Shamrock 303i
303 mm focal length, motorized, Czerny-Turner Spectrograph

Features and Benefits

- **Pre-aligned, pre-calibrated detector & spectrograph**
  Motorized, individually factory-calibrated systems – out-of-the-box operation and seamless integration to experimental set-ups

- **Image astigmatism correction**
  Optimized toroidal optics enabling high density multi-track capabilities

- **USB 2.0 interface**
  Plug and play connectivity, ideal for laptop operation alongside Andor USB cameras

- **Motorized, indexed triple grating turret**
  Easily upgradable in-the-field

- **Dual detector outputs**
  For extended wavelength coverage when combining Andor UV-Visible CCD and InGaAs cameras
  Compatible with Andor’s range of CCD, ICCD & EMCCD cameras

- **Wide range of accessories available**
  The ultimate in modular set-up and in-field upgradability, including:
  - Motorized slits & filter wheel
  - Microscope interfaces
  - Shutters
  - Fibre-optic & lens couplers
  - Multi-way fibre-optic bundles
  - Light sources and optics

- **Silver-protected coated optics option**
  Most efficient for Near-Infrared detection when used in conjunction with Andor InGaAs cameras

- **Integrated in EPICS**
  Supported by EPICS control software

Research-grade high performance spectrograph

The Shamrock 303i spectrograph is a research-grade, high performance and rugged platform designed for working with demanding low-light applications, but equally suited to day-to-day routine measurements. It is a highly versatile platform configurable seamlessly with a wide range of light coupling interfaces and gratings upgradeable in-the-field. The Shamrock 303i can be seamlessly integrated with Andor’s world-class range of CCDs, Electron-Multiplying CCDs, InGaAs and Intensified CCDs to offer a versatile, yet most sensitive modular solutions on the market. Andor Solis software offers the most user-friendly and state-of-the-art real-time control of detectors, spectrograph and motorized accessories at the touch of a button.

Specifications Summary

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution with Newton DU940 CCD</td>
<td></td>
</tr>
<tr>
<td>1200 l/mm @ 500 nm</td>
<td>0.10 nm</td>
</tr>
<tr>
<td>2400 l/mm @ 300 nm</td>
<td>0.05 nm</td>
</tr>
<tr>
<td>Aperture</td>
<td>F/4</td>
</tr>
<tr>
<td>Focal length</td>
<td>303 mm</td>
</tr>
<tr>
<td>Magnification @ centre of CCD</td>
<td></td>
</tr>
<tr>
<td>Vertical, spectral flange</td>
<td>1</td>
</tr>
<tr>
<td>Vertical, multi-track flange</td>
<td>1</td>
</tr>
<tr>
<td>Gratings</td>
<td>Interchangeable indexed triple turret</td>
</tr>
<tr>
<td>Slit width range (input/output)</td>
<td>Motorized 10 µm to 2.5 mm</td>
</tr>
<tr>
<td></td>
<td>Wide aperture option to 12 mm</td>
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<tr>
<td>Communication</td>
<td>USB 2.0</td>
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<tr>
<td>Wavelength accuracy</td>
<td>0.04 nm</td>
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<tr>
<td>Wavelength repeatability</td>
<td>4 pm</td>
</tr>
<tr>
<td>Stray light</td>
<td>$2.2 \times 10^{-5}$</td>
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</table>
Step-by-Step System Configuration
How to customize the Shamrock 303i:

Step 1. - Chassis configuration
a) Select either a single output port (model A) or dual output port (model B) option.
b) Select type of optics coating required (aluminium + MgF$_2$ is standard, protected silver coated optics available on request for NIR detection).
c) Select purge port option (for improved detection down to 180 nm), and shutter for background acquisition and detectors protection.

Step 2. - Resolution & band-pass
a) Select the appropriate Shamrock spectrograph platform, giving due consideration to bandpass and spectral range requirement.
b) Select gratings and detector to fulfill resolution requirements.
c) Select gratings for suitable wavelength coverage.

Step 3. - Input light coupling interface
Refer to accessory tree for available configurations (direct coupling, fibre coupling or 3rd party hardware connectivity).

