OXFORD INSTRUMENTS | ANDOR

Newton CCD

Spectroscopy at Pace

Key Specifications

- ✓ Peak QE up to 95%
- ✓ TE cooling down to -100°C
- ✓ Ultravac™ technology
- ✓ 26 or 13.5 µm pixel size
- ✓ 1024x256 or 2048x512 pixel matrix
- ✓ Up to 1,612 spectra per second
- ✓ Read noise as low as 2.5 e-

Key Applications

- ✓ Raman
- ✓ Fluorescence
- ✓ Luminescence
- ✓ Photoluminescence
- ✓ Absorption/Transmission/Reflection
- ✓ Micro-spectroscopy
- ✓ Non-linear spectroscopy (SFG/SHG)

Available with Anti-fringing Deep Depletion & Dual AR Extended Dynamic Range Technology

andor.oxinst.com

Introducing Newton CCD

Spectroscopy at Pace

The high-end USB 2.0 Newton CCD series brings together Andor's ultra fast, low-noise electronics platform and market-leading deep thermo-electric cooling to -100°C, complemented by Andor's Ultravac™ technology with its un-matched reliability track record in the scientific and industrial communities.

Broadband detection rates of up to 1,600 spectra per second are enabled with intelligent Crop Mode operation. The Newton CCD is an ideal tool for ultrafast UV, VIS or NIR spectroscopy (or all the above with the Dual AR-coating BEX2-DD technology), such as 2D chemical mapping, online process monitoring or non-invasive medical diagnosis.

The Newton 940 series offers 13.5 x 13.5 µm pixels for the highest UV to VIS resolution spectroscopy, while the 920 series and its 26 x 26 µm offers the highest dynamic range for UV to NIR applications. Both > 6.6 mm high sensors are ideally suited for multi-track spectroscopy or hyper-spectral imaging.

Features & Benefits

Feature	Benefit
Peak QE up to 95%	Visible-optimized 'BV', infrared-optimized 'BR-DD' and broadband UV-NIR 'BEX2-DD' model
Fringe suppression technology (BR-DD models)	Fringing greatly reduced (Deep-Depletion)
Extended range dual-AR option	Superior UV-NIR broadband QE
TE cooling down to -100°C	Critical for elimination of dark current detection limit - no inconvenience associated with LN_2
Multi-Megahertz Readout	High repetition rates achievable with low noise electronics
Crop Mode Operation	Up to 1,600 spectra per second rates
Single UV-grade fused silica window	Best UV-NIR throughput performance, specific AR coating and wedge options available
Down to 13.5 x 13.5 µm pixels	Optimized format for high resolution spectroscopy
Software-selectable pre-amplifier gain	Choice of best SNR performance or dynamic range at the touch of a button
USB 2.0 connection	Ideal for laptop operation, Seamless operation alongside USB-based Shamrock spectrograph family
Solis software for Spectroscopy	Comprehensive, user-friendly interface for simultaneous detector & spectrograph control
Software Development Kit (SDK)	Ease of control integration into complex setups: Matlab, Labview, Visual Basic or C/C++

Key Specifications •[1]

