



iQ-Trigger

iQ-Trigger-T

User Manual

August 29, 2022





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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-Trigger corresponds to the essential requirements of the following EC directive:

- Electromagnetic Compatibility - 2014/30/EU

1.2 Intended use

iQ-Trigger/iQ-Trigger-T is used to press the shutter release button of a camera with high temporal accuracy.

A typical use of iQ-Trigger/iQ-Trigger-T is to measure camera shutter delay in conjunction with the LED-Panel.

- Only suitable for indoor use.
- Usable for cameras with a hardware release button and touch screens.
- In combination with LED-Panel measurement according to ISO15781:2014

1.3 Product variants

- iQ-Trigger: electromechanical finger (including hydraulic arm and mounting), suitable for pushing hardware buttons and touch screens
- iQ-Trigger-T: suitable for capacitive touch screens



1.4 Foreseeable misuse

1.4.1 Do not use iQ-Trigger-T with STEVE-2D

iQ-Trigger-T cannot be combined with STEVE-2D. Usage will cause irreversible damage to iQ-Trigger-T.

1.4.2 Do not use iQ-Trigger-T with lightSTUDIO-M

iQ-Trigger-T cannot be used with lightSTUDIO-M, and usage will cause irreversible damage to iQ-Trigger-T. To combine iQ-Trigger-T with lightSTUDIO-M, set it up as a separate device (e.g., manual usage or using the iQ-Trigger USB box).

1.4.3 Do not touch adhesive nano-coating of iQ-Trigger-T

Extensive touch might substantially damage the adhesive nano-coating of iQ-Trigger-T and lose its characteristic.

1.4.4 Do not put any fragile items under iQ-Trigger's finger

Take care and do not place any fragile items or part of the body under iQ-Trigger's finger. If iQ-Trigger is released inadvertently, it may cause injuries. iQ-Trigger presses the electromechanical finger down with 11 N.

1.5 General safety information

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-Trigger is available in different product bundles.

iQ-Trigger-T

- iQ-Trigger-T
- 2 x TPE-band 90 mm
- 2 x TPE-band 130 mm
- Microfiber cloth
- iQ-Trigger-T storage box



- iQ-Trigger USB box
- Wired remote release
- Power supply
- USB cable (connection of iQ-Trigger USB box to PC)
- 7.5 m extension cable for iQ-Trigger-T (6.3 mm TRS connector)
- iQ-Trigger API

iQ-Trigger

- iQ-Trigger (electromechanical finger including hydraulic arm and mounting)
- Manfrotto L bracket and mounting plate (type 405)
- iQ-Trigger USB box
- Wired remote release
- Power supply
- USB cable (connection of iQ-Trigger USB box to PC)
- Connection cable (iQ-Trigger USB box to LED-Panel)
- iQ-Trigger API

iQ-Trigger + iQ-Trigger-T

- iQ-Trigger-T
- 2 x TPE-band 90 mm
- 2 x TPE-band 130 mm
- Microfiber cloth
- iQ-Trigger-T storage box
- iQ-Trigger (electromechanical finger including hydraulic arm and mounting)
- L-shaped holder on a mounting plate (Manfrotto Type 405)
- iQ-Trigger USB box
- Wired remote release
- Power supply
- USB cable (connection of iQ-Trigger USB box to PC)
- 7.5 m extension cable for iQ-Trigger-T (6.3 mm TRS connector)
- iQ-Trigger API

iQ-Trigger add-on

- iQ-Trigger (electromechanical finger including hydraulic arm and mounting)
- L-shaped holder on a mounting plate (Manfrotto Type 405)



iQ-Trigger-T add-on

- iQ-Trigger-T
- 2 x TPE-band 90 mm
- 2 x TPE-band 130 mm
- Microfiber cloth
- iQ-Trigger-T storage box

2.2 Commissioning

iQ-Trigger-T: Remove the protection film from the adhesive side of the device before first use. The device comes ready to use. Please refer to chapter 3 for setting up iQ-Trigger-T hardware.

iQ-Trigger: The device comes ready to use.



3 OPERATING INSTRUCTIONS HARDWARE – IQ-TRIGGER-T

3.1 Setup

The surface of the iQ-Trigger-T has an adhesive nano-coating, which helps you attach the iQ-Trigger-T to the surface of the touch screen. The surface of the device has to be clean and degreased to provide maximal adhesion.

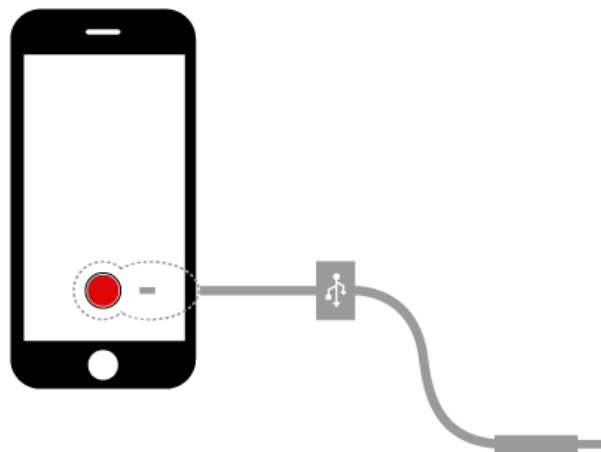


Figure 1 iQ-Trigger-T placement on mobile devices

Place the round anterior part on the release button of the touch screen.

Secure the iQ-Trigger-T with one of the included TPE bands. Stretch the band around the tested device and place it under the small hook on the backside of iQ-Trigger-T. We supply two different sizes of TPE bands for tablets and smartphones.



3.2 Using iQ-Trigger-T with other IE measurement devices

3.2.1 LED-Panel (timing measurement)

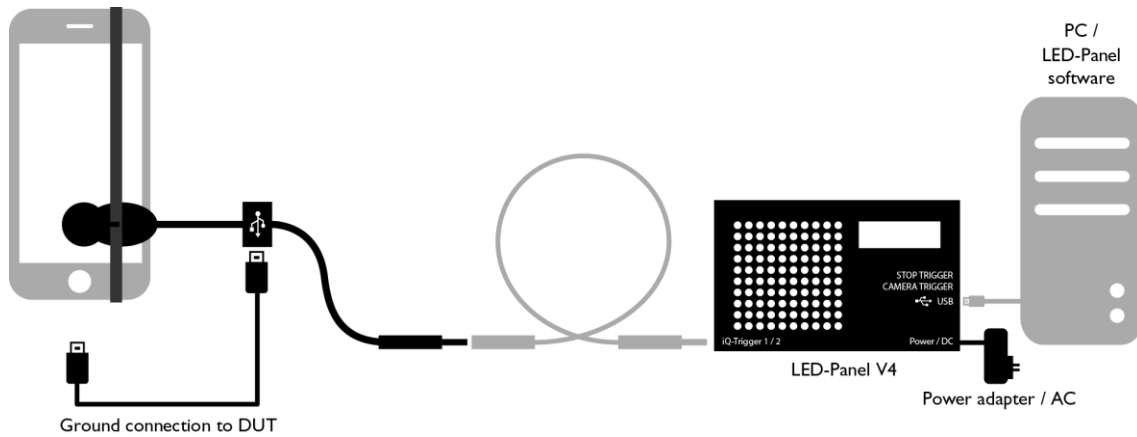


Figure 2 Connection scheme iQ-Trigger-T and LED-Panel V4

Mount iQ-Trigger-T on the device under test and connect the TRS connector (6.5 mm “jack plug”) to the LED-Panel V4 (over an optional extension cable). Use either “Stop Trigger” or “Camera Trigger,” depending on the measurement type. Connect the device under test and iQ-Trigger-T (via USB) to provide a ground connection. Connect the PC (via USB) to LED-Panel to trigger the LED-Panel and release the camera device simultaneously by using the software.

