

## Acton Research Spectroscopy Accessories

We Cover the Full Spectrum of Accessories . . .

- Light-Input Adapters
- Light Sources
- Filter Wheel Assemblies
- Sample Holders
- Detector Assemblies
- Fiberoptic Bundles
- Data-Acquisition Electronics

## Your Spectroscopy Supply Source

Roper Scientific/Acton Research provides spectroscopists with a complete line of products for demanding spectroscopy applications. The Acton Research SpectraPro® spectrometers, SpectruMM™ CCD detectors, NCL™ data-acquisition system, and SpectraSense™ software are all designed to meet the stringent requirements of high-performance spectroscopy. These products are enhanced by our full line of integrated spectroscopy accessories, so you can quickly get to your research without worry about performance or compatibility of any aspect of your spectroscopy equipment.

### Light-Input Accessories

We offer a wide variety of specially designed light-input accessories, including fiber adapters, filter chambers, and slit assemblies, to match your specific application needs.

#### A Raman Notch Filter Chamber

Model NFC-446-040 is an efficient and easy method of using cut-off or notch filters with spectrographs and monochromators. It collects the output of fibers and collimates the beam, which passes through the filter. A second lens focuses the beam on the entrance slit of the spectrograph or monochromator. The NFC-446-040 accepts up to 38.1-mm-diameter filters. A micrometer controls the filter angle from 0° to 10° for precise filter tuning. The NFC-446-040 can also accept nonfiber sources or focused sample images.

#### B Nikon® Camera Lens Adapter

Model CM-446-050 was designed specifically for remote light collection and imaging applications. It includes a standard F-mount, which permits a Nikon lens to be mounted on the entrance slit of any SpectraPro monochromator or spectrograph. The lens focus is at the slit, permitting remote light collection or direct source imaging through the system.

#### C Bilateral Slit Assembly

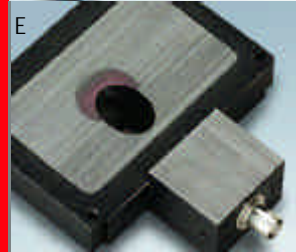
Model SP-716 is a unique, kinematically mountable bilateral slit assembly that includes a micrometer for continuously variable slit-width settings from 10  $\mu\text{m}$  to 3 mm. The slit height is controlled by a baffle plate, allowing standard 4-mm or 14-mm heights. For imaging applications that require a larger area than the standard slit, Roper Scientific's exclusive Acton Research model SP-716-MS indexable slit is available. It permits moving the slit out of the beam path, resulting in a large 12 x 12-mm image area, and then back into the beam for high-resolution work, without having to remove accessories.

#### D Motorized Slit Assembly

The model 718 motorized slit assembly is a self-calibrating, 10- $\mu\text{m}$  to 3-mm adjustable bilateral slit. Stepping-motor-controlled adjustments are made in 1- $\mu\text{m}$  increments over the full range. Full control of the slit, including automated bandpass setting, is integrated into SpectraSense software. Once the slit is set, it maintains its position even with the power turned off. The motorized slit is available for all SpectraPro spectrometers except the SpectraPro 150.

#### E Source-Compensation Accessory

Model SCA-440-UV mounts on the exit slit of a monochromator that is used for illumination. It compensates for source fluctuations at a target wavelength, unlike most compensators that look at the total output of a lamp. This selectivity ensures the utmost sensitivity to source variations at any wavelength.



## Light Sources

Roper Scientific/Acton Research provides a variety of light sources for UV-VIS-IR operation. All sources are supplied complete with housings, integrated refocusing mirrors, power supplies, and mounting flanges for SpectraPro-type slits. Most include cooling fans for stable operation.

### Mercury Light Source (UV and Visible Line Output)

**A** Model MS-416 is a compact, light source that features high stability and line output useful for wavelength-calibration purposes. There are many lines produced by mercury, including 253.7-nm, 313.1-nm, 365-nm, 435.8-nm, 546.1-nm, 577-nm, and 579-nm wavelengths. This source includes a mercury lamp mounted in a flange that matches the SpectraPro-type slit body, plus a power supply.

