ANDOR
an **Oxford Instruments** company

iKon-L HF | High Energy Imaging
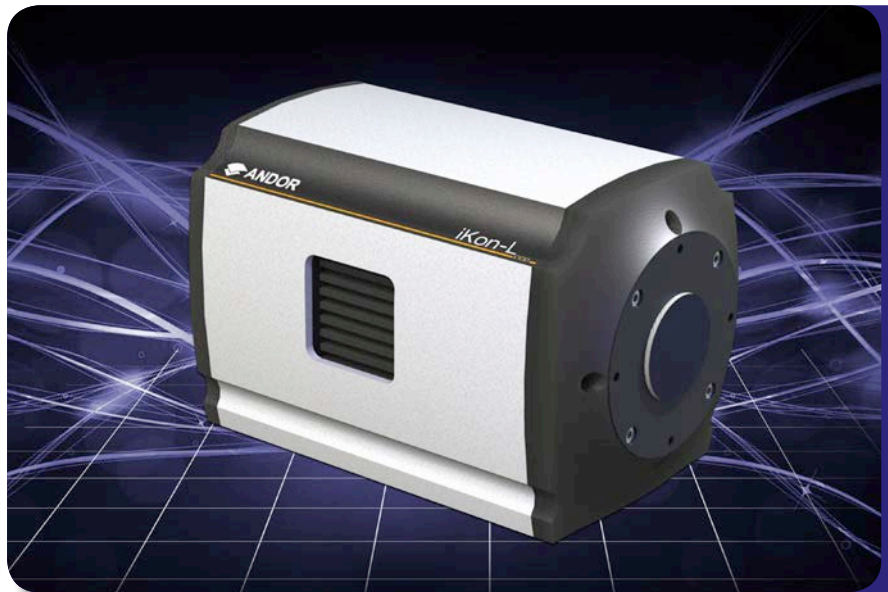Fibre Optic Indirect Detection
4 Megapixel

High Energy Detection

**Phase Contrast Tomography
Pill Bug / Roly Poly**

Courtesy of Will Schumaker of the Center for Ultrafast
Optical Science, University of Michigan, USA

Features and Benefits

- **Soft Dock Feature**
  Unique spring-loaded Fibre optic design allows the camera to be mounted safely and securely against fragile instrumentation

- **Fibre optic plate** [1]
  Single bonded fibre optic 1:1 as standard. Other options available on request.

- **Peak QE of 95%**
  High detector sensitivity @ 550 nm, peak scintillator emission

- **13.5 x 13.5 μm pixel size**
  Optimal balance of dynamic range and resolution

- **Large area 2048 x 2048 sensor**
  Large field of view and high resolution

- **TE cooling to -35°C**
  Minimization of dark current and pixel blemish

- **Up to 5 MHz pixel readout** [2]
  Slower readout for low noise, faster speeds for dynamic processes

- **Ultra-low noise readout**
  Intelligent low-noise electronics offer the most 'silent' system noise available

- **Dual output**
  High Sensitivity option for low-light applications, or a High Capacity option for maximum dynamic range with extensive binning

- **Cropped sensor mode**
  Specialized acquisition mode for continuous imaging with fast temporal resolution

- **Enhanced baseline clamp**
  Essential for quantitative accuracy of dynamic measurements

- **USB 2.0 connection**
  USB plug and play – no controller box

- **Multiple mounting options**
  Camera can be securely mounted from either the front or side position

High Energy Indirect Detection Imaging

Andor's iKon-L HF is built for scientific imaging! The outstanding design brings together the key elements in a single optimized format; the highest QE (95%) Back-illuminated sensor, a single directly bonded FOP and a unique spring-loaded "Soft Dock" mount. This design delivers the highest transmission and spatial resolution optical performance combined with the ultra-low noise performance of the outstanding iKon-L platform.

iKon-L HF 936 TE cooler, enables cooling of this large area sensor without the aggravation of liquid nitrogen or compressed gas cooling, perfect for the longest of exposure times. USB 2.0 connectivity, multiple mounting points and multi-MHz readout options enable seamless integration and operation.

