

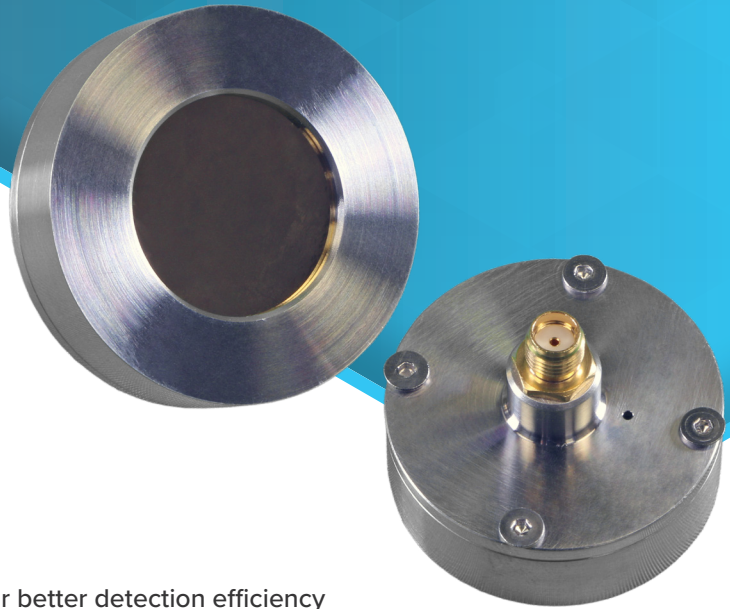


DETECTORS

Silicon Lithium Si(Li)

*Silicon Lithium drifted detectors Si(Li) for
Charged Particles Spectroscopy*

Lithium drifted Silicon detectors to address the need for better detection efficiency for high energy charged particles.



KEY FEATURES

- Designed for highly penetrating charged particles measurements at room temperature
- Better stopping power than implanted silicon PIPS® detectors: up to 3 MeV Betas, 30 MeV protons, 140 MeV Alphas. More if detectors are stacked
- Designs for LN₂ cooled applications like conversion electron spectroscopy
- As an option:
 - Thin back contact available (transmission option) for the dE/dx measurement or stack arrangement with connector on the side
 - Special dimensions, shapes, connectors
 - Segmentation: pixels or strip / single or double sided

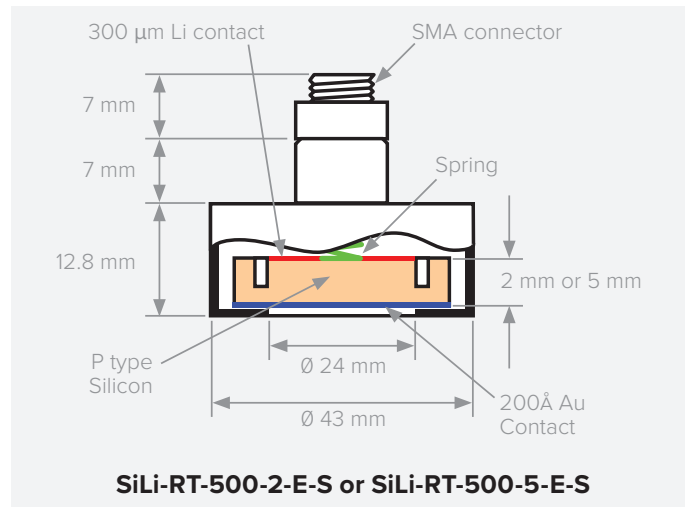
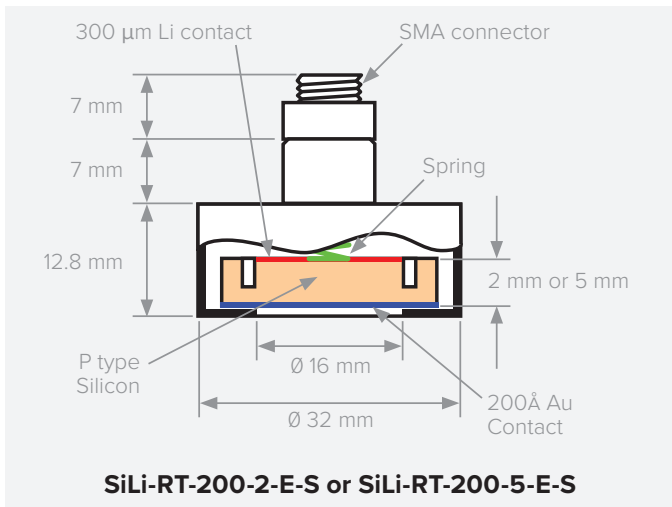
ROOM TEMPERATURE SI(LI) DETECTORS