### Deuterium Light Source (190 to 350 nm)

**B** Model DS-421 is a 30-watt light-source system that provides useful UV continuum starting at ~190 nm and continuing out to ~350 nm. Negligible visible light output helps to minimize stray light.

### Tungsten-Halogen Light Sources (350 nm to 2.5 $\mu\text{m}$ )

**C** Model TS-425 is a 30-watt quartz light source with a DC power supply.

**B** Model TS-428 is a 250-watt light source that includes variable brightness control, forced-air cooling, and an AC power supply.

**B** Model TS-428-DC is a 250-watt light source that features a regulated DC power supply plus variable brightness control.

### Xenon Light Source (190 nm to 2.7 $\mu\text{m}$ )

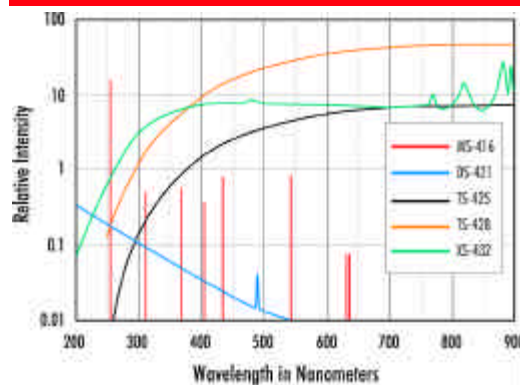
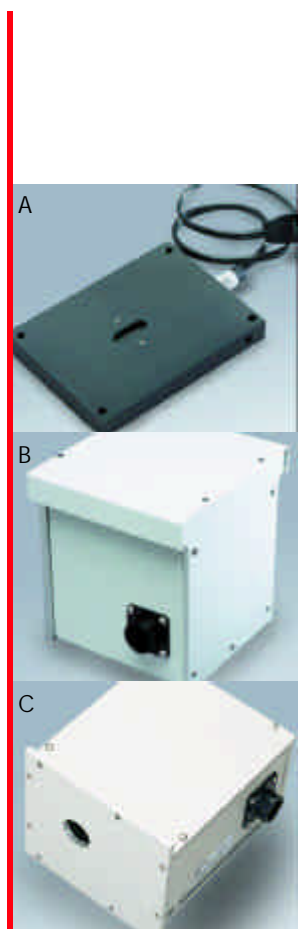
**B** Model XS-432 is a 75-watt light source that features broad wavelength output with small source size, permitting more efficient light delivery to a monochromator or spectrograph. This source provides useful continuum from 190 to 750 nm, with declining output out to 2.7  $\mu\text{m}$ .

### Infrared Light Source (1 to 16 $\mu\text{m}$ )

**B** Model IS-434 is a blackbody source that provides broadband IR output out to approximately 16  $\mu\text{m}$ . It includes a silicon carbide resistor as the IR emitter that is mounted in a housing with a refocusing mirror, cooling fan, and mounting flange.

### Deuterium and Tungsten-Halogen Dual Light Source (190 nm to 2.5 $\mu\text{m}$ )

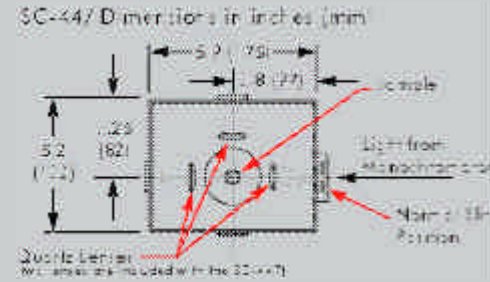
**B** Model TDS-429 combines 30-watt deuterium and tungsten-halogen lamps in the same housing. It includes a manually controlled source-selection mirror (motorized optional), power supplies, and forced-air cooling fan. Other combinations are available on a custom basis.



Note: All light sources listed above, with the exception of the XS-432 and IS-434, are tested and conform to European CE standards.

