iKon-XL 231

CCD

VERY LARGE AREA ASTRONOMY CCD

NEW

- ✓ Absolue BEST noise and well depth
- ✓ -100 ˚C TE Cooling (ColdSpace™)
- ✓ NO liquid nitrogen or cryo-cooler
- ✓ 18-bit Extended Dynamic Range

Key Specifications

- 16.8 Megapixel sensor (CCD231-84)
- -100 ˚C TE cooled
- 2.1 e- read noise
- 350,000 well depth
- 166,700: 1 dynamic range
- Standard silicon or deep depletion

ANDOR
an Oxford Instruments company

INTRODUCING
IKON-XL 231

Extreme performance, no hassle...

Andor's iKon-XL is a TE-cooled, very large area CCD camera platform, accommodating big field of view sensors that are ideally suited to long exposure astronomy applications. Patent-pending **ColdSpace™ technology** thermoelectrically cools a **back-illuminated 16.8 Megapixel** sensor (e2v) down to **-100 ⁰C**, avoiding the requirement for liquid nitrogen or unreliable cryo coolers. **Extended Dynamic Range technology** is complemented by up to **18-bit digitization**. Flexible connectivity is standard through either **USB 3.0** or a long distance **direct fibre optic** interface. iKon-XL is a **high quality**, **robust** and '**hassle-free**' detector solution, designed to operate with **low maintenance** and exceptional longevity in remote observing sites around the globe.

The iKon-XL 231 model uses the e2v **CCD231-84** 'astro' back-illuminated sensor, offering a very large **61.4 x 61.7 mm** imaging area from a 4096 x 4112 array format and 15 µm pixel size. Available with a range of sensor QE coatings, in both **standard and deep depletion formats** (the latter for extended NIR coverage), the model also offers the absolute best CCD performance available, combining exceptionally low **read noise of 2.1 e⁻** with a very large **well depth of 350,000 e-**. The iKon- XL 231 can be considered the ultimate camera for challenging Astronomy observations, including exoplanet discovery, large sky surveys, photometry, astro-spectroscopy (Echelle) and debris tracking.
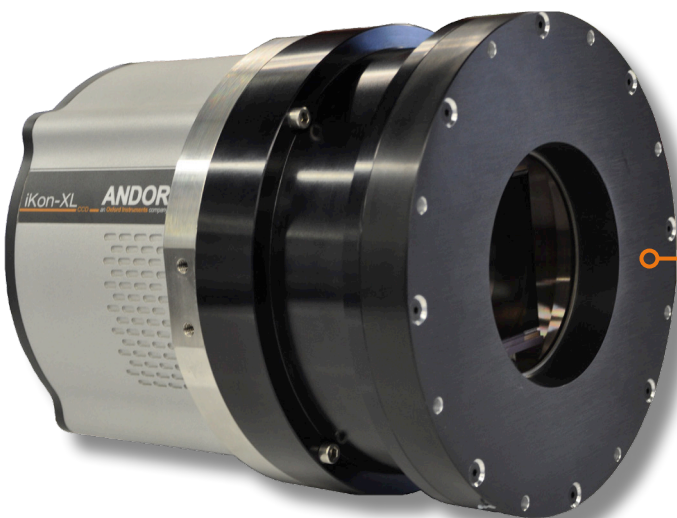
Low Maintenance Advantage

✓ **NO liquid nitrogen (LN₂)** – LN₂ cooled cameras require ready access to LN₂ supply and routine top up of LN₂ levels in order to hold temperature, as well as carrying an additional safety concern. Many observatories are in remote locations and in some cases unmanned, making LN₂ at best impractical, at worst impossible.

✓ **NO cryo cooler** – as many are already painfully aware, cryo coolers are cumbersome and notoriously unreliable. iKon-XL can reach typical cryo-cooled temperatures using only TE cooling and water flow.

✓ **No vacuum re-pumping** – the iKon-XL sensor enclosure design is based on Andor's proven, proprietary UltraVac™ process, which carries a Mean Time Between Failure (MTBF) value of > 100 years! Where other very large area CCD cameras require routine re-pumping, expect the iKon-XL to hold firm!