Description

- As a standard two active areas 200 mm² and 500 mm²
- As a standard two thicknesses 2 mm and 5 mm.
- Other dimensions or shapes are available on request
- Gold entrance window 0.2 μm equivalent silicon
- Lithium back contact 300 μm. As an option a thin 50μm contact is possible for transmission mode (deltaE)
- Circular Stainless Steel mounts
- SMA female connector at the back of the housing

Operation

- The detectors can be operated either under vacuum or atmospheric pressure
- They must be used in darkness
- Maximum count rate 100 k count per sec at 524 keV electrons



Reference for SiLi-RT	Active Area [mm ²]	Active Thickness [mm]	FWHM alpha [keV]	FWHM pulser [keV]
SiLi-RT-200-2-E-S	200	2	35	30
SiLi-RT-200-5-E-S	200	5	50	45
SiLi-RT-500-2-E-S	500	2	45	40
SiLi-RT-500-5-E-S	500	5	55	50

Measurement Conditions

- Alpha ²⁴¹Am source (5.486 MeV) under vacuum
- Short distance between the preamplifier and the diode (cable <10 cm)
- With a Mirion charge sensitive preamplifier PSC765
- Shaping time of 0.5 to 1 μs with a Mirion amplifier 2025 or 2026
- Count rate <1000 counts per second
- At +20 °C, in full darkness

Operating Conditions

- Temperatures <+35 °C
- Humidity <80%, non-condensing

Storage Conditions

- Temperatures <+20 °C
- Humidity <80%, non-condensing

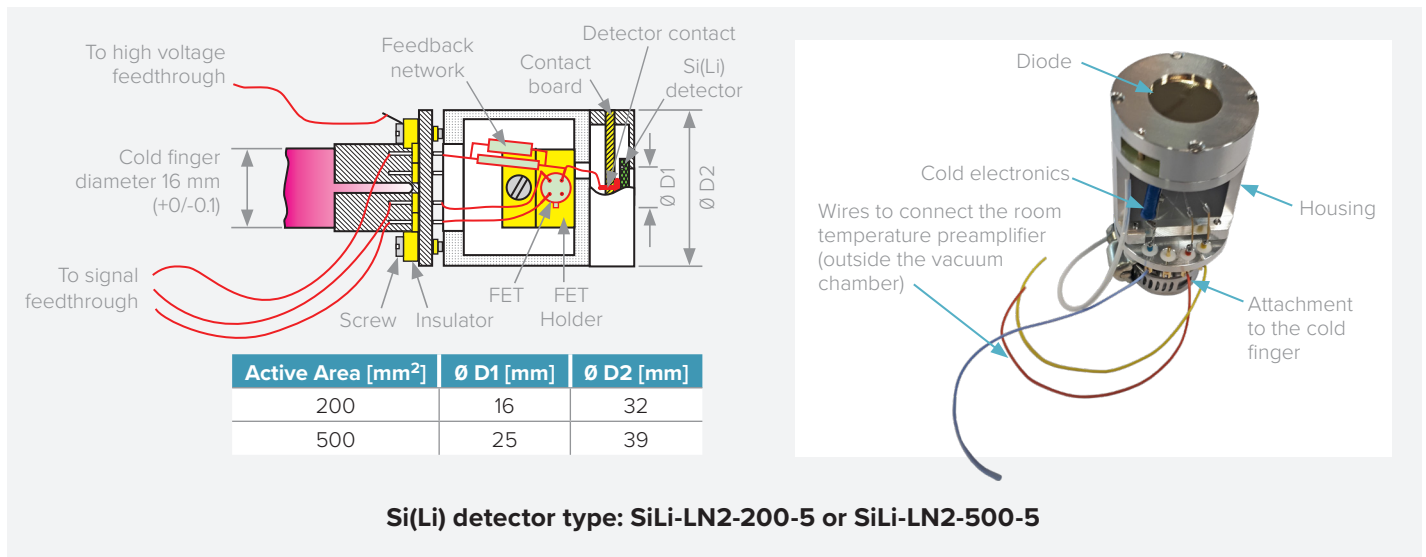
NOTE: For higher storage temperatures, please consult factory to avoid any Lithium retro-drift.

