Heraeus

Hollow Cathode Lamps

High Quality Lamps for all Instrument Brands

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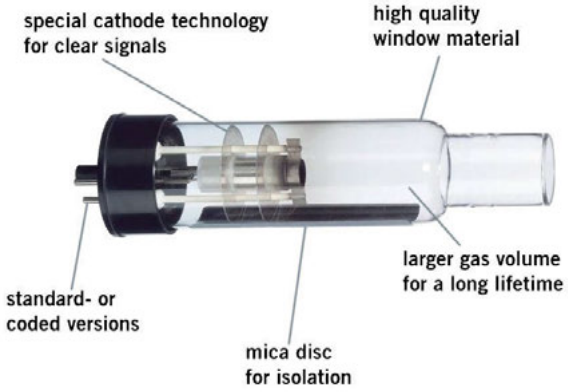
Heraeus hollow cathode lamps are primarily used in instruments for atomic absorption spectroscopy (AAS).

Heraeus hollow cathode lamps are designed for optimal performance and characterised by good chemical sensitivity and spectral response, combined with stable light output and low noise.

Heraeus hollow cathode lamps are available both for OEMs and as a replacement lamp by discerning users the world over. The range includes standard lamps and data-coded versions for PerkinElmer and ThermoFisher atomic absorption spectrometers. Lamps for use with Smith-Hieftje background correction can also be offered.



Hollow cathode lamps consist of a cathode made from the element of interest, an anode and an inert filler gas contained in a glass envelope. In addition various mica discs, ceramic sheaths and glass shields assist in alignment and insulation.

Heraeus Hollow Cathode Lamp range includes:

- 70 single-element lamps
- More than 120 multi-element lamps with up to seven combined elements
- 1.5" (37 mm) and 2" (50 mm) diameters
- Low-Current and High-Current versions for optimum performance in all OEM systems
- Standard and coded lamps
- Available for OEMs and end users
- High stability, low noise and long service life due to advanced cathode technology
- Special power supply available

Applications of Hollow Cathode Lamps:

Hollow cathode lamps are gas discharge devices in which the discharge is highly constrained within the cathode of a specific metal. The resultant output is a unique line spectrum, the most intense of which are suitable for highly specific and sensitive metals analysis. Further derivatives of the fundamental technology extend the applications to include:

- Atomic Absorption Spectroscopy (AAS)
- Atomic Fluorescence Spectroscopy
- Multi wavelength laser tuning
- Laser output stabilisation (optogalvanic effect)
- Multi component analysers
- Environmental analysers
- Medical analysers

Single-Element Lamps

Single-Element Lamps

The Heraeus catalogue includes 70 single-element lamps in standard 37 mm (1.5 inch) and 50 mm (2 inch) diameters to fit almost any AA instrument. All cathode materials are selected 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 primary spectral lines of the cathode element. Borosilicate glass is used for wavelengths over 350 nm, and high quality quartz for shorter wavelengths.

Standard 37 mm Lamps
37 mm hollow cathode lamps are suitable for most commercial atomic absorption instruments. Standard lamps may also be used in computer controlled spectrophotometers which are designed to take coded lamps as these instruments normally have the facility to be set up manually. Manual setting up of lamp current, wavelength, slit width, gas conditions and burner height takes only a few moments and allows the operator to set the optimum conditions for each particular analysis, which can be stored and recalled when required. Indeed in many cases the instrument will set default conditions for these parameters on entry of the element. Whilst these parameters are generally suitable for a particular element, they may need fine tuning to suit the specific analysis being carried out.

Standard 50 mm Lamps
Perkin Elmer Instruments are unique in requiring hollow cathode lamps with a 2" (50 mm) diameter, and a dedicated electrical connector. Heraeus has developed a full range of such lamps for direct use in Perkin Elmer instruments utilising the long established features of our standard range but making the necessary processing changes to ensure they are entirely compatible to these instruments.

Data Coded Hollow Cathode Lamps
Heraeus manufacture and supply a complete range of data coded hollow cathode lamps for Perkin Elmer and Thermo instruments.

