

## Key Features & Benefits

### Electronics

- Optical (through FC/APC or FC/UPC connector) or electrical analog input (through BNC connector)
- 8 (SPGD<sup>+</sup> CU-8), 16 (SPGD<sup>+</sup> CU-16), 24 (SPGD<sup>+</sup> CU-24), or 32 (SPGD<sup>+</sup> CU-32) analog outputs with amplitude range  $\pm 2$  V
- Full remote control through 10/100Base-TX Ethernet Interface
- Advanced stochastic parallel gradient descent (SPGD<sup>+</sup>) control algorithm embedded on ARM926EJ-S® 32-bit processor with controllable iteration rate from 10 to 250,000 SPGD<sup>+</sup> iterations per second
- Hardware & software flexibility for various applications
- Open architecture allowing for firmware upgrade

### Software

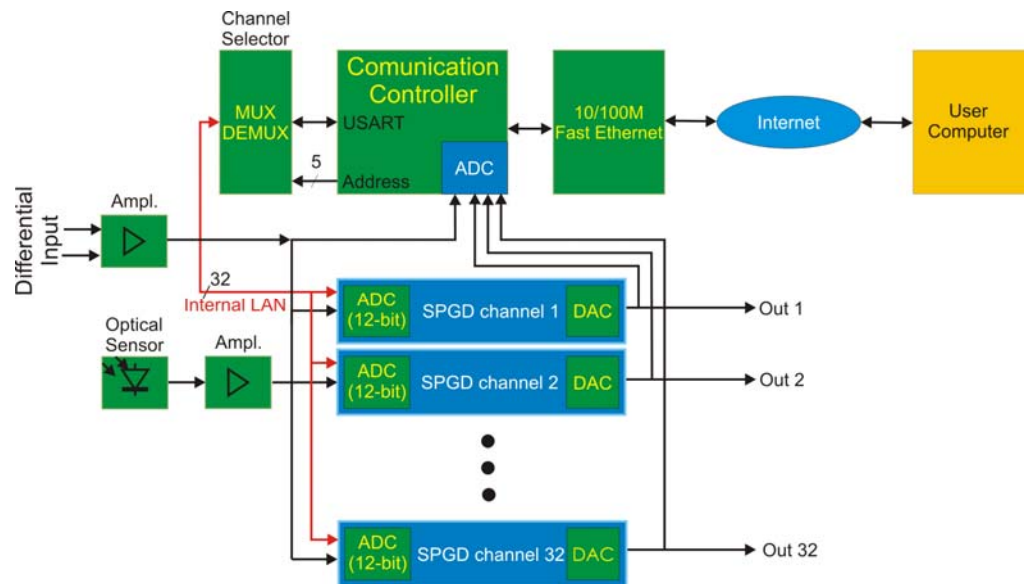
- Graphical interface for end-user operation
- Input signal time-history display
- Manual setting of the output voltages
- Options for a setting or an update of SPGD<sup>+</sup> control parameters
- Setting the limits of individual control voltages
- Manual setting of the SPGD<sup>+</sup> update rate
- Computer requirements: PC (Windows XP or later, Linux) or Mac
- Network requirements: TCP/IP connection between a computer and the INFOCO SPGD<sup>+</sup> CU

## INFOCO SPGD<sup>+</sup> CU

### SPGD<sup>+</sup> Multi-Channel Blind Optimization Control Unit

An 8-, 16-, 24-, or 32-channel controller implementing the Optonicus' proprietary latest advanced stochastic parallel gradient descent (SPGD<sup>+</sup>) control algorithm in hardware for various optimization tasks; includes user-friendly and platform-independent software that easily interfaces various systems with your PC.

The INFOCO SPGD<sup>+</sup> multi-channel control unit (CU) can be used for different applications including phase locking of fiber-array systems, compensation of optical phase distortions such as atmospheric-turbulence-induced wavefront aberrations in laser beam projection (directed energy) and free-space optical communication systems, mitigation of mechanical and/or acoustical jitter and adaptive optics applications to drive deformable mirrors.



SPGD<sup>+</sup> 32-channel controller (SPGD<sup>+</sup> CU-32) schematic diagram

The INFOCO SPGD<sup>+</sup> CU is based on the latest microprocessor technology. The controller receives either an optical or an electrical analog input signal that is sent into the 12-bit analog-to-digital converters (ADC) of microcontroller channels running the Optonicus' SPGD<sup>+</sup> control algorithm. The INFOCO SPGD<sup>+</sup> CU channels compute digital outputs that are sent to the corresponding 12-bit digital-to-analog converters (DAC) supplying analog output signals. In addition, a communication controller provides the interface through a local area network (LAN) between the end-user computer and the INFOCO SPGD<sup>+</sup> CU, sending and receiving commands and system data.

# INFOCO SPGD<sup>+</sup> CU GUI

## Controller Configuration Window

INFOCO Controller
X

**Static Voltage Outputs**

Upper Rail Voltage(URV)

Lower Rail Voltage(LRV)

**Initial Parameters**

**Parameters Update**

**Adaptive Control Parameters**

Use Adaptive Gamma       Use Adaptive Pert

	Gain Max	Gain Exp	Pert Max	Pert Exp
Bernoulli	<input type="text" value="5"/>	<input type="text" value="2"/>	<input type="text" value="20"/>	<input type="text" value="1"/>
Modal	<input type="text" value="5"/>	<input type="text" value="1"/>	<input type="text" value="5"/>	<input type="text" value="1"/>

Channel 1-8

Ch. #	Limit Plus	Reset Plus	Limit Minus	Reset
1	15.0	11.0	-15.0	-11.0
2	15.0	11.2	-15.0	-11.2
3	15.0	11.2	-15.0	-11.2
4	15.0	11.2	-15.0	-11.2
5	15.0	11.2	-15.0	-11.2
6	15.0	11.2	-15.0	-11.2
7	15.0	11.2	-15.0	-11.2
8	15.0	11.2	-15.0	-11.2

**Controller Address**

**Misc Optimization Parameters**

Measurement Delay (us)   
 Pert Delay (Iterations)   
 Pert Delay (us)   
 SPGD Update Period (us)   
 Modal Threshold (V)

Override Default Best Metric  
 New Best Metric (V)

**Optimization Mode**

Max\_A       Max\_B  
 Optimization OFF