



# NRT-2500

Polarization Control Platform



**The Luna NRT-2500 is a versatile Polarization Control Platform, offering seven built-in polarization control functions for optical transponder, device and sub-system development and manufacturing.**

The 2500 combines an integrated-optic Lithium Niobate (LiNbO<sup>3</sup>) waveguide polarization-controller device for super-fast polarization response driven by a customizable digital signal processing for functional flexibility. Together they enable Luna to provide a seven different polarization functions: Acquirer, Depolarizer, Paddles, Randomizer, Scrambler, Spinner, and Tracker in a single bench-top instrument.

A Versatile Polarization Platform for Multiple Lab Purposes.

## Key Features

**Acquirer** adjusts polarization to maximize or minimize feedback for silicon photonics chip testing.

**Depolarizer** offers a faster Scrambler to average over PDL and PDG at detector

**Paddles** offers electronic fiber polarization paddles to manually set polarization

**Randomizer** creates ultrafast SOP impulse events to imitate lightning induced dSOP/dt events for coherent receiver testing. Also used in fiber loop testing.

**Scrambler** provides stochastic, Rayleigh distributed, general purpose SOP scrambling up to 10,000rad/sec (mean)

**Spinner** generates precise SOP speed, up to 940,000 rad/sec, for quantifying polarization demultiplexing capability of coherent receivers

**Tracker** offers a fast, robust and endless tracker/ stabilizer to capture and hold moving polarization for test and system prototyping

## Applications

**General** lab use

**Coherent** receiver and DSP testing

**PLD** and **Si-Photonic** device testing

**Testing** lightning effects on coherent communication systems

**Directed** energy, Coherent Beam

Combination, LIDAR system prototyping

## Properties

Key Specification	NRT 2500
Insertion Loss	< 3 dB
PDL	< 0.3 dB
Optical Return Loss	> 50 dB
Optical Power Handling	< 20 dB
Operating Wavelength	1.55 microns (C- and L- Brands), 1.31 and 1.064 micron windows
Optical Connectors	FC/UCP, FC/ACP, SC
Scrambler Mode SOP Speed	up to 3,400 rad/sec for $r_{mode} b^{0.5}$ of a Rayleigh distribution <sub>2</sub>
Spinner Mode Rate	940,000 rad/sec on great circle orientation for 75 kHz drive
Randomizer Mode SOP Speed	up to 2,250,000 rad/sec <sup>3</sup>
Depolarizer Mode SOP Speed	over 3,000,000 rad/sec <sup>4</sup>
Tracker Mode Update Time	~20 microseconds <sup>5</sup>
Power Supply	12 VDC from 100-240 VAC, 50 – 60 Hz, AC-DC converter
Communication Interfaces	RS-232 <sup>6</sup>
Dimensions	H=4.04" (102.6 mm), W=10.12" (257 mm), D=12.32" (313mm)



NRT's polarization control platform combines an integrated-optic Lithium Niobate waveguide polarization-controller device for super-fast polarization response driven by a customizable control platform for functional flexibility. Together they enable the NRT-2500 to provide a wide range of polarization operations in one product.

## Notes

1. Subject to change at any time by Luna Innovations, LLC.
2. For a Rayleigh distribution:  $r_{mode}$  is the statistical mode of the distribution,  $r$  is the mean SOP change, and 99.9% of all SOP changes occur before  $r_{max} = 3 r \sim 3.76 r_{mode}$
3. Calculated assuming radians on Poincaré sphere.
4. Non-stochastic  $dSOP/dt$  distribution from 0 to >3 Mrad/sec completely covering Poincaré sphere.
5. This speed is the closed loop feedback/update algorithm loop time based on reading A/DCs and DSP speed and updating polarization controller voltages. The feedback signal detector response time and customization of the algorithm may slow system response.
6. RS-232-to-USB dongle provided with each NRT-2500.

