Custom Liquid-Crystal Devices

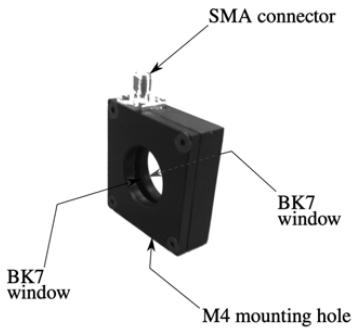
DESCRIPTION

HOASYS designs and manufactures liquid-crystal devices to specification, from a single cell to a complete component with its driver, for research laboratories and OEM integration.

A liquid-crystal cell is a thin liquid-crystal layer between two glass windows with transparent electrodes. The AC voltage applied on the electrodes reorients the molecules and changes the birefringence of the layer: phase, intensity, polarization or spectrum of the light are controlled electrically, with very low power consumption.

WHAT WE TAILOR

- Liquid crystal: nematic, cholesteric, dye-doped
- Alignment: planar, vertical, twisted, hybrid
- Layer thickness: 4 – 50 µm
- Clear aperture: up to 55 mm
- Electrodes and coatings: ITO and AR optimized for the VIS, the NIR or a single wavelength
- Transmission or reflection, fibre coupling on request
- Housing, mounting and driver



EXAMPLES OF DEVICES

- **Variable retarders and phase plates** (planar alignment): fine, continuous tuning of the phase shift
- **Shutters and intensity modulators** (twisted nematic): high contrast between crossed polarizers
- **Polarization rotators and controllers**
- **Tunable filters** (Lyot type): electrically tuned transmitted wavelength
- **Vortex beams and vortex arrays** (vertical alignment, negative dielectric anisotropy)
- **Large-aperture cells** for high-power lasers



LC cells with 55 mm, 20 mm and 35 × 35 mm apertures.

APPLICATIONS

- Laser systems: polarization control, shutters, beam shaping
- Microscopy and imaging systems
- Spectroscopy and multispectral imaging
- Nonlinear optics, vortex beams
- Research and teaching laboratories

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TYPICAL CHARACTERISTICS

Item	Custom LC devices
Operating mode	Transmission (reflection on request)
Modulation	Phase, intensity, polarization, spectral filtering
Liquid crystal	Nematic, cholesteric, dye-doped (other phases on request)
Alignment	Planar, vertical, twisted, hybrid
LC thickness	4 – 50 µm (standard: 4, 9, 14, 25, 50 µm, ± 0.05 µm)
Clear aperture	20 mm, 35 × 35 mm, 55 mm
Coatings	ITO and AR for VIS, NIR or a single wavelength
Optical transmission (1030 nm, AR)	> 93 %
Extinction ratio (twisted nematic)	> 300 : 1
Wavefront distortion	λ/4
LC refractive index (632 nm, example)	1.74 – 1.52 (20 °C)
Response time	A few ms (thin layers) to ≈ 20 ms (9 µm), 10 – 100 ms for thick layers (up to 50 µm)
Driving voltage	Sinusoidal AC, no DC component, typically 1 kHz
Power consumption (20 Vrms, 1 kHz)	< 200 mW
Damage threshold (1064 nm, CW)	> 50 W/cm^2
Housing	Aluminium, SMA connector, M4 mounting holes

HOUSING AND DIMENSIONS

Aperture	Weight	Dimensions
20 mm	52 g	40 × 40 × 14 mm
35 × 35 mm	141 g	65 × 65 × 15 mm
55 mm	307 g	95 × 95 × 16 mm

Other sizes and mountings on request.

DRIVER AND DEVELOPMENT KIT

The cells are driven by the **HOA-20K**, a compact, battery-powered sine-wave voltage driver (0 – 28 Vrms, 0 – 20 kHz) with control software and a Python client.

A **development kit** includes the LC device, the HOA-20K driver with its software and the SMA cable.

YOUR DEVICE

Tell us your wavelength, aperture, modulation (phase, intensity, polarization or spectrum), speed and environment: we propose the liquid crystal, the alignment, the thickness and the housing that fit your application. Contact: hoasys.fr.

Each device is designed for its application: the values above are typical values measured on HOASYS devices. Liquid-crystal devices must be driven with an AC voltage with no DC component; a DC voltage applied for a long time can damage the liquid crystal.