



Light sources for optical and analytical instrumentation
Deuterium lamps, hollow cathode lamps, FiberLight,
specialty light sources and power supplies

**The leading team
for light sources in
optics and analytics**



Content

“Incorporating 150 years of quartz and metal technology combined with use of high quality materials, Heraeus offer lamps that do not just look good on a spec sheet.”

The Heraeus group is one of the global leaders in quartz to metals materials processing technology. With this technical competence Heraeus constantly develop high-quality analytical light sources that match the continual demand for high performance instruments. Deuterium lamps, hollow cathode lamps and specialty light sources from Heraeus are engineered to provide long life, high precision and stability.

Heraeus employ more than 10,000 people worldwide, with our key R&D, engineering and service staff for light sources located in Germany, U.K., U.S.A. and China. As a customer you will have access to the resources of the group through one point of contact from one of our many worldwide locations.

For more information, go to www.heraeus-noblelight.com.



Deuterium lamps for HPLC, photometers and other UV applications 4



Hollow cathode lamps for AAS 6



FiberLight miniature UV/vis light source 8



Specialty light sources and power supplies 10

Deuterium lamps for HPLC, photometers and other UV applications

Vacuum UV
deuterium
lamp



Deuterium (D₂) lamps emit an almost continuous spectrum of light ranging from the main UV wavelengths of 160 nm – 400 nm to the visible spectral range (800 nm). This makes them the ideal light source for high precision absorption measurement.

Heraeus has developed a lamp technology that combines high stability and long lifetime of D₂ lamps. This makes Heraeus lamps the first choice of instrument makers and users when it comes to highest precision of analytical results. With the support of our own test laboratory, Heraeus engineers work closely with instrument manufacturers to optimise the lamp for the specific operating conditions in the instrument.

For lamp development with OEMs Heraeus have available a substantial number of bare lamp types which can be adapted to suit any new instrument design.

Through our approved worldwide dealer network, replacement Heraeus deuterium lamps are available for the majority of existing instrument types.

If you require a replacement lamp, please contact your country's approved dealer, by logging onto www.heraeus-noblelight.com/analytical.



Prealigned
deuterium
lamp



OEM
deuterium
lamp

Long-life deuterium lamps

Heraeus long-life D2 lamps combine a guaranteed lifetime of 2,000 hours with unmatched stability of the output over the entire life. This sets them apart from many other long-life lamps on the market and makes them the ideal choice for high-end HPLC instruments.

Standard quartz deuterium lamps

This lamp type is based on the same high-stability technology as the Heraeus long-life lamps which ensures the highest quality of analytical results. Their guaranteed lifetime is 1,000 hours.

UV glass deuterium lamps

UV glass lamps are an economical alternative for standard instruments or for applications that need to cut out wavelengths below 200 nm to avoid ozone generation. Heraeus UV glass deuterium lamps are made to the same high standards as our quartz lamps and have a lifetime of 1,000 hours.

Vacuum UV deuterium lamps

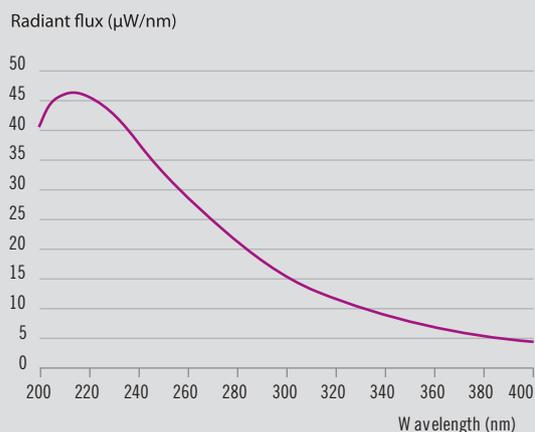
Vacuum UV (VUV) lamps are deuterium lamps that are especially designed to supply deep UV light down to a wavelength of 110 nm. The spectral range covers 110 nm to 400 nm with especially high intensity between 120 nm and 160 nm. They are used in high resolution optics (e.g. quality assurance), semiconductor exposure, cleaning of silicon wafer surfaces and many other applications. Heraeus is specialized on high power VUV lamps with up to 250 W.

Special deuterium lamp designs

For special applications, Heraeus offers a wide range of deuterium lamps. This includes

- nose (or “snouted”) lamps
- shine-through lamps
- high power lamps
- calibration lamps.

