Why Choose Meadowlark
Liquid Crystal Devices?

Industry-Leading Metrology – Meadowlark is the most experienced manufacturer of precision liquid crystal devices. Our proprietary measurement techniques provide you with extremely accurate calibration for every liquid crystal device we ship.

High Quality and Precision – When selecting a liquid crystal device, key performance features must be considered. These include wavelength dependence, temperature sensitivity, laser damage threshold, response time and aperture size. Our liquid crystal selection chart provides an at-a-glance review of our standard LC devices; as always, Meadowlark Solutions Engineers are happy to assist you in the process of selecting an LC component or controller that works for your application.

Custom Solutions – While we are delighted to provide you with one of our standard components or systems, we are also happy to customize a solution for you. Switching speeds, retardance values, wavelength ranges, coatings, sizes and shapes can all be modified to your specifications.

Did you know?

Meadowlark Optics was the first to develop a commercially available Liquid Crystal Variable Retarder? Our LCVRs are now the fundamental component used in the following devices and systems:

- Rotators
- Variable Beamsplitters
- Spatial Light Modulators
- Non-Mechanical Shutters
- Beam Steerers
- Optical Compensators
- Polarimeters
- Tunable Filters

About Meadowlark Optics

Innovating since 1979 – Meadowlark Optics has provided world-class polarization optics and liquid crystal solutions for a variety of applications for 40 years. To ensure precision and top quality, our 20,000 SF headquarters and manufacturing facility boasts the latest in clean rooms, optical fabrication, and metrology equipment. Need help selecting the right product for your application? Contact one of our Solutions Engineers to discuss your requirements.
**Silicon backplane, performance varies as a function of wavelength.**

### Controller Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Liquid Crystal (LC)</th>
<th>Analog LC Controller</th>
<th>Liquid Crystal Digital Interface</th>
<th>High Speed LCVR Digital Interface</th>
<th>Two-Channel High Voltage Interface</th>
<th>Ferroelectric LC Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand alone</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>LED display</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>1 channel temperature control</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Liquid Crystal Component Features

- **Wavelength (TWD)**: P-V (N/IT)
- **Laser Damage Threshold**: Low
- **Switching Speed (typical)**: N/A
- **Contrast Ratio**: ≤ 2 arc min
- **Beam Deviation**: N/A

### Variable Retarders

- **LC Variable Retarder**:
  - Custom retardances
  - Temperature control options
  - Available compensated
  - Precision non-mechanical retardation control
  - Wavelength: 400 – 1800 nm
  - TWD: ≤ λ/4 [≤ λ/16]
  - Low
  - Switching Speed: 4 – 8 ms
  - Contrast Ratio: N/A
  - Beam Deviation: ≤ 2 arc min

- **OEM LC Variable Retarder**:
  - Precision control at lower cost
  - Scalable quantities
  - Thin housing
  - Large clear aperture
  - Wavelength: 400 – 1800 nm
  - TWD: ≤ λ/2 [≤ λ/8]
  - High
  - Switching Speed: 4 – 8 ms
  - Contrast Ratio: N/A
  - Beam Deviation: ≤ 3 arc min

- **MWIR Variable Retarder**:
  - Non-mechanical polarization control
  - Polarization control in the MWIR
  - Useful for variable attenuation
  - Wavelength: 3600 – 5500 nm
  - TWD: N/A
  - High
  - Switching Speed: ~ 14 ms
  - Contrast Ratio: N/A
  - Beam Deviation: N/A

- **UV LC Variable Retarder**:
  - Phase of amplitude modulation of UV spectrum
  - Analog modulation
  - Non-mechanical polarization control
  - Wavelength: 350 – 450 nm
  - TWD: ≤ λ/4 [≤ λ/16]
  - Low
  - Switching Speed: ~ 4 ms
  - Contrast Ratio: ≤ 2 arc min

- **LC Polarization Rotator**:
  - High polarization purity
  - 180 degree polarization rotation
  - Continuous rotation of linearly polarized light
  - Wavelength: 400 – 1800 nm
  - TWD: ≤ λ/4 [≤ λ/16]
  - Low
  - Switching Speed: 4 – 8 ms
  - Contrast Ratio: 150:1 average
  - Beam Deviation: ≤ 2 arc min

- **Achromatic High Speed LC Rotator**:
  - Sub-millisecond switching speeds
  - Broadband performance
  - Silent, vibration-free
  - Binary switching
  - Wavelength: 405 – 850 nm
  - TWD: ≤ λ/2 [≤ λ/8]
  - Low
  - Switching Speed: < 100 µs
  - Contrast Ratio: N/A
  - Beam Deviation: ≤ 5 arc min

- **Binary LC Rotator (twisted nematic)**:
  - High polarization purity
  - Silent, vibration-free, low voltage operation
  - Broad thermal range
  - Faster switching speeds than LCVRs
  - Wavelength: 400 – 1800 nm
  - TWD: ≤ λ/4 [≤ λ/16]
  - High
  - Switching Speed: 2 – 4 ms
  - Contrast Ratio: 500:1
  - Beam Deviation: ≤ 2 arc min

- **High Speed LC Shutter (ferroelectric)**:
  - Sub-millisecond switching speeds
  - Stand alone controller available
  - Silent, vibration-free
  - OEM sizes and shapes
  - Wavelength: 400 – 750 nm
  - TWD: ≤ λ/2 [≤ λ/8]
  - Low
  - Switching Speed: < 100 µs
  - Contrast Ratio: N/A
  - Beam Deviation: ≤ 5 arc min

- **High Speed Liquid Crystal Variable Retarder**:
  - Sub-millisecond switching
  - Does not require 50/50 duty cycle drive scheme
  - Ships complete with controller & software
  - No mechanical motion
  - Wavelength: 400 – 700 nm
  - TWD: ≤ λ/4 [≤ λ/16]
  - Low
  - Switching Speed: 600 µs
  - Contrast Ratio: N/A
  - Beam Deviation: ≤ 2 arc min

- **High Contrast Optical Shutter (twisted nematic)**:
  - High contrast
  - No mechanical motion
  - No vibration
  - Wavelength: 400 – 1800 nm
  - TWD: ≤ λ/4 [≤ λ/16] (each component)
  - Low
  - Switching Speed: 2 – 4 ms
  - Contrast Ratio: 1,000:1
  - Beam Deviation: ≤ 2 arc min

- **LC Variable Attenuator (twisted nematic)**:
  - High contrast
  - Computer control capabilities
  - Continuous control of light intensity
  - Wavelength: 400 – 1800 nm
  - TWD: ≤ λ/4 [≤ λ/16] (each component)
  - Low
  - Switching Speed: 2 – 4 ms
  - Contrast Ratio: 500:1
  - Beam Deviation: ≤ 2 arc min

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Please contact your Meadowlark Optics Solutions Engineer – sales@meadowlark.com or +1.303.433.8333.