Model number	DU920P	DU920P Bx-DD	DU940P
Sensor options	• BU: Back Illuminated CCD, UV-Enhanced, 350 nm optimized • BU2: Back Illuminated CCD, UV-Enhanced, 250 nm optimized • BVF: Back Illuminated CCD, Vis-optimized and anti-fringing • OE: Open Electrode CCD	• BR-DD: Back Illuminated, Deep Depletion CCD with anti-fringing • BEX2-DD: Back Illuminated, Deep Depletion CCD with anti-fringing, extended range dual AR coating	• BU: Back Illuminated CCD, UV-Enhanced, 350 nm optimized • BU2: Back Illuminated CCD, UV-Enhanced, 250 nm optimized • BV: Back Illuminated CCD, Vis-optimized
Active pixels •[2]	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 •[3] Air cooled Coolant recirculator Coolant chiller, coolant @ 10°C, 0.75 l/min	-80°C -95°C -100°C		
Max spectra per second •[4]	144 (OE - Full Vertical Bin) 273 (Full Vertical Bin) 1,149 (OE - Crop Mode - 20 rows) 1,612 (Crop Mode - 20 rows)	272 (Full Vertical Bin), 1,587 (Crop Mode - 20 rows)	122 (Full Vertical Bin), 943 (Crop Mode - 20 rows)
System window type	**BV, BVF, UVB, OE sensors:** UV-grade fused silica, 'Broadband VUV-NIR', unwedged **BR-DD sensor:** UV-grade fused silica, 'VIS-NIR enhanced', wedged **BEX2-DD sensor:** UV-grade fused silica, 'Broadband VUV-NIR', wedged (Various AR coatings & MgF_2 options available)		
Blemish specifications	Grade 1 sensor from supplier. Camera blemishes as defined by Andor Grade A andor.oxinst.com/learning/view/article/ccd-blemishes-and-non-uniformities		

Advanced Specifications •[1]

Dark current, e^-/pixel/sec @ max cooling OE BU, BU2, BV/BVF, UVB Bx-DD	0.0002 0.0003 -			- - 0.003			- 0.0002 -		
Register well depth Standard mode High Sensitivity mode High Capacity mode	1,000,000 e^- - -			1,000,000 e^- - -			- 150,000 e^- 600,000 e^-		
Active area pixel well depth •[5]	**BU, BU2, BVF:** 400,000 e^- **OE:** 300,000 e^-			650,000 e^-			**BU, BU2, BV:** 100,000 e^-		
Read noise (e^-) •[6] Standard mode: Typ (Max) High Sensitivity mode: Typ (Max High Capacity mode: Typ (Max)	50 kHz 4 (8) - -	1 MHz 12 (18) - -	3 MHz 20 (30) - -	50 kHz 4 (8) - -	1 MHz 12 (15) - -	3 MHz 15 (30) - -	50 kHz - 2.5 (4) 9 (12)	1 MHz - 7 (12) 27 (32)	3 MHz - 11 (15) 40 (56)
Sensitivity (e^-/count) Standard mode High Sensitivity mode High Capacity mode	Adjustable from 2.5 - 10 - -			Adjustable from 2.5 - 10 - -			- Adjustable from 1 - 4 Adjustable from 4 - 16		
Linearity •[7]	Better than 99%								
Digitization	16 bit								
Vertical clock speed •[8]	Software selectable between 2 - 179 µs								

Applications Guide	BU/ BU2 models	BV/BVF models	BR-DD models	BEX2-DD models	OE models
Absorption/Transmittance/Reflection	○	●	○	○	○
Fluorescence & Luminescence	○	●	○	○	○
NIR Spectroscopy			●	○	○
Raman Spectroscopy (244 – 488 nm)	●	○			○
Raman Spectroscopy (514, 531 nm)	○	●	○	○	○
Raman Spectroscopy (633, 785, 830 nm)			●	○	○
UV-VIS-NIR broadband spectroscopy				●	○

○ = Suitable ● = Optimum

Have you found what you are looking for?

