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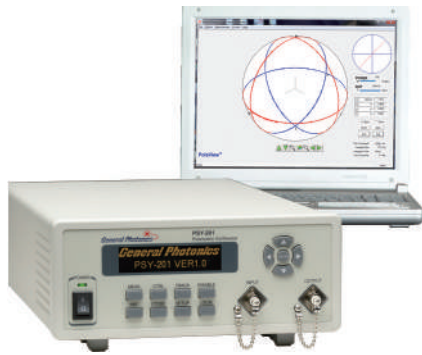Emulation Instruments for System and Network Characterization

# Polarization Synthesizer/Analyzer – PolaFlex™

The PSY-201 is a deterministic polarization controller that can generate and maintain any state of polarization (SOP), regardless of the input SOP. It combines General Photonics' patented polarization controller, in-line polarimeter, and control algorithm into an instrument that functions as both a polarization state generator and a polarization analyzer. The generated SOP and the corresponding Poincaré Sphere representation can be displayed on a computer screen via USB interface. The output SOP can be specified by inputting Stokes parameters using the front panel keypad or by manually tuning the SOP to reach a specific point on the Poincaré sphere or to reach an optimum value of a polarization-dependent metric. Once a desired output SOP is found, the instrument can automatically maintain this SOP against input SOP fluctuations. Another attractive feature is that the user can generate any of 6 distinct SOPs (0°, 90°, ± 45°, RHC and LHC) for Mueller matrix calculations, or select any of the 6 states at the touch of a button. Furthermore, the instrument can generate several preprogrammed SOP traces that emulate certain common polarization variations. The instrument can also function as a polarization scrambler, generating SOP scans with user-defined pattern and speed. Finally, with the internal polarization controller disabled, PolaFlex™ can function as an in-line polarimeter, displaying the instantaneous SOP and DOP of the input light beam. The PSY-201 replaces the popular PSY-101, with improved accuracy, speed, and functionalities. New features include long-term SOP monitoring, SOP markers for angle measurement, and a "SOP replay" function in sphere display mode, as well as extended triggering capability in oscilloscope mode. It puts all of the tools necessary for polarization management at your fingertips.

## Specifications:

| | |
|---|---|
| Operating Wavelength Range | 1480 to 1620 nm or 1280 to 1340 nm |
| Sampling Rate (max.) | 4.0M SOP samples/s |
| Analog Bandwidth[1] | 1MHz |
| SOP Settling Time | 1ms at stable input SOP |
| SOP Stability (Input Power > -25 dBm, DOP > 95%) | 0.1° with stable input SOP<br>0.5° with input SOP variation < 2 π/s<br>2° with input SOP variation < 10 π/s |
| SOP Measurement/Generation Uncertainty | ±0.25° after user calibration, with input > -25 dBm |
| DOP Uncertainty | ±2% using built-in calibration, with input > -25 dBm<br>±0.5% after user calibration, with input > -25 dBm |
| Input Stokes Parameter Resolution | 0.001 |
| Optical Power Uncertainty | ±0.25 dB |
| Insertion Loss | 1.6 dB max. at center wavelength |
| Return Loss | 55 dB (APC connector),<br>45 dB (PC connector) |
| PDL | < 0.25 dB |
| PMD | < 0.1 ps |
| Operating Power Range | -35 dBm to +10 dBm |
| Optical Power Damage Threshold | 300 mW |
| Operating Temperature | 0 °C to 40 °C |
| Storage Temperature | -20 °C to 60 °C |
| Front Panel Display | Graphic OLED |
| Communication Interfaces | High Speed USB 2.0 (30 MB/s data rate) for PolaView software RS-232, Ethernet, GPIB |
| Analog Output | 0 to 5 V max range, user configurable<br>Monitor voltage for DOP, S1, S2, S3, power or dREF |
| Power Supply | 100 – 240 VAC, 50 – 60 Hz |
| Software | PolaView™ (included) |
| Dimensions | 2U, 19" half rack width 14" (L) x 8.5" (W) x 3.5" (H) |

## Features:

· 4 MHz SOP sampling rate
· 1 MHz analog bandwidth
· 45 dB input power dynamic range
· Real-time Poincaré Sphere display
· High-speed SOP generation and tracking
· High speed analog output of SOP & DOP

## Applications:

· Receiver polarization sensitivity analysis
· System SOP/DOP monitoring
· PER measurement
· Polarization generation and stabilization
· Sensor system characterization
· 100G system polarization characterization

Note: Loss specifications are referenced without connectors. Unless otherwise noted, specifications listed in table apply for standard 1480-1620nm or 1280-1340nm operation at 23±5°C, at power levels >-25 dBm.
1. For input power > -10 dBm. At lower power levels, bandwidth may change due to automatic gain control.