Specifications Summary [3]

Active pixels	2048 x 2048
Sensor size	27.6 x 27.6 mm
Pixel size (W x H)	13.5 x 13.5 μm
Active area pixel well depth (typical)	100,000 e-
Maximum readout rate [2]	5 MHz
Read noise	4.9 e-
Maximum cooling	-35°C
Frame rate	0.95 fps

Sensor Specifications[3]

Sensor type	**FB**: Back Illuminated CCD with FOP
Active pixels [4]	2048 x 2048
Pixel size	13.5 x 13.5 µm
Image area	27.6 x 27.6 mm with 100% fill factor
Blemish specification	Grade 1 sensor as per manufacturer definition

Advanced Performance Specifications[3]

Minimum temperature [5] Coolant chiller, coolant @ 10ºC, 0.75l/min	-35ºC	
Dark current @ minimum temperature [6]	0.09 e⁻/pixel/sec	
Pixel readout rates	5[2], 3, 1, 0.05 MHz	
Output node capacity	250,000 e⁻	
Pixel well depth	100,000 e⁻	
Read noise [7]	High Sensitivity output (e⁻)	High Capacity output (e⁻)
0.05 MHz	4.9	12
1 MHz	8	22
3 MHz	12	36
5 MHz	35	90
Linearity [8]	Better than 99%	
Digitization	16-bit	
Vertical clock speed	38.55 or 76.95 µs (software selectable)	

Fibre Optic Input[10]

EMA Design	Enhanced Statistical
Fibre Diameter	6 µm
Core : Cladding Ratio	75 : 25 %
Resolution	90 lp/mm
Perpendicularity/parallelism of fibre relative to front face	+/-0.5 degrees

Optional Scintillator Specifications[9]

Part Code	Description	Wavelength/Energy Range	Outer dimension (mm)	Effective area (mm)	Substrate thickness (µm)	Relative light output (%)	Contrast Transfer Function @ 10 lp/mm (%)
ACC-OPT-01471	High Throughput: CsI (Tl), 150 µm thick	10 keV to 100 keV	50 x 50	47 x 47	3	70	18
ACC-OPT-01472	High Resolution: CsI (Tl), 150 µm thick	10 keV to 100 keV	50 x 50	47 x 47	3	40	33

Frame Rates[11]

50 kHz Precision Photometry Mode			
Binning	Full Frame	1024 x 1024	512 x 512
1 x 1	0.011	0.023	0.046
2 x 2	0.040	0.059	0.102
4 x 4	0.155	0.138	0.213
8 x 8	0.482	0.293	0.420
16 x 16	1.166	0.572	0.780

1 MHz Photometry Mode			
Binning	Full Frame	1024 x 1024	512 x 512
1 x 1	0.221	0.433	0.835
2 x 2	0.662	0.993	1.670
4 x 4	1.594	1.947	2.951
8 x 8	2.912	3.266	4.571
16 x 16	4.152	4.710	6.204

3 MHz Photometry Mode			
Binning	Full Frame	1024 x 1024	512 x 512
1 x 1	0.607	1.157	2.115
2 x 2	1.294	2.175	3.588
4 x 4	2.305	3.545	5.326
8 x 8	3.463	5.017	6.953
16 x 16	4.496	6.270	8.180