Step 4. - 2nd exit port configuration
Refer to accessory tree for available configurations, including camera flanges.

Step 5. - Software interface
Select either state-of-the-art Solis software or Software Development Kit (SDK) option – please refer to appropriate section for further information.
Step 1 - Chassis Configuration

Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Side input port</th>
<th>Direct output port</th>
<th>Side output port</th>
<th>Motorized flipper mirror</th>
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</thead>
<tbody>
<tr>
<td>SR-303i-A</td>
<td>Motorized slit</td>
<td>Camera</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SR-303i-B</td>
<td>Motorized slit</td>
<td>Camera</td>
<td>Camera (standard) Optional motorized slit</td>
<td>√</td>
</tr>
<tr>
<td>SR-303i-X-SIL</td>
<td>Protected silver coated optics for models shown above (replace X with relevant model number)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Optics Coatings Reflectivity Graph

The graph shows the standard Al + MgF$_2$ optics coatings reflection efficiency versus wavelengths.

Protected silver coated optics option is also available on request for maximum efficiency in the NIR region and is recommended for working with Andor iDus InGaAs detectors.

When choosing protected silver coatings, it is strongly recommended to also order protected silver coated gratings for maximum efficiency throughout the system.

Chassis Accessories

Additional Grating Turret (SR-ASM-0003)

New iStar I'C to BNC shutter cable (ELC-05323)

Purge Connector (SR-ASM-8040)

Shutter (SR-SHT-9001)

I'C and USB Cables (Standard)

Adjustable feet for micro-spectroscopy (SR-ASM-0080) 137 – 157 mm optical height

Adjustable feet (basic) - (SR-ASM-022)
Czerny-Turner spectrographs are designed to provide the best optical performance for a range of grating angles as indicated by the green parts of the graph above. Outside this range, the spectral lines may exhibit a degree of optical aberration (such as coma), which will become more prominent at the steeper angles. These configurations are indicated by the orange to red scales on the graph. In these regions, consideration should be given to higher spectrograph focal length models with lower groove density gratings to achieve the desired resolution.

Where aberration is a concern for a particular experimental set-up, the table above shows resolution and band-pass performance for a variety of alternative configurations. This should be used in conjunction with the graph above to assist in selecting the most appropriate Shamrock spectrograph platform to meet resolution and band-pass needs, whilst minimising the risk of potential aberration.
Step 2b - Choosing The Right Grating vs Resolution & Band-pass

The Shamrock 303i features an innovative triple grating turret, designed to offer flexibility and control over your choice and interchange of gratings. The triple grating turret can be easily and speedily removed, and replaced by an alternative turret with new gratings. The intelligent design of the 303i means that only a simple offset adjustment is required once the new turret and gratings are added. The 303i is shipped with the grating turret already in place, ensuring your system is ready for use straight out of the box. Additional grating turrets are available with up to three pre-installed gratings per turret (see below for details). If the grating you require is not on the list, please contact Andor for further details. Additional grating turret(s) (part number SR-ASM-0003) can also be supplied on request.