For using the remote release, use the set-up described for LED-Panel V3.

Please refer to the LED-Panel manual for details on how to measure different timings (shutter lag, autofocus time, etc.) and how to interpret the captured images.

3.2.2 LED-Panel V3 (timing measurement)

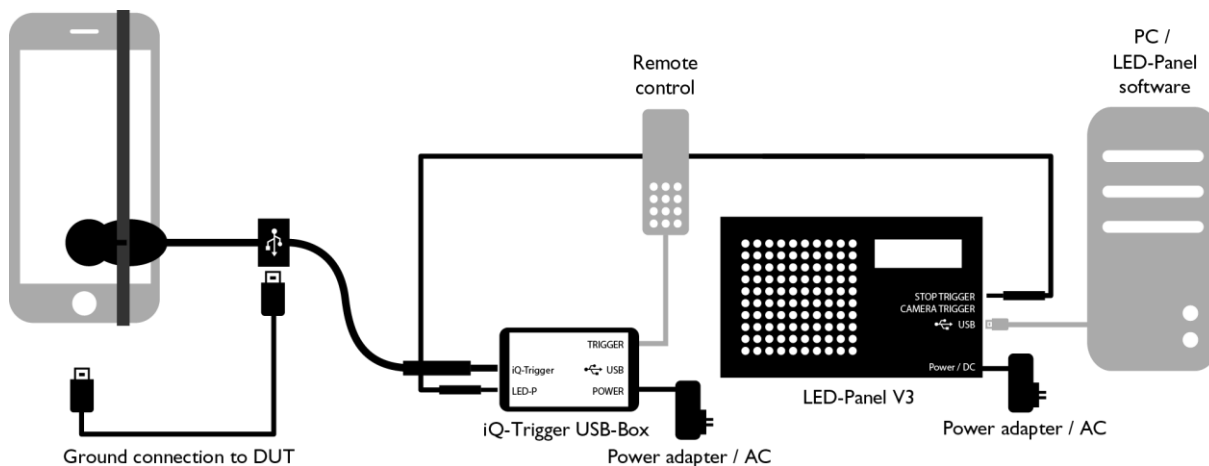


Figure 3 Connection scheme iQ-Trigger-T and LED-Panel V3

Mount iQ-Trigger-T on the device under test and connect the TRS connector (6.5 mm “jack plug”) to the iQ-Trigger USB box (over an optional extension cable). Use either “Stop Trigger” or “Camera Trigger,” depending on the measurement type. Connect the device under test and iQ-Trigger-T (via USB) to provide a ground connection. Connect the iQ-Trigger USB box to the LED-Panel (via 3.5 mm TRS connector). Connect the remote release (2.5 mm TRS connector) to the Trigger input of the iQ-Trigger USB box for manual control of iQ-Trigger-T/LED-Panel, or connect the PC (via USB) to LED-Panel V3 for software control. Both will trigger the LED-Panel and release the camera device simultaneously.

Please refer to the LED-Panel manual for details on measuring different timings (shutter lag, autofocus time, etc.) and how to interpret the pictures captured.



3.2.3 STEVE-6D (OIS/IS performance)

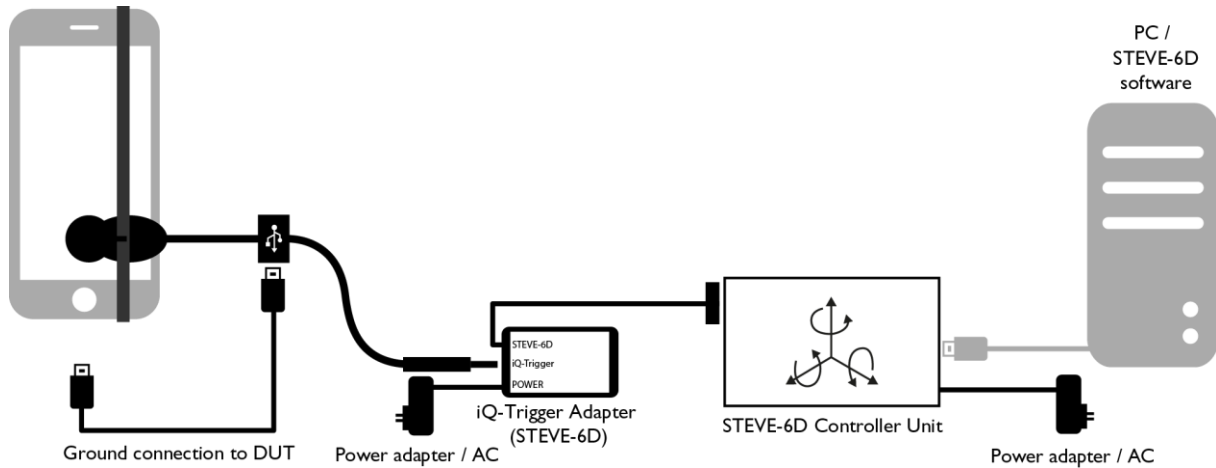


Figure 4 Connection scheme iQ-Trigger-T and STEVE-6D

Mount iQ-Trigger-T on the device under test and connect the TRS connector (6.5 mm “jack plug”) to the iQ-Trigger Adapter (STEVE-6D) delivered with STEVE-6D (over optional extension cable). Connect the device under test and iQ-Trigger-T (via USB) to provide a ground connection. Connect the iQ-Trigger Adapter (STEVE-6D) with the D-SUB connector to STEVE-6D Controller Unit. Control the iQ-Trigger-T by using the STEVE-6D software.

Please refer to the STEVE-6D manual for further details on how to use the STEVE-6D or the STEVE-6D software.



