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Acton Research Corporation

Model ID-441-C

InGaAs Near Infrared Detector

With Preamplifier and Thermoelectric Cooler

Operating Instructions

Ver 2.0

Contents

I. Description

The Acton Research Corporation Model lD-441-C InGaAs near infrared detector assembly consists of a 3mm diameter InGaAs detector mounted in a sealed housing with a thermoelectric cooler and thermistor. The thermoelectric cooler is controlled by an optional external module (Model 442-1A) which allows adjustment of detector operating temperature. A preamplifier is built into the detector assembly and provides a positive voltage output to the incident near IR radiation. The detector is usable over the wavelength range of 800nm to 1700nm.

II. Detector Installation

The InGaAs detector assembly mounts to the Acton Research Corporation SpectraPro monochromator exit slit using the four cap screws provided. For maximum transfer of signal, the detector should be mounted directly to the monochromator slit housing and not spaced away from the slit by a filter assembly or other accessory.

If provided, place the 442-1A temperature controller near the detector assembly. Attach the 9 pin connector of the interface cable provided to the rear of the temperature controller and connect the 9 pin round connector of this cable to the detector assembly. The temperature controller also provides the necessary voltages for the detector preamplifier. If the optional temperature controller was not ordered, a separate plug-in supply is provided for the preamplifier. It also has a 9 pin round connector which plugs into the detector assembly.

Connect the BNC output from the detector assembly using the BNC cable provided to a readout system such as the Acton Research Corporation NCL or other device capable of reading 0 to +10 volts.

III. Operation

The InGaAs detector assembly is sensitive to near IR radiation in the wavelength range of approximately 800nm to 1700nm. For enhanced detectivity, the InGaAs detector can be cooled down to –20 degrees C. The detector is cooled by precisely controlling the current through the thermoelectric cooler mounted inside the detector case. The maximum thermoelectric cooler current is 1.2 amps. Also mounted inside the detector case is a thermistor which monitors the detector temperature. The 442-1A temperature controller provides the thermoelectric cooler current and monitors the thermistor resistance in a closed loop setup to maintain the detector at constant temperature. The operating temperature is set by first determining the thermistor resistance corresponding to the desired operating temperature.

A thermistor calibration table is listed with the component manufacturer's date in section IV of this manual; a typical table is listed below. Refer to the data sheets provided in Section IV for the exact values.

Temperature (deg. C)	Resistance (K ohms)
25.0	1.12
0.0	2.84
-10.0	4.30
-20.0	6.77

Set the display mode selector to "TEC CURRENT MAX SET" and adjust the potentiometer on the right to a maximum of 1.2 amps.

Switch the Display Mode selector on the temperature controller to "TEC TEMPERATURE SET" and adjust the output control until the display reads the desired thermistor resistance. Switch the Display Mode selector to "TEC TEMPERATURE". The display will indicate the actual thermistor resistance and should quickly match the value selected. Refer to the instruction manual in Section IV for further instructions on use of the temperature contoller.

The InGaAs detector is operated in the photovoltaic mode for lowest noise performance. The preamplifier has a fixed gain to provide +10 volts out for 1.0×10^{-6} amps input.

IV. Component Manufacturers Specifications and Instructions

ID441-C TEC Specifications:

Number of stages: 2

ΔT_{MAX} (°C): 78

Q_{MAX}(watts): 0.39

I_{MAX}(amps): 1.4

V_{MAX}(volts): 0.8

Nominal thermistor R (KΩ): 1.25

ID441 DATA

	(V_R=10mV)	**(V_R=10mV)**	**(1300 nm)**
Serial No.	R_S (MΩ)	C (pF)	R (A/W)

ID-441 Responsivity

Responsivity of Short Wavelength Enhanced InGaAs Photodiodes

(FD1000WX and FD3000WX Photodiodes)