Operating Manual

MPY-01

Pyroelectric Detector

WiredSense

Rev. 2.0

Warranty

This product is warranted to be free from defects for one (1) year from the date of initial purchase. Should such defects occur during this period, WiredSense's sole obligation shall be to repair the defective part or product or replace it with a comparable part at its own discretion. Damage caused by normal wear and tear is not covered by this or any other warranty. WiredSense assumes no liability for accidents, injuries, deaths, losses and other claims in connection with or in consequence of the use of this product. In no event shall WiredSense be liable for incidental or consequential damages in connection with or as a result of the use of this product or any part thereof.

Service

In case of repair the product must usually be sent in to WiredSense. If you have any questions about product defects, before returning them please contact us by e-mail at service@wiredsense.com.

Information in this document is subject to change without notice.

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1. General information

Pyroelectricity is a commonly used method for detecting temperature changes. A pyro-electric sensor generates an electrical signal when exposed to a temperature change ΔT. This temperature change can then be amplified and evaluated in an electronic circuit. Pyroelectric detectors can be used for the detection of long wave light (MIR, THz) but also for visible light.

In the detectors of the MPY series, this principle is used for the sensitive detection of temperature changes. The resulting thermoelectric signal is amplified and can be evaluated using an analog-to-digital converter or an oscilloscope.

2. Handling

The detectors of the MPY-series are equipped with a battery tester. To avoid interference with the measurement, this only works if the detector is switched off. If the battery test button is operated in this state, the indicator LED lights red or green, depending on the battery level.

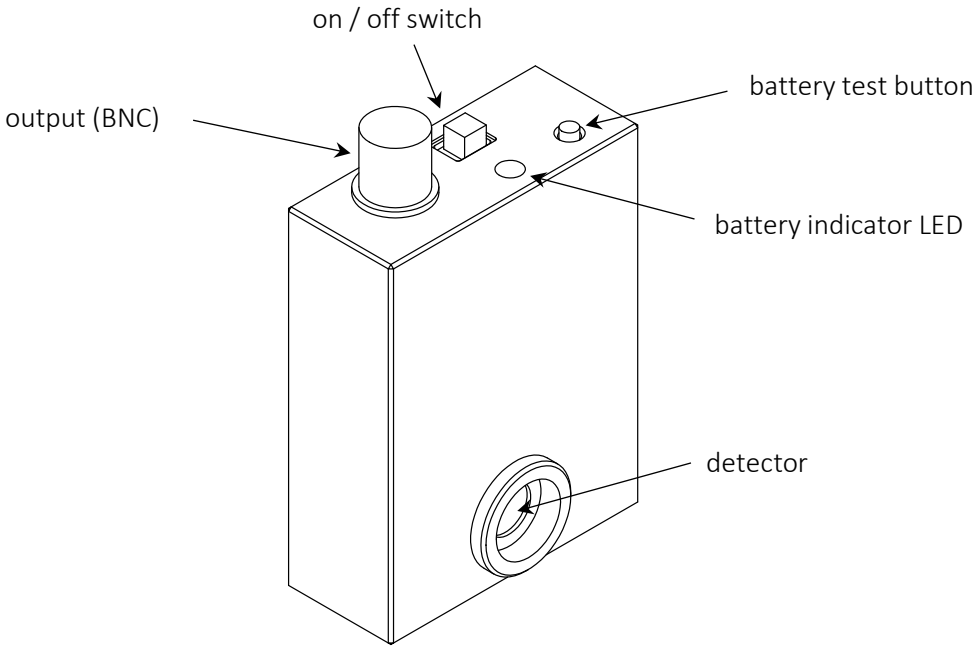

FIGURE 1: DETECTOR HOUSING

2.1 Battery test

If the display lights green, the battery has sufficient capacity. If the indicator lights red, the detector is still working but the battery is largely discharged (voltage < 10 V) and should be replaced. If the display does not light up at all, the battery is so empty that a display is no longer possible.

2.2 Set-up and connection to the oscilloscope

For optimum decoupling of the detector from electrical ambient noise, the supplied set screw and washer made of PEEK should be used for mounting.
The detectors of the MPY series are activated by switching the slide switch to the "On" position. Immediately, temperature changes are output as an electrical signal via the BNC connection.

The oscilloscope should be connected to the MPY detector with an input resistance of 1 MΩ via a BNC cable (not included). Furthermore, the oscilloscope should be triggered on the heat source irradiating the detector (e.g. the laser or chopper).

