

Thorlabs Deformable Mirror DMP40 device adapter

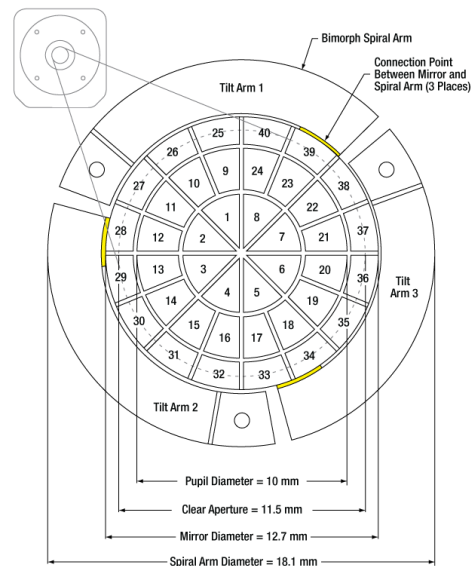
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This is a brief user guide to set up a Thorlabs deformable (DMP40) device adapter in Micro-Manager. This adapter will allow you to control the deformable mirror via the “device property browser” found in the “tools” tab.



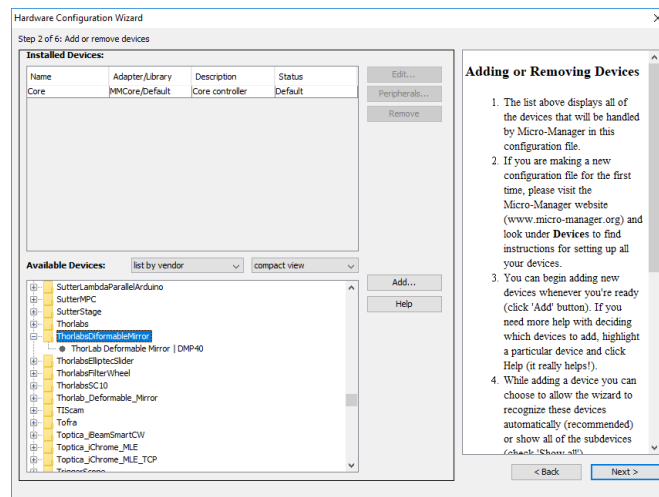
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=5056



https://www.thorlabs.com/images/tabimages/DMP40-P01_Actuators_dwg_780.gif

Download and install Micro-Manager

- 1) Download Micro-Manager (https://micro-manager.org/wiki/Download%20Micro-Manager_Latest%20Release) and install it. We highly recommend downloading the nightly build version [Tested on both 1.4 and 2.0]. After installation, depending on the version of Micro-Manager, copy the “mmgr_da1_Thorlab_Deformable_Mirror.dll” file to the location of your Micro-Manager installation (e.g., C:\Program Files\Micro-Manager-1.4).
- 2) Check whether the dlls provided by Thorlabs (“TLDFM_64.dll” and “TLDFMX_64.dll”, found after installation in C:\Program Files\IVI Foundation\VISA\Win64\Bin) are present in the micromanager directory. If not, copy them.
- 3) Follow the instructions from “https://micro-manager.org/wiki/Micro-Manager_Configuration_Guide” to configure your deformable mirror in Micro-Manager. You can add your mirror under the ThorlabsDeformableMirror tab as shown below.



Usage

The deformable mirror has a number of property groups that can be changed as follows (see also figure below).

1. **Tip & Tilt** sets *Mirror-amplitude* and *Mirror-angle* controlling the three-arm segments of the mirror
2. **Apply Zernikes** for communication with the REALM plugin (<https://github.com/MSiemons/REALM, As of February 2020>, REALM requires Micro-Manager 1.4)
3. **Load wavefront correction** loads previously saved entries of property groups and PSF settings
4. **Temperature** shows the temperature of the mirror
5. **Relax the mirror** allows you to use relaxation feature, which removes mechanical tensions in the mirror. For more information please read the manual of the deformable mirror
6. **Reset segments** returns all 40 segments to 100 V
7. **Reset Zernikes** sets all Zernike coefficients to 0 and all 40 segments to 100 V
8. **Save current position** saves the voltages of all segments
9. **Mirror segments** sets the voltage of individual segments to value between 0 V to 200 V

10. **Zernike Coefficients** sets individual Zernike modes. Note that setting a Zernike mode will change all associated mirror segments.