Recommended Preamplifiers

- Mirion model PSC765

Options

- Transmission type detector: thin back contact for the dE/dx measurement or stack arrangement (select T instead of E in the reference table)
- Annular design
- BNC connector instead of SMA (select B instead of S in the reference table)
- Optimized charge sensitive preamplifier PSC765



LN₂ cooled Si(Li) detectors

Description

- A kit configuration is delivered with all components required for integration into an existing vacuum chamber:
- The aluminum mount including the diode and the first stage of the charge sensitive preamplifier (input FET, feedback network). The mount outputs on a 16 mm diameter cold finger
- Two feedthroughs (multipin and high voltage connectors) to be glued by the user on its cryostat
- A charge sensitive preamplifier with a 3.5 meter cable set

Spectroscopy Performance Table

Reference for SiLi-LN ²	Active Area [mm ²]	Active Thickness [mm]	FWHM electron at 624 keV [keV]	FWHM X-ray at 5.9 keV [eV]
SiLi-LN2-200-5	200	5	2.2	
SiLi-LN2-500-5	500	5	2.2	
SiLi-LN2-500-5 w/ cryostat	500	5	2	460
SiLi-LN2-200-5 w/ cryostat BWR	200	5	2	460*

* Only with an optional Be window

Operation

The detector is to be mounted by the user on the cold finger of its cryostat (not supplied). The remaining part of the resistive preamplifier is mounted outside the experiment chamber.

A complete cryostat version is also available, providing user-friendly features to create a common vacuum between the cryostat and the experiment chamber. It consists in:

- Lithium drifted Silicon diode
- Flanged dipstick cryostat with horizontal output and with a 30 liter Dewar – additional cryostat configurations and electrical cryocooling are available as an option
- Flange on the cap enables a vacuum connection on the customer's vacuum chamber
- The removable flange is equipped with a Be window (typ. 125 µm) for X-ray measurements. Also, gated valves are available as an option to replace the removable flange, allowing for much easier vacuum operations
- Charge-sensitive preamplifier with a cold input stage and resistive feedback network – an alarm card drives the bias shut down signal in case of incorrect temperature
- Set of cables (power supply – signal – high voltage)
- VOP10 vacuum operator to enable easy access to the cryostat vacuum

Silicon Lithium Si(Li) | Silicon Lithium drifted detectors Si(Li) for Charged Particles Spectroscopy

Recommendations

Because the Si(Li) detector is sensitive to visible light, there must be no light leaks on the vacuum chamber of the experiment.

No outgasing at high temperature is possible with Si(Li) detectors to avoid drift of the Lithium. The pumping should only be performed at room temperature.

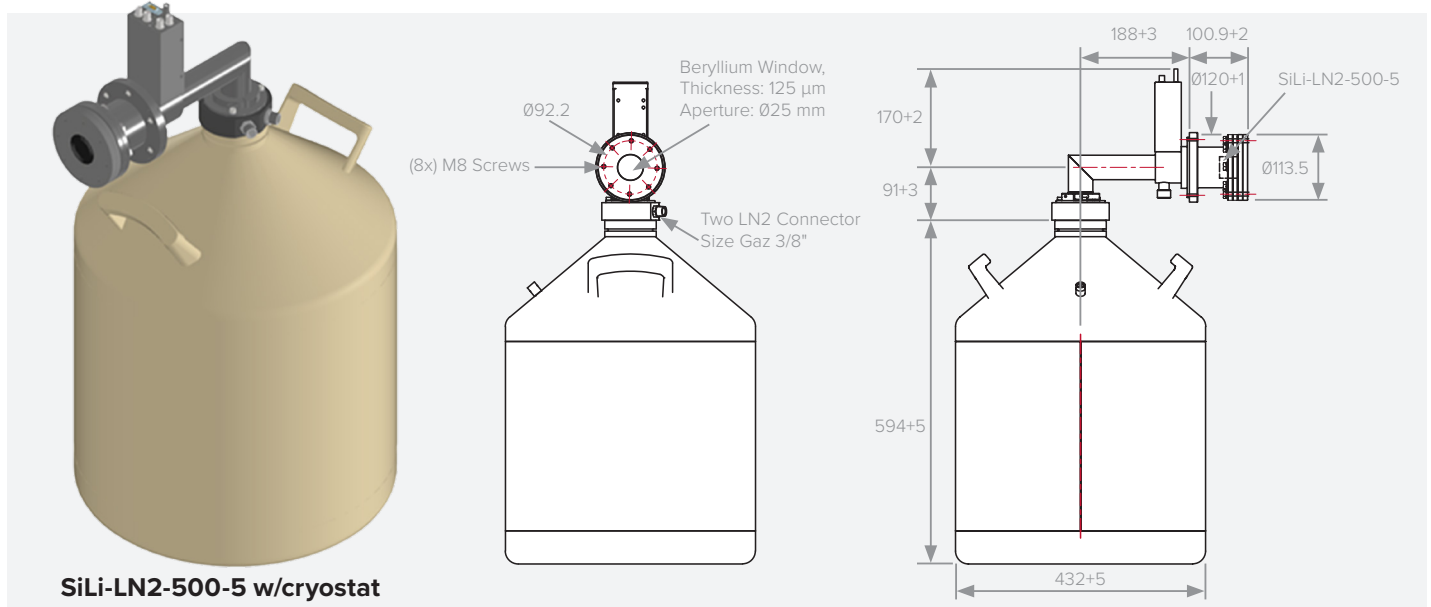
Be careful with the Beryllium window on the removable flange when dismantled.