✓ **Field replaceable shutter** - No shutter is designed or specified for infinite usage! When it finally fails in a remote observing location, the shutter mounting of the iKon-XL has been purposefully designed such that the shutter can be easily replaced by the user on site.

FEATURES & BENEFITS

ANDOR
an **Oxford Instruments** company

Feature	Benefit
Thermoelectric Cooling to -100ºC (Liquid/ Water)	Patent-pending ColdSpace™ very large area TE cooling technology avoids need for liquid nitrogen or unreliable cryo coolers. Minimization of darkcurrent to below the zodiacal background.
61.4 x 61.7 mm sensor	Very large field of view from 16.8 Megapixel, 15 μm pixel pitch sensor
Extended Dynamic Range (18-bit)	Unique method to achieve lowest noise and maximum well depth within one scan. Supplemented by up to 18-bit digitization.
Peak QE over 95% (deep depletion NIR-enhanced options available)[5]	High photon collection efficiency for maximising SNR. Deep depletion sensor options for extended NIR sensitivity, including Fringe Suppression technology.
Lowest noise readout	Intelligent low-noise electronics, combined with the 'astro' CCD231-84 sensor, deliver the lowest CCD noise available.
350,000 e⁻ well depth	Extremely high well depth for linear quantification of relatively bright signal.
Ultravac™[1]	Critical for sustained vacuum integrity and to maintain unequalled cooling and QE performance, year after year.
'Deep Cooled' and 'Flexi' versions	'Deep Cooled' for -100ºC water/liquid (no air cooling). 'Flexi' for combined -75ºC water liquid; -55ºC air cooled.
Fibre-optic or USB 3.0 interface flexibility	Built-in robust plug and play interface options as standard. Fibre optic for long distance solution.
Balanced Quad-port readout	Tracking stability to ensure all readout circuits experience same temperature and operating conditions.
Multiple readout speeds, up to 3 MHz	Slower readout for lowest noise, faster speeds for more rapid readout and focusing.
Field replaceable shutter	No shutter is designed or specified for infinite usage! When it finally fails in a remote observing location, it can be easily replaced on site.
iRig-B GPS timestamp	Image GPS timestamp with 10ms resolution for network integration.
Fully Enclosed Casing (Deep Cooled model)	Reduced thermal bloom; minimal effect on nearby optics
Easy reference column access	Easy and flexible software access to dark (shielded) reference columns
Windows, Linux & Labview	Andor's user-friendly SDK supports both Windows and Linux OS. LabView VI package available.

Extended Dynamic Range Technology

CCD cameras always require software selection of amplifier gain to optimize either for low noise (weak signal) OR max well depth (bright signal). **Not both…**

…until now. iKon-XL utilizes proprietary Andor CCD know-how to offer **lowest read noise** AND **maximum well depth** *in one image*, with only one gain setting.

TECHNICAL DATA

System Specifications [2]

Sensor Options	**BV**: Back Illuminated CCD231-84 sensor, mid band AR coating **BB**: Back Illuminated CCD231-84 sensor, broad band AR coating (blue optimized) **BEX2**: Back Illuminated CCD (231-84) sensor and dual AR coating **BR-DD**: Back Illuminated CCD (231-84) sensor, deep depletion with fringe suppression **BEX2-DD**: Back Illuminated CCD (231-84) sensor, deep depletion with fringe suppression and dual AR coating
Pixels	4096 (H) x 4112 (V)
Pixel size	15 x 15 μm
Image area	61.4 x 61.7 mm with 100% fill factor
Minimum temperatures [3] **@ coolant temperature of 10ºC** **@ coolant temperature of 16ºC** **air cooled**	**Deep Cooled Model** -100ºC -95ºC N/A **Flexi Model** -75ºC -70ºC -55ºC
Blemish specification	Grade 1 or higher, as per manufacturers definition
System window type	Single AR coated UV grade fused silica window (>98% transmission)

