

High Energy Detection

## Features and Benefits

- **‘Standalone’ Beryllium window<sup>1</sup>**  
200 µm thick Beryllium foil window as standard
- **TE cooling down to -100°C**  
Critical for elimination of dark current
- **UltraVac™**  
Critical for sustained vacuum integrity and to maintain unequalled cooling, year after year
- **Hermetic vacuum seal**  
Maximum protection of sensor QE performance over time, no inconvenient sensor chamber maintenance
- **Multi-Megahertz readout**  
High repetition rates achievable with low noise electronics
- **Down to 13.5 x 13.5 µm pixel size**  
Optimal balance of dynamic range and resolution
- **Crop mode operation**  
Specialized acquisition mode for continuous imaging with fast temporal resolution
- **USB 2.0 connection**  
USB plug and play – no controller box
- **Enhanced baseline clamp**  
Quantitative accuracy of dynamic measurements
- **Software-selectable pre-amplifier gain**  
Choice of best SNR performance or dynamic range at the touch of a button
- **Software Development Kit (SDK)**  
Ease of control integration into complex setups: Linux, Matlab, Labview, Visual Basic or C/C++
- **Integrated in EPICS**  
Platform is fully integrated into the EPICS control software

## ‘Standalone’ Soft X-Ray Spectroscopy @ -100°C

Andor’s Newton SY series features high-QE sensors ideal for direct detection of low flux and low energy photons such as soft X-Rays. A convenient thin Beryllium foil window blocks visible wavelengths with minimal ‘Beam Hardening’ of X-Ray energies. The maintenance free vacuum design allows for long exposures at the highest sensitivity. Variable readout rates enable data readout at up to 3 Megahertz, through the plug and play USB interface.

The camera utilizes a 1024 x 255 (1024 x 256 for BR-DD model) or 2048 x 512 array of 26 x 26 µm or 13.5 x 13.5 µm pixels, with thermoelectric cooling down to -100°C, resulting in negligible dark current and provides unrivalled performance for spectroscopic applications.

## Specifications Summary <sup>\*2</sup>

Active pixels	1024 x 255 (1024 x 256 for BR-DD model) or 2048 x 512
Pixel size (W x H)	26 x 26 or 13.5 x 13.5 µm
Image area	Up to 27.6 x 6.9 mm
Register well depth	
Standard mode	1,000,000 e <sup>-</sup>
High Capacity mode	600,000 e <sup>-</sup>
High Sensitivity mode	150,000 e <sup>-</sup>
Maximum cooling	-100°C
Maximum spectra rate <sup>*3</sup>	1,612 spectra/sec
Read noise	2.5 e <sup>-</sup>
Dark current	As low as 0.0001 e <sup>-</sup> /pixel/sec
Beryllium foil thickness	200 µm

