

What makes the Tunable KiloArc a better Illuminator

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

The Tunable KiloArc™ Illuminator can deliver up to 1 watt of tunable light output!

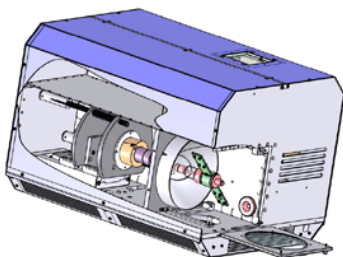
Think of the Tunable KiloArc™ Illuminator as a continuously tunable high intensity laser. It can produce tunable monochromatic light with hundreds of milliwatts of power, and an overall available spectral output from 180 nm to 2.4 microns.

Consisting of a unique arc lamp housing tightly coupled to a 0.2 meter monochromator, the Tunable KiloArc™ Illuminator is a self aligned illuminator that generates hundreds of milliwatts of intensity and offers the versatility of continuous wavelength and bandwidth selection. The wavelength can be set manually or, for ultimate flexibility, it can be scanned under computer control. The Tunable KiloArc™ Illuminator could not be easier to operate. The system is air cooled and requires no ozone venting. Simply push the start button and dial the wavelength and bandpass of output that you require. It's that easy!

Lamp Housing

You would have to buy 6 old style vertical lamp housings to deliver the same number of photons that a KiloArc™ delivers to a single point!

At the heart of every KiloArc™ is a proprietary on-axis ellipsoidal reflector. Our reflectors collect up to 70% of the radiant energy from the arc lamp, versus only 12% for typical condenser systems in vertical lamp housings. The ellipse literally wraps around the arc lamp, collecting 5 to 6 times more output power than from a conventional system.



The arc source is located at one focus points of the ellipse, and the radiation is reflected by the ellipse to the secondary focus which is actually outside of the KiloArc™. Since the light is brought to a focus by reflection rather than refraction (through a lens), there are less losses from absorption or lens-surface back-reflection. This design is so efficient that an lamp housing can deliver up to 11 times more optical power into a given smaller area than a conventional lamp housing.

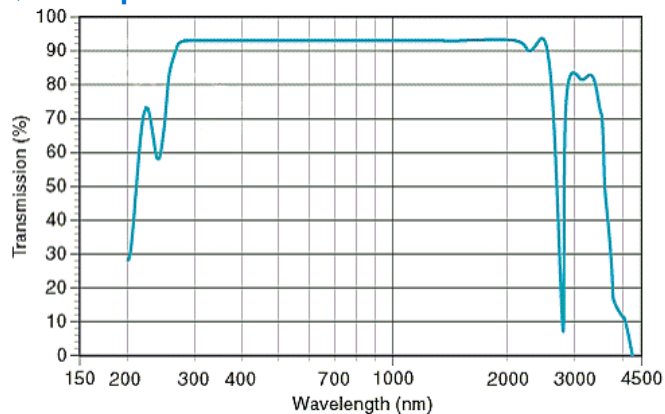
Our ellipsoidal reflectors are proprietary in design and the coating used. They are NOT electro-formed reflectors, which can distort with heat, and can degrade within months. Our proprietary design ensures that distortion of the critical ellipsoid cannot occur as the lamp reaches its operating temperature. This ensures thermal stability of focus. The coating ensures reasonably long operating life, typically 2–3 years.

The KiloArc™ ellipsoidal reflector is an f/4 reflector. The f/# is important when considering matching the KiloArc™ source to some other components like, fiber optics, liquid light guides or monochromators. However f/# for an ellipsoidal reflector is not an indicator of light collection as it is in a simple lens design. The shape and size of the ellipsoidal reflector determines how much light is collected from the lamp arc. The f/# only determines the focal cone angle.

The KiloArc™ is air cooled. However since the system uses ozone free lamps, there is no ozone or venting requirements, although there is an exhaust hose adapter if you want to vent the warm air out of a lab.

The KiloArc™ is a sealed arc lamp housing with a quartz window through which the focused light is delivered. Below is the spectral transmission curve for the quartz window.

Quartz Spectral Transmission Curve



Lamp



You have a choice of lamps depending on the spectral output that you require. Of course you may order different types of lamps for the housing, they are interchangeable.

There are two types of arc lamps available—xenon and mercury. The xenon gas used in the lamp provides continuous spectra from 180 nm to 2,500 nm of course at varying intensity (refer to spectral output graph). The mercury provides a line spectra (refer to spectral graph). The spectral curves for xenon and mercury are normalized (relative intensities) therefore it is not obvious that the mercury lamps, intensity—where it emits, exceeds that of the xenon lamp. Because of the smaller arc size, the mercury lamp can also provide greater intensity in a smaller area (greater brightness) than the xenon lamp.

We also have an optional tungsten-halogen filament lamp for NIR applications.

