Stable Laser Systems

# PDH-1000-5E

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# 1 PDH-1000-5E

The PDH-1000-5E is intended for the derivation of a Pound-Drever-Hall error signal for the frequency locking of a laser to a Fabry-Perot cavity. The PDH-1000-5E produces the radiofrequency (RF) modulation signal, detects the light reflected from the cavity, and demodulates the detected RF signal to produce the error signal. The unit is available in visible (silicon), near infrared (InGaAs) and extended infrared (strained InGaAs) versions, with free space or fiber-coupled alignment. The oscillator output is adjustable in phase and amplitude, and can drive 10 dBm into 50Ω for use with a phase modulator. Amplification may be required for high voltage phase modulators.

# 2 Front Panel

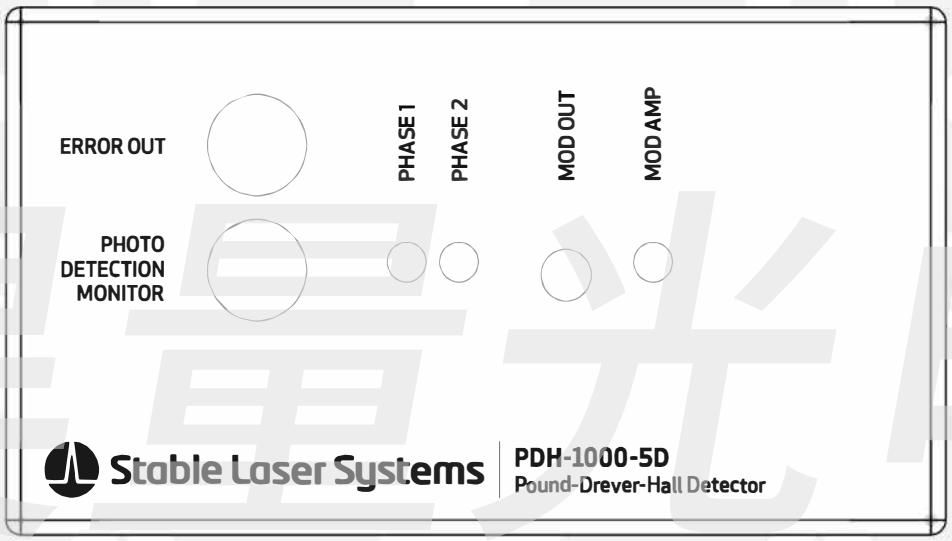


Figure 1: Front Panel of the PDH-1000-5E

The front panel elements of the PDH-1000-5D, as shown in Figure 1 are described in the following subsections.

## 2.1 Error Out

The Pound-Drever-Hall (PDH) error signal output has notch filtering at the modulation frequency and its first harmonic. For this reason, residual higher harmonics of the modulation may be seen on the error signal at the 10 mV level.

## 2.2 Photodetection Monitor

The voltage corresponding to the photodetector power in a DC-150 kHz bandwidth, with a transimpedance gain of 10 kΩ.

## 2.3 Phase 1 and Phase 2

These trim pots are adjustable with a flat head screwdriver. Use these to adjust the phase of the RF (amplified photodiode signal) and Local Oscillator for optimum error signal slope, generally obtained by maximizing the height of the main peak and the symmetry of the sidebands. Each adjustment has a range of 0 to 90 degrees. An example may be seen in Figure 2.

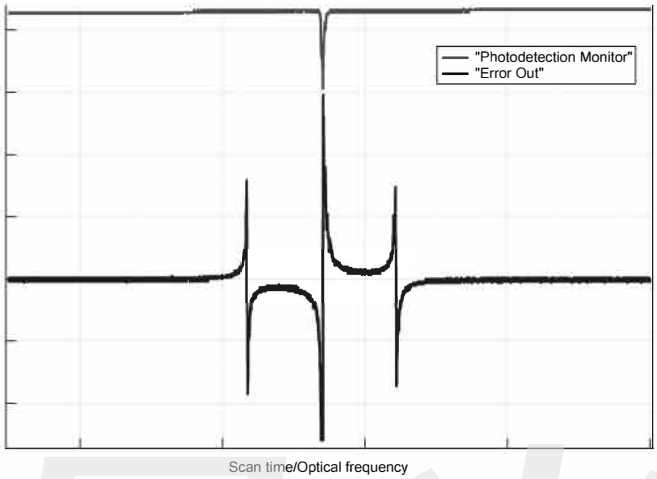


Figure 2: Example PDH Error Signal

## 2.4 Mod Out

RF oscillator output for 50Ω load. Amplitude is adjustable from < -25 to 10 dBm by use of the Mod Amp trimpot (subsection 2.5). The oscillator frequency for this device is 5MHz.

## 2.5 Mod Amp

Trimpot to adjust the amplitude of the modulation.

## 2.6 Photodetector

This device contains a Fermionics FD500 free-space InGaAs photodetector. The datasheet for this device may be found in Appendix 1 (Section 3). The optical power on this detector should not exceed 20$\mu$W, otherwise damage to electrical components may occur.