



Manual

iQ-Headturner

Image Engineering GmbH & Co. KG

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1 About these operating instructions

Before using the iQ-Headturner for the first time or starting other work that uses the iQ-Headturner, you must read these operating instructions.

Pay special attention to Chapter 2, "General safety regulations."

1.1 General

These instructions are intended to simplify the iQ-Headturner's use and ensure it's utilized for its intended purpose.

The operating instructions contain important information on the proper use and safety of the iQ-Headturner. Observance of these instructions will assist you with the following:

- Avoiding hazards
- Reducing repair costs and downtime
- Increasing the reliability and service life of the product

These instructions must be read and applied by any person involved in working with the iQ-Headturner.

In addition to these operating instructions, the accident prevention and environmental protection regulations applicable in the country and place of use must also be observed.

1.2 Presentation of information

Structure of instructions for action

Action instructions are divided into:

- Action steps
- Results of the actions
- Application tips for optimal use

A symbol identifies each piece of information:



Symbol	Meaning
1. 2. 3.	Action steps: These action steps are numbered consecutively and must be performed in the specified order from top to bottom.
✓	Result symbol: The text after this symbol describes the result or intermediate result of an action.
TIP:	Application tip: Additional information on the optimal use of the product.

Tab. 1.1 Meaning of symbols

Structure of the warnings

Signal word	Use with ...	Possible consequences if the safety instruction is not observed:
DANGER	Personal injury (imminent danger)	Death or most serious injuries!
WARNING	Personal injury (potentially dangerous situation)	Death or most serious injuries!
CAUTION	Personal injury	Light or minor injuries!
NOTE	Property damage	Damage to the device and the surrounding area

Tab. 1.2 Warning levels

The warnings are structured as follows:

- Warning sign with signal word according to warning level
- Type of hazard (description of the hazard)
- Consequences of the hazard (description of the consequences of the hazard)
- Hazard prevention (measures to prevent the hazard)



DANGER!

Hazard type

Hazard consequences

1. Security

Warning sign

Special warnings are given at the relevant points. They are marked with the following symbols:



General danger point

This sign warns of personal injury.

If there is a clear source of danger, it is preceded by one of the following symbols.



High voltage current

This sign warns of a possible electric shock, possibly with fatal consequences.



Crushing hazard

This sign warns of places where there is a risk of being crushed.



Suspended loads

This sign warns of lifted loads that may fall and injure people.



Hand injuries

This sign warns that hands can be crushed, pulled in, or otherwise injured.



Hot surfaces

This sign warns against burns in case of contact with hot surfaces.



2 General safety regulations

2.1 Principles

Before commissioning the device, please carry out the checks listed in **Chapter 11**.

Ensure that the device:

1. Is in perfect condition visually.
2. Is properly standing.
3. The head is firmly seated on the iQ-Headturner and secured with the screw.
4. The iQ-Headturner can be seen from the operator station.

Please ensure that you can view the device in operation at all times.



NOTE!

Unintended/ unexpected start-up

Unexpected rotary motion during operation due to deliberate control

The operating station must have direct visual contact with the iQ-Headturner .

The device is built according to the most recent and recognized safety regulations. Nevertheless, the use of the device may result in danger to life and limb of the user or third parties or impairment of the device and other material assets.

2.2 Intended use

The iQ-Headturner simulates the typical, reproducible rotation around the Z-axis (yaw/spine) of human heads during videoconferences by means of an oscillating rotation (+/- 360°) and of exchangeable, separately available dummy heads. It is used to evaluate the behavior of

webcams with respect to the head in terms of face detection, autofocus and exposure control.

Control is exclusively via the wired USB interface through the supplied PC software or API.

Only doll heads approved by the manufacturer according to the compatibility list may be used.

(See: **Chapter 3.1** Accessories + Compatibility List)

The device may only be operated in closed rooms.

2.3 Foreseeable misapplication

- Use of attachments other than the doll heads approved by the manufacturer
- Use without doll head attached
- Use of an "overaged" head, resulting in loosening of the attachment
- Use of modified doll heads
- Use of the iQ-Headturner as a hand-held device instead of setting it up on a flat surface
- Operating the iQ-Headturner on a sloping or moving surface (risk of falling or tipping over)
- Faulty transport, e.g., lifting or tilting at/with the slip-on spigot or head



WARNING!

Improper use of the iQ-Headturner

Risk of injury to the user and damage to the device

Only use the iQ-Headturner as intended.

2.4 Safety regulations

**NOTE!****Unintended/ unexpected start-up**

Unexpected rotary motion during operation due to deliberate control

The operating station must have direct visual contact with the iQ-Headturner.

**CAUTION!****Burns**

Burning on the hot surface of the engine after a malfunction/blockage

In case of malfunctions of the motor, immediately take the device out of operation and contact the manufacturer.

**CAUTION!****Impact/abrasions**

Injury to hands when operating without a head or with an unapproved attachment

Operate the iQ-Headturner only with heads that are on the compatibility list. The heads must not be modified.

**CAUTION!****Shock**

Bumping of body parts with or by the rotating head during operation

During operation, maintain a minimum distance of 1 meter from the device.

General notes

The operation of the iQ-Headturner is only permitted with a securely mounted head.

Use only approved heads - these are listed in **Chapter 3.1** in the compatibility list.

During transport

Only use the folding handles mounted on the side to transport the iQ-Headturner

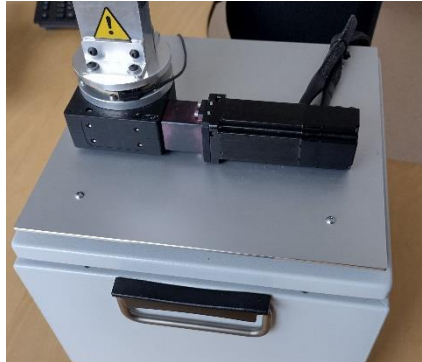


Figure 1 Folding handle

If a head is mounted, ensure that it is secured with the enclosed screw before transportation.



WARNING!

Falling or crushing

Injury due to the dropping of the device
Crushing of fingers when placing the device down

Only use the folding handles to transport the iQ-Headturner.

Never lift the device by the head fixture or the head.

During commissioning

The device may only be operated in closed rooms.

Set the iQ-Headturner on a stable, level surface.



The iQ-Headturner requires a base area of 30 x 30 cm and an additional approx.---15 cm at the side for the connection lines.



CAUTION!
Loss of stability

Tipping over the device due to installation on an inclined or movable surface

The iQ-Headturner must be placed on a flat, stable surface.

During operation

Ensure that the iQ-Headturner is visible from the operator station.

Ensure that no one is closer than 1m to the device during operation.



NOTE!

Unintended/ unexpected start-up

Unexpected rotary motion during operation due to deliberate control

The operator station must have direct visual contact with the iQ-Headturner.



CAUTION!
Shock

Bumping of body parts with or by the rotating head during operation

During operation, maintain a minimum distance of 1 meter from the device.

Care, maintenance, and control work

The device is maintenance-free.

Any necessary repairs may only be performed by Image Engineering and professionals designated by Image Engineering.



DANGER!

Fatal electrocution

The housing may only be opened for maintenance by Image Engineering or qualified personnel commissioned by IE.

Before starting work, the iQ-Headturner must be checked.

To do this, perform the steps in **chapter 11.1**.

Disposal

After the service life of the iQ-Headturner, it must be disposed of properly. The device must not be disposed of with household waste.



Please observe chapter **13.2 Disposal and recycling**



2.5 Residual hazards

Even if all safety instructions are observed, a small residual danger still remains.

Therefore, please ensure that no one is closer than 1m to the device during operation.



CAUTION!

Shock

Bumping of body parts with or by the rotating head during operation

During operation, maintain a minimum distance of 1 meter from the device.

2.6 Selection and qualification of personnel

The iQ-Headturner may only be operated by persons who have carefully read these instructions.

2.7 Workstations for the operating personnel

The person operating the iQ-Headturner must be able to view the device at all times.



NOTE!

Unintended/ unexpected start-up

Unexpected rotary motion during operation due to deliberate control

The operator station must have direct visual contact with the iQ-Headturner

2.8 Safety devices

The iQ-Headturner iQ-Headturner a fuse in the mains connection socket (IEC socket) to protect against electrical overload in the event of a fault.

Disconnect the power cord at the socket to safely take the device out of operation.

Position and function of the safety devices



Figure 2

Mains connection socket with fuse switch

2.9 Safety signs

Next to the mains connection socket is the command plate:



Follow the instructions.

Read the instructions carefully before starting up the iQ-Headturner.



The following warning is attached to the mounting pin on which the head is placed:



General warning sign

Make sure that the head is securely mounted and screwed down.

When mounting, be careful not to pinch your fingers.

2.10 Extension and reconstruction

Modifications to the device are not permitted.



DANGER!

Fatal electrocution

The housing may only be opened for maintenance by Image Engineering or qualified personnel commissioned by IE.

2.11 Fire protection

There are no special requirements for fire protection.

2.12 Actions in case of emergency

Take the device out of operation immediately.

To do this, pull the mains connection cable out of the socket.

Fire Fighting

The iQ-Headturner does not require separate protective equipment when fighting fires.

If the device itself catches fire, use a suitable fire extinguisher (class C).

Projected emissions

The iQ-Headturner does not contain any particularly hazardous ingredients. Therefore, no emissions are to be expected.

First aid measures

No serious injuries are to be expected, even in the event of a fault.

Notify a first responder.



3 Scope of delivery and identification of the machine

Scope of delivery

The iQ-Headturner is delivered fully assembled.

The following accessories are included:

- Cold device cable + USB cable
- Spare fuse
- Acceptance protocol
- iQ-Drive Software / API

A Dapper Cadaver doll head is required for use.

See Chap. 3.1 Accessories + Compatibility List.

Nameplate

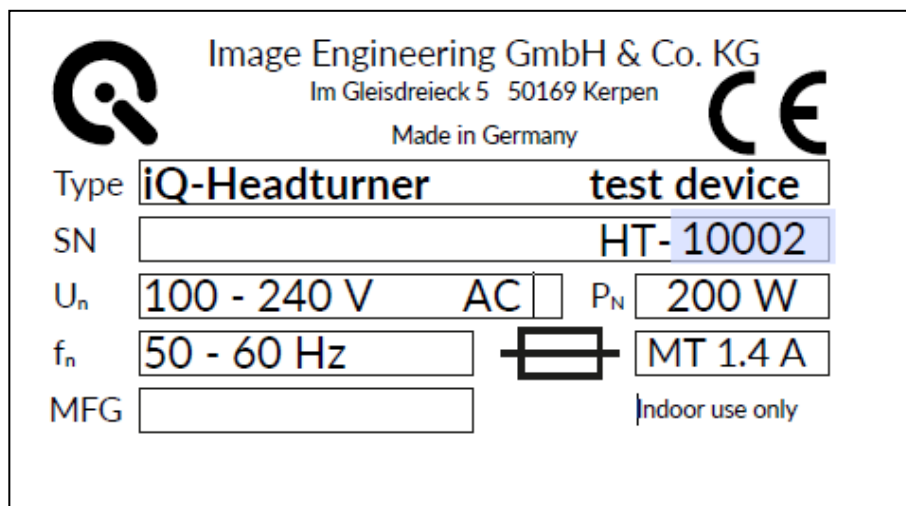


Fig. 3.1 Nameplate

Listed are:

- 1st** Manufacturer + Address
- 2nd** Type = type designation + part number
- 3rd** Serial number
- 4th** U_n =Nominal voltage
- 5th** F_n =Nominal frequency

- 6th** MFG = Year of manufacture
- 7th** P_n = nominal power
- 8th** Fuse used
- 9th** Note: For indoor use only
- 10th** AN = Item number

3.1 Accessories + Compatibility List

The iQ-Headturner is intended for use with the following Dapper Cadaver doll heads:

- iQ-Headturner- Mannequin Head David (SKU: 9500-OV)
- iQ-Headturner- Mannequin Head Alexis (SKU: 9488-IV)
- iQ-Headturner- Mannequin Head Richard (SKU: 9501-EB)

The use of other doll heads or other superstructures is not permitted.

The heads must not be modified.

Please note the maximum durability of the heads.

According to the manufacturer, Dapper Cadaver, the life of the heads is 2 to 5 years.

The head turner can be combined with the VCX frame and the TE295 chart.



CAUTION!

Impact / abrasions

Injury to hands when operating without a head or with an unapproved attachment

Operate the iQ-Headturner only with heads that are on the compatibility list. The heads must not be modified.



4 Structure and function

4.1 General overview

The iQ-Headturner is delivered fully assembled.

