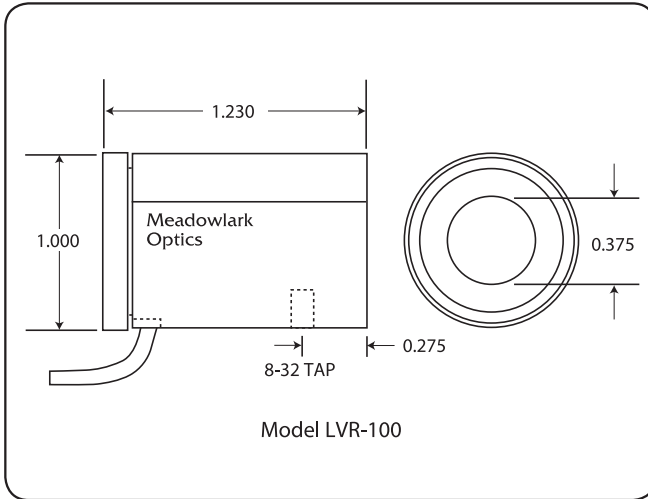


# Liquid Crystal Variable Retarders

Liquid crystal devices should be electrically driven with an AC waveform with no DC component to prevent ionic buildup which can damage the liquid crystal layer. We require a 2 kHz square wave of adjustable amplitude for controlling our Liquid Crystal Variable Retarders (LCVR). Our Basic Controller and Four Channel Interface described on pages 59-61 ensure these drive requirements are met. A temperature sensing and control option can be added to our LCVRs for accurate controlling of the operating temperature. The sensor is attached directly to the LCVR substrate, outside its clear aperture. Without this option, retardance decreases by approximately 0.2% to 0.3% per °C increase in temperature.

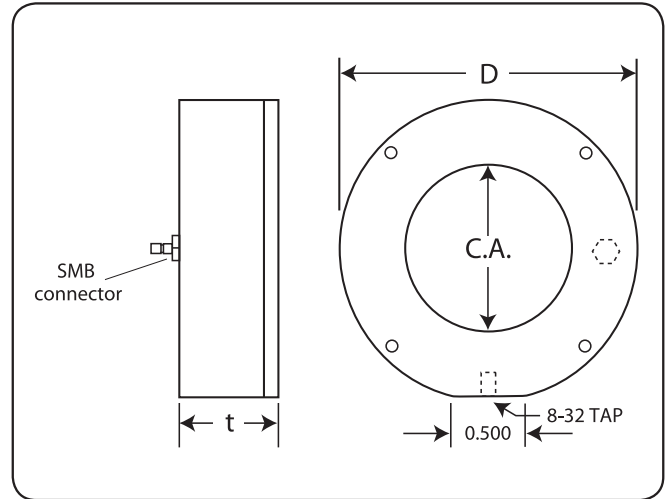


**Fig. 4-9** Model LVR-100 dimensions  
All dimensions in inches

SPECIFICATIONS	
Retarder Material	Nematic liquid crystal
Substrate Material	Optical quality synthetic fused silica
Wavelength Range	450-1800 nm (specify)
Retardance Range	
Without compensator	~30 nm to $\lambda/2$
With compensator	0 to $\lambda/2$ custom ranges are available
Transmitted Wavefront Distortion (at 632.8 nm)	$\leq \lambda/4$
Surface Quality	40-20 scratch and dig
Beam Deviation	$\leq 2$ arc min
Reflectance (per surface)	$\leq 0.5\%$ at normal incidence
Diameter Tolerance	$\pm 0.005$ in.
Temperature Range	0° C to 50°C
Recommended Safe Operating Limit	500 W/cm <sup>2</sup> , CW 300 mJ/cm <sup>2</sup> , 10 ns, visible

## Key Benefits

- Computer control capability
- Temperature control options
- Usable from 450 to 1800 nm
- Precision non-mechanical retardation control



**Fig. 4-10** Models LVR-200 and LVR-300 dimensions  
All dimensions in inches

ORDERING INFORMATION			
Diameter, D (in.)	Clear Aperture, CA (in.)	Thickness t (in.)	Part Number
<i>Without Attached Compensator (30 nm to <math>\lambda/2</math>)</i>			
1.00	0.37	1.23	LVR - 100
2.00	0.70	0.75	LVR - 200
3.00	1.60	1.00	LVR - 300
<i>With Attached Compensator (0 nm to <math>\lambda/2</math>)</i>			
1.00	0.37	1.23	LRC - 100
2.00	0.70	0.75	LRC - 200
3.00	1.60	1.00	LRC - 300
We offer standard liquid crystal variable retarders to cover four spectral regions:			
VIS: 450 - 700 nm		IR 1: 650 - 950 nm	
IR 2: 900 - 1250 nm		IR 3: 1200 - 1700 nm	
<i>Please specify spectral region when placing your order. For temperature control option, append-TSC to part number .</i>			