



AN005: Data visualization program

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1. Calibration data file download

Calibrated lenses have data files linked to each lens individually. The data files can be accessed via Theia's web database and are linked to the lens by serial number.

When lenses are delivered, they will come with a QR code to link to the online data. No login credentials are required and the data can be downloaded multiple times.

Theia provides a Visualizer program for exploring the data and as a reference for developing your own data interpretation program. Download the file to a local drive so it can be imported into the data visualizer program.

2. Data Visualizer program

Once the calibrated lens data file is available locally, the Visualizer program can be used to explore the data. This Theia provided program uses the lens data and input parameters to calculate results based on each data set. It is useful for exploring the dataset.



The Visualizer can be downloaded from www.theiatech.com/vis

2.1. Download the Visualizer program

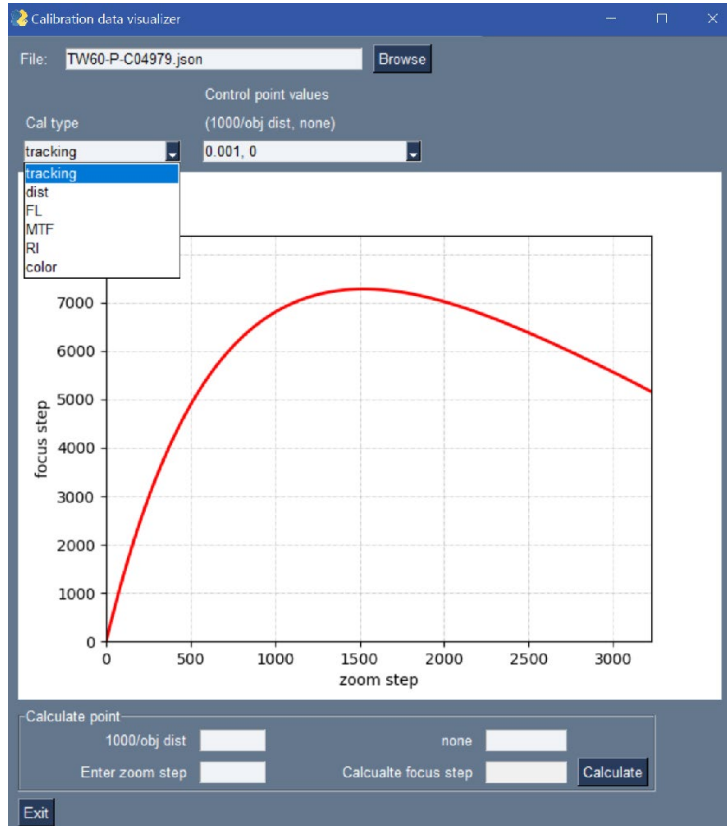
The Visualizer program is downloadable as an executable program and also as Python source code.

The source code is provided for use as reference in developing your own code. It is provided as is and without warrantee and without support. There are 2 files for the source code. One file `visualizer.py` controls the GUI. The supporting file `TheiaCalLensCalc.py` is responsible for reading data from the selected data file, calculating the calibration curve to be displayed in the GUI, and calculating (interpolating) the y-value result for given input values and parameters.