## Universal Sample Chamber And Sample Holders

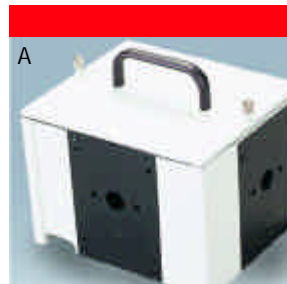
Our universal sample chamber can be configured for transmittance, reflectance, absorbance, or fluorescence measurements, with 0° or 45° sample positioning depending on the type of measurements required. It accepts standard 1-cm square cells or solid samples up to 50 x 50 x 10 mm, with custom sample holders available upon request. The sample chamber is normally set up with a scanning monochromator, which delivers monochromatic light. A quartz lens focuses this incident light in the center of the cell, or at the front surface of a sample depending on the position of the sample stage. Another quartz lens focuses the reflected, emitted, or transmitted light to the in-line port, or 90° exit port. A suitable detection system is then used to collect the light for analysis. As this is a single-beam sample chamber, it requires a scan of the incident light with no sample, and then a second scan with the sample in the beam. The two scans are then ratioed to yield the sample characteristics.



## Typical System Configurations

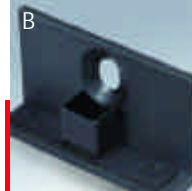
### Universal Sample Chamber

**A** Model SC-447 is a four-port sample chamber with rotatable platform for holders (see below), a mount for slit assemblies, two ports compatible with light sources or detectors, one aperture port for customer-supplied accessories or beam dump, and two quartz lenses. It requires a sample holder for operation.

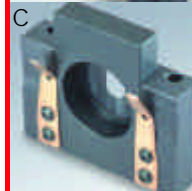


### Sample Holders

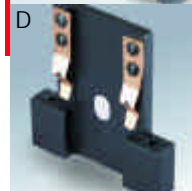
**B** Model 447-1 is a general-purpose sample holder that includes a holder for standard 10-mm-path-length cuvettes and a spring-clip-style holder for samples up to 50 x 50 x 10 mm.



**C** Model 447-2 is a fixed-position mount with a removable sample holder for 1-inch-diameter samples. The removable sample holder slides into a fixed-position mount. It allows measurements at 0° and 45° with the beam passing through the center of the sample.



**D** Model 447-3 is a fixed-position microscope slide holder that is designed to hold standard 1 x 3-inch slides. Stepped guides with spring clips hold the long edge of the slide so that the center of the slide (or sample) does not contact the holder. It allows 0° and 45° testing.

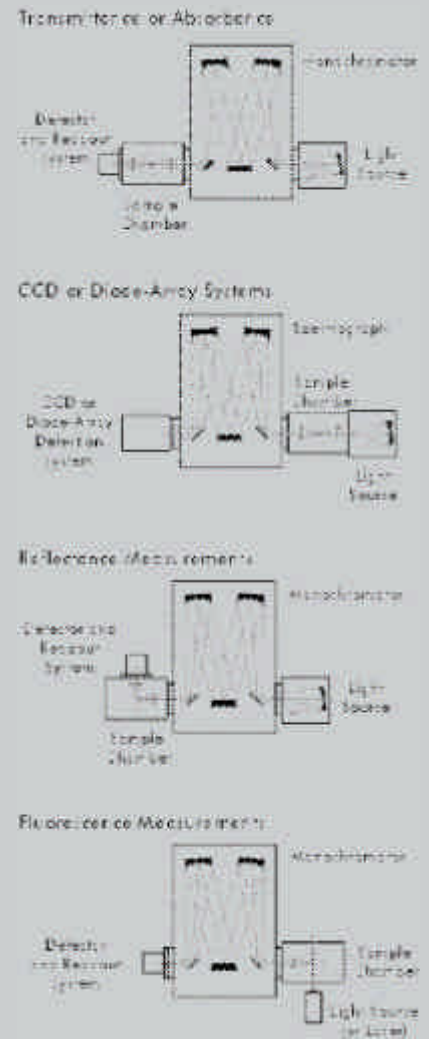


## Filter Wheel Assemblies

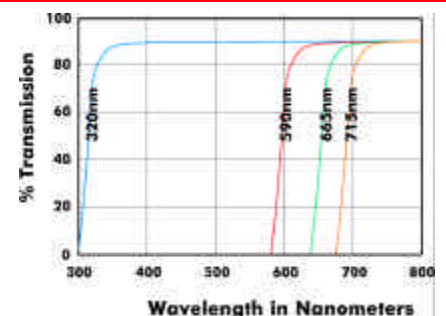
Roper Scientific/Acton Research filter wheel assemblies are designed to hold up to six 1-inch-diameter samples or filters. Normally, up to five filters are installed with the sixth position left open. FA-448 filter wheels are available with manual or motorized filter selection.



