

iQ-Chart Box

User Manual

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1 INTRODUCTION

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

Inappropriate utilization may cause damage 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 on to any future user.

1.1 Conformity

We, Image Engineering GmbH & Co. KG, hereby declare that the iQ-Chart Box corresponds to the essential requirements of the following EC directive in its current version:

- Electromagnetic Compatibility - 2014/30/EU
- RoHS 2 - 2011/65/EU
- Low Voltage - 2014/35/EU

1.2 Intended use

The iQ-Chart Box is the ultimate compact chart-based camera testing solution with a flexible illumination source. The test charts (A460) can easily be exchanged using a mechanical rail system, and due to the iQ-LED technology, the light spectrum can be custom generated. It includes a micro spectrometer and is controlled with the iQ-LED control software or via dip switches when not connected to a PC.

- Only suitable for indoor use.
- Place your system in a dry, constant tempered environment without light interference.
- The optimal ambient temperature range is 22 to 26 degrees Celsius. The maximum ambient temperature range is 18 to 28 degree Celsius.
- The optimal system temperature range, displayed in the software user interface, is between 35 and 50 degrees Celsius. The system has internal temperature management, if there is any error regarding the internal temperature, you will get a warning message, and the system will automatically shut off to avoid any damage.

1.2.1 Departing from described setup

The following steps must be performed in the correct chronology to allow smooth commissioning. Departing from the chronology may lead to an incorrect working device.

1. Install the iQ-LED software
2. Connect iQ-Chart Box to power and via USB to the PC
3. Switch iQ-Chart Box on; the system drivers will now be installed
4. After drivers are installed completely, start the software



1.2.2 USB connection

Only an appropriate USB connection allows error-free operation of the iQ-Chart Box. Use delivered USB cables. If you need to extend the USB connection to longer distances, please check if powered hubs/repeaters are necessary.

1.3 General safety information



WARNING!

Some LEDs emit invisible light in the IR and UV near area.



- **Do not** look directly into the emitted light or the optical LED system.
- **Do not** look directly in the open sphere or light source when using high intensities or sequences with low response time.



- **Do not** open the device without instructions from the Image Engineering support team or when connected to the power supply.

2 GETTING STARTED

2.1 Scope of delivery

- iQ-Chart Box
- Calibration device with spectrometer
- Power cord USB cable
- Control software
- Calibration protocol

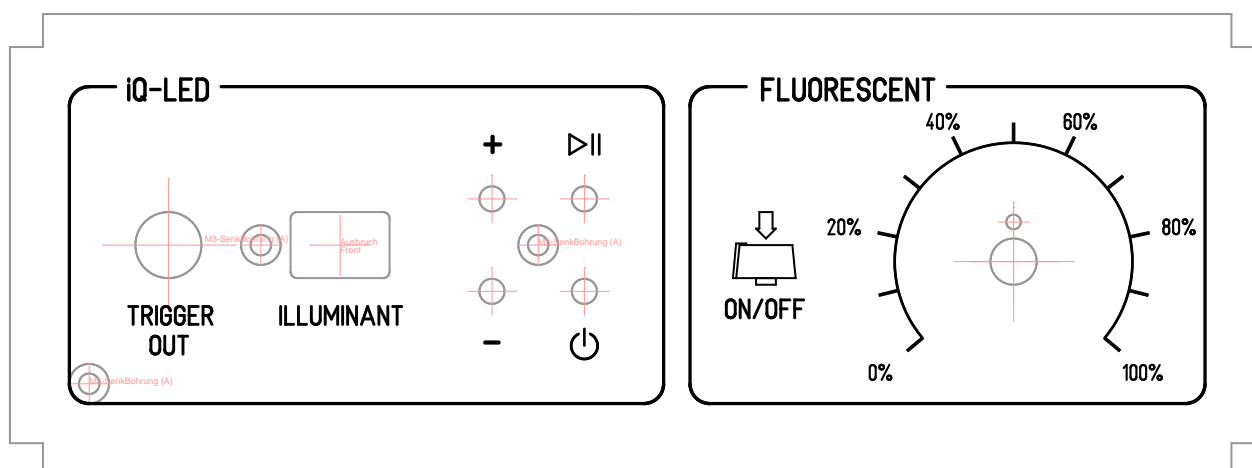
Optional equipment:

- **Rolling Cart**
- **iQ-Trigger:** The iQ-Trigger is a mechanical finger that can press the release button within 100 ms. When working with touchscreens, exchange the solid fingertip for a touch pen tip

3 OPERATING INSTRUCTIONS HARDWARE

3.1 Overview display and ports

- 1 x USB port for software control
- 1 x port for power adapter
- 1 x trigger output



Use the control panel to set different light settings for the iQ-LEDs and the fluorescent tubes:

iQ-LED:

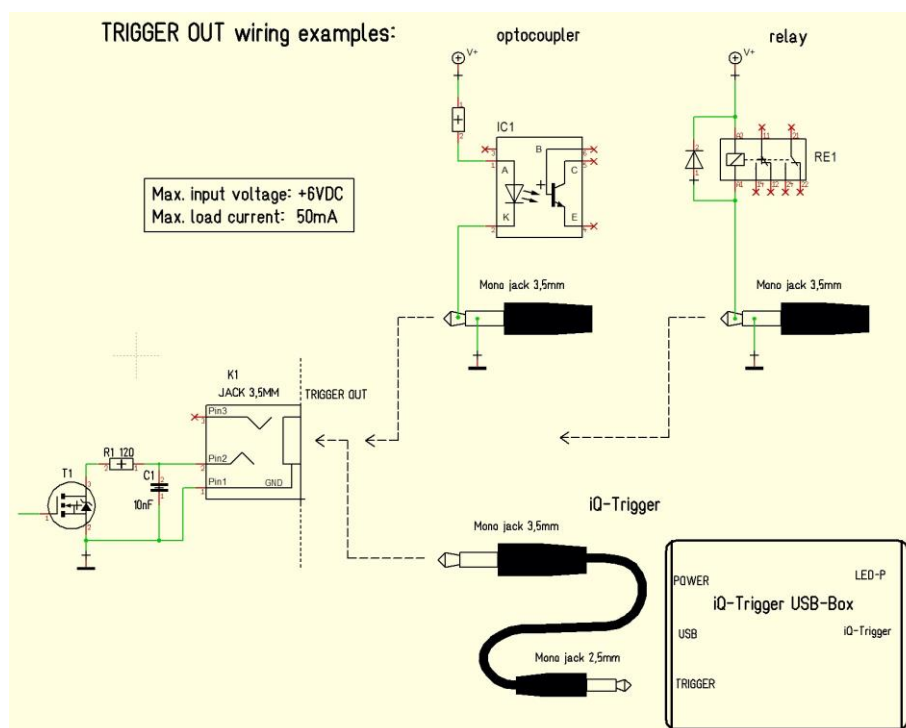
- Use the “+” and “-“ buttons to switch between 44 saved illuminants
- The numerical display shows the storage of the illuminants
- With the play and stop button, you can start and stop a saved light sequence with different illuminants (it is possible to save one sequence on the device)
- Use the power button to turn on and off the light

There are three pre-stored illuminants on your device (the intensity of each illuminant is shown in the acceptance protocol of your device)

- 1: illuminant A (default illuminant)
- 2: illuminant D50
- 3: illuminant D75

Note: To store your generated illuminants or sequences on your device, please follow the iQ-LED SW user manual instructions.

Wiring examples for the trigger output:



The default duration value for the trigger output is 500 ms. This value can be modified with the iQ-LED API. A signal is sent out to the trigger output while changing the illuminates or the intensity of LED channels. It can be used to synchronize your test setup. For example, with an iQ-Trigger (see 2.1 optional equipment).

3.2 Connecting the hardware

1. Connect the power cord to the power supply on the back of the iQ-Chart Box.
2. Connect the USB cable to the iQ-Chart Box and your PC.
3. Turn on the iQ-Chart Box; the power switch is next to the power supply.
4. Connect the spectrometer to the PC using the USB cable. The system will install the spectrometer and iQ-LED drivers on your PC; this will take a few seconds.
5. You can check the installation in your hardware manager.



Hardware Manager: active iQ-LED and spectrometer



3.3 Illumination



Illumination devices

The iQ-Chart Box is equipped with the iQ-LED technology to illuminate test charts. It can be controlled via software or small switches directly on the device. Use the iQ-LED software to control the iQ-LED elements. For in-depth information on how to use the iQ-LED software, please see the iQ-LED software manual.



ND filter

The iQ-LED elements are on the right and left sides of the front part of the iQ-Chart Box.

Both can be dimmed by a neutral density flap which will snap to magnetic parts either in its opening position (ND filter not used) or if it's closed (ND filter covers light source).

The iQ-LED software allows you to set a compensation factor for the neutral density filters. When using the ND filter flaps, read chapter 3.1.3, "Compensation factors," and set the factor as stated in the manual. The neutral density filter covers the spectral range up to 680 nm.



3.3.1 Calibration



Calibration device

Use the provided calibration device for iQ-LED calibration. Place the device inside the iQ-Chart Box, as shown in the image above. Please note that the test chart needs to be removed while calibrating the iQ-LEDs. The calibration process is described in the iQ-LED user manual.

3.4 Charts



Chart exchange mechanism

The iQ-Chart Box is equipped with a chart holder which can be used for all Image Engineering test charts in size A460. To exchange the test chart, use the knob on the right side of the iQ-Chart Box and pull it slightly towards the front. You can now easily exchange the test chart by lifting it slightly to release it from the chart holder guide rail. Remove the current test chart and put the new test chart in the chart holder. The ideal way to insert the test chart is to hold it upright above the chart holder guide rail inside the iQ-Chart Box. Lower it carefully into the chart holder and ensure it is fixed. Use the knob again to move the chart to the back of the box and fix its position.