3.2.4 iQ-Trigger USB box

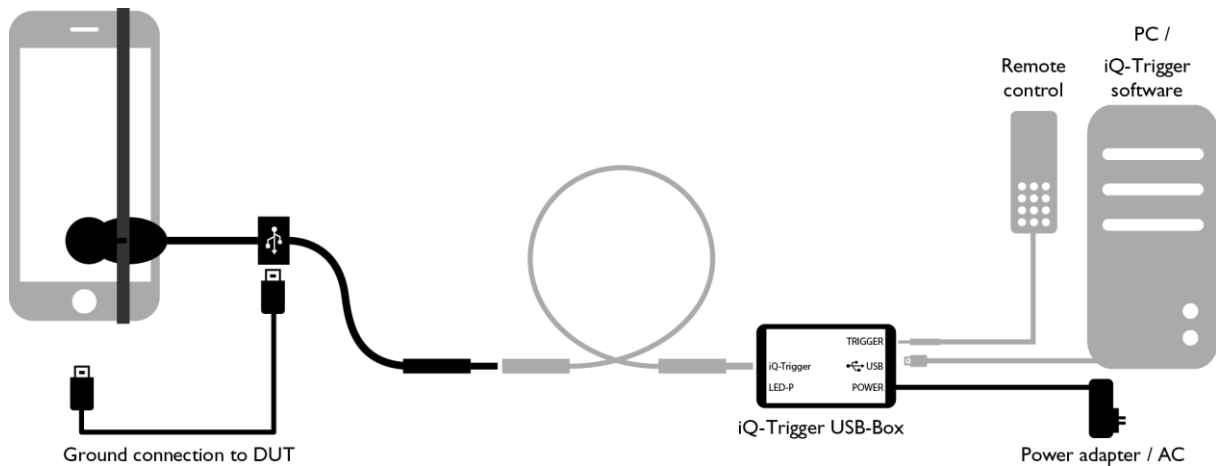


Figure 5 Connection scheme iQ-Trigger-T and PC/remote release over iQ-Trigger USB box

Mount iQ-Trigger-T on the device under test and connect the TRS connector (6.5 mm “jack plug”) to the iQ-Trigger USB box (over an optional extension cable). Connect the device under test and iQ-Trigger-T (via USB) to provide a ground connection. The iQ-Trigger-T can now be operated via remote release (connect 2.5 mm TRS connector to Trigger input of iQ-Trigger USB box) or with the iQ-Trigger API on a PC (connect PC via USB with iQ-Trigger USB box).

3.3 Care instructions

- Keep the adhesive surface free of dust and debris
- Do not touch the adhesive surface with your hands
- Always store the iQ-Trigger-T in the supplied case
- If necessary, clean the adhesive surface with a wet cloth and allow it to air dry.
- Do not wash the device underwater
- Do not use any chemical cleaning agents



4 OPERATING INSTRUCTIONS HARDWARE – IQ-TRIGGER

4.1 Setup

iQ-Trigger with L bracket can be mounted to a geared head, or a tripod with the Manfrotto RC4 rapid connect system.

The adapter plate of the L bracket comes with a ¼" UNC screw.

Mount the camera on the L bracket. Adjust the finger of iQ-Trigger by opening the knurled screw on the electromechanical arm. Now the arm can be adjusted in all directions, and the finger can be positioned directly above the release button.

Use the knurled screw on top of the iQ-Trigger to adjust the travel distance of the finger. The further the screw is screwed in, the shorter the distance the finger must travel. Set the travel distance as short as possible. Smaller travel distances mean more power and less delay (refer to chapter 4.1.2 to determine the delay).

If the arm is not long enough to reach the release buttons on the backside of your device, you can rotate the iQ-Trigger by 90°. Open the two screws connecting the aluminum block (3) (see

Figure 6) to the L bracket (4), and then re-assemble it in the rotated position using the other holes in the aluminum block.

4.1.1 Exchange finger for a touch pen tip

iQ-Trigger is delivered with two different fingers: a solid finger for general use and a finger with a touch pen tip.

To exchange the fingers, tighten the knurled screw (1) at the top of the iQ-Trigger. When the magnet is locked, unscrew the finger (2) and replace it with the other.

When using the touch pen, please remember that the front's soft tip will add some extra delay.

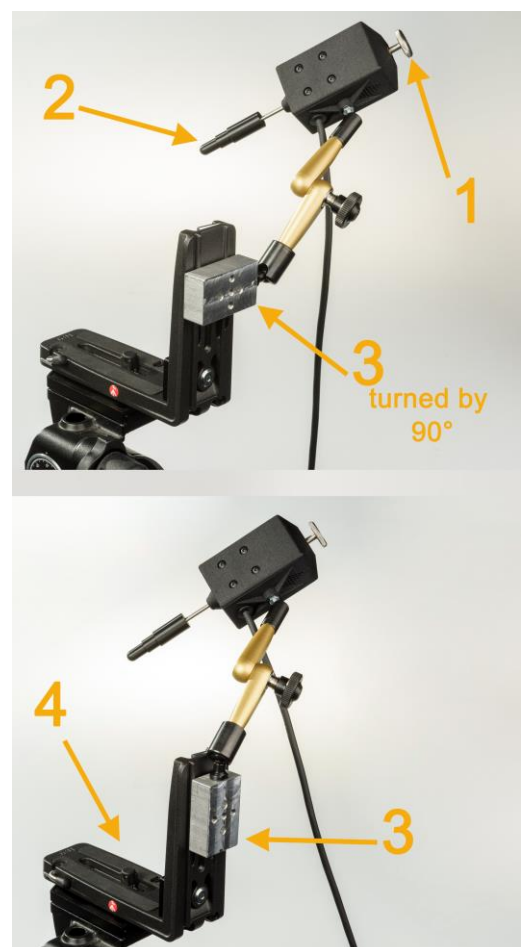


Figure 6: Modifying iQ-Trigger for large devices and touch screens



4.1.2 Measuring the iQ-Trigger delay

iQ-Trigger has a typical delay of 20 ms between pressing the trigger button and the collision of the finger. If you need to know the exact delay, you can use a LED-Panel to determine it.

For typical uses of iQ-Trigger, this is not required.

Note: the distance the finger moves considerably influences the delay! Hence adjust the desired move distance with the knurled screw on top of the iQ-Trigger before measuring.

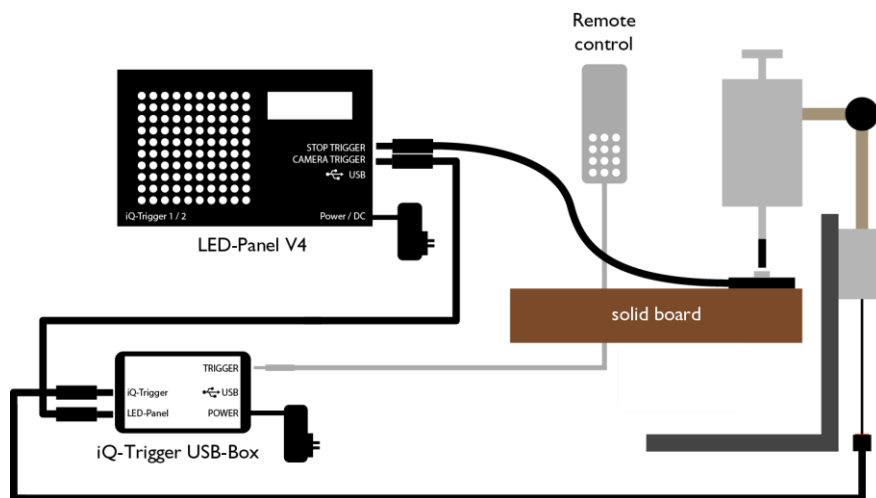


Figure 7 Set up to determine iQ-Trigger delay

Fix the microswitch delivered with LED-Panel on a solid board (table). Assemble the iQ-Trigger with the finger positioned directly above the switch.

