

FEATURES & BENEFITS

- All digital processing
- High resolution / precision [6 μ rad]
- 32 bit digital output covering ± 2000 fringes
- Adjustable modulation frequency
- Selectable high pass filter for digital and analog outputs
- Selectable data averaging
- Enable/disable servos
- Single or Multi-channel configurations
- Built-in optical receiver
- Polarization Diversity Receiver option
- USB 2.0 interface
- Quick set-up and on-the-fly parameter changes
- PhaseView™ software for system set-up, control, monitoring and data capture.

The **OPTIPHASE® OPD-4000** is the world's leading instrument for high-precision interferometric measurement applications. Developed by experts in the use of fiber based interferometry, the OPD-4000 delivers previously unattained levels of cost-effective performance and ease-of-use for a wide variety of applications.

The OPD-4000 is a simple yet powerful instrument for measuring interferometric phase. The unique and patented digital process provides for simultaneous low noise and high dynamic range operation. For anyone designing, developing or using a fiber-based interferometer, there is no better way to get faster, easier and more cost effective measurement results.

The OPD-4000 is a DSP based large-angle optical phase demodulator. It performs demodulation of interferometers that can accommodate Phase Generated Carrier [PGC] modulation [see chart below]. Through precise monitoring of the received optical signal, the OPD-4000 automatically determines the proper parameters for gain-optimizing the receiver signal, stabilizing modulation depth at π radians and sampling phase for accurate quadrature

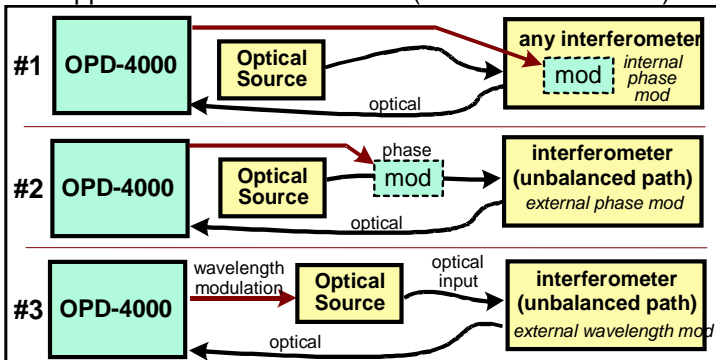
signal extraction. Optical phase is determined through inverse trigonometric functions and dynamic range is enhanced via fringe counting. The measured optical phase is a 32 bit word updated once per modulation cycle. Output formats are digital [USB 2.0] and 20 bit analog. A Polarization Diversity Receiver is available for those needing to address polarization fading. The OPD-4000 ships with PhaseView™ software, a powerful MS Windows based user interface for easy set-up and data transfer.

Whether you are conducting research and development, designing photonic components or sensor systems, the OPD-4000 will serve as an indispensable tool in all your applications. Outside the R&D arena the OPD-4000 is a powerful productivity tool reducing labor and material costs in quality assurance testing, industrial process controls or service and repair operations.

The OPD-4000 has no commercial equivalent as a general-purpose interferometric phase measurement instrument. With the user-friendly PhaseView™ software and indicators for input signals and modulation levels, the user is free to perform the task of taking critical measurements.

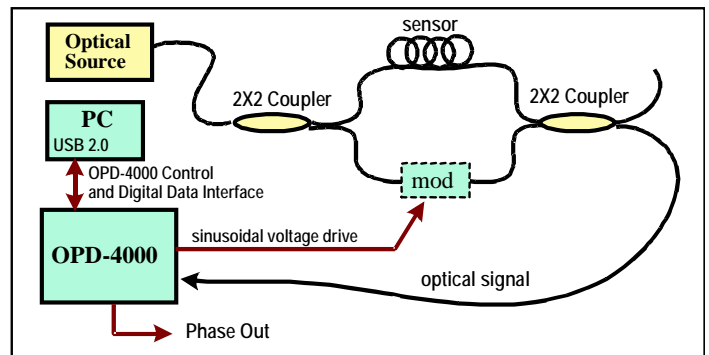
COMPATIBLE WITH WIDE RANGE OF INTERFEROMETRIC CONFIGURATIONS

Applicable Modulation Modes (internal and external)



#1 uses an internal phase modulator (in one leg of any two beam interferometer or entry end of a Sagnac); #2 uses a phase modulator in-line to a mismatch path interferometer; #3 uses source wavelength modulation into mismatch path interferometer.

Example: Fiber Mach-Zehnder



Example of OPD-4000 configured with a Mach-Zehnder interferometer with an internal phase modulator.