**E** Model FA-448 is a manually operated six-position filter wheel that includes a two-pole stepping motor with an integrated filter selection knob. It is easily converted at any time for motorized operation by purchasing the FA-448-4 controller. The FA-488 is automated when attached to an NCL and used with SpectraSense software. Model FA-448-2 is a motorized six-position filter wheel with a stepping motor and a controller with an RS232 interface for computer-controlled filter indexing. This assembly permits both computer selection of filters and motorized selection using the thumb-wheel control.



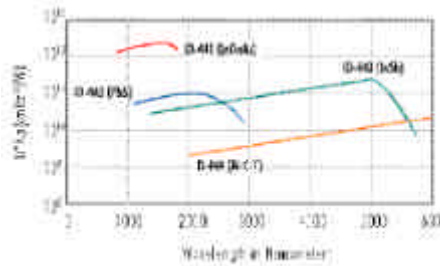
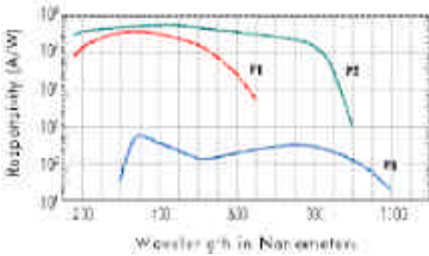
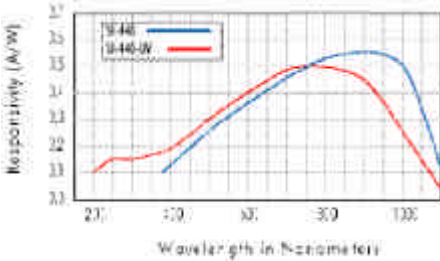
## Order-Sorting Filters



# Single-Channel Detector Assemblies

Roper Scientific/Acton Research provides a wide variety of single-channel detectors for use with SpectraPro monochromators, enabling efficient operation from the UV to the IR. We offer three photomultiplier tubes, two silicon detectors, plus InGaAs, PbS, InSb, and HgCdTe (M-C-T) infrared detectors.

## A Silicon Detectors



Model SI-440 is a low-cost, general-purpose detector with a 10-mm-diameter active area for use from 400 to 1100 nm. It is enclosed in a housing with the BNC signal connector and includes mounting flanges for SpectraPro slit assemblies. Model SI-440-UV is a detector with a UV-enhanced, 10-mm-diameter active area for use from 200 to 1100 nm operation. It is enclosed in a housing with the BNC signal connector and includes mounting flanges for SpectraPro slit assemblies.

## B Photomultiplier Tubes (PMTs)

Model P1 is a side-window PMT for use from 190 to 650 nm. Model P2 is a side-window PMT for use from 190 to 900 nm. Model P3 is a side-window PMT for use from 300 to 1100 nm.

Model PD-438 is a standard PMT housing that permits direct mounting to SpectraPro slit assemblies. Model PD-439 is a PMT housing with an integrated light-tight shutter that permits direct mounting to SpectraPro slit assemblies. Model PD-471 is a PMT housing for 1 1/8-inch side on tubes with built in HV supply. For use only with NCL-based systems.

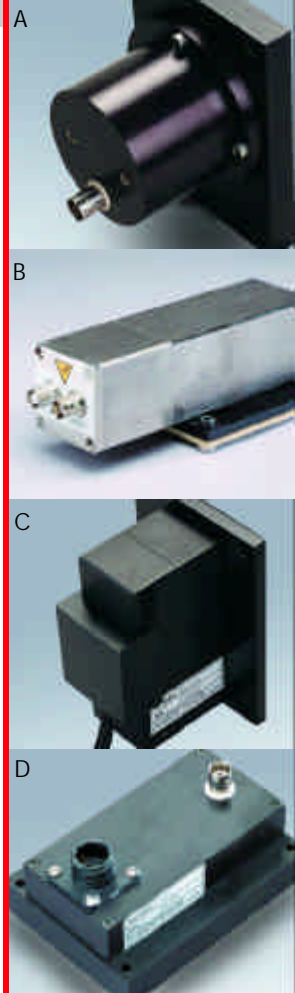
## C Integrated Photon Counting Assembly

Model PD-473-1 includes amplifier-discriminator, HV, and PMT. Works with NCL and SpectraSense software.

