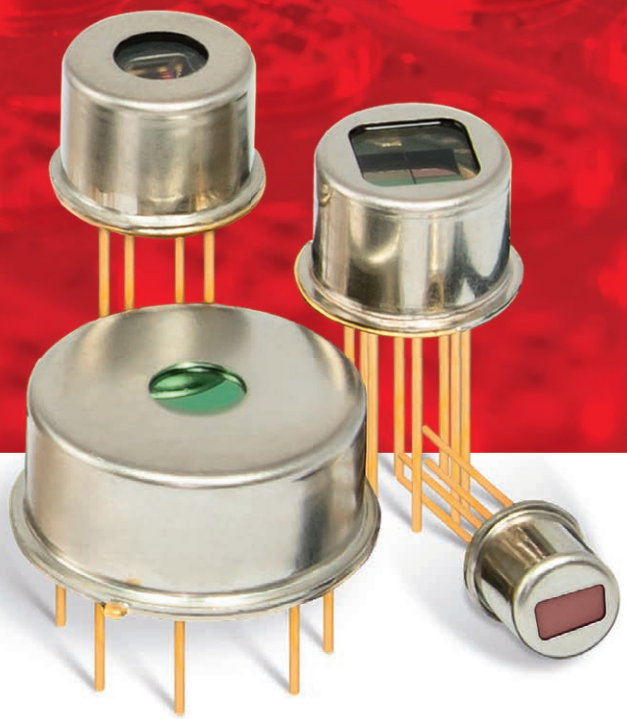
PYROMID®
Multi Channel Detectors

Miniaturised Detectors for Gas Analysis and Flame Detection

Multi channel detectors with up to eight channels
Integrated beam splitter or micromechanical frame
Easy integration into measurement devices
For use in gas analysis and flame detection



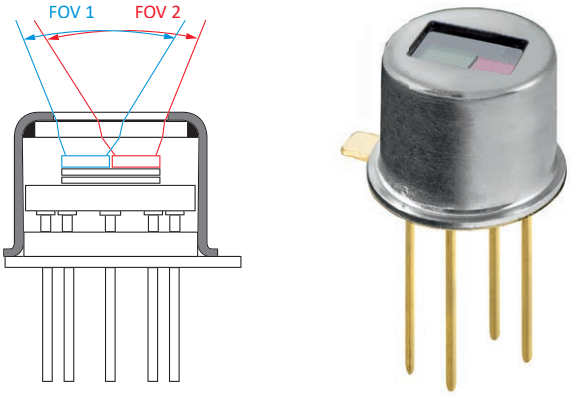
InfraTec.

LRM Detectors

Miniaturised Multi Channel Detectors with Compact Stack Design

Cutting Edge Technology in Most Confined Spaces

LRM detectors by InfraTec, a series of miniaturised multi channel detectors, offer an extremely wide field of view (FOV) in combination with a compact design and attractive pricing. Their most obvious hallmark is a robust central window in the cap, e.g. made of silicon. It offers reliable protection against environmental influences such as penetrating moisture. Optionally soldered to the housing this central window enables complete hermetic sealing.



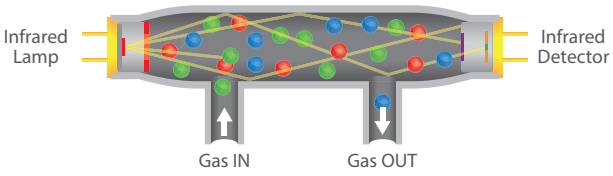
The central window in the cap is characteristic for the LRM detectors.

Innovative Modular Stack Design

The channel filters are placed inside the detectors. Shielded from mechanical stress as well as from other strains from harsh environments they are located close to the pyroelectric elements. The reduced distance and the central window integrated into the detector caps are two of the factors that ensure a wide FOV. At the same time, all elements are placed close together inside the detectors. This allows more radiation to reach the pyroelectric element and therefore a higher signal. In addition, since the optical crosstalk of the individual channels is suppressed very effectively, the entire detector series proves to be extremely powerful. The compact, miniaturised construction allows for more analysis channels with unchanged package size. Or, the same number of channels can be integrated into significantly smaller packages.