37 mm Hollow Cathode Lamp

50 mm Hollow Cathode Lamp

Data coded hollow cathode lamps incorporate a unique electronic configuration in the base or plug which the instrument recognizes and sets default operating conditions for the routine analysis of that element. The parameters may be overridden by the operator if desired to suit the specific requirements of the analysis. The electronic configuration of the data coding is also specific to each instrument manufacturer and not interchangeable i.e. a Varian coded lamp will not register in a Thermo instrument. Heraeus offers a full range of coded lamps for each manufacturer, the exact range being governed by the software embedded in the instrument.

Self Reversal (Smith-Hieftje) Background Correction lamps
Background correction in atomic absorption spectroscopy commonly uses a Deuterium continuum lamp and on certain instruments the Zeeman method utilising magnetic field polarisation. However, both of these methods have limitations regarding the correction of uniformly distributed background. An alternative method of background correction is the self reversal (Smith-Hieftje) technique in which a high current is momentarily passed through the cathode producing a dense cloud of neutral atoms in front of the cathode, effectively cutting off the stream of photons produced during normal lamp operating low current. This momentarily stops absorption in the flame, the spectrophotometer now reading the background absorption only. At normal operating current the instrument records the sum of the absorption of the element and the background. The spectrophotometer can then electronically subtract the background from the sample signal to solve the analytical problems that may be encountered with other methods of background correction. Heraeus has developed a range of lamps specifically designed to be used at the currents recommended by the manufacturers of instruments where the self reversal or “Smith-Hieftje” method of background correction is available. These lamps have enhanced insulation to cope with the high voltage pulse used by this background correction method, but may also be used in normal atomic absorption applications. Not all elements are suitable for use with this technique; the available range is included in the lamp listing.

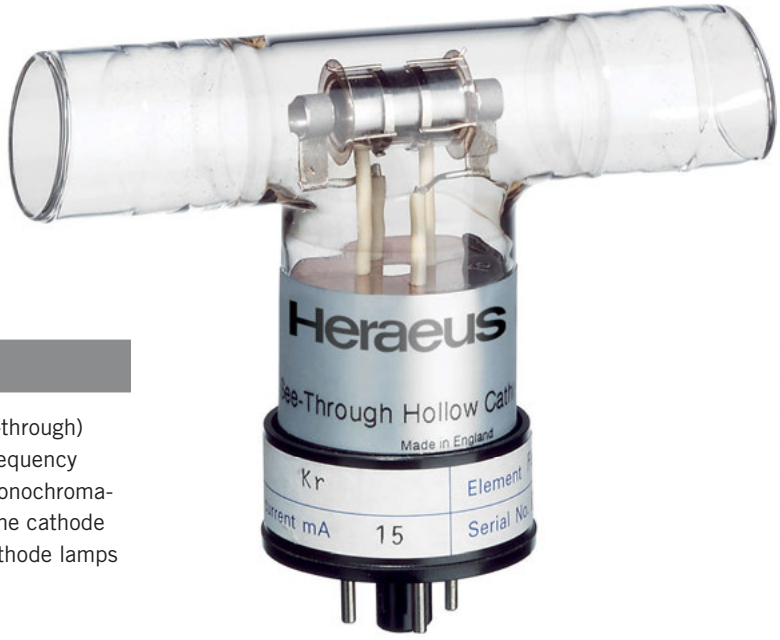
Multi-Element Lamps and See-Through Hollow Cathode Lamps

Multi-Element Lamps

Heraeus manufactures the largest range of multi-element lamps offering only those combinations which provide sufficient intensity and an acceptable lifetime for each element with no spectral interference.
Multi-element hollow cathode lamps are available with two to seven different element combinations. These are particularly useful for carrying out routine analysis on a number of different elements in the same sample, such as alloys. Multi element lamps are inevitably a compromise in which energy levels will be lower than single element lamps and hence noise levels may be higher. This may limit ultimate detection levels, single element lamps being preferred wherever sensitivity is an issue.

See-Through Hollow Cathode Lamps

Heraeus also manufactures optogalvanic (see-through) hollow cathode lamps, designed to act as a frequency stable reference for high intensity tuneable monochromatic light sources, particularly lasers. Most of the cathode materials used in standard Heraeus hollow cathode lamps may be used in the “see-through” design.