Emission spectrum of doped quartz deuterium lamp



Technical data Deuterium lamps

| Lamp type | DX | DS | UV glass | VUV |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|
| Max. noise value (AU) | 2×10^{-5} | 2×10^{-5} | 2×10^{-5} | 2×10^{-4} |
| Guaranteed lifetime (hrs) | 2,000 | 1,000 | 1,000 | 500 |
| Spectral range (nm) | 185 – 600 | 185 – 600 | 200 – 600 | 110 – 600 |
| Aperture diameter (mm) | 0.5/1.0 | 0.5/1.0 | 0.5/0.75/1.0 | 1.0 |
| Shine-through version available | yes | yes | yes | no |

Further deuterium lamp categories:

High power VUV, broad band (160 nm – 600 nm), calibration lamps

Hollow cathode lamps for AAS



Hollow cathode lamps (HCLs) are a key component for atomic absorption spectroscopy. They consist of a cathode made from the element of interest, an anode and an inert filler gas contained in a glass envelope.

Heraeus hollow cathode lamps have a unique cathode cup system that allows the lamp to reach equilibrium quicker. A special base design ensures a direct connection between cathode pin and wire for maximum reliability. And because lifetime is key in AAS, Heraeus hollow cathode lamps have a larger internal gas volume than many other designs. Every Heraeus hollow cathode lamp has a guaranteed lifetime of 5,000 mA hrs – even for elements like As or Hg.

Heraeus hollow cathode lamps are available both for instrument makers and as replacement lamps. The program includes standard and data-coded versions. A complete range of lamps is available for the Perkin Elmer "AAAnalyst" atomic absorption spectrometers. Lamps for use with Smith Hieftje background correction are also available.

Single element lamps

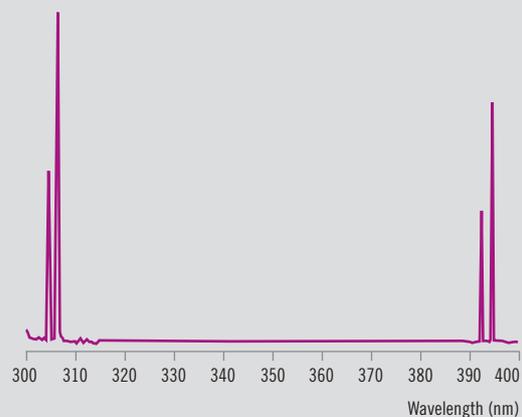
The Heraeus hollow cathode lamp program includes 70 single element lamps in standard 1½" (37 mm) and 2" (50 mm) diameters to fit virtually all instruments. All cathode materials are chosen from the highest purity available usually 99.99% or better to ensure high spectral line intensity, stability and low noise with good analytical sensitivity. The window material is selected to achieve the optimum transmission of the key spectral lines of the cathode element. For a list of available elements, please go to www.heraeus-noblelight.com/analytics.

Multi element lamps

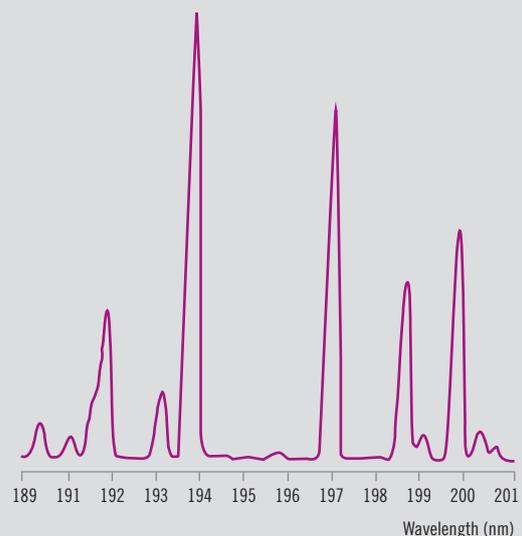
Multi element hollow cathode lamps are especially useful when carrying out routine analysis on a number of different elements in the same sample. Heraeus offers more than 120 multi element combinations in standard 1½" (37 mm) and 2" (50 mm) diameters. Each multi element combination is carefully tested to ensure sufficient energy for each element with no spectral interference. For a list of available multi element combinations, please contact Heraeus at hna-analytics@heraeus.com.



