



LG3

User Manual

December, 21st 2017



Image Engineering GmbH & Co. KG · Im Gleisdreieck 5 · 50169 Kerpen-Horrem · Germany

T +49 2273 99991-0 · F +49 2273 99991-10 · www.image-engineering.com



Content

1 INTRODUCTION	3
1.1 Conformity	3
1.2 Intended Use.....	3
1.3 General Safety Information	3
1.3.1 Photosensitive Epilepsy	3
2 GETTING STARTED	4
2.1 Scope of Delivery	4
2.2 Commissioning	4
3 OPERATING INSTRUCTIONS HARDWARE	5
3.1 Overview	5
3.2 Connecting the Hardware.....	5
3.3 Starting the System.....	5
3.3.1 Calibration.....	5
3.4 Continuous Illumination.....	6
3.4.1 Power Modes	7
3.4.2 PWM (Pulse Width Modulation).....	7
3.4.3 Setting the Illumination Level.....	8
3.4.4 Intensity Stabilization	8
3.5 Flicker	9
4 ADDITIONAL INFORMATION	11
4.1 Maintenance	11
4.1.1 Fuse Replacement	11
4.2 Storage and transport	11
4.3 Disposal instructions	12
5 TECHNICAL DATA SHEET	12

1 INTRODUCTION

Important information: Read the manual carefully before using the device.

Inappropriate utilization may cause damages to the device, to the DUT (device under test) and/or other components of your setup.

Keep these instructions in a safe place and pass them to any future user.

1.1 Conformity

We, Image Engineering GmbH & Co. KG, hereby declare, that the LG3 corresponds to the essential requirements of the following EC directive:

- Electromagnetic Compatibility - 2014/30/EU
- Photobiological safety of lamps and lamp systems - IEC 62471:2009

1.2 Intended Use

The LG3 is a high intensity illuminator for transparent charts based on LED technology. It is capable of flicker-generation with variable frequency and variable duty cycle. The device can be controlled over the external controller unit and over the LG3 Software.

- Only suitable for indoor use.
- Place your system in a dry and constant tempered environment without any interfering light.
- The optimal ambient temperature range is 22 to 26 degrees Celsius. The maximum ambient temperature range is 18 to 28 degree Celsius.
- The system has an internal temperature management system, if there is any error regarding the internal temperature you will get a warning message and the system automatically turns off to avoid any damage.

1.3 General Safety Information

Do not open the device without any instructions from the Image Engineering support team and when connected to the power supply.

1.3.1 Photosensitive Epilepsy



A small number of users with pre-existing conditions may experience seizures while using the flicker mode of the LG3. Certain frequency and intensity combinations may trigger seizures with no prior medical history. Refrain from using the device and consult a doctor immediately if you experience sickness while using the LG3.

1.3.2 Eye Safety

The LEDs used in the LG3 can be classified as belonging to the Exempt Group or Risk Group 1 according to IEC 62471:2009.



2 GETTING STARTED

2.1 Scope of Delivery

- LG3 control unit
- LG3 illumination unit
- Tripod handle
- Power supply cable
- USB cable
- 2 x spare Fuses (2A)
- Flight case
- Control software
- User manual
- Calibration protocol

Optional equipment:

- LG3 Control Holder and Tripod
- LG C++ API.



LG3 Control Holder and Tripod

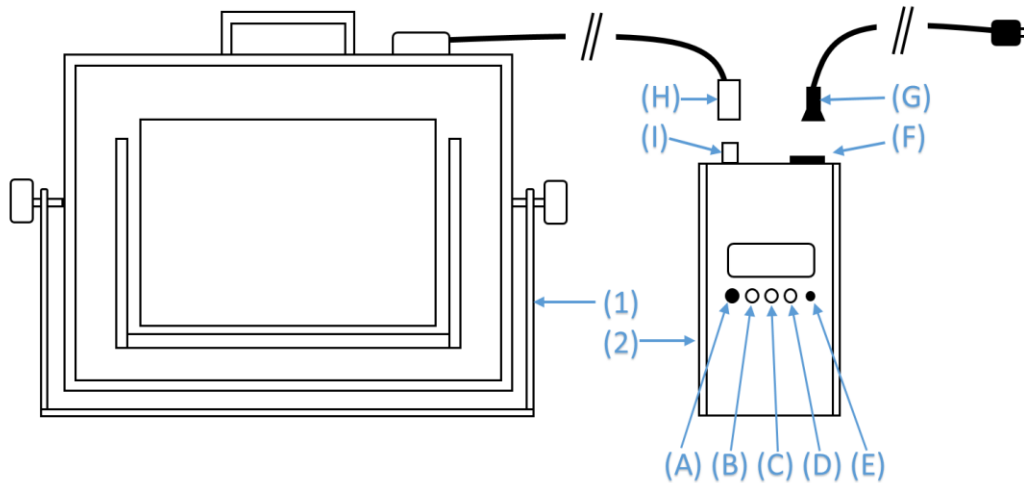
2.2 Commissioning

Keep all ventilation slits of the LG3 illumination unit free of foreign objects. The minimum clearance is 15 cm.



3 OPERATING INSTRUCTIONS HARDWARE

3.1 Overview



Hardware Overview

1. Illumination unit
2. Control unit
- A. Multifunctional rotary/push knob
- B. Multifunctional button (function is stated on the display)
- C. Multifunctional button (function is stated on the display)
- D. Multifunctional button (function is stated on the display)
- E. Display brightness adjustment
- F. Powerswitch, powersocket and fuses combination
- G. Power cable
- H. Illumination unit connection cable
- I. Illumination unit connection socket

3.2 Connecting the Hardware

Connect the illumination unit (1) to the control unit (2):

- Plug the cable (H) into the socket (I)
- All “open” marks must face to the frontside of the device
- Turn the lock ring clockwise for a secure connection

3.3 Starting the System

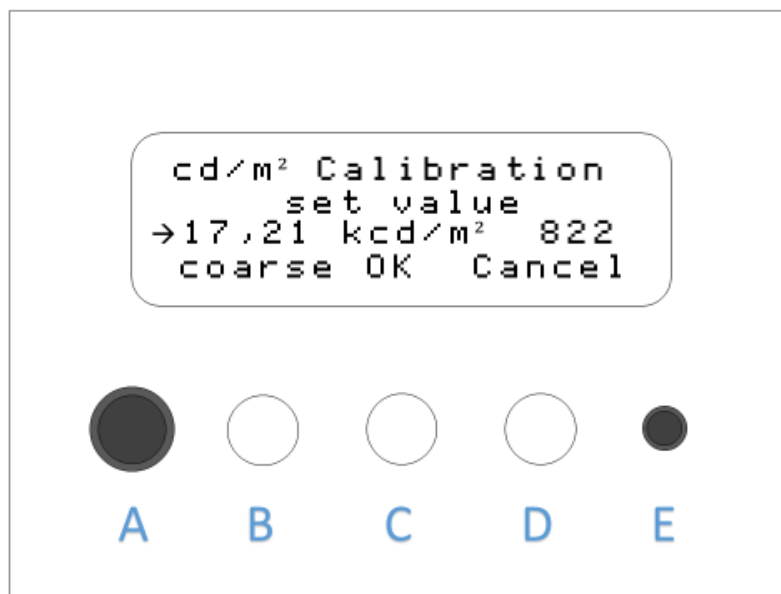
The powerswitch (F) is located on the upper side of the control unit.

3.3.1 Calibration

The LG3 has a stabilized intensity output. To use the output feedback in cd/m^2 or lux, the system needs to be calibrated. The LG3 provides two calibration modes.



- **Luminance calibration:** Luminance is a measure of the emission or reflection from a flat surface in cd/m^2 . In the case of the LG3, the chart surface is measured, but in case of a shading measurement the diffusor plate is measured. Therefore, it is a measure of the emission in the direction towards the device under test (e.g. a camera system). Choose a reference point on the chart for the calibration. When using an OECF chart the field with the lowest density is recommended.
- **Illuminance calibration:** Illuminance is a measure of how much light illuminates a surface in lux. Therefore, it is a measure of the illumination in the direction of the lightsource and is not suitable for a measurement on the chart.



Calibration menu

- Press button (B) and (C) simultaneously to enter the calibration menu
- Wait until the calibration reference value is measured, this will take a few seconds
- Switch between luminance and illuminance calibration mode by pressing the rotary knob (A)
- Measure the calibration values with a suitable measurement device (e.g. luminance meter) on the preferred region of the chart
- With the measured value from the external measurement device, rotate the rotary knob (A) to assign the calibration
- Switch between “fine” and “coarse” to set the sensitivity of the rotary knob (A) by pressing button (B)
- Press “OK”, button (C) to save the calibration and exit the calibration menu
- Press “Cancel”, button (D) to exit the calibration without saving
- The last performed calibration will be activated

The LG3 is factory calibrated. Perform an individual calibration to use it with your charts

3.4 Continuous Illumination

Use the continuous illumination when illuminating test charts. The continuous illumination is preset as default on the LG3 start up. Read chapter 3.6 on how to enter and exit the flicker mode.