See-Through Hollow Cathode Lamp

Getting the best from your Hollow Cathode Lamps

Operating Current

Each hollow cathode lamp has a maximum current which should not be exceeded. Exceeding the limit will considerably reduce the usable life of the lamp and may damage the cathode by sputtering off excess material or even melting some of the more volatile alloys and elements.

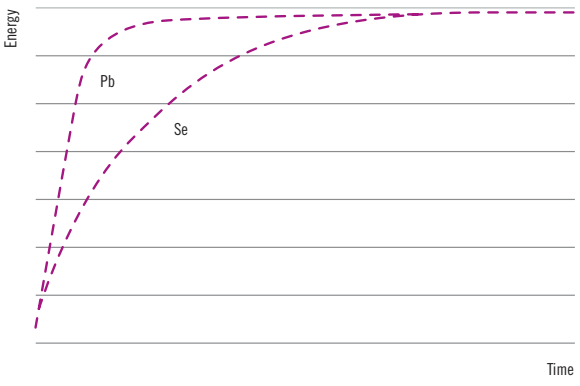
The current indicated on a 37 mm hollow cathode lamp is the maximum current at which the lamp should be run in an instrument using a modulated power supply typical of most manufacturers.

The current shown on a 50 mm lamp is the maximum current at which the lamp should be used in an instrument with a continuous power supply typical of most Perkin Elmer instruments. It is possible, with the correct adapters, to run a 37 mm lamp in a Perkin Elmer instrument with a continuous power supply in which instance the current recommended for 50 mm lamps should be used. Some Perkin Elmer models have a modulated power supply, reference to the instrument user manual will indicate the type of power supply in the instrument. If a modulated supply is present then the lamp should be operated at the current recommended for a 37 mm lamp.

In general lamps should be run at 75 % of their maximum current to achieve best precision and 65–75 % to achieve their maximum sensitivity. However, the performance of some elements is not materially affected by operation anywhere between 65 and 100 %. Lamps should not be operated below 50 % maximum current as, in all but a few cases, stability and noise levels deteriorate significantly. Indeed elements with naturally low outputs such as Arsenic, Tin, Antimony, Bismuth and Selenium would be too noisy for analysis at the detection limit at anything other than maximum current.

Stabilisation

After striking the lamp or following a change in operating current most lamps will require a warm-up period before full stability is obtained. Depending upon the element, the warm-up time can be between 5 and 30 minutes. If lamps have not been used for a considerable time or have been stored before initial use they may require somewhat longer than usual to stabilise. This period will normally be around 2 hours but an overnight run may prove to be the most efficient way of restoring full stability. Softer elements with lower melting points such as lead especially benefit from this practise. For optimum performance, on receipt of a new lamp it is also good practice to run it in the instrument to acclimatize the lamp to the particular power supply.



Typiccal warm up curves

Alignment

A hollow cathode lamp produces a very narrow beam of light; if not aligned correctly the output from the lamp will not fill the entrance slit and there will be an apparent loss in signal and the noise levels will increase. Low output and high noise may indicate that the lamp is misaligned. The lamp should then be re-aligned until maximum signal output is achieved.

Getting the best from your Hollow Cathode Lamps

Output

Low output is often cited when lamps are returned or discarded despite otherwise working well for chemical analysis. It is in fact common for an old lamp to have a slightly higher fundamental output than the new lamp. This increase in output comes about from a combination of two mechanisms, one of which is a decrease in the internal pressure of the lamp caused by the gradual usage of the fill gas. In addition material movement within the lamp may increase the output by closing the hole in the hollow cathode and concentrating the beam. The same material movement may also cause an opposing effect through a diminution of the transmittance of the window.

Chemical Sensitivity

Sensitivity is defined as the concentration of the element in mg/ml in aqueous solution which gives an absorbance of 0.0044 (1 % absorption). It is useful for calculating the calibration range of the instrument, which is usually in the range of 20-200 times the sensitivity value. It should be noted that the chemical sensitivity is dependant on the instrument and the set up such as burner height, flame chemistry and nebuliser positioning. For this reason reference should be made to the instrument manual for the recommended conditions and expected resultant sensitivity.