LRM Detectors at a Glance

- Assortment of 2-, 4- and 8-channel detectors
- Operation in voltage mode or current mode
- Extremely wide FOV provides powerful performance
- TO46, TO39 and TO8 housings available
- Robust central window for protection against penetrating moisture
- Option for complete hermetic sealing
- Available with thermal compensation



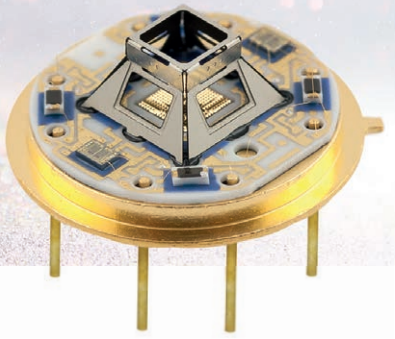
Schematic design of an infrared gas analyser.

Space and Cost Saving

The innovative product line of LRM detectors provides additional possibilities for the use of sensors. Due to its miniature stack design, users gain important new flexibility and benefit directly from cost-optimised production. They get a solution for gas analysis that can be used in stationary and mobile devices ranging from medicine to safety technology along with an attractive price-performance ratio.

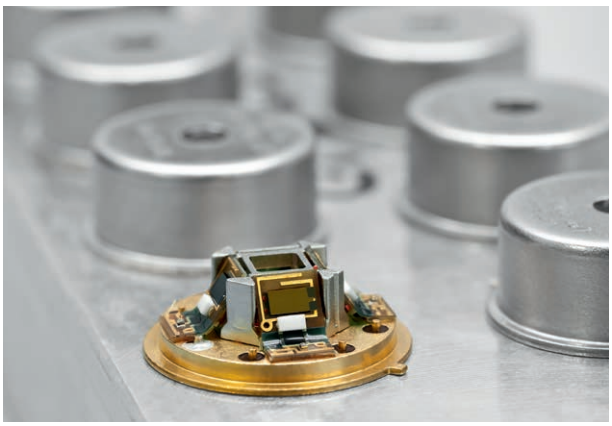
Beam Splitter Detectors

Precise and Stable Measurements for Long-term Applications



Unconventional Solution for Precise Measurements

Beam splitter detectors are perfectly suited for measurement tasks that demand accurate and stable measurement results over the long term. These multi channel detectors are equipped with only a single aperture. They contain an array of micro mirror surfaces working as an internal beam splitter.



In quad channel detectors InfraTec uses four-sided micro-pyramids to split the infrared radiation.

Due to the detector's single aperture opening, major parts of the incoming radiation impinges reflectively to the pyroelectric crystal. This allows for very precise NDIR gas analysis particularly in gas detection technology. To solve such measurement tasks, a gas cell with an effective diameter of just 2.5 mm is sufficient. Apart from an accelerated exchange of gas, this results in very low dead volumes of the measuring system. Measurement devices equipped with the detector can be correspondingly smaller. The permanently stable signal ratio between the individual channels ensures a high degree of measurement accuracy.

One of a Kind – Reflection Beam Splitter

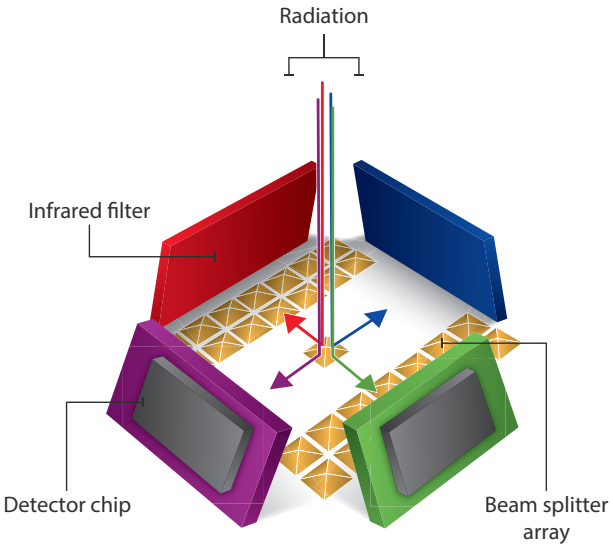
The beam splitters used by InfraTec are solely reflection beam splitters and consist of highly reflective gold plated microstructures. The division of the beam into two or four spectral channels is done only within the detector.