4 OPERATING INSTRUCTIONS SOFTWARE

4.1 Requirements

- PC with Windows 7 (or higher) operating system
- One free USB port

4.2 Software installation

Install the iQ-LED control software before connecting the hardware. Follow the setup instructions from the iQ-LED control software manual.

4.3 Starting the system

Start the iQ-LED software by clicking the 'iQ-LED.exe' or the iQ-LED icon on your desktop. Follow the iQ-LED software manual to control the iQ-Chart Box.

NOTE

The iQ-LED devices can operate with high precision only when the set up and calibration are performed correctly.

Consult the iQ-LED software manual for a comprehensive description, and read it carefully.

4.3.1 Spectrometer settings

The iQ-LED software (see iQ-LED software manual) automatically generates the best spectrometer settings for your lighting conditions after pressing the "auto-detect" button. For special applications, it is also possible to set the spectrometer settings manually. If you have further questions, please contact the Image Engineering support team.

4.3.2 Spectrometer calibration

Your spectrometer comes fully NIST traceable calibrated. We recommend recalibrating the spectrometer yearly, regardless of the operating hours. If a spectrometer calibration is required, please contact Image Engineering.

Note: Before removing the spectrometer, measure and note the lux value of a predefined standard illuminant.

After calibrating and reinstalling the spectrometer to your system, perform a spectral calibration (iQ-LED calibration) and check if this intensity value is still correct. If it is not correct, you must perform a lux calibration.



4.3.3 iQ-LED calibration

The individual LED lights inside the iQ-Chart Box depend on many different types and wavelengths. Some LEDs will change their intensity level and peak wavelength slightly in the first 500-600 working hours because of a burn-in effect.

The LEDs will also degrade in intensity during their lifetime. To ensure that all measurements including the auto-generated and standard illuminants are correct, you must perform a spectral calibration regularly.

You must also consider the degradation of the LED when saving self-defined presets. Suppose you save a preset with LED channels that uses its maximum intensity. In that event, the possibility exists that this intensity cannot be reached after the burn-in time or the long-time degradation of the LED. In this case, you will get a warning message from the iQ-LED control software.

During the first 500-600 working hours, we recommend performing a spectral calibration every 50 operating hours.

After the first 500-600 operating hours, a calibration of every 150 working hours suffices.

Other factors that indicate the need for a spectral calibration are unsatisfactory illuminant generation or the aberration of the intensity values. In addition, a spectral curve does not fit with the predefined standard illuminants of the corresponding preset.

- The spectrometer works correctly
- The spectrometer settings are correct
- All LED channels work correctly
- The dark measurement is correct
- Your measurement environment is correct
- Your ambient temperature is correct

How to perform the spectral calibration is described in the iQ-LED control software manual.

4.4 Low-intensity use

When using your system with very low intensity, the spectral measurement values will start to fluctuate. The lower the intensity, the higher the fluctuation. The generated light is still stable up to a certain point. The fluctuation of the values is caused by the noise of the spectral measurement of the internal spectrometer. The light intensity will continue to get lower when the influence of the noise continues to get higher. When using standard illuminants with an intensity lower than 25 lx, obtaining a correct value will no longer be possible.



5 ADDITIONAL INFORMATION

5.1 Maintenance

The spectrometer requires a recalibration yearly, regardless of the operating hours. If a spectrometer calibration is necessary, please contact Image Engineering.

We can provide a temporary replacement spectrometer to bridge the time gap while your spectrometer is recalibrated. Please contact us for more information.

5.2 Spectrometer removal for calibration



Do NOT remove the fiber from the spectrometer.

The spectrometer must be calibrated with the fiber.

A spectrometer without the fiber or cap may be permanently damaged by dust.

- Please ship the spectrometer complete with the calibration device.
- Remove the spherical reflector by unscrewing the two holding screws.
- Package the whole calibration device in bubble wrap.
- Put the device in a box and use cushioning.





5.3 Care instructions

- Do not touch, scratch, or pollute the diffuser.
- If there is any dust on the diffuser, clean it with an air blower.
- Do not remove the fiber from the spectrometer. Otherwise, the calibration is invalid, and the spectrometer has to be **recalibrated!**

5.4 Disposal instructions

After the service life of iQ-Chart Box, it must be disposed of properly. Electrical and electromechanical components are included in iQ-Chart Box. Observe your national regulations and ensure that third parties cannot use iQ-Chart Box after disposing of it.

Contact Image Engineering if assistance for disposal is required.

6 TECHNICAL DATA SHEET

See annex for the technical data sheet. It can also be downloaded from the website of Image Engineering <https://image-engineering.de/support/downloads>.