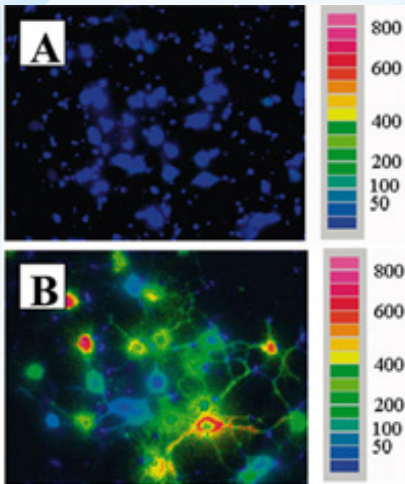


What makes the DeltaRAM™ X a better illuminator for quantitative intracellular ion research

ELEMENTAL ANALYSIS
FLUORESCENCE
GRATINGS & OEM SPECTROMETERS
OPTICAL COMPONENTS
CUSTOM SOLUTIONS
PARTICLE CHARACTERIZATION
RAMAN / AFM-RAMAN / TERS
SPECTROSCOPIC ELLIPSOMETRY
SPR IMAGING

High-speed wavelength switching monochromator for radiometric measurements

The ideal fluorescence microscope illuminator for quantitative intracellular ion research of Fura-2 [Ca⁺⁺], BCECF [pH], SBFI [Na⁺], FRET and much more.



The patented DeltaRAM™ X microscope illuminator is the ideal fluorescence illuminator for quantitative intracellular ion research. It utilizes a galvanometer based random access monochromator that can switch between any wavelength in 2 milliseconds. The DeltaRAM™ X is a complete, self contained, illuminator that includes a power supply, high intensity xenon light source, DeltaRAM™ X monochromator, TTL shutter and flexible liquid light guide. The wavelength position is a simple analog voltage control. All you need to add is a microscope adapter for your fluorescence microscope and a USB or PCI DAC interface depending on the software you will be using to drive the illuminator.

The DeltaRAM™ X is widely recognized as the multi-wavelength illuminator of choice with outstanding reliability and customer support.

Compatible DeltaRAM™ X vendor and software platforms

The DeltaRAM™ X can be controlled directly with a variety of third party imaging and instrument software, and HORIBA provides a number of USB and PCI driver interfaces to support these packages.

Better than a Filter Wheel: Key benefits of the DeltaRAM™ X versus traditional filter wheel illuminators

- Much faster wavelength switching times
- Vibration isolation
- Precise selection of any excitation wavelength and any spectral bandwidth
- Maximum dynamic range for ratiometric dyes (Fura-2 R_{max}/R_{min} = 40 with DeltaRAM™ X)
- Excitation wavelength scanning
- Much greater value for about the same price

Hardware

The DeltaRAM™ X is a complete self aligned and portable illuminator that includes a flexible 2 meter liquid light guide. There are optional microscope adapters available for virtually any fluorescence microscope. The DeltaRAM™ X can be placed on the microscope bench or on a separate shelf or table top, allowing it to be used outside of a Faraday cage for electrophysiology experiments.

Key Components of the DeltaRAM™ X

- PowerArc™ xenon arc lamp illuminator and power supply
- DeltaRAM Random Access Monochromator
- Liquid light guide
- Microscope adapter (optional)
- USB or PCI interface (optional)

PowerArc™ Lamp Housing

The DeltaRAM™ X is powered by a proprietary PowerArc™ lamp housing that requires no cooling or venting. It uses an on-axis ellipsoidal reflector for light collection to collect 70% of the radiant energy from the 75 watt xenon arc lamp compared to only 12% collection efficiency for traditional microscope fluorescence illuminators. The ellipse literally wraps around the arc lamp, collecting 5 to 6 times more output power than from a conventional lamp housing. This outstanding collection efficiency and brightness assures the delivery of as much light as possible through the DeltaRAM™ X random access monochromator. The PowerArc lamp housing is powered by a simple push button, ignition safe, integrated power supply with a lamp usage meter.

Patented DeltaRAM™ X Random Access Monochromator

The heart of the DeltaRAM™ X illuminator is the Random Access Monochromator. The DeltaRAM™ X monochromator is a scanning monochromator that delivers light anywhere from 250 to 650 nm. The monochromator uses a grating to disperse the different wavelengths of light from the incident white light xenon lamp. The scanning element inside the monochromator is a galvanometer which can switch between wavelengths in 2 milliseconds. With a simple and direct voltage control the DeltaRAM monochromator can hop around to multiple wavelength pairs much like a filter wheel. The DeltaRAM™ X however is much faster. It can be continuously tuned to any precise wavelength from 260 to 650 nm and it has an adjustable bandwidth. It can even be scanned like a traditional monochromator to provide spectra.

The DeltaRAM™ X has a continuously adjustable bandwidth because there is no best bandwidth to do any particular fluorescence experiment. Some users prefer to keep the bandwidths as narrow as possible while still getting good throughput because a narrower slit will have less photobleaching. Some experiments however require opening up the slits to maximize speed or signal to noise. With ratiometric experiments such as with Fura-2 or BCECF you want to be sure that the bandwidth is not so large that you will get cross talk between the two excitation channels. For this reason the DeltaRAM™ X lets you empirically test and precisely set the best bandwidths for you. The bandwidth is continuously adjustable from 0 to 24 nm with a manual slit adjustment.

DeltaRAM™ X Wavelength Control



The DeltaRAM™ X is operated remotely, so it requires an external interface, or DAC, that is run by software. To control the DeltaRAM™ X wavelength position you need an interface device that provides a voltage to a BNC connector labeled “position” on the unit. The wavelength position is linear with respect to applied voltage as follows.

Applied Voltage	Corresponding Wavelength
4.87 volts	250 nm
0 volts	450 nm
-4.87 volts	650 nm

DeltaRAM™ X Shutter Control

There is a BNC connector labeled “shutter” to digitally open and close the shutter. This is a simple solenoid shutter that is not intended for high speed shuttering.

DeltaRAM™ X DAC Interface Options

PCI DAC: The DeltaRAM™ X can be purchased with an optional 16 bit PCI DAC board that is slotted into a computer. A PCI DAC is necessary for millisecond wavelength switching.

USB DAC: HORIBA also offers two low cost optional USB DAC interfaces for slower wavelength switching requirements. One is based on a National Instruments driver and the other uses a Measurements Computing driver.

The USB DAC using the National Instruments driver converts input commands from 0 to +5 volts into +4.87 to -4.87 volts on the Analog Out 1 BNC. As such, input commands from 0 to 5 volts drive the DeltaRAM™ X from 250 to 650 nm. This interface includes BNC connectors for Shutter 1 and 2, Trigger A and B, Analog Out 1 (DeltaRAM™ X Position) and 2.

The USB DAC using the Measurements Computing driver converts input commands from 0 to +5 volts into +4.87 to -4.87 volts on the Analog Out 1 BNC. As such, input commands from 0 to 5 volts drive the DeltaRAM™ X from 250 to 650 nm. This interface includes BNC connectors for Shutter Out, TTL In, TTL Out and Analog Out (DeltaRAM™ X Position)

DAC Software

ALL DAC interfaces come with a LabVIEW driver and a simple USB 1.1 compatible interface with a very basic control software package that is Windows2000/XP compliant. This simple program will allow you to set and move wavelengths and manually open and close the shutter.

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