

Storage Phosphor System

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Description

The Cyclone® Plus storage phosphor system performs filmless autoradiography of gene arrays, electrophoresis gels, blots, thin layer chromatography samples, and tissue sections. Reusable storage phosphor screens capture and store the activity of samples which are exposed, as with film, in common film cassettes. The screens are scanned by a laser focused to less than 50 μm , and the latent image is detected by unique confocal optics to create a high resolution digitized image with quantitative data in the form of an image file. The image is displayed on the screen for analysis with OptiQuant™ software and can be printed, exported, and archived for future reference.

The Cyclone Plus replaces film and toxic developing chemicals with reusable, erasable storage phosphor screens which are uniquely suited for different applications. All screens perform with a linear dynamic range of five orders of magnitude so that each image requires only one exposure. The Cyclone Plus storage phosphor system detects activity with better efficiency than film, thereby reducing exposure times 10 to 100 times compared to film.

Standard Instrument Features

- **High performance, solid state red laser** is focused to less than 50 μm within a helical scanning system.
- **Unique confocal light collection optics** optimize the capture of light emitted from the screen for high sensitivity.
- **Photomultiplier tube** enables precise detection of the lowest activity captured by the phosphor screen.
- **16-bit analog to digital converter** produces precise quantitation of image data.
- **High speed digital signal processing** improves signal-to-noise performance, and yields greater than 16-bit effective signal resolution.
- **Automatic, continuous laser and electronics stabilization** ensures consistent performance.
- **Four user-selectable scan resolutions** are available: 150 dpi (170 micron pixels), 200 dpi (127 micron pixels), 300 dpi (85 micron pixels), and 600 dpi (42 micron pixels).
- **Novel helical scanning mechanism** rotates the screen past the laser and optics.
- **Constant speed feedback loop** maintains a constant 360 revolutions per minute.
- **Potential image surface area** is 37 cm x 43 cm or greater with stitching, and 12.5 cm x 43 cm without stitching.
- **Front panel indicator lights** indicate power-on and scanning-in progress.
- **Complete regulatory compliance certification** includes UL, CSA, TUV, FCC, and CE approvals.
- **16-bit square root TIFF file format** provides a wide linear dynamic range. It is compatible with desktop publishing, word processing, and a variety of specialized image analysis software packages.
- **High resolution, 256-color image display** yields grey scale or pseudocolor images.
- **Windows® 7 operating system** enables easy navigation.

Standard Software Features

OptiQuant software is a Windows® 7 application software for image acquisition, analysis, display, and archiving.

- **Scan control software** specifies resolution, scan area, and file name for a new image acquisition. An on-screen scan progress bar indicates percentage completed. All scans are complete in three to ten minutes depending on the resolution required and scan area.
- **Cyclone Plus image users utility** creates and maintains separate user directories. This allows each user to store individual images and preferences.
- **On-screen image display functions** allow a user to instantly minimize background and/or optimize the image display.
- **Advanced palette control features** include linear, log, sigmoid, or customized scaling for publication quality images.
- **On-screen scrolling and magnification** features offer additional image handling for an enhanced view of all or part of an image.
- **Groups-of-regions analysis templates** provide flexibility in quantitating samples in various regular or irregular shapes and patterns.
- **Grid analysis templates** provide regular repeatable patterns for quantitation of dot blots, slot blots, and other regular arrays.
- **Lanes analysis templates** provide the ability to quantitate bands or spots of interest in lanes or tracks by 2-D regions or by integration of area under the profile peak.
- **Profile analysis feature** enables variable base line subtraction, peak integration, splitting and merging, scaling, and reporting of data.
- **Lane specific background subtraction** controls sample-to-sample variability in background.
- **Automatic save feature for analysis templates** with image files enables archiving for future reference.
- **User-selectable report options** include region label, digital light units (DLU), DLU/mm², %sum, %total, and area.
- **Automatic R_f determination** of bands or spots is configured in lanes or 2-D regions.
- **Enhanced printing feature** prints all or part of an image at the size and intensity required for publication, presentation, or notebook recording.
- **Image stitching feature** creates one image from multiple screens exposed side by side across a large sample, such as a sequencing gel.
- **Annotation, text and graphic elements** can be added to the image to highlight and label features.
- **Image Arithmetic** enables a user to overlay images and subtract to obtain quantitative differences.

