For current pricing, please see our website.

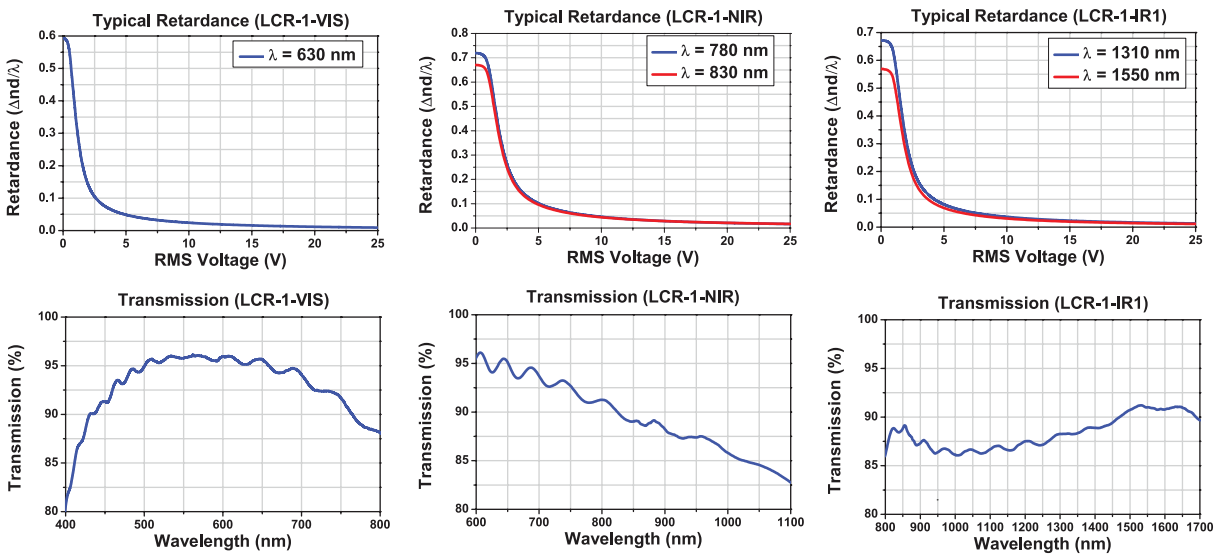
Liquid Crystal Retarder (Page 1 of 2)

Liquid crystal (LC) retarders allow the user to actively control the phase of the transmitted light. They are often used instead of conventional wave plates because they can be precisely tuned to retard the transmitted light by up to a half of a wavelength over a broad spectral range.

Each liquid crystal variable retarder is housed in a 1" outer diameter aluminum housing. The conductive layers of the LC cell are electrically contacted with the BNC-terminated wire extruding from the housing. Since the housing has a Ø1", it can be easily mounted in most Ø1" rotation mounts, including those found starting on page 289. Alignment of the axis of the variable liquid crystal retarder is most easily accomplished when it is held in a rotation mount.

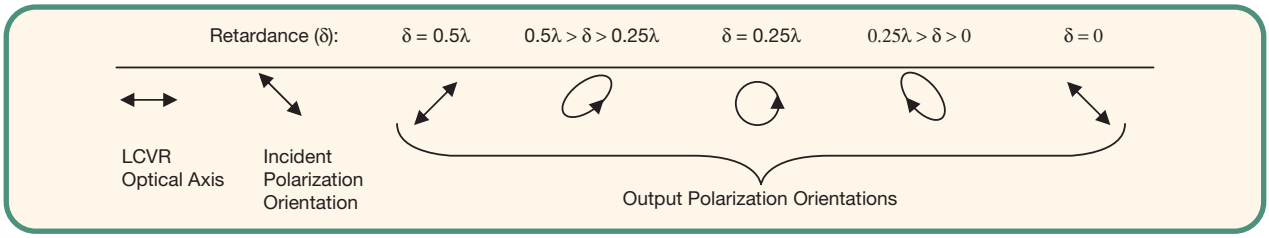
Specifications

- **Material:** Nematic Liquid Crystal
- **Retardance Range:** ~30 nm to >λ/2
- **Clear Aperture:** Ø10 mm
- **Outer Diameter of LCR Mount:** 1"
- **Surface Quality:** 40-20 Scratch-Dig
- AR Coating on Glass-to-Air Interfaces



Polarization Control with a Liquid Crystal Variable Retarder

The retarder can be effectively used as a variable zero-order wave plate over a broad spectrum of wavelengths. The optical axis of the retarder is defined as the major axis of the liquid crystal molecules when no voltage is being applied to the cell; without an applied voltage all of the molecules are aligned due to the LC alignment layer. When using the liquid crystal variable retarder to control the polarization of a beam, the linearly polarized input beam should be aligned so that its polarization axis is oriented at a 45° angle with respect to the optical axis of the LCVR in order to maximize the dynamic range of the optic. The schematic below shows how the output state of polarization will change as retardance is decreased (rms voltage increased).