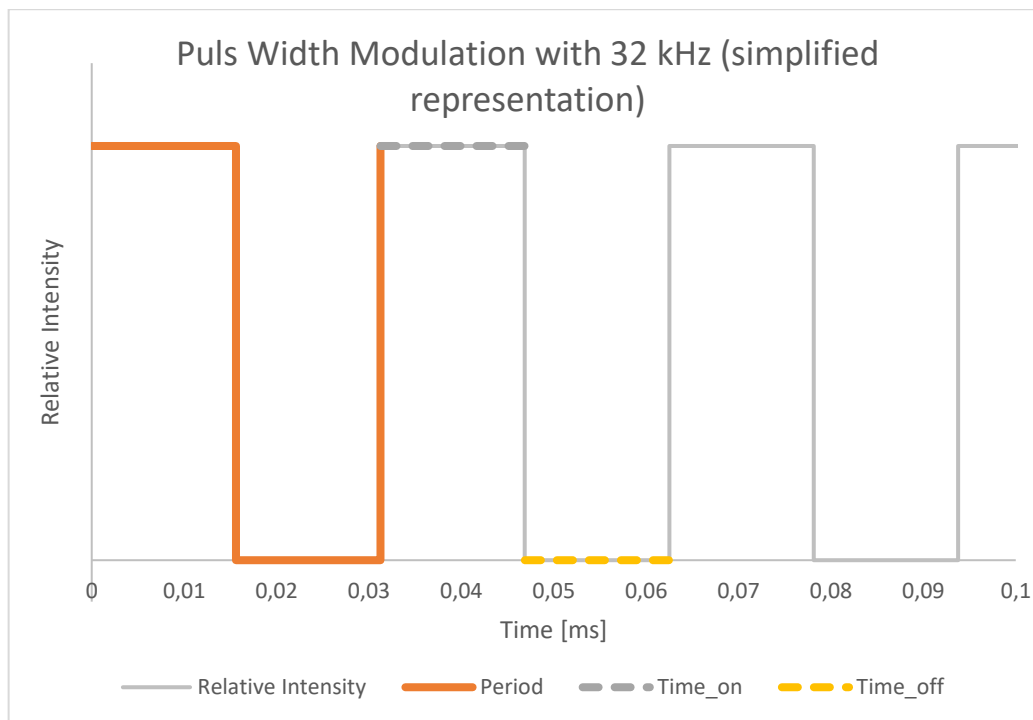
3.4.1 Power Modes

Three power modes are available

- **LOW:** 32 kHz PWM, variable duty cycle, stabilized illumination level
- **NORM:** 32 kHz PWM, variable duty cycle, stabilized illumination level with higher intensities
- **HIGH:** direct current, not stabilized, high illumination level (over 150 kLux)
 - The illumination in the high-power mode is not variable by the user and preset at maximum possible intensity
 - Due to the high thermal stress, the high-power mode is available for 60 seconds at a time
 - The device will not start the high-power mode if the LED temperature is too high

3.4.2 PWM (Pulse Width Modulation)

The LG3 uses pulse width modulation (PWM) for the illumination level control. The high frequency of 32 kHz allows a flicker free image acquisition for the most cameras. The constant voltage has the benefit of a constant correlated color temperature.

