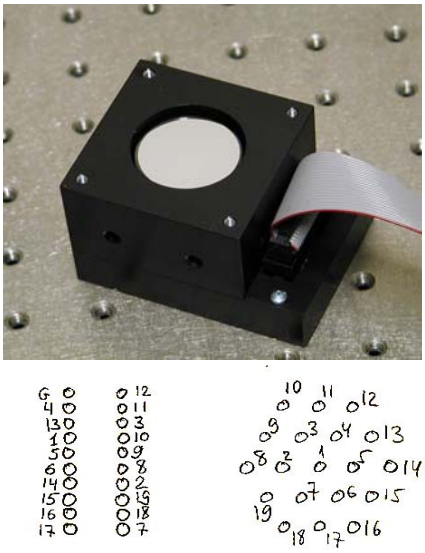
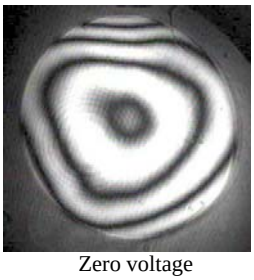
FLEXIBLE OKO OPTICAL

OKO 19-CHANNEL LOW COST PIEZOELECTRIC DEFORMABLE MIRROR

OKO 19-channel piezoelectric deformable mirror is fabricated with traditional technology using piezoelectric actuators that are fixed to a solid base. Continuous mirror face has free edge and can be deformed by the actuators that push and pull the plate. Mirror has light aperture of 30mm. The mirror surface can be coated with Al, gold, silver or multilayer stack. Amplitude of mechanical response is 3 to 6 micron per channel, making the device highly suitable for quick correction of low-order aberrations with large amplitudes. Initial optical figure can have aberration of up to 3 fringes, the surface quality is better than lambda/20 rms after active flattening. Compared to MMDM piezo mirrors are more robust, can handle higher optical loads at larger apertures and have larger stroke per actuator. The actuator mechanical response time is better than 0.2 ms, the hysteresis and creep do not exceed 7% and 2% respectively. The mirror actuators have capacitance of 10nF can be driven with voltages in the range -150 to +450V. OKO Tech can supply driver boards providing 0 to 350V control range and 0.2 ms response time. The mirror can be driven in a closed-loop configuration by OKO FrontSurfer wavefront control system. The overall dimensions are 72x54x47mm, the mass is less than 0.5kg.



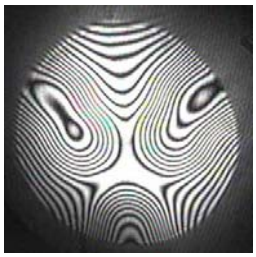
TYPICAL INTERFEROMETRIC TEST DATA WITHOUT ACTIVE FEEDBACK



Zero voltage

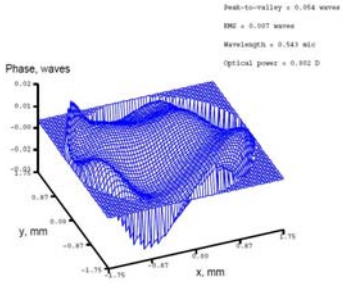
+300V on central actuator

+300V on the side actuator

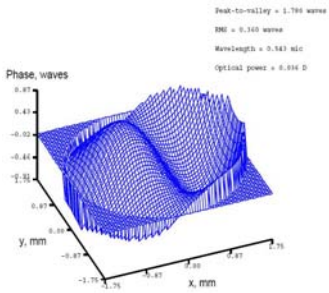


Random voltages

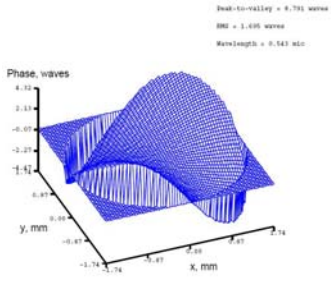
TYPICAL TEST DATA WITH ACTIVE FEEDBACK



Optical figure of OKO 19-ch piezoelectric DM after active flattening using FrontSurfer wavefront control system. P-V aberration does not exceed lambda/40, while RMS aberration is as good as lambda/100 for lambda=540nm.