## D Solid-State Infrared Detectors

Model ID-441 is an InGaAs detector with a 3-mm-diameter active area for use from 800 to 1700 nm. Model ID-441-C is a thermoelectrically cooled version of this detector. Model ID-442\* is a thermoelectrically cooled PbS detector with a 5 x 5-mm active area, for use from 1100 to 2900 nm. Model ID-443\* is an InSb detector that is cooled with liquid nitrogen and has a 4-mm-diameter active area, for use from 1500 to 5000 nm. Model ID-444\* is an M-C-T detector that is cooled with liquid nitrogen and has a 4 x 4-mm active area, for use from 2000 to 1200 nm.

\*Requires chopper and lock-in amplifier for operation.

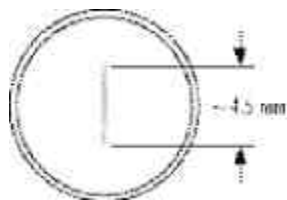


## Customized Accessories

Do not hesitate to contact your Roper Scientific/Acton Research representative for any custom requirements. We have developed many variations to our standard product line and we would enjoy the opportunity to help you choose or customize the right product for your application.

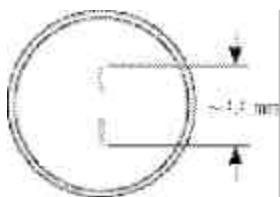
## Fiberoptic Bundles

Roper Scientific/Acton Research offers several different fiberoptic bundles designed specifically for use with SpectraPro monochromators and spectrographs. Standard bundles come with 200- $\mu\text{m}$ -diameter fibers in either silica for UV-VIS, or anhydrous silica for VIS-NIR applications. Fibers are arranged as a slit pattern (in a 10-mm-diameter ferrule) on the spectrograph end, with a round configuration (in SMA 905 connectors) on the source end.



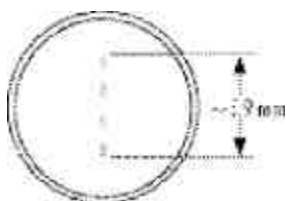
### Single-Leg Fiber Bundles

Models LG-455-020 and LG-456-020 are bundles that contain a single column of 19 fibers, each 200  $\mu\text{m}$  in diameter ( $\sim 245\text{-}\mu\text{m}$  diameter with cladding), to match a SpectraPro entrance slit. LG-455-020 models are UV-VIS fiberoptic bundles in 1- or 3-m lengths for 190 to 1100 nm. LG-456-020 models are VIS-NIR bundles in 1- or 3-m lengths for 400 to 2200 nm.



### Two-Leg Fiber Bundle

Model BFB-455-7 is a 1-m-long UV-VIS fiberoptic bundle for 190 to 1100 nm. It contains two groups of 200- $\mu\text{m}$ -diameter fibers ( $\sim 245\text{-}\mu\text{m}$  diameter with cladding), with seven fibers per group and  $\sim 1\text{-mm}$  spacing between groups.



### Four-Leg Fiber Bundle

Model QFB-455-3 is a 1-m long UV-VIS fiberoptic bundle for 190 to 1100 nm. It contains four groups of 200- $\mu\text{m}$ -diameter fibers ( $\sim 245\text{-}\mu\text{m}$  diameter with cladding), with three fibers per group and  $\sim 1\text{-mm}$  spacing between groups.

## Fiber Adapters

Several adapters are also available for fiberoptic bundles:

### A Fixed-Position Fiber Adapter

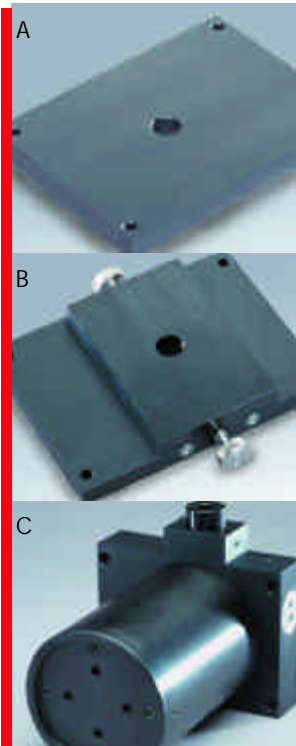
Model FC-446-010 positions fiberoptic bundles directly at the entrance (or exit) ports of SpectraPro monochromators and spectrographs. Designed to hold 10-mm-diameter fiber ferrules, the FC-446-010 is intended to be a simple, low-cost method of mounting fibers.

