

## Spec-10:400

1340 x 400 imaging array | 20 x 20- $\mu$ m pixels



The Princeton Instruments Spec-10:400 utilizes high-performance, spectroscopic-format CCDs designed exclusively for Princeton Instruments. Liquid nitrogen cooling to  $-120^{\circ}\text{C}$  minimizes dark charge, giving the best detection limits possible for long exposures. The 1340 x 400 imaging array with an 8-mm chip height is ideal for single- and multistripe spectroscopy applications. This detector delivers much higher resolution and sensitivity than industry-standard "1024 pixel" sensors. Another exclusive feature is the integration of software-selectable amplifiers that offer an easy choice of high sensitivity or high signal-to-noise ratio (SNR).

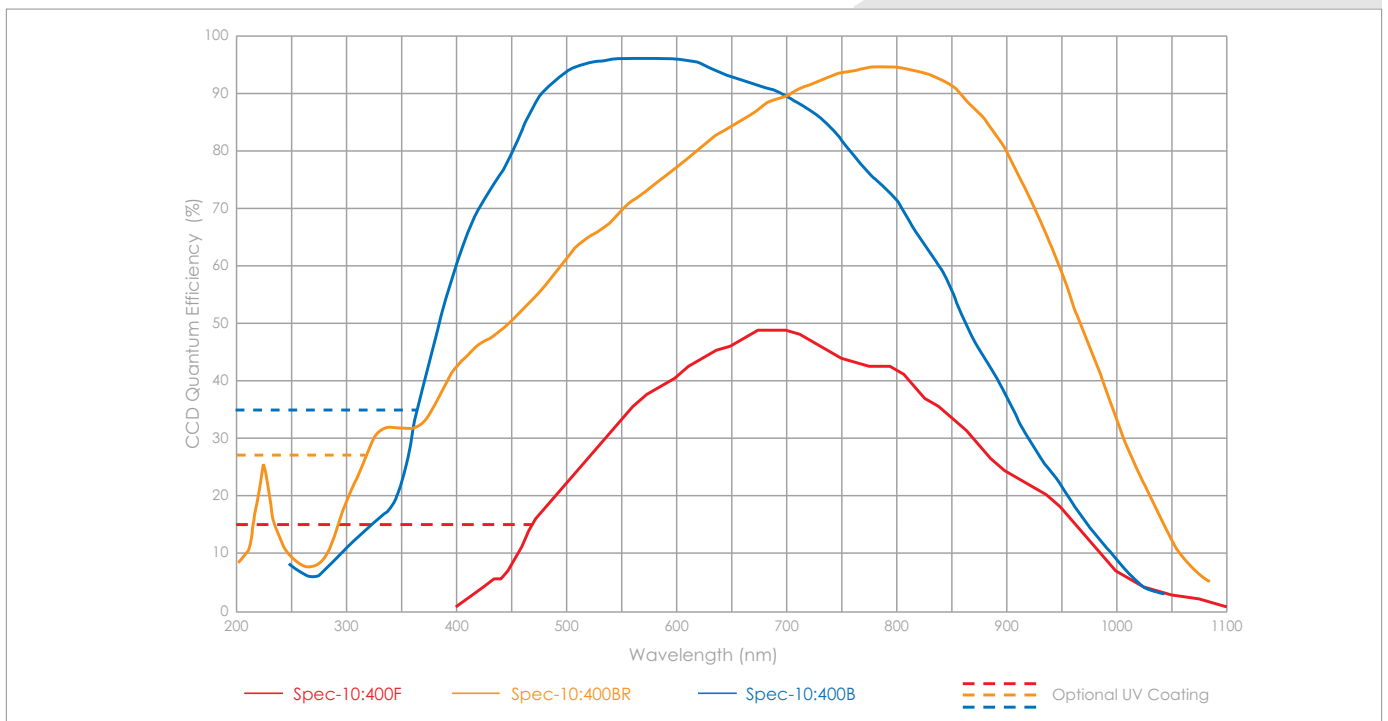
Features	Benefits
<b>Cryogenic cooling</b>	Eliminates noise attributable to dark current, even for long exposure times
<b>1340 x 400 imaging array</b>	Exclusive feature that provides superior resolution over industry-standard "1024 pixel" format
<b>Exclusive CCD architecture</b>	Provides industry's lowest-noise CCD system
<b>20 x 20-<math>\mu</math>m pixels</b>	Optimum pixel size for full well and high resolution
<b>8-mm chip height</b>	Ideal for rapid multistripe spectroscopy
<b>Software-selectable amplifiers</b>	Exclusive feature provides choice of superior sensitivity or superior SNR
<b>Standard spectrometer interface</b>	Will interface with most spectrometers
<b>Optional dual digitizers</b>	High speed provides fast data acquisition and easy focusing Slow scan provides lowest noise
<b>"USB 2.0 interface" configuration</b>	Seamless, plug-and-play connection to PC notebooks and desktops Easy OEM integration
<b>"PCI interface" configuration</b>	Industry standard for fast data transfer over long distances
<b>WinSpec and PVCAM<sup>®</sup></b>	Offers easy-yet-sophisticated Windows <sup>®</sup> GUI controls Automates data acquisition, analysis and display
<b>Linux<sup>®</sup> drivers and SITK<sup>™</sup> plug-in for National Instruments' LabVIEW<sup>™</sup></b>	Extends system utility

