Lightdiction LBA-C-100
Laser Beam Analyzer

The LBA-C-100 is a beam analyzer designed to handle high continuous power while measuring beam parameters like the divergence or RGB alignment of laser sources.

A PC interface enables to do a live measurement while focusing or aligning the beams safely.

FEATURES

- **COMPACT** AND **ROBUST** DESIGN
- VERY-HIGH **RESOLUTION**
- HANDLES HIGH **CONTINUOUS POWER**
- **EASY SETUP**
- **EASY PC INTERFACE**
- **LIVE MEASUREMENTS** OF ALIGNMENTS AND DIVERGENCES
- POWER AND COMMUNICATION THROUGH **USB**

TYPICAL APPLICATIONS

- LENS COLLIMATING OF LASER SOURCES
- DIVERGENCE MEASUREMENTS
- ACCURATE RGB ALIGNMENTS WHEN MANUFACTURING, OR BEFORE SHOWS
- POWER MEASUREMENT

TABLE OF CONTENT

I. PRESENTATION OF THE DEVICE

1. TECHNICAL SPECIFICATIONS

Parameter	Comment	Min	Typ	Max
Optical Specifications				
P_{opt}	Optical power (*) (**)	0.1W	-	100W
	Power measurement accuracy (Calibrated on 635nm / 520nm / 445nm) Other wavelengths can be added by the user.		+/-1 %	
R_Φ	Resolution on divergence	-	0.01 mrad	-
	Typical accuracy on divergence (+/-)	-	0.01 mrad	-
Φ	Divergence measured (FWHM)	0.1 mrad	-	10 mrad
D	Input beam diameter	-	-	22mm
λ	Wavelength detected	400nm	-	1000nm
Mechanical / Housing Specifications				
L x W x H	Length x Width x Height (mm) – Without the holder With the holder		105 x 75 x 59 153 x 110 x 70	
m_{sys}	Weight – without the holder with the holder		600g 800g	
Electrical Specifications				
P_{USB}	Typical Power consumption (USB 3.0)	-	2W	-

(*) The sensor of the LBA-C must remain below 75°C while operating. It may be need to dissipate heat from the case with a fan when using the device with high power beams for a long period.

(**) A correct alignment should be done before setting the laser projector to maximum power. The user must follow the alignment procedure described in the User Manual to prevent damage to the system.

2. REQUIREMENTS

The LBA-C Laser Beam Analyzer requires the following to work:

- USB 3.0 port
- Computer with windows 10 or 11 installed

II. HOW TO USE THE LBA-C-100

1. DOWNLOAD AND INSTALL THE SOFTWARE

The latest version of the software can be found here:

https://lightdiction.com/en/Downloads#lba

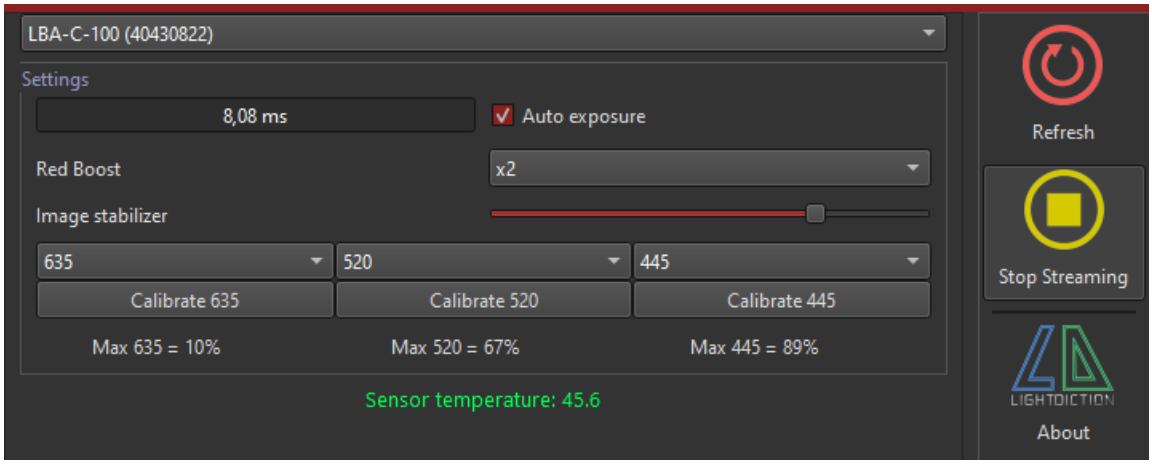
To install the software, simply download and start the setup file "LBA_vX.XX_setup.exe" (X.XX is the version of the software). Then **place the license and calibration file** (in the USB key provided) next to the executable file.