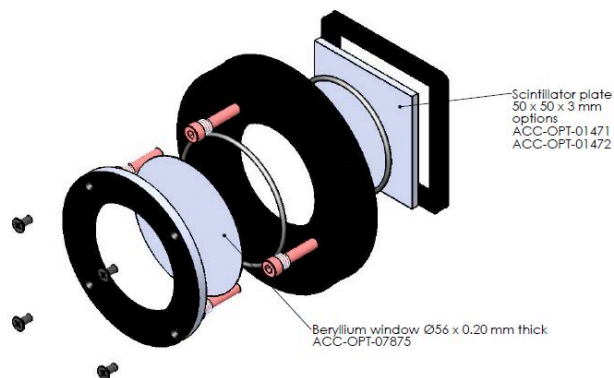| 5 MHz Visualization mode [2]			
Binning	Full Frame	1024 x 1024	512 x 512
1 x 1	0.953	1.771	3.100
2 x 2	1.655	2.922	4.733
4 x 4	2.619	4.329	6.424
8 x 8	3.697	5.700	7.822
16 x 16	4.654	6.776	8.777

Sensor Quantum Efficiency Curve [12]
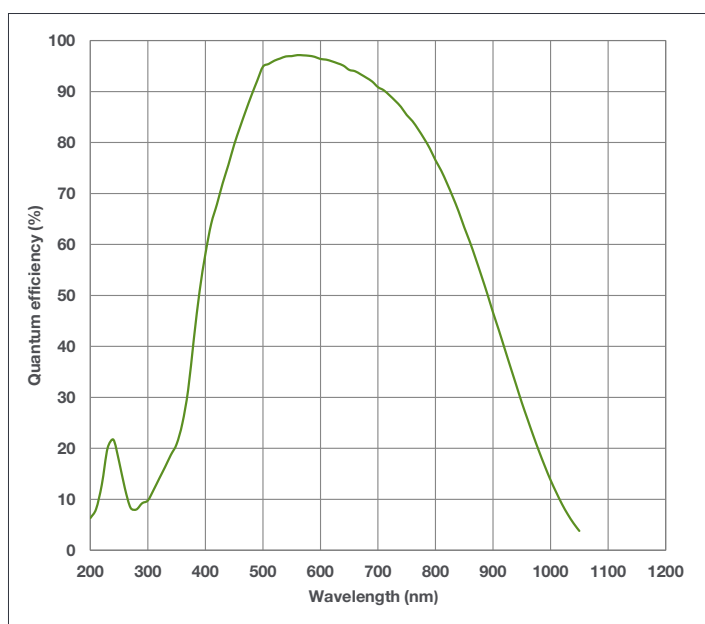
Fibre Optic Plate (FOP)

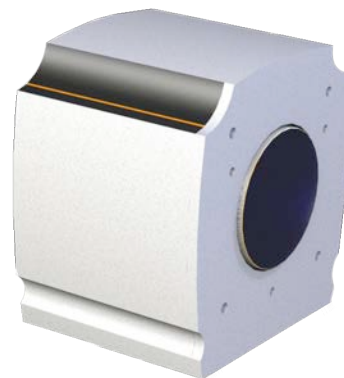FOP Structure Schematic (representative image)
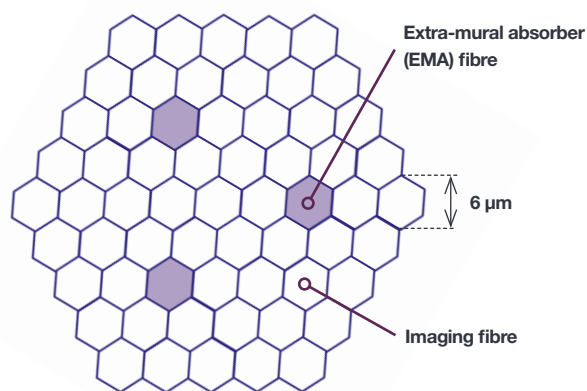
Filter Holder
(ACC-MEC-07873- filter and scintillator plate supplied separately)

Taper Housing Module
(ACC-MEC-08169, 1:1.9 model)

Creating The Optimum Product for You

How to customize the iKon-L HF:

Step 1.

The iKon-L HF CCD comes with a single sensor type.

Step 2.

Please select the option, standard, high resolution or high capacity.

Step 3.

Please indicate which software you require.

Step 4.

For compatibility, please indicate which accessories are required.

DF936N- FB - (HR-T2)
example shown

Step 1.