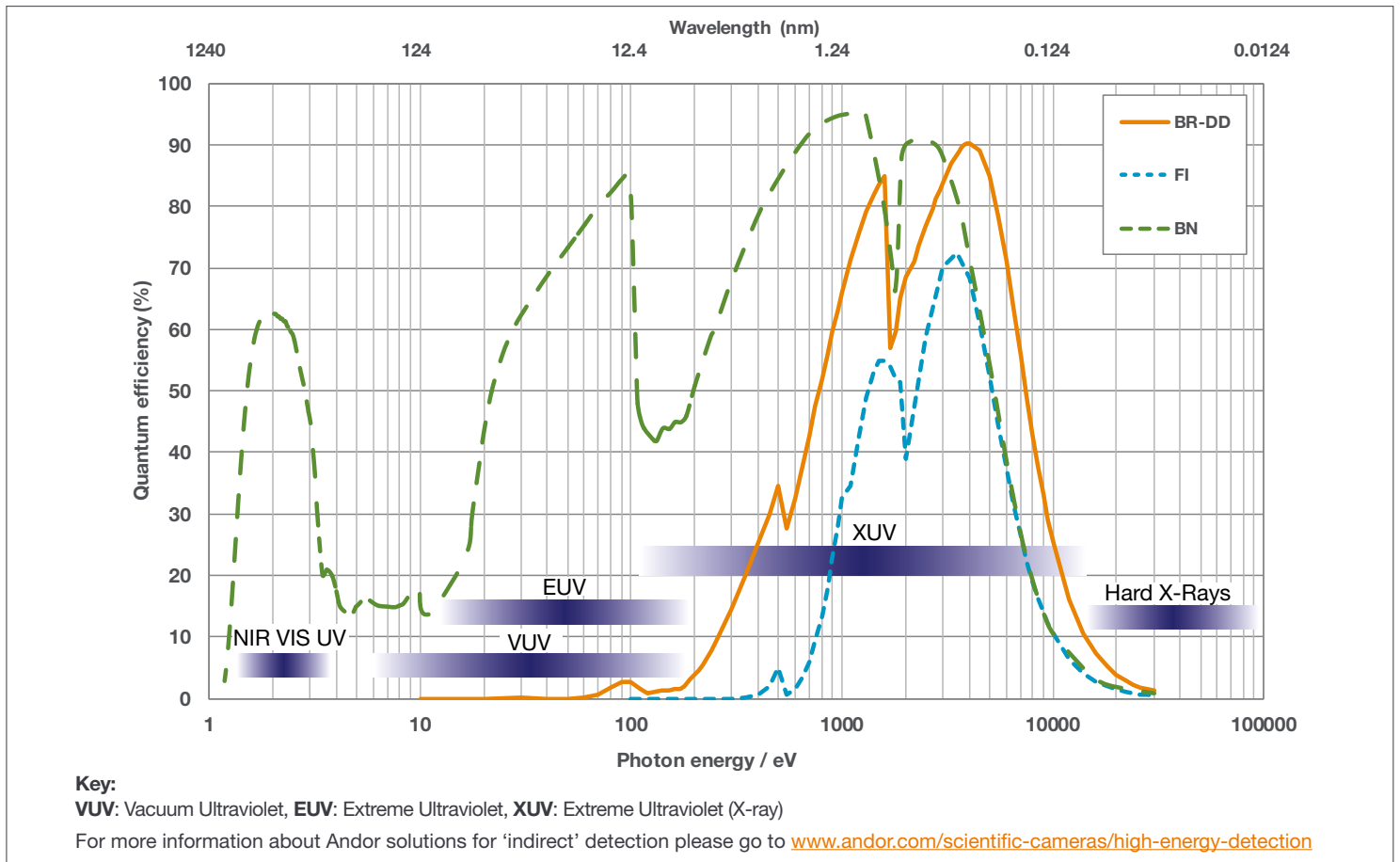
## System Specifications •<sup>2</sup>

Model number	DY920P	DY920P BR-DD	DY940P
Sensor options	<ul style="list-style-type: none"> <li>• BN: Back Illuminated CCD</li> <li>• FI: Front Illuminated CCD</li> </ul>	<ul style="list-style-type: none"> <li>• BR-DD: Back Illuminated, Deep Depletion CCD</li> </ul>	<ul style="list-style-type: none"> <li>• BN: Back Illuminated CCD</li> <li>• FI: Front Illuminated CCD</li> </ul>
Active pixels <sup>*4</sup>	1024 x 255	1024 x 256	2048 x 512
Pixel size	26 x 26 μm	26 x 26 μm	13.5 x 13.5 μm
Image area	26.7 x 6.7 mm with 100% fill factor	26.7 x 6.7 mm with 100% fill factor	27.6 x 6.9 mm with 100% fill factor
Minimum temperatures <sup>*5</sup> Air cooled Coolant recirculator Coolant chiller, coolant @ 10°C, 0.75l/min		-80°C -95°C -100°C	
Blemish specifications	Grade 1 sensor from supplier. Camera blemishes as defined by Andor Grade A: <a href="https://andor.oxinst.com/learning/view/article/ccd-blemishes-and-non-uniformities">https://andor.oxinst.com/learning/view/article/ccd-blemishes-and-non-uniformities</a>		

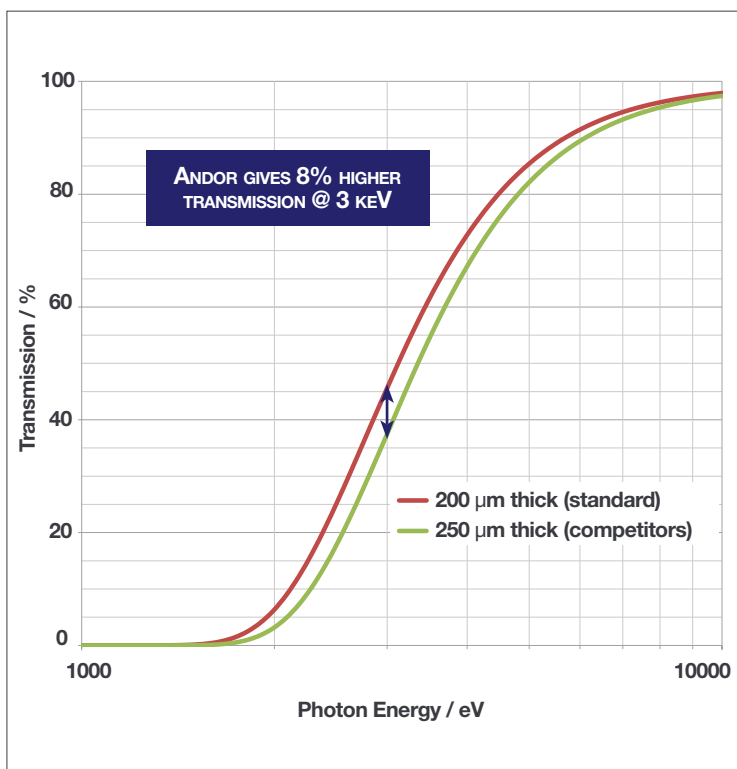
## Advanced Performance Specifications •<sup>2</sup>

