

AppliedPrecision®

Delta Vision|OMX™

3D-SIM™ *Super-Resolution Imaging*

Technical Specifications



DeltaVision OMX Specifications

General Information

- Three-dimensional Imaging and Analysis System
- High spatial resolution beyond the diffraction limit
 - ~100 nm lateral (depending on wavelength and optics)
 - ~200 nm axial (depending on wavelengths and optics)
- Fast temporal resolution truly simultaneous live-cell imaging
- Up to four-channels per data set
- Super resolution beyond the cover slip using 3D-SIM Structured Illumination Microscopy (per technology inventors Sedat, Agard and Gustafsson at UCSF)
- High speed imaging at up to 65 frames/second in each of four channels
- Applied Precision certified optics
- Includes personalDV widefield deconvolution system for integrated target ID and standard widefield imaging
- Custom Applied Precision transilluminator with ultra-white LED
- Choice of large field-of-view or high-speed camera options
- Laser fluorescence illumination
- Conventional and Structured Illumination light paths
- Image acquisition software
- Full suite of image processing and analysis tools
- Stage mapping between personalDV and DeltaVision OMX systems
- Proprietary image restructuring software
- Time-lapse
- 3-D Modeling and analysis
- Includes toolkit, calibration slides, alignment optics, and immersion oil kits.

Imaging Components

- Custom optics assembly with novel optical light path
- API certified highest quality PSF objective lens
- High precision, repeatable X, Y, Z stage
 - Absolute accuracy: +/- 0.02%
 - Repeatability: +/- 10 nm (Z), +/- 150 nm (X, Y)
 - Step resolution: 5 nm (Z), 10 nm (X, Y)
 - Maximum travel: 25 mm (X, Y, and Z)
- Novel Z-axis closed-loop piezo crystal drive
- Closed loop diffraction grating motion and rotary stage
- Fixed optics light path
- Integrated proprietary FPGA timing architecture
- Integrated motion control system
- Integrated camera control architecture
- Fixed-cell filter set with custom lasers
- Optional Live-cell filter set
- Includes 405 nm and 488 nm high power lasers
- Optional Lasers
 - 514 nm
 - 592.5 nm
 - 642 nm
- High-speed excitation shutter for each laser (2 ms)
- Neutral Density filter wheel for each laser
- Novel widefield scrambling technology
- Olympus Plan-Apo 60X, 1.42 NA PSF "A" quality objective lens (Standard)
 - API certified for optimal 3D imaging performance
 - UIS-2 extended color correction
- Optional U-Apo 60X, 1.30 NA Silicone Oil Lens optimized for live-cell imaging
 - API certified for optimal 3D imaging performance
 - UIS-2 extended color correction

- High-performance custom 20 MHz cooled interline CCD camera for maximum field-of-view
- Optional high-sensitivity custom EMCCD frame-transfer camera for maximum sensitivity and frame speed
- OMX Master control computer
- Separate computers for each camera
- High-performance image processing and analysis workstation
- High-performance dedicated gigabit Ethernet switch

Filter Sets

- Standard fixed-cell filter set (DAPI, Alexa488, Alexa594, Alexa642)
- Optional live-cell filter set (CFP, YFP, EGFP, mCherry, DIC)
- Optional filter drawers available

CCD Cameras

- Custom monochrome 20 MHz camera with Sony ICX285 ER progressive scan CCD
- Custom monochrome 10 MHz camera with E2V back-thinned, frame-transfer, CCD camera. ~92% QE with electron multiplication (Optional)

Workstations

- OMX Master Controller
 - Dual-processor, dual-core 64-bit Xeon workstation
 - 4 GB DDR RAM
 - 500 GB hard disk
 - Dual gigabit Ethernet adapters
 - Windows XP-64 Professional
 - 24" widescreen (1920 x 1600) flat panel monitor
- OMX Image Processing Workstation
 - Dual-processor, quad-core 64-bit Intel Xeon workstation
 - 4 GB DDR RAM
 - 320 GB System hard disk
 - 3 X 500 GB RAID 5 hard disk (1 TB total)
 - Dual gigabit Ethernet adapters
 - CentOS EL 4.0 Linux®
 - 24" widescreen (1920 x 1600) flat panel monitor
- OMX Camera Workstations
 - Dedicated to each camera
 - Gigabit Ethernet
- OMX Instrument Control
 - Proprietary Nanomotion-3 motion control interface
 - Proprietary Applied Precision Field Programmable Gate Array (FPGA) timing controller

softWoRx Image Processing and Analysis Software

- 5-D Image Window (X, Y, Z, Time, Channel)
- Multi-processor enabled software tools
- Multi-threaded image processing
 - Deconvolution
 - Volume rendering
- System-level processing queueing
 - Deconvolution
 - Volume rendering
 - Quick projections
 - TIFF file conversion
 - Movie conversion (AVI and Quicktime®)
- Task Builder
- Orthogonal Viewer
- Arbitrary line profiles
- On-the-fly color blending

- Co-localization measurements (2 methods)
- File chooser with interactive thumbnails
- Time projections
- Data extraction tools
- Interactive volume rendering
- FRET analysis tool
- Drag-and-drop deconvolution queueing
- Support for file sizes over 2 GB
- Fully network compatible
- Image deconvolution methods:
 - Constrained Iterative Algorithms (four methods)
 - Nearest Neighbor
- Image import formats supported:
 - Tagged Image File Format (TIFF®)
 - UIC MetaMorph® STK
 - BioRad® MRC-600 Pic
 - Inovision ISee
- Image output formats:
 - MPEG movie file export format supported
 - Tagged Image File Format (TIFF)
 - Quicktime® movie file
 - Photoshop® (.psd) multi-layer file export format
- 3D modeling from 2D image data volume
- Per channel image analysis:
 - Image stitch
 - Image rotation on X, Y or Z axis
 - Volume View
 - 2D and 3D measurements
 - Histogram review and non-destructive min/max intensity adjustments
 - Numerical data inspection from region of interest with ASCII export
 - 3D data graph from region of interest
- Complete Optical Transfer Function (OTF) Library for common microscope objectives
- Archive data via network connection or on-board DVD-RW

softWoRx Licenses

- Includes softWoRx DMS license
- Includes softWoRx Suite license

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personalDV System Specifications