Choose sensor type
#FB: Back Illuminated CCD, with AR coating and FOP

Step 2.

Choose option
T2: Fibre optic input (no scintillator)
HR-T2: High Resolution (scintillator and holder)
HT-T2: High Throughput (scintillator and holder)

Step 3.

The iKon-L-HF 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-L range can be operated through a large variety of third party imaging packages. See Andor web site for detail: http://www.andor.com/software/

Step 4.

The following accessories are available:

BERYLLIUM FILTER- ACC-OPT-07875, Beryllium foil (Ø 56 mm, 200 microns thick)
TAPER MODULE- ACC-MEC-08169 1:1.9 Taper Module (see page 3). Other taper options also available.

FILTER/SCINTILLATOR HOLDER- ACC-MEC-07873 filter holder accessory for use with Beryllium and Scintillator filters (see page 3)

XW-RECR Re-circulator for enhanced cooling performance

ACC-XW-CHIL-160 Oasis 160 Ultra compact chiller unit
XU-RECR/TRANS USB 2.0 - transmitter and receiver, including 2 power supplies

Have you found what you are looking for?

Need a faster frame rate? Andor's iKon-M HF 934 boasts a 1 x 1k active image area.
Need to get even closer to the action? Andor's range of SX/HX cameras are designed for use inside vacuum chambers.
Need a standalone camera for X-ray? A custom built Beryllium window is fitted as standard to our SY/HY range of cameras to block visible light.
**Need a specific mounting?** Contact our experienced design team so we can make the perfect fit.
Need a camera for VUV / X-ray spectroscopy? Andor's specialist spectrographic cameras (SO 920 or SO 940) are ideally suited for vacuum spectrographs.
Need a customised version? Please contact us to discuss our Customer Special Request options.

Product Drawings

Dimensions in mm [inches]

Third-angle projection
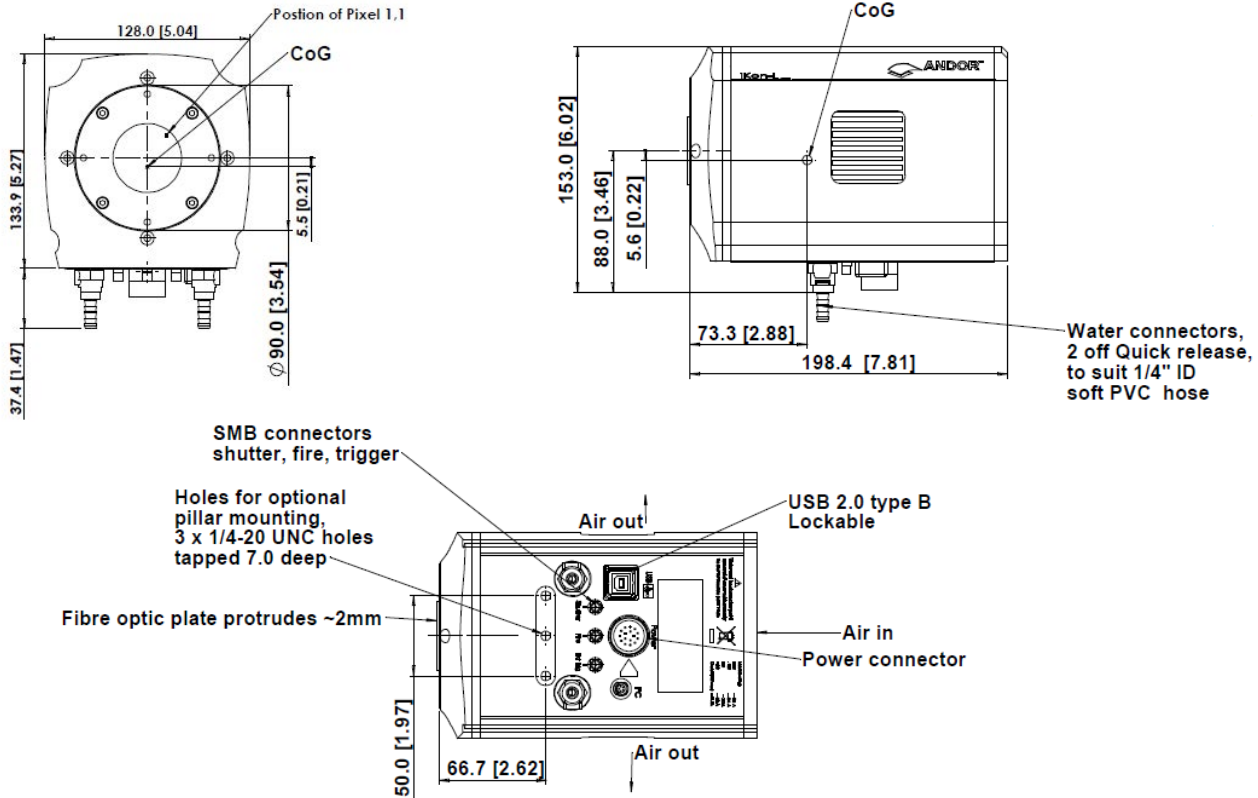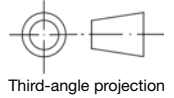
Weight: ~4.5 kg [9 lb 15 oz]