Always avoid breaking the vacuum if the Si(Li) detector has not reached room temperature: the icing effect will cause irreparable damage to the detector.

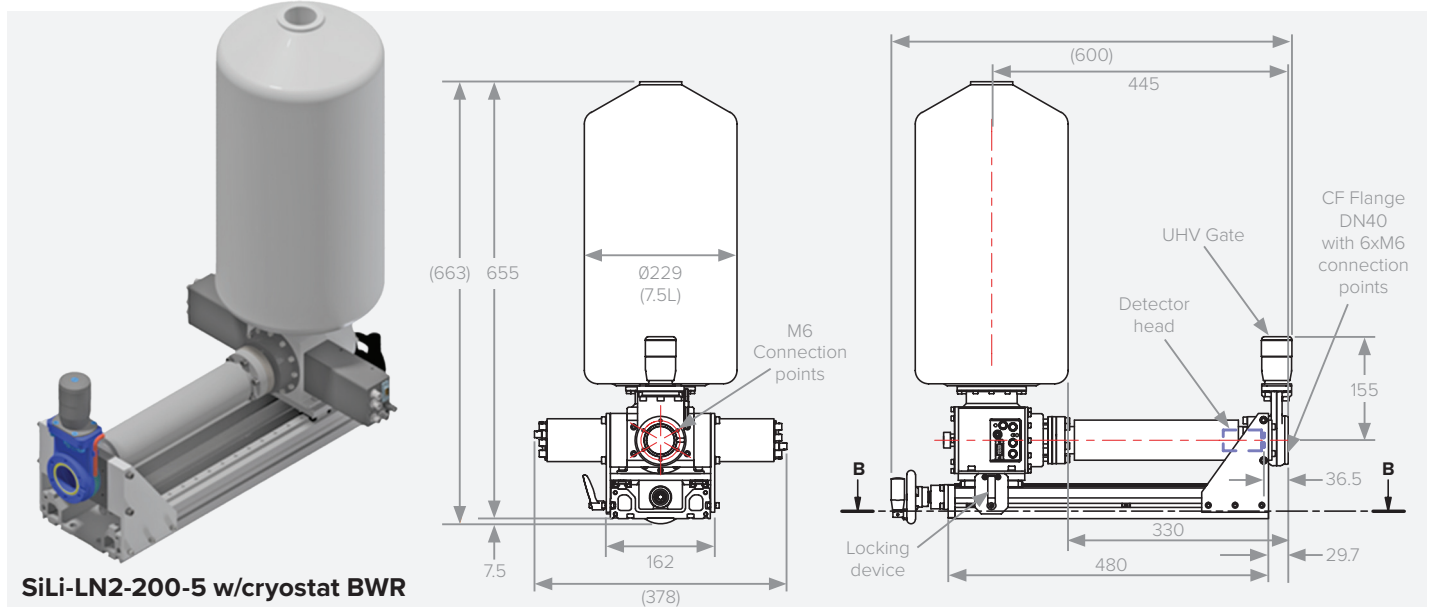
Mechanical contact between the Si(Li) diode and any hardware should be avoided.

The UHV-vacuum-gated valve makes it possible to directly connect the cold detector to the vacuum chamber. This will avoid the time consuming warm up and cool down periods.

Please contact Mirion for any additional information.



SiLi-LN2-500-5 w/cryostat



SiLi-LN2-200-5 w/cryostat BWR