System Configuration

- White LED transillumination
- API 250W Xe illumination
- Fast shutter
- 10-position ND filter wheel
- 10-position EX filter wheel
- 6-position EM filter wheel
- Optical fiber
- Fiber Optic Module (FOM)
- IX-71 microscope base
- Custom DeltaVision Quad filter set
- 60x objective/1.42NA
- Stackable IC/MIC
- Dual processor tower computer, 400GB
- 25 mm stage
- CoolSnap ES2 Camera (PCI)
- Benchtop microscopy isolation platform
- 19" monitor
- Backlit keyboard, laser mouse

Stage Specifications

- Z axis
 - Travel: 1 mm
 - Resolution: 40 nm
 - Linearity error: <0.2 um over 100 um travel range
 - WaveTuner drive actuator
- X-Y axes
 - Travel: 25 mm (X), 25 mm (Y)
 - Resolution: 40 nm
 - Linearity error: < 2 um / 25 mm
 - Standard NanoMover (X), integrated drive (Y)

Software

- softWoRx 3.7.0
- Actions
- Ratio Imaging
- Enhanced Queue Management
- Optional Data Management Solution (DMS) support
- Optional Multiplexed Wavelengths Imaging support

Workstation

- Dual processor
- 400 GB storage
- High capacity, high speed
- Multi-threaded deconvolution and rendering
- CentOS EL 4.5
- USB drive support
- DVD-R/CD-R support

Options

- API designed environmental chamber
- Live-cell filter set
- Multiplexed Wavelengths Imaging

DeltaVision OMX Specifications (continued)

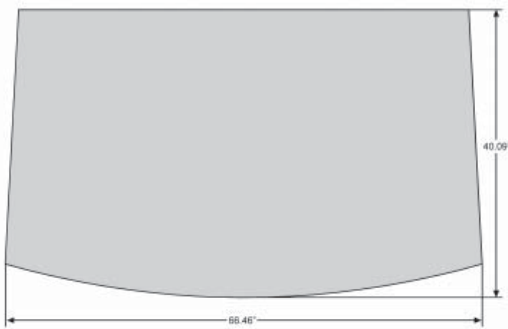
Ergonomic Design

- Optics Module
 - Laser safety interlocks
 - Light tight enclosure
 - Vibration isolation (mechanical and acoustic)
 - Class 100 HEPA filtering with positive pressure
 - Vibration isolation table
 - Integrated lighting
 - 3 ft x 4 ft x 6ft (90 cm x 120 cm x 180 cm)
- Laser Module
 - Laser safety interlocks
 - Rigid optical design
 - Multiple light paths
 - 2.5 ft x 4 ft x 4 ft (105 cm x 120 cm x 120 cm)
 - Integrated electronics rack
- Ergonomically designed workstation desk
 - 3 ft x 4ft x 2.5 ft (90 cm x 120 cm x 105 cm)
- Maximum system weight = 1500 lbs (680 kg)

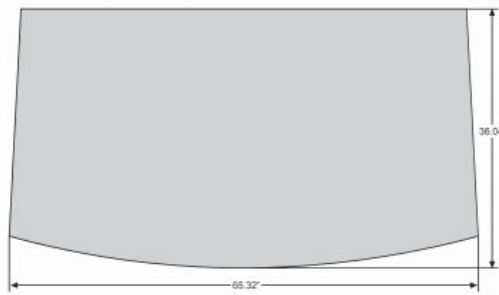
Electrical/Environmental Specifications

The DeltaVision OMX requires a laboratory roughly 8' x 16' (2.5m x 5m) to provide adequate space for all the components and to accommodate the work flow. The following are the room requirements:

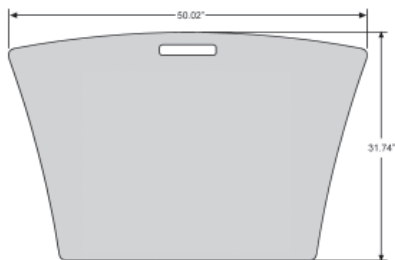
- Minimum Size: 8 ft x 16 ft x 8 ft high
- Dry, clean air or nitrogen lines:
 - 100 psi regulated for clean gun, de-ionized
 - 100 psi regulated for OMX table
- Room temperature maintained at 72° F (+/- 2° F over 4 hour period). System heat load ~ 5 kW.
- Power
 - System power: 200-240 V ± 10%, 50 Hz ± 5%, 20 Amperes, single outlet located within 6 feet of laser/electronics cabinet
 - Additional power: 120 V ± 10%, 60 Hz ± 5% or 200-240 V ± 10%, 50 Hz ± 5%
 - Installation category 2 (office power)
 - Total power ~3-5 kW
 - An Uninterruptible Power Source or power conditioner supplied by user is recommended



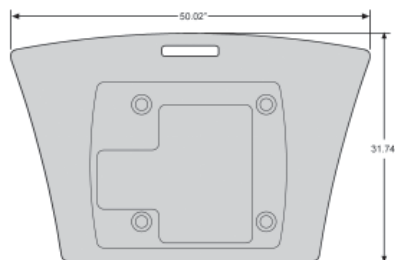
Optics Module Cabinet



Laser Module Cabinet



Workstation Table



personalDV Workstation Table