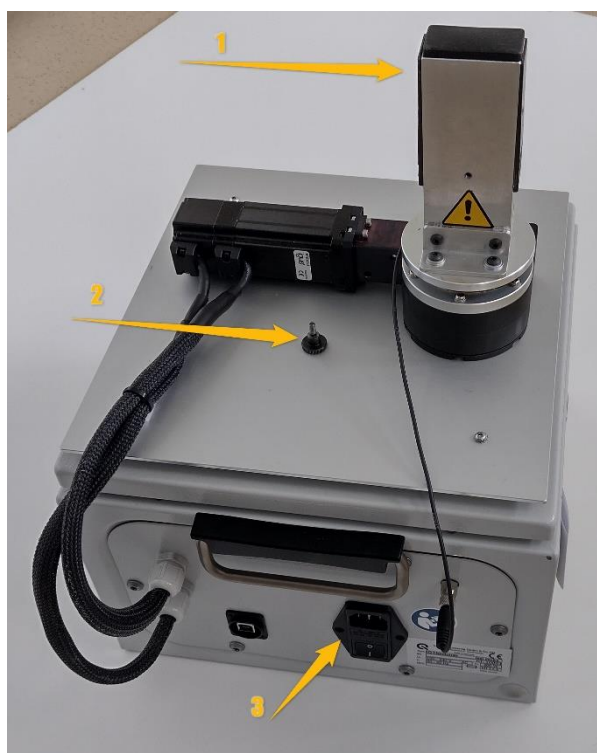


Figure 3 Structure iQ-Headturner

Tagged are:

- 1) Mounting pegs for the heads
- 2) Knurled screw to securely fix heads in place
- 3) Socket for the mains connection (IEC socket) with fuse holder and power switch

4.2 Interfaces

The iQ-Headturner is controlled by a PC via USB.

4.3 Function sequence

1. Switch on the iQ-Headturner and make sure that the USB connection is established.
2. Start the iQ-Drive software.
3. In the software, first load the configuration key.
4. Load the configuration file that came on the USB stick.
5. Perform a homing.

For detailed use of the software, see **Chapter 8**.



5 Transport and storage

5.1 Transportation

Requirements for the installation site

The device may only be operated in closed rooms.

Place the iQ-Headturner on a stable, flat surface.

The iQ-Headturner requires a 30 x 30 cm footprint plus an additional approx—15 cm at the side for the connection lines.



CAUTION! **Loss of stability**

Tipping over of the device due to installation on an inclined or movable surface

The iQ-Headturner must be placed on a flat, stable surface.

Transporting machine

To transport the iQ-Headturner only use the folding handles mounted on the side.

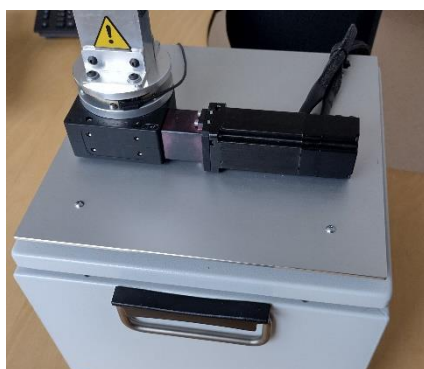


Figure 4 Folding handle

If a head is mounted, ensure it is secured with the screw before transport.



WARNING!

Falling down or crushing

Injury due to dropping the device
Crushing of fingers when putting the device
down

Only use the folding handles to transport the iQ-Headturner.

Never lift the device by the fixture or the head.

Unpacking machine

The iQ-Headturner is delivered in a cardboard box.

To unpack:

1. Open the box
2. Remove the plastic bag with the documentation and accessories
3. Remove the iQ-Headturner
4. Dispose of the packaging material

5.2 Storage

Requirements for the storage location

- Temperature range: 10-35°C
- No direct, permanent UV radiation
- Sand and dust-free environment
- Humidity: 10 ~ 95% RH, no condensation



6 Installation and commissioning

6.1 Installation

The device may only be operated in closed rooms.

Place the iQ-Headturner on a stable, flat surface.

The iQ-Headturner requires a base area of 30 x 30 cm and an additional approx—15 cm at the side for the connection lines.



CAUTION!
Loss of stability

Tipping over of the device due to installation on an inclined or movable surface

The iQ-Headturner must be placed on a flat, stable surface.

Installation of a head

Before commissioning, make sure that a head has been securely mounted.

See **Chapter 9.1** on changing the head.



CAUTION!
Danger from bruising on the hands

Slight injury

Be careful not to pinch your fingers when changing the head.

Establish power supply

Connect the iQ-Headturner to the main power supply via the power cable.

Then, connect the iQ-Headturner to the PC via the USB cable.

6.2 Commissioning

Install the software on your PC.

Switch the iQ-Headturner on using the main switch.

The iQ-Headturner is controlled by software only.
For the use of the software, please refer to **Chapter 8**.



7 Operating and display elements

7.1 Control elements on the control box



Figure 5 Main switch and nameplate

The only control element on the iQ-Headturner itself is the main switch.

This switch is located directly at the cold appliance socket for the power cable.

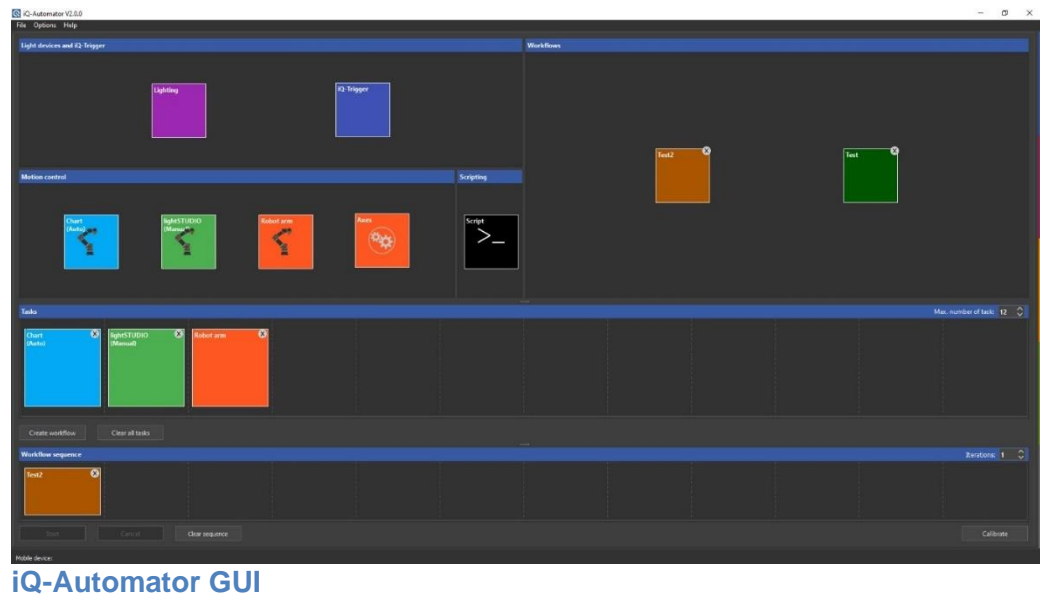
iQ-Automa- tor

iQ-Automa- tor

8 iQ-Automator Software 1.1.2

8.1 PREFACE

The iQ-Automator software provides a substantial time saver for testing your DUTs while eliminating human error and creating more precise and accurate testing. The software can control the iQ-Automator Solution and create a testing sequence.



8.2 Minimum requirements

- Windows 10 32bit
- USB 2.0 or higher
- Ethernet connector (for robot arm)

8.3 Installation

The iQ-Automator control software is available in 32-bit. During installation, the drivers and additional software will be installed. Along with the iQ-Automator software, the installation includes the following:

- Microsoft Visual C++ Redistributable Package
- Hardware drivers



8.4 Safety instructions

General instructions



- Only personnel trained by the manufacturer may assemble and disassemble the device.
- Only personnel trained by the manufacturer may put the device into operation!
- Only trained personnel may operate the device!
- As defined in the risk assessment, verify that safety measures and the robot safety configuration parameters have been set up to protect programmers, operators, and bystanders.
- Do not wear loose clothing or jewelry when working with the robot. Make sure long hair is tied back when working with the robot.
- If the software prompts a fatal error, immediately activate the emergency stop, write down the conditions that led to the mistake, find the corresponding error codes on the log screen, and contact Image Engineering.

Danger



- Before disassembling, all supply lines must be disconnected from the mains voltage!
- Before connecting the device to the supply voltage, the operator must ensure the supply connections (socket) are properly grounded!
- Ensure to install the robot and all electrical equipment according to the specifications.
- Before putting the device into operation, all cables (mains cable to the socket, USB cable to the PC, cable to the remote emergency stop switch, cable to the warning operating lights) must be laid in such a way that there is no risk of tripping and no risk of cable damage!
- The control cabinet must not be opened. Failure to do so could result in an electric shock!

Warning



- Never use the robot if it is damaged.
- When the Automator is switched on, a safety distance of 1.2m to the bench must be maintained!

- If the Automator is not operating, it must be switched off at the main switch!
- Before each operation, ensure the camera holder is firmly mounted on the robot arm.
- Before each operation, check whether the camera is firmly connected to the holder! It is recommended to use an additional security device between the camera and the camera mount, e.g., a safety line.
- Do not connect any safety equipment to standard inputs/outputs. Only use safety-related interfaces.
- Be aware of the movement of the robot when using the teach pendant.
- Do not enter the safety range of the robot or touch the robot when the system is in operation.
- Collisions can release high portions of kinetic energy, significantly higher at high speeds and with large payloads.
- Combining different machines might increase hazards or create new dangers. Always do an overall risk assessment for the complete installation. Always choose the highest level when other safety and emergency stop performance levels are needed. Be sure to read and understand the manuals of all the equipment used in the installation.
- Never modify the robot, as a modification might create unforeseen hazards for the integrator. All authorized reassembling shall follow the newest version of all relevant service manuals.
- Before cleaning the Automator, switch off the device at the main switch! Follow the cleaning instructions in the UR3 manual!

Intended use

The intent of the joint operation is only for non-hazardous applications. The Automator hardware consisting of the bench and robot arm is intended only to align mounted USB cameras. Image Engineering does not recommend any other use, and Image Engineering GmbH & Co KG cannot guarantee the system's success or durability with any other endeavor.

The entire application, including tools, workpieces, obstacles, and other machinery, is without any significant hazards according to the risk assessment of the specific application.

Any use or application deviating from the intended use is deemed to be impermissible misuse. This misuse includes, but is not limited to:

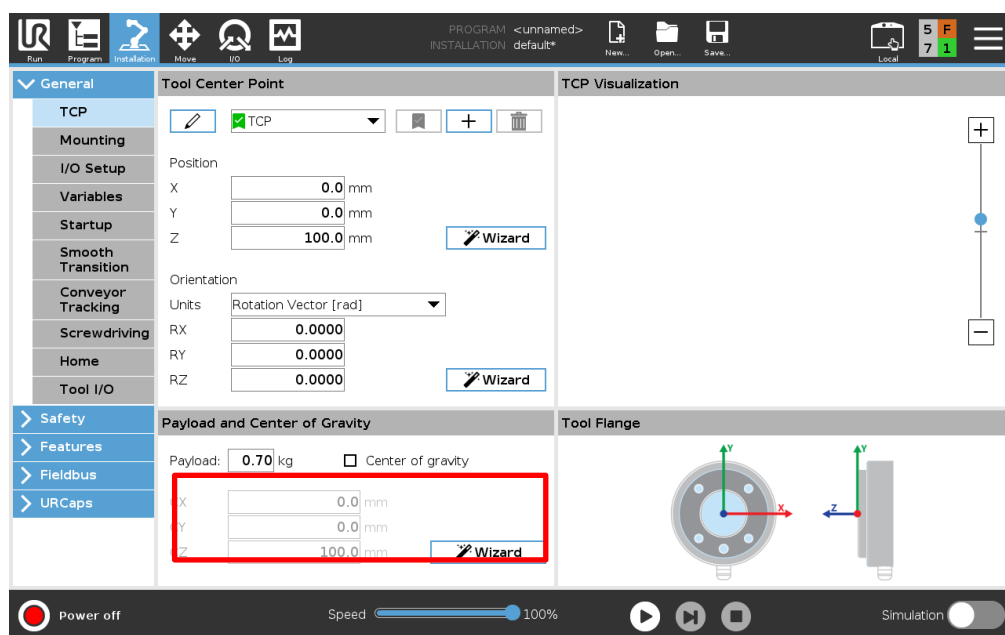
- Use in potentially explosive environments
- Use in medical and life-critical applications
- Use before performing a risk assessment
- Use where the rated performance levels are insufficient



- Use where the reaction times of the safety functions are insufficient
- Use as a climbing aid
- Operation outside the permissible operating parameters

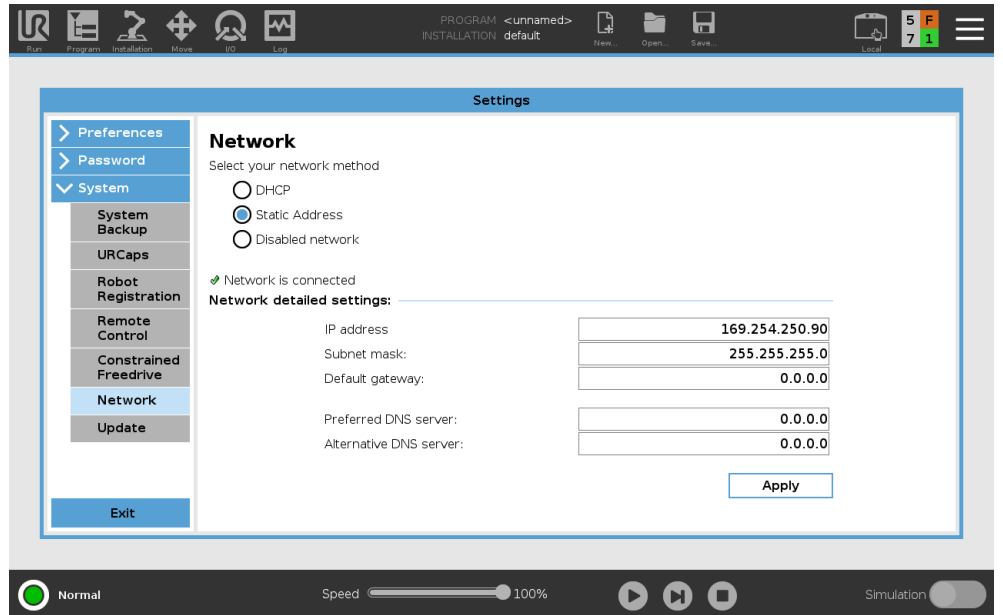
8.5 Initialize robot

Please familiarize yourself with the robot arm (UR3e) user manual. This chapter only describes the steps necessary to work with the iQ-Automator software. The robot arm with the iQ-Automator software must be initialized with the connected controller tablet.