2. SHOOT THE LASER BEAM ON THE LBA-C-100

Place the LBA-C-100 in front of the of the laser output to measure, as shown on the following picture. Use the holder to adjust the height if necessary.

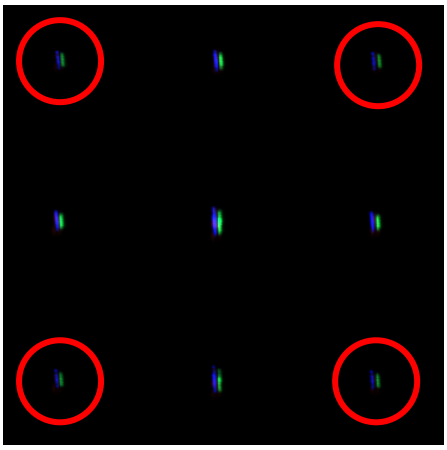
Then connect the USB cable to the LBA-C-100 and to your PC, using a USB 3.0 (or over) port.

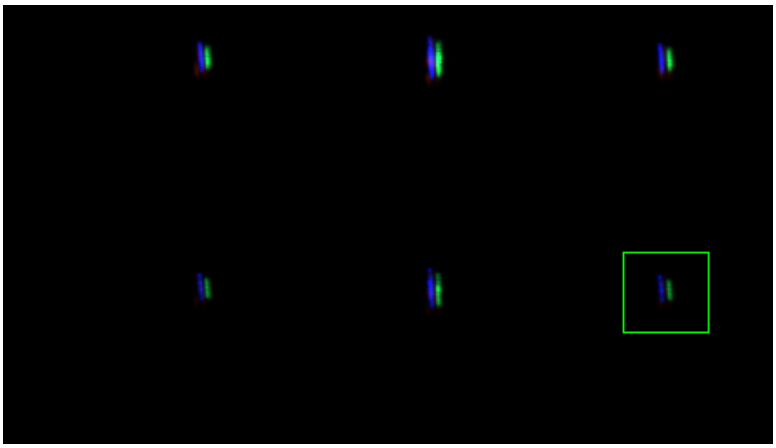
Start your "Lightdiction – Beam Analyzer" software. Select the LBA-C-100 sensor from the list, then start Streaming.



The sensor should remain below to 75°C at any time.

Create a beam pattern, with around 1000 points (~30FPS), or the maximum point number you can if 1000 is not possible, set it to low power and enable it. **Incline slightly Left, right, Up and down** the LBA-C-100 in front of your laser until you see a part of the “9 spots pattern”. Keep shooting at the center of the lens.

