D2-125 High-Speed Laser Servo
With Loop-Filter Controls

The D2-125 laser servo was designed for low-noise servo control of lasers and other experimental systems. The PI^{2}D loop filter, with two-stage integral feedback, provides tight locking to cavities and atomic/molecular transitions. The D2-125 provides full user-control over the loop-filter parameters, enabling servo-loop optimization for a wide variety of plants such as: acousto and electro-optic actuators, voice coils, piezo actuators, etc..

High Bandwidth (10 MHz)

Servos PZT & Laser Current

User Adjustable Loop Parameters

Applications Include:

- *Atom & ion trapping, including BEC*
- *Frequency metrology*
- *Pound-Drever-Hall cavity locking*
- *Laser stabilization and control*
- *Position control*
- *AOM amplitude stabilizaiton*

Features Include:

- *Peak Lock Option*
- *Two servo loops for feedback to both laser current and PZT*
- *Optional centering knob with fine & coarse control*
- *Smooth lockup and frequency jump controls*
- *Internal ramp generator*
- *Optional temperature controller with adjustable PID setting*
- *External Power Supply (keeps 60 Hz & harmonics off)*

Vescent Photonics, Inc.
www.vescent.com
Denver CO
(303) 296-6766
sales@vescent.com

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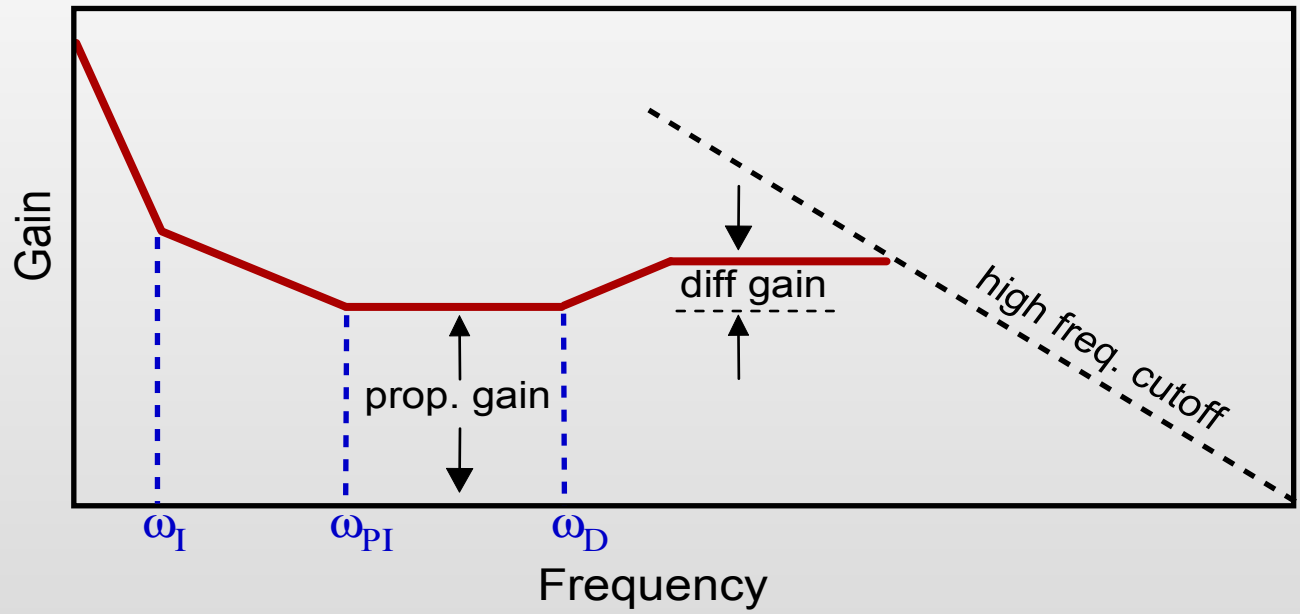
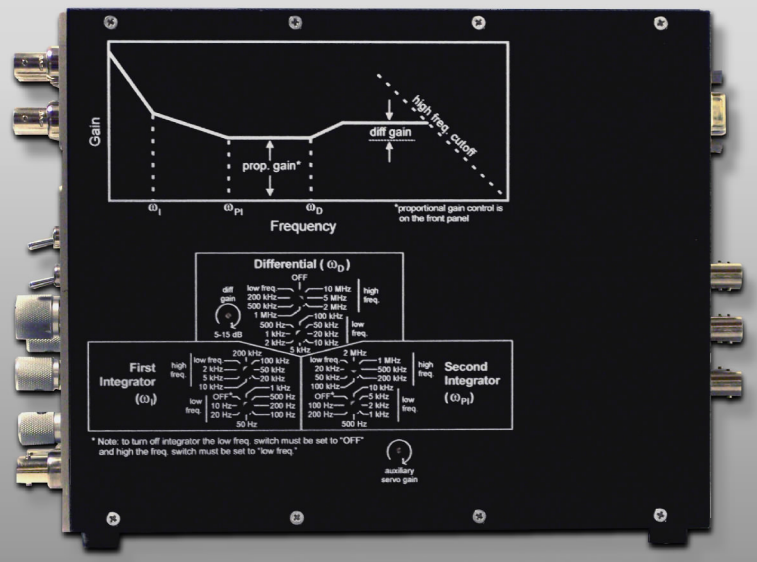
The loop filter parameters (PI²D) may be reconfigured with side panel controls, enabling optimization for a wide variety of servo-loop plants.



General	
Bandwidth [A]	>10 MHz
Input Impedance	50 Ω
Input Voltage [B]	±0.5V
Input Voltage Noise [B]	< 5 nV/√Hz
Output Voltage [C]	±10V
Proportional Gain	-40 to +32 dB
Loop Filter	
ω_I (Integrator One)	Off, 10 Hz – 200 kHz
ω_{PI} (Integrator Two)	Off, 100 Hz – 2 MHz
ω_D (Differential)	Off, 500 Hz – 10 MHz
Differential Gain	5 to 15 dB
Temp./PZT Output	Integral: 60 msec to 6 sec
Monitors	
DC Error, AC Error, Input, Ramp, Ramp TTL, Servo Output	
Ordering Options	
-PL	Peak Lock
-T	Temperature Controller [D]

[A] Oscillation frequency when Laser Servo locked to itself in proportional mode.
[B] Reference to 50 Ω input load.
[C] Driving a high impedance load.
[D] For use with D2-110 spectroscopy module or as an auxiliary temperature controller



The D2-125 is powered with an external power supply (D2-005) or user provided power via a breakout board (D2-001).

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