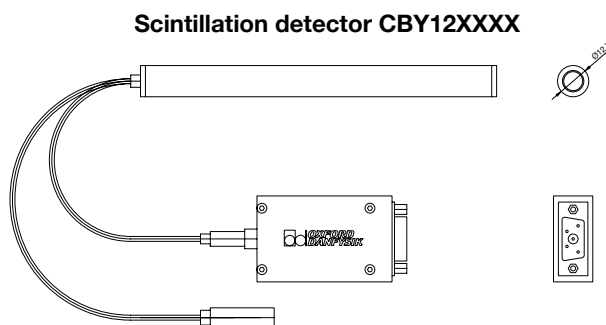
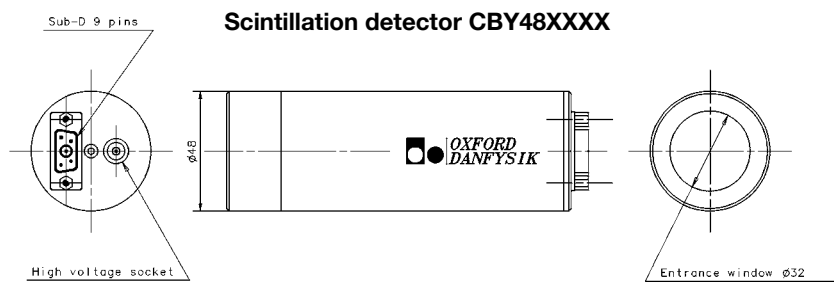


CBY Cyberstar Scintillation Counter X2000

The Cyberstar is the scintillation counter of choice in many of the world's synchrotron beamlines with about 250 installed around the world. The X2000 unit supercedes the popular X1000. The system has been upgraded to obtain maximum performance from the CBY48YA11P and CBY12YA12P YAP heads (linear up to 1.5MHz, up to 3MHz with counting loss correction) owing to the fast shaping constants (40, 100, 300, 1000ns.) The upgraded electronics units are fully compatible with the NaI(Tl) heads which have a lower energy capability, and better energy resolution. We also offer a 5 channel version of the electronics.



Specifications

Part Number	CBY48YA11P	CBY48NA01B	CBY48NA02B	CBY48NA05B	CBY12NA02B	CBY12YA12P
Body Length		138mm			144mm	
Body Diameter		48mm			12.5mm	
Detector Aperture		30mm			6mm	
Scintillator	YAP	NaI(Tl)			YAP	
Crystal Thickness	1mm	2mm	5mm		2mm	
Photomultiplier Ø		38mm			10mm	
Photomultiplier Gain		10 ⁶				
Window	70µm Conducting polymer	0.2mm Beryllium			70µm Conducting polymer	
Background Noise		<0.2cps at 5keV				
Minimum Energy	5-6keV	1.5keV			5-6keV	
Advantages	Fastest count rate (linear to 1.5MHz, up to 3MHz with counting loss correction)	Best efficiency and good energy resolution			Fastest count rate (linear to 1.5MHz, up to 3MHz with counting loss correction)	

Preamplifier

The preamplifier is internal on 48mm diameter heads, and external on a short flying lead for smaller diameter heads.

Output impedance	50Ω		
Bandwidth Gain	500MHz	180MHz	500MHz
Slew rate	2000 V/µs		

CBY-2202 NIM Electronics module (single channel)

Shaping amplifier

Gain	Adjustment by front panel scroll keys
Shaping constants	40, 100, 300, and 1000ns adjustable by front panel scroll keys
Baseline shift	Negligible
Pulse output	BNC - 50Ω

Single channel analyser

Controls	
Lower level	Front panel mounted scroll keys
Upper level	Front panel mounted scroll keys
Outputs	
	BNC, Positive TTL, 0.8-2V into a 50Ω load (short circuit protected) Jumper selection for lower level, upper level, or window output

