

4QD - VIS/UV/IR

- Most commonly used detectors
- Highest resolution (down to < 100 nm)
- Fast position detection (up to 500 kHz)



Figure 1: Rear side of 4QD vis detector
(The base plate is not included in the delivery.)

Product description

The 4QD detectors are detectors with 4-quadrant diodes. The position of a laser beam on the diodes can be displayed without delay on an oscilloscope or, if MRC's beam stabilization system is used, in the plots of the software. Even fastest fluctuations are resolved. The 4QD detectors measure the center of the power distribution. They differ from both, beam profilers, which do not show positions in real time and do thus not resolve fast motions, and fast photodiodes, which do not measure beam positions at all.

The 4QD detectors are characterized by a very high spatial resolution. With suitable parameters, resolutions down to and even below 100 nm are possible (see figure 2). By fixing the sensors with Invar, a material with a small coefficient of thermal expansion, the position is also maintained on long term. In combination with the *Compact* beam stabilization of MRC, 4QDs are the most commonly used detectors.

For easy adjustment of the laser onto the sensor, the 4QD detectors have position and intensity displays on the rear side.

Vacuum and clean room versions are also available.

Specifications

Detector type	Wavelength	Detection area	Gap ***
4QD standard (vis)	320 – 1100 nm	10 x 10 mm ²	30 µm
UV 4QD 3x3	190 – 1000 nm	3 x 3 mm ²	100 µm
UV 4QD 10x10 */**	170 – 1000 nm	10 x 10 mm ²	30 µm
IR 4QD InGaAs	900 – 1700 nm	Ø = 3 mm	45 µm
IR 4QD Germanium	800 – 2000 nm	Ø = 5 mm	35 µm

Resolution	Down to < 100 nm (see figure 2)
Bandwidth	Up to 500 kHz (Default setting: 30 kHz)
Peak holder	For signal stretching with pulsed lasers
Optical filters in slot in front of sensor / dimension	2 pieces, exchangeable / 11.9 x 11.9 mm ²
Position display / Intensity display at housing	LED cross with 9 LEDs / LED line with 10 LEDs
Signal scaling of position output	12.6 mV/µm @ d = 1 mm and I = 4 V ****
Electrical power consumption	max. 1.3 W (12 V, 110 mA)

- * The UV 4QD 10x10 is especially recommended for use with UV lasers of e.g. 193 nm. It is characterized by a low degradation of the sensitivity.
- ** The UV 4QD 10x10 must be handled with particular care as the bond wires are freely accessible. When changing the filters, the sensor must not be touched or contaminated.
- *** The "Gap" designates the non-sensitive separation line between the four quadrants of the diode.
- **** Here d denotes the beam diameter and I the intensity hitting the sensor. A formula for calculating the position output for other parameters is given in the manual.

Data sheet

4QD Detectors



Sensitivity

The sensitivities of all detectors depend on the wavelength. Typical ranges are :

4QD standard (vis) / UV 4QD 3x3	5–1130 μ W cw / 2–370 nJ @ 532 nm
UV 4QD 10x10	25–5600 μ W cw / 25–5600 nJ @ 193 nm
IR 4QD Germanium / IR 4QD Germanium	3–400 μ W cw / 3–400 nJ @ 1500 nm

The specification refers to the values on the sensor. With optical filters in front of the sensor, significantly higher powers or energies can be used. The damage threshold of the detector is defined by these filters (see the separate description "Selection of filters"). Fine adjustment of the sensitivity is possible via two push-buttons. In case of UV detectors, we recommend to work with the lowest possible power in order to avoid a degradation.

General Data

Material	Anodized aluminium, Invar, etc.
Dimensions (H x W x D)	49.5 x 40 x 23.9 mm (without post, rod, and filter slot)
Weight	85 g (without post and rod)