<table>
<thead>
<tr>
<th>Lines/mm</th>
<th>Blaze (nm)</th>
<th>Nominal dispersion (nm/mm)*</th>
<th>Bandpass (nm)</th>
<th>Resolution (nm)</th>
<th>Peak efficiency (%)</th>
<th>Andor part number</th>
<th>Maximum recommended wavelength (nm)</th>
<th>Maximum attainable wavelength (nm)</th>
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<tbody>
<tr>
<td>150</td>
<td>300</td>
<td>21.79</td>
<td>603</td>
<td>0.89</td>
<td>72</td>
<td>SR3-GRT-0150-0300</td>
<td>6910</td>
<td>11300</td>
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<tr>
<td>150</td>
<td>500</td>
<td>21.70</td>
<td>600</td>
<td>0.88</td>
<td>73</td>
<td>SR3-GRT-0150-0500</td>
<td>3455</td>
<td>5650</td>
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<tr>
<td>150</td>
<td>800</td>
<td>21.56</td>
<td>596</td>
<td>0.87</td>
<td>80</td>
<td>SR3-GRT-0150-0800</td>
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<td>2825</td>
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<td>150</td>
<td>1250</td>
<td>21.32</td>
<td>589</td>
<td>0.86</td>
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<td>1410</td>
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<tr>
<td>150</td>
<td>2000</td>
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<td>0.85</td>
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<td>SR3-GRT-0150-2000</td>
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<td>300</td>
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<td>0.44</td>
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<td>300</td>
<td>500</td>
<td>10.73</td>
<td>297</td>
<td>0.43</td>
<td>81</td>
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<td>300</td>
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<td>10.43</td>
<td>288</td>
<td>0.42</td>
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<td>300</td>
<td>1200</td>
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<td>600</td>
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<td>600</td>
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<td>600</td>
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<td>600</td>
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<td>1200</td>
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<td>1200</td>
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<td>1200</td>
<td>Holographic (500 nm peak)</td>
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<td>1800</td>
<td>Holographic (250 nm peak)</td>
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<td>Holographic (380 nm peak)</td>
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<td>0.05</td>
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<td>SR3-GRT-2400-0300</td>
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<td>4800</td>
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<td>2400</td>
<td>Holographic (220 nm peak)</td>
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<td>34</td>
<td>0.05</td>
<td>68</td>
<td>SR3-GRT-2400-BH</td>
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<td>4800</td>
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<tr>
<td>2400</td>
<td>Holographic (400 nm peak)</td>
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<td>29</td>
<td>0.04</td>
<td>73</td>
<td>SR3-GRT-2400-GH</td>
<td>2400</td>
<td>4800</td>
</tr>
<tr>
<td>Mirror</td>
<td>UV-VIS</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>SR3-GRT-MR-AL-MGF2</td>
<td>2400</td>
<td>4800</td>
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<tr>
<td>Mirror</td>
<td>VIS-NIR</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>SR3-GRT-MR-SILVER</td>
<td>2400</td>
<td>4800</td>
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</tbody>
</table>

*Option for minimized scattered light.

**Need to have maximum collection efficiency in the NIR/SWIR?** All gratings are also available with protected silver coating. Please contact your local representative for further information.
Step 2c - Selecting The Correct Grating Efficiency Option

All graphs shown below represent efficiency for 45° polarisation.

Important Consideration

System throughput is dependent on the grating’s angle of operation and may decrease with higher grating operating angles.
Step 3 - Selecting The Correct Light Coupling Interfaces

How to customize the Shamrock 303i:

- Spacer (Standard)
- Filter Wheel Assembly (SR-ASZ-7001)
- Fixed FC Fibre Adapter (SR-ASM-8011)
- Fixed SMA Fibre Adapter (ACC-SR-ASM-8003)
- Motorized Slit Assembly (Standard) inc 6 x 4 mm (W x H) Cover Plate
- Motorized Wide Aperture Slit inc Ø27 mm Cover Plate
- X-Y Adjustable Fibre Adapter (See page 9 Section B: Direct X-Y fibre couplers)
- Neutral Density Filters
- Long Pass Filters
- Short Pass Filters
- Raman Edge Filters
- Side input port

- Sample Chamber (ACC-SR-ASZ-0056)
- F/# Matcher for NA = 0.22 Fibre (SR-ASM-0038)
- X Adjustable Fibre Adapter, Ferrule Input (SR-ASM-8006)
- Fixed Fibre Adapter, Ferrule Input (SR-ASM-8001)
- X-Y Adjustable Fibre Adapter (See page 9 Section C: X-Y fibre couplers with slit assembly)
- Optical Cage System Adapter (SR-ASM-0065)
- F-Mount Camera Lens Adapter (SR-ASM-0013)
- 1.5" Flange Adapter for Newport Oriel Accessories (SR-ASM-0002)
- C-Mount Adapter (SR-ASM-0021)
- Pen-Ray Lamp Mount (SR-ASM-0014)
- Pen-Ray Lamp Hg-Ar, Hg-Ne, Ar, Kr, Ne

