OXFORD INSTRUMENTS

Andor iDus 416 Series

Workhorse laboratory and OEM CCD platform for NIR Spectroscopy

Key Specifications

- ✓ Low dark current deep-depletion
- ✓ Peak NIR QE up to 95%
- ✓ Ultravac™ technology
- ✓ 30 mm wide sensor
- ✓ Low NIR etaloning options
- ✓ Fringe suppression technology
- ✓ TE cooling down to -95°C

Key Applications

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

andor.oxinst.com

Introducing iDus 416 Series

Andor's new iDus 416 platform boasts a unique combination of very low dark noise and very high QE, offering unrivalled sensitivity in the near-infrared. This makes it the ideal detector for NIR Raman and Photoluminescence, reducing greatly acquisition times and removing the need for inconvenient LN_2 cooling.

Features and Benefits

Feature	Benefit
Low dark current	10x better than Back-Illuminated Deep-Depletion NIMO sensors, best SNR in the NIR
Peak QE up to 95%	Best detection capability in the NIR
15 μm pixels	Ideal for high resolution spectroscopy
30 mm wide sensor	Superior simultaneous band-pass capture
Fringe suppression technology as standard	Optical etalonning virtually eliminated
TE cooling down to -95°C	Critical for elimination of dark current detection limit - no inconvenience associated with LN_2
Ultravac™•1	Critical for sustained vacuum integrity and to maintain unequalled cooling and QE performance year after year
USB 2.0 connection	Ideal for laptop operation Seamless operation alongside USB-based Shamrock spectrograph family
Compact and rugged platform	Ideal for OEM integration & laboratory setups
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 [2]

Model number	DU416A-LDC-DD
Sensor options	LDC-DD: Back-Illuminated CCD, Deep-Depletion with anti-fringing, low dark current
Active pixels [3]	2000 x 256
Pixel size	15 x 15 µm
Image area	30 x 3.8 mm with 100% fill factor
Minimum temperatures [4] Air cooled Coolant recirculator Coolant chiller, coolant @ 10 °C, 0.75 l/min	-80ºC -90ºC -95ºC
Dark Current e^-/pixel/sec @ max cooling	0.0006
Max spectra per second [5]	30 (Full Vertical Binning)
System window type	Fused silica window, 'VIS-NIR Enhanced', wedged (AR coated on both sides, optimized at 900 nm) Other broadband UV-NIR options available on request.
Blemish specifications	Grade 1 sensor from supplier. Camera blemishes as defined by Andor Grade A See technical article: CCD blemishes and non uniformities black pixels and hot pixels on a ccd sensor

Advanced Specifications [2]

Image well depth	150,000 e^-		
Register well depth	300,000 e^-		
Read noise (e^-) [6]	33 kHz 4	50 kHz 4.5	100 kHz 5
Sensitivity (e^-/count) Pre-amplifier Gain PAG 0 Pre-amplifier Gain PAG 1	33 kHz 0.7 -	50 kHz 1.5 0.85	100 kHz 5.0 3.4
Linearity [7]	Better than 99%		
Digitization	16 bit		
Vertical clock speed [8]	32 and 64 µs (software selectable)		

Have you found what you are looking for?

Need a larger sensor for multi-track spectroscopy? The iDus 420 series is available with 26.6 x 6.6 mm format and 1024 x 255 pixels.

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

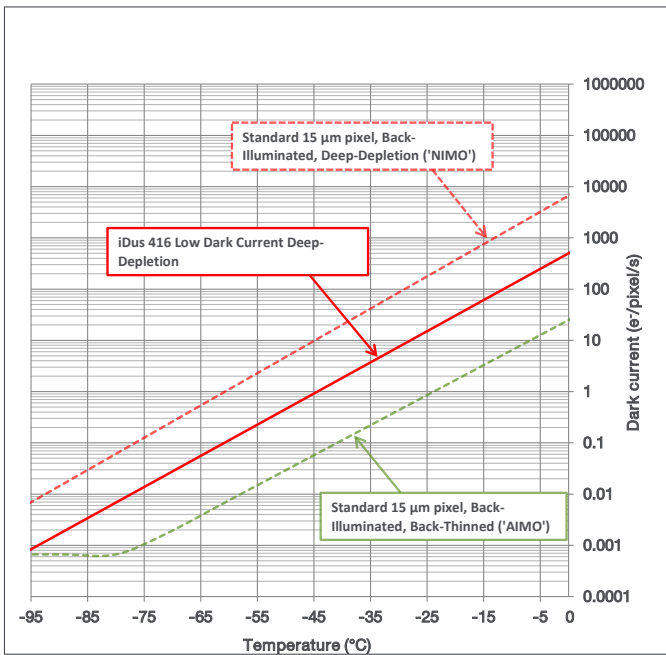**Need a faster or more sensitive CCD?** The Newton series offers over 1,600 spectra per second and EM technology.