Optical figure of OKO 19-ch piezoelectric DM after coma with amplitude 1.78 waves (lambda=540nm) was formed on the mirror surface.



Optical figure of OKO 19-ch piezoelectric DM after astigmatism with amplitude of 8.8 waves (lambda=540nm) was formed on the mirror surface.

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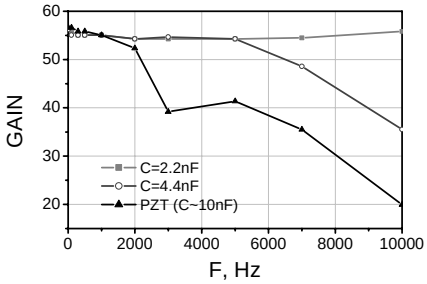
FLEXIBLE OKO OPTICAL

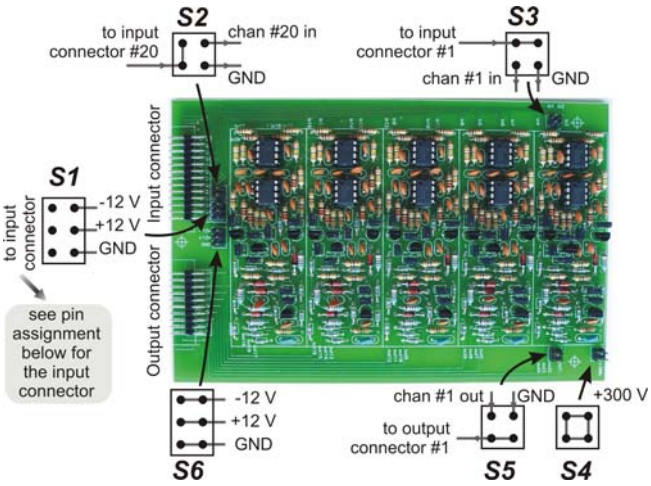
OKO 20-CHANNEL DC HIGH VOLTAGE AMPLIFIER

OKO 20-channel DC high voltage amplifier is fabricated using a discrete-component technology with DMOS FET transistors at the output. This facilitates the reliability of the amplifier, stability of its parameters and ensures the broadband output of > 2kHz on the capacitive loading $C \leq 10$nF. All the channels are short-circuit protected and equipped with an auto-zero circuit.

PARAMETER	VALUE
Number of channels	20; 19 channels can be used with one extra grounded channel #20 (see jumper configuration)
High voltage supply	≤ 450 V, with ~11 mA standby current
Low voltage supply	±(9÷15) V, with ~55 mA standby current
Input resistance	>360 kΩ
Output resistance	~1 kΩ
DC gain	~57

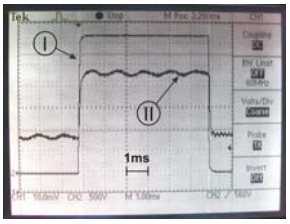
Operating voltage *gain-frequency* characteristics for capacitive loadings (*C*)





Configuration of jumpers:

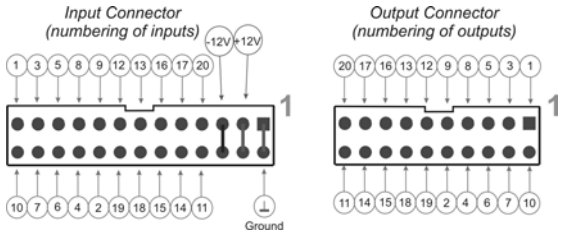
S1 – low voltage supply (±12V);
S2 – input connector configuration (channel #20);
S3 – channel #1 input configuration;
S4 – high voltage supply (+300V);
*S*5 – channel #1 output configuration;
S6 – low voltage supply (±12V);



Dynamic response of OKO 19-ch piezoelectric mirror driven by the amplifier
(I) - the amplifier output (voltage on the actuator)
(II) - the optically measured mechanical response of the DM

Horizontal scale: 1.0ms/div

Channel-pin assignment: configuration of the PCB connectors (front view)



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