

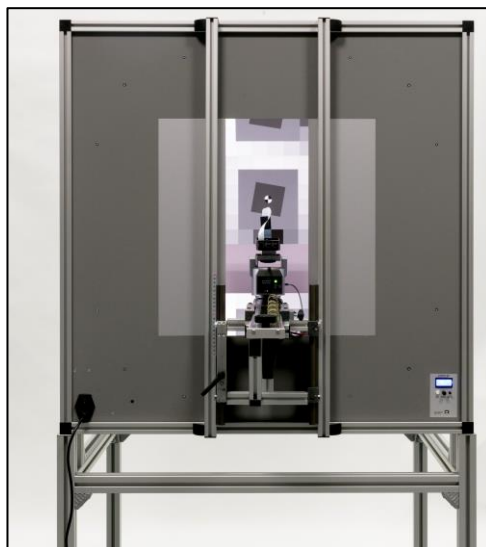
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# iQ-FoV Box

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User Manual

8. August 2017





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## 1 INTRODUCTION

With the iQ-FoV-Box you have a chart illumination and positioning system that is optimized for resolution measurements of high FoV cameras up to 180 degree. Together with the iQ-Analyzer, it is a complete solution for automatic detection and analysis for two different chart setups. In the following manual you will find a detailed description how to use this system to get the best measurement performance.

If you assemble your iQ-FoV-Box by yourself please follow the separate installation manual.

**Safety note: If the power supply gets interrupted or there is a power failure the illumination may execute a reset and start again with 1 % brightness.**

## 2 STARTING THE SYSTEM

### 2.1 PLACEMENT

Place your iQ-FoV-Box in a dry condition and on an even ground. Make sure that there is enough space around the box. You need full access to the back door and enough space to adjust the alignment arm at the front side in the full length.

### 2.2 STARTING / CONTROL OVERVIEW

Connect the box to power and turn it on with the power switch that is placed on the control panel at the lower left edge of the front wall of the box. On the right side of the control panel the illuminance intensity knob, the illumination on/off button and a USB port is located. This USB port is a direct connection to the camera mounting inside the box. You do not need to put a control or power cable inside of the box.

The box is now ready for starting with camera and chart alignment. The alignment tools and chart setups will be described in the following chapters.

## 3 CAMERA AND CHART ALIGNMENT

You can choose between two different chart setups when using your iQ-FoV Box. These setups will allow you to analyze your images automatically with the iQ-Analyzer. To get a good performance it is important to align your camera inside the box and position the three different chart types in the correct areas.

Please follow the steps below to arrange your camera's position and charts in the right way. If possible use the live view mode of your camera, this will help you arranging the charts and aligning your camera. The magnetic rulers (see "image 03") are a good way to align the camera properly, assuming that the camera's orientation will be good if horizontal / vertical rulers each show the same distance.

### 3.1 CAMERA DEPTH AND HEIGHT

Put your camera on the mounting inside of the box, therefor the back door of the box can be opened. If your camera is controllable via USB you can use the cable that is already mounted inside the box and connect your control device from the outside of the box (control panel at the front). The USB connection is placed right beside the illumination level knob.

Align the camera attachment so that the position of your camera is centered inside the box and the optical axis of your camera is centered. For camera depth and height alignment, use the mechanical positioning of the extension arm from the outside of the box. Depending on the FoV and dimensions of your camera you may have to adjust the depth, height or leveling again when adjusting the chart positions which is described in the following chapters. We suggest to start with the chart setup (1) to



align the camera depth corresponding to the upper and lower chart in the image. These two charts should be placed as deep as possible inside the box, if possible directly to the border of the back wall.



### 3.2 CAMERA PITCH AND YAW

The pitch and yaw alignment of your camera can be adjusted with the motorized positioner via the IR remote control from outside of the box. The IR detector of the motor is positioned on the backside of the motor device on a small pin. You can adjust this pin if you want to use your remote control device from other directions.

### 3.3 CAMERA FINE LEVELING

The fine leveling of your camera can be regulated with the leveling tool that is positioned directly under the camera attachment.

### 3.4 CHART POSITIONING

Please note that the placement of chart type (A), (B) or (C) in the following description is very important and must not be changed. Otherwise the automatic detection of the iQ-Analyzer will not work. You may also have to optimize your camera position during positioning your charts.

#### Setup 1:

Place chart (C) in the center of the back wall. The other charts have to be positioned on a straight vertical and horizontal line going through the image center. The vertical placement has to have one chart (A) on the top using the top wall and one chart (B) at the bottom using the bottom floor wall. The horizontal placement has to be done in a similar fashion: place one chart (B) on the left wall and one chart (A) on the right wall. Use folding and rotating for each chart that its border looks straight-lined in the resulting image:

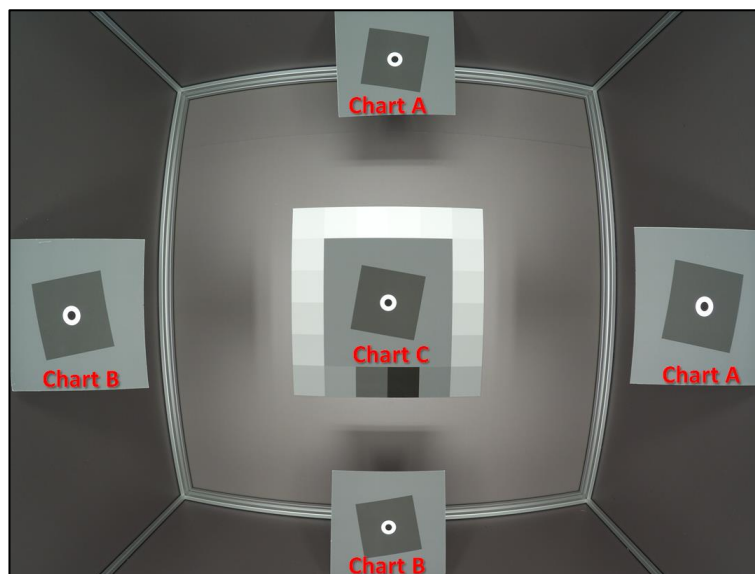


Image 01: Chart positions, Setup 1



### Setup 2:

Position chart (C) in the center of the back wall. The other charts have to be positioned on a straight diagonal line going through the image center, so that they will be located in the image corners. Use the right wall to attach the top-right chart (B) and bottom-right chart (A). Use the left wall to attach the top-left chart (A) and bottom-left chart (B):

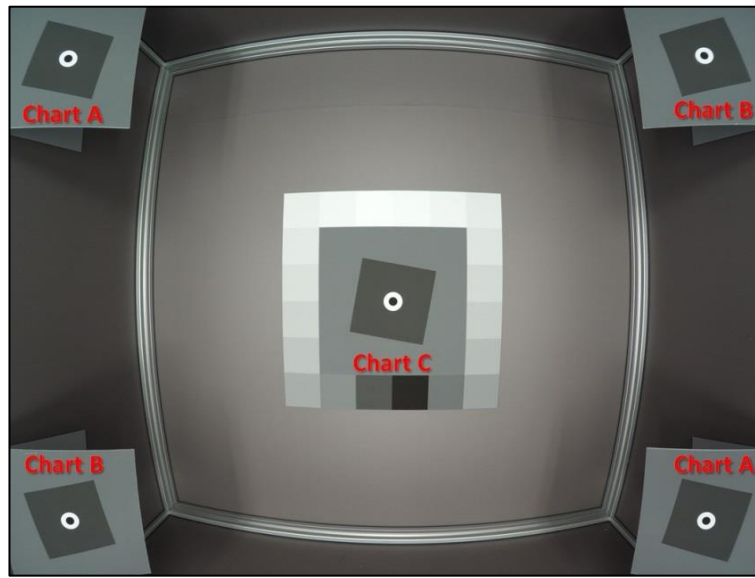


Image 02: Chart positions, Setup 2

## 4 ILLUMINATION INTENSITY

You can adjust the intensity of the fluorescent tubes inside the box via the illumination level knob from the outside. The intensity panel shows the actual intensity in percent. Turn on/off the tubes via the on/off button.

To get the best measure performance, adjust the intensity so that the brightest area of the OECF grey patch fields around the center chart (C) is on its possible maximum, but not saturated.

For low intensity use you can put the density filters over the fluorescent tubes. The actual intensity could be calculated via the density factor of the installed filters.

It is recommended to measure and note the lux value inside the box on a defined position.

## 5 CHART HANDLING

You have to be super carefull with the test charts. While the positioning please make sure that you will not touch the chart surface.



## 6 FIELD OF VIEW CALCULATION

The iQ-FoV Box offers a simple way to check a camera's angle of view (horizontally/vertically). The iQ-FoV Box is supplied with 4 magnetic rulers which should be placed like shown in „image 03“.

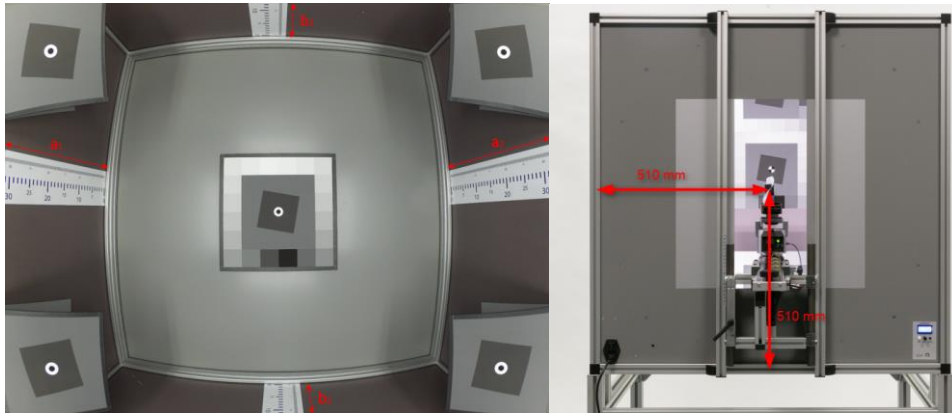


Image 03: horizontal / vertical distances and camera centering



Image 04: camera distance, origin of measure

To calculate the angle of view simply use distances  $a_{1/2}$ ,  $b_{1/2}$  and  $d$  in the following formular:

$$\theta_{hor} = 2 \cdot \left( 90^\circ - \tan^{-1} \left( \frac{985 \text{ mm} - d - \frac{a_1 + a_2}{2}}{510 \text{ mm}} \right) \right)$$

for horizontal angle

$$\theta_{ver} = 2 \cdot \left( 90^\circ - \tan^{-1} \left( \frac{985 \text{ mm} - d - \frac{b_1 + b_2}{2}}{510 \text{ mm}} \right) \right)$$

for vertical angle

$d$  is the distance of the camera moved into the iQ-FoV Box measured from the front plate (see „image 04“ left side). The origin of measure is shown in „image 04“ on the right side – it is located in the center of the front plate.

Please note that it is very important to center the camera for field of view calculations. The optical axis of the lens has to be orthogonal to the back plane and centered around 510 mm in height and width of the iQ-FoV Box.