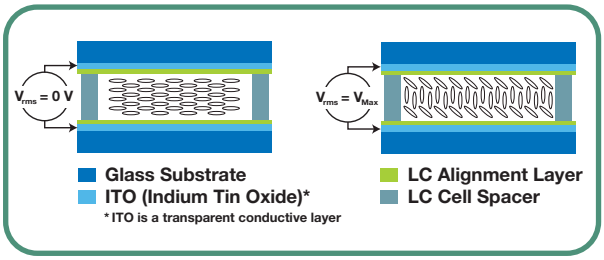


Pure Phase Retarder with Liquid Crystal Variable Retarder

In order to only affect the phase of the incident beam, the linearly polarized input beam must have its polarization axis aligned with the optical axis of the liquid crystal retarder. As V_{rms} is increased, the phase offset in the beam is decreased. Pure phase retarders are often used in interferometers to alter the optical path length of one arm of the interferometer with respect to the other. With a liquid crystal variable retarder, this can be done actively.

Liquid Crystal Retarder (Page 2 of 2)

A liquid crystal variable retarder (LCR) consists of a transparent cell filled with a solution of Liquid Crystal (LC) molecules. Two parallel faces of the cell wall are coated with a transparent conductive film so that a voltage can be applied across the cell. The orientation of the LC molecules is determined by the alignment layer in the absence of an applied voltage. By applying an AC voltage across the cell, the LC molecules can be rotated. Hence, the phase offset in a linearly polarized beam of light can be actively controlled by varying the applied voltage.



ITEM #	$	£	€	RMB	DESCRIPTION
LCR-1-VIS	$ 450.00	£ 324.00	€ 391,50	¥ 3,586.50	Liquid Crystal Variable Retarder, 450 – 650 nm
LCR-1-NIR	$ 450.00	£ 324.00	€ 391,50	¥ 3,586.50	Liquid Crystal Variable Retarder, 650 – 950 nm
LCR-1-IR1	$ 450.00	£ 324.00	€ 391,50	¥ 3,586.50	Liquid Crystal Variable Retarder, 950 – 1650 nm

Liquid Crystal Controller

The LCC25 liquid crystal variable retarder controller produces a 2000 Hz square wave output with an amplitude that can be varied from 0 to 25 V_{rms}. The output amplitude can be set via the front panel controls, the USB interface, and the external input. Both the front panel and USB interface allow the user to select two voltage levels, Voltage 1 and Voltage 2. When the LCC25 is operated in the constant voltage mode, the output of the controller will be a 2000 Hz square wave with an amplitude equal to either of the two set voltage levels (Figure A). If the LCC25 controller is operating in the modulation mode, the output 2000 Hz square wave will be modulated in amplitude between the two voltage settings with a modulation frequency that can be set by the user to be between 0.5 and 150 Hz (Figure B).

External or remote control of the LCC25 is possible using the external input or the USB interface. The external input accepts a 0 to 5 VDC signal that directly determines the 0 to 25 V_{rms} output of the LC225. The USB interface can be used to send line commands to the controller so that the LC225 can be used in automated lab sequences.

In order to prevent the separation and buildup of charges in the liquid crystal layer, the LCC25 will automatically detect and correct any DC offset in real time to within ±10 mV.

LCC25

Specifications

- **Max Output Current:** 15 mA
- **Max External Input Voltage:** 5 VDC
- **Operating Temperature Range:** 10 to 40 °C
- **External Input Voltage:** 0 to 5 VDC Square Wave
- **Adjustable Output Voltage:** ± 25 VAC
- **Voltage Resolution:** 1.0 mV
- **Adjustable Internal Modulation Frequency** 0.5 to 150 Hz @ 50% Duty Cycle
- **Switching Frequency** 2,000 ± 5 Hz, 50% Duty Cycle
- **Slew Rate:** 10 V/ms
- **DC Offset:** ±10 mV
- **AC Power:** 85 - 264 VAC, 47 - 63 Hz, 25 VAC
- **External Input Connector:** BNC
- **Output Connector:** BNC
- **USB Interface:** USB Standard B Plug
- **Dimensions:** 9" x 5" x 12.5" (228.6 mm x 127 mm x 317.5 mm)
- **Weight:** 3.6 lbs (1.6 kg)

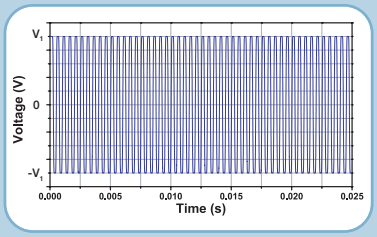


Figure A
A plot of the output voltage of the LCC25 Liquid Crystal Controller when it is being operated in the constant voltage mode.

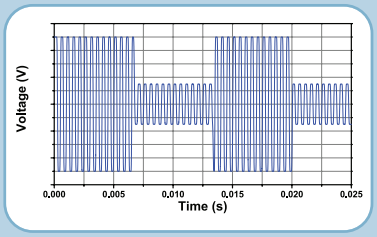


Figure B
A plot of the output voltage of the LCC25 Liquid Crystal Controller when the output voltage is being modulated between the two set voltages.The modulated mode can be used to measure the response time of the LC retarder.

ITEM #	$	£	€	RMB	DESCRIPTION
LCC25	$ 980.00	£ 705.60	€ 852,60	¥ 7,810.60	Liquid Crystal Controller, ±25 VAC