Principal lines of Al hollow cathode lamp

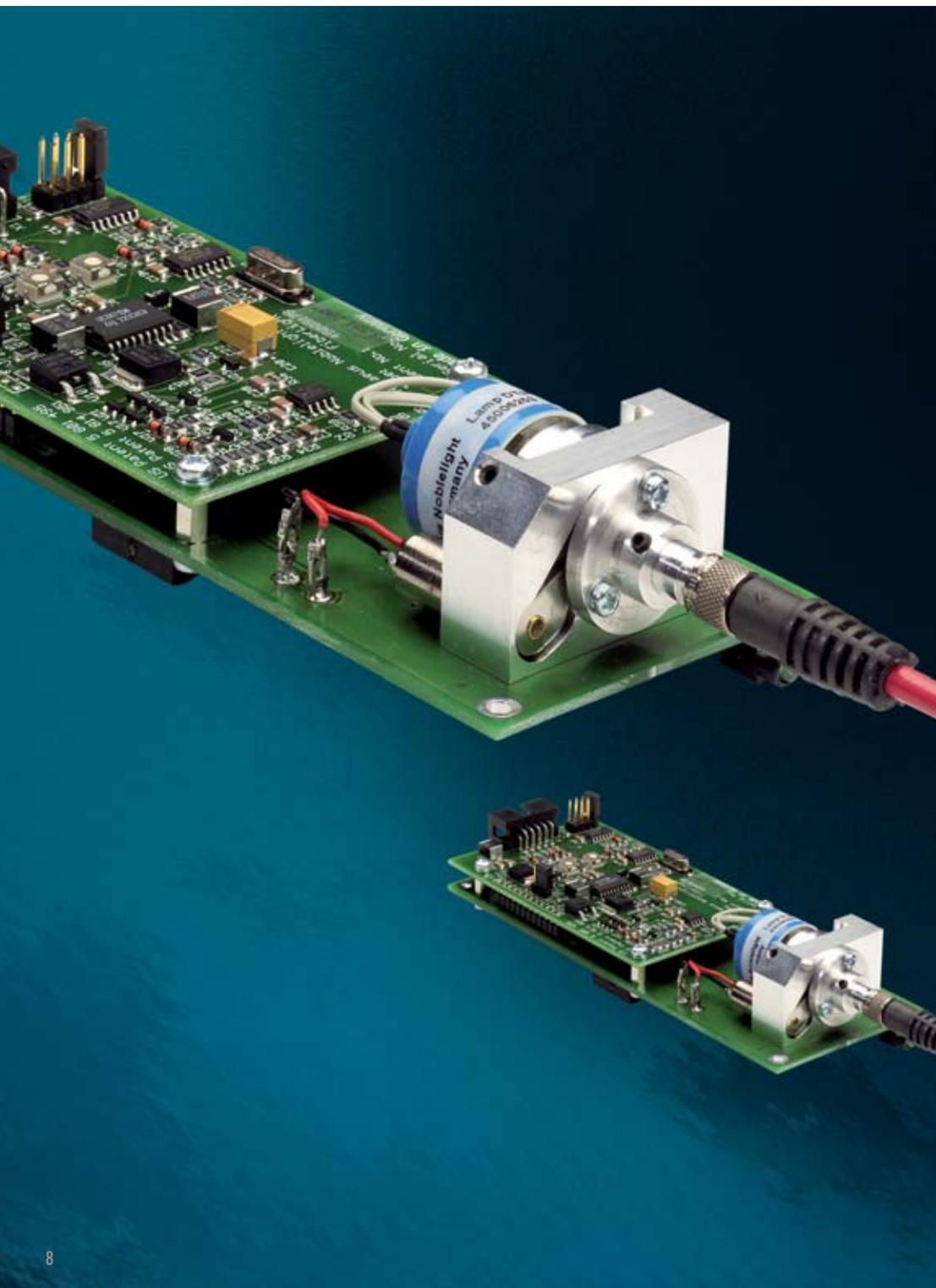


Principal lines of As hollow cathode lamp



FiberLight miniature UV/vis light source

for mobile spectroscopy and online process control



FiberLight is a UV/vis light source developed by Heraeus especially for mobile and compact spectroscopy applications. It consists of an electrodeless, RF induced deuterium lamp with additional vis light source mounted ready-to-use on a PCB board with fiber optics connector. The spectral emission covers the entire range from 200 nm to 1,100 nm, optional even from 185 nm to 1,100 nm. Its small dimensions and ease of operation open up new possibilities for instrument designers.