High voltage power supply

Output range	0-1250V Adjustable by front panel scroll key
Output connector	SHV high voltage socket on rear panel
Display	2 LCDs each having 2 lines 8 characters with backlight. Displays gain, shaping constant, lower level, upper level and high voltage

Miscellaneous

Power req.	+24V, 120mA; +12V, 200mA; -12V, 20mA; +6V, 250mA; -6V, 150mA
Phototube preamp power	NIM standard, 9 pin sub-D, female connector on rear panel
Head cable length	5m, 10m, 15m, and 20m

Computer control

The RS232 communications port can be used to independently control phototube high voltage, preamplifier gain, single channel analyser lower and upper levels, shaping constant. The standard cable lengths are 5m, 10m, 15m, and 20m.

CBY-1300 NIM linear rate meter

General

Linearity	Better than 0.1% of full scale
Stability	0.01% of full scale per °C
Count rate	Six position front panel switch giving count rate selection between 10 and 10 ⁶ cps full scale reading
Time constant	Four position front panel switch selecting 0.1, 0.3, 1 and 3μs
Pulse input	Front panel BNC, TTL standard, 50ns minimum duration
Indicator	Large 70mm x 23.5mm edge reading galvanometer
Output	Front panel BNC, recorder output, 0-1V, short circuit protected
Speaker	4 BNC, positive TTL, 0.8-2V into a 50Ω load (short circuit protected) for upper level, lower level, signal and window
Power req.	+24V 50mA, -24V 20mA
Dimensions	The unit is supplied in a single NIM format, 34.3mm x 221.3mm. A 3U 19" rack mounting version is available

Ordering information

A single channel system comprises a detector head, a head cable, a counter module, and an RS232 cable. The rate meter is optional.

Item	Part Number	Description
Detector head	CBY12NA02B	12.5mm body, 6mm aperture, 2mm NaI(Tl) scintillator, Be window
Detector head	CBY12YA12P	12.5mm body, 6mm aperture, 2mm YAP scintillator, polymer window, fast pre-amp
Detector head	CBY48YA11P	48mm body, 30mm aperture, 1mm YAP scintillator, polymer window, fast pre-amp
Detector head	CBY48NA01B	48mm body, 30mm aperture, 1mm NaI(Tl) scintillator, Be window
Detector head	CBY48NA02B	48mm body, 30mm aperture, 2mm NaI(Tl) scintillator, Be window
Detector head	CBY48NA05B	48mm body, 30mm aperture, 5mm NaI(Tl) scintillator, Be window
Detector head	CBY48VNA01B	Vacuum compatible detector head
Counter module	CBY-2202	Fast scintillation counter PPU NIM 1 channel + RS232
Counter module	CBY-2206	Fast scintillation counter PPU NIM 5 channel + RS232
Rate meter	CBY-1300	Linear rate meter NIM module
Head cable	CBY-1401,2,3,7	Pulse processing cable 5m, 10m, 15m, and 20m long
RS232 cable	CBY-1404,5,6,8	RS232 cable 5m, 10m, 15m, and 20m long



CBY-2206 NIM 5 channel electronics module

The specifications are identical to the CBY-2202, except that the module does not contain the high voltage supply. We recommend a dedicated HVPSU. The current consumption on the 6V rails is higher as follows:
+6V, 1250mA; -6V, 750mA

Cyberstar Scintillation Counter - Frequently Asked Questions

Can I connect multiple detectors together?

The RS232 protocol used permits a system to be installed as part of network of up to 16 detectors (including other scintillation counters or our IC Plus Ion Chambers) through just one serial port on a host computer. Each unit is assigned a unique address for communications. This is particularly common for powder diffraction experiments where large numbers of heads may be used simultaneously.

- Custom cables to “daisy-chain” multiple electronics modules are also available to order.
- Custom built arrays of heads in a single housing can be constructed to order.

How fast will the detectors count?

Comparison is slightly difficult as the experimental conditions and the synchrotron bunch structure will have an effect, in practice with (NaI(Tl)), the maximum count rate is 1,000,000cps, the linear range is 500,000cps. *This has been measured recently at the ESRF with a NaI(Tl) head followed by the new high-speed pre-amplifier.* YAP heads have count rates of several MHz depending on conditions.