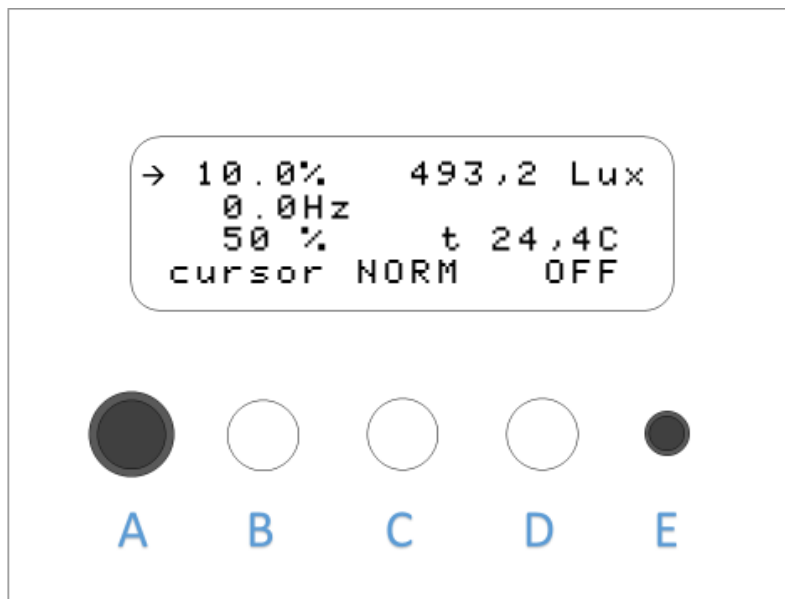


LED intensity over time at 32kHz pulse width modulation with 50% duty cycle



3.4.3 Setting the Illumination Level

The illumination level is adjustable. Set the illumination level by performing the following steps:



Default settings

- Make sure the selected chart is placed in the chart holder if it is required for your measurement.
- Calibrate the illumination feedback (*Chapter 3.3.1*)
- Select the power mode by pressing button (C)
- To enter HIGH power mode, hold button (C) for 2 seconds
- Select the illumination feedback unit by pressing the rotary knob (A). Lux and cd/m² are available. Make sure the selected unit is calibrated with the actual setup
- Toggle the cursor with button (B) through the settings and change the setting by turning rotary knob (A)
 - First line: set the actual illumination level in percent and Lux or cd/m²
 - Second line: set the flicker frequency (0 Hz = continuous illumination as described in *chapters 3.4.1– 3.4.2*)
 - Third line: set the flicker duty cycle. (*Chapter 3.5*)
- The stabilization of the set intensity may take up to 10 seconds
- Press button (D) to turn the illumination on and off.

3.4.4 Intensity Stabilization

The intensity of continuous illumination in the LOW and NORM modes is stabilized. The LG3 performs independent of the LED temperature. However, the stabilization can take from 2 up to 10 seconds. Do not change the chart position in this period.

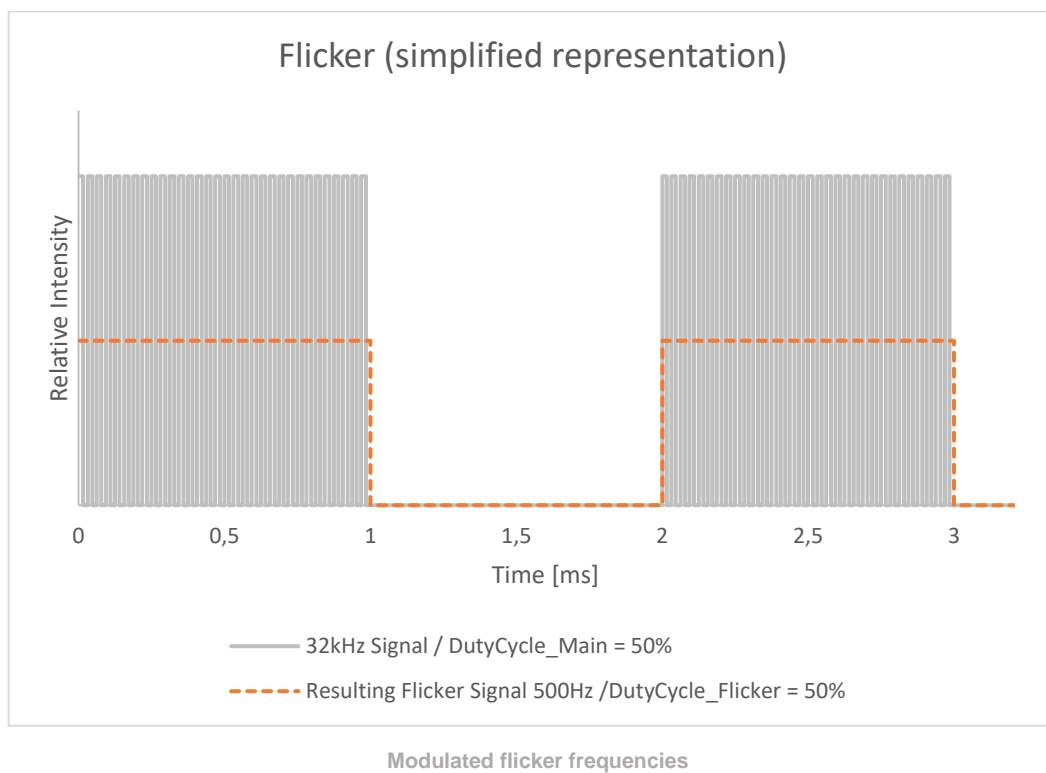
Light, emitted by external light sources or reflected by objects in front of the LG3, can enter the illumination unit and will affect the stabilization. Place the illumination unit in a dark room and avoid reflective and moving objects in this room.



