

# DXOMARK LED Universal Timer mkII

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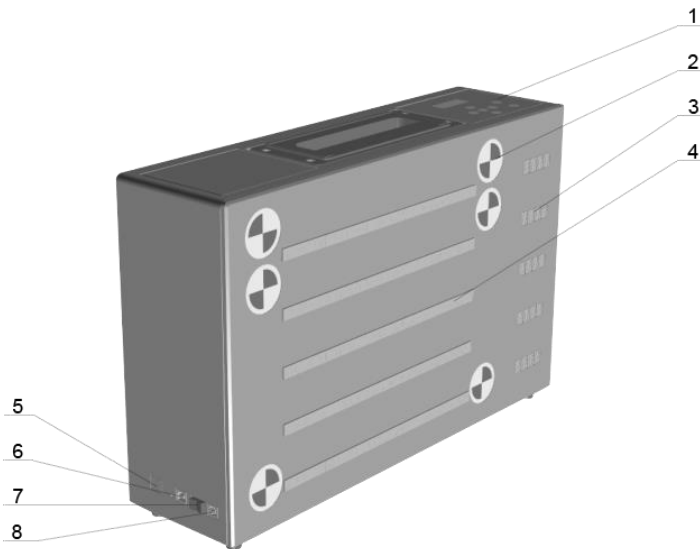
## 1 DXOMARK LED Universal Timer

The DXOMARK LED Universal Timer is a device with five rolling LED lines designed by DXOMARK Image Labs to measure the following camera timings:

- Exposure time (shutter speed)
- Rolling shutter
- Time lags (shooting time lag and shutter release time lag)
- Video frame rate

## 2 Description

Elements of the DXOMARK LED Universal Timer:



1. Controller with seven buttons and a 2x12 LCD display.
2. Markers for automatic detection in images.
3. Seven-segment display for each LED line calibration.
4. Lines of LEDs. Each line has 100 LEDs which light up one after another. Line calibrations are independent.
5. Mini-DIN port for capturing the position of lit LEDs at camera trigger (time lag measurement).
6. USB port for controlling the device from a computer.
7. ON/OFF button.
8. Power cable plug

### 3 Principles

On each LED line, the LEDs light up one after another. At any given moment, there is always one and only one lit LED on each line. When an LED goes off, the next LED lights up. When the last LED on the line goes off, the first LED on the same line lights up. On any given line, each LED is lit for exactly the same amount of time, and the total time to light all of the LEDs is given in ms by the 7-segment display on the right. For instance, "0100" means that the time for an LED to travel from left to right is 100ms, so each LED is lit for 1ms.

If the exposure time of a camera is longer than the light time of a single LED, several LEDs will be lit on the same line in the image. Analyzer counts the lit LEDs, thus measuring the exposure time used to take the photo.

Rolling shutter, time lag, and frame rate are computed using the difference between the first lit LED on a line and (respectively) the first lit LED on a synchronized line; the lit LED during capture (on mini-DIN port); and the lit LED on the same line in the previous frame.

The timer is controlled by the "Timer Pilot" software, released with Analyzer,

### 4 DXOMARK LED Universal Timer characteristics

- LED lines
  - Five adjustable LED lines of 100 LEDs each. Lines with the same calibration are synchronized.
  - Line calibration from 1ms (each LED lit for 0.01ms) to 9999ms.
  - Six luminosity levels, with automatic luminosity adaptation if line calibrations are different (LED line intensity is inversely proportional to its time "on").
- Timer setup
  - Four predefined modes:
    - All lines freely adjustable
    - All lines with the same calibration
    - Each line faster than the preceding line, following pre-defined calibrations
    - Top and bottom line synchronized, the others free
  - Five user-defined configurations
  - Five luminosity levels for calibration display
- Capture of camera trigger time with mini-DIN
- Full control of the device from USB port
- Timer size: 296 x 451 x 100mm
- Mains input: 19V DC, 1.3A

Timer comes with a power supply (100-240VAC, 50/60Hz), a USB cable and a software controller.

**5 Using the controller to set up the LED Universal Timer**

Plus (+) / minus (-) buttons

Change the period of the current LED line. Zero means no light.  
 Activate the selected mode (press “Mode” to select another mode).



Up / down buttons

Change the current LED line (1 to 5, from top to bottom).  
 Change the settings in the “Set” menu.

Step

Change the step mode.  
 Change the next and previous values for “+” and “-” buttons.

Possible step modes are:

<b>CALIB</b>	<b>Li1</b>	<b>Li10</b>	<b>Li100</b>
Pre-selected values: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 8000	+/- 1 ms	+/- 10 ms	+/- 100ms

Modes

Select the mode.  
 Modes define the constraints between LED lines. Lines can be independent (“ind.”), or synchronized (“sync.”). If two lines are synchronized, changing the setting of one changes the setting of the other. Two lines with the same period, synchronized or not, will begin simultaneously. Changing one line in “CRESC” mode changes all of the lines.

Possible modes are:

<b>FREE</b>	<b>ROLSH</b>	<b>SAME</b>	<b>CRESC</b>	<b>MEMO[1-5]</b>
All lines ind.	Lines 1,5 sync. Lines 2,3,4 ind.	Lines 1,2,3,4,5 sync.	Line 1 ind. Line 2 →next calib. L1 Line 3 →next calib. L2 ...	Memorized config.

**After selecting a mode, press “+” or “-” to validate the change.**

Set

Change the luminosity and sound settings.  
 Use up and down buttons to change setting values.

Settings are:

<b>SOUND</b>	<b>LUM</b>	<b>LUM DIS</b>
Select the beep line (beep sound heard at the end of the selected line). No beep if time < 1s.	Select LED luminosity (1-6)	Select display luminosity (1-5).

Memo

Press “Set” to see the content of the selected mode. Release the button to return to current setting.  
 Press “+” or “-” for 2s to activate the selected memo mode.  
 Press “+” and “-” simultaneously for 2s to memorize the current settings (lines times, luminosity, and sound). Previous memo is erased.