- SMA Adapter for F/# Matcher (SR-ASM-0041)
- FC Adapter for F/# Matcher (SR-ASM-0064)
- Fibre Ferrule (SR-OPT-800X)
- Cage System (Please refer to Thorlabs or Linos catalogue)
- Cage system microscope flange (TR-XXXXX-CAGE-ADP)
- 1.5" Flange Adapter (SR-ASZ-0079)
- Optical Relay
- C-Mount Lens (OL-XXXX-XXX)
- C-Mount Adapter (SR-ASM-0021)
- Pen-Ray Lamp Mount (SR-ASM-0014)
- Pen-Ray Lamp Hg-Ar, Hg-Ne, Ar, Kr, Ne

- SMA Fibre (50 µm: ACC-ME-OPT-8004)
- (100 µm: SR-OPT-8039)
- SMA - SMA Fibre (50 µm: ACC-ME-OPT-8004)
- (100 µm: SR-OPT-8039)
- X Adjustable Fibre Adapter, Ferrule Input (SR-ASM-8006)
- Fixed Fibre Adapter, Ferrule Input (SR-ASM-8001)
- X-Y Adjustable Fibre Adapter (See page 9 Section C: X-Y fibre couplers with slit assembly)
- Optical Cage System Adapter (SR-ASM-0065)
- F-Mount Camera Lens Adapter (SR-ASM-0013)
- 1.5" Flange Adapter for Newport Oriel Accessories (SR-ASM-0002)
- C-Mount Adapter (SR-ASM-0021)
- Pen-Ray Lamp Mount (SR-ASM-0014)
- Pen-Ray Lamp Hg-Ar, Hg-Ne, Ar, Kr, Ne

- SMA Adapter for F/# Matcher (SR-ASM-0041)
- FC Adapter for F/# Matcher (SR-ASM-0064)
- Fibre Ferrule (SR-OPT-800X)
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- Optical Relay
- C-Mount Lens (OL-XXXX-XXX)
- C-Mount Adapter (SR-ASM-0021)
- Pen-Ray Lamp Mount (SR-ASM-0014)
- Pen-Ray Lamp Hg-Ar, Hg-Ne, Ar, Kr, Ne
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Step 4 - Cameras & Output Port Flanges
How to customize the Shamrock 303i:

- X-Y Adjustable Fibre Adapter
  See page 9 Section B: Direct X-Y fibre couplers

- Exit Port Motorized Slit Assembly
  (SR-ASZ-0005)
  inc 6 x 4 mm (W x H) Cover Plate

- Cover Plate for Motorized Slit Assembly
  (See page 9 Section A: Slit Covers)

- C-Mount Adapter
  (SR-ASM-0021)

- Sample Chamber
  (ACC-SR-ASZ-0056)

- Direct connection of Andor spectroscopy cameras (no need for flange)

- Direct Output Port
  - iKon-L Mounting Flange
    (MFL-SR303i-IKON-L)
  - iKon-M Mounting Flange
    (MFL-SR303i-IKON-M)
  - Intermediate Plane Multi-channel Detector Flange
    (MFL-SR303i-INTER)
  - iXon ULTRA Mounting Flange
    (MFL-SR303i-IXON)
  - iXon 888 Mounting Flange Crop Mode & Fast Kinetics
    (MFL-SR3-888U-CROP)
  - Multi-channel Detector Flange (Standard)

- Side Output Port
  - X-Y Adjustable Fibre Adapter
    See page 9 Section C: X-Y fibre couplers (with slit assembly)
  - C-Mount Adapter
  - Sample Chamber
  - Direct Output Port

See page 9 Section C: X-Y fibre couplers (with slit assembly)
Shamrock 303i
303 mm focal length, motorized, Czerny-Turner Spectrograph

A: Slit Covers

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Size</th>
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<tbody>
<tr>
<td>SR-ASM-0010</td>
<td>6 x 8 mm (W x H)</td>
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<tr>
<td>SR-ASM-0011</td>
<td>6 x 14 mm (W x H)</td>
</tr>
<tr>
<td>SR-ASM-0015**</td>
<td>Ø 15 mm</td>
</tr>
<tr>
<td>SR-ASM-0016**</td>
<td>6 x 4 mm (W x H)</td>
</tr>
<tr>
<td>SR-ASM-0017</td>
<td>6 x 6 mm (W x H)</td>
</tr>
</tbody>
</table>