FiberLight is available in different PCB board layouts to fit any compact instrument design. The lamp is an interchangeable module that is available for the spectral ranges 200 nm – 1,100 nm and 185 nm – 1,100 nm or for lines of many elements like HG, Ar or Xe.

FiberLight features

The key characteristics of FiberLight are its small size, low power consumption (6 W), low heat generation and robust mode of operation with instant ignition. This makes FiberLight the ideal light source for applications with limited space in the instrument, portable instruments or battery-operated equipment. Application references are available from hng-analyticalamps@heraeus.com.

The optional line sources are mainly used for wavelength calibration.

Lamp modules

A lamp module consists of the RF induced deuterium lamp, an integrated tungsten lamp and the prealigned mounting ring for easy lamp change. Lamp modules are available with quartz windows for 200 nm – 1,100 nm and with Suprasil windows for 185 nm – 1,100 nm or as line sources. The high frequency excitation ensures immediate ignition of the lamp. It can be switched on and off at any time and can be operated in cycles. The operating life exceeds 1,000 hours, and the number of cycles has no significant effect on lifetime.

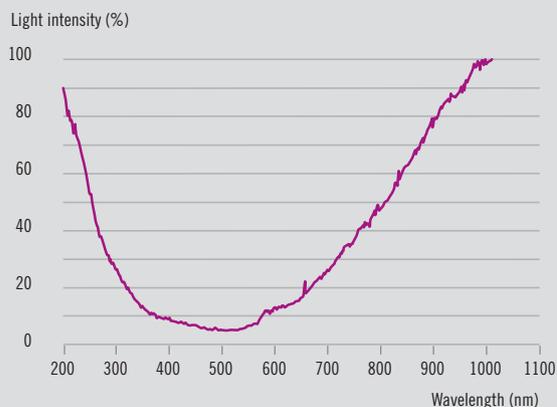
Power supply and control

FiberLight is a complete unit requiring a 12 Vdc/0.6 Adc input. The deuterium/tungsten lamp and the integrated shutter can be separately controlled by TTL signals.

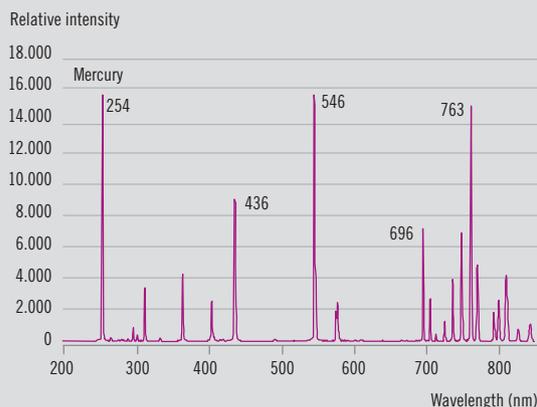
Fiber coupling

The FiberLight unit has an integrated SMA 905 connector for fiber optics. Recommended fiber diameters are 200 µm, 400 µm or 600 µm.

Fiber Light UV/vis spectrum



FiberLight mercury line spectrum



Technical data FiberLight unit

| | |
|------------------------------|---|
| Power consumption | 6 W approx. |
| Power supply | 12 Vdc regulated/0.6 Adc |
| Operation temperature | 5 – 35°C |
| Functions | Deuterium lamp, tungsten lamp and shutter separately controlled by TTL signal |
| Light outlet | SMA plug 905 for coupling in fiber optic |
| Fiber optic | Diameter 200 µm, 400 µm or 600 µm |
| Power supply | integrated |
| Cooling | not required |

Technical data FiberLight lamp module

| | |
|-----------------------------------|---|
| Type | Electrodeless RF induced lamp with coupled-in tungsten lamp |
| Spectral ranges | 200 – 1,100 nm or 185 – 1,100 nm or line spectra |
| Window material | Quartz or synthetic quartz (Suprasil) |
| Light power (beam density) | > 5 x 10 ⁻⁸ W/nmsr at 240 nm |
| Stability | < 1 x 10 ⁻³ AU |
| Drift | < 0.25%/h |
| Life | > 1,000 hrs at 240 nm (50% output drop) |

Specialty light sources and power supplies

Photoionisation lamps, tungsten halogen lamps, continuous xenon lamps, line sources and power supplies



Heraeus offers a wide range of experience and technical support alongside high quality lamps when it comes to special applications. A comprehensive selection of specialty light sources enables our engineers to select the lamp with the optimal performance under specific conditions and to optimise it together with the customer.