3.5 Flicker

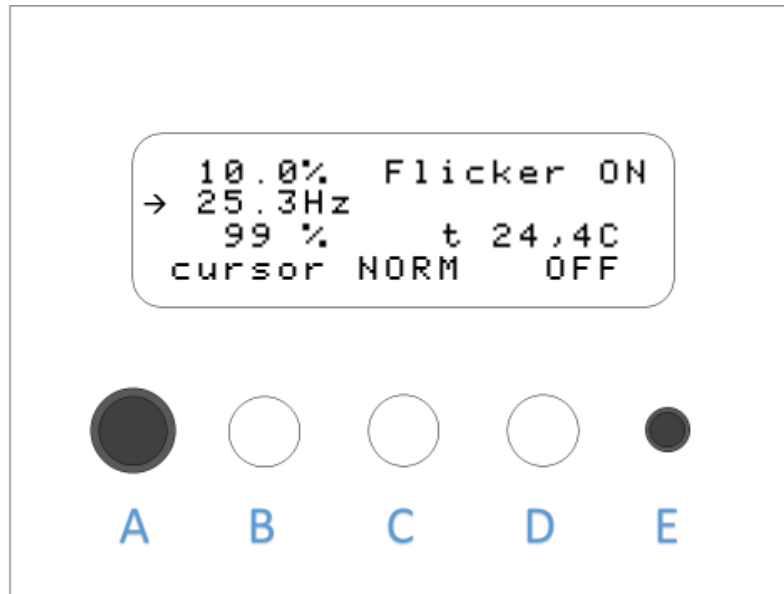
Camera systems are often used as part of safety systems, such as in the automotive or security industries. Often, they have to handle different illumination scenarios, such as traffic lights, LED street illumination, LED stop lights, etc. Different light sources use different frequencies and duty cycles, which can affect the image quality and cause loss of image information.

The LG3 simulates different light sources with its capability to vary the duty cycle and frequency of the illumination. The adjustable duty cycle settings of the 32 kHz frequency have the ability to change the illumination. The flicker frequency is modulated on the 32 kHz frequency.





Perform the following steps to use the flicker mode for your measurement.



Set flicker frequency

- Make sure the selected chart is placed in the chartholder if required for your measurement.
- Select the power mode by pressing button (C)
- To enter HIGH power mode, hold the button C for 2 seconds
- Illumination feedback in Lux and cd/m² is not available in flicker mode
- Toggle the cursor with button (B) through the settings and change the setting by turning rotary knob (A)
 - First line: set the actual illumination level in percentage
 - Second line: set the flicker frequency (0 Hz = continuous illumination as discribed in *chapters 3.4.1– 3.4.2*)
 - Third line: set the flicker duty cycle.
- Press button (D) to turn the illumination on and off.
- For a quick switch between continuous and flicker mode press rotary knob (A)



4 ADDITIONAL INFORMATION

4.1 Maintenance

- Do not touch, scratch or pollute the diffusor.
- If there is any dust on the diffusor clean it with compressed air or an air blower.

4.1.1 Fuse Replacement

In case of an overcurrent, the fuses will protect the device by breaking. Broken fuses need to be replaced.

Only use T2/250E fuses.

TURN THE DEVICE OFF
DISCONNECT FROM THE POWER SUPPLY
MAKE SURE ALL CABLES ARE DISCONNECTED



Fuse replacement

- Lift the fuse cover located over the power switch using a small flathead screwdriver
- Lift the red fuse holder using a small flathead screwdriver
- Replace the defect fuse
- Place the fuse holder back into the fuse holder socket
- Close the fuse cover

4.2 Storage and Transport

- Store and transport the LG3 only in the delivered hard case.



4.3 Disposal Instructions

The LG3 must be disposed properly after the service life is over. Electrical and electromechanical components are included in LG3. Observe your national regulations. Make sure that LG3 cannot be used by third parties after disposing of it.

Contact Image Engineering if assistance for disposal is required.

5 TECHNICAL DATA SHEET

See annex for the technical data sheet. It can also be downloaded from the website of Image Engineering: www.image-engineering.com.