The radiation entering through the aperture opening of the detector is split into several radiation beams of equal intensity but in different, predefined directions within the detector based on the architecture of the innovative microstructure inside. Each of the beams impinges on a corresponding pyroelectric sensor element with an upstream optical filter.

Mechanical expansions in the optical system of the measurement device, ageing effects or any possible contamination of these detectors are already accounted for before the beam is split and thus affect all channels equally. This minimises differences between the measurement channels and the required beam diameter. The microstructures vary according to the detector type. In quad channel detectors these resemble four-sided micro-pyramids, whereas in dual channel detectors these are V-shaped grooves.

Advantages of Beam Splitter Detectors

- Multi channel detectors with a single aperture
- High degree of measurement accuracy due to a permanently stable signal ratio between the individual channels
- Simple constructive solutions allow exact same reflected intensities of the individual radiation beams
- Very low dead volumes of the measurement systems
- Small gas cells enable easy integration into measurement devices



The incoming radiation is split into several radiation beams of equal intensity but in different, predefined directions.

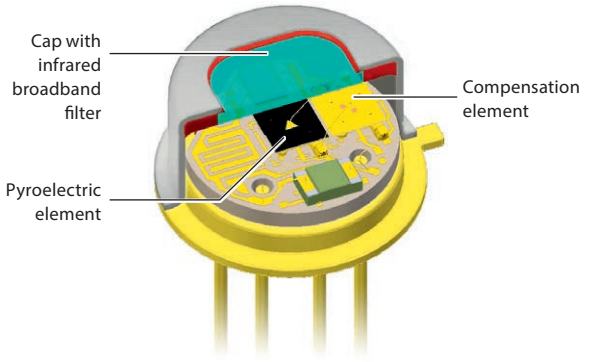
Model Range – PYROMID® Multi Channel Detectors from InfraTec

Detektor	LRM-202	LRM-292	LRM-254	LRM-284	LRM-244	LRM-274	LRM-278	LIM-032	LIM-082	LIM-011	LIM-054
Housing-Pins	TO46-4		TO39-8		TO8-12			TO39-4	TO39-4+1	TO8-12	TO8-8
Number of channels	2		4				8	2		4	
Element size (mm^2) / channel	1.2 × 0.8		1.4 × 1.4		2.0 × 2.0		1.4 × 1.4	2.2 × 1.3			
Field of View (FOV)	54°		70°		110°		70°	14°			
Detectivity*	4.0	3.0	4.7	4.5	6.0		4.5	2.9	1.9	0.8	0.42
Thermal compensation	Ja							Nein			
Voltage mode (VM) / Current mode (CM)	VM	CM	VM	CM				VM	CM	VM	CM

* (500 K, 10 Hz, 1 Hz, 25 °C, without window) / 10 E + 8 cm $Hz^{1/2}$ / W

How Does a Pyroelectric Detector Work?

Pyroelectric crystals have a rare asymmetry due to their single polar axis. This causes their polarisation to change with temperature. This so-called pyroelectric effect is used in sensor technology. For this, a thin pyroelectric crystal is coated perpendicular to the polar axis with electrodes. On the upper electrode of the crystal, an absorbing layer (black layer) is applied. When this layer interacts with infrared radiation, the pyroelectric layer heats up and surface charge arises. If the radiation is switched off, a charge of the opposite polarity originates. However, the charge is very low. Before the finite internal resistance of the crystal can equalise the charges, extremely low-noise and low leakage current field-effect transistors (JFET) or operational amplifier (OpAmp) convert the charges into a signal voltage.



Schematic diagram of a single channel detector.

InfraTec – Specialist in Infrared Sensor Technology

The InfraTec GmbH Infrarotsensorik und Messtechnik was founded in 1991 and has its own design, manufacturing and distribution capabilities. Its more than 200 employees produce custom-made pyroelectric detectors for clients worldwide.

Spectrally single and multi channel infrared detectors count among the products, next to infrared sensors with electrically tunable filters based on MOEMS. Pyroelectric detectors from InfraTec can be used in gas analysis, fire and flame sensor technology, NDIR spectroscopy and non-contact temperature measurement.

The German privately held company has established subsidiaries in the USA and Great Britain as well as a sales office in China in order to reinforce its activities in the leading markets in Europe, North America and Asia.

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