FOR USE WITH

Bulk Interferometers	Fiber Interferometers
• General phase measurement	• Mach-Zehnder
• Polarimeters	• Michelson
• Projection or shearing interferometers	• Sagnac
	• Others

APPLICATIONS

Large Structure	Environment	Industrial	Fiber Optic Instrumentation
• Structural Monitoring	• Oil & Gas Exploration	• Photonic Source Characterization	• Pressure
• Strain	• Wind Shear Detection	• HDD Metrology	• Temperature
• Accoustic	• Seismic	• Flow	• Acceleration
	• Thermal Dynamics	• Vibrometry	• Vibration
		• Profilometry	• Displacement
		• Velocimetry	• Acoustic

SPECIFICATIONS

MODULATOR DRIVE INTERFACE

Modulation Frequency	1 KHz to 79 KHz
Frequency Tuning	1 Hz resolution
Maximum Amplitude	13.8 V p-p 500 Ω load
Output Adjustment Range	1% to 100%
Connector	Front panel BNC

OPTICAL INTERFACE

Wavelength	900 to 1700 nm
Programmable Gain Adjust [for proper ADC fill]	34 db
Max / Min Optical Power	50 μW / 500 nW default
Receiver	InGaAs PIN / TIA @ 100 KV/W
Optical Connector	FC/APC

OUTPUT

Analog Output	20 bit DAC
Full Scale Amplitude	[4π] V p-p behind 50 Ω [12.56 V p-p]
Resolution	20 bit
Scaling Range	0.05 - 32768 radians / volt, user selectable
High Pass Filter	0.1Hz – 3KHz
Digital Output	32 bits
Output rate	Synchronous with modulation frequency
Data Averaging	1 to 65535
Distortion	< 0.2% typical
High Pass Filter	0.24 – 15923 Hz @ 50 KHz

DEMODULATION CHARACTERISTICS

Resolution	6 μ radians
Range	25,000 radians, ±12.861 radians
Maximum Signal Frequency	½ modulation frequency [Nyquist]
Self Noise	3 μrad/rt-Hz
Maximum Slew Rate	π times modulation frequency [Nyquist]
Internal Calculation	64 bits

GENERAL

Power	Universal 85-265 VAC, 47-440 Hz
Dimensions & Weight	
½ rack base system	6¾" H x 13" W x 20" D; 20 lbs.

PC HOST REQUIREMENTS

CPU	≥ 300 MHz Pentium class
Interface	USB 2.0
Memory [RAM]	128MB minimum; 256MB recommended
Operating System	Windows 2000/NT/XP

BASE SYSTEM CONFIGURATION

Single-channel Instrument	½ rack; 1 receiver channel; 1USB I/O
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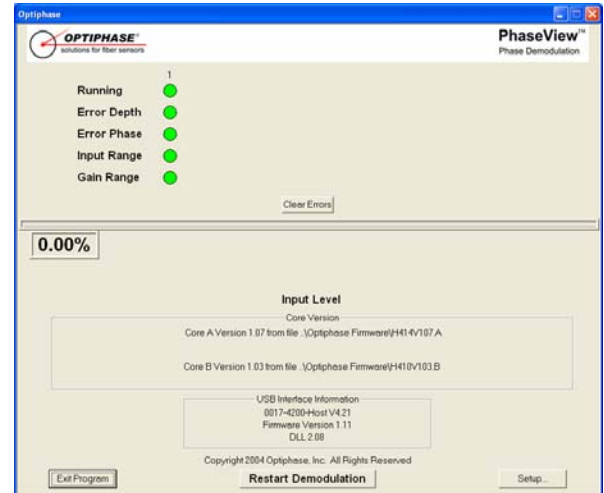
OPTIONS

Chassis	1-8 receiver channels in ½ rack 1-16 receiver channels in full rack
Receiver Channels	1 card per receiver channel
Polarization Diversity Receiver	For interferometers with polarization fading [1.5 or 1.3 μm per receiver channel]
Shorter Wavelength	Silicon detector
Receiver Trans-impedance	User specified, from 10 to 100 KV/W

This instrument requires a PC to operate.

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PhaseView™ Main Screen

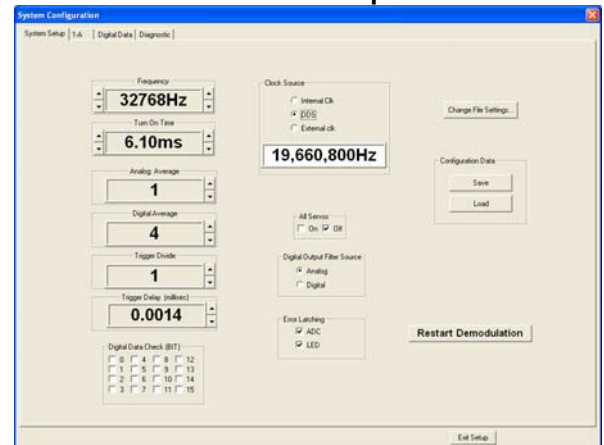


Single-channel, ½ rack OPD-4000



The OPD-4000 is easy to set-up and use with a Windows host PC. The standard USB interface and the PhaseView™ application enable you to set-up, control and monitor digital output quickly and precisely.

PhaseView™ Set-up Screen



- Real-time interactive control of OPD-4000
- Real-time display of demodulation status
- Automatic card detection on start-up
- Filter and averaging functions
- Data destination selection
- Built-in diagnostics