

# Raytrix data export manual

This document will give you information about:

- The different raw image formats that can be exported from RxLive
- How to use MLA calibration data generated in RxLive with the exported raw images
- The data format for depth maps calculated from Raytrix lightfield camera images



# Raw Image

RxLive allows you to export three different raw image types. All these images have full sensor resolution. The different image types will be described on the next pages.

## Exportable Files

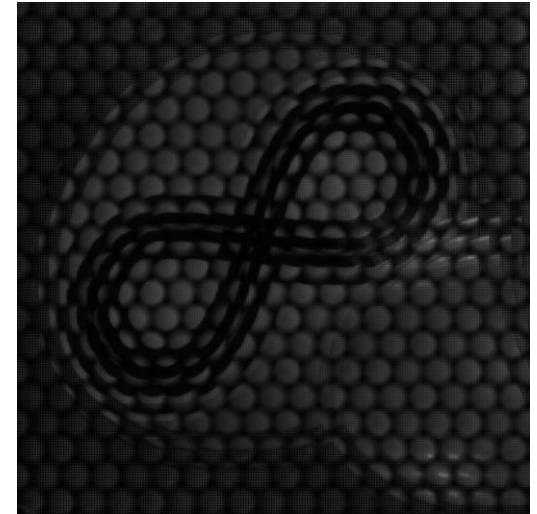
Select All Deselect All

Lightfield		
<input type="checkbox"/>	Ray File	Light field image file
Image		
<input checked="" type="checkbox"/>	Raw Image	Image taken by camera
<input checked="" type="checkbox"/>	Processed Image	Raw image processed by preprocessing parameters
<input type="checkbox"/>	Stereo Image	Anaglyph stereo image
<input type="checkbox"/>	Calibration Grid	Calibration grid
<input checked="" type="checkbox"/>	Gray Image	Processed gray image taken by camera
<input type="checkbox"/>	Total Focus	Focus on surface
<input type="checkbox"/>	Colored Depth Map	Depth Map Colored
<input type="checkbox"/>	Focus on plane	Focus on plane
Depth		
<input type="checkbox"/>	Raw Depth Map	Raw depth image after estimation without fusion



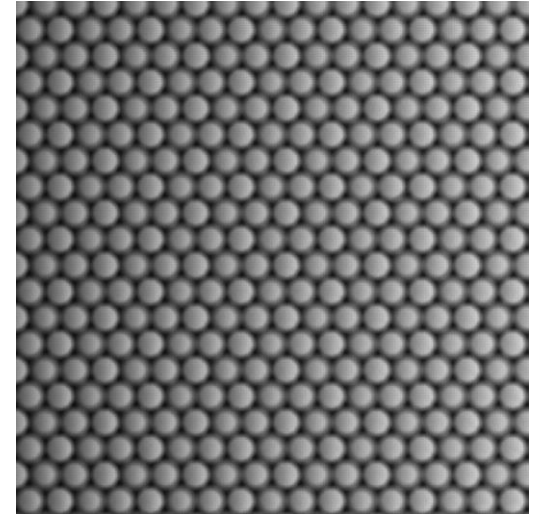
# Raw Image

The raw image shows the intensity values as recorded by the sensor during the exposure. The file has an 8 bit per pixel monochrome image format. For a color sensor, the color filter matrix will still be visible and the image should be demosaiced before further processing. The microlens structure is still easy to see in the image.



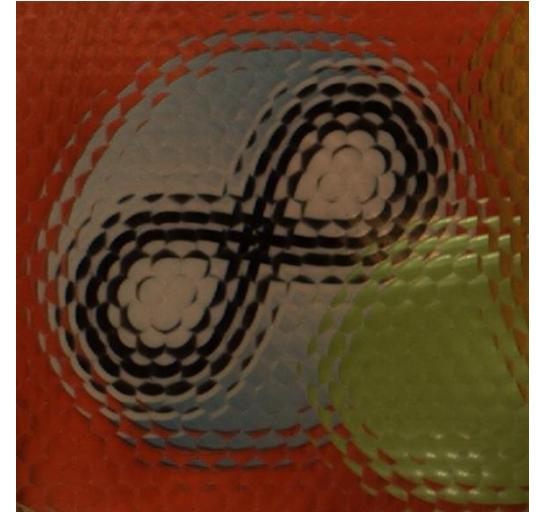
# Grey Image

To remove the microlens structure from the image, a grey image should be taken. This is the final step during the MLA calibration of the camera. The grey image is taken with a perfectly homogeneous illumination, so that only the vignetting of the microlenses is captured in the image. This can then be used to remove this vignetting from a raw image.