Connect the micro switch to the “Stop Trigger” jack plug of the LED-Panel. Connect the iQ-Trigger USB box with the “Camera Trigger” jack plug of the LED-Panel and set the time of the LED-Panel with the rotary knob to 1 ms (1000 Hz).

Activate the iQ-Trigger with the remote release or via the iQ-Trigger software.

When the micro switch has stopped the LED-Panel, count the number of LEDs to get the delay in milliseconds (the LEDs run from left to right and top to bottom).



4.2 Using iQ-Trigger with other IE measurement devices

4.2.1 LED-Panel V4 (timing measurement)

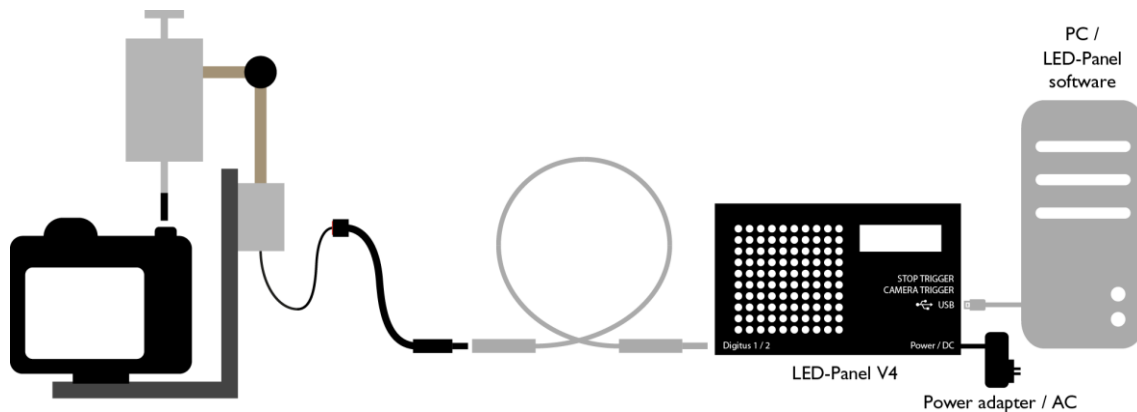


Figure 8 Connection scheme iQ-Trigger and LED-Panel V4

Mount iQ-Trigger and the device under test and connect the TRS connector (6.5 mm “jack plug”) to the LED-Panel V4 (over optional extension cable). Use either “Stop Trigger” or “Camera Trigger,” depending on the measurement type. Connect the PC (via USB) to LED-Panel to trigger the LED-Panel and release the camera device simultaneously using the software.

For using the remote release, use the set-up described for LED-Panel V3.

Please refer to the LED-Panel manual for details on measuring different timings (shutter lag, autofocus time, etc.) and how to interpret the pictures captured.



4.2.2 LED-Panel V3 (timing measurement)

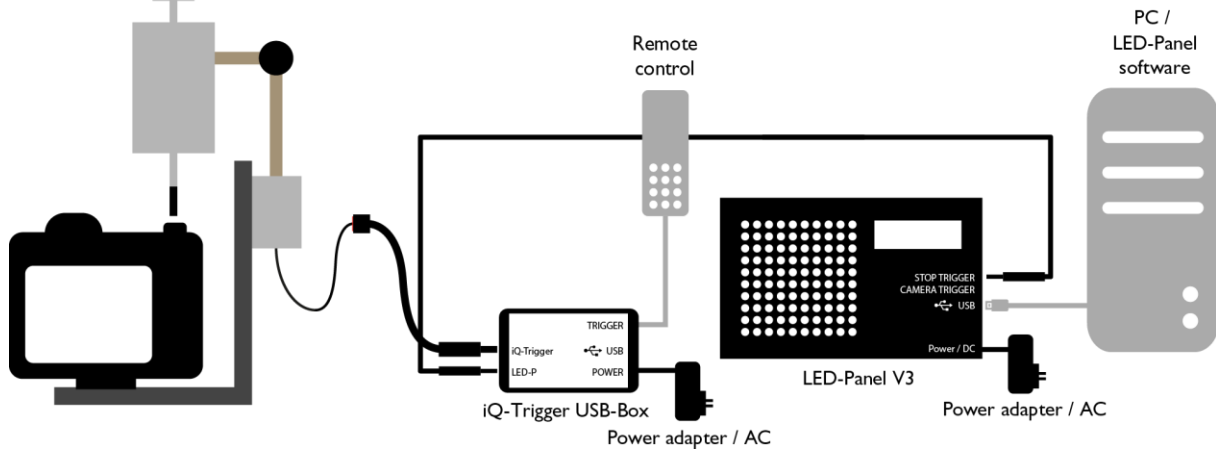


Figure 9 Connection scheme iQ-Trigger and LED-Panel V3

Mount iQ-Trigger and the device under test and connect the TRS connector (6.5 mm “jack plug”) to the iQ-Trigger USB box (over an optional extension cable). Use either “Stop Trigger” or “Camera Trigger,” depending on the measurement type. Connect the iQ-Trigger USB box to the LED-Panel (via the 3.5 mm TRS connector). Connect the Remote Release (2.5 mm TRS connector) to activate the iQ-Trigger USB box input for manual iQ-Trigger-T/LED-Panel, or connect the PC (via USB) to LED-Panel V3 for software control. Both will trigger the LED-Panel and release the camera device simultaneously.

Please refer to the LED-Panel manual for details on how to measure different timings (shutter lag, autofocus time ...) and how to interpret the taken pictures.