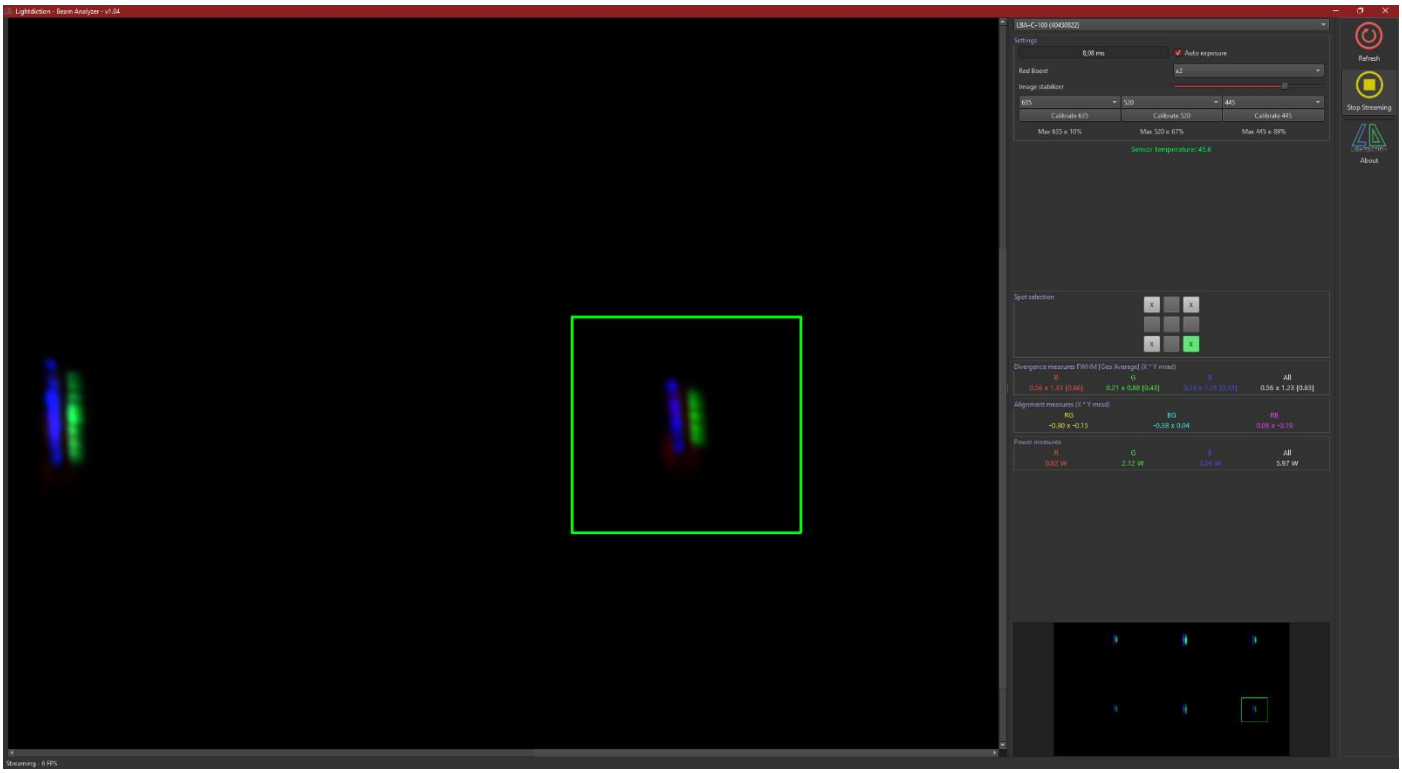




The 4 corner spots you see here are the images of your laser projected at “infinity”.

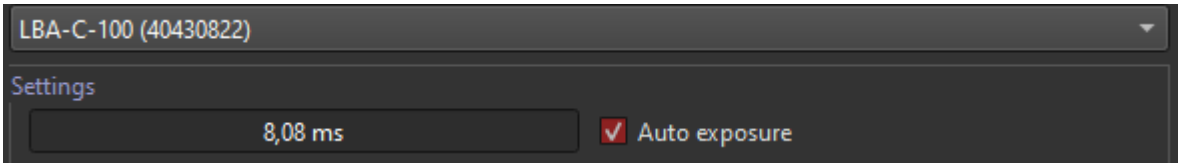
As the device is measuring angles, it is important to incline it correctly, more than positioning the beam perfectly at the center of the lens.

Once you start to see the pattern, click and drag on one of the spots to move and resize the **ROI (Region of Interest)** on it. Then you can increase the power of your laser.