Please note that continuous sources cannot be measured as only temperature changes can be detected by the detector. Therefore, a pulsed source or a chopper are necessary.

Please also note the frequency dependence of the sensitivity (Figure 1). The detector has the highest sensitivity at a signal frequency of approx. 20 Hz. Sensitivity decreases strongly at higher frequencies.

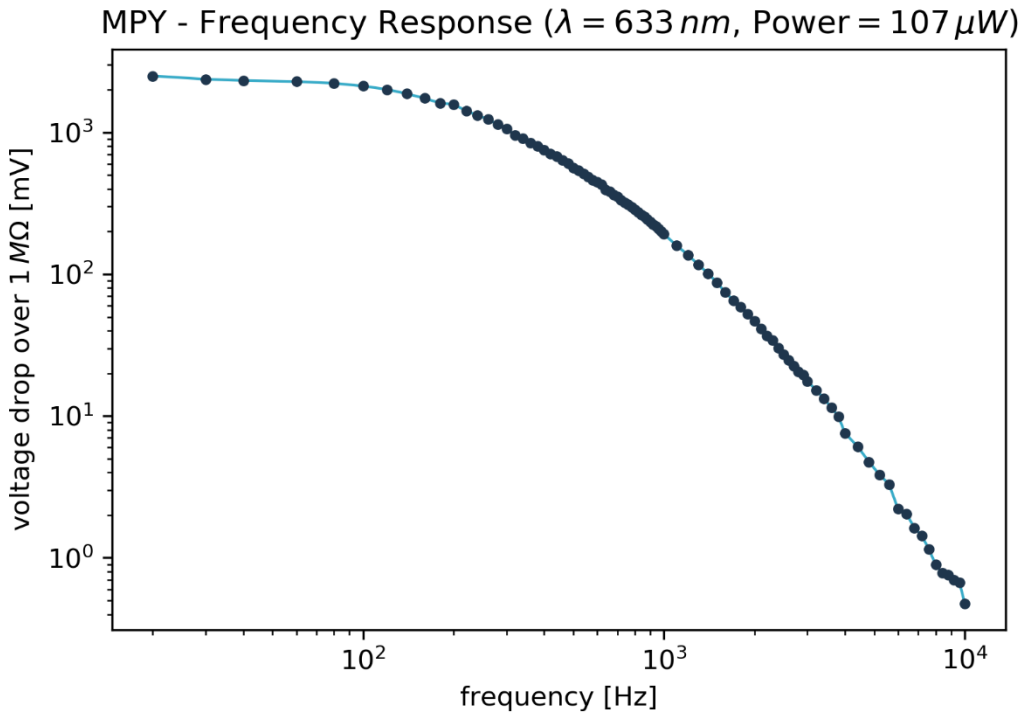

FIGURE 2: FREQUENCY DEPENDENCE OF SENSITIVITY

3. Signal analysis

When used on the oscilloscope, an image similar to Figure 3 should appear. A positive change in IR flux is resulting in a negative signal. The amplitude of the signal (peak-to-peak) is proportional to the radiated heat (Figure 4).