4.2.3 STEVE-6D (OIS/IS performance)

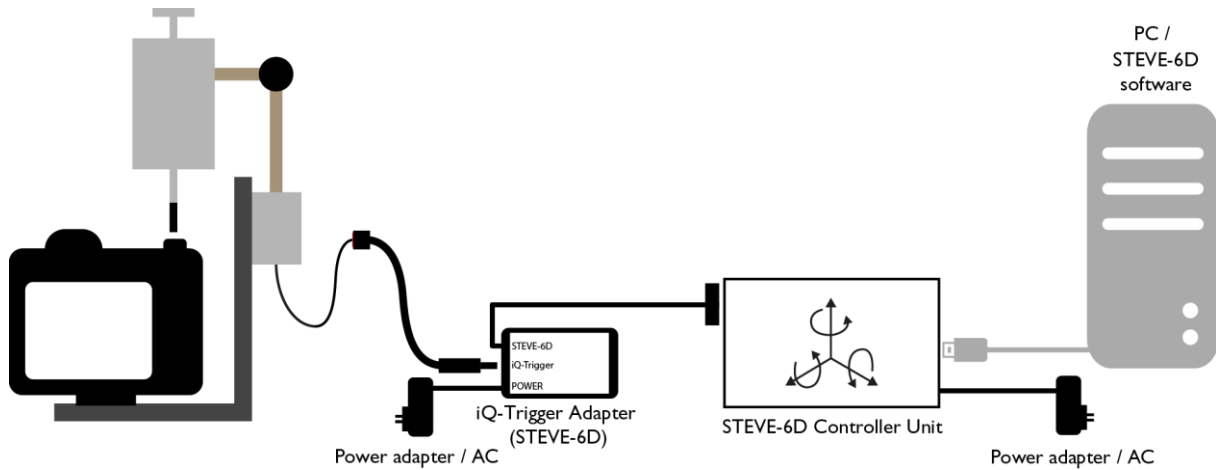


Figure 10 Connection scheme iQ-Trigger and STEVE-6D

Mount iQ-Trigger and the device under test and connect the TRS connector (6.5 mm “jack plug”) to the iQ-Trigger Adapter (STEVE-6D) that is delivered with STEVE-6D (over optional extension cable). Connect the iQ-Trigger Adapter (STEVE-6D) with the D-SUB connector to STEVE-6D Controller Unit. Control the iQ-Trigger-T by using the STEVE-6D software.

Please refer to the STEVE-6D manual for further details on how to use the STEVE-6D or the STEVE-6D software.

4.2.4 STEVE-2D (OIS/IS performance)

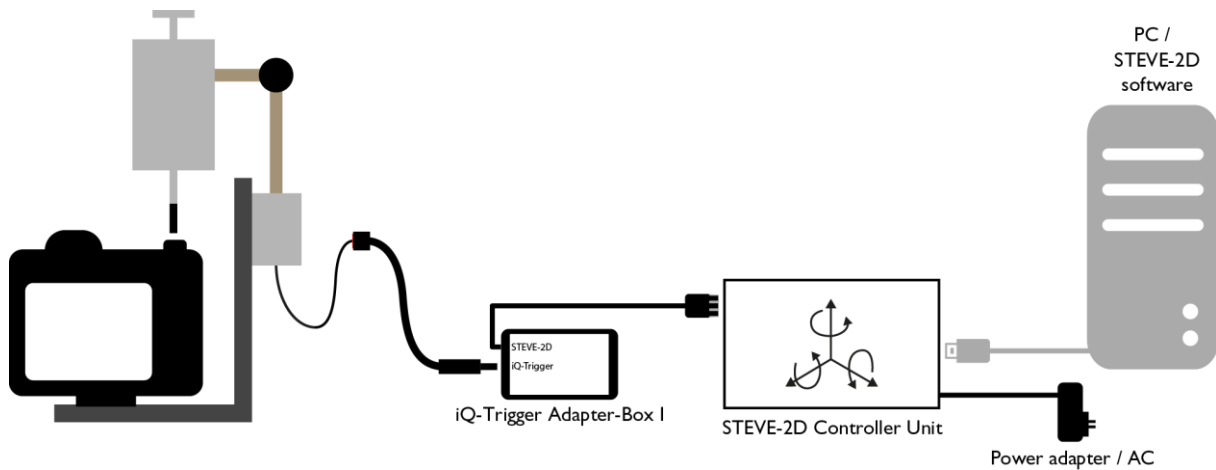


Figure 11 Connection scheme iQ-Trigger and STEVE-2D

Mount iQ-Trigger and the device under test and connect the TRS connector (6.5 mm “jack plug”) to the iQ-Trigger Adapter (lightSTUDIO-M/STEVE-2D) that is delivered with STEVE-2D (over optional extension cable). Connect the iQ-Trigger Adapter (lightSTUDIO-M/STEVE-2D) with the D-SUB connector to the STEVE-2D Controller Unit. Control the iQ-Trigger-T by using the STEVE-2D software.

Please refer to the STEVE-2D hardware and software manual for further details how to use the STEVE-2D or the STEVE-2D software.

4.2.5 iQ-Trigger USB box

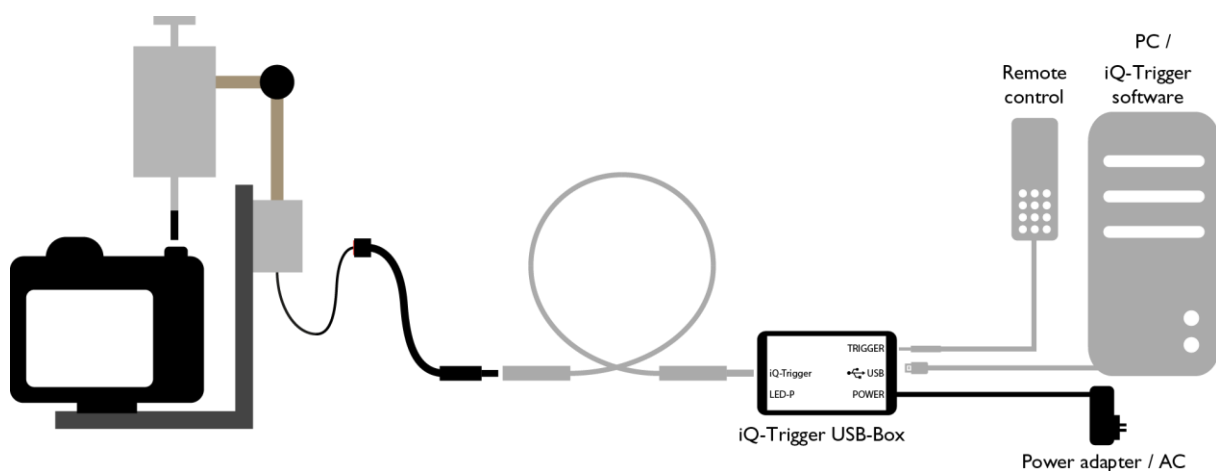


Figure 12 Connection scheme iQ-Trigger and PC/Remote Release over iQ-Trigger USB box



Mount iQ-Trigger and the device under test and connect the TRS connector (6.5 mm “jack plug”) to the iQ-Trigger USB box (over an optional extension cable). The iQ-Trigger-T can now be operated via Remote Release (connect 2.5 mm TRS connector to Trigger input of iQ-Trigger USB box) or with the iQ-Trigger API on a PC (connect PC via USB with iQ-Trigger USB box).

Some touchpad devices have an inverted release switch. In this case, the picture is taken when the finger is released from the display.

The iQ-Trigger USB box has an inverting switch to measure these devices. In the standard setting, the LED-Panel starts when the button is pressed. In the inverted setting, the LED-Panel starts when the button is released.