# Processed Image

This is a combination of the current raw image from the camera and the grey image that was taken after calibration. Each current raw image from the camera is divided by the grey image to remove vignetting of the microlenses. This image also has demosaicing applied, so with a color camera you will get an RGB image with 24 bits per pixel.



















# Working with raw lightfield data

To write your own algorithms for use with lightfield data generated by Raytrix cameras, you can export the current MLA calibration of your camera in RxLive. The information in this .XML file is documented on the following pages.

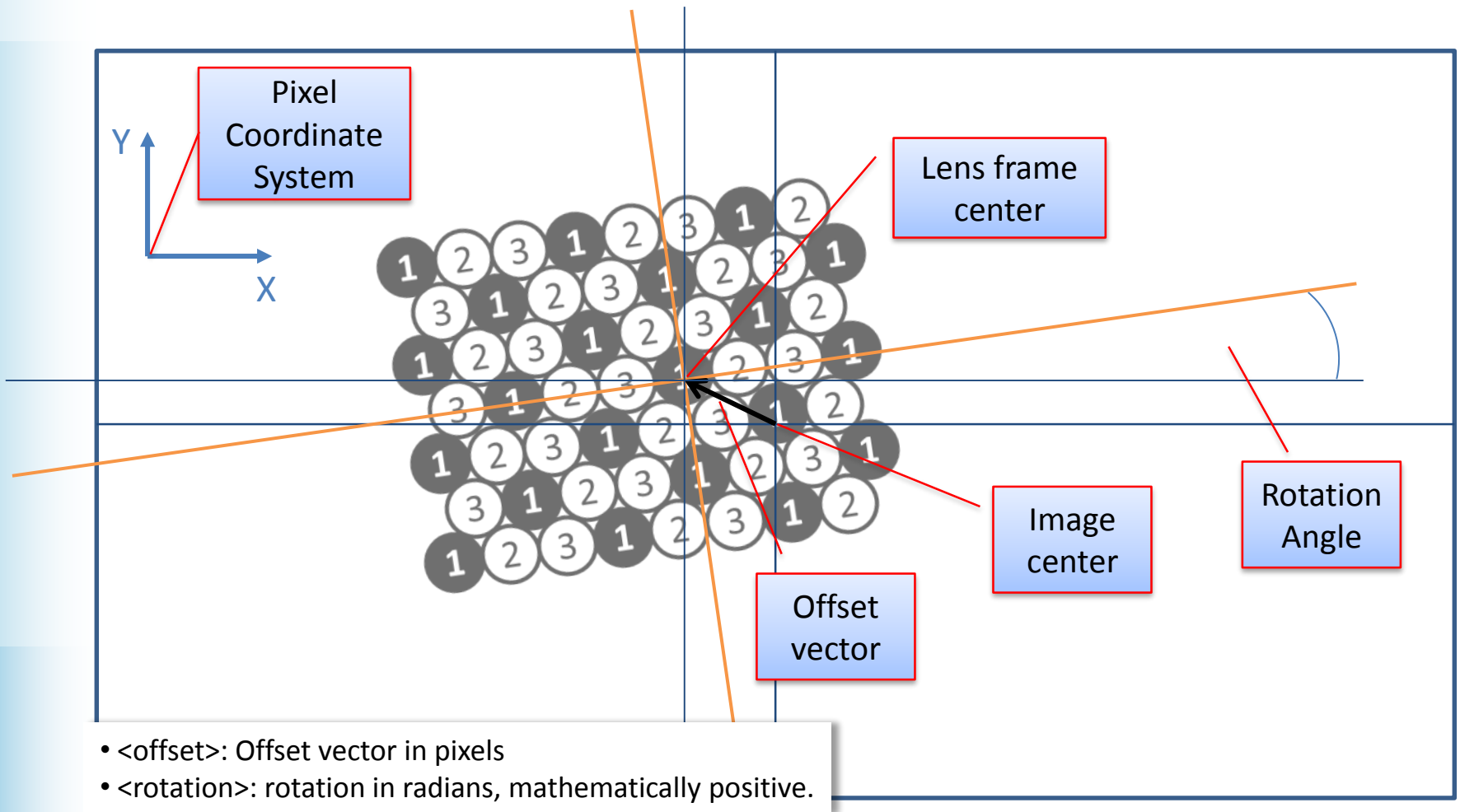
## Exportable Files

Select All Deselect All

Lightfield	
<input type="checkbox"/>  Ray File	Light field image file
Image	
<input type="checkbox"/>  Raw Image	Image taken by camera
<input type="checkbox"/>  Processed Image	Raw image processed by preprocessing paramet
<input type="checkbox"/>  Stereo Image	Anaglyph stereo image
<input type="checkbox"/>  Calibration Grid	Calibration grid
<input type="checkbox"/>  Gray Image	Processed gray image taken by camera
<input type="checkbox"/>  Total Focus	Focus on surface
<input type="checkbox"/>  Colored Depth Map	Depth Map Colored
<input type="checkbox"/>  Focus on plane	Focus on plane
Depth	
<input type="checkbox"/>  Raw Depth Map	Raw depth image after estimation without fusior
<input type="checkbox"/>  Depth Map	Depth map after fusion and filling
Data	
<input type="checkbox"/>  3D Mesh (PLY)	3D mesh in binary PLY format (with color)
<input type="checkbox"/>  3D Mesh (STL)	3D mesh in binary STL format (without color)
<input type="checkbox"/>  3D Points (XYZ)	3D point list in ascii XYZ format
<input type="checkbox"/>  3D Points (PCD)	3D point list in binary PCD format
<input checked="" type="checkbox"/>  Calibration File	The camera calibration saved in a '.xml' file