Detection Limit

The detection limit is defined as the concentration of the element in mg/ml which gives a signal equal to three times the standard deviation of a series of at least 10 determinations at or near the blank level (95 % confidence). In practical terms concentrations of less than 10 times the detection limit cannot be measured with any accuracy. The determination of this limit is particularly sensitive to noise levels so optimisation of output is essential in ensuring as low a detection limit as possible.

Lifetime

Service life is an important factor in AAS. Heraeus hollow cathode lamps have a larger internal gas volume than many other products. All hollow-cathode lamps produced by Heraeus have a guaranteed service life of 5000 mA hours, including for elements such as As or Hg.
The milliampere usage is calculated by multiplying the hours of lamp operation by the lamp operating current.

All Heraeus hollow cathode lamps are manufactured to the highest standards and are warranted free from electrical and mechanical defect caused either by workmanship or materials. The lamps provide satisfactory service when used within the limits of our written specification and when used in equipment of standard manufacture.

Current VS Output VS Chemical Sensitivity

For optimum use of the lamp for its end purpose, chemical analysis, Heraeus aims to provide the best ratio of output : chemical sensitivity : life : noise and stability. The general relationship between these factors demonstrates that lower current gives increased chemical sensitivity but also increased noise levels and decreased output. Higher current will conversely reduce the noise, increase the output but will also reduce the chemical sensitivity. Each element and its matrix presents a unique problem, requiring the analyst to determine the optimal conditions for each particular analysis. The result will inevitably be a compromise in which some output has to be sacrificed in favour of other factors considered more important to the analysis.

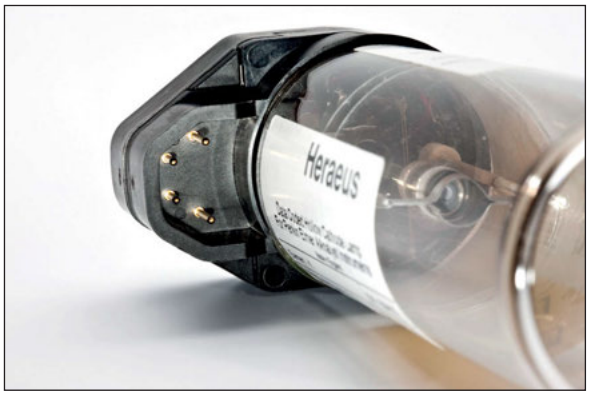
Heraeus Hollow Cathode Lamps
Different Socket Versions

37 mm Thermo Coded

37 mm Varian Coded

37 mm Standard, 37 mm Self Reversal

50 mm Standard



50 mm PE coded Analyst

A variety of base designs is available for Heraeus Hollow Cathode lamps.