Need more UV sensitivity? The iDus 420 offers a range of UV optimized sensors.

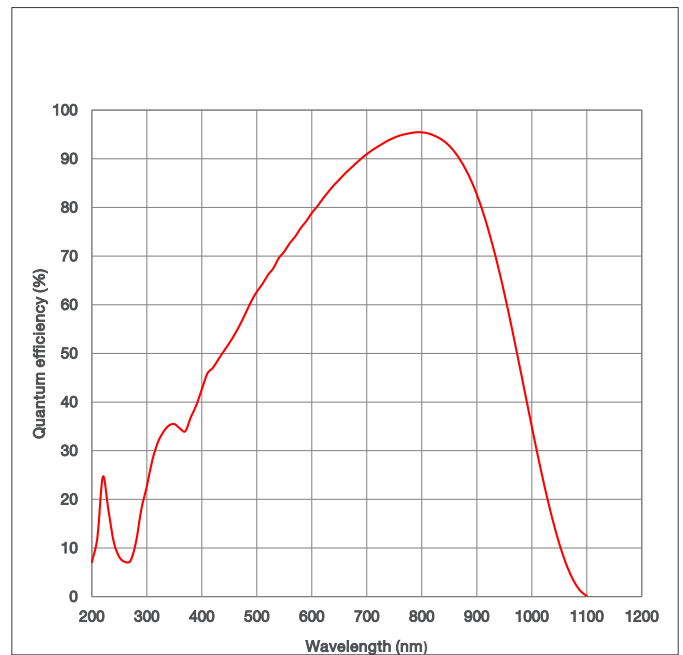**Need a customized version?** Please contact us to discuss our Customer Special Request options.

The iDus series combines seamlessly with Andor's research grade Kymera and Shamrock Czerny-Turner spectrographs.
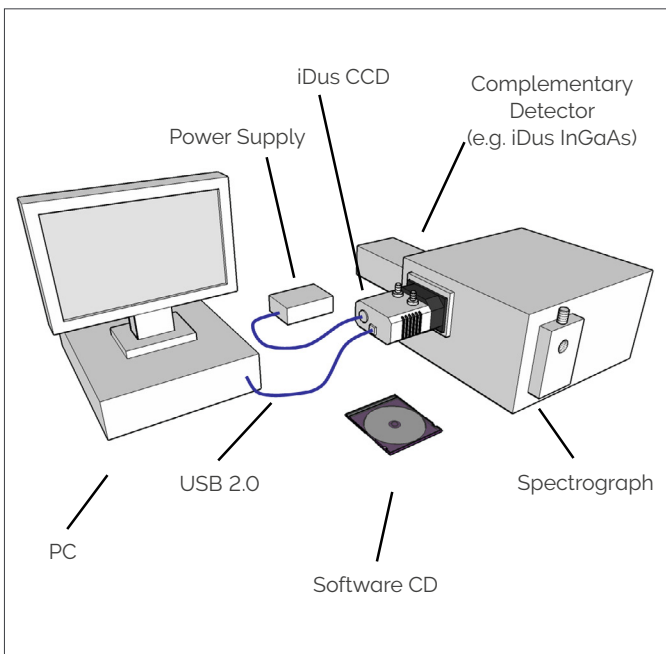
Dark Current [9]

Standard 15 μm pixel, Back-Illuminated, Deep-Depletion ('NIMO')

iDus 416 Low Dark Current Deep-Depletion

Standard 15 μm pixel, Back-Illuminated, Back-Thinned ('AIMO')

Quantum Efficiency Curves [10]
25°C

Typical Setup

iDus CCD

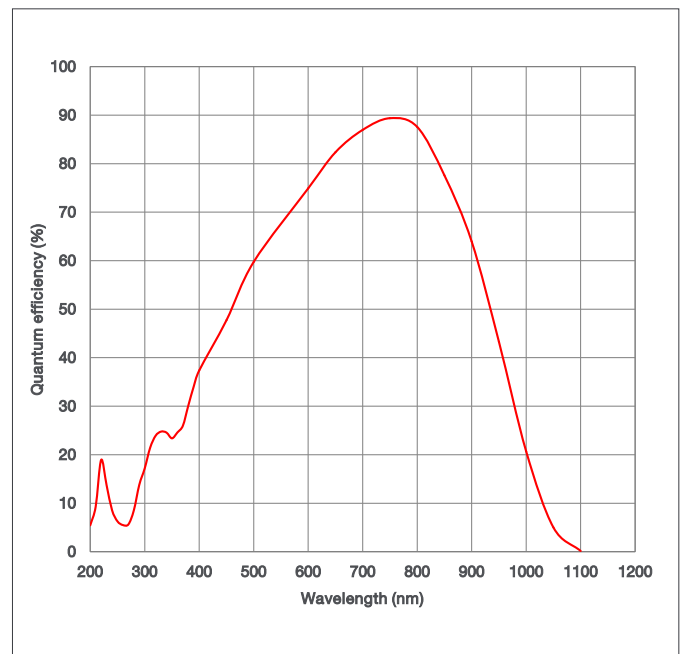Complementary Detector (e.g. iDus InGaAs)

