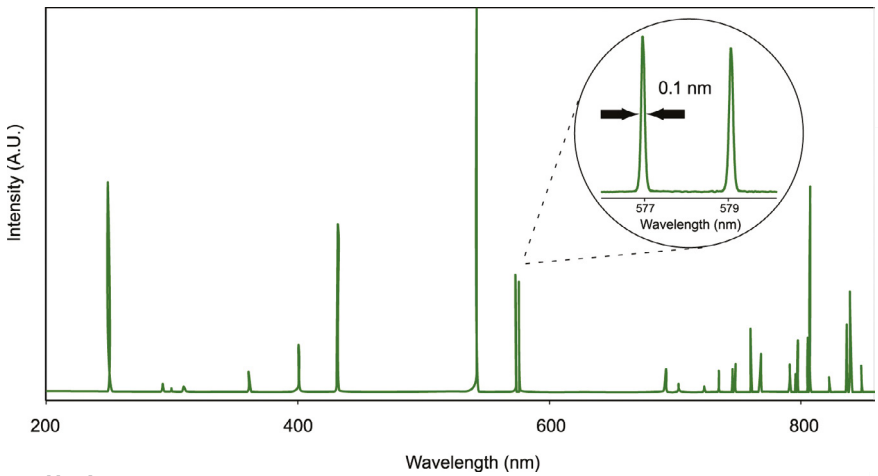
Mechelle 5000

High-band-pass
Echelle spectrograph

OXFORD INSTRUMENTS ANDOR

Spectroscopy



Hg-Ar spectrum
Acquired with Mechelle 5000,
1024 x 1024 pixel Gen 2 Andor iStar
and 10 µm slit width

Features and Benefits

- **Compact and robust design with no moving components**
  Ideal for non-lab based applications
- **Simultaneous high resolution and high bandpass**
  Single acquisition covers 775 nm with a resolution power up to 6,000 nm
- **Patented optical design**
  Ensures maximum resolution and high bandpass with extremely low crosstalk
- **Auto-temperature correction**
  Corrects for the variation of prisms optical refractive index with temperature
- **N_2 purged**
  Sealed, nitrogen backfilled enclosure minimizes degradation in performance, due to moisture-laden air, especially in the UV region
- **Pre-aligned detector/spectrograph solution**
  Enables fast, efficient experimental set-up
- **Low F/number**
  Highly efficent light collection
- **Wide range of accessories available**
  Including fibre optics, slits, allignment laser, collector/collimator and calibration lamps
- **Andor Solis software**
  Automatically extracts a full wavelength calibrated spectrum from a complex echelle image and offers system advanced data manipulation capabilities
- **Peak labelling with NIST table**
  Easy tagging of known atomic species at the press of a button

Simultaneous high bandpass and high resolution Echelle spectrograph

Andor's Mechelle ME5000 spectrograph has been designed to provide simultaneous recording of a wide wavelength range (200 - 975 nm) in one acquisition. It has no moving components and is available in a pre-aligned detector/spectrometer format.