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## Application Example:

Coherent Receiver Polarization Sensitivity Test
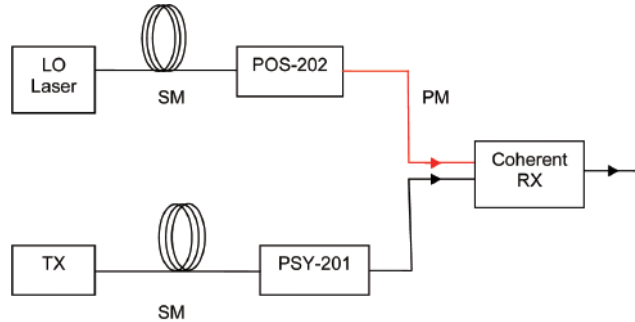
1. Use polarization stabilizer (POS-202) to lock the polarization of one receiver input (local oscillator input).
2. Use polarization synthesizer (PSY-201) to control the polarization of the other receiver input to find the SOP that maximizes the receiver power reading.
3. Lock the PSY-201 output at that SOP to eliminate polarization fluctuations in the SM fiber. Test receiver performance.
4. Use PSY-201 to find or switch to the orthogonal SOP (minimize receiver power reading).
5. Lock PSY-201 output at that SOP to eliminate polarization fluctuations. Test receiver performance.

Sample setup for a coherent receiver performance test using a polarization stabilizer (POS-202) and a polarization synthesizer (PSY-201).
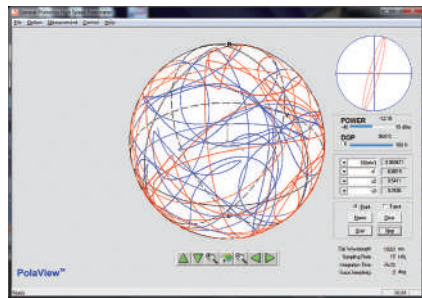
## Typical Performance Data:

Polarization stabilization

Special polarization state/trace generation

Scrambling

Figure 1. Input polarization pattern: triangle wave scramble at 1 Hz, taken over 20 sec

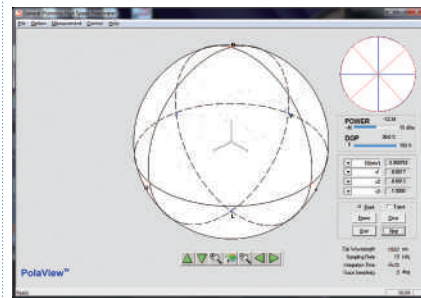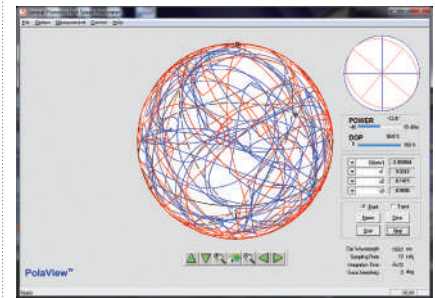Figure 3. Poincaré sphere pole state generation

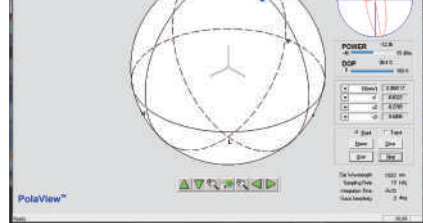Figure 5. Triangle scrambling trace, 1 Hz after 1 minute

Figure 2. Output polarization stabilized by PSY-201 against the same polarization-scrambled input, taken over 20 sec
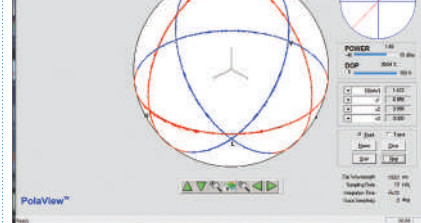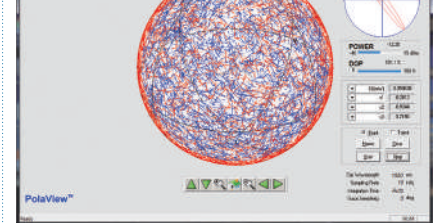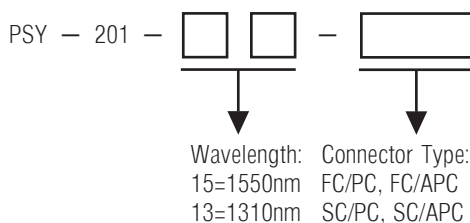
Figure 4. Trace Scans

Figure 6. Discrete scrambling, 100 Hz after 1 minute

## Ordering Information:

PSY — 201 — ☐ ☐ — ☐

Wavelength:
15=1550nm
13=1310nm

Connector Type:
FC/PC, FC/APC
SC/PC, SC/APC

## Accessories:

NoTail™ Polarizer          p. 90
NoTail™ Isolator           p. 91
Rack Mount Kit             p. 83