Notes

- Fibre Optic Plate is on a spring loaded design. If required to move, can apply approx 253 N to move FOP 1 mm max towards camera.
- Protective cap MEC-04028 not shown

Best Practice Guidelines

- Camera is susceptible to shock damage. Protective plate should always be fitted when camera is not in use.
- The FOP should always be protected when mounting, both surfaces *must* be free of contamination to avoid damage.
- Dust or contamination can be removed by drop and drag optical cleaning technique. For cleaning use lens tissue with a suitable solvent e.g. spectroscopic grade solvent.
- Do not use abrasives, corrosive solvents, avoid impact or point contact.
- The Beryllium foil is very brittle in nature therefore extreme care should be taken to avoid shock damage. If the foil is broken there is a health risk. Please contact Andor for further information if required.

Connecting to the iKon-L HF

Camera Control
Connector type: USB 2.0

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

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

Minimum cable clearance required at bottom of camera
90 mm

Applications Guide

X-ray / Gamma Tomography
X-ray Plasma Diagnostics
X-ray Imaging
X-ray Diffraction (XRD)
Neutron Tomography
Crystallography
Phase Contrast Imaging
Micro Computer Tomography

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: www.andor.com/contact

Our regional headquarters are:

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Items shipped with your camera:

1 x 2m BNC to SMB connection cable
1 x 3m USB 2.0 cable Type A to Type B
2 x Power supplies (PS-29 & PS-40) with associated cables
1 x CD containing Andor user guides
1 x Individual system performance booklet
1 x Protective cover shipping plate

Footnotes: Specifications are subject to change without notice

1. IMPORTANT-Due to the sensor/ fibre optic being exposed to environments outside of Andor's control there is no warranty on the sensor. For full details of Andor's Warranty Policy please refer to our webpage at http://www.andor.com/support. Please refer to the best practice guidelines on page 5.
2. 5MHz for focusing mode only.
3. Figures are typical unless otherwise stated.
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.
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 set photon flux up to the saturation point of the system.
9. Data as supplied by the scintillator manufacturer. Scintillator peak emission at 550 nm.
10. Data as supplied by the fibre optic plate manufacturer.
11. Typical binning or array size combinations. All measurements are made with 38.55 μs vertical shift speed. It also assumes internal trigger mode of operation and minimum exposure time.
12. Quantum efficiency of the sensor at 20°C as supplied by the sensor manufacturer.

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 1GB recommended for data spooling)
- USB 2.0 High Speed Host Controller capable of sustained rate of 40 MB/s
- Windows (XP, Vista, 7 and 8) 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
- 110 - 240 VAC, 50 - 60 Hz

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.

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