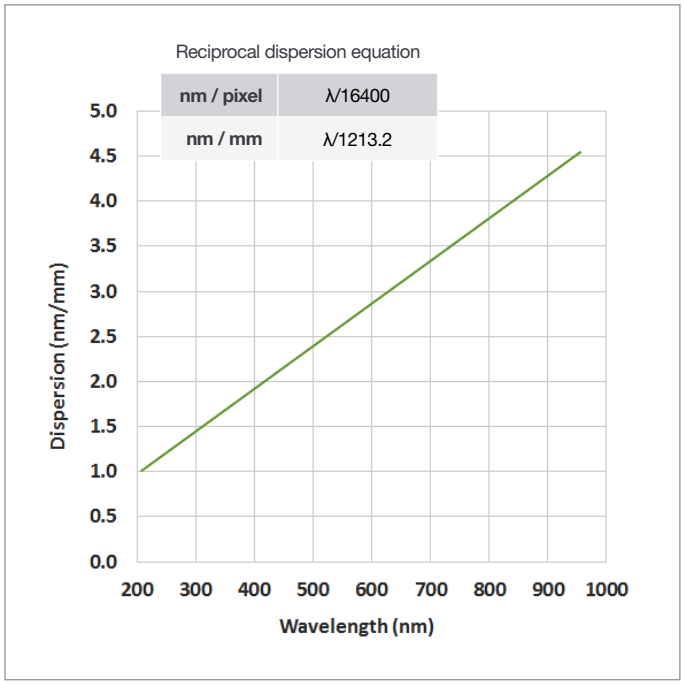
Based on the echelle grating principal, its patented optical design provides extremely low crosstalk and maximum resolution compared with other spectrographs. It is designed to operate with Andor's New iStar DH334T intensified camera[•7] and the iKon-M DU934P-yy-9FL camera in applications such as LIBS and plasma studies.

Specifications

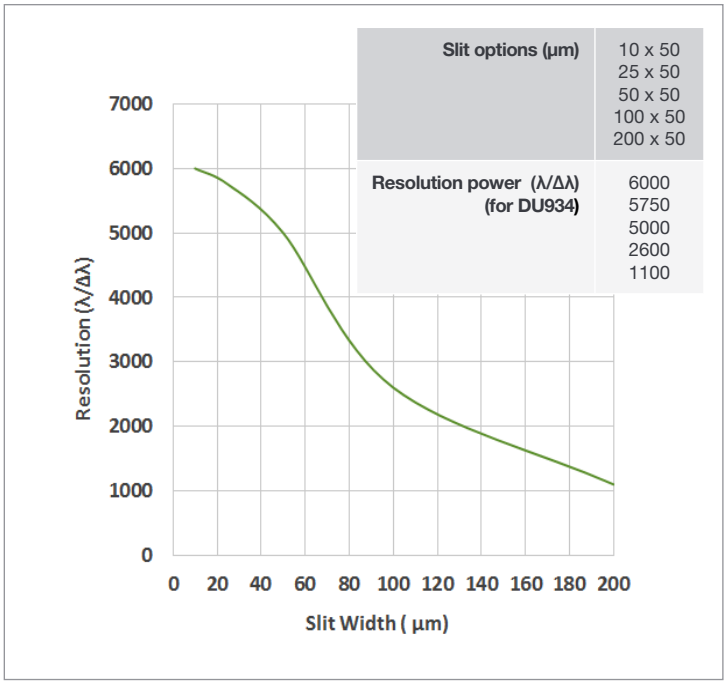
Wavelength range (nm)	**200 - 975**
Focal length (mm)	**195**
Aperture	**F/7**
Spectral resolution (λ/Δλ) [•1] (corresponding to 3 pixels FWHM)	**Up to 6,000**
Wavelength accuracy	**Better than ± 0.05 nm**
Channel height (pixels) [•2]	**5, 3, 1**
Channel width (pixels)	**1**
Optical adjacent order crosstalk [•3]	**Better than 1 x 10^{-2}**
Stray light [•4]	**Better than 1.5 x 10^{-4}**
Shutter rate (Hz) [•5]	**1**