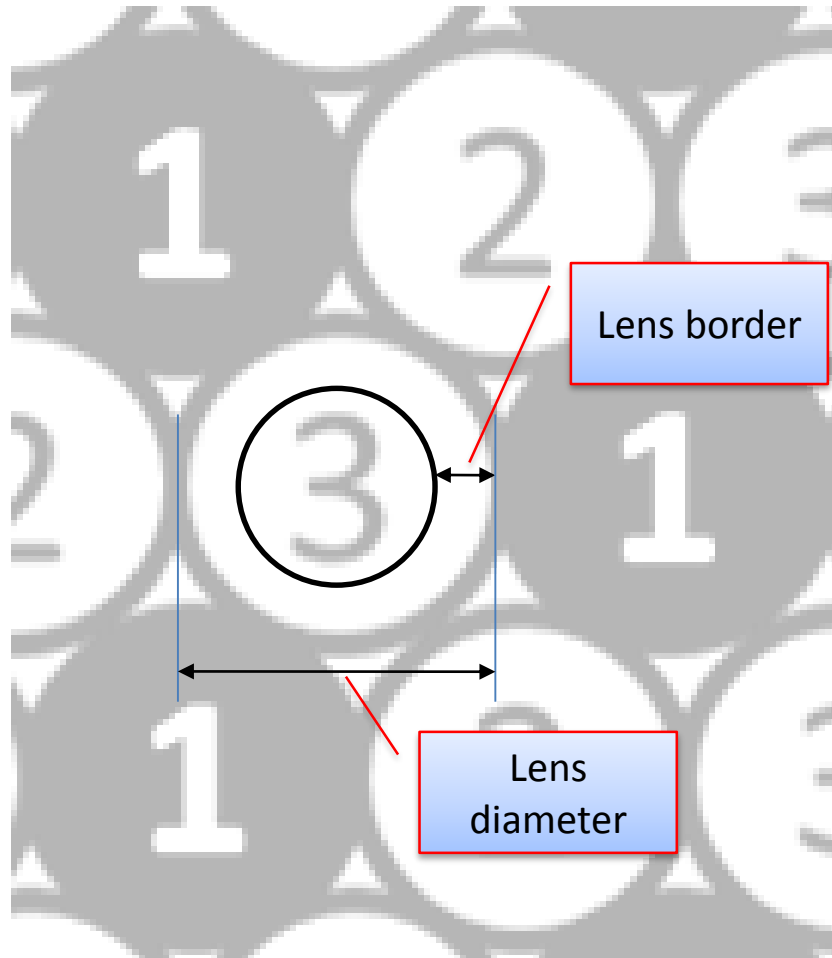


# Lens Frame to Image Frame



# Lens Border