System Configuration

Model	Description
C431200	Cyclone Plus Storage Phosphor Scanner, no PC, includes OptiQuant software, no PC, includes OptiQuant software and a choice of carousel

Accessories and Consumables

- **70242010 Cyclone Plus PC** (see recommended computer specifications.)
- **7601015 Large format carousel** loads long (12.5 cm x 43 cm) Cyclone Plus storage phosphor screens.
- **7600029 Medium format carousel** loads medium (12.5 cm x 25.4 cm) Cyclone Plus storage phosphor screens. One medium carousel is provided with the basic system.
- **7601017 Small format carousel** loads small (12.5 cm x 19.6 cm) Cyclone Plus storage phosphor screens.
- **7001442 Eraser light box** (110 V) erases storage phosphor screens before exposing samples.
- **7001962 Epson® Stylus printer, 220V**
- **7001674 Epson Stylus printer, 110V**
- **7001556 HP DeskJet printer, 220V**
- **1520107 110V Multiple Outlet Strip**
- **0100859 Small/medium stainless steel film cassette** (20 cm x 25 cm) exposes samples to small and medium storage phosphor screens.
- **0100860 Large stainless steel film cassette** (34 cm x 43 cm) exposes sequencing gel size samples to storage phosphor screens.
- **6011701 Screen Cleaner**
- **1694155 Cyclone Plus Hardware Manual**
- **1694156 OptiQuant Software Manual**
- **1694174 Cyclone Plus Service Manual**

Storage Phosphor Screens

Not all types of samples require the same type of performance. A variety of screens are available for use with the Cyclone Plus, optimized for different applications.

- **MS (MultiSensitive) storage phosphor screens** are designed for durability and high sensitivity. They are available in small, medium and long sizes.
- **SR (Super Resolution) storage phosphor screens** are made from the finest grain phosphor crystals for highest resolution. They are available in small, medium and long sizes.
- **TR (Tritium Sensitive) storage phosphor screens** are uncoated for the detection of tritium. They are available in small and medium sizes.

Ordering Information

Cat. No.	Description
7001722	MS, MultiSensitive Phosphor Screens, Small
7001723	MS, MultiSensitive Phosphor Screens, Medium
7001724	MS, MultiSensitive Phosphor Screens, Long
7001485	SR, Super Resolution Phosphor Screens, Small
7001486	SR, Super Resolution Phosphor Screens, Medium
7001487	SR, Super Resolution Phosphor Screens, Long
7001488	TR, Tritium Phosphor Screens, Small
7001489	TR, Tritium Phosphor Screens, Medium

Storage Phosphor Screen Sizes:

Small: 12.5 cm x 19.2 cm (5 in. x 7.6 in.)

Medium: 12.5 cm x 25.2 cm (5 in. x 10 in.)

Long: 12.5 cm x 43 cm (5 in. x 17 in.)

Samples larger than any given screen can be exposed to two screens in the same film cassette, scanned, and then stitched together with OptiQuant software

Recommended Computer Specifications

Lenovo M82 with Windows® 7 ultimate 32 bit: 1TB HD; 8USB 2.0 ports, 4GB SDRAM; 2 serial ports; USB optical mouse and keyboard; Ethernet enabled; 17" LCD monitor

Physical Data

Dimensions:

Height: 28 cm (11 in.)

Width: 45.5 cm (18 in.)

Depth: 27 cm (10.5 in.)

Weight: 17 kg (37 lb.) (unit only)

Electrical Requirements:

100–240 Vac, 50/60 Hz

Power Consumption:

100 watts maximum

Environmental Conditions:

Operating ambient temperature: 15–40 °C

Operating relative humidity: 5%–95%, NC

Lighting Conditions:

Storage phosphor scanning requires “subdued” light for screen loading after exposure. Dark room or incandescent lighting is recommended.

Typical Performance Specifications

Isotopes Detected:

All common beta or gamma emitters, including ³H.

Sensitivity*, TR Screen:

³H: <3 DPM/mm²/hr

* Criteria for detection threshold: Net signal corresponds to four times the standard deviation of background.

Spacial Resolution:

For ¹⁴C autoradiography, SR screen, equal to or better than 2.5 lp/mm at CTF = 33%.

For ³H autoradiography, TR screen, equal to or better than 2.5 lp/mm at CTF = 70%.

Linear Dynamic Range:

Five orders of magnitude (1–100,000).

Linearity:

± 5% standard deviation for entire dynamic range.

Pixel Sizes:

~170 microns at 150 DPI

~127 microns at 200 DPI

~85 microns at 300 DPI

~42 microns at 600 DPI

Maximum Scan Times (for Long Screens):

~3 minutes at 150 DPI

~4 minutes at 200 DPI

~5 minutes at 300 DPI

~9 minutes at 600 DPI

Erasure Time:

0.5–1.0 minutes, 15 minutes for optimized results

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