### B Adjustable Fiber Adapter

Model FC-466-020 holds 10-mm-diameter fiber bundles directly at the entrance slit of SpectraPro spectrographs and monochromators. It includes a spring-loaded slide mechanism for precise horizontal alignment of the fibers to the slit opening. Thumb screws on each side control horizontal adjustments.

### C Imaging Fiber Adapter

Model FC-446-030 is an imaging adapter for fiber bundles designed specifically for our imaging spectrographs and monochromators. The all-reflective design eliminates chromatic aberrations and the aspheric mirror cancels astigmatism, allowing precise imaging of fibers at the spectrograph entrance slit. The FC-446-030 includes up-down/right-left fiber-image adjustments to exactly match the fiber images to the entrance slit and detector for optimum throughput. There is also a 19-mm-thick removable spacer to allow use with filter wheels or other accessories.



## NCL Specifications

### Hardware control

- Control of 2 spectrometers and all associated motorized accessories;
- Filter wheel;
- 2 security shutter circuits;
- 4 input and 4 output trigger lines;
- $\pm 15$  V output for biasing

### Data acquisition

- 2 signal inputs (3<sup>rd</sup> optional);
- 20-bit data resolution

### Works with:

- PMTs,
- solid-state detectors,
- photon counting;

### Sensitivity:

- current:  $\pm 10$  nA to 1  $\mu$ A full scale,
- voltage:  $\pm 100$  mV to 10 V full scale;

Integration time: 5 ms to 64 sec

### High voltage control circuits:

- 0 to 1250 V,
- 12-bit resolution for PMT housings with built-in power supplies;

Internal memory: 8000 data points

### Communications

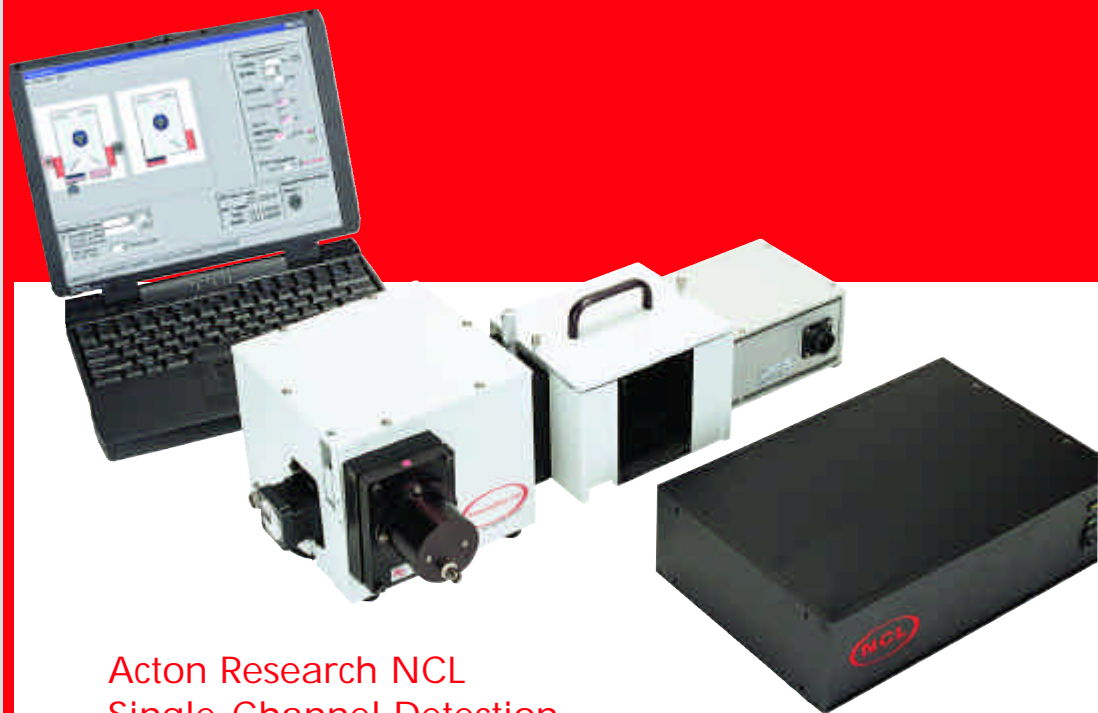
- RS232C (standard);
- IEEE488 (optional)

