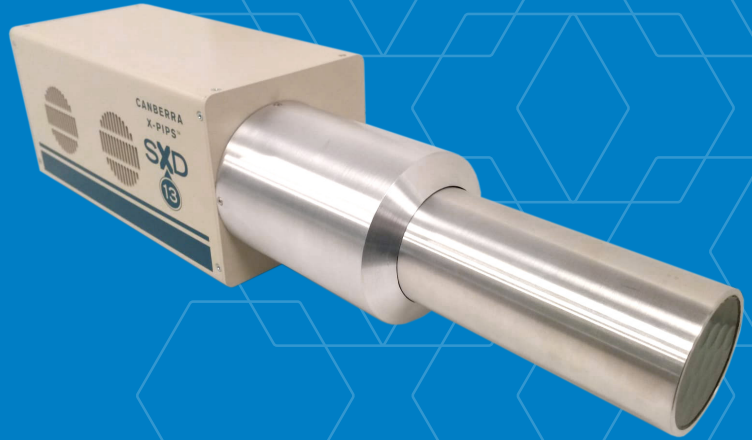




DETECTOR

# X-PIPS™

## 13-Element SDD Array



**X-PIPS™ is a spectroscopy sub-system sensitive to X-rays and low-energy gamma rays. It comprises 13 Silicon Drift Detectors (SDD) with a low noise CMOS reset type preamplifier, a HV bias supply and a cryogenic cooler.**

The X-PIPS detector array is a spectroscopy sub-system sensitive to X-rays and low-energy gamma rays. It is comprised of thirteen Silicon Drift Detectors (SDD) with a low noise CMOS reset type preamplifier, a HV bias supply and a cryogenic cooler.

The detector elements and CMOS preamplifiers are cooled and temperature regulated, ensuring stable operation in changing environmental conditions. The Beryllium entrance window is 2 mil (50 µm) thick which allows for measurement of X-rays as low as 2 keV.

The CMOS preamplifiers have a fast reset mechanism which reduces dead time and allows the detector to perform well at high count rates.

### FEATURES

- ✓ Thirteen Silicon Drift Detectors (SDD)
- ✓ 2 mil (50 µm) Be window
- ✓ CMOS Preamplifiers
- ✓ HV bias supply
- ✓ Cryogenic (pulse-tube) cooled

### PERFORMANCE

- ✓ Total maximum output count rate: >50 Mcps
- ✓ Guaranteed resolution: <135 eV FWHM (typ. below 125 eV)
- ✓ Energy range: 2 to 30 keV
- ✓ Collimated active area: 13 x 80 mm<sup>2</sup>
- ✓ Detector thickness: 0.5 mm

### APPLICATIONS

- ✓ X-ray Absorption Spectroscopy (EXAFS, XANES)
- ✓ X-ray Fluorescence
- ✓ X-ray Diffraction
- ✓ Mössbauer Spectroscopy
- ✓ Densitometry

## X-PIPS 13-ELEMENT SDD ARRAY

The high performance SDD combined with a CMOS preamplifier provides a very fast, low noise response, which results in extremely good energy resolution with fast peaking times. The signal rise time is well below 50 ns which makes for excellent energy resolution at high count rates.

The energy resolution is guaranteed within an ambient temperature range of +10 °C to +30 °C with the default factory settings.

The detector is cooled by a 1.5 W pulse-tube cooler. This technology allows low operating temperature which leads to faster signal rise time and better resolution at higher count rates. Other advantages of this cryo-cooler are the ease of maintenance, high reliability, long lifetime (>10 years), low power consumption (<50 W) and very low vibration levels. The pulse-tube cooler operates with a pressure wave instead of a piston, virtually eliminating wear and vibrations. Although the compressor already exhibits very low vibration levels, all efforts are done to reduce these even more. Apart from shock mounts to isolate the compressor from the rest of the cooler and the detector housing, the system is equipped with an active vibration reduction system.