Power Supply

USB 2.0

PC

Software CD

Spectrograph

Quantum Efficiency Curves [10]
-95°C

Customizable & Flexible

For industrial applications, the iDus 416 offers various levels of customization based around the following:

- Lockable USB
- Alternative water connections (90 degrees)
- Chassis mounting options
- Please contact us to discuss your specific requirements.

Creating the Optimum Product for you

DU416A-LDC-DD
example shown

Step 1. Choose the cooling option

Cooling

Description	Code
Deep cooling: (Air cooled: -80°C, Coolant recirculator: -90°C, Coolant chiller, coolant @ 10°C, 0.75 l/min: : -95°C)	**DU**

## Step 2. 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 3. Select the required accessories and adapters
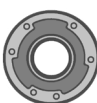
Accessories & Adapters

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**
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 iDus series is fully compatible with Andor's Kymera and Shamrock spectrographs (193 - 750 mm focal lengths). Spectrograph mounting flanges and software control are available for a wide variety of third party spectrographs including McPherson (including 1 m and greater focal length option), JY/Horiba (excluding USB models), Teledyne-PI/Acton, Chromex/Bruker, Oriel/Newport, Photon Design, Dongwoo, Bentham and others.

## Step 4. Select the required software

Software

The iDus 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, 10 and 11) 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 third 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, 10, 11) and Linux. Compatible with C/C++, C#, Delphi, VB.NET, LabVIEW, MATLAB and Python.

Product Drawings

Dimensions in mm [inches]
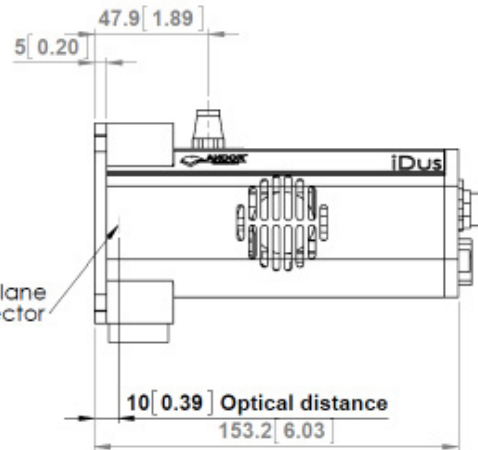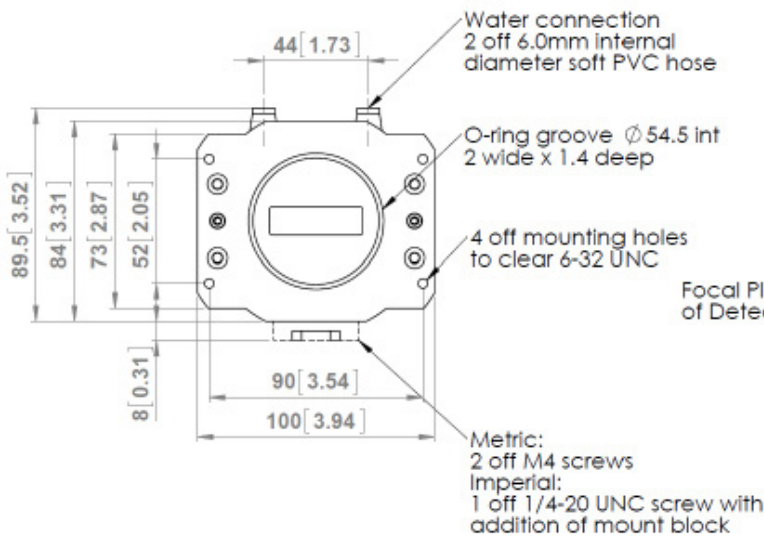
■ = position of pixel 1,1
Weight: 2 kg [4 lb 8 oz]