Advanced Performance Specifications [2]

|		
Dark Current, e⁻/pixel/sec [4] **@ -55ºC** **@ -75ºC** **@ -100ºC (Deep Cooled Model only)**	**BV, BB and BEX2 sensors** 0.05 0.006 0.0008	**BR-DD and BEX2-DD sensors** TBD TBD TBD
Active area pixel well depth (typical)	350,000 e⁻	
Pixel readout rates	0.1, 1, 3 MHz	
Read Noise (e⁻)	**100 kHz** **1 MHz** **3 MHz** 2.1 4.8 8	
Peak QE [5]	>95% for BV models >90% for BEX2, BR-DD and BEX2-DD models >87% for BB models	
Binning	User definable	
Region of Interest (windowing mode)	User definable (centred in 4-output mode)	
Linearity	Better than 99%	
Digitization	16-bit (all speeds) 18-bit (100kHz and 1 MHz)	
Outputs	Quad or Single	
Timestamp	iRig-B GPS with 10 ms resolution	

Quantum Efficiency Curves •5
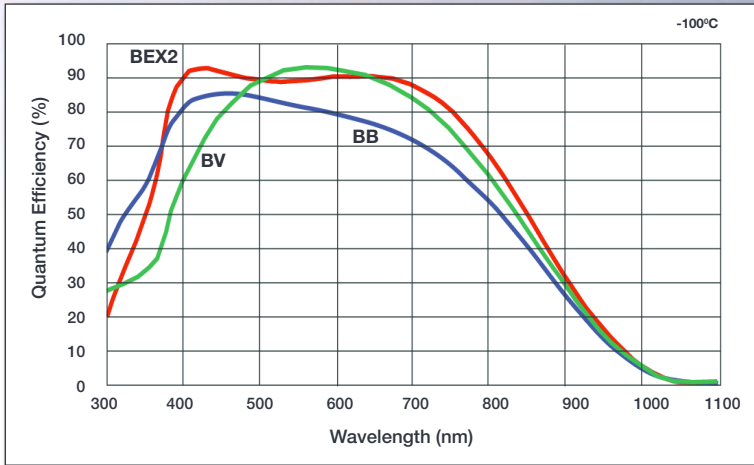
A range of sensor options are available for the iKon-XL 231 that provide high photon collection efficiency for maximising the SNR. Deep depletion (-DD) sensor options provide extended NIR sensitivity.

Standard Silicon Sensor Options

- **BV:** mid band AR coating
- **BB:** broad band AR coating (blue optimized)
- **BEX2:** dual AR coating (sensitivity extends to both the blue and NIR wavelength regions)
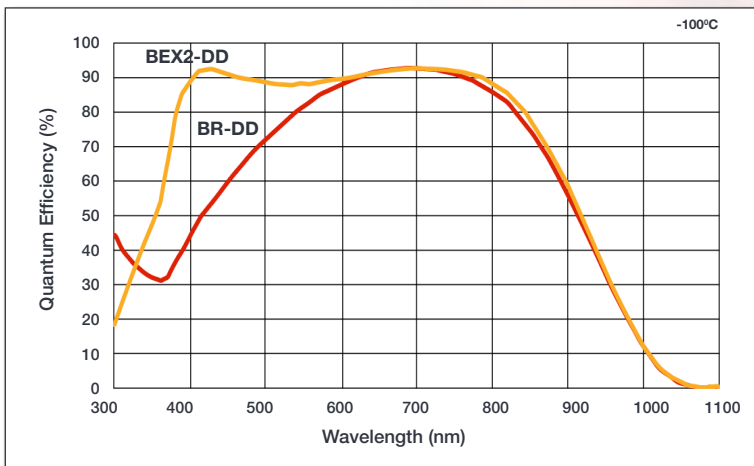
Deep Depletion Sensor Options

- **BR-DD:** deep depletion with fringe suppression (extended response in the NIR region)
- **BEX2-DD:** deep depletion with fringe suppression and dual AR coating (sensitivity extends to both the blue and NIR wavelength regions)