3. ADJUST THE EXPOSURE

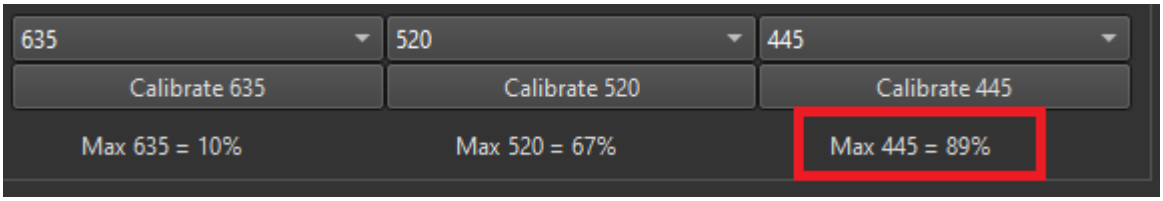
The exposure can be adjusted in the settings. It should be high enough to have a correct brightness, but not too high to avoid saturation.



“Auto exposure” helps you to set the exposure correctly, but it takes a few seconds to stabilize.

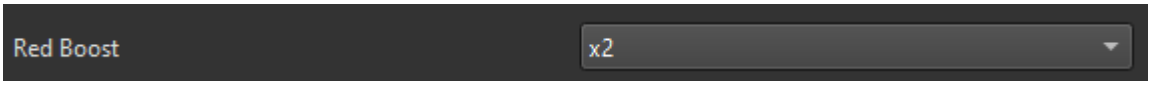
The exposure is always calculated in function of the ROI you have selected.

To have a correct measurement, the “Max” value should be close to 80-90%.



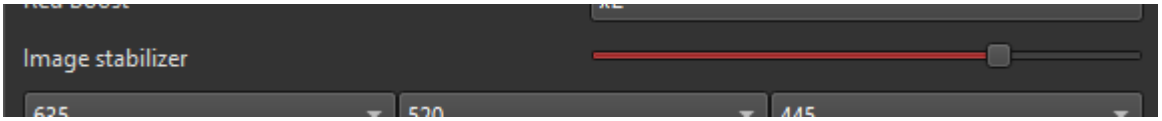
If the RGB balance do not permit to have all 3 colors > 50%, you should dim the most powerful colors or measure all colors individually.

For display only, you can use the Red Boost to boost the red on the display. This is useful when you want to align R G and B by looking at the spot on the screen.



The laser software does not always have a solution to project a beam 100% On. There is often a few anchor / black points. This cause flickering on the sensor.

To prevent this and to have more stability on the display and the measures, the Image Stabilizer is used.

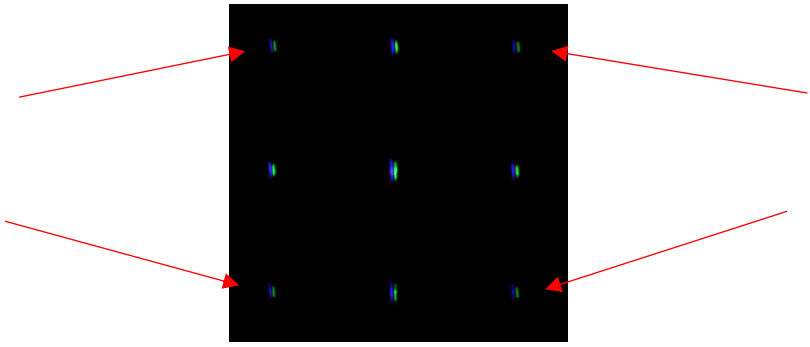


But this also cause a little delay on the display.

We recommend keeping the image stabilizer to a high value. Setting the Image Stabilizer to a low value generally cause inaccurate measures (divergence and power).