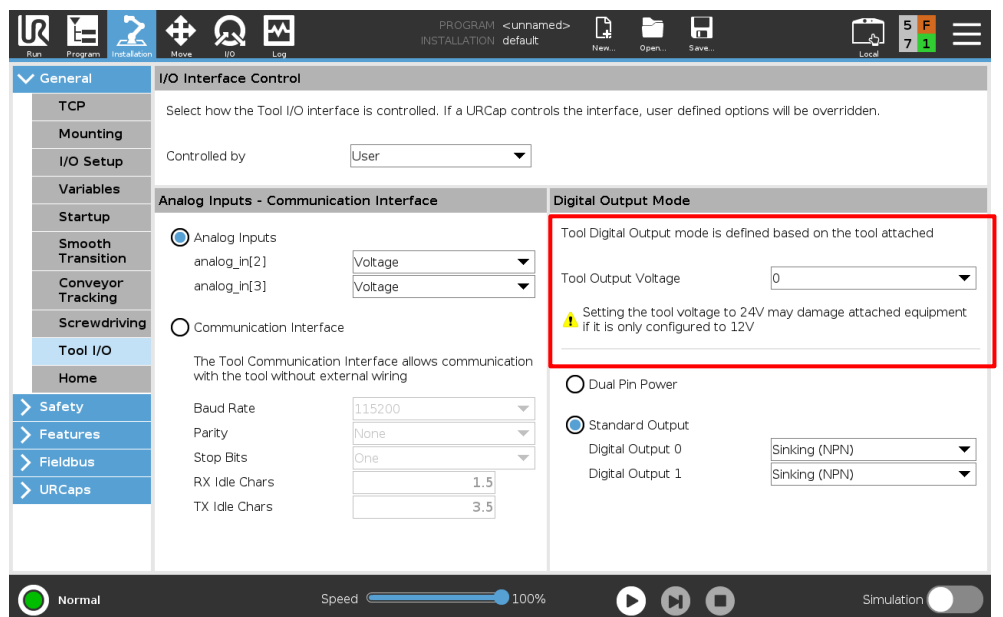
Enter the current weight (payload) mounted on the tool plate, including mounting or similar.

8.6 Set up robot Arm Network



An Ethernet connection is not necessary for the basic robot functions and is disabled by default. To work with the iQ-Automator, please enable **DHCP** or set a **static IP address**. In both cases, the IP address must be entered later in the software; see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**

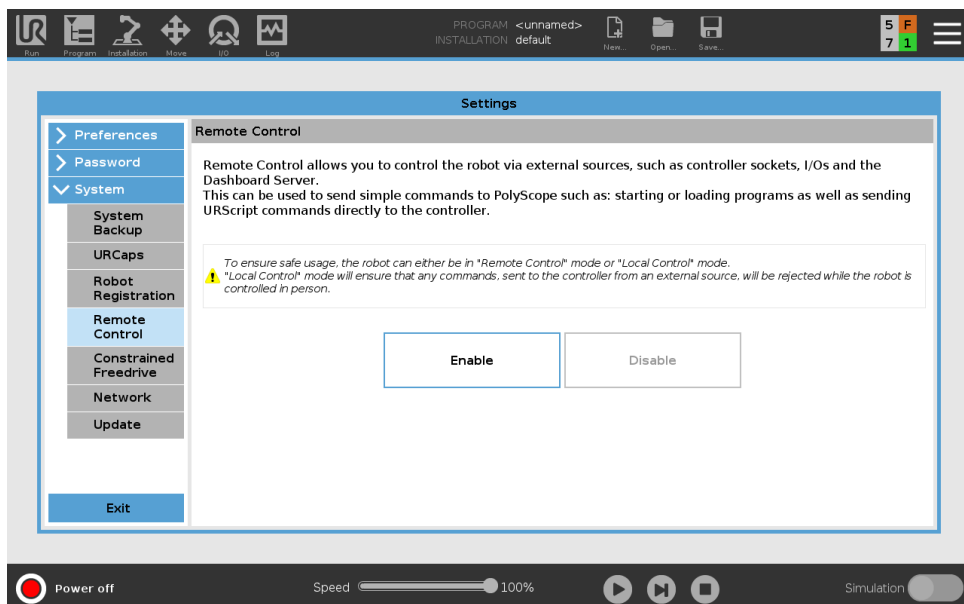
Check Digital Output mode



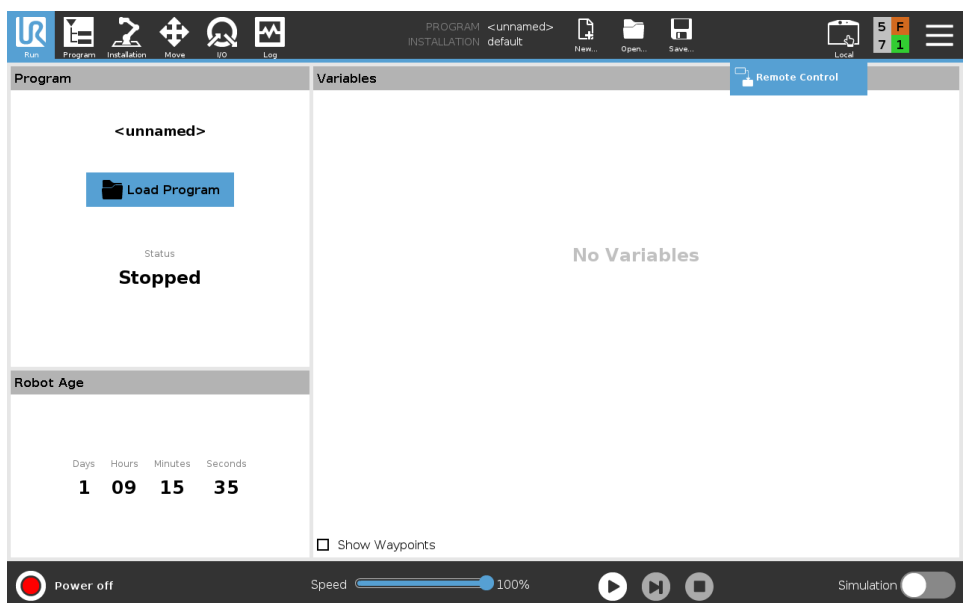
Please check that the "Tool Output Voltage" is set to 0.



Enable Remote Control

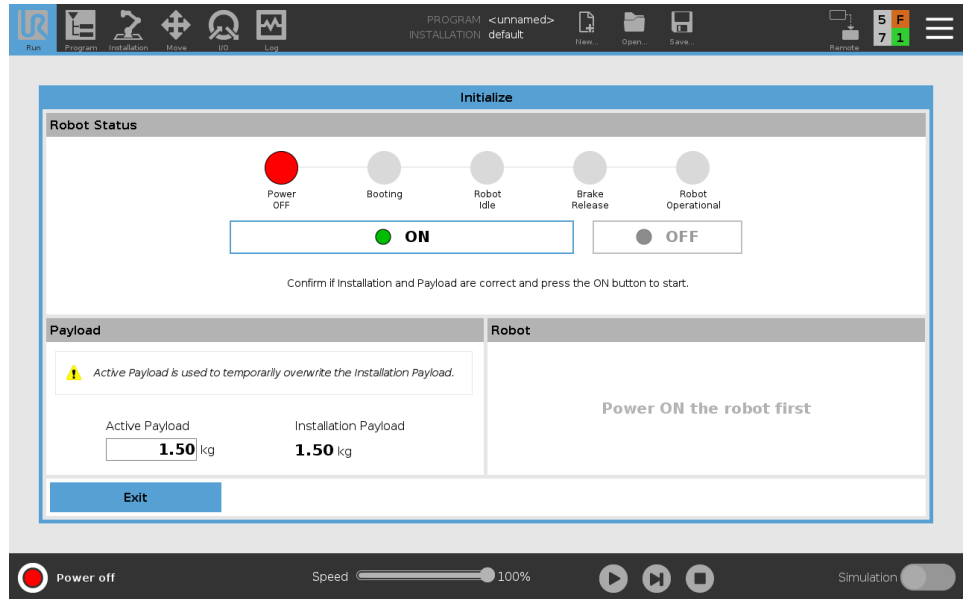


Please be aware that if you enable "Remote Control," some of the control panel's functionality is disabled.



Once enabled, you can switch between local and remote control with the "Local" button on the top right corner of the interface.

Start Robot Arm

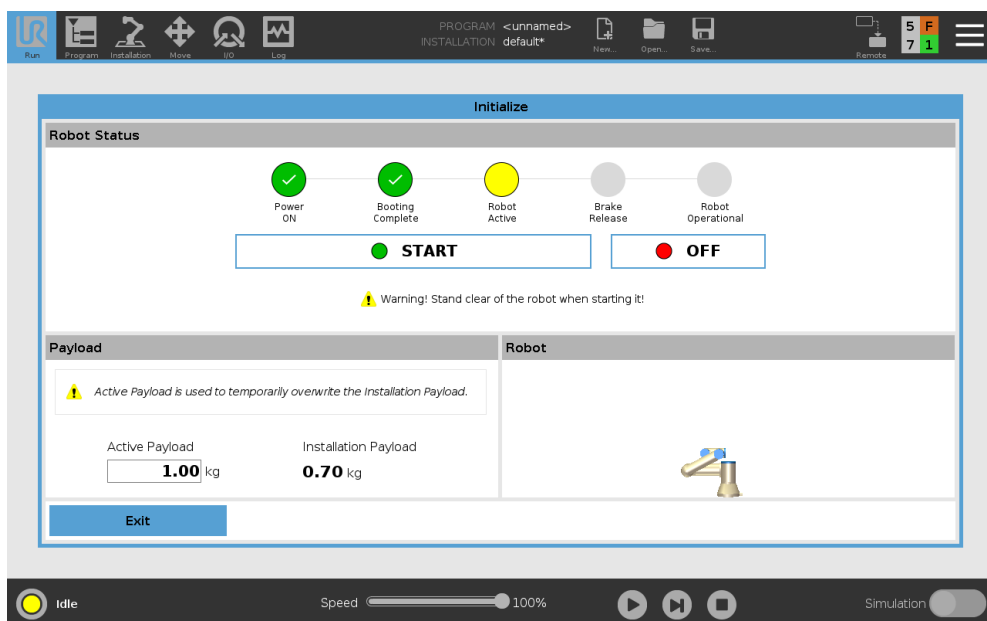


During this step, you must weigh the device under test and input the value into "Active Payload." Please note that the weight of the device under test does not need to be exact. We recommend that you take the average of a few different DUTs and use that value as your "Active Payload," so you don't need to measure the exact weight of every DUT.

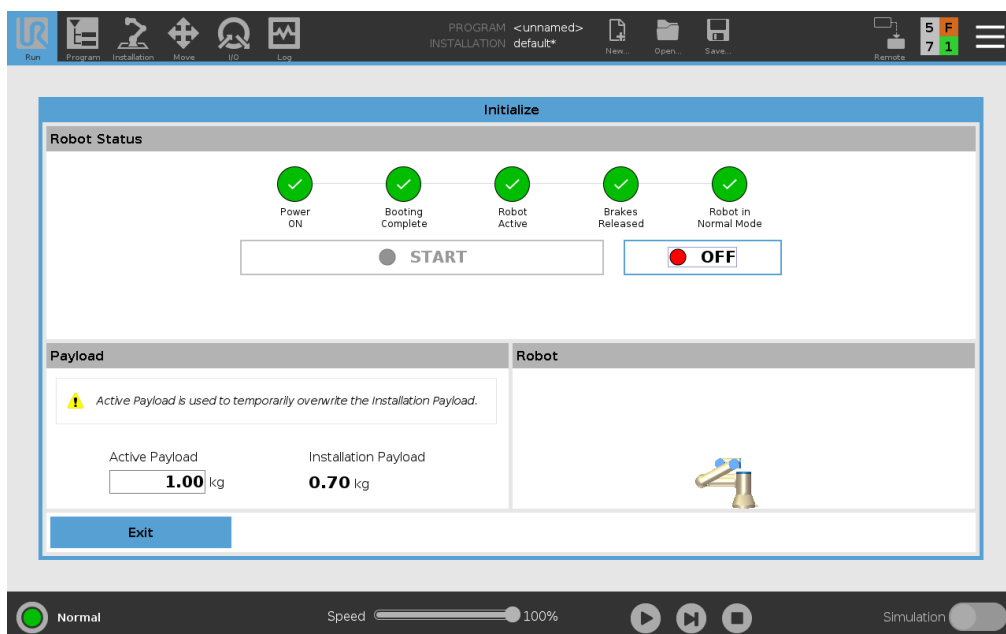


Attention! Please add the weight of your device under test to the weight of the Installation Payload. Enter the sum into "Active Payload." For example, the Installation Payload is 1.5 kg, and the DUT weight is 200 g. The value you need to enter into "Active Payload" is 1.7 kg.

Once that is complete, you can click the "on" button.

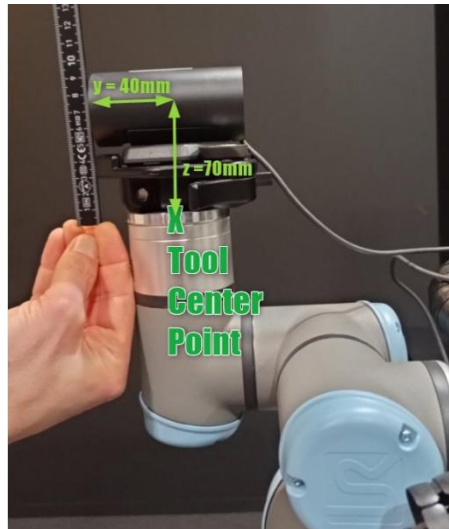


Once you click "On" (see the previous image), the button will change to "Start," and you can click it once the program has completed booting and the robot arm is in normal mode.

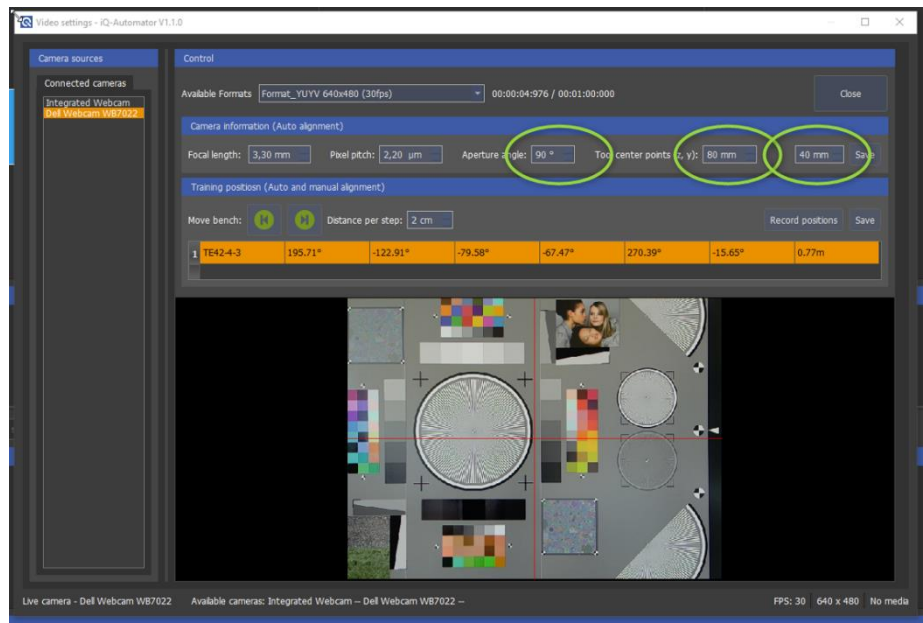


These steps are all necessary for starting the program. Once activated, please check to ensure everything is actively working (all green circles with checks). For all other actions, please refer to the robot arm manual.

Mounting USB webcam



By default, the top center of the shining plate of the robot arm is the Tool Center Point. For auto alignment, measure the additional height z and offset to the front y in mm and enter the values in the software. Then, measure z from the base plate to the camera's optical center. In the case of the picture, this would be 70mm. Measure y from the TCP forward to the lens of the camera.



Make sure to use the USB cable extension that comes with the iQ-Automator. The cable must fulfill many requirements, such as being able to be bent in the energy chain.



8.7 Software Usage

Along with the different Image Engineering hardware components, the iQ-Automator software provides an efficient and time-effective option to automatically test and give feedback on the image quality of a digital camera. The software enables users to create workflows involving various connected Image Engineering devices. The critical elements of this solution are the iQ-Bench and the robot arm with six degrees of freedom. The combination of translation and rotation movement and the ability to control motor-driven devices, iQ-LED-powered devices, and other illuminated targets provides the basis of extraordinarily versatile software.

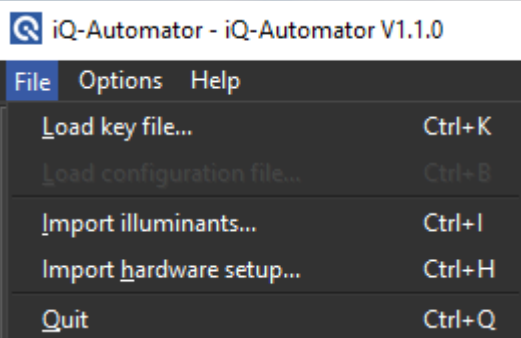
Logging Functionality:

The software writes a log.txt file to C:/Users/<user>/AppData/Roaming/Image Engineering/iQ-Automator. A lot of information for debugging purposes is saved here. If an error appears or a crash happens, copy this file to another directory and send it directly to Image Engineering support. This process helps us to detect mistakes and improve the software.

First start

Make sure that all components are connected correctly and switched on.

Open the program "iQ-Autmotor.exe" .



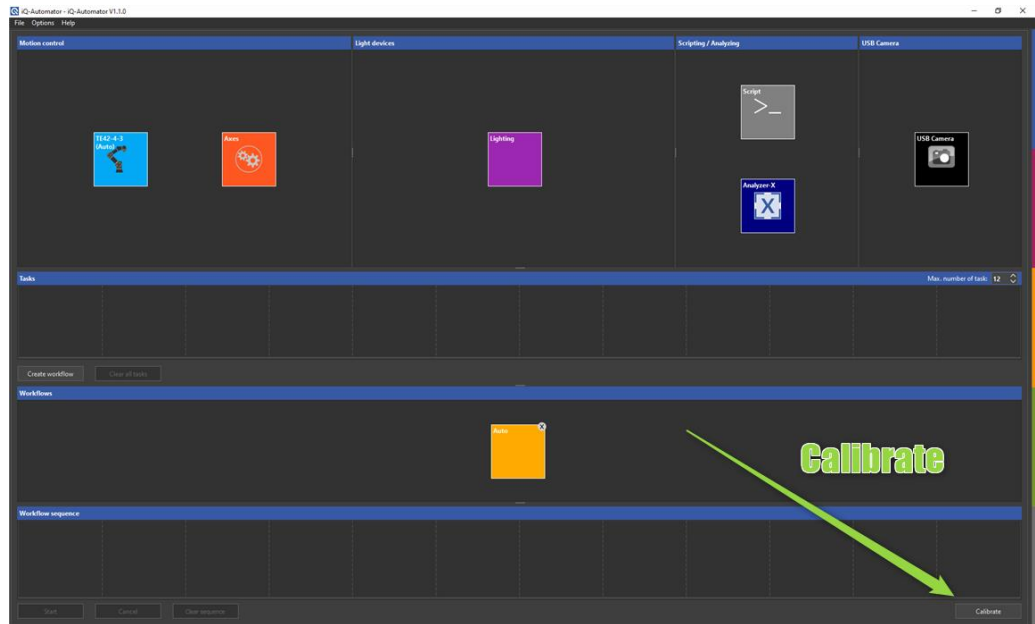
In the main menu under "**File**," choose "**Load key file...**" and enter the path to your license key.

Under "**Import hardware setup...**" you can choose your configuration file for your individual hardware setup.

"**Import illuminants...**" lets you import generated and stored illuminants from iQ-LED software.

Finding the home positions of connected devices

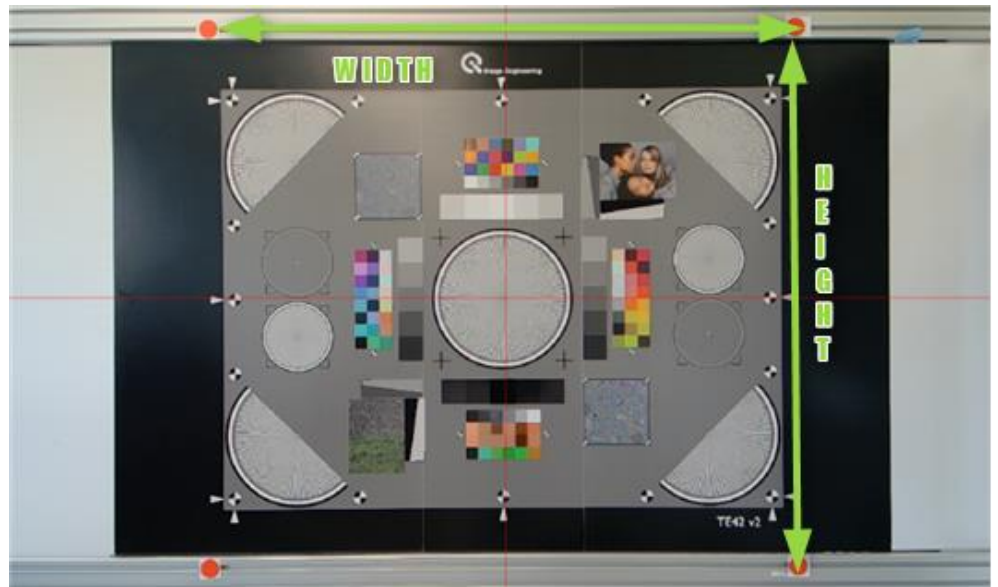
When all components are connected correctly, click the **Calibrate** button in the lower right corner to perform the homing procedure for each piece of equipment.



- The sleigh of the iQ-Bench will move to the default position of the iQ-Bench.
- The robot arm will simultaneously move its elements to designated home positions.
- The iQ-Chartmount VM will move all frames to the home position.
- The iQ-Headturner will adjust the head to look straightforward.



Marker positioning for auto alignment



Position the red markers as shown in the picture:

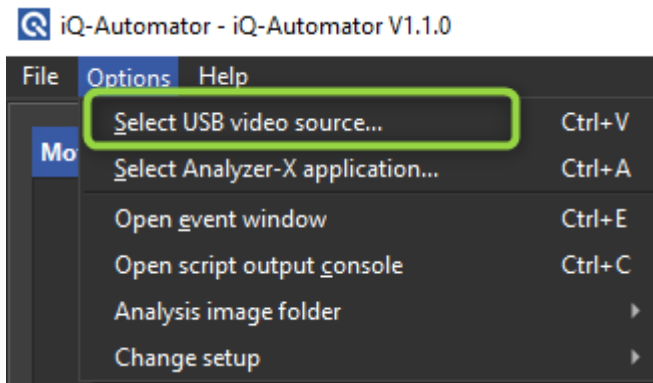
- Each marker must be completely visible and not partially covered
- Perpendicular in a rectangle

HINT: It is easier to measure the width from the left edge to the left edge and the height from the upper edge to the upper edge instead of visually assuming the circles' centers to measure the distance height and width between the markers,

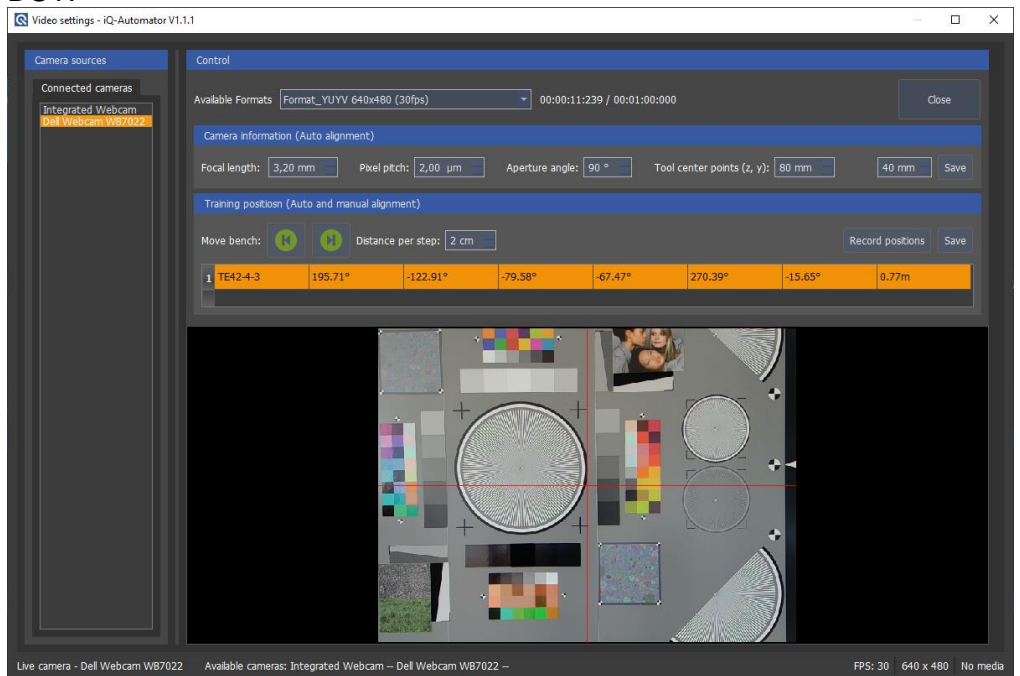
Enter the measured distances and dimensions into the target configuration files, then save them:

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <Device Description="Root node">
3 <Name Description="Name of the device">LE7</Name>
4 <Serial Description="Serial number of the device" Available="false"></Serial>
5 <Robotarm Description="Position of the robot arm facing this device" Available="true">
6 <Base Unit="deg" Description="Joint position in degree" Available="true">189.79</Base>
7 <Shoulder Unit="deg" Description="Joint position in degree" Available="true">-113.1</Shoulder>
8 <Elbow Unit="deg" Description="Joint position in degree" Available="true">-95.47</Elbow>
9 <Wrist1 Unit="deg" Description="Joint position in degree" Available="true">-61.81</Wrist1>
10 <Wrist2 Unit="deg" Description="Joint position in degree" Available="true">270.53</Wrist2>
11 <Wrist3 Unit="deg" Description="Joint position in degree" Available="true">79.15</Wrist3>
12 </Robotarm>
13 <Bench Unit="mm" Description="Distance from surface of chart to home switch on bench." Available="true">1.14</Bench>
14 <TargetDimensions Description="Target dimensions in mm for auto alignment" Available="true">
15 <TargetWidth Unit="mm" Description="Width of the target in millimeters" Available="true">900</TargetWidth>
16 <TargetHeight Unit="mm" Description="Height of the target in millimeters" Available="true">675</TargetHeight>
17 <MarkerWidth Unit="mm" Description="Width between detection marker in millimeters" Available="true">900</MarkerWidth>
18 <MarkerHeight Unit="mm" Description="Height between detection marker in millimeters" Available="true">850</MarkerHeight>
19 <MarkerSize Unit="mm" Description="Size of detection marker in millimeters" Available="true">30</MarkerSize>
20 </TargetDimensions>
21 <AutoAlignment Description="Perform auto alignment on target, may be 'true' or 'false'" Available="false">
22 <DebugMode Description="Enables some debug functionality.">1</DebugMode>
23 <ClosingIterations Description="Number of iterations for closing operation.">34</ClosingIterations>
24 <CannyThreshold Description="Threshold value for Canny operator.">50</CannyThreshold>
25 <BlurKernelSize Description="Kernel size for gaussian blur.">15</BlurKernelSize>
26 <SquarenessThreshold Description="Value for squareness (contour width / height).">0.5</SquarenessThreshold>
27 <BenchOffset Unit="mm" Description="Distance from this device to bench origin (homing pos) if device is perpendicular to the be
28 <RobotArmBaseOffset Unit="mm" Description="Distance from homing switch at bench to base position of robot arm">100</RobotArmBase
29 <SafetyMaxMove Unit="mm" Description="Maximum allowed move distance for robot arm in Y direction.">200</SafetyMaxMove>
30 <SafetyMaxDegree Unit="Degree" Description="Maximum allowed move distance for robot arm in Y direction.">10</SafetyMaxDegree>
31 </AutoAlignment>
32 <SubComponents Description="Hardware components defining the product" Available="false">
33 </Device>
34
```


Select USB-Camera Device (DUT)



In the main menu, go to **Options** → **Select video source** and choose your DUT from the list on the left. Create the settings for that DUT:



- Select a video format for the preview. Remember that the total pixel count of the used format in the test is needed for the auto-alignment to avoid the red markers being cropped in smaller formats.
- Insert the values for Focal length, Pixel pitch, and Aperture Angle.
- Determine the Tool center point according to the description in §2.5 Mounting USB Webcam.

For each webcam type, each test chart must provide an initial position of the bench and robot arm. This position is either the starting position for the auto-alignment procedure or the final position for manual

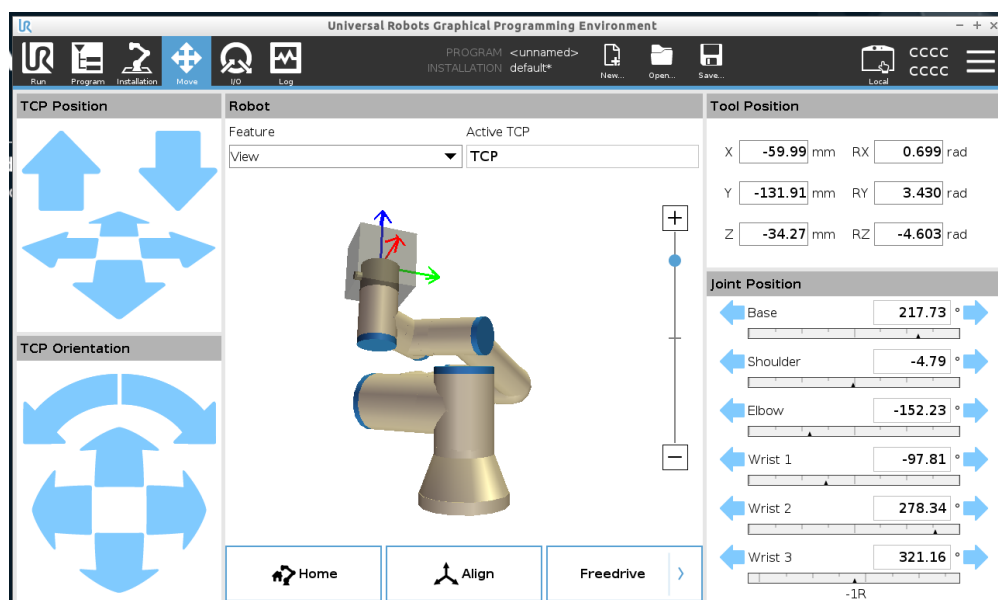


alignment to a trained position. The use case for each destination chart is defined in the XML files for the hardware setup. The auto-alignment always requires four red markers to be mounted around the destination chart and corresponding entries in the XML configuration (refer to §4.3).

Please note that for safety reasons, you are not allowed to stay in the action radius of the iQ-Automator whenever the iQ-Bench and/or the robot arm are empowered and active. Always move the robot arm from a safe distance via the UR3e tablet. You can move the single joints (shoulder, elbow, wrists) by degrees or by steering the Tool Center Point in distinct directions (recommended).

Bring the robot arm into a position outstretched to the front to begin the process of positioning.

With the DUT chosen, select the target that is to be recorded.



To navigate the camera intuitively, use the upper left panel with the arrows to steer the TCP (Tool Center Point). The camera will remain aligned forward.

For manually trained positions, use the "Move bench |< and >| (left & right)" function in the iQ-Automator software and the UR3e Panel in combination to position the camera in the final spot where the video or picture should be taken. For more details on aligning to different charts, refer to detailed information regarding the single types of charts and devices.

For auto-alignment starting positions, align the camera so that the red markers appear in the picture, as seen in the example above. The position should be chosen with respect to the following conditions:

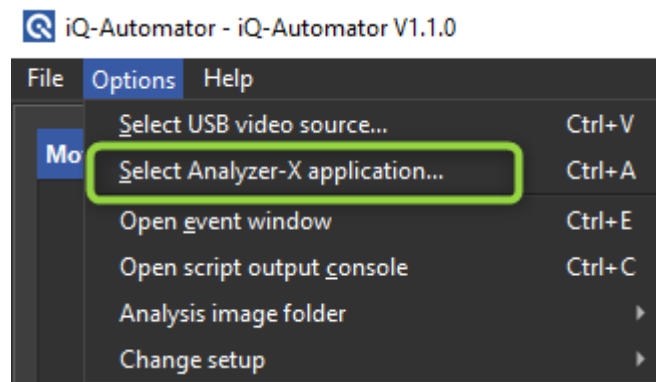
- The optical axis of the camera is aligned orthogonally to the chart plane.
- The center of the picture is identical to the center of the chart.

To save the current position, click **Save**.

All workflows created with auto-alignment configurations now use the recorded position as the initial position. The manually trained positions will be used as the final position to take a picture or video.

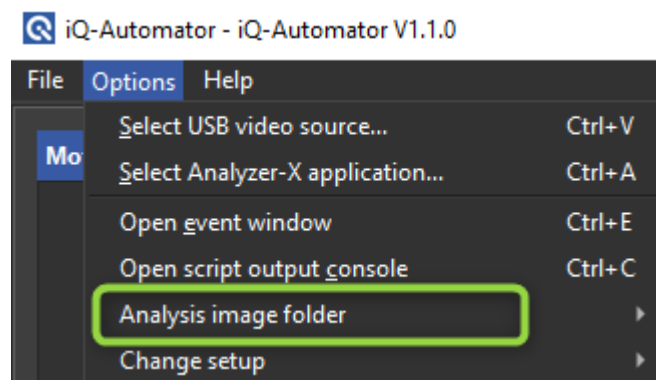
Select/Confirm the Analysis Tool

In the main menu, go to **Options** → **Select Analyzer-X** application and select or confirm the path to your latest version of the iQ-Analyzer-X.



Select Analysis image folder

In the main menu, go to **Options** → **Analysis image folder** and choose the directory where the upcoming records shall be stored.

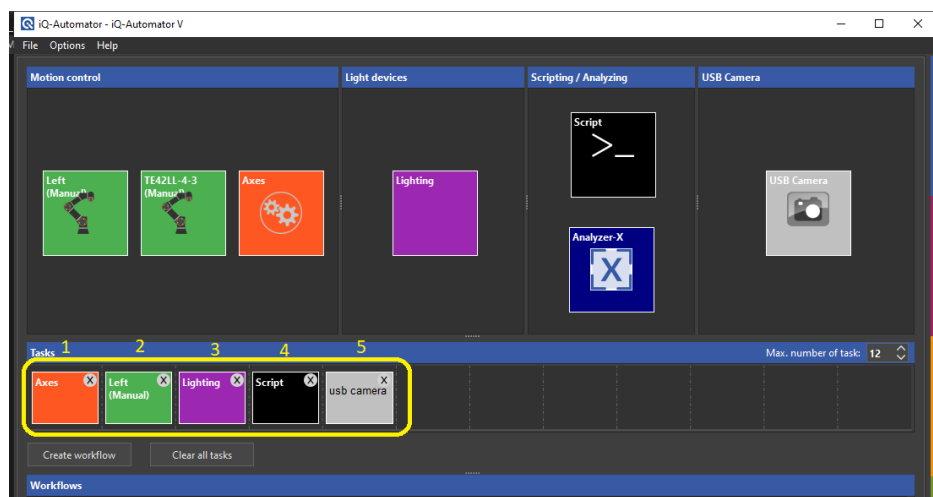




8.8 Optimal workflow module

The optimal workflow, in general, should have the main elements in the following order:

1. Axes (only ChartMount; for a head turner, we have a different order)
2. Robot manual alignment or auto-alignment (if required)