### Power

- 12 V;
- 750 mA DC via external power supply;
- Rechargeable battery pack available

### Dimensions

- 8.07 in (20.5 cm) width;
- 12.2 in (31 cm) length;
- 3.15 in (8 cm) height;
- 5 lb (2.25 kg) weight



## Acton Research NCL Single-Channel Detection

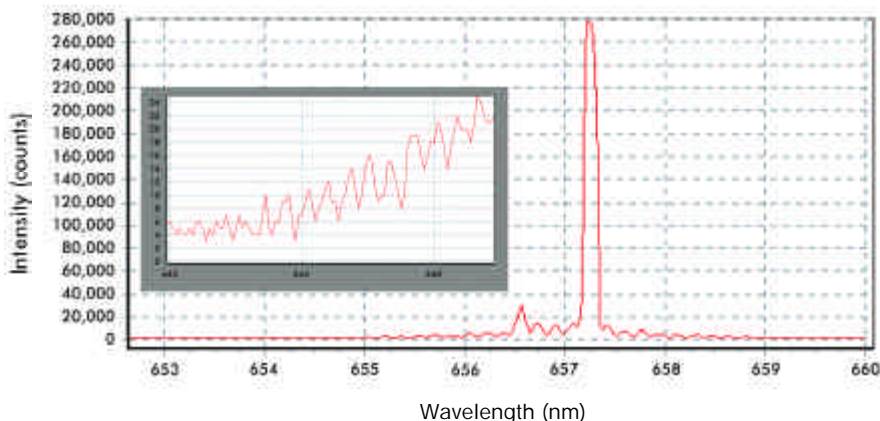
### Unsurpassed Sensitivity and Dynamic Range

The NCL is a complete spectral measurement system designed to give the ultimate performance in single-channel detection. It features a 32-bit microprocessor and 20-bit ADCs. It also delivers true signal integration, which is critical for measurement of weak signals and can extend the useful operation range of silicon and other solid-state detectors over 100 times the classical successive-approximation circuitry used in competitive systems.

### Unmatched Versatility

The NCL comes standard with two signal-input channels. A third channel can be added as an option. All channels are read simultaneously and the data manipulated on the fly via SpectraSense software. The NCL can control two monochromators, a filter wheel, two shutters, and four input and four output lines. Virtually any experimental configuration from dual-beam absorption to excitation/emission matrices in fluorescence can be controlled through the NCL. Internal buffering of up to 4000 data points per channel allows 5-ms kinetic measurements.

The NCL's unsurpassed dynamic range can be seen in this spectrum of a laser with intensities from 2 counts to 270,000 counts are recorded.



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For the latest product and technical information visit us at

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# Roper Scientific / Acton Research

## Product Literature

## Data sheets

### Brochures

*SpectraPro monochromators*

*Spectrum Acquisition Systems*

*Spectroscopy accessories*

*Guide to system configuration*



**ROPER SCIENTIFIC™**  
ACTON RESEARCH

*Gratings*

*CCD Chips*

*GS 1024 x 128 Front*

*GS 1024 x 128 Back*

*GS 1024 x 256 Front*

*GS 1024 x 256 Back*

*S 1340 x 100 Front*

*S 1340 x 100 Back*

*S 1340 x 100 Red*

*S 1340 x 100 Back Red*

*S 1340 x 400 Front*

*S 1340 x 400 Back*

*S 1340 x 400 Red*

*S 1340 x 400 Back Red*

*S 1024 x 256 Front*

*S 1024 x 256 Open Elect.*

*S 1024 x 256 Back*