Technical Information

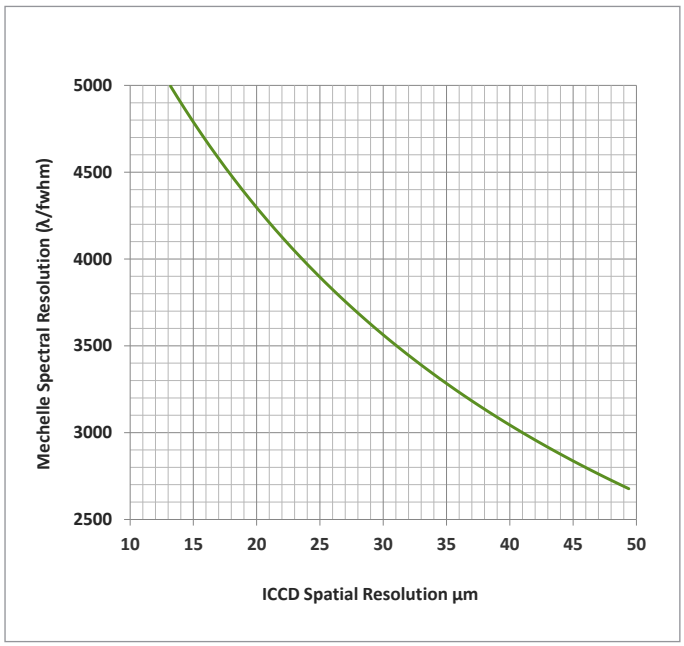
Reciprocal Dispersion



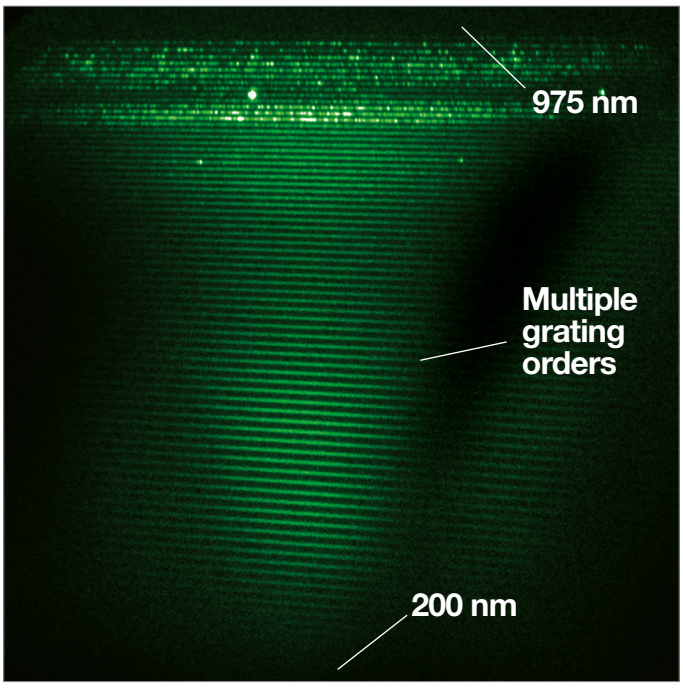
Resolution Power vs Slit Width



Mechelle 5000 Spectral Resolution vs ICCD Spatial Resolution



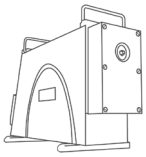
Echellogram Example



Echellogram of Deuterium-Tungsten light source
acquired with Mechelle 5000 and Andor New iStar ICCD

Creating The Optimum Product for You

Step 1. Select the Spectrograph model

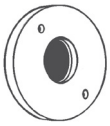


Spectrograph

Quote the model number below:

Description	Order Code
Mechelle 5000 echelle spectrograph	**ME-5000**

Step 2. Select the required accessories & adapters

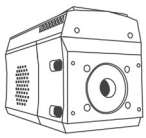


Adapters & Accessories

The Mechelle 5000 is supplied with ME-OPT-8004 (Fibre optic cable, UV, SMA-SMA, 50 µm core x 2m) and an SMA adaptor, but no slit or shutter. The following accessories are available:

Description	Order Code
Mercury-Argon calibration lamp with SMA connector	ACC-LK-HGAR-OCE
Deuterium-Halogen lamp, radiometrically calibrated (230 to 1,050 nm)	LK-DHRD-OCE-CAL
UV-NIR light collector/collimator with alignment laser for F/# = 2 collection	ME-OPT-0007
Mechelle shutter unit (recommended when using iKon-M DU934P-yy-9FL)	ME-SHT-9002
Mechelle 25 x 25 µm slit [6]	ME-SLT-25x25
Mechelle 10 x 50 µm slit [6]	ME-SLT-10x50
Mechelle 50 x 25 µm slit [6]	ME-SLT-50x25
Mechelle 25 x 50 µm slit [6]	ME-SLT-25x50
Mechelle 50 x 50 µm slit [6]	ME-SLT-50x50
Mechelle 100 x 50 µm slit	ME-SLT-100x50
Mechelle 200 x 50 µm slit	ME-SLT-200x50

Step 3. Select your camera



Camera

Camera	Description	Order Code
iStar CCD	Intensified fast gated CCD camera, 1024 x 1024 matrix with 13 um pixels, Ø 18 mm Gen 2 intensifiers, gating down to 2 ns or better	DH334T-18x-xx
iStar sCMOS	Intensified fast gated sCMOS camera, 2560 x 2160 matrix with 6.5 um pixels, Ø 18 mm Gen 2 intensifiers, gating down to 2 ns or better, fast frame rates up to 50 Hz	ISTAR-SCMOS-18x-xx
iKon-M CCD	CCD camera, 1024 x 1024 matrix with 13 um pixels, deep TE-cooling to -100°C for non-gated or long exposure times, no mechanical shutter	DU934P-yy-9FL

Refer to the camera specification sheets for further information

Step 4. Select your software

Software

The Mechelle 5000 requires at least one of the following software options:

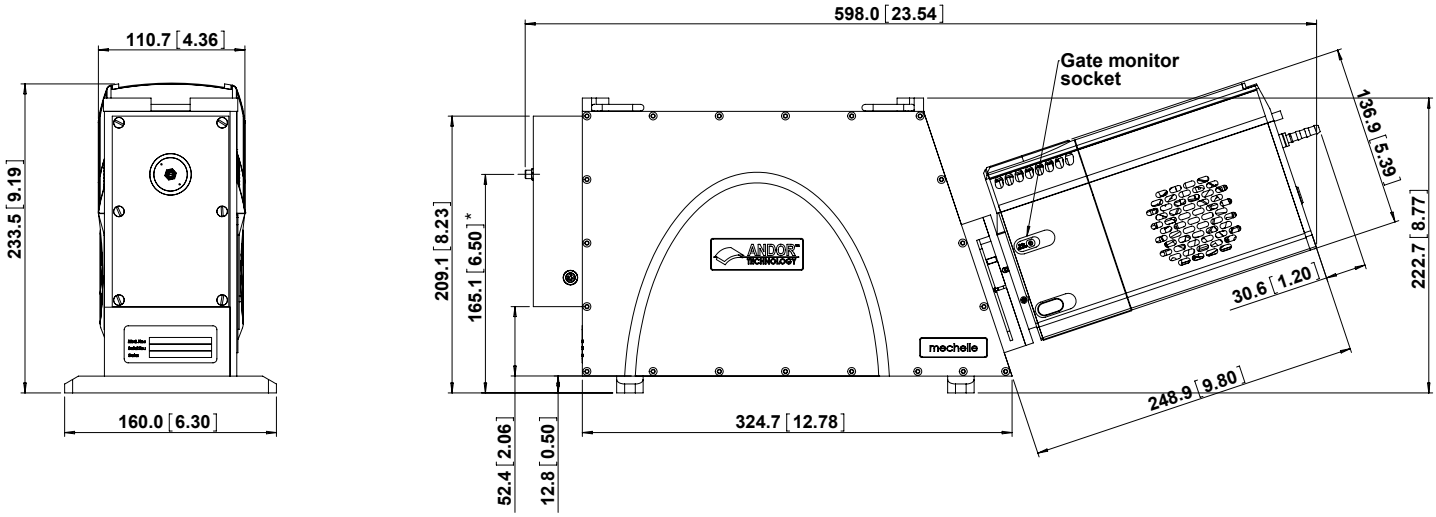
Solis for Spectroscopy A 32-bit and fully 64-bit enabled application for Windows (8, 8.1 and 10) offering rich functionality for data acquisition and processing. AndorBasic provides macro language control of data acquisition, processing, display and export. Control of Andor Shamrock spectrographs and a very wide range of 3rd party spectrographs is also available.