4.2.6 lightSTUDIO-M

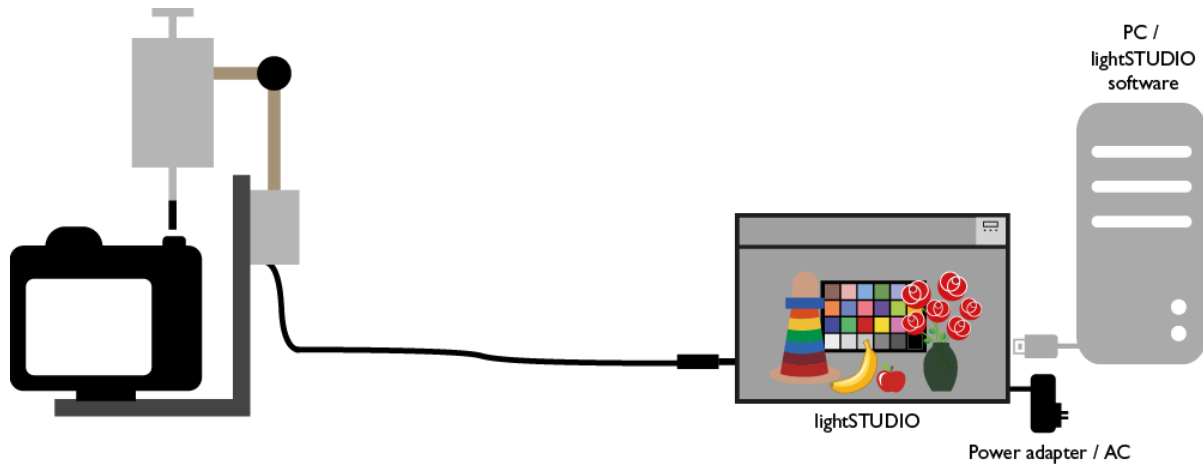


Figure 13 Connection scheme iQ-Trigger and lightSTUDIO-M

Mount iQ-Trigger and the device under test and connect the TRS connector (6.5 mm “jack plug”) to the iQ-Trigger Adapter (lightSTUDIO-M/STEVE-2D) that is delivered with lightSTUDIO-M (over optional extension cable). Connect the iQ-Trigger Adapter (lightSTUDIO-M/STEVE-2D) with the D-SUB connector to lightSTUDIO-M’s control cabinet. Control the iQ-Trigger-T by using the lightSTUDIO software.

Please refer to the lightSTUDIO manual for further details on how to use the lightSTUDIO-M or the lightSTUDIO software.

5 OPERATING INSTRUCTIONS SOFTWARE

IQ-TRIGGER-T / IQ-TRIGGER

5.1 Requirements

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



5.2 Software installation

Please choose the proper installer (32 or 64-bit) for your Windows operating system and run it. During installation, drivers and additional software are installed. The software installations include:

Microsoft Visual C++ Redistributable

After a successful installation, you will find inside your “Program Files” directory the “Image Engineering\iQ-Trigger-API <version number>” subdirectory. Besides all program files for the iQ-Trigger software, there are the following directories:

- Documentation: A PDF document and HTML files containing the documentation for the iQ-Trigger API
- API: The API files (see chapter API)
- Sample project: A complete Qt sample project with source code for iQ-Trigger software (see chapter Sample Project)

5.3 Connection of hardware

Connect the power supply with the iQ-Trigger USB box.

Connect the USB cable to the iQ-Trigger USB box and your PC.

You can check the correct driver installation in your device manager: the iQ-Trigger USB box is listed under “libusb (WinUSB) devices.”

5.4 Usage of software

Connect the iQ-Trigger USB box to the iQ-Trigger software by clicking the ‘iQ-Trigger.exe’ or the iQ-Trigger icon on your desktop.

5.5 Software description

The iQ-Trigger software is a convenient program for controlling the iQ-Trigger USB boxes and is based on the iQ-Trigger API.

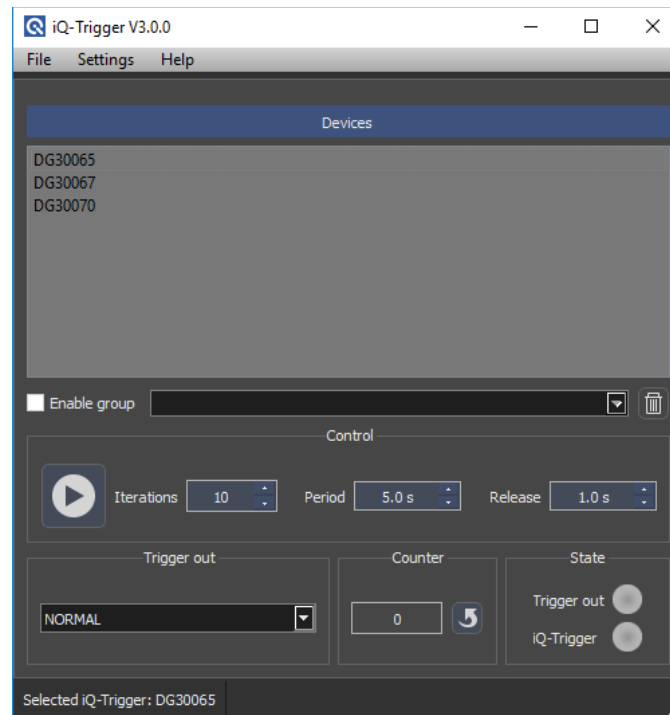


Figure 14 iQ-Trigger software

5.5.1 iQ-Trigger devices

When an iQ-Trigger USB box is connected to the PC, it is displayed with its serial number in the devices panel. Multiple UBS boxes can be connected and used. If the UBS box was connected after the program has started, select “Find iQ-Trigger devices” from the “File” menu. The USB boxes in the panel can be renamed, therefore right-click on the serial number and select “Rename.”

5.5.2 Grouping devices

To control multiple devices with equal parameters simultaneously, select the devices in the panel and right-click to add them to a group.

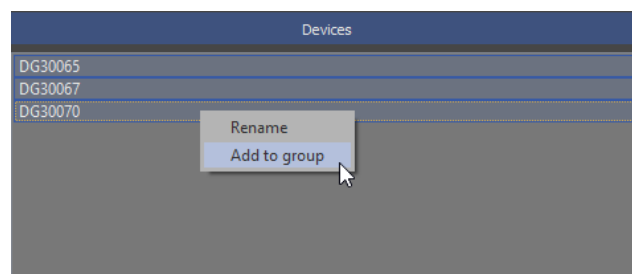


Figure 15 Grouping devices

When “Enable groups” is enabled, the created groups can be selected from the menu. The parameters set in the control panel are now used for all devices in a group.



5.5.3 iQ-Trigger control / sequences

The period and release time can be edited for each device or each group of device parameters for the number of iterations. These sequences can be saved and loaded for future use.