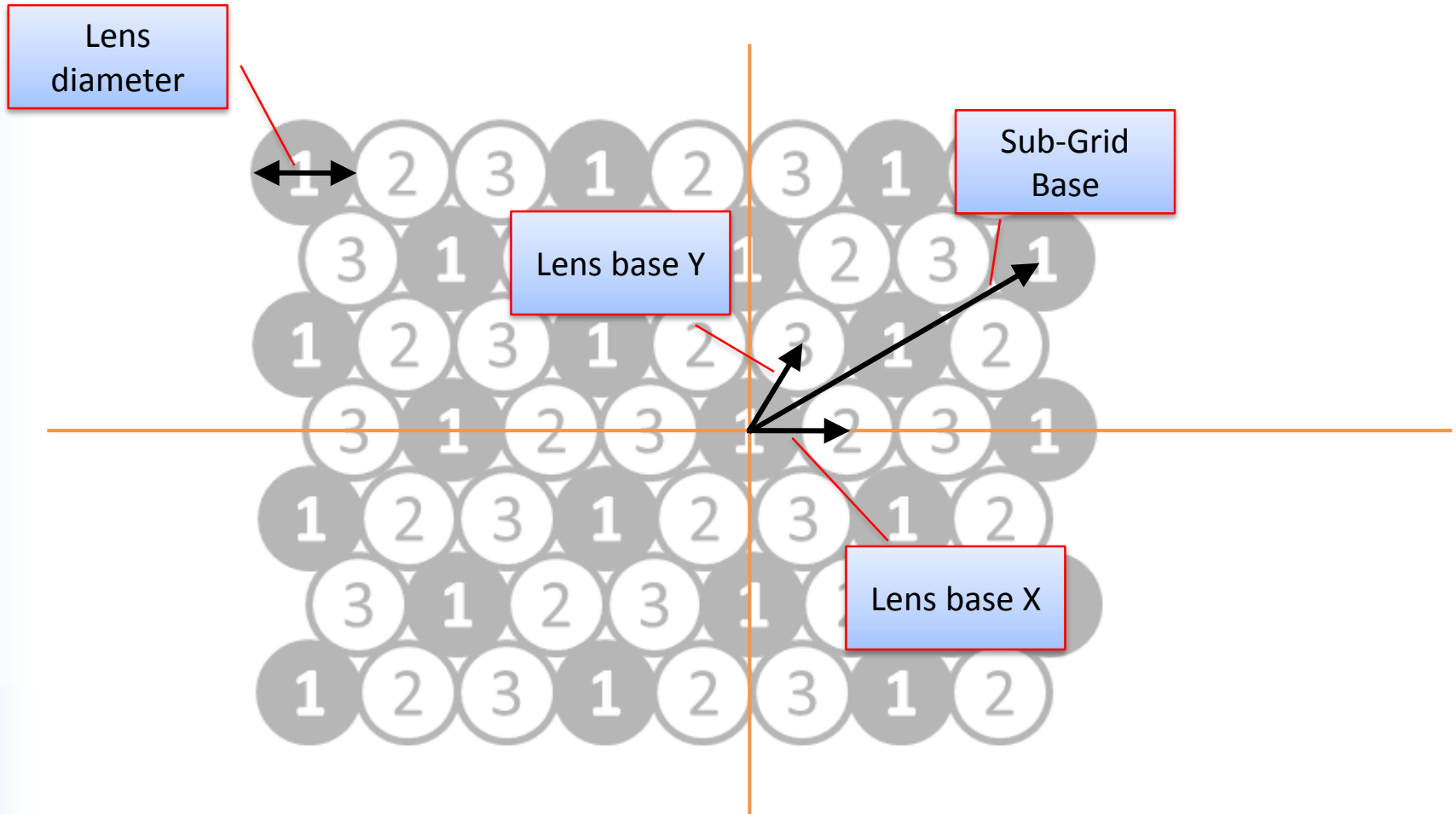
The lens border gives the part of a lens that is not used for rendering.





