900 Series Camera

Summary

The 900 Series camera is a low temperature multi-CCD camera designed for applications requiring very large imaging areas at very high resolution. The 900 Series is capable of accepting up to 16 scientific CCDs in a single camera head.

Optional fiber optic tapers coupled to each CCD are arranged to allow virtually seamlessly imaging of areas up to 325mm square. Coupled with an optical array, completely seamless high-resolution images are possible.

Even in extremely high-resolution situations, the 900 Series camera is capable of reading up to 4 ports on each CCD in the camera head simultaneously, which allows for full frame rates as fast as 1 frame per second.

Dark current is practically eliminated by using a unique mechanical cryocooler capable of cooling the CCD to below -100°C, making the 900 Series cameras capable of very low light level imaging.

Key Features

- Large imaging field up to 325mm square
- High frame rates of up to 1 frame per second
- 9 or 16 CCDs in a 3x3 or 4x4 arrangement
- High resolution virtually seamless images up to 16384x16384 pixels
- 16-bit digitization at 50kHz to 1MHz pixel rates
- Very low readout noise (<3e- RMS) over a range of pixel readout rates achieved by correlated double sampling using dual-slope integration
- Near zero background by -100°C cryocooling

Example Applications

- X-Ray Crystallography
- Medical Imaging
- Nondestructive Testing
- X-Ray Inspection

Continued other side.

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900 Series

CCDs Supported

A variety of large area, multi-phase scientific grade CCDs can be used in the 900 Series camera. Two, three, and four phase architecture CCDs from Fairchild Imaging, E2V, Kodak, and Atmel can be used.

Cooling of CCDs

The 900 Series system uses a unique mechanical cryogenic cooler. The CCD temperature is computer controlled to a set point, which may be adjusted by the user. Internal vacuum sensors monitor the pressure within the sensor chamber. CCDs can be cooled to temperatures below -100°C to minimize dark current.

Camera Electronics and Noise Details

Each CCD output is connected to an individual analog processor that uses an advanced form of correlated double sampling to achieve short frame times with read noise less than 3 electrons. Images from the 900 Series camera are constructed into a single organized array by the controller before they are delivered to the host computer. A single gigabit fiber optic cable connects the camera to a proprietary PCI host computer data interface.

Size of Camera

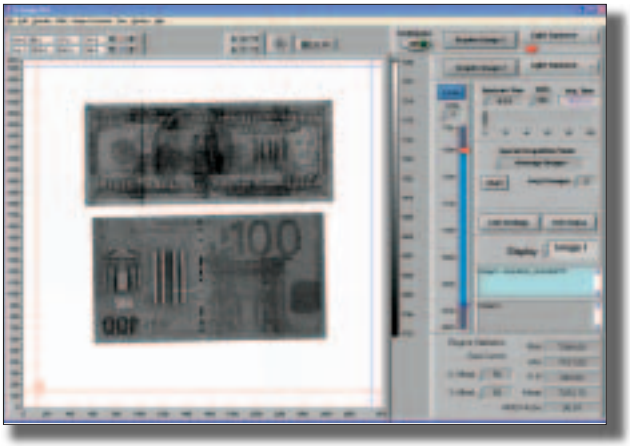
The 900 Series camera head when configured with a 3 x 3 (9) CCD array with bonded fiber optics is a 330 x 400 x 460 mm (13 x 16 x 18 inches) in size, and weights approximately 62 kilograms (136 pounds). The accompanying electronics are housed in a standard 19-inch rack chassis that can be located up to 7.6 meters (25 feet) away from the camera head.

Computer Interface Hardware

A fiber optic data connection is used to connect to the camera. The fiber optic data link can be used at distances of over 30 meters. The fiber connects the camera head to a PCI bus interface card in a PC.

Software Interface

Spectral Instruments provides our own SI Image SGL camera control software that uses an intuitive graphical user interface for camera control, image acquisition, viewing, processing and archiving. In addition, a TCP/IP server is built into the software allowing another program on the same computer or from another computer to initiate image acquisition and transfer. SI Image SGL is written in LabVIEW and is provided as a Windows application. The LabVIEW source code is available as an option for users who need to extend its functionality or incorporate controlling other instruments into a single program. While our current software runs on Windows 98, NT, 2000 and XP, Windows 2000 or XP are recommended for the current version and will be required for future versions.



SI Image SGL is an Intuitive GUI for Camera Control

Options Available

Optional configurations of the 900 Series camera can be equipped with either 9 CCDs in a 3x3 array, or 16 CCDs in a 4x4 array. This allows for total image resolutions from 6144x6144 (38 megapixel) when using a 3x3 array of 2048x2048 pixel CCDs, up to extremely high-resolution images of 16384x16384 (268 megapixel) when using a 4x4 array of 4096x 4096 pixel CCDs. Imaging area with use of fiber optic tapers can vary from 225mm square to 325mm square.

A network appliance option allows for the camera to be operated remotely through TCP/IP with software application on the remote PC, or with a standard web browser. This allows multiple remote cameras to be operated from a single location.

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