3. Lighting (optional)
4. Scripting (optional)
5. USB camera (mandatory)



The analyzer object must be a separate workflow object; even if we have one capturing workflow, we could create that workflow and use it usually at the end of every session for processing the images.

For example, we could first create a single task object as a workflow (analyzing object). We then run the capturing session with different workflows as usual, and then we insert this object as the last process, which will evaluate all captured images one by one.

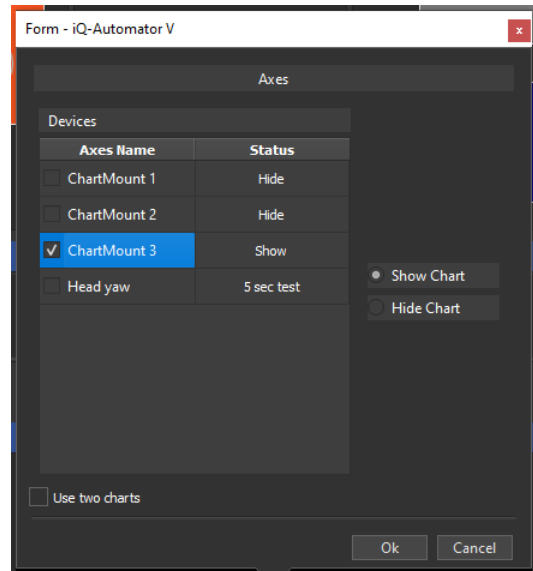
Double click on the single tasks lets you choose details:

Axes

Single object

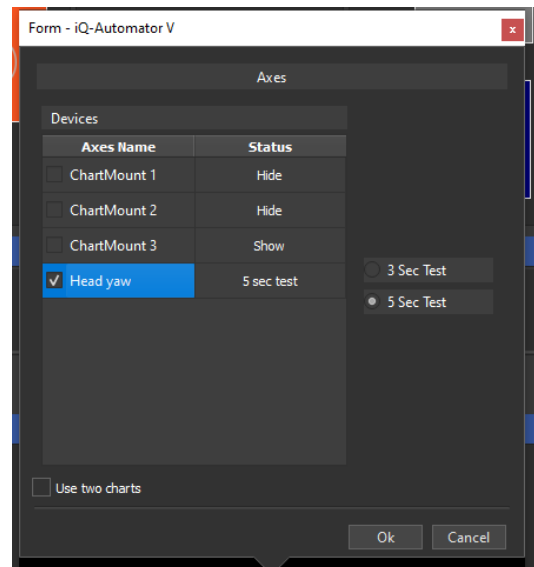
Single chartmount

Select the Chart frame number with the desired target chart in the iQ-Chartmount VM to get up or down as shown in the picture below:



Head Turner

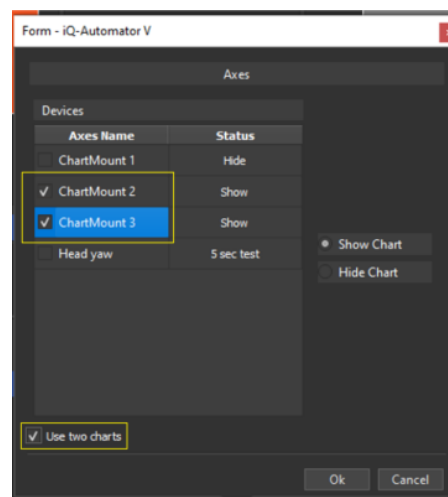
Select the Head turner and choose the predefined 3s and 5s tests:





iQ-Chartmount - moving two charts

If you want to move two charts, you need to check the "Use two Charts" control box and then select the desired charts to be moved (this option is helpful if you want to try transparent charts), as shown in the figure below:

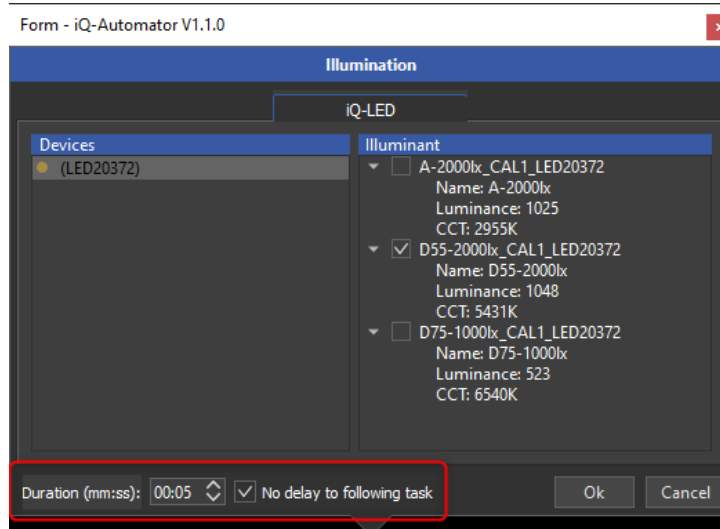


Target

Just drag & drop the desired target for the camera to move to the correct position.

Lighting

Choose an illuminant and set a duration time. Leave the tick "No delay to following task" always checked. It is only needed in special cases.



Script

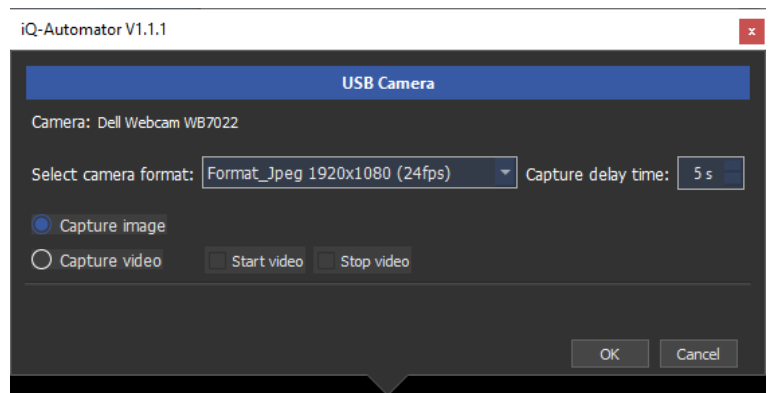
Use the script task to control your grey background from the ceiling.

USB camera

Select the necessary capture format and use the capture delay time to let the auto exposure and autofocus prepare the camera for the shot. The default value is 5 seconds. This value is used for image and video capturing.

Image capturing

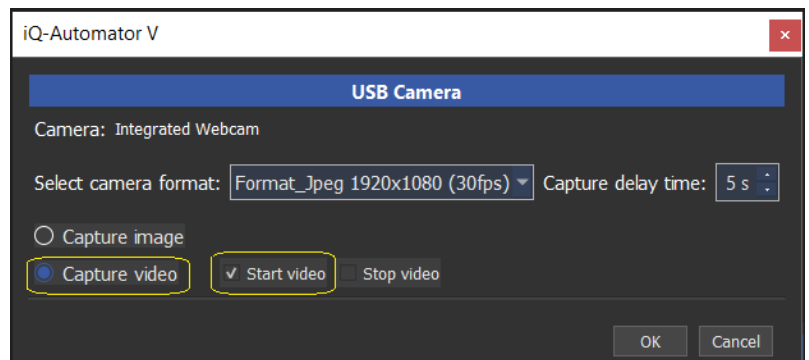
In case of image capturing, select the item in the below window:



For the image capturing, the USB camera item should be the last one in the scope of the workflow.

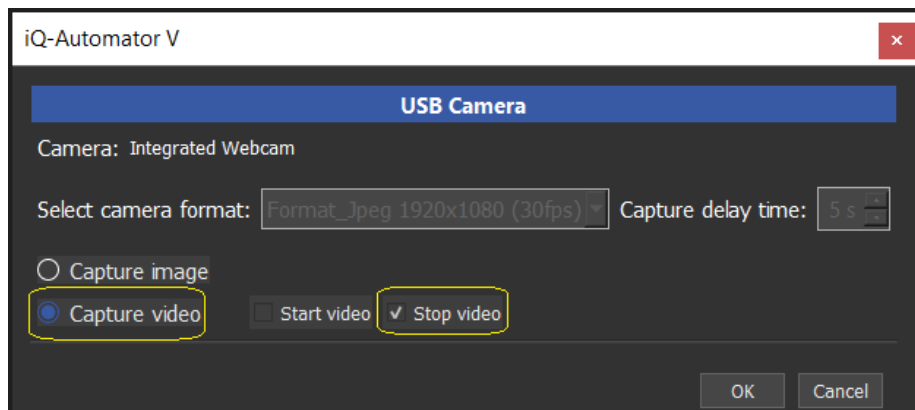
Video capturing

When capturing video, we must add two USB camera items. One is before the target, and the second is after the target. In the first USB camera item, we should make the configuration below:

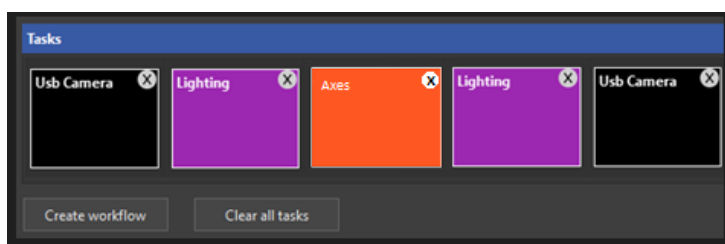




In the second USB camera item, we should do the configuration below:



We then could configure the target as desired.



Also, choose if you want to take a picture or a video and determine its duration.

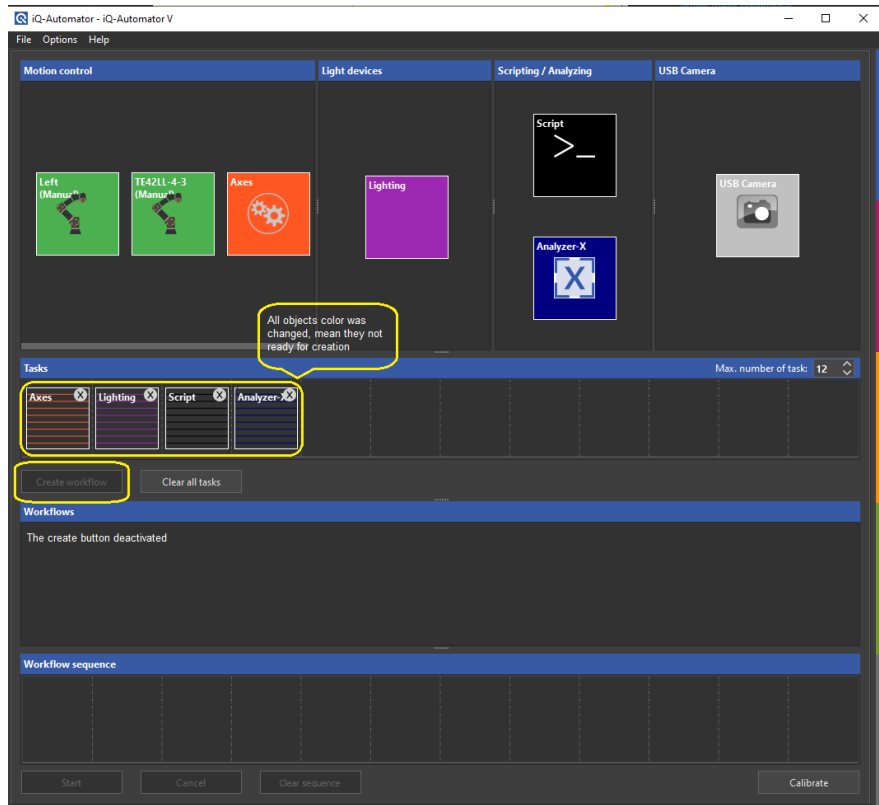
"Video duration": Select the video duration in amounts of seconds. Be aware that the software grabs the number of images from the camera so that the multiplication of the time and the selected frame rate sums up the exact capturing time. A high-performance CPU is required for capturing video files without any dropped frames.

The path to the current Analyzer-X application is displayed. It can be changed in the Options menu.

"Analysis name": Add a name for the current analysis; it should be unique since it is used as a keyword for the storage in the database and as a name for the exported XML and PDF results files. This means all images measured in one task item are always integrated into one "analysis."

8.9 Unfinished Task Settings

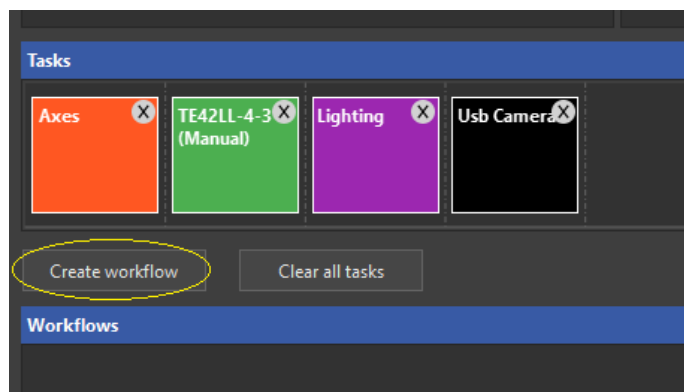
If a task is incorrectly defined, its icon will be depicted with a line pattern, and the Create button will stay greyed out.



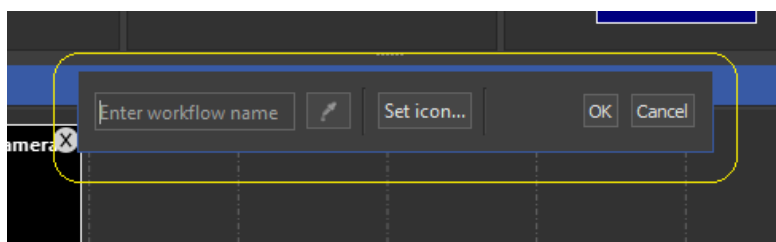
With all tasks defined, the icon color will be restored, indicating that it's now ready for creation, and this should be done with all objects in the task timeline. When all objects are done, the "Create workflow" button will be activated.



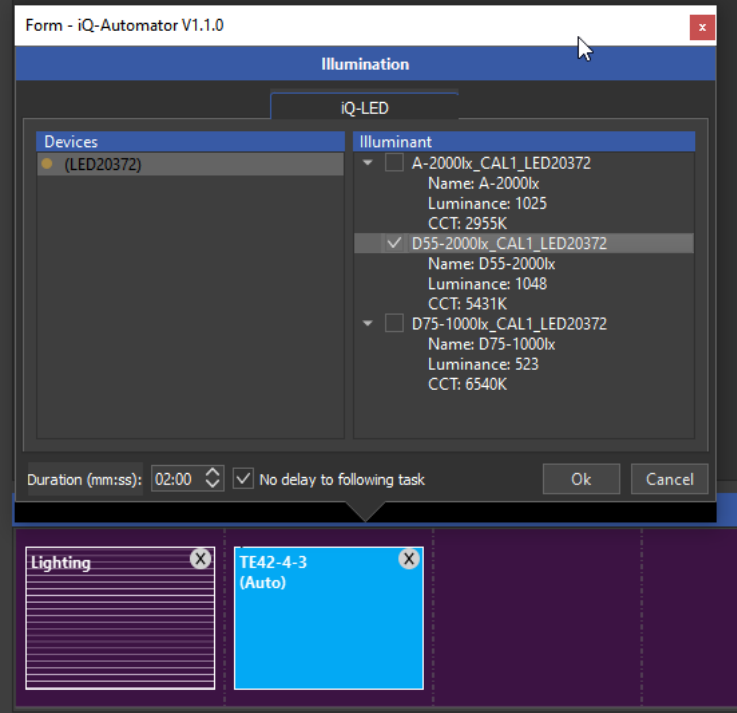
8.10 Create Workflow



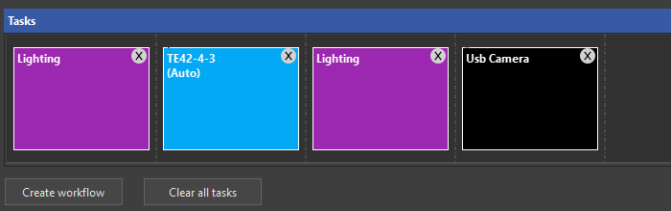
At this point, you can click Create workflow, and a small window will appear asking you to add the object's name. The object will be generated in the Workflow timeline.



To create a setup that lets you flawlessly auto-align to a target, we recommend creating and inserting a particular bright illuminant (maybe even name it auto-alignment illuminant) and let it last for about two minutes (tick: No delay to following task) so that the process of auto-alignment has enough time to be entirely performed.



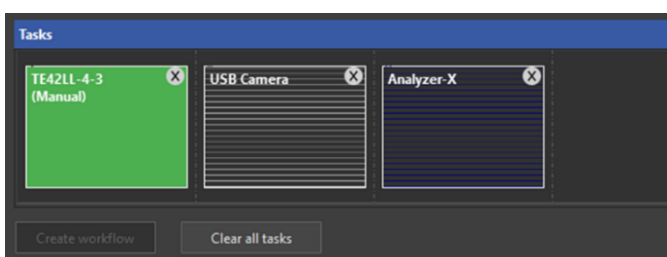
Only then switch to the test illuminant and take the picture.



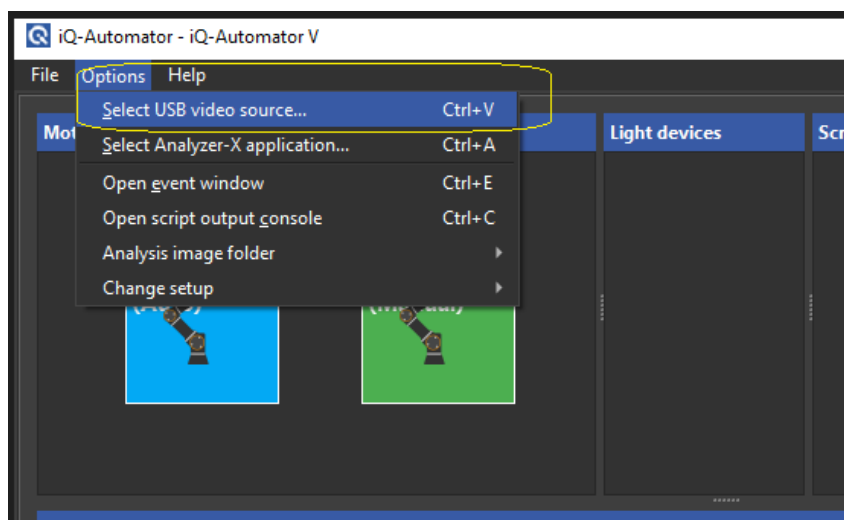


8.11 Custom workflow module

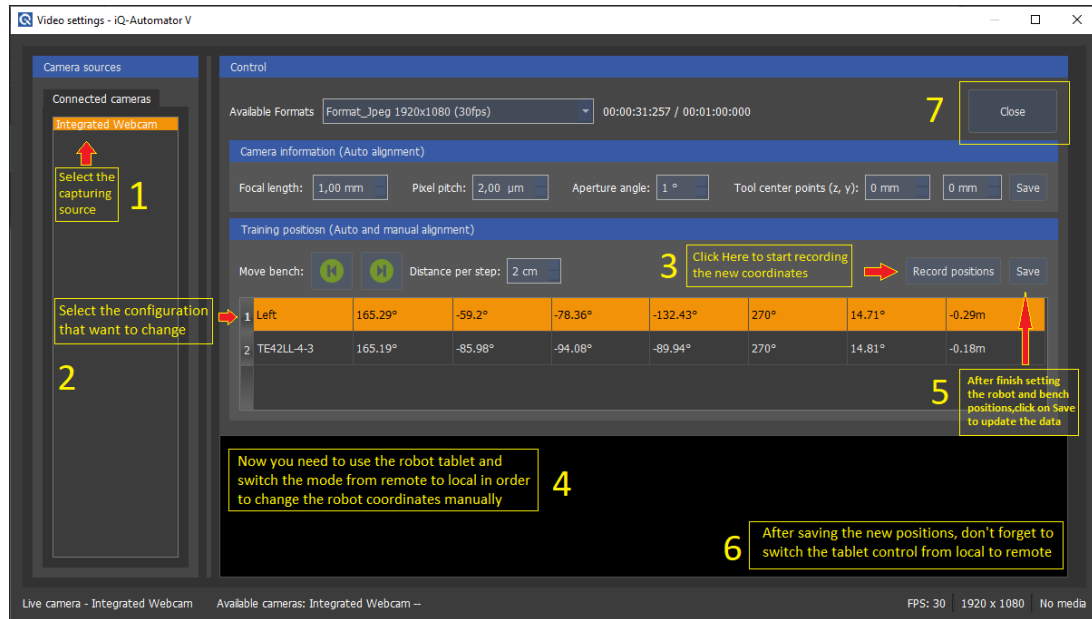
In the case of creating a custom workflow (the analyzer object could be after the camera object), a simple example explains the combination of moving the camera to a target, capturing an image, and starting the Analyzer-X application from the Automator software to measure the captured image.



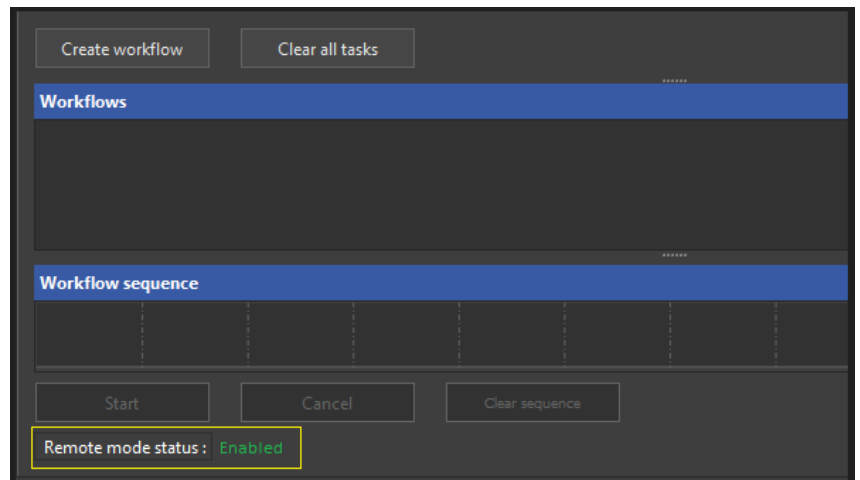
- 1) The manual alignment task item (the green) moves the bench and robot arm to the trained position, and this can be done by clicking Options→Select USB video source as seen below:



You will then see the window below:



Make sure to see the remote-control status after switching back to the remote control as in the picture below:



- 2) The **USB camera** task captures and stores an image in the selected directory with a specific file name. The file name contains information about the chart type of the preceding task (here: TE42LL-4-3).

The general format of the image name:

<Camera



model>_<TestModule?>_<ColorTemperature>_<illumination>_<ISO>_<shutter>_<Videoformat>__<ChartType>__.bmp

The chart type is located between two double underscore characters; in the sample above, it would be:

<...>__TE42LL-4-3__.bmp

- 3) The following Analyzer-X task starts the iQ-Analyzer-X application with the scripting functionality, and it uses the chart type in the image name to enforce the application to detect this chart type in the image. The Analyzer-X does not perform any chart classification for the image before.

8.12 OPTIONS AND PROCEDURES FOR THE ANALYZER-X TASK

General Introduction

The Analyzer-X task calls the application Analyzer-X executable with a CMD command as a detached process. It creates one script for measuring all images in the output image folder with only one call to the application. The parameters for the script are merged from different sources:

- The path to the Analyzer-X as set in the Options menu, see Chapter 1
- The image paths from the output folder as set in the Options menu; see Chapter 1
- General parameters from the configuration file C:\Users\<user>\AppData\Roaming\Image Engineering\iQ-Automator\AnalyzerConfig\general.txt
- Chart-specific parameters from the configuration files in C:\Users\hbuhr\AppData\Roaming\Image Engineering\iQ-Automator\AnalyzerConfig\. For example, **TE42-4-3.txt**
- The analysis name from the input field in the task dialog

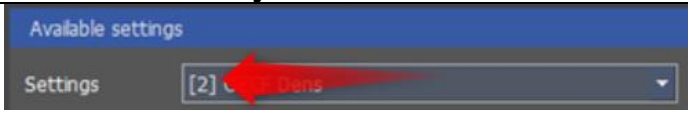
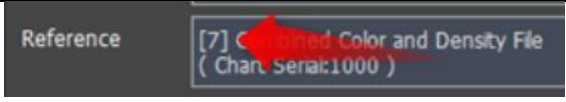
The parameters in the configuration files may be adjusted with respect to individual needs.

Sample of the general settings (general.txt), which are not related to individual images but to the general behavior of the Analyzer-X:

--save	Save analysis to the database
--database="local"	The name of the database
--template="Default"	Define the template for PDF export

--manufacturer="Dell"	The name of the camera manufacturer
--serial="123456"	The serial number of the camera
--model="WB7022"	The model of the camera
-- enable MRE	Enables manual ROI editing in command-line mode

Sample for the configuration of chart-specific commands for a TE42LL-4-3 chart type:

Command	Description	Reference in Analyzer-X
--settingsID=0	Defines the settings set used for this analysis by its ID	
--reference="1"	The ID for color or OECF reference values of a unique chart	
-- chart="TE42_LL_4_3"	The captured chart in the image	

See also the complete documentation for the command line tool in the Analyzer-X manual.

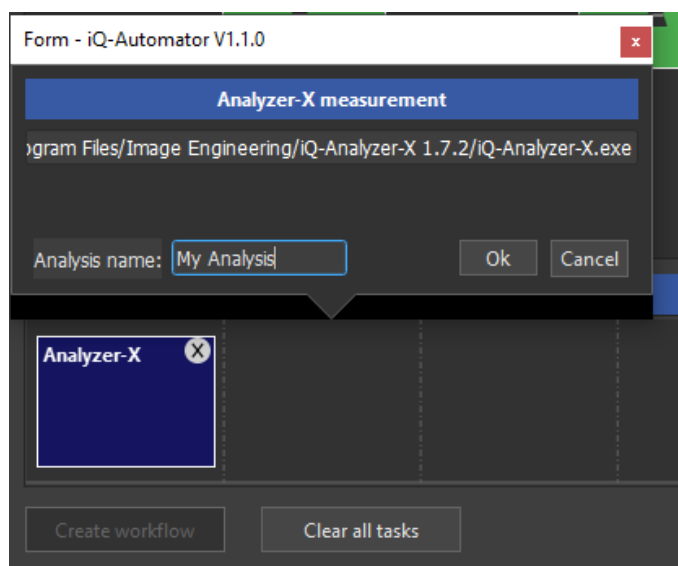
- ◊ Automation
 - ◊ Hot Folders
 - ◊ **Command Line**
 - ◊ Create a batch file
 - ◊ Example Batch Files
- ◊ Abbreviations

-> XML and PDF reports are generated in any case. There is no need to specify -xml or -pdf.

-> The analysis name is taken from the input field in the task item; see the next chapter.



Options for the Analyzer-X task



Double-click the Analyzer-X item to edit its behavior.

The path to the current Analyzer-X application is displayed. It can be changed in the Options menu.

"Analysis name": Add a name for the current analysis. It should be unique since it is used as a keyword for the storage in the database and as a name for the exported XML and PDF results files. This means all images measured in one task item are always integrated into one "analysis."

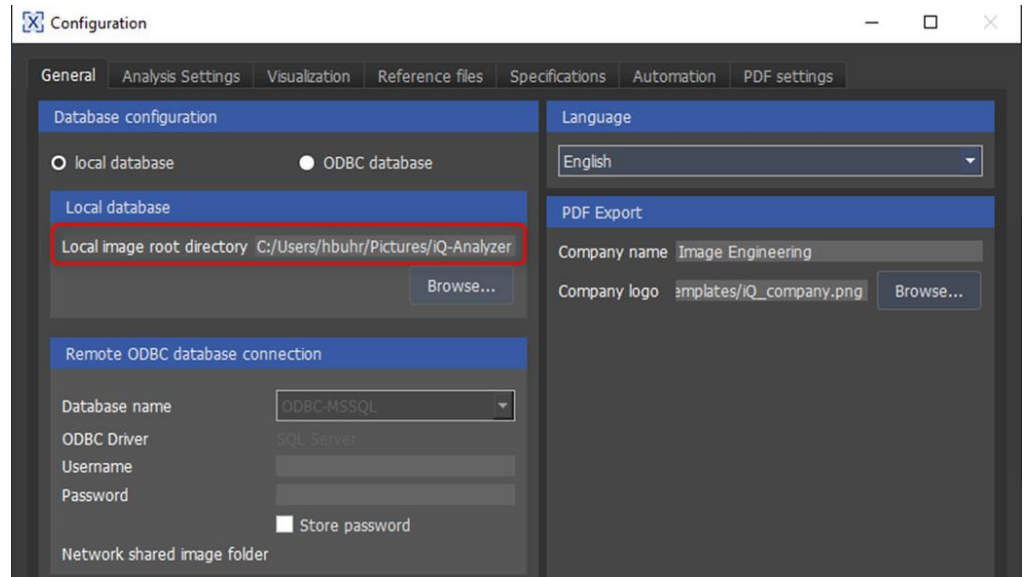
End of analysis

After the analysis process has finished, the results are saved to an XML and a PDF file in:

C:\Users\hbuhr\Documents\IE\iQ-Automator\Images\results

All image files in C:\Users\hbuhr\Documents\IE\iQ-Automator\Images\ are then deleted from this directory.

The Analyzer-X itself stores copies of the images in a directory, which is selected in the general settings:



The Automator software detects the end of the analyzing process by reading the log file for the analysis, which is written by the Analyzer-X application, e.g., "My Analysis.xml.log."
 If the line
 INFO [...] Finish process
 is shown, the process is assumed to be finished.

8.13 3rd Party components

The iQ-Automator software uses open-source software:
libusb (www.libusb.org) is licensed under the GNU Lesser General Public License version 2.1 or later (www.gnu.org/licenses/old-licenses/lgpl-2.1.html).

The **Qt framework** (www.qt.io) is licensed under the commercial Qt license.

OpenCV (<https://opencv.org>)

License Agreement

For Open-Source Computer Vision Library
 (3-clause BSD License)

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Exiftool (<https://www.sno.phy.queensu.ca/~phil/exiftool/>) is free software licensed under the GNU Lesser General Public License version 3.0 or later (www.gnu.org/licenses/lgpl-3.0).

9 Operate machine

9.1 Machine set up

Head change

1. Ensure the iQ-Headturner is out of operation (power plug disconnected).
2. Open the screw. Carefully lift the head upwards from the fixture and set it aside.
3. Take the new head and carefully place it on the fixture.
4. The head has a hole on one side for the locking screw. Make sure it matches the thread in the stud.
5. Then secure the head with the knurled screw.

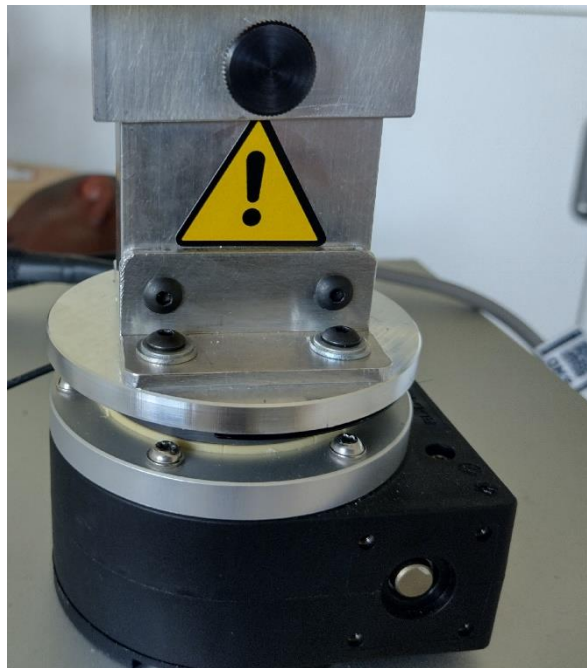


Figure 6 Mounting fixture with attached head



CAUTION!

Danger from bruising on the hands

Slight injury

Be careful not to pinch your fingers when changing the head.

9.2 Switch on machine

Switch on the iQ-Headturner using the main switch.



Figure 7 Main switch and name plate

9.3 Operate machine

The person operating the iQ-Headturner must be able to view the device at all times.



NOTE!

Unintended/ unexpected start-up

Unexpected rotary motion during operation due to deliberate control

The operator station must have direct visual contact with the iQ-Headturner

Ensure that nobody is closer than 1m to the device during operation.



CAUTION!

Shock

Bumping of body parts with or by the rotating head during operation

During operation, maintain a minimum distance of 1 meter from the device.

Use the software to operate the iQ-Headturner. See **Chapter 8**.

9.4 Switch off machine

Switch off the iQ-Headturner using the main power switch.

When the iQ-Headturner is taken out of operation for longer, disconnect it from the main power.



10 Help with malfunctions

10.1 Procedure in case of malfunctions or errors

In the event of a malfunction, take the iQ-Headturner out of operation immediately.

To do this, disconnect the power plug from the main socket.

After that, please contact Image Engineering Support.
(See Chapter 15.1 **Service addresses**)



CAUTION!

Burns

Burning on the hot surface of the engine after a malfunction/blockage

In the event of motor malfunctions, immediately take the device out of operation and contact the manufacturer.

10.2 Troubleshoot

Malfunctions may only be repaired by qualified personnel instructed by Image Engineering.

Please contact our support team for more details.



DANGER!

Fatal electrocution

The housing may only be opened for maintenance by Image Engineering or qualified personnel commissioned by IE.

11 Care and control work for operators

11.1 Control

Before starting work and commissioning, check daily that the iQ-Headturner