4. MEASURE THE DIVERGENCE AND COLOR ALIGNMENT

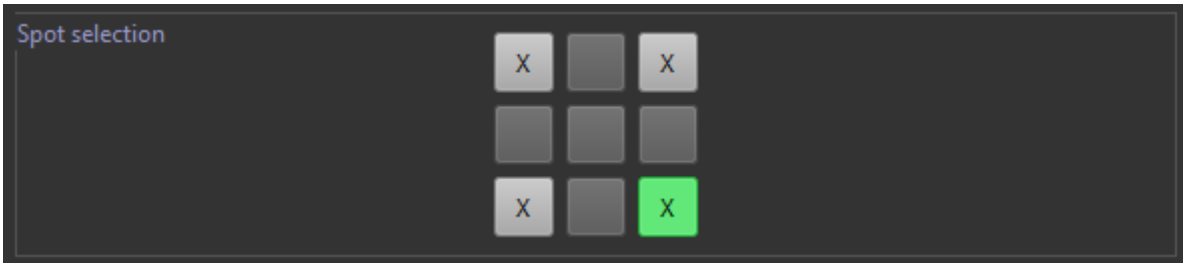
The “9 spots pattern” detected by the sensor looks similar to this:



Only a part of this pattern can be seen at once on the sensor, but the measure should be done on any of the 4 corners of the pattern.

Click on one of the corners and drag to create a Region of Interest around the corner you want to measure.

Then, choose the corner currently selected by your ROI on the Spot selection:



This will calculate a chromatic compensation in real time.

You can now read the divergence measured on the right of the screen. The Geo average is the square root of the product of X and Y divergences.

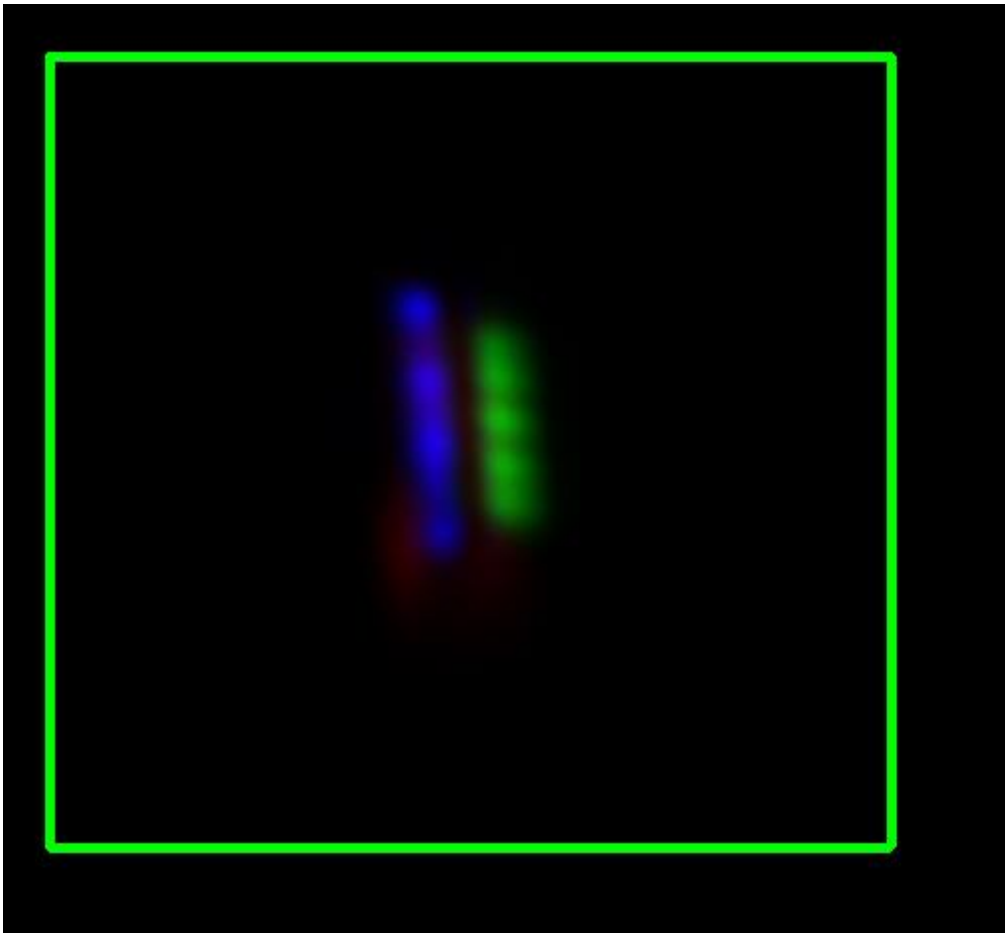
The value measured is FWHM (Full Width Half Max). Also, you can see the misalignment between red, green and blue beams. The spot you see here being the image of your laser spot at “infinity”, you just have to superimpose all 3 colors to optimize the alignment.