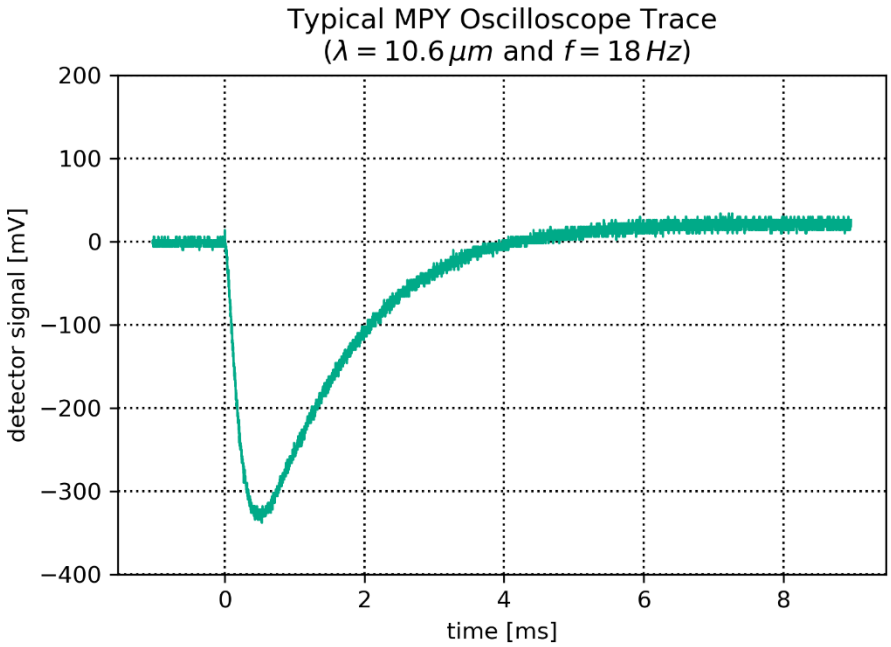

FIGURE 3: TYPICAL OSCILLOSCOPE TRACE OF THE MPY-DETECTOR

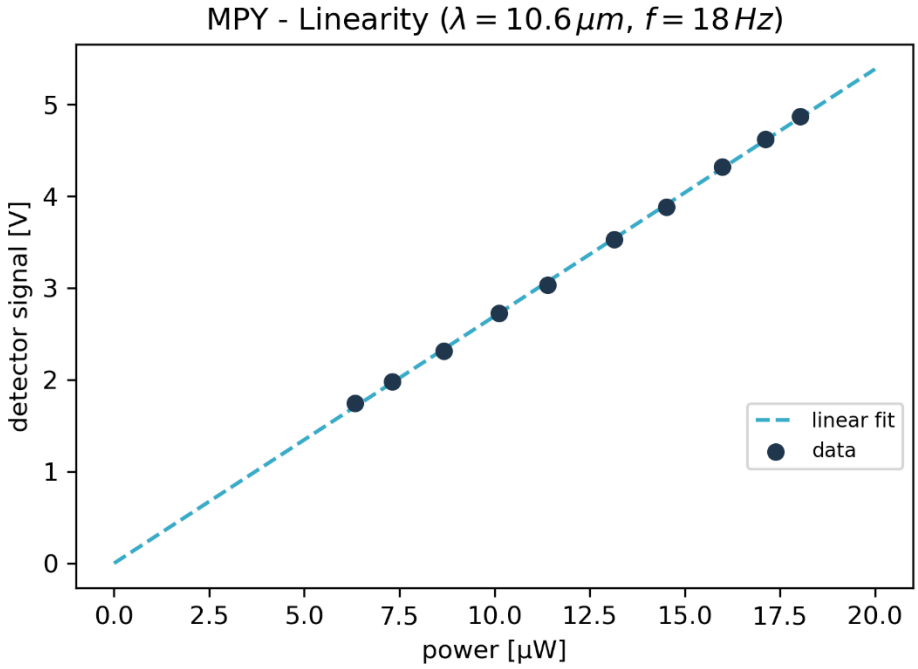

FIGURE 4: LINEARITY OF THE AMPLITUDE SIGNAL VS. INCIDENT POWER

4. Problem solving

4.1 The battery tester does not work

Either the detector is still on or the battery is completely empty. Switch off the detector and replace the battery.

4.2 A zero line appears always on the oscilloscope

First make sure that the detector is switched on and the battery is full (see 4.1). Check the connection between oscilloscope and detector again with a suitable BNC cable and set a high-impedance input resistance on the oscilloscope (e.g. 1MΩ). Now switch the oscilloscope to a higher sensitivity (e.g. 5 mV/div). Move your hand up and down in front of the detector in a distance of about 10 cm. The resulting heat change on the detector is usually sufficient to generate a large signal. If you do not see a signal here, please contact service@wiredsense.com and describe your problem.

4.3 The oscilloscope trace moves very irregularly with the signal

Especially with high-frequency signals (from 100 Hz) and low signal levels, low-frequency thermal influences can interfere with the measurement. For example, if you put your hand near the detector, the signal can be much higher than the signal to be measured. In this case, the AC coupling of the oscilloscope input must be used. If your oscilloscope does not have an AC input, you can use a commercially available high-pass filter between detector and oscilloscope.

5. Changing the battery

First switch off the detector. Now open the housing using the four countersunk screws on the rear cover. Remove the battery and replace it with a new A23 (12V) battery. Place the new battery between the flexible terminals, ensuring correct polarity (+ and - on the board). Leave the detector switched off and briefly check the battery charge level using the battery tester. Close the housing using the 4 countersunk screws. The detector is now ready for operation.