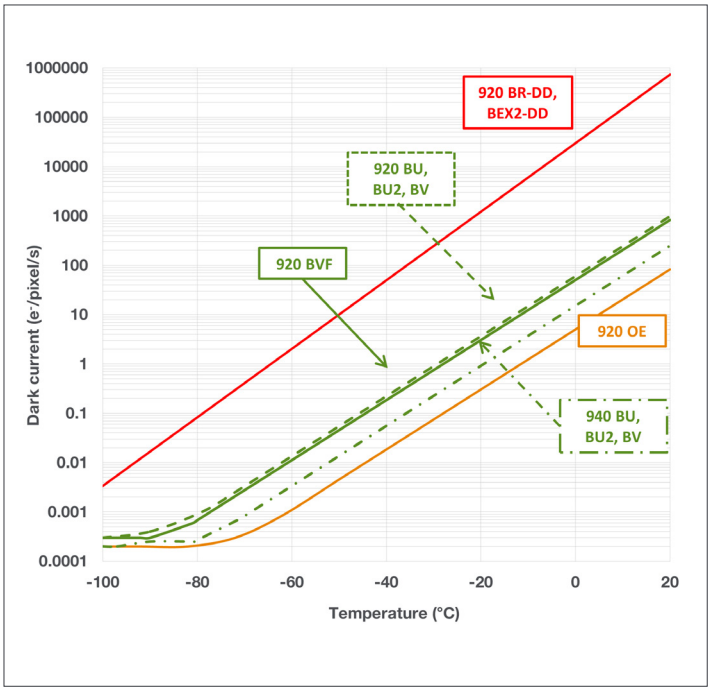
Need to work further into the NIR? The iDus InGaAs series, with up to 1024 pixel linear array with transmission to 2.2 µm.

Need higher sensitivity in the Visible? The Newton EMCCD provide detection capabilities down to single photon.

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

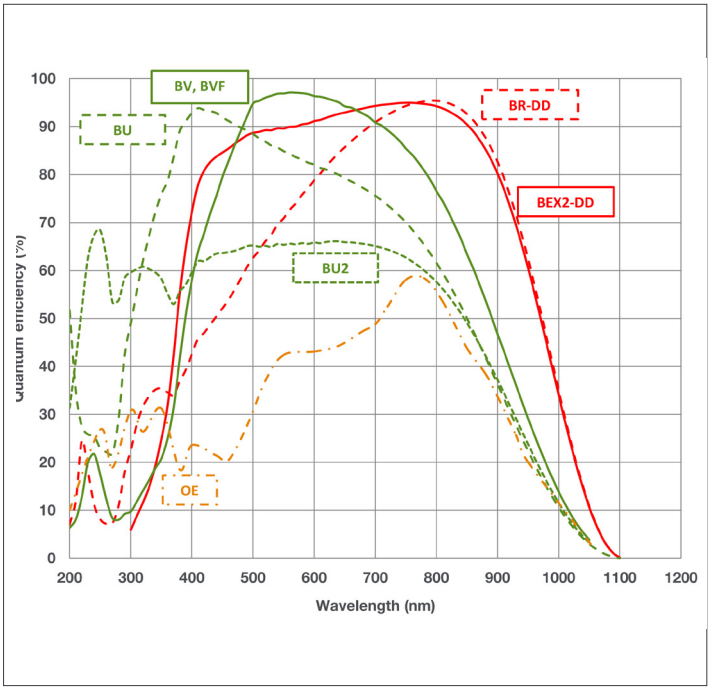
The Newton series combines seamlessly with Andor's research grade Kymera and Shamrock Czerny-Turner spectrographs.

Dark Current [9]