Mechelle 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 (8, 8.1 and 10). Compatible with C/C++, C#, Delphi, VB6 and LabVIEW.

Mechanical and Connectivity Information

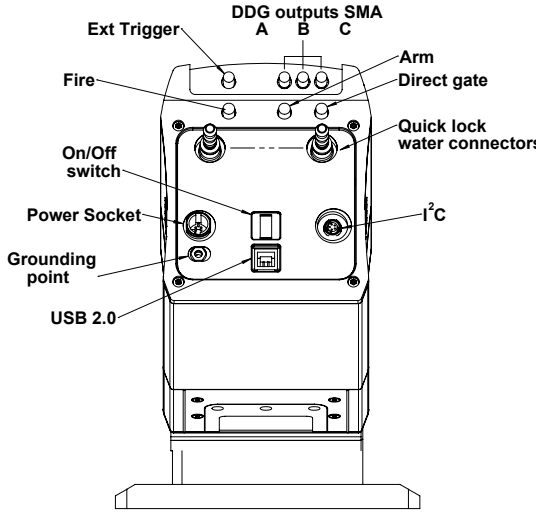
Product Drawings

Dimensions in mm [inches]



Mechanical & Electrical Specifications

*Optical path height	165.1 mm [6.50 inches] 155.1 mm [6.1 inches]
Camera flange mounting	4 off, 6/32 x 3/8 UNC
Weight	Mechelle alone: 10 Kg [22 lbs] With New iStar attached:14.2 kg [31 lbs 4 oz]
Camera Connection	Dependant on type of camera attached
Temperature correction	I²C bus
Optional shutter control	TTL signal for shutter



Rear view showing New iStar camera connections

Applications Guide

- ✓ Laser Induced Breakdown Spectroscopy (LIBS)
- ✓ Plasma Studies
- ✓ Chemical Detection
- ✓ Environmental Analysis

✓ = Suitable
✓ = Optimum

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Items shipped with your spectrograph

1x CD containing Solis software (if ordered)
1x I²C, shutter & temperature cable
1x SMA adapter
1x ACC-ME-OPT-8004, 50 µm core, UV-enhanced fibre optic cable

Footnotes: Specifications are subject to change without notice

1. The spectral resolution is measured using an Andor DU934P-yy-9FL shutterless camera. This value is equivalent to a FWHM of 0.04 nm at 200 nm or 0.1 nm at 500 nm, measured using a 50 µm wide slit. When used with a iStar DH334T the typical spectral resolution is 4000. (Resolving power of spectrograph = $\lambda / \Delta\lambda$).
2. The channel height is selectable through the software.
3. Crosstalk measured with a 50 x 25 µm slit at the 546 nm line, with a channel height of 5 pixels.
4. Stray light as measured at 20 nm from a 633 nm laser line.
5. The shutter is optional when using the Mechelle with Andor's New iStar intensified CCD camera. However it is recommended to protect the image intensifier photo-cathode from photo-bleaching during experimental 'dead-time'.
6. When working with narrow slits (< 50 µm), use of a larger core diameter fibre optic is strongly recommended e.g. 100 or 200 µm.
7. iStar DH334T models with Ø 18 mm intensifier.

Laser Safety Labels for Laser Accessories

Operating & Storage Conditions

- Operating Temperature: 20°C to 30°C ambient
- Relative Humidity: < 70% (non-condensing)
- Storage Temperature: -25°C to 50°C