Flexible Connectivity

1 USB 3.0
USB 3.0 offers a robust high speed plug and play data interface

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

3 I²C
Compatible with Fischer SC102A054-130
Shutter (TTL), I²C Clock, I²C Data, +5 Vdc, Ground

4 Fibre Optic
Long distance connection via LC Fibre-optic I/O connection

5 IRIG-B
Compatible with IRIG-B standard (GPS with 10 ms resolution)

W Water Cooling
Connection to recirculator or other water/liquid cooling system

P Power
Connection to external PSU (supplied) refer to power requirements on page 6

Notes:
Minimum cable clearance required at rear of camera 100mm
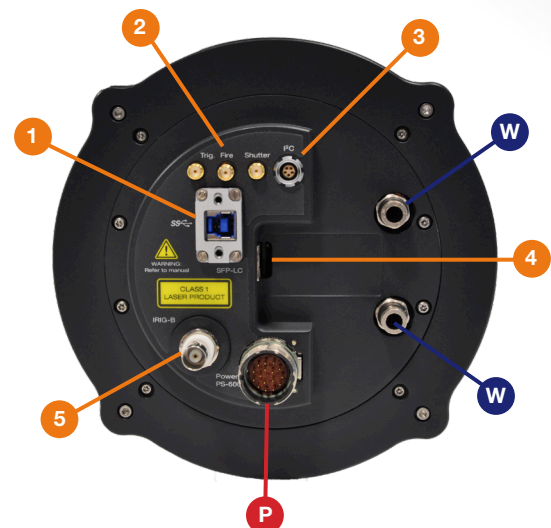
CREATING THE OPTIMUM PRODUCT FOR YOU

ANDOR
an **Oxford Instruments** company
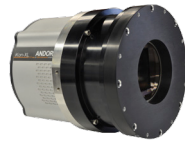
XL- (EA06) - (D) (S)

example shown

Step 1. Choose the sensor type option

Sensor Type

Description	Code
16.8 Megapixel CCD231-84 Back Illuminated Sensor. BV: midband AR coating	EA03
16.8 Megapixel CCD231-84 Back Illuminated Sensor. BB: Broadband AR coating	EA04
16.8 Megapixel CCD231-84 Back Illuminated Sensor. EX2 dual AR coating	EA05
16.8 Megapixel CCD231-84 Back Illuminated Sensor. BR-DD deep depletion with fringe suppression.	EA06
16.8 Megapixel CCD231-84 Back Illuminated Sensor. BEX2-DD deep depletion with fringe suppression and dual AR coating	EA07

Step 2. Choose the cooling option

Cooling

Description	Code
Flexi Cooling model (max. cooling -75°C @ coolant temp of 10°C; -55°C max. air cooling)	C
Deep Cooled model (max. cooling -100°C @ coolant temp of 10°C)	D

Step 3. Select with or without shutter

Shutter

Description	Code
With Shutter	S
Without Shutter	O

Step 4. Select the required accessories

Accessories

Please contact your local sales representative regarding other options such as different mounting types, camera window options or other customizations you may require for system integration or your specific application.

Step 5. Select the required software

Software

The iKon-XL requires at least one of the following software options:

Solis for Imaging A 32-bit and fully 64-bit enabled application for Windows (XP, Vista, 7 and 8) Linux and Labview, 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 and 64-bit libraries for Windows (XP, Vista, 7 and 8), compatible with C/C++, C#, Delphi, VB6, VB.NET, LabVIEW and Matlab. Linux SDK compatible with C/C++.
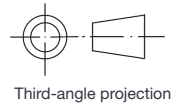
Third party software compatibility Drivers are available so that the iKon-XL can be operated through a large variety of third party imaging packages. See Andor web site for detail: **http://www.andor.com/software/**

Have you found what you are looking for?