2.2. Using the Visualizer program

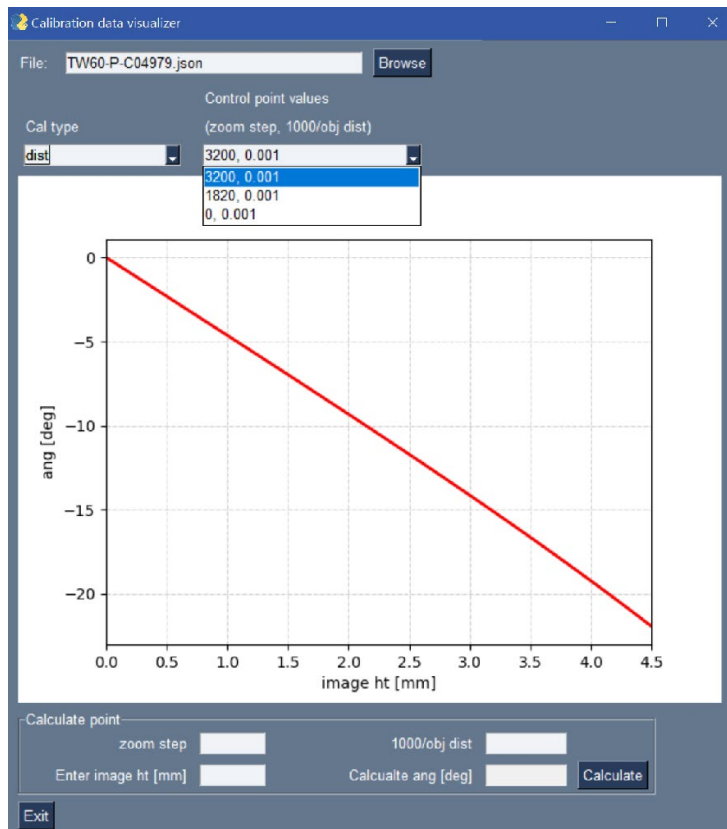
2.2.1. Load data

After starting up the program, browse for the data file for the lens. Data files are linked by serial number to the lenses. When successfully loaded, the Visualizer program will list the calibration types available. For each type, there will also be a list of calibration control points.



2.2.2. Choose calibration points

Some calibration types are done with multiple input parameters. See section 2.2 for the interpretation and availability of input parameters for each calibration type. In this example, the distortion calibration type is selected and it has curves based on different focal lengths (3200...) and object distances (0.001...). These can be selected from the drop-down list.

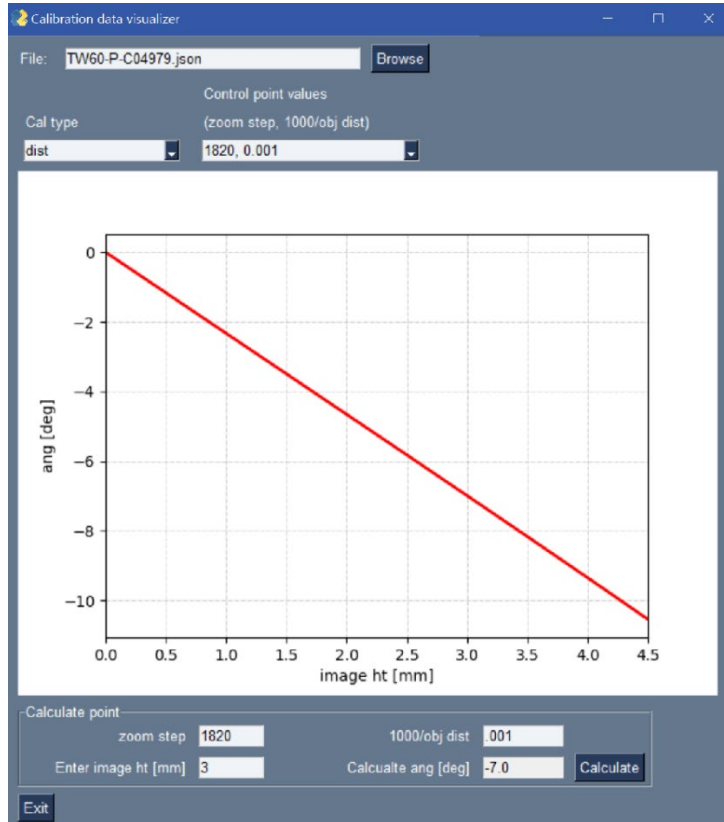


Theia calibrated lenses

2.2.3. Calculating points

Once the curve is selected, data points can be calculated at any valid x-axis value. In this example, the curve parameters are selected to match the measured curve parameters of 1820 (zoom motor step number) and 0.001 (1000/object distance in meters).

Image height along the x-axis is entered as 3.0mm and the resulting distortion angle is calculated at -7.0deg.



2.2.4. Calculation interpolation

The graph will always show one of the measured curves based on the selected calibration points from section 3.3. The graph is not affected by the calculation input parameters.

In this example, the zoom step position is changed to 2500 which is between two measured curves. When the result is calculated, the angle is -10.0deg and has been interpolated/ extrapolated from the available data.



3. License

The Theia calibrated lens visualizer program and the TheiaCallensCalc.py module if used alone in your application (as is or modified) is licensed under BSD 3-clause license. More information can be found at <https://opensource.org/licenses/BSD-3-Clause>

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4. Revisions

Version	Change	Reason
220408		Preliminary release
221209	Added iris calibration curve	Used for calculating depth of field
230308	Separated from AN002	Moved Data Visualizer into a separate application note
230728	License type	Changed from LGPL to BSD for Visualizer program