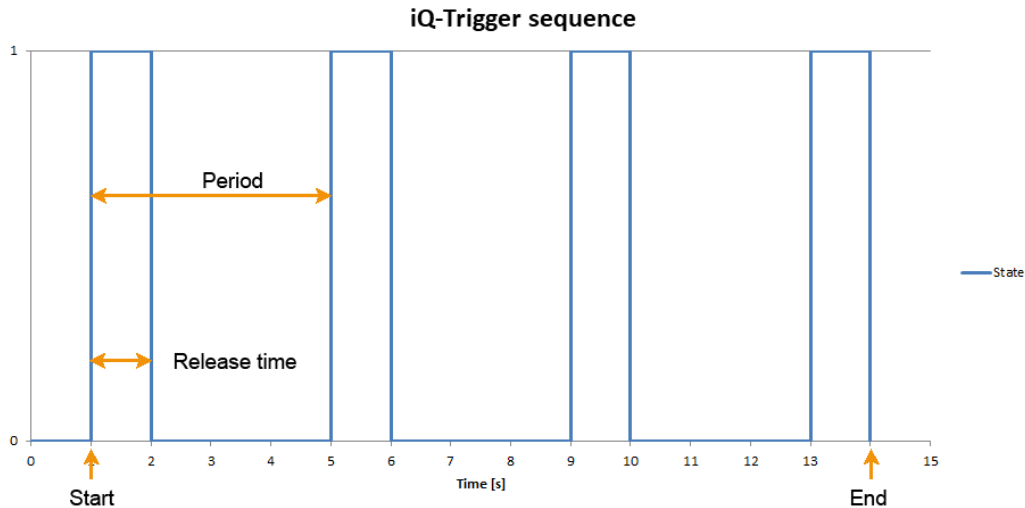


Figure 16 iQ-Trigger Sequence diagramm

Iterations: The number of iterations is limited to 1 million. The value -1 can be entered for infinite looping.

Period: The period is the time for one cycle of release and pause of the iQ-Trigger. Its minimum must always be 0.5 seconds longer than the release time, and the absolute minimum is 0.6s. For an extended-release (only iQ-Trigger-T, see note), set the period and release time to a high value.

Release time: The minimum value is 0.1s. Release time must always be 0.5 seconds shorter than the period time.

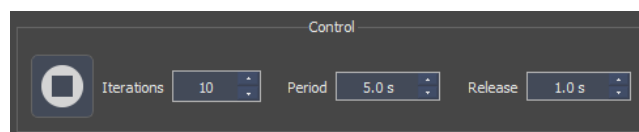


Figure 17 Control panel

Click the play/stop button for playback and stopping of the sequence.

NOTE:

DUE TO MECHANICAL CONSTRUCTION, THE MECHANICAL FINGER IQ-TRIGGER IS LIMITED IN CONTINUOUS OPERATION:

- MAXIMUM TIME IN RELEASED STATE: 60S
- SHORTEST RELEASE TIME: 100MS



- FOR CONTINUOUS OPERATION, THE DUTY CYCLE MUST NOT BE LONGER THAN 50% (DUTY CYCLE = THE RATIO OF RELEASE TIME TO PERIOD).
THE MECHANICAL FINGER MAY BE HEATED UP OR EVEN DESTROYED IF OPERATED FOR A LONG TIME IN A RELEASED STATE WITHOUT INTERRUPTION.

5.5.4 Trigger output

The trigger output port of the USB box is directly dependent on the state of the iQ-Trigger. Select the desired trigger behavior with the pop-up menu.

Overview of the states:

iQ-Trigger state	Trigger output behavior	Trigger output port
Idle	Normal	Open-circuit
Released	Normal	Short-circuit
Idle	Inverse	Short-circuit
Released	Inverse	Open-circuit

The following images represent both trigger output behaviors utilizing a sequence.

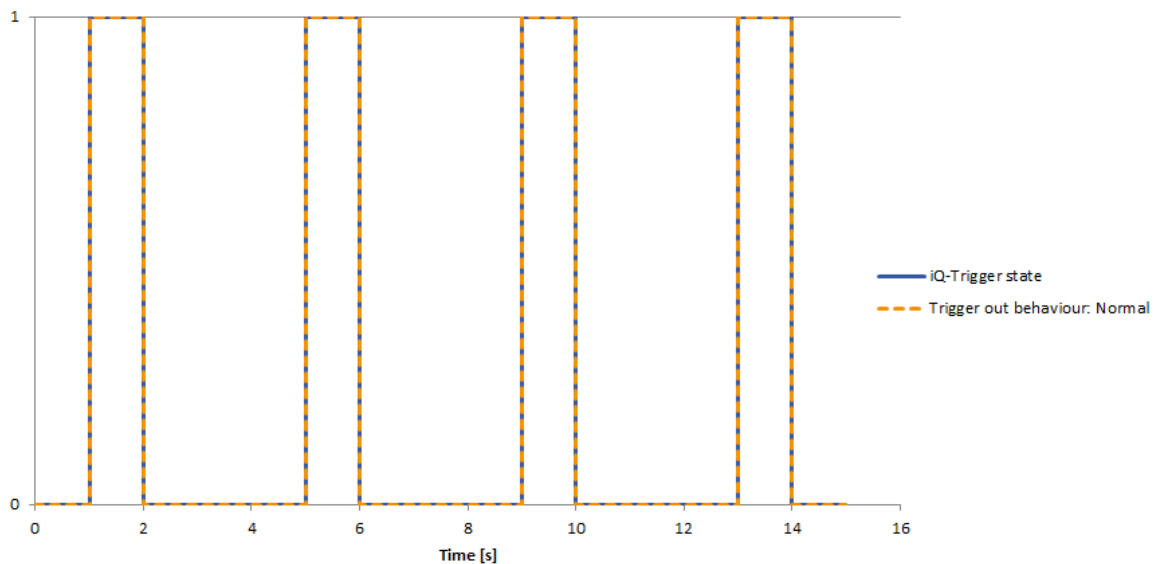


Figure 18 iQ-Trigger sequence (normal)