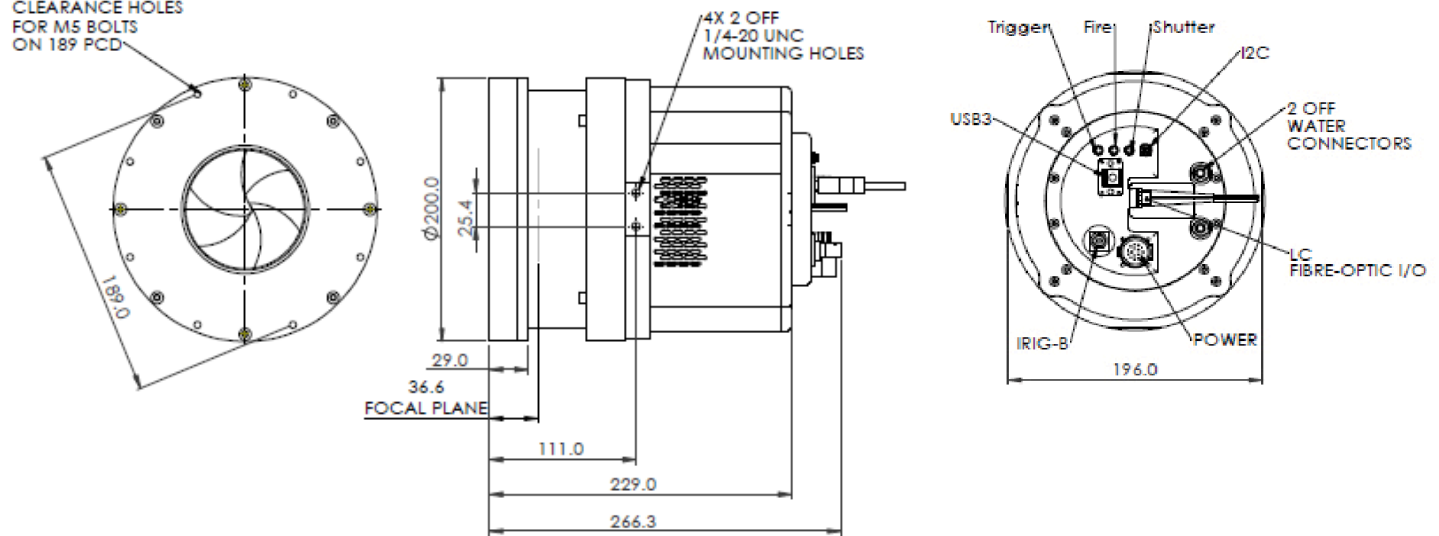**Need a customized version?** Please contact us to discuss our Customer Special Request options.
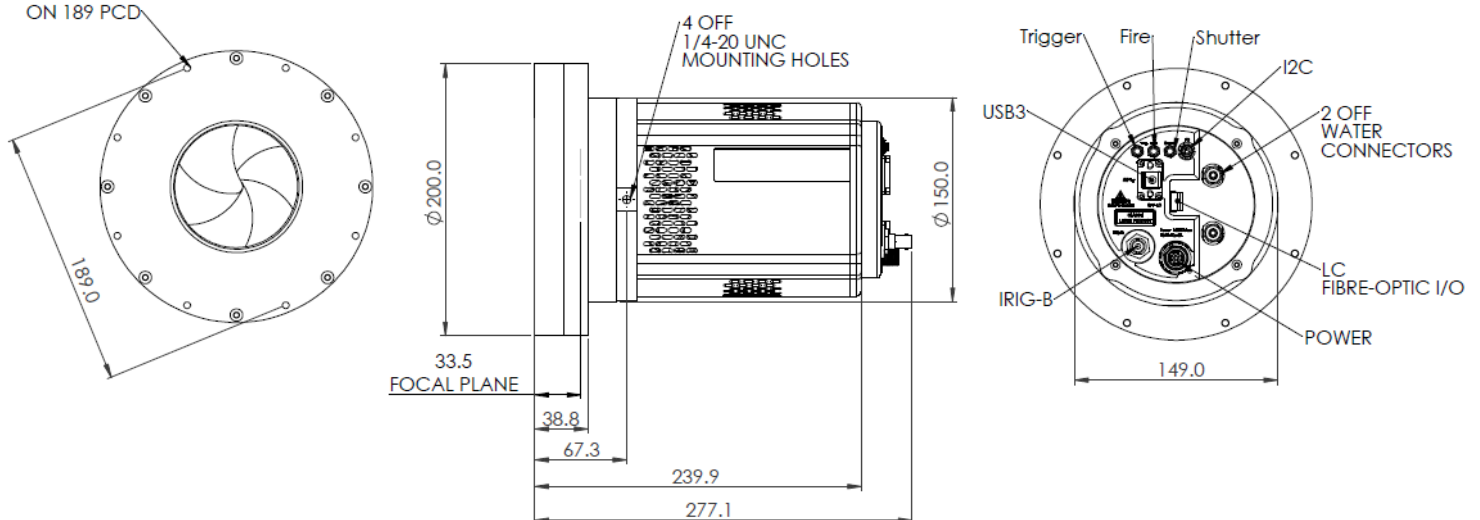
MECHANICAL DRAWINGS