Photoionisation (PID) lamps

PID lamps are most commonly used in gas chromatography (GC), trace gas monitoring and sample ionisation for mass spectrometry. The PID approach involves the use of an appropriately selected discharge lamp to obtain monoenergetic photons, which are then used to photoionize gaseous molecules whose ionization potentials are lower than the photon energy.

Heraeus can design PID lamps for special instrument requirements e.g. compact dimensions. Both DC and RF (electromagnetic field) energized lamps are available with a variety of gas fills and window materials.

Tungsten halogen lamps

Tungsten halogen (TH) lamps are used individually or together with a shine-through deuterium lamp to enhance the spectral emission for analytical instrumentation in the visible range. Power outputs range from 5 W to 200 W typical lifetimes in excess of 3,000 hrs dependent on operating conditions.

Heraeus tungsten halogen lamps are designed and manufactured especially for use in analytical instrumentation and not for general lighting. They use special quartz for a high transmission also below 380 nm and are available in precisely pre-aligned versions to fit many analytical instruments. A special manufacturing process allows Heraeus to carefully control the filament position for a high-precision light output.



Continuous xenon lamps

Heraeus offers a stable long-life 150 W continuous xenon lamp specifically designed for instrumental applications like fluorescence spectroscopy. It is an excellent solution for applications requiring a xenon point source with high radiance and stability.

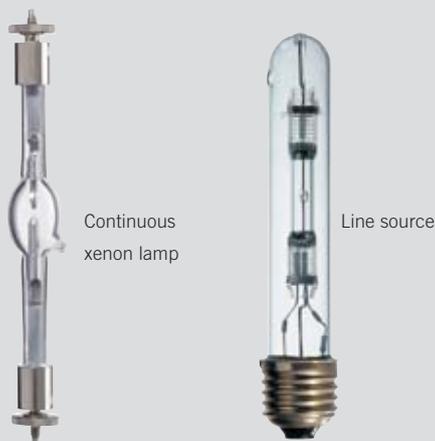
Line sources

For applications that require single or multiple line spectra and for the calibration of instruments, Heraeus offers low pressure mercury lamps with a 253.7 nm line and an optional 185 nm line and medium pressure mercury lamps with spectral lines between 250 nm and 580 nm. They have a high UV radiation flux of the virtually monochromatic spectral lines as well as an exceptional reproducibility of the wavelength.

For information on the full range of line sources, please go to www.heraeus-noblelight.com.

Power supplies

Heraeus has developed power supplies for especially low noise levels and long lamp life through carefully controlled ignition. Heraeus power supplies are available either in a ready-to-use end user version or in an OEM version to be built into equipment.



Technical data Speciality light sources

PID lamps

| | |
|---------------|---------------|
| Excitation | RF or DC |
| Photon energy | 8.4 – 11.8 eV |

Tungsten halogen lamps

| | |
|----------|-----------------|
| Power | 10 – 400 W |
| Lifetime | up to 2,000 hrs |

Continuous xenon lamps

| | |
|----------------|-------------|
| Power | 150 W |
| Nominal output | 2,600 Lumen |

Line sources

| | |
|-------------------------------|---------------------------------|
| Low pressure mercury lamps | 253.7 nm/optional 185 nm |
| Medium pressure mercury lamps | lines between 250 nm and 580 nm |

Technical data Power supplies

| Version | PSD 181 | PSD 182 | PSD 184 | PSD 185 | PSD 200 |
|--------------------|----------------------------|----------------------------|---------|--------------------------|----------|
| | Benchtop | OEM | OEM | OEM | Benchtop |
| | (for 24 Vdc input) | | | | |
| suitable for | | | | | |
| deuterium lamp | 30 W | 30 W | 30 W | 30 W | 200 W |
| tungsten lamp | – | – | ● | – | – |
| Heater voltage | 2.0 and 2.5 and 12.0 | 2.0 and 2.5 and 12.0 | 2.5 | 2.0 or 2.5 or 12.0 | 6.0 |
| Dimensions (in mm) | | | | | |
| Length | 235 | 200 | 190 | 100 | 210 |
| Width | 260 | 135 | 100 | 100 | 175 |
| Height | 155 | 86 | 50 | 36 | 300 |
| Weight (in kg) | 3.3 | 1.6 | 0.6 | 0.2 | 12.0 |

Other power supplies available upon request

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