The LBA-C-100 is displaying the spot pattern as if it was projected at the “infinity”. To align the RGB and B or stacks of diodes, we should see 1 single spot on the LBA-C-100, with all colors superimposed.

Also, the best focus of a diode is obtained with a lower divergence measured on the LBA-C-100.

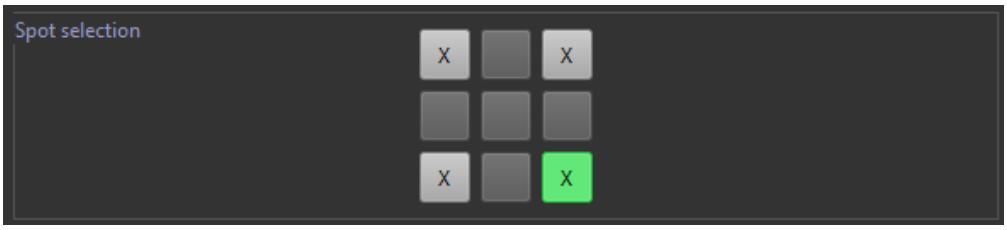
5. MEASURE THE POWER

To measure the power, it is important to place the ROI correctly, and to keep it large enough. The measure is based on the full spot.



If all 3 colors have a “Max” value above 50%, you can measure all colors at the same time. Else, the color with too low or too high “Max” value can false the results, even on other colors. Then you should measure these colors individually.

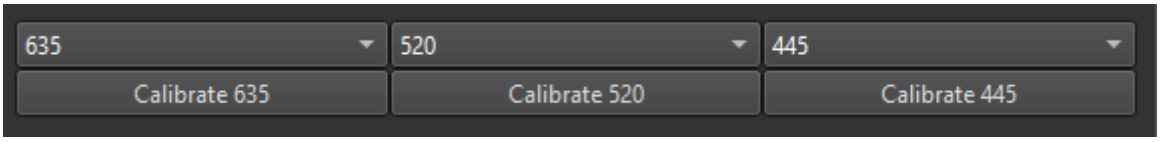
Keep in mind to always select the right spot, even when using the power measurement.



6. CALIBRATIONS

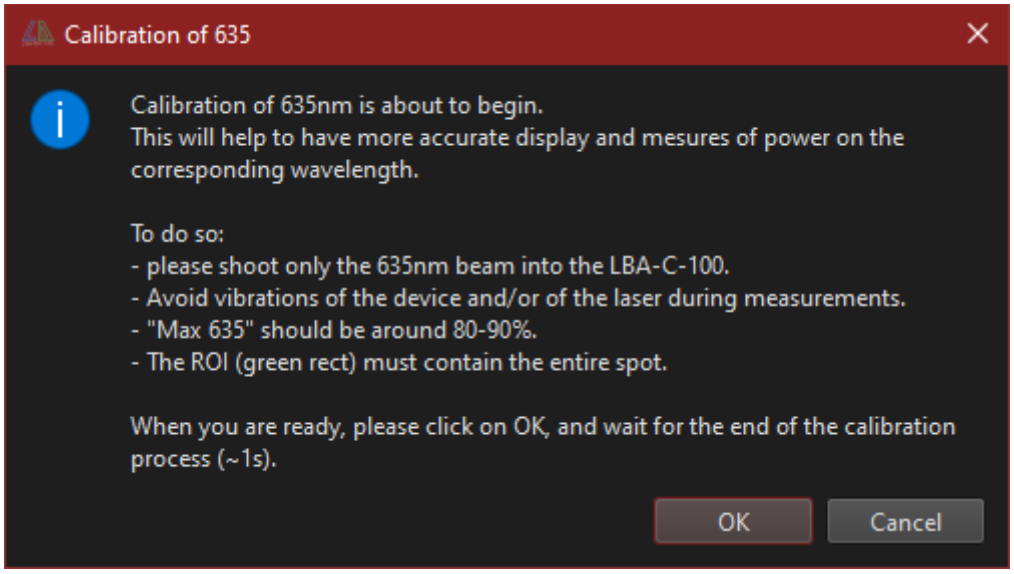
All colors and wavelengths can be calibrated to have more accurate results for the divergence and power measurement.