Dimensions in mm

Third-angle projection

Deep Cooled Model

8 OFF CLEARANCE HOLES FOR M5 BOLTS ON 189 PCD

4X 2 OFF 1/4-20 UNC MOUNTING HOLES

189.0

Ø200.0

25.4

29.0

36.6 FOCAL PLANE

111.0

229.0

266.3

Trigger   Fire   Shutter   I2C

USB3

2 OFF WATER CONNECTORS

LC FIBRE-OPTIC I/O

IRIG-B   POWER

196.0

Weight (approx): 12 Kg [26 lbs 7]

Flexi Model

8 OFF CLEARANCE HOLES FOR M5 BOLTS ON 189 PCD

4 OFF 1/4-20 UNC MOUNTING HOLES

189.0

Ø200.0

Ø150.0

33.5 FOCAL PLANE

38.8

67.3

239.9

277.1

Trigger   Fire   Shutter   I2C

USB3

2 OFF WATER CONNECTORS

LC FIBRE-OPTIC I/O

IRIG-B   POWER

149.0

Weight (approx): 8.25 Kg [18lbs 3oz]

Note: Product drawings of models without shutter can be found at http://www.andor.com/xl-product-drawings

ORDER TODAY

Need more information? 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 regional sales offices, please see: **andor.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
Connecticut, USA
Phone +1 (860) 290 9211
Fax +1 (860) 290 9566

China
Beijing
Phone +86 (10) 8271 9066
Fax +86 (10) 8271 9055

Items shipped with your camera

1x Fibre Optic PCIe Card (note: PC requires 1x slot for installation of the Fibre Optic PCIe Card)
1x iKon-XL Power Supply
1x Country specific power Cord (5 M)
1x Camera power lead
1x BNC-SMA Cable
1x USB 3.0 Cable
1x Fibre Optic Patch Lead LC-LC OM3 (5 M)

Footnotes

1. Assembled in a state-of-the-art facility, Andor's UltraVac™ vacuum process combines a permanent hermetic vacuum seal (no o-rings), with a stringent protocol and proprietary materials to minimize outgassing. Outgassing is the release of trapped gases that would otherwise degrade cooling performance and potentially cause sensor failure.
2. Figures are typical unless otherwise stated.
3. Specified minimum temperature with coolant assumes coolant temperature of 10°C, measured at camera head. Note that cooling performance may be affected by distance between camera head and cooler.
4. Dark current measurement is averaged over the CCD area excluding any regions of blemishes.
5. Quantum efficiency as supplied by the sensor manufacturer.

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 1 GB recommended for data spooling)
- USB 3.0 High Speed host Controller capable of sustained rate of 60 MB/s
- Windows (7 and 8) or Linux

Operating & Storage Conditions:
- Operating Temperature: 0°C to +30°C ambient (-30°C to +30°C ambient on request)
- Operating Altitude: up to 6000m
- Relative Humidity: <70% (non-condensing)
- Storage Temperature: -30°C to 50°C

Power Requirements:
- 100 - 240 VAC, 50 - 60 Hz
- Power consumption: 500W max

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