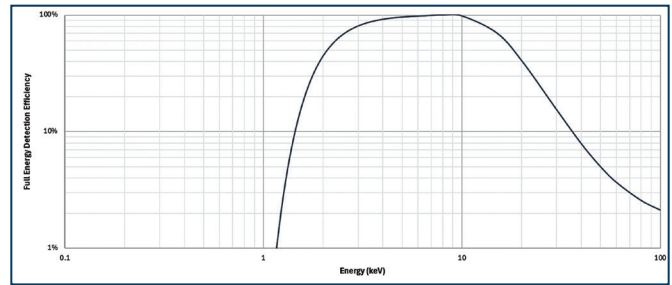


Figure 1: Calculated efficiency curve for the X-PIPS detector with 2 mil Be window and 500 μm Silicon.

Table 2. Guaranteed energy resolution at higher count rates. Energy resolution is given at 5.9 keV (Mn-Kα).

Input count rate (Mcps)	Output count rate (Mcps)	Energy resolution FWHM (eV)	
		Typical	Max
1	>0.9	150	200
2	>1.5	160	230

Table 1.

Model	Collimated Active Area (mm <sup>2</sup> )	Collimator	PTB		Energy Resolution FWHM (eV)*			
			Typical	Max	Typical	Max	Typical	Max
					@ Optimum Peaking Time	@ 1 μs Peaking Time		
SXD13x80M-500-CM	13 x 80	Multilayer	15000	>10000	125	135	130	150

\* Energy resolution is given at 5.9 keV (Mn-Kα), with an ambient temperature ranging from +10 °C to +30 °C, on a digital spectroscopy system with trapezoid shaping filter.

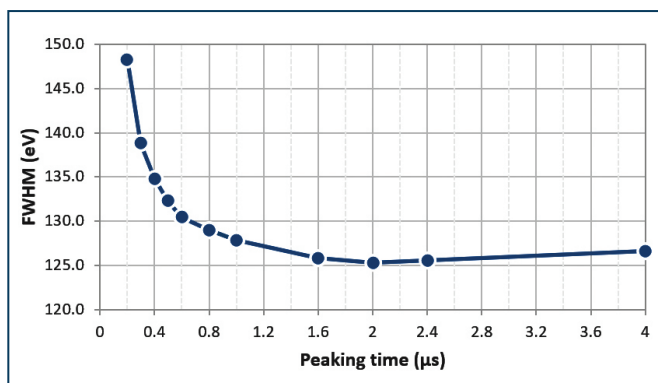


Figure 2: Typical resolution as a function of the peaking time at 5.9 keV (Mn-Kα).

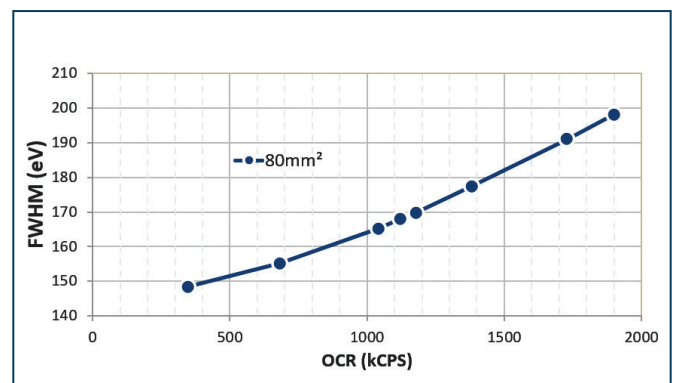


Figure 3: Typical resolution at higher count rates at 5.9 keV (Mn-Kα).