Device Property Browser

☐ Show cameras ☐ Show shutters ☐ Show stages ☐ Show discrete changers ☒ Show other devices ☐ Show read-only properties

Property	Value
ThorLab Deformable Mirror-Amplitude	0
ThorLab Deformable Mirror-Angle	0
ThorLab Deformable Mirror-ApplyZernikes	0
ThorLab Deformable Mirror-Load wavefront correction	DMDData/init/WavefrontCorrection.txt
ThorLab Deformable Mirror-Mirror Temperature	29.1601
ThorLab Deformable Mirror-Relax the Mirror	OFF
ThorLab Deformable Mirror-Reset Segments	
ThorLab Deformable Mirror-Reset Zernikes	
ThorLab Deformable Mirror-Save current position [input filename]	DMDData/WavefrontCorrection_save.txt
ThorLab Deformable Mirror-Segment 1	100
ThorLab Deformable Mirror-Segment 10	100
ThorLab Deformable Mirror-Segment 11	100
ThorLab Deformable Mirror-Segment 12	100
ThorLab Deformable Mirror-Segment 13	100
ThorLab Deformable Mirror-Segment 14	100
ThorLab Deformable Mirror-Segment 15	100
ThorLab Deformable Mirror-Segment 16	100
ThorLab Deformable Mirror-Segment 17	100
ThorLab Deformable Mirror-Segment 18	100
ThorLab Deformable Mirror-Segment 19	100
ThorLab Deformable Mirror-Segment 2	100
ThorLab Deformable Mirror-Segment 20	100
ThorLab Deformable Mirror-Segment 21	100
ThorLab Deformable Mirror-Segment 22	100
ThorLab Deformable Mirror-Segment 23	100
ThorLab Deformable Mirror-Segment 24	100
ThorLab Deformable Mirror-Segment 25	100
ThorLab Deformable Mirror-Segment 26	100
ThorLab Deformable Mirror-Segment 27	100
ThorLab Deformable Mirror-Segment 28	100
ThorLab Deformable Mirror-Segment 29	100
ThorLab Deformable Mirror-Segment 3	100
ThorLab Deformable Mirror-Segment 30	100
ThorLab Deformable Mirror-Segment 31	100
ThorLab Deformable Mirror-Segment 32	100
ThorLab Deformable Mirror-Segment 33	100
ThorLab Deformable Mirror-Segment 34	100
ThorLab Deformable Mirror-Segment 35	100
ThorLab Deformable Mirror-Segment 36	100
ThorLab Deformable Mirror-Segment 37	100
ThorLab Deformable Mirror-Segment 38	100
ThorLab Deformable Mirror-Segment 39	100
ThorLab Deformable Mirror-Segment 4	100
ThorLab Deformable Mirror-Segment 40	100
ThorLab Deformable Mirror-Segment 5	100
ThorLab Deformable Mirror-Segment 6	100
ThorLab Deformable Mirror-Segment 7	100
ThorLab Deformable Mirror-Segment 8	100
ThorLab Deformable Mirror-Segment 9	100
ThorLab Deformable Mirror-Z2-2	0
ThorLab Deformable Mirror-Z20	0
ThorLab Deformable Mirror-Z22	0
ThorLab Deformable Mirror-Z3-1	0
ThorLab Deformable Mirror-Z3-3	0
ThorLab Deformable Mirror-Z31	0
ThorLab Deformable Mirror-Z33	0
ThorLab Deformable Mirror-Z4-2	0
ThorLab Deformable Mirror-Z40	0
ThorLab Deformable Mirror-Z42	0
ThorLab Deformable Mirror-Z44	0

Diagram illustrating the relationship between Zernike modes and mirror segments:

- 1. ThorLab Deformable Mirror-Amplitude
- 2. ThorLab Deformable Mirror-Angle
- 3. ThorLab Deformable Mirror-Load wavefront correction
- 4. ThorLab Deformable Mirror-Mirror Temperature
- 5. ThorLab Deformable Mirror-Relax the Mirror
- 6. ThorLab Deformable Mirror-Reset Segments
- 7. ThorLab Deformable Mirror-Reset Zernikes
- 8. ThorLab Deformable Mirror-Save current position [input filename]
- 9. ThorLab Deformable Mirror-Segment 27
- 10. ThorLab Deformable Mirror-Z3-1