This can also be used to measure other wavelengths than RGB (Yellow, orange, cyan, purple…).



Select the wavelength you want to calibrate, and click on “Calibrate xxx”.

It will display a window explaining the calibration process. Click on OK when you are ready.



7. LIST OF ALL COMMANDS

Command	Description
Select LBA sensor	Select your LBA-C-100 device.
Refresh (tool bar)	Refresh the list of Sensors that can be used by the software.
Start / Stop Streaming (tool bar)	Toggle Start / Stop streaming with the sensor.
About (tool bar)	Some information about the software and the current version.
Exposure value	Sets the exposure value of the sensor (shutter). A higher value will result in more brightness.
Auto exposure	Enable this option the adjust automatically the exposure inside the Area of Interest (measurement area).
Red Boost	Increase the values of red on the display only, to ease the alignment.
Image stabilizer	Number of images stacked to help stabilize the measures.
Calibrate	Click to start the calibration process on any wavelength.
Max R / G / B	Maximum value measured currently by the sensor. If the value is close to 100%, the sensor is saturating. The exposure value should be reduced. At the opposite, if the value is too low, the measure is incorrect. The exposure should be increased.
Sensor temperature	Should remain below 75°C. The sensor will automatically shutdown if the temperature goes too high, but it can still be damaged.
Divergence measures X Y	FWHM values of the divergence measured in the ROI. [Geo Avg] is the geometrical average of the divergence measured (square root of the product of X and Y divergence). The FWHM being based on the maximum, it is possible to have a “All” divergence less than R, G or B divergence alone.
RG alignment	Alignment of red beam relatively to green beam.
BG alignment	Alignment of blue beam relatively to green beam.
RB alignment	Alignment of red beam relatively to blue beam.
Power measures	Values of power for each wavelength

III. PRECAUTIONS AND RECOMMANDATIONS ON USE

- Do not put the laser to the maximum power if the LBA-C-100 is not correctly placed in front of the laser projector (if the 9-spot pattern cannot be seen).
- Check that the input lens is clean before shooting high power lasers through it, or it may burn the lens.
- Never attempt to open the LBA-C-100 cover. This would void the warranty, ruin the alignment and could present a danger for the next uses.

IV. COMMON ISSUES

Issue	Cause	Solution
The device is recognized and opened by the software, but I can't see the beam.	The sensor is not currently streaming	Start Streaming by clicking on the button
The device is recognized and opened by the software, but I can't see the beam.	The LBA-C-100 is not aligned currently in front of the beam.	Follow the alignment procedure on II / 2.
There are black lines scrolling on the spot seen by the sensor.	This is a rolling shutter effect because the laser beam is not "On" 100% of the time.	Try adjusting the Image Stabilizer, or set a higher number of points in your laser frame.
The divergence on white is lower than with R, G or B only.	FWHM measure is relative to the maximum power.	The max on white being higher, it is completely possible to measure a lower FWHM divergence, nothing is wrong.

V. PLEASE READ CAREFULLY:

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VI. REVISION HISTORY

Date	Information	Version
27.03.2024	New information for the software version 1.4.	1.3
15.02.2024	Design global et divergences R, G et B.	1.2
30.11.2023	Spot selection for improved measurements	1.1
19.11.2023	Initial information	1.0