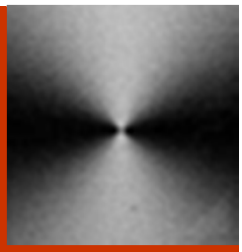
Arcoptix Variable Spiral plate.
Spiral and Vortex Beam
Radial & Azimuthal Polarization

ARCoptix Switzerland

DATA SHEET

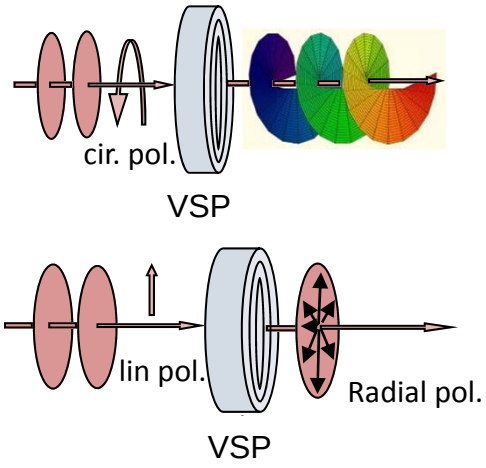
Radial polarization and spiral phase vortex beams based on liquid crystal technology.

The ARCoptix variable Spiral plate (also called Q-plate) is a worldwide unique Liquid crystal device that can act as a radial polarizer or as a spiral phase plate (SPP) for any wavelength in the VIS-NIR spectral range. The Spiral plate offers many is perfectly transparent without diffusion or phase steps.



How does it works?

The Arcoptix Variable Spiral Plate (VSP) is a liquid crystal cell with a spatially varying optical axis (with circular symmetry). Depending of the application, it is possible to enter into the device with a circular polarized plane wave and at the output the beam will have a spiral phase (with orbital momentum). Another possibility is to enter with a linear polarization (0 or 90°) and obtain a radial or azimuthal polarization pattern at the output.



By introducing an additional variable phase retarder in front of the VSP all kinds of polarization distributions and phase plates can be generated. When adjusted at quarter wavelength it transforms the linear polarization in circular one and the VSP plate will transform this planar beam into a spiral phase beam.

What makes the ARCoptix variable spiral plate so exclusive?

The Arcoptix VSP is a versatile device offering many possibilities to play with vortex beams and different polarization pattern. It offers new possibilities for any optical research laboratory.

- ✓**Continuous radial or azimuthal polarization distribution (no segmentation)**
- ✓**Spiral phase beam**
- ✓**Usable over a wide spectral range (400nm-1700nm).**
- ✓**Uniform amplitude output.**
- ✓**Possibility to switch between radial and azimuthal polarization electrically.**
- ✓**Maximum 15% absorption losses in the VIS**
- ✓**No phase step, No diffusion**

FEATURES & BENEFITS

▪ Worldwide unique

Thanks to our in house polymer alignment technology combined with liquid crystal technology we are worldwide the only company offering this kind of device.

▪ Large spectral range

The device can be used for any wavelength in the VIS-NIR spectral range. The phase retardance of the VSP can be adapted to any wavelength in the VIS-NIR by simply adjusting the bias applied to the cell (0-5V) .

▪ Easy to use

The VSP can simply introduced anywhere in the optical path of the light beam. Only the bias of the Spiral plate needs to be adjusted to fit to the used wavelength and the it needs to be centered

▪ Spiral wave plate

When entering the VSP with a circular polarization, the phase of the beam is transformed into a spiral phase (or vortex beam) carrying orbital momentum.

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Applications

- Donut focal point
- Orbital momentum
- Spiral phase plate
- Radial & azimuthal polarization
- Laser cutting
- Optical trapping

The variable Spiral Plate specification overview:

Features	Specs
Spectral range	450 nm – 1700 nm
phase retardance	30-1500nm Electrically adjustable
Clear aperture	12 mm
Transmission	>70 % (VIS range)
Substrate material	Glass
Operating Temperature	10°-50°C
Driving voltage (optional)	0-5 V (min 50Hz) square
Amplitude uniformity	> 1% (hole in the center inherent to the physics)
Retarder Material	Nematic Liquid crystal
Linear polarization output for radial polarization output configuration	~ 1:100 ellipticity @ 630nm
Housing Size	6cm x 4 cm x 1.5 cm
Save operating limit	200 W/cm2 CW 100 mJ/cm2 10 ns, visible 100 mJ/cm2 10 ns, 1064 nm

Specifications are subject to change without notice

▪ Radial-Azimuthal polarization pattern

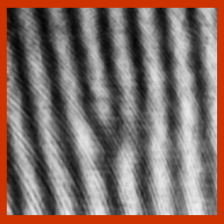
When entering the VSP with a horizontal or vertical polarization the polarization is modified into a radial or azimuthal pattern with homogenous amplitude (with a hole in the center) and a planar phase

▪ Versatile device for research

Many different phase and polarization patterns can be obtained with the VSP by adjusting the applied bias or by changing the input polarization. An interesting device for original research subjects

▪ Donut beam

Laguerre Gaussian beams (LG01 beams) have always an amplitude hole in the center of the beam. Donut focus point and sub diffraction size focal points can be generated with such beams



Fork interferogram obtain by placing the VSP in a Mac-Zehnder interferometer

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