B: Direct X-Y Fibre Couplers

FC: SR-ASM-8053***
FC-APC: SR-ASM-8055***
SMA: SR-ASM-8054

FC upgrade: ACC-FC-DIRECT-APT
FC/APC upgrade: ACC-FCAPC-DIRECT-APT
SMA upgrade: ACC-SMA-DIRECT-APT

Ferrule: SR-ASM-8057

C: X-Y Fibre Couplers (with Slit Assembly)

FC: SR-ASM-8056***
SMA: SR-ASM-8052
Ferrule SR-ASM-8069

FC upgrade: ACC-FC-SLIT-APT
SMA upgrade: ACC-SMA-SLIT-APT
Ferrule upgrade: ACC-FERRULE-SLIT-APT

Fibre Ferrule (SR-OPT-80XX)**

SMA - SMA Fibre
(50 µm: ACC-ME-OPT-8004)
(100 µm: SR-OPT-8039)

Notes:
- For connection to manual slits, please also order Ø15 mm slit cover plate SR-ASM-0067
- For connection to motorized slits, please also order Ø15 mm slit cover plate SR-ASM-0015
Step 5 - Selecting A Software Option

The Shamrock 303i requires at least one of the following software options:

1 - **Solis Spectroscopy** A 32-bit and fully 64-bit enabled application for Windows (7, 8 and 10) offering rich functionality for data acquisition and processing, as well as Andor cameras, spectrograph and motorized accessories simultaneous control. AndorBasic provides macro language control of data acquisition, processing, display and export.

2 - **Standalone Solis Spectroscopy** GUI for standalone spectrograph operation.

3 - **Andor SDK** software development kit that allows you to control the Andor range of Shamrock spectrographs from your own application. Compatible with 32-bit libraries for Windows (7, 8 and 10). Compatible with C/C++, C#, VB6 and LabVIEW.

**Solis Spectroscopy: Dedicated spectroscopy acquisition software**

1. **Exposure time**
   - Set the wavelength range for the current grating - drag slider to desired wavelength or just type in appropriate value

2. **Real Time Control**
   - (a) Slit drive: Control the spectrograph slit width - drag blades on icon or type in required slit width
   - (b) Flipper motor: Used to select the appropriate exit port
   - (c) Shutter: Synchronization mode selection for shutter operation
   - (d) Filter wheel: Used to select a particular filter on the filter wheel - just click on the desired filter position
   - (e) Grating turret: Used for setting grating turret to a new position and bringing desired grating in the optical path - just click on the desired grating
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Product Drawings
Dimensions in mm [inches]

Connecting to the Shamrock 303i

Wavelength Drive Performance

<table>
<thead>
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<th>Specification</th>
<th>Value</th>
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<tbody>
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<td>Wavelength accuracy <strong>18</strong></td>
<td>Center</td>
</tr>
<tr>
<td>Wavelength repeatability <strong>19</strong></td>
<td></td>
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Shutter Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum repetition rate</td>
<td>2 Hz</td>
</tr>
<tr>
<td>Minimum open/close time</td>
<td>15 ms</td>
</tr>
<tr>
<td>Minimum lifetime</td>
<td>Better than 100K cycles</td>
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Optical Axis
127 mm [5"] with pad feet
The optical path height is shown with standard feet attached.

Screw Type Requirements

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<th>Measurement</th>
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<tr>
<td>CCD flange to Spectrograph flange</td>
<td>4 off, M4 x 16</td>
</tr>
<tr>
<td>Camera to CCD flange</td>
<td>4 off, M3 x 10</td>
</tr>
<tr>
<td>iXon camera to iXon flange</td>
<td>4 off, M5 x 10, countersunk, hex head</td>
</tr>
</tbody>
</table>

