

## Key Features & Benefits

### Electronics

- Input voltage range: 0–3 V
- Electrical input: BNC
- 8, 16, or 32 analog outputs
- Output amplitude range  $\pm 2$  V
- Load for each output  $> 2$  k $\Omega$ m
- Advanced stochastic parallel gradient descent (SPGD<sup>+</sup>) control algorithm with maximum SPGD<sup>+</sup> cycle frequency of 20 kHz
- Part of the Optonicus WACO Design Kit
- Full LAN remote control through 10/100Base-TX Ethernet Interface
- Power: AC 100–240 V,  $< 15$  W, 50/60 Hz

### Software

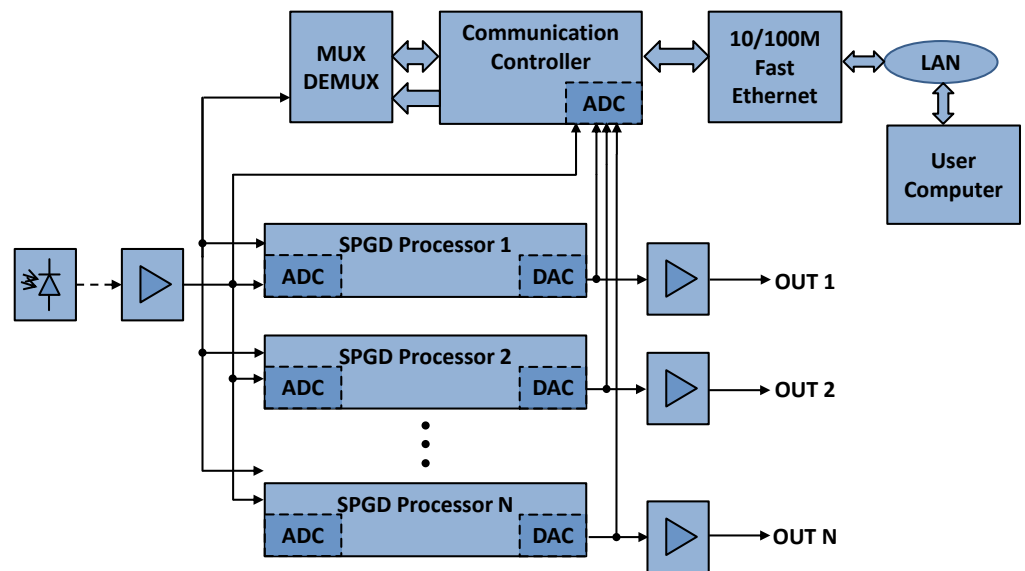
- Graphical user interface
- Input signal time-history display
- Manual setting of output voltages
- Automatic feedback control of deformable mirror optimizing the input signal (maximizing or minimizing)
- Windows XP or later, Linux or Mac
- TCP/IP connection between a computer and the INFOCO SPGD<sup>+</sup> CU required

## WACO CU

### SPGD<sup>+</sup> Multi-Channel Deformable Mirror Controller

An 8, 16, or 32 channel blind optimization controller for the Optonicus WACO DM multi-actuator deformable mirror complete with user-friendly and platform-independent software.

The WACO CU is the control unit for the Optonicus WACO DM multi-actuator deformable mirror. The WACO CU consists of an easily configurable number of eight-output microcontroller assemblies running the Optonicus advanced stochastic parallel gradient descent (SPGD<sup>+</sup>) control algorithm simultaneously. The WACO CU family includes controllers with 8, 16, or 32 channels that are used for parallel computation of control voltages supplied to the WACO DM deformable mirrors through the corresponding WACO AM high-voltage amplifiers.

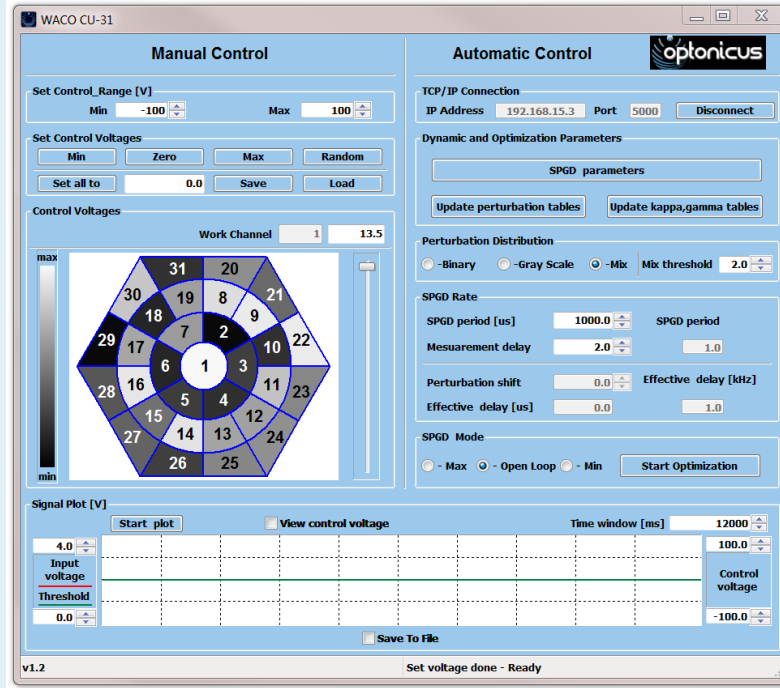


**WACO CU Block Diagram**

The WACO CU receives an analog input signal from a WACO PM or user supplied optical receiver that is used as the metric input to the Optonicus SPGD<sup>+</sup> control algorithm running simultaneously on each individual channel's processor. The SPGD<sup>+</sup> algorithm computes a digital output value based on the current input metric value. This digital value is then converted to the individual channel's analog output signal. In addition, a communication controller provides the interface between the end-user computer and the WACO CU, sending and receiving commands and system data through a local area network (LAN).

## WACO CU GUI:

The WACO CU GUI software provides an easy to use graphical user interface for the end user.



Features include:

- Interactive start and stop of the SPGD optimization processor
- Interactive editing of SPGD control parameters for system fine tuning
- Setting of output voltage limits and reset values
- Provides real-time monitoring of the input (performance metric) and output signals
- Allows manual setting of the individual channel output voltages

## WACO CU:

