

FSC Fast Servo Controller



The MOGLabs FSC fast servo controller provides high bandwidth low latency PID/PI²D feedback control for linewidth narrowing and frequency locking with a high-finesse optical cavity.

Front-panel controls of all loop parameters make it very easy to use: no fiddling with hidden rotary switches or trimpots.

Parallel FAST and SLOW control loops are designed for feedback to laser current and piezo. An internal ramp generator allows convenient scanning to find a peak, with simple scan/lock switch to lock.

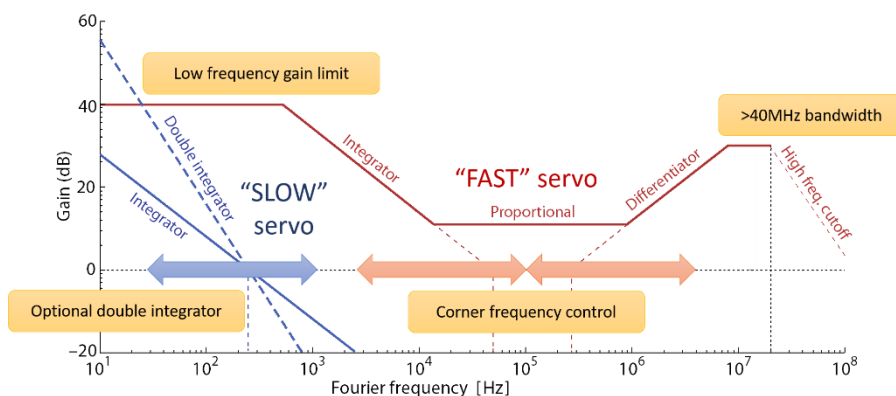
Two photodiode power supplies are included, with standard Thorlabs-style connectors. A companion high-speed ultra-low-noise photodetector suitable for PDH cavity locking is also available.

Features

- Low latency (<40ns)
- High bandwidth
- Intuitive controls
- Auto-lock to centre of oscilloscope trace
- Two oscilloscope trace selector switches
- Two parallel feedback loops
- PID/PI²D loop shaping
- Ramp generator
- High-bandwidth external modulation
- Low-noise photodiode power supplies ($\pm 12V$)

Applications

- Laser frequency stabilisation
- Linewidth narrowing
- Optical cavity locking
- Beatnote offset locking



Fast Servo Controller

Specifications

General

Bandwidth (fast output)	>35 MHz (–3 dB)
Propagation delay	< 40ns
External modulation	0 – 35MHz (–3 dB)
Sweep mode	Internal or external
Internal sweep rate	Adjustable, 1 – 50Hz
Monitor outputs	2 selectable monitors, $\pm 5V$

Inputs

A in, B in	SMA, 1M Ω , $\pm 2.5V$
External sweep	SMA, 1M Ω , 0 to 2.5V, 10kHz bandwidth
External gain control	SMA, 1M Ω , $\pm 1.0V$
External fast modulation	SMA, 1M Ω , $\pm 1.0V$
Input noise	< 5.5nV/ $\sqrt{Hz}$ [measured 3.2nV/ $\sqrt{Hz}$]
Error offset	$\pm 450mV$
TTL lock input	3.5mm stereo jack, active low

Servo controls

Servo type	Independently configurable fast and slow servos, can be nested
Controller action	Slow: I or I ² , Fast: PID
Slow gain	-20dB to +20dB
Slow integrator	Off, 25Hz – 1kHz
Fast gain	-14dB to +46dB
Fast integrator	Off, 10kHz – 2MHz
Fast differentiator	Off, 100kHz – 10MHz
Fast differentiator gain limit	0 – 24dB
Adjustable low-pass filter	Off, 25kHz – 200kHz
Fast gain limit	Off, 0 – 60dB
Slow output	SMA, 0 - 5V, 50 Ω impedance
Fast output	SMA, $\pm 2.5V$, 50 Ω impedance

Power and dimensions

IEC input	100 or 110/120 or 220/240V, 50/60 Hz, 3A
Photodiode supply output	$\pm 12V$, 150mA, M8 connector
Power consumption	< 10W
Dimensions	250x79x292mm (W x H x D), 2kg