

275 Ultra Low Noise Amplifier

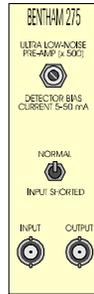
User Notes



Overview

The Bentham 275 is an ultra low noise, voltage pre-amplifier designed for use with low impedance signal sources. Its input voltage noise is less than that of a 50Ω resistor at room temperature.

The 275 includes a constant current bias supply and an input shorting switch for use with mercury cadmium telluride detectors. The unit can be supplied without bias supply for use with search coils and other unbiased low impedance sources.



Mechanical

The 275 is normally supplied already mounted in a Bentham 417 bin/power supply unit. If you are fitting a 275 into an existing 417 you should refer the 417 manual which provides information on the installation procedure and on the preferred position of the 275.

The 275 should always be mounted at the extreme left hand side of the 417.

Operation

For all low impedance sources except MCT detectors connect the INPUT via a BNC-BNC lead to the signal source. This lead should be kept as short as possible.

Connect the OUTPUT via a short BNC-BNC cable to the voltage input of a lock-in amplifier such as the Bentham 225.

MCT detectors are electrically fragile. In order to avoid damage Bentham recommends the following connection and operating procedures.

- Set the input shorting switch on the 275 to INPUT SHORTED.
- Connect one end of the BNC-BNC signal interconnecting cable to the 275 INPUT socket.
- Connect the other end to the MCT detector.

Making the connections in this order ensures that any stray charge stored in the cable capacitance is dissipated through the shorted input of the 275 and not through the detector.

Setting Bias Current

- Set the 275 input switch to INPUT SHORTED.
- Set the DISPLAY & OUTPUT switch on the 417 to position F.
- Adjust the detector bias current control using a small screwdriver or miniature potentiometer adjusting tool to give the bias current recommended by the detector manufacturer. The display will show the bias current divided by 10 in mA, e.g. a display of 2.13 corresponds to a detector bias current of 21.3mA.

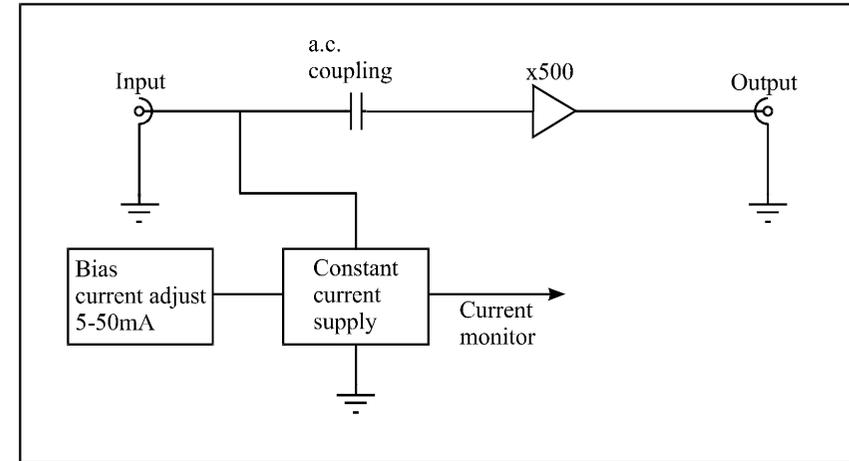
Provided that all precautions have been taken, set the 275 input switch to normal.

Specification

Short circuit input noise:	$1\text{nV}/\sqrt{\text{Hz}}$ at 1kHz
Voltage gain:	x500*
Bandwidth:	5Hz to 100kHz (-3dB)
Bias current:	5mA to 50mA variable
Bias current compliance voltage:	10V
Maximum output:	$\pm 10\text{V}$

The fixed gain of x500 is suitable for most MCT detectors. Gain switching should be carried out in the lock-in amplifier to which the 275 is connected. The gain of the 275 can be changed to x1000 by removing R3 from the PCB.