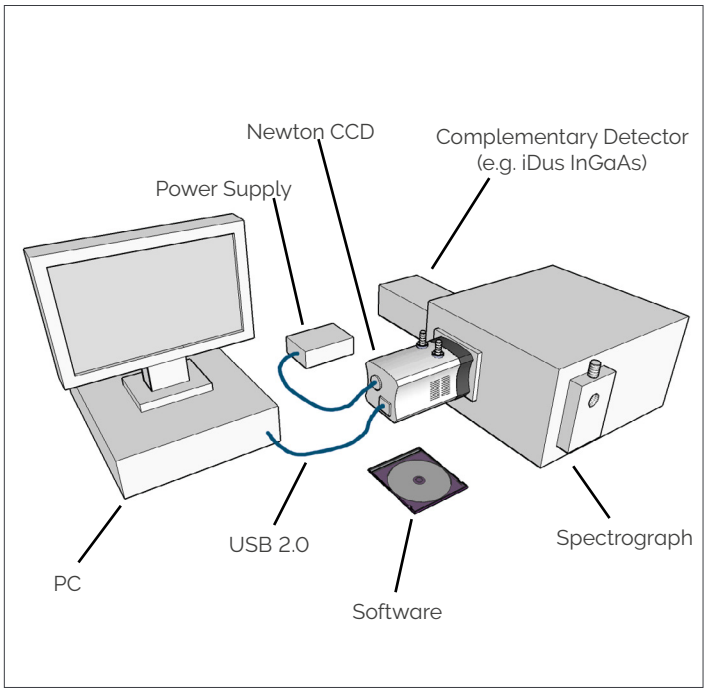


Quantum Efficiency Curves [10]

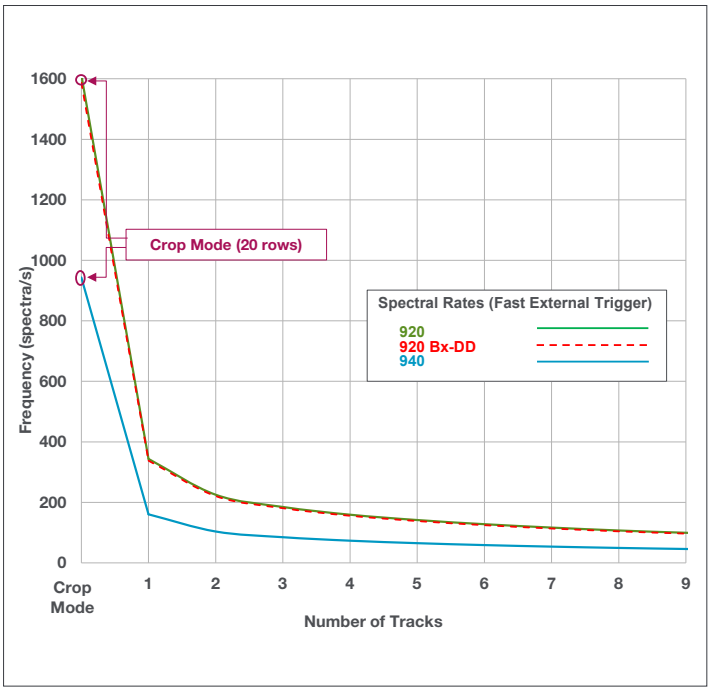
25°C



Typical Setup



Readout Rate & Speed [11]

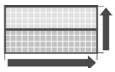


Creating the Optimum Product for you

DU 940 P- BV

example shown

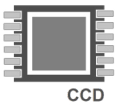
Step 1. Choose the sensor array size



Array Size

Description	Code
1024 x 255 array 1024 x 255 array (BxDD)	920
2048 x 512 array	940

Step 2. Choose the sensor type option



Sensor Type

Description	Code
Back Illuminated CCD, Vis-optimized	BV
Back Illuminated, Deep Depletion CCD with fringe suppression and extended range dual AR coating (920 only)	BEX2-DD
Back Illuminated, Deep Depletion CCD with fringe suppression (920 only)	BR-DD
Back Illuminated CCD, Blue optimized AR coating	BU
Back Illuminated CCD, Vis-optimized and anti-fringing (920 only)	BVF
Back Illuminated CCD, AR coated for optimized performance in the 250 nm region	BU2
Open Electrode CCD (920 only)	OE

Step 3. Select an alternative camera window (optional)

Camera Window

The standard window has been selected to satisfy most applications. However, other options are available. The alternative camera window code must be specified at time of ordering.

To view and select other window options please refer to the Camera Windows Selector Tool. Further detailed information on windows can be found in the technical note – How to Select a Window for your Camera.