Dark current, e <sup>-</sup> /pixel/sec @ max cooling <sup>*6</sup> FI BN BR-DD	0.0002 0.0003 -			- - 0.001			0.00003 0.0001 -		
Register well depth	1,000,000 e <sup>-</sup>			1,000,000 e <sup>-</sup>			-		
Standard mode	-			-			150,000 e <sup>-</sup>		
High Sensitivity mode	-			-			600,000 e <sup>-</sup>		
High Capacity mode	-			-			-		
Read noise (e <sup>-</sup> ) <sup>*7</sup>	50 kHz	1 MHz	3 MHz	50 kHz	1 MHz	3 MHz	50 kHz	1 MHz	3 MHz
Standard mode: Typ (Max)	4 (8)	12 (18)	17 (25)	4 (8)	12 (18)	17 (25)	-	-	-
High Sensitivity mode: Typ (Max)	-	-	-	-	-	-	2.5 (4)	7 (12)	11 (15)
High Capacity mode: Typ (Max)	-	-	-	-	-	-	9 (12)	27 (32)	37 (50)
Sensitivity (e <sup>-</sup> /count)	Adjustable from 2.5 - 10			Adjustable from 2.5 - 10			-		
Standard mode	-			-			Adjustable from 1 - 4		
High Sensitivity mode	-			-			Adjustable from 4 - 16		
High Capacity mode	-			-			-		
Vertical clock speed <sup>*9</sup>	Software selectable between 2 - 179 μs								
Linearity <sup>*8</sup>	Better than 99%								
Digitization	16-bit								

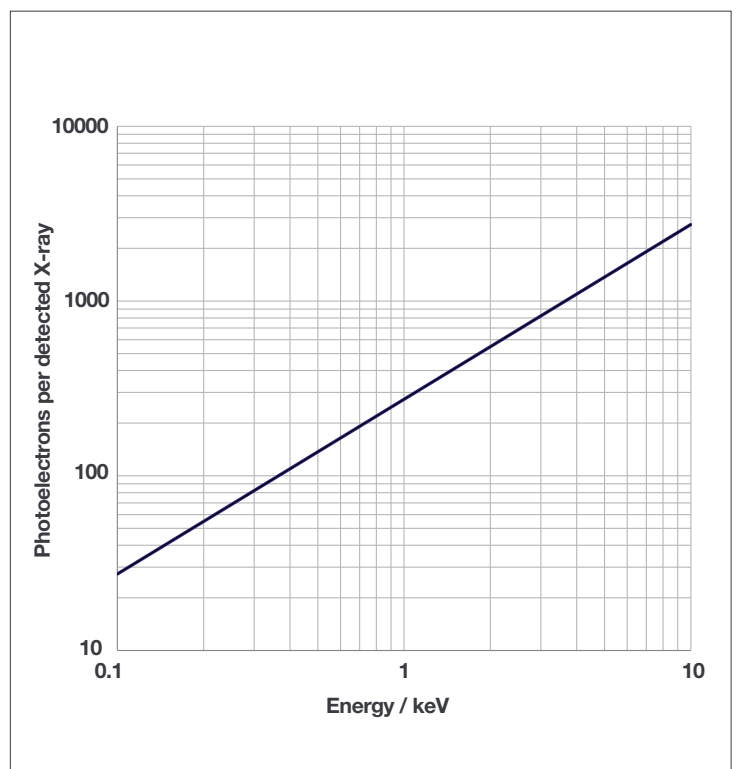
### Quantum Efficiency Curves <sup>\*\*10</sup>