1. It is in perfect visual condition.
2. It is standing correctly.
3. The head is firmly set on the iQ-Headturner and secured with the screw.
4. The iQ-Headturner can be seen from the operator station.

11.2 Care

If the housing of the iQ-Headturner is dirty, clean it with a dry cloth.



12 Maintenance

The iQ-Headturner is maintenance-free.

It has an intended service life of 10 years.

At the end of its service life, please dispose of the iQ-Headturner. See **Chapter 13** for more information.

13 Decommissioning

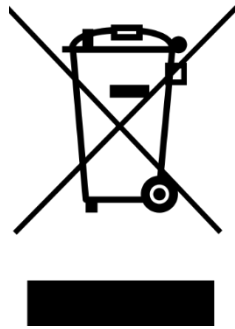
13.1 Decommissioning

Once the iQ-Headturner is out of service, switch it off and disconnect it from the main power supply.

To do this, remove cold device cable from the socket.

13.2 Disposal and recycling

After the useful life of the iQ-Headturner, it must be disposed of properly. The device must not be disposed of in household waste.



When you are ready to dispose of the iQ-Headturner, please return it to Image Engineering.

If you need assistance with return shipping or would like a return shipping label, please contact one of Image Engineering's service addresses.



14 Technical data

14.1 Datasheet

The latest version of the data sheet can be found online.

Overview

Name	iQ-Headturner
Function	Device to rotate a doll head with defined speed
Special features	<ul style="list-style-type: none">• Quick change system for different doll heads• Can be integrated into the TE295 (test chart for VCX PC-Cam)

Speed

Movement radius	+/- 180° from home position
Max. Speed	470°/ s or 78 rpm
Min. speed	3°/ s or 0.5 rpm
Time for 180° rotation	< 1,5 s

Software (API)

Request	PC with Windows 7 (or higher) USB port
Functions	<ul style="list-style-type: none">• Setting the parameters for position, speed, acceleration, and deceleration• Homing function (Homing) for calibration of the device
API (C++)	iQ-Drive API

General description

Power supply/consumption	230 V, 100 W
Connections	1 x USB for software control
Base dimensions (width x depth)	400 x 300 mm

Height	Without head: 390 mm With typical mannequin head: 600 mm
Max. Device weight	11 kg
Operating conditions	Optimal: 22 - 26 °C, maximum: 10 - 35 °C
Scope of delivery	iQ-Headturner <ul style="list-style-type: none"> • Cold device cable + USB cable • Spare fuse • Acceptance protocol • Instruction • iQ-Drive Software/API Doll head with quick change system depending on the selected bundle

Other

Accessories	Doll heads with quick change system: <ul style="list-style-type: none"> • Alexis (Ivory) • David (Olive) • Richard (Ebony)
Terms & Conditions	image-engineering.com/terms-and-conditions



15 Appendix

15.1 Service addresses

For support requests, it is best to contact us directly at:
support@image-engineering.de

Europe

Image Engineering GmbH & Co KG
Im Gleisdreieck 5
50169 Kerpen

Mon-Fri: 9:00 a.m. to 5 p.m. (CET)

Tel: +49 2273 99 99 1-0

Email: info@image-engineering.de

USA

Image Engineering USA, Inc.
3079 Harrison Avenue, Suite 6
South Lake Tahoe, CA 96150

Mon-Fri: 8 a.m. to 6 p.m. (CT)

Tel: +1 408 386 1496

Email: sales@image-engineering.us

China

Shenzhen Image Engineering Optoelectronic Equipment Co., Ltd. (IE
China Subsidiary)

深圳艾宜光电设备有限公司 (IE中国全资子公司)

Room 1508, Chengshi Shanhai Pingji Center,
Pingxin North Road No.51, Pinghu Street,
Longgang District, Shenzhen City, China

深圳市龙岗区平湖街道平新北路51号城市山海平吉中心15楼1508室

Mon-Fri: 9 a.m. to 6 p.m. (CST)

中国子公司工作时间: 每周一至周五 上午9点-下午6点

Tel: +86 158 8961 9096

Email: leon.xiao@image-engineering.com

15.2 Spare and wear parts

The iQ-Headturner has no parts that wear down.



15.3 Declaration of Conformity



EG-Konformitätserklärung
im Sinne der Maschinenrichtlinie 2006/42/EG, Anh. II 1. A
Original

EG-Konformitätserklärung
im Sinne der Maschinenrichtlinie 2006/42/EG, Anh. II 1. A
Original

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller

Image Engineering GmbH & Co. KG
Im Gleisdreieck 5
DE - 50169 Kerpen

In der Gemeinschaft ansässige Person, die bevollmächtigt ist, die relevanten technischen Unterlagen zusammenzustellen

Uwe Artmann
Image Engineering GmbH & Co. KG
Im Gleisdreieck 5
DE - 50169 Kerpen

Beschreibung und Identifizierung der Maschine

Produkt / Erzeugnis	IQ-Headturner
Seriennummer	HT-10001
Handelsbezeichnung	IQ-Headturner
Artikelnummer	100300106
Funktion	Drehen eines Puppenkopfes

Es wird ausdrücklich erklärt, dass die Maschine allen einschlägigen Bestimmungen der folgenden EG-Richtlinien bzw. Verordnungen entspricht:

2006/42/EG	Richtlinie 2006/42/EG des Europäischen Parlaments und des Rates vom 17. Mai 2006 über Maschinen und zur Änderung der Richtlinie 95/16/EG (Neufassung) (1) Veröffentlicht in L 157/24 vom 09.06.2006
2011/65/EU	Richtlinie 2011/65/EU des Europäischen Parlaments und des Rates vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten Veröffentlicht in 2011/L 174/88 vom 01.07.2011
2014/30/EU	Richtlinie 2014/30/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (Neufassung) Veröffentlicht in 2014/L 96/79 vom 29.03.2014

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EG-Konformitätserklärung

im Sinne der Maschinenrichtlinie 2006/42/EG, Anh. II 1. A
Original



Fundstelle der angewandten harmonisierten Normen entsprechend Artikel 7 Absatz 2:

Norm

EN IEC 63000:2018	Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe
EN 61000-6-2:2005/AC:2005	Elektromagnetische Verträglichkeit (EMV) - Teil 6-2: Fachgrundnormen - Störfestigkeit für Industriebereiche
EN 61000-6-3:2007/A1:2011/AC:2012	Elektromagnetische Verträglichkeit (EMV) - Teil 6-3: Fachgrundnormen - Störaussendung für Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe

Typ-A-Norm

EN ISO 12100:2010-11	Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobewertung und Risikominderung (ISO 12100:2010)
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Typ-B-Norm

EN 60204-1:2018	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen
EN ISO 13854:2019	Sicherheit von Maschinen – Mindestabstände zur Vermeidung des Quetschens von Körperteilen
EN ISO 13732-1:2008	Ergonomie der thermischen Umgebung — Bewertungsverfahren für menschliche Reaktionen bei Kontakt mit Oberflächen — Teil 1: Heiße Oberflächen (ISO 13732-1:2008)

Hinweis:

Die Schutzziele der Richtlinie 73/23/EWG (Niederspannungsrichtlinie) werden eingehalten

Kerpen-Horrem, 13.07.2023

Dietmar Wüller, CEO



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