by using only a soft, lightly-moist cloth. Use only mild detergents.

3. Inspection / Calibration

As evidence of the high quality standards a PTB* traceable Calibration Certificate is available for the HELIO-STROB micro2. The results of inspections shall be documented in inspection sheets and stored in a product database.
(*Physikalisch-Technische Bundesanstalt)

4. Dispatch / Transport

For the dispatch of the instruments we recommend to use the hard shell instrument case that is included in the delivery. Before dispatching the instrument remove the batteries / accumulators from the instrument. In case the instrument is dispatched without the hard shell instrument case, only anti-static packing materials may be used.

5. Repairs / Disposal

Instruments which are damaged or do not perform according to their specifications shall not be used anymore. To provide for a safe and functional instrument, only original spare parts shall be used for repair.

	Batteries shall be disposed of according to relevant legal provisions. To dispose of the old instrument according to legal rules and provisions, please send the HELIO-STROB micro2 to the manufacturer.

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

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

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

Additional information

Definition of terms

Terms	Explanation
LED	Light emitting diode
Flash duration	On-time of light emitting diodes The setting in µs does not depend on the frequency. The flash duration corresponds to the time set. If set in degrees, the flash duration depends on the frequency and changes proportionally to the frequency. The flash duration selected determines the sharpness of the picture. The shorter the flash duration, the sharper the contours of the object under observation.
Triggering	Trigger impulses for the flash sequence (internal / external)
Rising flank	Triggering occurs when trigger impulses change from “0” to “1”
Falling flank	Triggering occurs when trigger impulses change from “1” to “0”
Flash frequency	Number of light flashes per time unit
Display	Indication for the display of pre-set values
RPM / fpm	Number of revolutions per minute of the object under observation
Hz / fps	Repetition frequency per second of the object under observation
Repeat – function	Automatic function repetition of the key being pressed longer
SAFE – Mode	Instrument switch off and key lock activation
Phase shifting	Random positioning of the object under observation (0° – 360°)

Notes