How can I use the scintillation counter?

A range of typical experiments is shown below. If there is a need to cover a larger solid angle then multiple detectors can be used. The narrow (CBY12) detector head may be useful in crowded experimental areas or can be used in multiples where the larger aperture (CBY48) head would perhaps limit positional information. Vacuum adaptors are also available.

Why choose YAP over NaI(Tl) as the scintillator material?

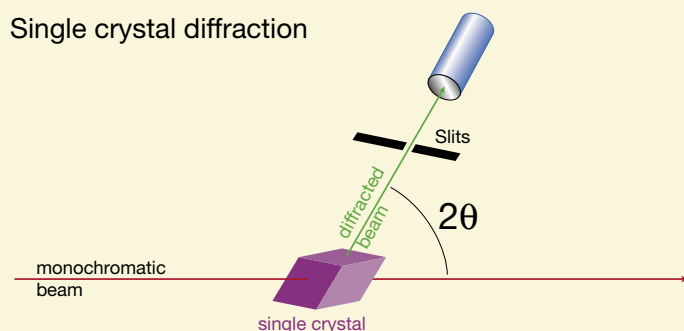
Light pulses from YAP decay very quickly compared to NaI(Tl) - about 8 times faster, although in practice this is limited by the bandwidth of the electronics. YAP will always count faster, however its energy resolution is not so good - 25% at 60keV, versus 15% for NaI(Tl), and the low energy performance is impaired due to the lower efficiency of conversion; typically 5keV should be considered a minimum workable energy for this material.

What thickness of scintillation crystal should I choose?

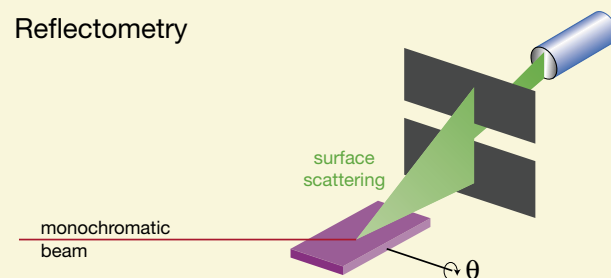
99% of all detectors we sell have 1mm crystals, except for the small diameter heads which use 2mm crystals for ease of manufacture. In practice the thickness has little effect, and the heads can be used over a wide range of energies. Please see our table of absorption versus energy for various crystal thicknesses. If the crystal is thinner than ideal for a particular energy then some X-rays will penetrate the crystal and not be converted into visible light (so there is an apparent counting loss), if the crystal is too thick then the light produced has to go through a greater thickness of crystal before entering the PMT, fortunately NaI(Tl) is quite transparent.

	Thickness (mm)		
	1	2	5
99% absorption	20 keV	30 keV	90 keV
90% absorption	30 keV	80 keV	120 keV
80% absorption	70 keV	95 keV	150 keV

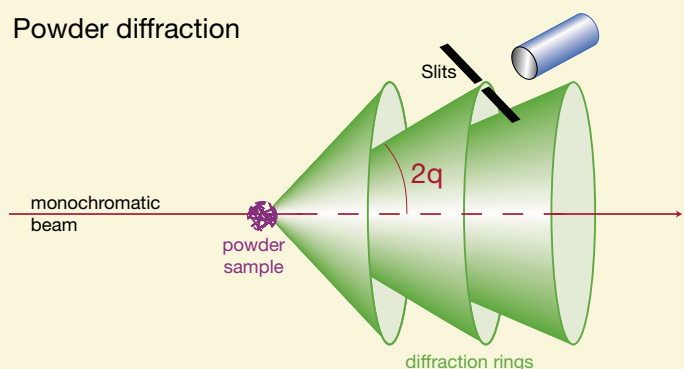
Single crystal diffraction



Reflectometry



Powder diffraction



Intensity or polarisation monitor

