

DH-PbS-Te Cooled Lead Sulphide Detector User Notes



Overview

The Bentham DH-PbS-Te houses a 3mm diameter active area lead sulphide detector, which may either be mounted to the exit slit of Bentham monochromators, or used free-standing.



This device is responsive over the spectral range 1000-3500nm.

The DH-PbS-Te may only be used in the AC regimes; a chopping frequency of 225Hz is suggested.

Electrical

This device is operated in the photoconductive mode, requiring therefore a potential for operation. A high voltage is taken from a Bentham 215 high voltage supply for this purpose.

The voltage output from this detector can be coupled to a lock-in amplifier via BNC; the pin configuration is inner pin cathode, outer sheath anode.

Mechanical

The DH-PbS-Te may be mounted to the slits of any Bentham monochromator. When mounting the device to a monochromator exit slit, the fitting of a rubber O-ring around the detector should be ensured to prevent light leakage.

Temperature Control

The CPS1M is a feedback Peltier cooler controller module, housed in the Bentham 417 electronics bin. This is set in factory to a fixed temperature. At room temperature this is set to 0.5A cooling current. This corresponds to a device temperature of $\sim -10^{\circ}\text{C}$.



The CPS1M is connected to the Peltier cooled device via Amphenol socket.

A flick switch turns cooling on/ off. Cooling is established within thirty seconds. As a function of ambient temperature, this cooling current may vary.

Specifications

The device specifications are as follow:-

Active area:	3mm diameter
Peak sensitivity wavelength (typ.):	2600 nm
Peak Responsivity (typ., RT)	$1 \times 10^3 \text{ V W}^{-1}$
Peak Responsivity (typ., -10°C)	$2 \times 10^3 \text{ V W}^{-1}$
Detector resistance (RT)	0.5-2 M Ω
Detector resistance (-10°C)	0.7-4 M Ω
D* (2.6 μm , 500Hz, 1Hz) (cm Hz ^{1/2} W ⁻¹):	$1.8 \times 10^{-14} \text{ W/Hz}^{1/2}$
Cooler current (-10°C)	0.65A

For lead sulphide and lead selenide detectors it is necessary to reduce the output of the 215 using a potential divider. This scheme has the advantage that a capacitor can be included to give a super-quiet bias voltage to the detector circuit. It is worth noting that, with photoconductive detectors such as lead sulphide and lead selenide, any noise on the bias supply appears in the signal.

The following diagram shows typical circuitry for lead sulphide and lead selenide detectors when used with the 215.

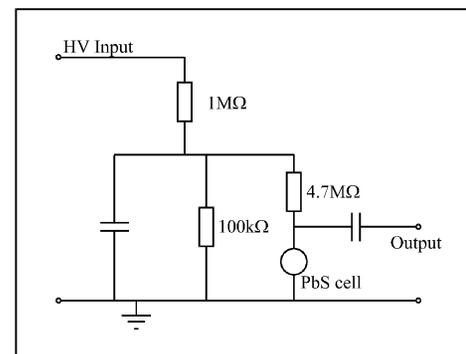


Figure 1: Circuitry for Detectors used with 215

When using the above circuit the bias applied to the photoconductive cell will be nominally 1/11 of the output of the 215.

This arrangement makes it possible to operate a photomultiplier and lead sulphide detector in parallel from a single 215 in dual detector systems. If the pmt is run at a typical level of 750V the PbS bias will be approximately 70V. For systems using two detectors Bentham can supply an HV-BNC "T" piece to give dual output from the 215.

WEEE statement:

Bentham are fully WEEE compliant, registration number is WEE/CB0003ZR. Should you need to dispose of our equipment please telephone 0113 385 4352 or 4356, quoting account number 135419.