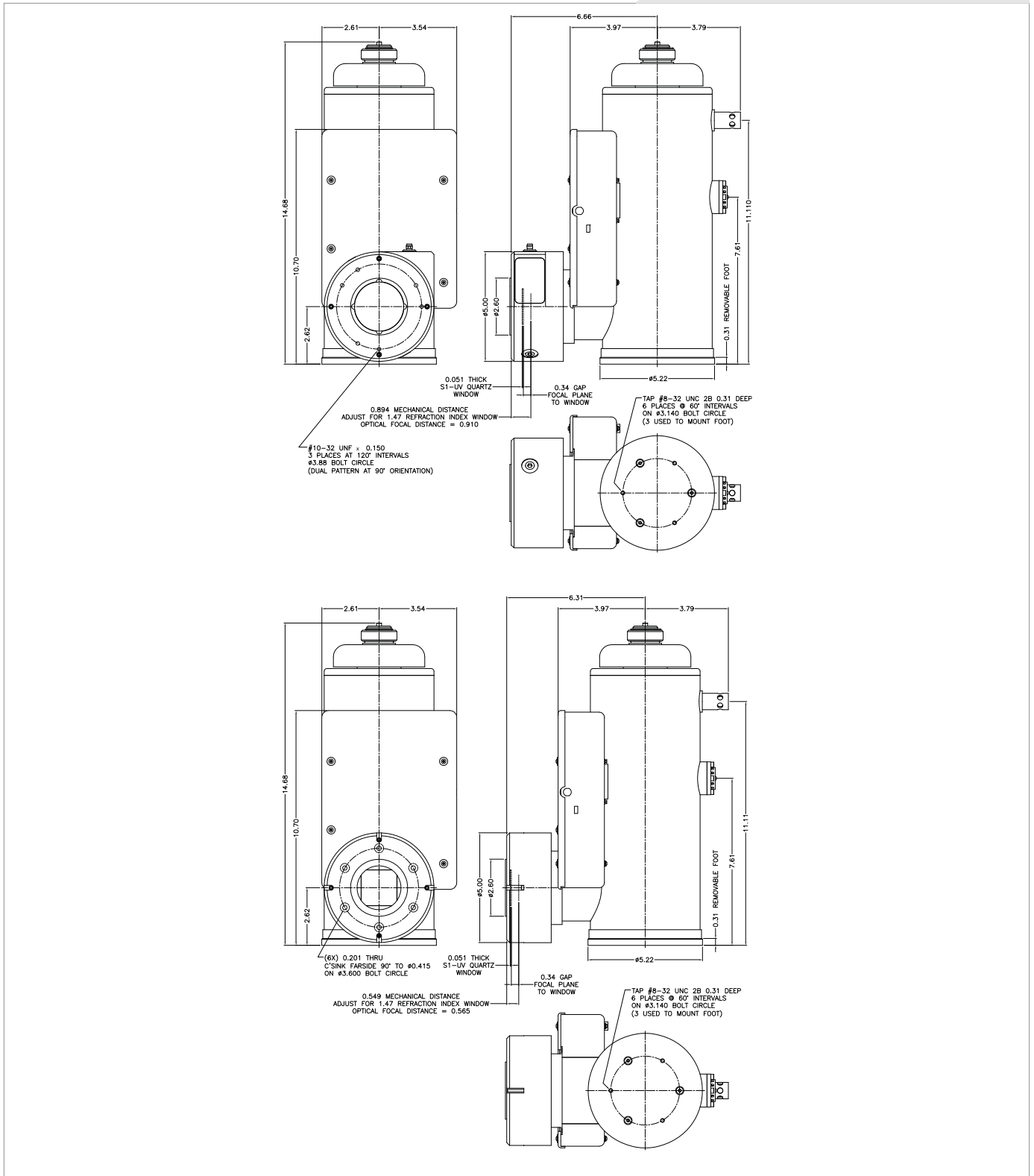
## Spec-10:400 Specifications

	Spec-10:400F		Spec-10:400B		Spec-10:400BR	
<b>CCD Image Sensor</b>	front-illuminated		back-illuminated		back-illuminated; deep depletion with anti-etaloning technology	
<b>Dark Current LN @ -120°C (e-/p/hr)</b>	Typical 0.3	Maximum 1	Typical 0.3	Maximum 1	Typical 1	Maximum 2.5
	Front-illuminated			Back-illuminated		
	Typical		Maximum		Maximum	
<b>System Read Noise</b>						
@ 100 kHz readout	3 e-rms		4 e-rms		3.5 e-rms	
@ 1 MHz readout	6 e-rms		8 e-rms		8 e-rms	
@ 2 MHz readout	12 e-rms		15 e-rms		13 e-rms	
<b>Vertical shift rate</b>	15 $\mu$ sec/row					
<b>Spectral rate<sup>1</sup></b>						
@ 100 kHz	65 spectra/sec (FVB)					
@ 1 MHz	350 spectra/sec (FVB)					
@ 2 MHz	450 spectra/sec (FVB)					
@ 2 MHz	1000 spectra/sec (1.0 mm high)					
	All Spec-10:400s					
<b>CCD Image Sensor</b>	Princeton Instruments exclusive, scientific grade 1, MPP device, optional UV coatings available					
<b>CCD Format</b>	1340 x 400, 20 x 20 $\mu$ m pixels, 26.8 x 8.0 mm imaging area					
	Minimum			Typical		
<b>Spectrometric Well Capacity</b>						
High Sensitivity	250 ke-			300 ke-		
High Capacity	800 ke-			1 Me-		
<b>Deepest Cooling Temperature LN cooled (LN)</b>	-120°C			-120°C		
<b>Thermostat Precision</b>	$\pm 0.05^\circ\text{C}$ across entire temperature range					
<b>Software-selectable gains</b>	High		Mid		Low	
High Sensitivity	1 e-/ct		2 e-/ct		4 e-/ct	
High Capacity	4 e-/ct		8 e-/ct		16 e-/ct	
<b>Dynamic Range</b>	16 bits					
<b>Nonlinearity</b>						
@ 100 kHz readout	< 1%					
@ 1 MHz readout	< 2%					
@ 2 MHz readout	< 2%					

Notes: All specifications subject to change.  
<sup>1</sup> Fast spectral rates may require the use of custom timing modes.

## QE Curves





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