Arc lamps come with a quartz or suprasil envelope depending on the application. Quartz lamps do not transmit the deep UV below 240 nm. Suprasil lamps do transmit the deepest UV output from the arc down to about 180 nm. For either type of lamp envelope our unique lamp housing design does not create ozone and therefore requires no ozone venting.

Tunable KiloArc™ Arc Lamp Specifications

Lamp Wattage	Lamp Type	Nominal Arc Gap
75 watt	Compact Arc Xenon	0.8 mm
100 watt	Tungsten Halogen Filament	4 x 2 mm
100 watt	Mercury	0.25 mm
75 watt	Suprasil Compact Arc Xenon	1.3 mm
150 watt	Compact Arc Xenon Ozone free	2.1 mm
150 watt	Compact Arc Xenon	2.1 mm

The 75 watt xenon lamp and 100 watt tungsten-halogen lamps require no cooling whatsoever. The larger wattages of lamps require water cooling.

You can either get your water directly from the cold-water tap (can be a problem if the water is hard or when water is not available) or from an inexpensive circulating water bath option that we provide.

We have selected water-cooling over air: because it allows us to make a more compact housing; seal in the ozone and eliminates the need for venting.

Power Supply

The KiloArc™ illuminator has a dedicated 1,000 watt power supply and igniter built into it. The power supply is a high efficiency switch-mode type supply. It is rated at 1,200 watts to ensure that it is not operated at the limit of its range. This provides better stability and longer lifetime when operated at 1,000 W. The KiloArc™ has triple shielding and electronic filtering to ensure that there is no RF transmitted or radiated out of the illuminator to interfere with sensitive equipment, like computers.

Ignitor

The internal igniter provides a 45 kV pulse for reliable lamp ignition. Ignition noise can disrupt, or even destroy, sensitive equipment in the vicinity of an arc lamp during start-up. This can be quite a concern in a crowded lab environment. HORIBA Engineers carefully designed and tested the KiloArc's triple shielding housing and electronic filtering to ensure that there is no RF transmitted or radiated out of the illuminator.

KiloArc™ Power Supply and Igniter Specifications

Input	210–240 V AC 50/60 Hz
Starting	45 kV starting pulse
Power Rating	800–1200 watts (adjustable) — recommended 800–1000 watts
Output Volts Compliance	17–23 VDC
Output Current Limit	70 A rms

Smart Features

There are two LED indicators on the back, one called the “STATUS” which shows the modes of operation: cool down, stand by, or error. The other is an ERROR indication. It senses problems and displays error codes when they occur.

Particular considerations were paid to safety. The lamp chamber and power supply are constantly monitored for heat, as well as the airflow for cooling. If there are problems the lamp will shut down automatically and you will receive an appropriate error message. If the access door to the lamp is loose or open the lamp will turn off, or not ignite.

We tried to make the operation as fool proof, safe and reliable as possible, making the KiloArc™ ideal for commercial applications.

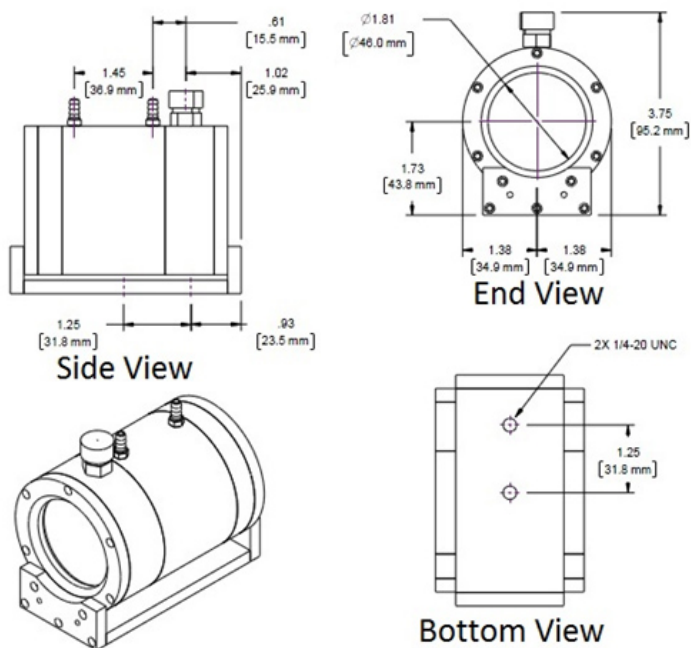
4-Inch Exhaust Hose Adaptor

The KiloArc™ does not generate harmful levels of ozone (less than a typical copier). It does generate some heat. Therefore venting is not a requirement, but if you do desire to vent the exhaust from the KiloArc™, select this option.

IR Absorbing Water Filter

The KiloArc™ light source is coupled to a monochromator with a light tight adapter tube which contains an IR absorbing water filter. The IR absorbing water filter is used to protect the optical elements in the monochromator from the very intense IR heat delivered by the KiloArc™ illuminator. These cylindrical metal devices are filled with water or some other IR absorbing liquid, such as copper sulfate, and have two quartz windows on either end to allow light to transmit through the absorbing solution. The cylindrical walls are water jacketed to allow cooling water to be circulated around the IR absorbing solution itself to keep it from overheating.