## X-PIPS 13-ELEMENT SDD ARRAY

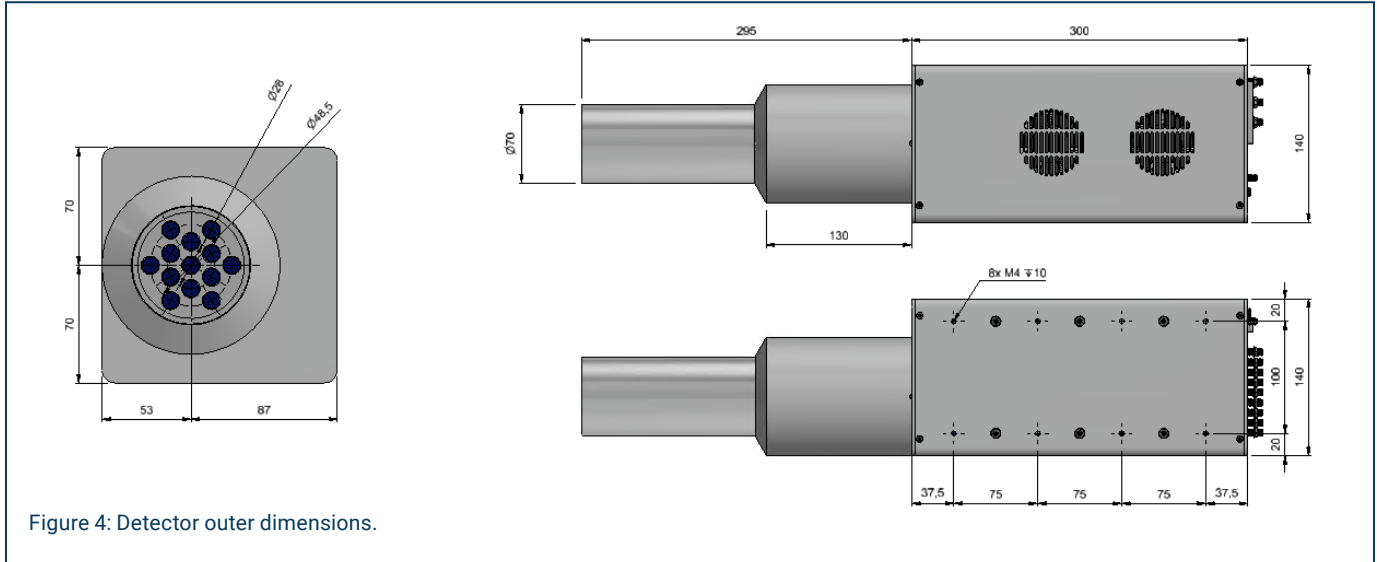


Figure 4: Detector outer dimensions.

## SPECIFICATIONS

### PHYSICAL

#### Cold Head (Excluding detector chamber):

- Dimensions: 140 x 140 x 300 mm (5.7 x 11.3 x 12.3 in.) (W x H x D)
- Weight: 8 kg (18 lb) approximately

#### Power Controller:

- Dimensions: 280 x 88 x 315 mm (11 x 3.5 x 12.4 in.)
- Weight: 5.3 kg (11.6 lb)
- Power Controller Cable Length: 3 m (10 ft)

#### Option:

- Model CP5PLUS-C-25: Controller Cable 7.5 m (24.5 ft)

### PERFORMANCE

#### Gain Stability:

- <25 ppm/°C over a range between +10 °C to +30 °C
- <50 ppm over 24 h at constant temperature with 1 h stabilization

#### Charge Sensitivity:

- Gain is 4 mV/keV
- Gain tolerance is  $\pm 25\%$

#### Power Requirements:

- 110-240 V, 50-60 Hz, 60 W maximum

### OUTPUTS AND INDICATORS

#### Energy Output:

- Provides staircase output function with step amplitude proportional to the absorbed photon energy. The output swing range is from -1.5 V to +2 V open circuit. The reset is a transistor reset. Output impedance is 50  $\Omega$ , series connected, dc coupled.
- SMA female connector

#### Temperature Indicator:

- Two LED's are present on the rear panel of the X-PIPS detector. The blue LED indicates that the detector is cooled down to its setpoint. The green LED indicates that the detector has NOT reached its setpoint.
- SMA connector for temperature readout

#### RS-232:

- Remote control and status read-out (USB/RS-232 adapter provided)

#### DB15-F:

- Relay output – cooler status and warm/cold indication

### ENVIRONMENTAL

- Operating Temperature: +5 to 30 °C
- Operating Humidity: 0 to 80%, non-condensing

### ORDERING INFORMATION

- SXD13x80M-500-CM
- Contact factory for custom configurations.



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