Connecting to the iDus

Camera Control
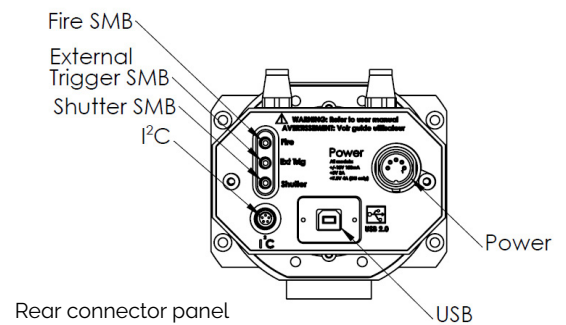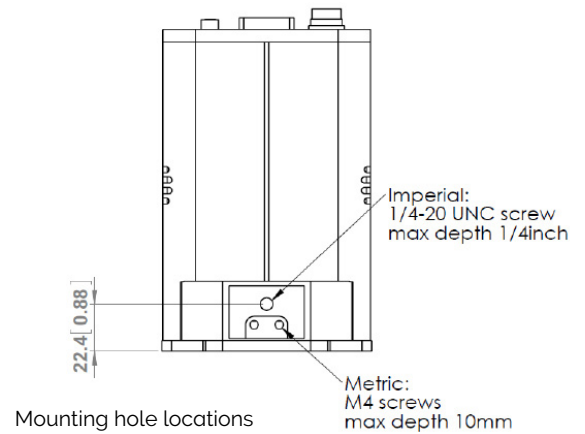Connector type: USB 2.0

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

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

Minimum cable clearance required at rear of camera
90 mm

Our Cameras for Spectroscopy

Spectroscopy-based diagnostics in the fields of Material Science, Chemistry, Life Science or Fundamental Physics & Optics rely on the capture and analysis of optical and chemical signatures with a high degree of precision.

Andor's range of detectors offer a wide range of sensitivity, time-resolution and sensor formats to best suit specific experimental conditions from UV to SWIR, nanosecond to hours time resolution, high photon flux to single photon with super dynamic range and resolution.

High Sensitivity & Dynamic Range

- ✓ Long exposure
- ✓ High sensitivity UV-SWIR
- ✓ Large pixel well depths
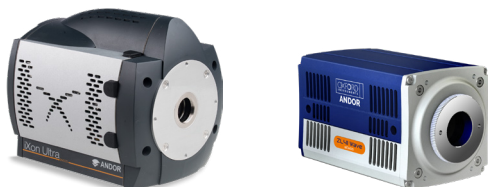- ✓ High resolution matrix

iDus CCD & InGaAs | Newton CCD & EM

ns to µs Time-Resolution

- ✓ Nanosecond gating
- ✓ High sensitivity down to single photon
- ✓ On-head DDG with ps accuracy
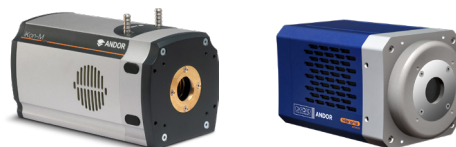
iStar CCD & sCMOS

kHz Spectral Rates

- ✓ µs to ms time-resolution
- ✓ High sensitivity down to single photon
- ✓ High resolution matrix

Newton CCD & EMCCD | iXon EMCCD | Zyla sCMOS | Marana sCMOS

Extended Multi-fibre Spectroscopy

- ✓ Large area sensors
- ✓ Ultrafast sCMOS and EMCCD options
- ✓ High sensitivity down to single photon

iKon-M CCD | iXon EMCCD | Zyla sCMOS | Marana sCMOS | iStar CCD & sCMOS

Learn more about our detector range here.

Learn more about our spectrograph solutions here.

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 local sales offices, please see: **andor.oxinst.com/contact**

Our regional headquarters are:

Europe
Belfast, Northern Ireland
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Fax +1 (860) 290 9566

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

Footnotes: Specifications are subject to change without notice

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. Edge pixels may exhibit a partial response.
4. Minimum temperatures listed are typical values with ambient temperature of 25°C.
5. Based on a Horizontal Pixel Readout of 100 kHz and a vertical pixel shift of 32 µs.
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 -50°C and minimum exposure time under dark conditions. Noise is measured at the highest available pre-amplifier gain for each speed.
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, and designed to give optimum Charge Transfer Efficiency (CTE) at 32 µs 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. The 'BR-DD NIMO' and 'BV' dark current curves are shown for comparison purposes only, and have been scaled to account for pixel size differences between the iDus 401 and iDus 416 sensors.
10. Quantum efficiency of the sensor as supplied by the sensor manufacturer.

Items shipped with your camera:
1x 2 m BNC - SMB conection cable
1x 3 m USB 2.0 cable Type A to Type B
1x Set of hex keys (7/64" & 3/32")
1x Power supply with mains cable
1x Quick Start guide
1x Electronic copy of user guides
1x Individual system performance booklet
1x Electronic copy of Solis software or SDK (if ordered)

Regulatory Compliance
Compliant with the requirements of the EU EMC and LVD Directives, compliant with the international EMC and safety standards IEC 61326-1 and IEC 61010-1.

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, 10 and 11)

Operating and 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: 42 W (max)

EMS91062   FM40523

EPICS   µManager   Linux   Windows 8 Compatible   Windows 11 Compatible   LabVIEW   MATLAB

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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