### Beryllium Foil Transmission



### Photoelectrons v Incident X-Rays <sup>\*\*11</sup>



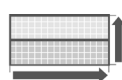
## Creating The Optimum Product for You



DY 940 P - FI - T2

example shown

### Step 1. Choose the sensor array size



Array Size

Description	Code
1024 x 256 pixel array (BR-DD)	920
1024 x 255 pixel array (FI, BN)	920
2048 x 512 pixel array (FI, BN)	940

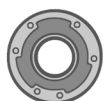
### Step 2. Choose the sensor type option



Sensor Type

Description	Code
Back Illuminated CCD, with no AR coating	BN
Front Illuminated CCD	FI
Back Illuminated, Deep Depletion CCD with fringe suppression (920P only)	BR-DD

### Step 3. Select the required accessories and adapters



Accessories & Adapters

Description	Order Code
Coolant re-circulator for enhanced cooling performance	XW-RECR
Oasis 160 Ultra Compact Chiller Unit (tubing to be ordered separately)	ACC-XW-CHIL-160
6 mm tubing options for ACC-XW-CHIL-160 (2x2.5 m or 2x5 m lengths)	ACC-6MM-TUBING-2X2.5/ ACC-6MM-TUBING-2X5M
USB Extender: Icron USB 2.0 Ranger 2201 (100 m) - EU/UK/US	ACC-USBX-EU ACC-USBX-UK ACC-USBX-US
30 m Ethernet cable (for use with the above ACC-USBX-** USB extenders)	ACC-ELC-13295

### Step 4. Select the required software



Software

The Newton SY also requires at least one of the following software options:

**Solis Imaging** A 32-bit and fully 64-bit enabled application for Windows (7, 8, 8.1 and 10) offering rich functionality for data acquisition and processing. AndorBasic provides macro language control of data acquisition, processing, display and export.

**Andor SDK** A software development kit that allows you to control the Andor range of cameras from your own application. Available as 32/64-bit libraries for Windows (7, 8, 8.1 and 10), compatible with C/C++, C#, Delphi, VB.NET, LabVIEW and Matlab. Linux SDK compatible with C/C++.

## Have you found what you are looking for?

**Need a square field of view?** Andor's iKon-M SY 934 boasts a 13.3 x 13.3 mm active image area.

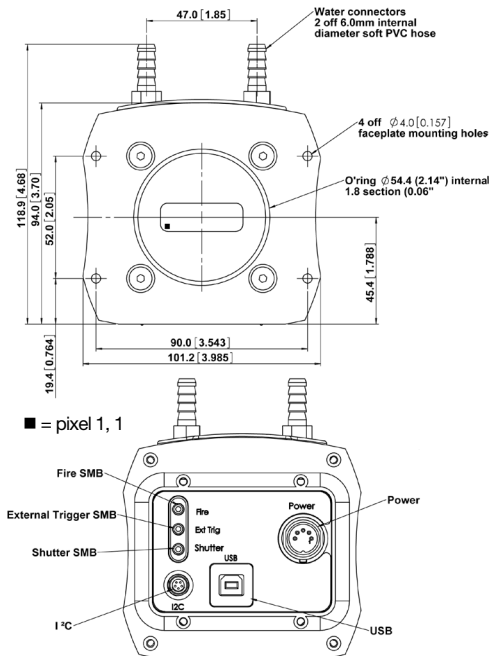
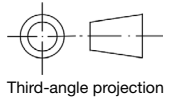
**Need to detect harder X-Rays?** Andor offers a range of Indirect Detection cameras (HH/HF range) that are compatible with industry-standard scintillators.

**Need a specific mounting?** Contact our experienced design team so we can make the perfect fit.

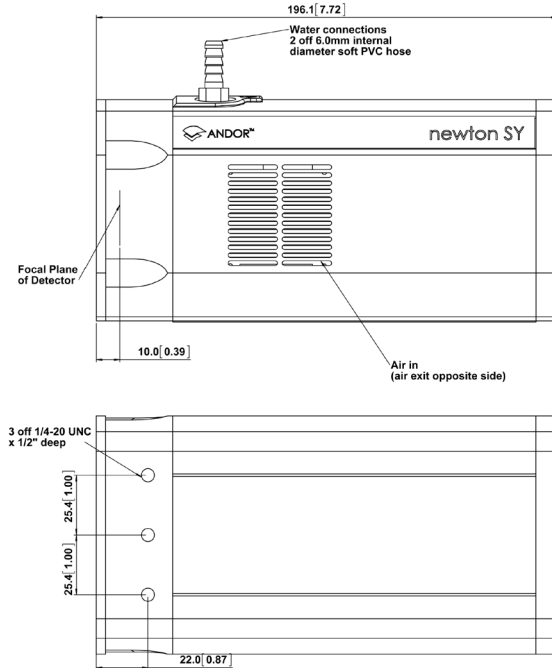
**Need a customized version?** Please contact us to discuss our Customer Special Request options.

## Product Drawings

Dimensions in mm [inches]



Rear connector panel



Weight: 2.7 kg [5 lb 15 oz]

## Best Practice Guidelines

- ✓ When not in use the window should be covered and protected.
- ✗ Not suitable for mounting to vacuum chamber.
- ✓ Handle the camera with care - due to the exposed nature of the window, damage can easily occur through mishandling or by contamination.
- ✓ If due to accident or misuse the window becomes contaminated, please contact Andor immediately for advice on cleaning.
- ✗ Avoid shock damage as the Beryllium foil window is very brittle. If the foil is broken there is a health risk. Please contact Andor for further information if required.

## Connecting to the Newton SY

### Camera Control

Connector type: USB 2.0

### TTL / Logic

Connector type: SMB, provided with SMB - BNC cable  
Fire (Output), External Trigger (Input), Shutter (Output)

### I<sup>2</sup>C connector

Compatible with Fischer SC102A054-130  
Shutter (TTL), I<sup>2</sup>C Clock, I<sup>2</sup>C Data, +5 Vdc, Ground

### Minimum cable clearance required at rear of camera

90 mm

## Applications Guide

- ✓ X-Ray Source Development
- ✓ X-Ray Plasma Diagnostics
- ✓ X-Ray Diffraction (XRD)
- ✓ X-Ray Fluorescence (XRF)
- ✓ X-Ray Spectroscopy



## Order Today

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### China

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### Items shipped with your camera:

- 1 x 2 m SMB-BNC connection cable
- 1 x 3 m USB 2.0 cable Type A to Type B
- 1 x PS-25 power supply with mains cable
- 1 x CD containing Andor user guides
- 1 x Individual system performance booklet

### Footnotes: Specifications are subject to change without notice

1. **IMPORTANT:** Due to the Be window there is a limited warranty on the sensor. For full details of Andor's Warranty Policy please refer to our webpage at [http://www.andor.com/contact\\_us/support\\_request/](http://www.andor.com/contact_us/support_request/). For key information on handling precautions for SY/HY systems, please refer to the Best Practice Guidelines on page 5. Note permanent damage can easily occur due to misuse.
2. Figures are typical unless otherwise stated.
3. Based on a 920 camera with a horizontal pixel readout rate of 3 MHz, a vertical shift speed of 12.9  $\mu$ s and in crop mode for 20 Rows. Achievable spectral rates will vary with selected trigger mode.
4. Edge pixels may exhibit a partial response.
5. Stabilized cooling temperatures are given for slowest readout speed. Use of faster readout speeds (in order to achieve faster frame rates) may require a higher cooling temperature to be selected. Specified minimum air cooled temperature assumes ambient temperature of 25°C. Specified minimum temperature with coolant assumes coolant temperature of 10°C.
6. Dark current measurement is averaged over the CCD area excluding any regions of blemishes.
7. Readout noise is for the entire system and is taken as a mean over the sensor area excluding any regions of blemishes. It is a combination of sensor readout noise and A/D noise.
8. Linearity is measured from a plot of counts vs exposure time under constant photon flux up to the saturation point of the system.
9. Vertical speeds are software selectable. All sensors are designed to give optimum Charge Transfer Efficiency (CTE) at 12.9  $\mu$ S (920 models) and 14.5  $\mu$ S (940 models).
10. Quantum efficiency of the sensor at 20°C, as supplied by the sensor manufacturer.
11. The graph shows photoelectrons generated as a function of photon energy of incident X-Ray.

### Minimum Computer Requirements:

- 3.0 GHz single core or 2.4 GHz dual or quad core processor
- 2 GB RAM
- 100 MB free hard disc to install software (at least 1GB recommended for data spooling)
- USB 2.0 High Speed Host Controller capable of sustained rate of 40 MB/s
- Windows (7, 8, 8.1 and 10) or Linux

### Operating & Storage Conditions

- Operating Temperature: 0°C to 30°C ambient
- Relative Humidity: < 70% (non-condensing)
- Storage Temperature: -25°C to 50°C

### Power Requirements

- 100 - 240 VAC, 50 - 60 Hz
- Power consumption: 48W max



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Labview is a registered trademark of National Instruments.  
Matlab is a registered trademark of The MathWorks Inc.