The standard IR absorbing water filter that comes with the Tunable KiloArc™ is made of aluminum which can be used with distilled water as the absorbing solution. There is an optional stainless steel filter that can be filled with distilled water, copper sulfate other IR absorbing liquids.



Distilled water is an excellent UV-Vis-NIR transmitter and IR absorber. It will transmit most of the light above 200 nm and absorb almost 100% of the light above 1,000 nm.

There is an optional filter mount that can be attached to the output side of either IR absorbing water filter to allow for multiple 2" square filters to be held.

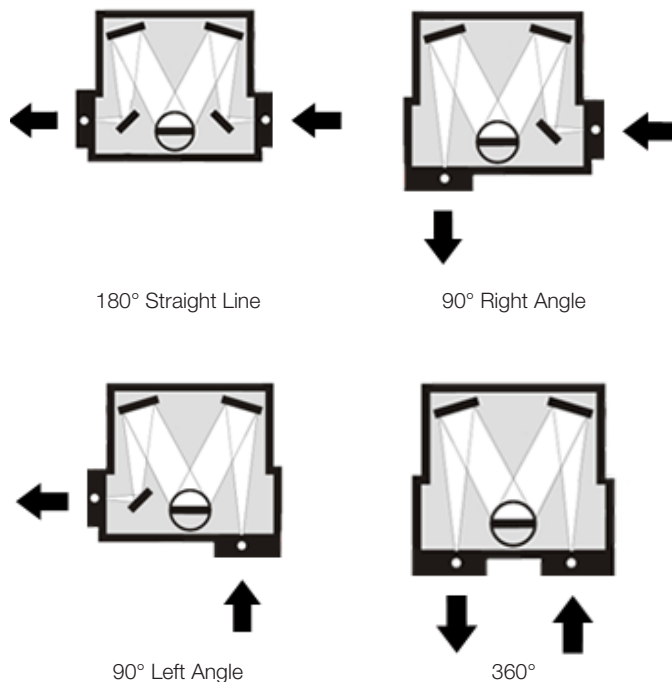
Monochromator Hardware

Optional Ports

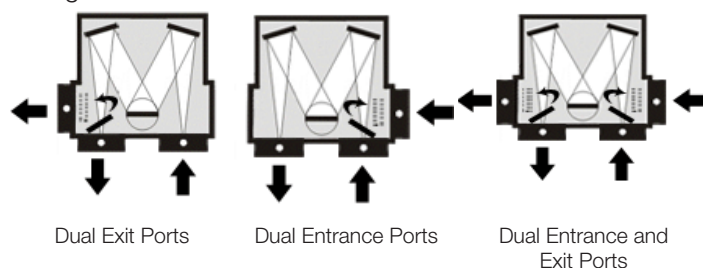
This extremely rugged monochromator is built from a single solid metal casting that includes the base plate, optical mounts and all four sides of the unit. Inside the monochromator has extensive baffles to reduce stray light. There is an entrance and exit baffle box at the entrance and exit slits, as well as a center baffle that separates the input side from the exit side of the monochromator.

The monochromator has four optional ports that can be utilized for two inputs and two outputs. In the standard configuration it comes with one entrance and one exit port. This gives you a choice of four different input/output geometries:

- 180° Straight Line – with folding mirrors on entrance and exit
- 90° Right Angle – with folding mirror on the exit side
- 90° Left Angle – with folding mirror on the entrance side
- 360° – with no folding mirrors



You can also elect as an option to have two entrance ports or two exit ports. This option adds an appropriate flipping mirror(s) and slit assemblies. The flipping mirror is manually switched to receive light from either entrance port, or to deliver light to either exit port depending on the configuration.



Slits

The monochromator slits are continuously adjustable manual slits with micrometers for adjustment from 0 to 6 mm. The micrometers have a digital readout of the physical slit size selected. The slit housing also has a manually sliding shutter to quickly shut off or open the light path. This manual slider also has a wedge height adjustment to allow you to select a slit height anywhere from 0 to 21 mm.

Wavelength Control

The monochromator wavelength is controlled with a manual dial and readout. The readout is designed to be in true wavelength in nanometers for the 1,200 g/mm grating. For other gratings you have to multiply the dial readout by a factor depending on the actual grating resolution. For example with the 600 g/mm grating you multiply the digital readout by 2 to arrive at the true wavelength position of the monochromator.

Programmable Computer Control

An optional computer control accessory is available. It includes a stepper motor assembly, an MD-2000 USB motor controller interface box and a LabVIEW* driver for computer control of the monochromator wavelength with LabVIEW software from National Instruments.

A very simple software package is also provided by OBB to remotely select the wavelength and control the shutter. Requires Windows 2000 or Windows XP operating system.

Software Screen Shots



*LabVIEW is a trade mark of National Instruments