Resolution

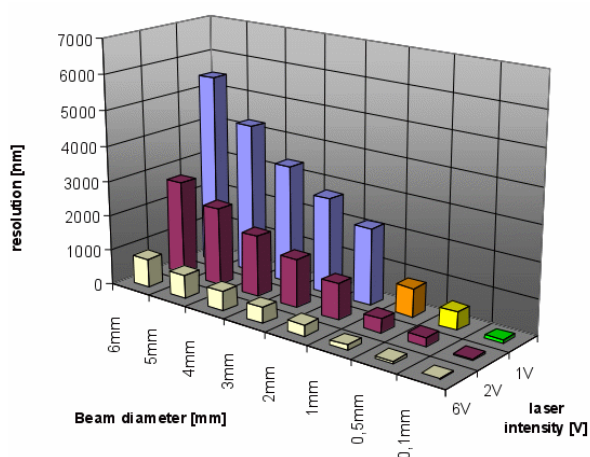


Figure 2: Resolution of a 4QD detector measured with a red He-Ne laser

Pin configuration FGG.0B.306.CLAD52

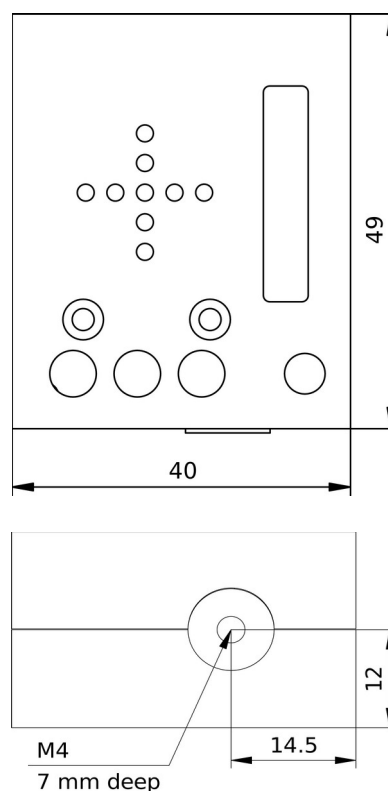
LEMO	Signal
Pin 1	GND
Pin 2	+ 12V
Pin 3	-
Pin 4	X position
Pin 5	Y position
Pin 6	Intensity

Cables

Adapter cable: 4x MCX (at detector), length 16 cm
Extension cable: LEMO → LEMO, length 4 m

Technical drawings

Rear and bottom view of all detectors

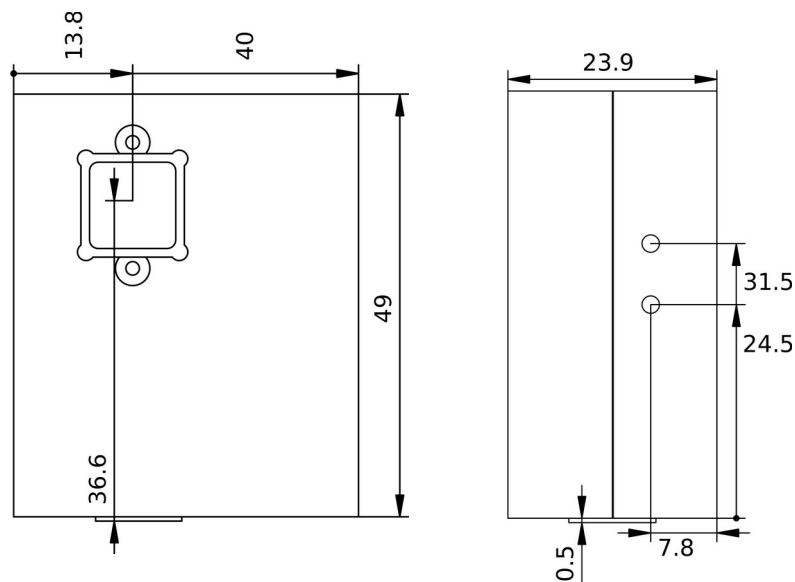


Data sheet

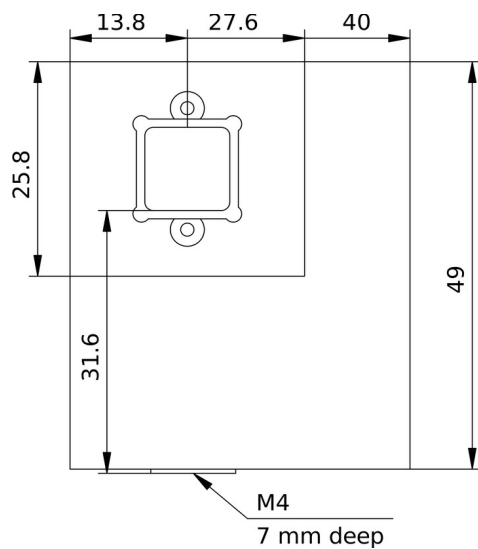
4QD Detectors



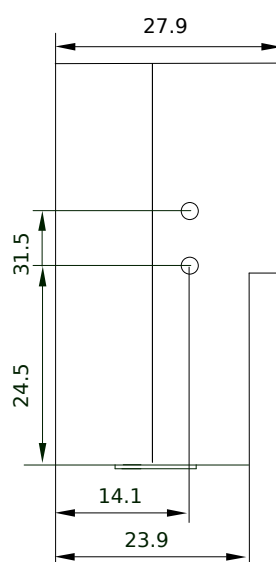
Frontal and side view of 4QD standard (vis) and
UV 4QD 10x10



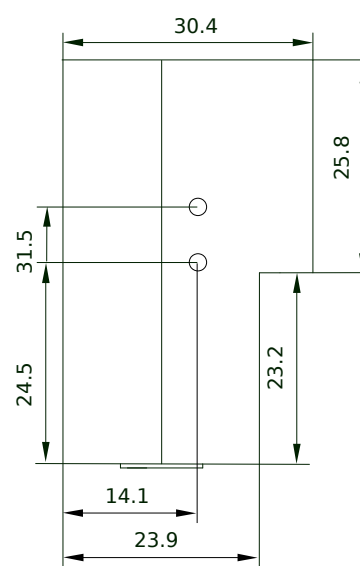
Frontal view of UV 3x3, IR Germanium and
IR InGaAs



Side views
UV 3x3 and IR Germanium



IR InGaAs



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Subject to change without prior notice.