

Key Features & Benefits

- ✓ WACO products provide cost-efficient building blocks for static and dynamic wavefront aberration compensation
- ✓ With Optonicus' advanced stochastic parallel gradient descent (SPGD⁺) wavefront control technique, WACO products allow easy assembling of advanced adaptive optics systems for wavefront aberration compensation without the use of expensive wavefront sensors
- ✓ WACO DM deformable mirrors are robust in respect to vibration and acoustics
- ✓ WACO DM's 40 mm clear optical aperture (36 mm deformable) is convenient for most practical applications
- ✓ Compact WACO DM design is suitable for conventional lens and mirror mounts
- ✓ Unique combination of key characteristics required for efficient wavefront aberration compensation: flexibility in aberration control spatial resolution, high stroke, > 15 kHz feedback control system bandwidth and low-cost make WACO Design Kit an excellent choice for many applications
- ✓ WACO PM performance metric sensors are based on commercially available inexpensive single-pixel fast and light sensitive photo-detectors. WACO PM sensors are customized for wide range of applications

WACO Product Series Design Kit

Wavefront Aberration Correction (WACO)

The WACO product series design kit is intended to address the growing demand for affordable intelligent instrumentation for optical wavefront phase aberration correction in a wide range of applications and under various operational conditions.

WACO Design Kit Applications

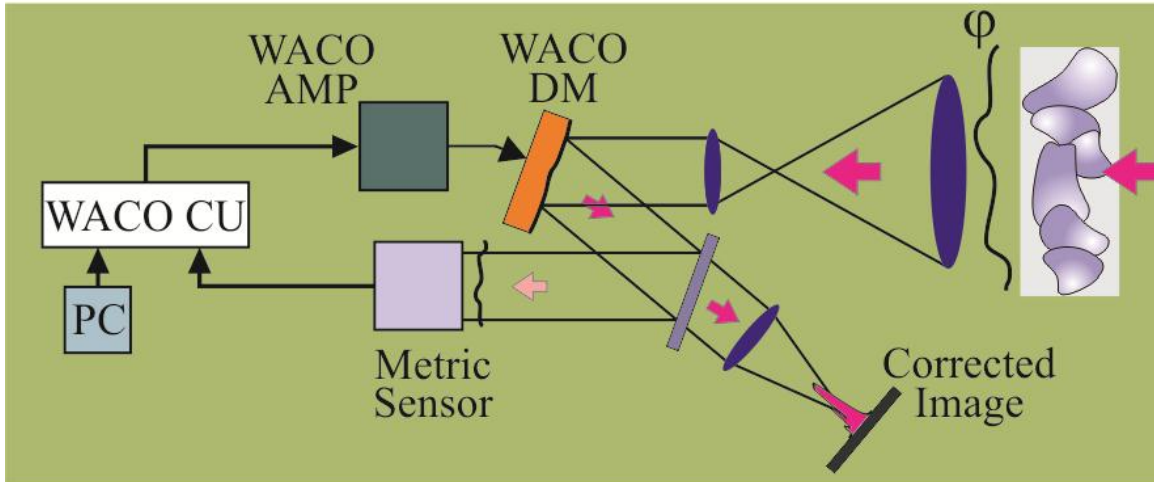
- Final sweep up of optical aberrations that are accumulated along a system's optical train composed of any number of optical elements
- Mitigation of the atmospheric-turbulence-induced aberrations in various optical systems
- Real-time compensation of quasi-static aberrations resulting from mechanical and thermal deformations of optical elements and components

WACO Design Kit Components

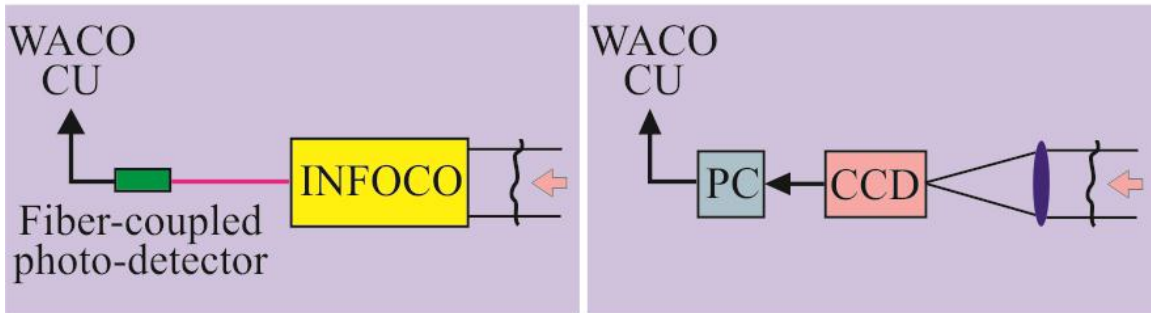
- **WACO DM:** High-speed, excellent optical quality deformable mirrors with 7 (WACO DM-7), 16 (WACO DM-16), or 31 (WACO DM-31) underlying piezo-electric actuators which can provide deformation of the reflecting surface with up to +/- 3 μm stroke and more than 10 kHz bandwidth; number of electrodes can be customized.
- **WACO AM:** Amplifier stacks specifically designed for the WACO DM mirrors, stacks of high-voltage amplifiers containing 8 (WACO AM-8), 16 (WACO AM-16), or 32 (WACO AM-32) amplifiers with analog differential input (± 1 V) and high-voltage (± 100 V) outputs with 20 kHz bandwidth.
- **WACO CU:** Multi-channel control unit and software designed for adaptive control of WACO DM mirrors based on blind optimization of an input signal characterizing optical system performance (performance metric). WACO CU products are based on Optonicus' advanced stochastic parallel gradient descent (SPGD⁺) control algorithm. WACO CU family includes controllers with 8 (WACO CU-8), 16 (WACO CU-16), or 32 (WACO CU-32) channels that are used for parallel computation of control voltages supplied to the corresponding high-voltage amplifiers (WACO AM).
- **WACO PM:** A set of application oriented performance metric sensors that are sensitive to the strength of residual wavefront aberrations in optical systems. As a custom specified option to the design kit, the WACO PM sensor provides a customer-specified input signal (metric) for the WACO CU controller.

Example uses for WACO Design Kit:

WACO Based Adaptive Receiver



Metric Sensor Examples



WACO Based Adaptive Laser Transmitter