# Lens Frame

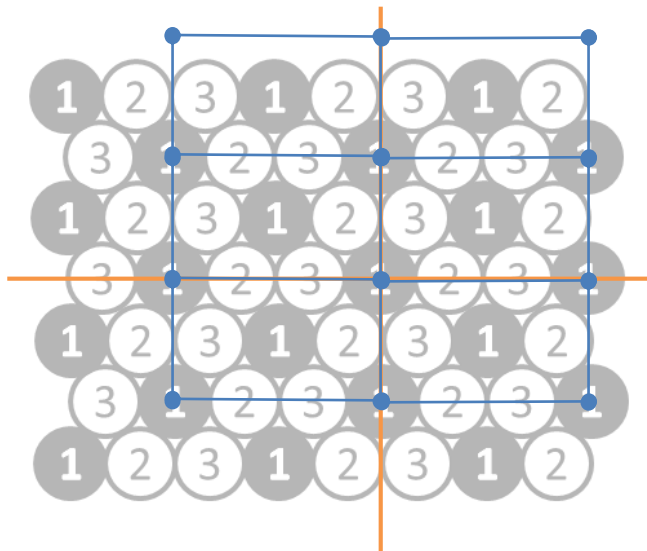
The lens base data is given in units of lens diameters in the lens frame.



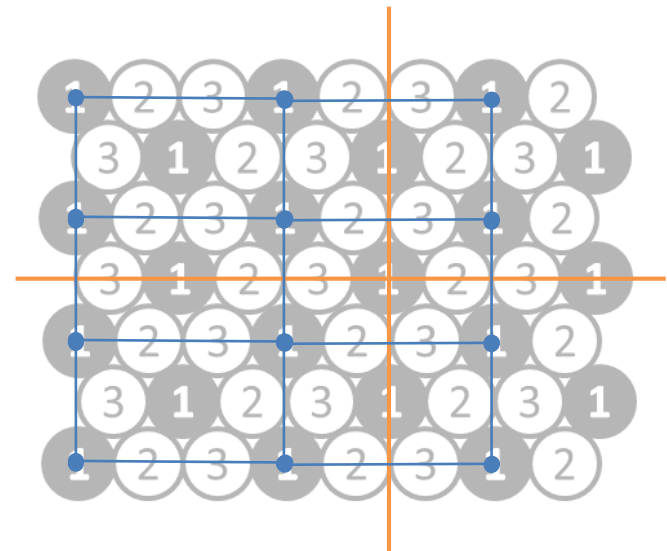
# Sub-Grids

The lenses of each type lie in a hexagonal grid, which can be regarded as the combination of two orthogonal grids. These two orthogonal grids are called sub-grids here. The „sub\_grid\_base“ vector gives the vector from one sub-grid to the next periodic repetition of the same sub-grid as seen on the previous page.

Sub-Grid 1

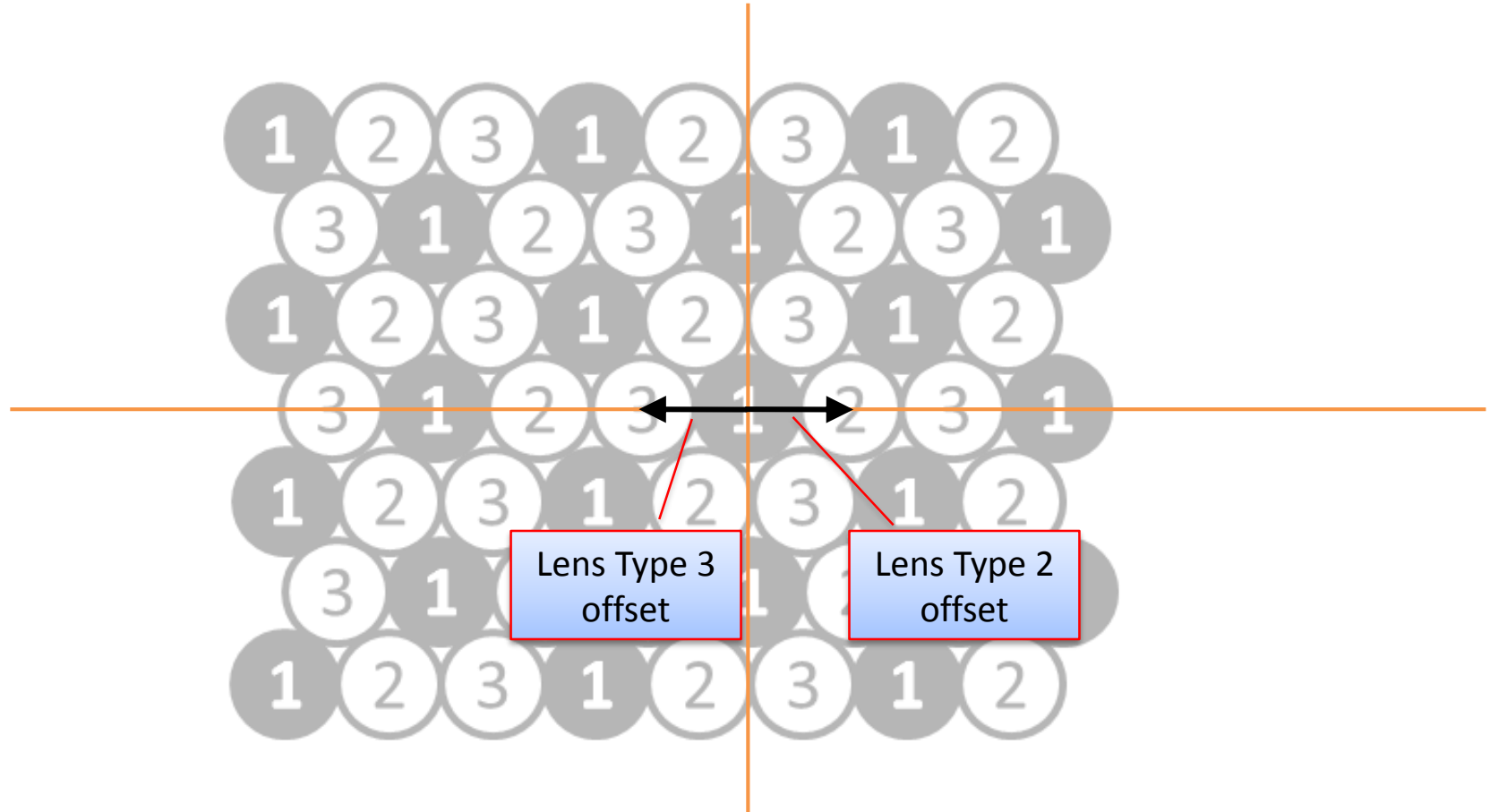


Sub-Grid 2



# Lens Type Data

Lens type offsets are relative to lens frame origin.



# Raytrix depth map data format

The depth maps generated by RxLive can be exported as a 2.5D .TIFF image file. The image contains float values for every depth estimation. The depth values are given in millimeters from the sensor plane, with a possible global offset. To read this data into MATLAB, please use the following commands:

```
t = Tiff('Demo_02_DepthMap.tiff','r');  
subimage_one = t.read();  
imagesc(subimage_one);
```