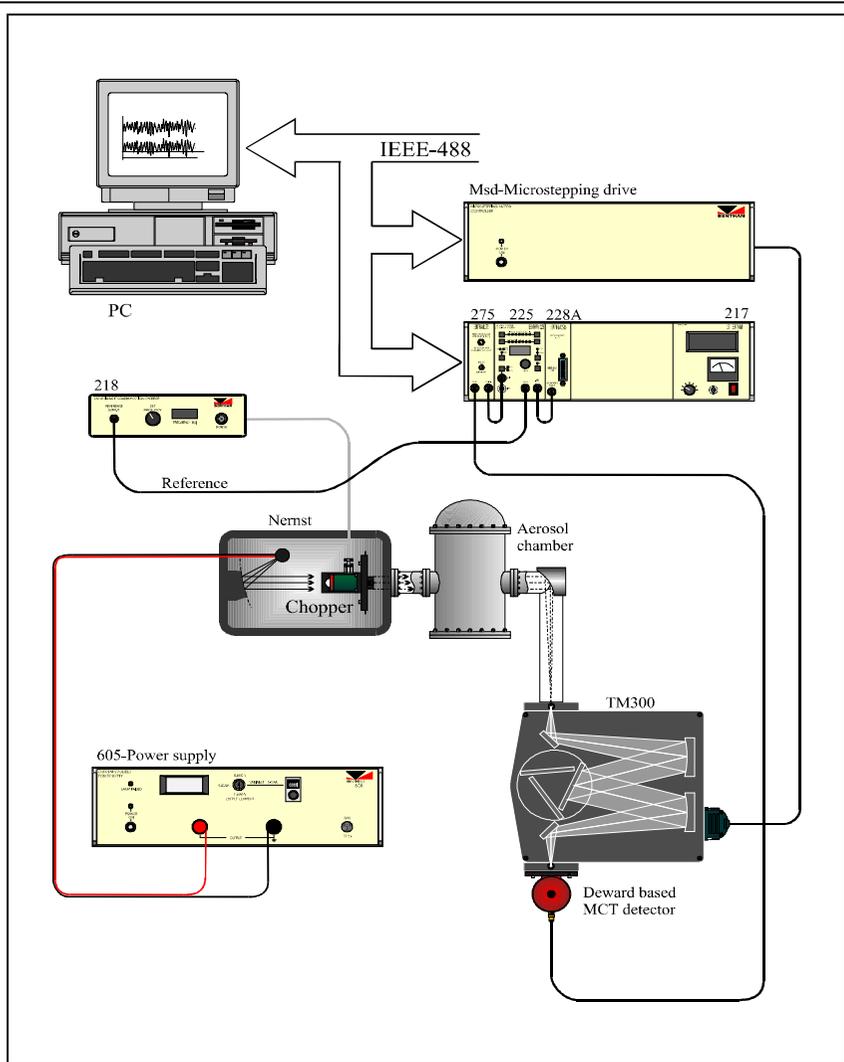
Block Diagram



The following diagram shows a typical application of the 275 as a preamplifier for an MCT detector in a system which is used to measure the effectiveness of aerosols as obscurants in the 8 - 14μm region.

Trouble Shooting

SYMPTOM	POSSIBLE CAUSES
Signal is expected from the detector but there is no output from the 275.	The input switch is set to INPUT shorted see 275.4 The 275 power lead is not connected to the motherboard inside the 217 see 217.2
There are excessive amounts of 50 & 100Hz (60 & 120Hz) ripple at the output.	The low impedance, high gain circuitry of the 275 is very sensitive to pick-up from magnetic flux leaking from transformers, motors etc. Check that the 275 is correctly mounted see 275.2 and that it is not close to any item which might act as source of magnetic interference. Furthermore, check the cables and grounding in the detector circuit. Some manufacturers connect the body of the Dewar to signal ground others do not. We recommend the former.



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.



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