Step 4. 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
C-mount lens adaptor	ACC-LM-C
F-mount lens adaptor	ACC-LM-NIKON-F
Nikon F-mount lens adaptor with shutter	LMS-NIKON-F-NS25B
Shutter Driver for NS25B Bistable Shutter (not needed for Kymera/Shamrock spectrographs)	ACC-SD-VED24
Bistable Shutter, Standalone (not needed for Kymera/Shamrock spectrographs)	ACC-SHT-NS25B

Spectrograph Compatibility

The Newton series is fully compatible with Andor's Kymera and Shamrock spectrographs (193 - 750 nm focal lengths). Spectrograph mounting flanges and software control are available for a wide variety of 3rd party spectrographs including, McPherson, JY/Horiba, PI/Acton, Chromex/Bruker, Oriel/Newport, Photon Design, Dongwoo, Bentham, Solar TII and others.

Step 5. Select the required software

Software

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

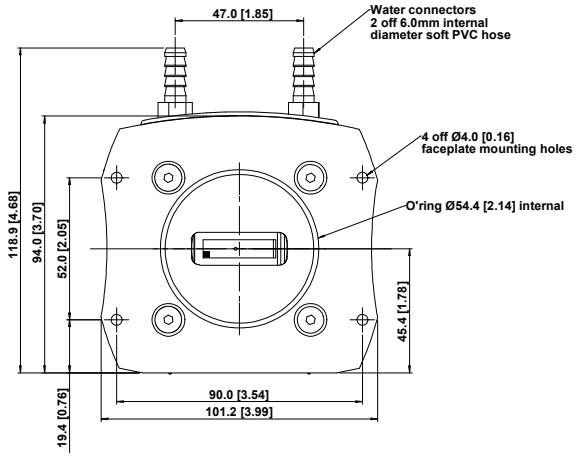
Solis for Spectroscopy A 32-bit and fully 64-bit enabled application for Windows (8.1 and 10) offering rich functionality for data acquisition and processing. AndorBasic provides macro language control of data acquisition, processing, display and export. Control of Andor Kymera and Shamrock spectrographs and a very wide range of 3rd party spectrographs is also available, see list in step 4 above.

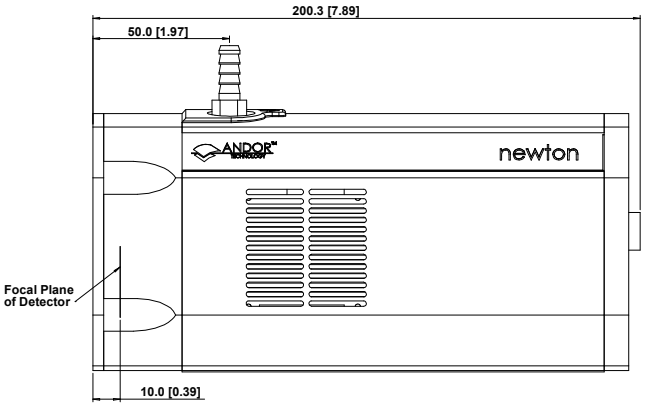
Andor SDK A software development kit that allows you to control the Andor range of cameras from your own application. Available as 32/ 64-bit libraries for Windows (8.1 and 10) and Linux. Compatible with C/C++, C#, Delphi, VB.NET, LabVIEW, MATLAB and Python.

Product Drawings

Dimensions in mm [inches]

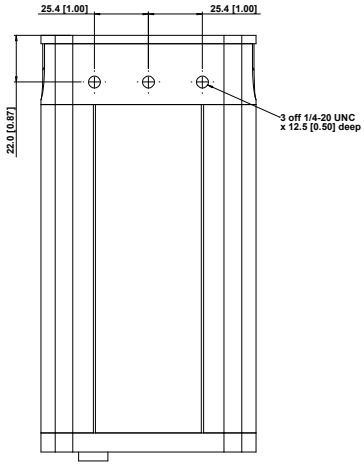
Third-angle projection





■ = position of pixel 1,1

Weight: 2.7 kg [5 lb 15 oz]