Optical Properties

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focal plane size (mm, W x H)</td>
<td>30 x 14</td>
</tr>
<tr>
<td>Stray light <strong>20</strong></td>
<td>FVB (1 nm from laser) 8.3 x 10⁻⁴</td>
</tr>
<tr>
<td></td>
<td>FVB (10 nm from laser) 2.2 x 10⁻⁴</td>
</tr>
<tr>
<td></td>
<td>1 mm strip (1 nm from laser) 6.1 x 10⁻⁴</td>
</tr>
<tr>
<td></td>
<td>1 mm strip (10 nm from laser) 2.2 x 10⁻⁴</td>
</tr>
</tbody>
</table>

Wavelength Side Accuracy

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength side accuracy <strong>21</strong></td>
<td>0.08 nm</td>
</tr>
</tbody>
</table>

USB Shamrock Control
Connector type: USB ‘B’ type

I²C Interface
Connector type: 5-pin, 1 = I²C data, 2 = I²C clock, 3 = Earth, 4 = Shutter TTL, 5 = 5 V

Shutter Control
Connector type: BNC Female, 50 Ω
Shamrock 303i
303 mm focal length, motorized, Czerny-Turner Spectrograph

Typical Setup - Spectroscopy

Typical Setup - Microspectroscopy

Applications Guide
- Absorption-Transmission-Reflection
- Raman (Stimulated, Resonance, CARS, SERS, SORS, TERS)
- Fluorescence-Luminescence
- Micro-Fluorescence
- Photon Counting
- Single Molecule Spectroscopy
- Plasma Studies & LIBS
- Plasmonics
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Fax +81 (3) 6732 8939

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

Items shipped with your spectrograph

1x 3 m USB 2.0 cable Type A to Type B
1x Power supply with 3 m mains cable
1x PCI / PCIe Direct cable
1x Camera / spectrograph PCIe cable
1x CD containing Andor user guides
1x Individual system performance booklet
1x CD containing either Solis software or SDK (if requested at time of order)
1x Allen key set (2 mm, 3 mm & 5 mm)

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.

Footnotes: Specifications are subject to change without notice

1. In the case of a multiple grating turret order, please specify desired grating configuration for each turret.
2. Typical values quoted with 27.6 mm wide CCD, e.g. Newton DU940.
3. Typical values quoted with 10 μm slit and 13.5 μm pixel CCD, e.g. Newton DU940.
4. Typical values quoted @ 500 nm centre wavelength.
5. Typical values quoted @ 300 nm centre wavelength.
6. Typical values quoted at maximum efficiency wavelength or blaze wavelength unless otherwise stated.
7. Wavelength within the recommended operating spectral region.
8. Indicative values; the working range of these gratings is principally in the region where optical aberrations may alter the system resolution performance quoted.
9. Values shown are representative of a triple grating system, where resolution has been optimized to give the best performance for the three gratings and across the full recommended wavelength range. Useful signal is assumed to be imaged on the entire height of a 6.9 mm sensor (i.e. Newton DU940) and fully vertically binned.
10. Please refer to F/# matcher specification sheet for magnification considerations.
11. Please refer to the local sales representative or website for further information on available options and complimentary accessories.
12. Silt widths range from 10 μm to 2.5 mm motorized.
13. Silt widths range from 10 μm to 2.5 mm motorized (full opening at 12 mm manually for wide aperture slit.
14. Require shutterless camera models. Please contact your local representative for further information.
15. Additional PCIe cable (ELC-00648) is required when operating Shamrock 303i with these cameras.
16. Recommended for use with fibre-optics and C-mount accessories.
17. Provided as standard.
18. Average measurements using > 30 calibration lines, covering the recommended grating angle operating range with a 1200 l/mm grating.
19. The standard deviation of 20 measurements of a peak’s centre-of-mass position: between each measurement the drive is moved 10x including both wavelength and grating changes to reflect typical use.
20. Measured with a 633 nm laser and a 1200 l/mm grating for Full Vertical Binning (FVB) on a 6.9 mm high sensor, and a 1 mm strip vertically centred on the optical axis.
21. Side accuracy measured using a 27.6 mm wide sensor, reflecting the dispersion calibration and step-and-glue accuracy.
22. Only Andor CCD platforms (Newton, iDus, iKon) can be controlled in conjunction with Shamrock spectrographs in EPICS software

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 (7, 8 and 10)

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

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