Hollow Cathode Lamps
Single Elements

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Aluminium	Al	3QNYAL-LC	37 mm low current	Ne	Quartz	10	6	309,3
		3QNYAL	37 mm Standard	Ne	Quartz	10	8	
		3QNYAL-V	37 mm Varian Coded	Ne	Quartz	10	8	
		3QNYAL-U	37 mm Thermo Coded	Ne	Quartz	10	8	
		3QNYAL-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNAL	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNAL-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Antimony	Sb	3QNYSB-LC	37 mm low current	Ne	Quartz	10	4	217,6
		3QNYSB	37 mm Standard	Ne	Quartz	15	12	
		3QNYSB-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYSB-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYSB-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNSB	50 mm Standard 9 pin	Ne	Quartz	25	20	
		5QNSB-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	25	20	
Arsenic	As	3QNYAS-LC	37 mm low current	Ne	Quartz	10	6	193,7
		3QNYAS	37 mm Standard	Ne	Quartz	12	10	
		3QNYAS-V	37 mm Varian Coded	Ne	Quartz	12	10	
		3QNYAS-U	37 mm Thermo Coded	Ne	Quartz	12	10	
		3QNYAS-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNAS	50 mm Standard 9 pin	Ne	Quartz	18	18	
		5QNAS-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	18	18	
Barium	Ba	3BAXBA-LC	37 mm low current	Ne	Borosilicate	15	6	553,5
		3BAXBA	37 mm Standard	Ar	Borosilicate	15	12	
		3BAXBA-V	37 mm Varian Coded	Ar	Borosilicate	15	12	
		3BAXBA-U	37 mm Thermo Coded	Ar	Borosilicate	15	12	
		3BAXBA-Self Reversal	37 mm Self Reversal	Ar	Borosilicate			
		5QABA	50 mm Standard 9 pin	Ar	Quartz	30	25	
		5QABA-A	50 mm PE coded tAAnalyst (Lumina)	Ar	Quartz	30	25	
Beryllium	Be	3QNYBE-LC	37 mm low current	Ne	Quartz	15	6	234,9
		3QNYBE	37 mm Standard	Ne	Quartz	15	12	
		3QNYBE-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYBE-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYBE-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNBE	50 mm Standard 9 pin	Ne	Quartz	30	20	
		5QNBE-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	20	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Bismuth	**Bi**	3QNYBI-LC	37 mm low current	Ne	Quartz	15	3	223,1
		3QNYBI	37 mm Standard	Ne	Quartz	12	10	
		3QNYBI-V	37 mm Varian Coded	Ne	Quartz	12	10	
		3QNYBI-U	37 mm Thermo Coded	Ne	Quartz	12	10	
		3QNYBI-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNBI	50 mm Standard 9 pin	Ne	Quartz	15	12	
		5QNBI-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	15	12	
Boron	**B**	3QNYB-LC	37 mm low current	Ne	Quartz	15	8	249,8
		3QNYB	37 mm Standard	Ne	Quartz	15	12	
		3QNYB-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYB-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYB-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNB	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNB-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Cadmium	**Cd**	3QNYCD-LC	37 mm low current	Ne	Quartz	10	2	228,8
		3QNYCD	37 mm Standard	Ne	Quartz	8	6	
		3QNYCD-V	37 mm Varian Coded	Ne	Quartz	8	6	
		3QNYCD-U	37 mm Thermo Coded	Ne	Quartz	8	6	
		3QNYCD-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNCD	50 mm Standard 9 pin	Ne	Quartz	10	6	
		5QNCD-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	10	6	
Caesium	**Cs**	3BNXCS-LC	37 mm low current	Ne	Borosilicate	8	6	852,1
		3QNYCS	37 mm Standard	Ne	Borosilicate	10	8	
		3QNYCS-V	37 mm Varian Coded	Ne	Borosilicate	10	8	
		3QNYCS-U	37 mm Thermo Coded	Ne	Borosilicate	10	8	
		3QNYCS-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QNCS	50 mm Standard 9 pin	Ne	Quartz	10	8	
Calcium	**Ca**	3BNXCA-LC	37 mm low current	Ne	Borosilicate	10	3	422,7
		3QNYCA	37 mm Standard	Ne	Quartz	6	5	
		3QNYCA-V	37 mm Varian Coded	Ne	Quartz	6	5	
		3QNYCA-U	37 mm Thermo Coded	Ne	Quartz	6	5	
		3QNYCA-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNCA	50 mm Standard 9 pin	Ne	Quartz	10	8	
		5QNCA-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	10	8	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Cerium**	Ce	3QNYCE	37 mm Standard	Ne	Quartz	15	15	520,0
		3QNYCE-V	37 mm Varian Coded	Ne	Quartz	15	15	
		3QNYCE-U	37 mm Thermo Coded	Ne	Quartz	15	15	
		3QNYCE-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNCE	50 mm Standard 9 pin	Ne	Quartz	20	20	
Chromium	Cr	3BNXCR-LC	37 mm low current	Ne	Borosilicate	10	4	357,9
		3QNYCR	37 mm Standard	Ne	Quartz	12	10	
		3QNYCR-V	37 mm Varian Coded	Ne	Quartz	12	10	
		3QNYCR-U	37 mm Thermo Coded	Ne	Quartz	12	10	
		3QNYCR-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNCR	50 mm Standard 9 pin	Ne	Quartz	12	10	
		5QNCR-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	12	10	
Cobalt	Co	3QNYCO-LC	37 mm low current	Ne	Quartz	15	4	240,7
		3QNYCO	37 mm Standard	Ne	Quartz	15	12	
		3QNYCO-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYCO-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYCO-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNCO	50 mm Standard 9 pin	Ne	Quartz	40	30	
		5QNCO-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	40	30	
Copper	Cu	3QNYCU-LC	37 mm low current	Ne	Quartz	8	3	324,8
		3QNYCU	37 mm Standard	Ne	Quartz	5	4	
		3QNYCU-V	37 mm Varian Coded	Ne	Quartz	5	4	
		3QNYCU-U	37 mm Thermo Coded	Ne	Quartz	5	4	
		3QNYCU-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNCU	50 mm Standard 9 pin	Ne	Quartz	20	15	
		5QNCU-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	15	
Dysprosium	Dy	3BNXDY	37 mm Standard	Ne	Borosilicate	15	12	421,2
		3BNXDY-V	37 mm Varian Coded	Ne	Borosilicate	15	12	
		3BNXDY-U	37 mm Thermo Coded	Ne	Borosilicate	15	12	
		3BNXDY-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QNDY	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNDY-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Erbium	**Er**	3BNXER	37 mm Standard	Ne	Borosilicate	15	12	400,8
		3BNXER-V	37 mm Varian Coded	Ne	Borosilicate	15	12	
		3BNXER-U	37 mm Thermo Coded	Ne	Borosilicate	15	12	
		3BNXER-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QNER	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNER-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Europium	**Eu**	3BAXEU	37 mm Standard	Ar	Borosilicate	12	10	459,4
		3BAXEU-V	37 mm Varian Coded	Ar	Borosilicate	12	10	
		3BAXEU-U	37 mm Thermo Coded	Ar	Borosilicate	12	10	
		3BAXEU-Self Reversal	37 mm Self Reversal	Ar	Borosilicate			
		5QAEU	50 mm Standard 9 pin	Ar	Quartz	30	25	
		5QAEU-A	50 mm PE coded AAnalyst (Lumina)	Ar	Quartz	30	25	
Gadolinium	**Gd**	3QNYGD	37 mm Standard	Ne	Quartz	15	12	368,4
		3QNYGD-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYGD-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYGD-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNGD	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNGD-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Gallium	**Ga**	3QNYGA-LC	37 mm low current	Ne	Quartz	10	6	287,4
		3QNYGA	37 mm Standard	Ne	Quartz	15	12	
		3QNYGA-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYGA-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYGA-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNGA	50 mm Standard 9 pin	Ne	Quartz	20	15	
		5QNGA-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	15	
Germanium	**Ge**	3QNYGE-LC	37 mm low current	Ne	Quartz	10	6	265,2
		3QNYGE	37 mm Standard	Ne	Quartz	15	12	
		3QNYGE-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYGE-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYGE-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNGE	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNGE-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Gold	Au	3QNYAU-LC	37 mm low current	Ne	Quartz	8	4	242,8
		3QNYAU	37 mm Standard	Ne	Quartz	10	8	
		3QNYAU-V	37 mm Varian Coded	Ne	Quartz	10	8	
		3QNYAU-U	37 mm Thermo Coded	Ne	Quartz	10	8	
		3QNYAU-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNAU	50 mm Standard 9 pin	Ne	Quartz	20	10	
		5QNAU-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	10	
Hafnium	Hf	3QAYHF	37 mm Standard	Ar	Quartz	15	12	307,3
		3QAYHF-V	37 mm Varian Coded	Ar	Quartz	15	12	
		3QAYHF-U	37 mm Thermo Coded	Ar	Quartz	15	12	
		3QAYHF-Self Reversal	37 mm Self Reversal	Ar	Quartz			
		5QAHF	50 mm Standard 9 pin	Ar	Quartz	30	25	
		5QAHF-A	50 mm PE coded AAnalyst (Lumina)	Ar	Quartz	30	25	