Mounting hole locations

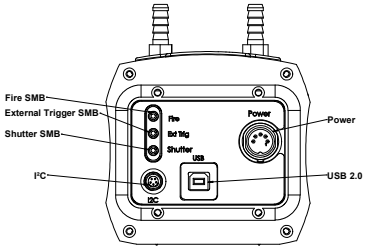
Connecting to the Newton

Camera Control
Connector type: USB 2.0

TTL / Logic
Connector type: SMB, provided with SMB - BNC cable
1 = Fire (Output), 2 = External Trigger (Input), 3 = Shutter (Output)

I²C connector
Compatible with Fischer SC102A054-130
1 = Shutter (TTL), 2 = I²C Clock, 3 = I²C Data, 4 = +5 V_{DC}, 5 = Ground

Minimum cable clearance required at rear of camera
100 mm



Rear connector panel

Order Today

At Andor we are committed to finding the correct solution for you. With a dedicated team of technical advisors, we are able to offer you one-to-one guidance and technical support on all Andor products.

For a full listing of our local sales offices, please see: andor.oxinst.com/contact

Our regional headquarters are:

Europe
Belfast, Northern Ireland
Phone +44 (28) 9023 7126
Fax +44 (28) 9031 0792

Japan
Tokyo
Phone +81 (3) 6732 8968
Fax +81 (3) 6732 8939

North America
Concord, MA, USA
Phone +1 (860) 290 9211
Fax +1 (860) 290 9566

China
Beijing
Phone +86 (10) 5884 7900
Fax +86 (10) 5884 7901

Items shipped with your camera:
1x 2m BNC - SMB connection cable
1x 3m USB 2.0 cable Type A to Type B
1x Set of hex keys (7/64", 3/32" & 3 mm)
1x Power supply with mains cable
1x User manuals in electronic format
1x Individual system performance booklet
1x Copy of Solis software or SDK (if ordered)

Minimum Computer Requirements:
- 3.0 GHz single core or 2.4 GHz multi core processor
- 2 GB RAM
- 100 MB free hard disc to install software (at least 1 GB recommended for data spooling)
- USB 2.0 High Speed Host Controller capable of sustained rate of 40 MB/s
- Windows (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: 48 W max

Footnotes: Specifications are subject to change without notice

1. Figures are typical unless otherwise stated.
2. Edge pixels may exhibit a partial response.
3. Cooling is provided by the use of an external mains driven power supply. Minimum temperatures listed are typical values with ambient temperature of 20°C. Systems are specified in terms of minimum dark current achievable rather than absolute temperature.
4. Based on horizontal pixel readout rate of 3 MHz and a vertical shift speed of 12.9 µs (920 models), 14.5 µs (940 models) and 25.7 µs (OE model).
   Achievable spectral rates will vary with selected trigger mode. Due to the nature of the Open Electrode sensor, the minimum Vertical Shift Speed (VSS) available is 25.7 µs, which will produce a lower maximum spectral rate compared to other models in the series.
5. Shown for High Capacity mode. For high sensitivity mode the measurable well depth value will be lower, as a result of the combination of higher sensitivity values and A/D 16 bits digitization.
6. Readout noise is for the entire system. It is a combination of CCD readout noise and A/D noise. Measurement is for Single Pixel readout with the CCD at a temperature of -80°C and minimum exposure time under dark conditions. Noise values will change with readout mode.
7. Linearity is measured from a plot of counts vs exposure time under constant photon flux up to the saturation point of the system.
8. Vertical speeds are software selectable. All sensors are designed to give optimum Charge Transfer Efficiency (CTE) at 12.9 µs (920 models), 14.5 µs (940 models) and 25.7 µs (OE model) vertical pixel shift, some decrease in CTE may be observed at faster shift speeds.
9. The graph shows typical dark current level as a function of temperature. The dark current measurement is averaged over the CCD area excluding any regions of blemishes.
10. Quantum efficiency of the sensor as supplied by the sensor manufacturer
11. The chart shows the maximum possible readout rates available when using Multi-track mode, each track being defined as 20 rows. Crop mode is a specific single-track readout method optimized for rapid kinetic-type acquisition.

SNewtonCCDSS 0924 R1