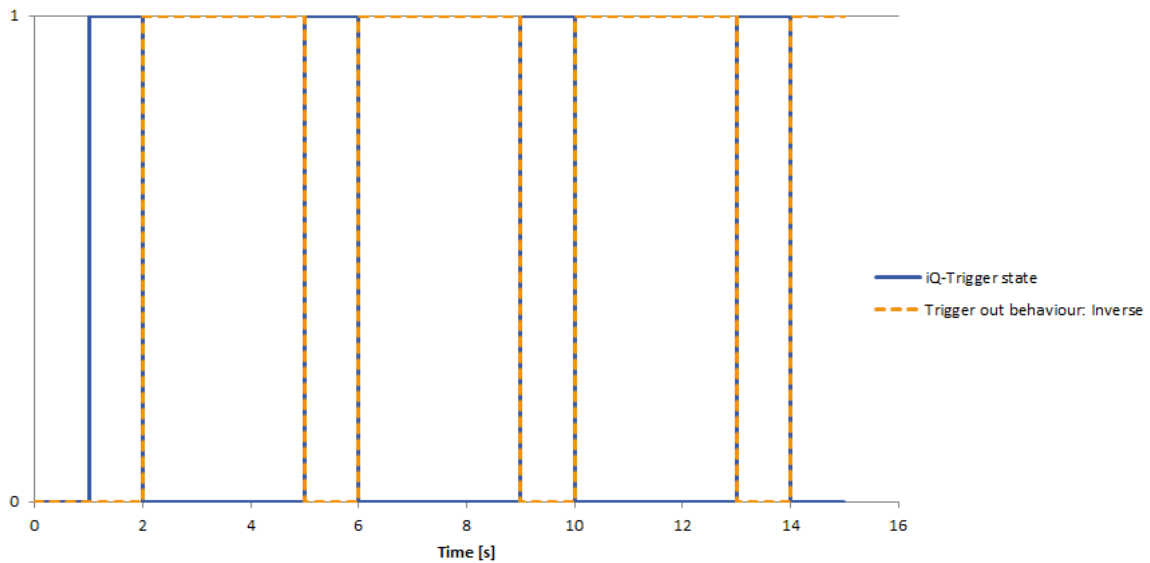


Figure 19 iQ-Trigger sequence (inverse)

5.5.5 Counter

The number of elapsed periods from the start is displayed. Counters are stored separately for each connected device and each group of devices. The counter value is not permanently stored and is lost when the program is closed. Reset counter for selected device or group with the button.

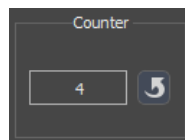


Figure 20 Counter

5.5.6 State display

The current states of the iQ-Trigger and the trigger output port are displayed. The colors correspond to the LED colors of the USB box.

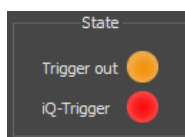


Figure 21 State display

5.5.7 Save parameters

Save all parameters for each device and group of devices with “Settings/Save” and load settings with “Settings/Load.” Be aware that settings are only loaded and applied if the device serial numbers for a dedicated setting match the serial numbers of the currently connected devices.



6 API

The program directory of iQ-Trigger contains an entry titled “API.” It contains a bin, a lib, and an included directory. The API has its own documentation; see directory “Documentation.”

6.1 Sample project

The program directory of iQ-Trigger contains the directory “Sample project” with a complete Qt (www.qt.io) project, including the source code of the iQ-Trigger program. The project is based on Qt 5.6 and MSVC 2012.

Qt Creator needs to be configured in the “Projects” section: In the “Debug” and “Release” build configuration, add a build step “Make” after the first “Make” step. Type “install” into the edit field “Make arguments.” This configuration is necessary for the INSTALL directive in the iQ-Trigger_sample.pro file.

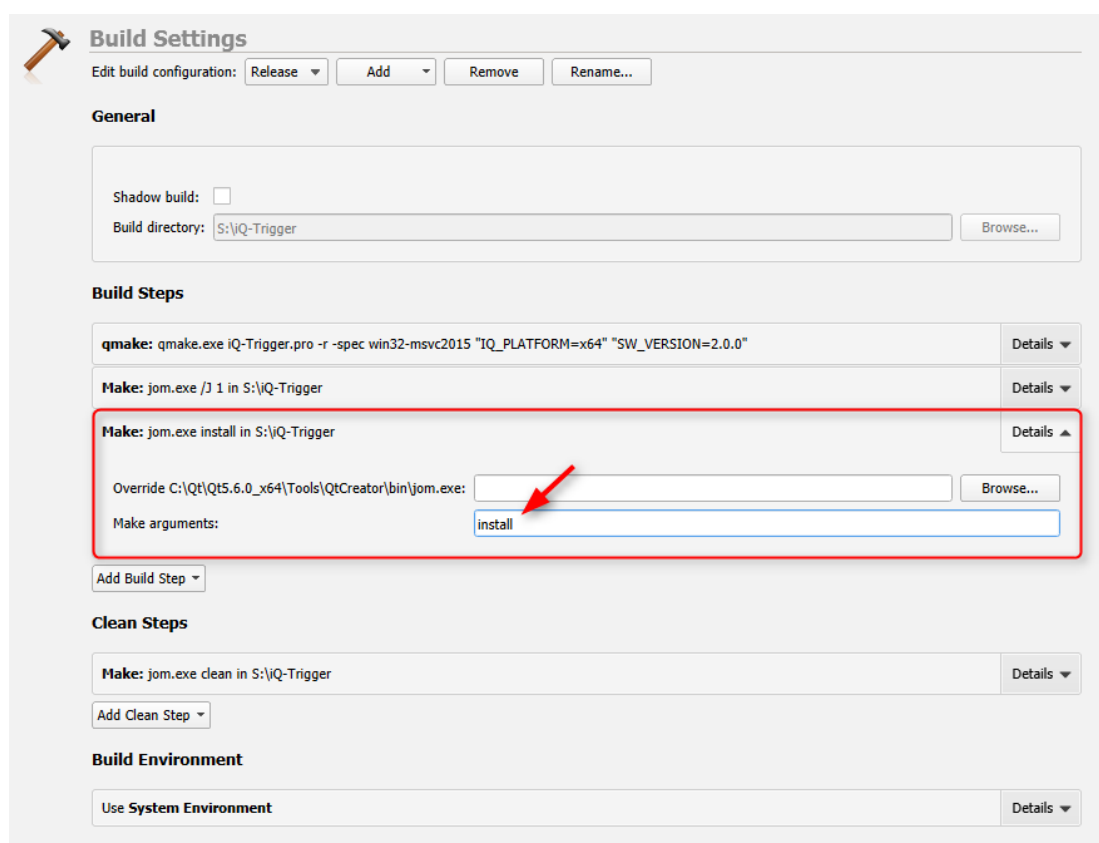


Figure 22 Sample project build settings



7 ADDITIONAL INFORMATION

7.1 Storage and transport

iQ-Trigger-T: Always store and transport the device in the iQ-Trigger-T storage box. Unplug all devices/cables from iQ-Trigger-T and iQ-Trigger USB Box before storage/transport.

iQ-Trigger: Ensure that the electromechanical finger is fixed, and the device is wrapped correctly for transport to avoid damage. Unplug all cables/devices from iQ-Trigger and iQ-Trigger USB box before storage/transport.

7.2 Disposal instructions

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

Contact Image Engineering if assistance for disposal is required.

8 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>.

9 3RD PARTY COMPONENTS

The iQ-Trigger software uses open-source software:

libusb (www.libusb.org) is an open source project; the code is licensed under the GNU Lesser General Public License version 2.1 or later (www.gnu.org/licenses/old-licenses/lgpl-2.1.html).

Qt (www.qt.io) is an open-source framework; the code is licensed under the GNU Lesser General Public License version 3.0 or later (www.gnu.org/licenses/lgpl-3.0).