Holmium	Ho	3BNXHO	37 mm Standard	Ne	Borosilicate	15	12	410,4
		3BNXHO-V	37 mm Varian Coded	Ne	Borosilicate	15	12	
		3BNXHO-U	37 mm Thermo Coded	Ne	Borosilicate	15	12	
		3BNXHO-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QNHO	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNHO-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Indium	In	3QNYIN-LC	37 mm low current	Ne	Quartz	10	5	303,9
		3QNYIN	37 mm Standard	Ne	Quartz	10	8	
		3QNYIN-V	37 mm Varian Coded	Ne	Quartz	10	8	
		3QNYIN-U	37 mm Thermo Coded	Ne	Quartz	10	8	
		3QNYIN-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNIN	50 mm Standard 9 pin	Ne	Quartz	25	20	
		5QNIN-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	25	20	
Iridium	Ir	3QNYIR-LC	37 mm low current	Ne	Quartz	15	8	208,9
		3QNYIR	37 mm Standard	Ne	Quartz	15	12	
		3QNYIR-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYIR-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYIR-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNIR	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNIR-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Iron	Fe	3QNYFE-LC	37 mm low current	Ne	Quartz	15	4	248,3
		3QNYFE	37 mm Standard	Ne	Quartz	15	1t2	
		3QNYFE-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYFE-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYFE-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNFE	50 mm Standard 9 pin	Ne	Quartz	30	30	
		5QNFE-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	30	
Lanthanum	La	3QAYLA-LC	37 mm low current	Ne	Quartz	10	6	550,1
		3QAYLA	37 mm Standard	Ne	Quartz	15	12	
		3QAYLA-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QAYLA-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QAYLA-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QALA	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QALA-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Lead	Pb	3QNYPB-LC	37 mm low current	Ne	Quartz	10	2	217,0
		3QNYPB	37 mm Standard	Ne	Quartz	10	8	
		3QNYPB-V	37 mm Varian Coded	Ne	Quartz	10	8	
		3QNYPB-U	37 mm Thermo Coded	Ne	Quartz	10	8	
		3QNYPB-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNPB	50 mm Standard 9 pin	Ne	Quartz	15	12	
		5QNPB-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	15	12	
Lithium	Li	3BAXLI-LC	37 mm low current	Ne	Borosilicate	10	2	670,8
		3BAXLI	37 mm Standard	Ne	Borosilicate	10	8	
		3BAXLI-V	37 mm Varian Coded	Ne	Borosilicate	10	8	
		3BAXLI-U	37 mm Thermo Coded	Ne	Borosilicate	10	8	
		3BAXLI-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QALI	50 mm Standard 9 pin	Ne	Quartz	20	15	
		5QALI-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	15	
Lutetium **	Lu	3QAYLU	37 mm Standard	Ar	Quartz	8	6	336,0
		3QAYLU-V	37 mm Varian Coded	Ar	Quartz	8	6	
		3QAYLU-U	37 mm Thermo Coded	Ar	Quartz	8	6	
		3QAYLU-Self Reversal	37 mm Self Reversal	Ar	Quartz			
		5QALU	50 mm Standard 9 pin	Ar	Quartz	20	15	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Magnesium	Mg	3QNYMG-LC	37 mm low current	Ne	Quartz	10	2	285,2
		3QNYMG	37 mm Standard	Ne	Quartz	6	5	
		3QNYMG-V	37 mm Varian Coded	Ne	Quartz	6	5	
		3QNYMG-U	37 mm Thermo Coded	Ne	Quartz	6	5	
		3QNYMG-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNMG	50 mm Standard 9 pin	Ne	Quartz	10	6	
		5QNMG-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	10	6	
Manganese	Mn	3QNYMN-LC	37 mm low current	Ne	Quartz	10	3	279,5
		3QNYMN	37 mm Standard	Ne	Quartz	12	10	
		3QNYMN-V	37 mm Varian Coded	Ne	Quartz	12	10	
		3QNYMN-U	37 mm Thermo Coded	Ne	Quartz	12	10	
		3QNYMN-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNMN	50 mm Standard 9 pin	Ne	Quartz	30	20	
		5QNMN-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	20	
Mercury	Hg	3QNXHG	37 mm low current	Ne	Quartz	10	3	253,6
		3QNYHG	37 mm Standard	Ne	Quartz	6	5	
		3QNYHG-V	37 mm Varian Coded	Ne	Quartz	6	5	
		3QNYHG-U	37 mm Thermo Coded	Ne	Quartz	6	5	
		3QNYHG-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNHG	50 mm Standard 9 pin	Ne	Quartz	8	6	
		5QNHG-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	8	6	
Molybdenum	Mo	3QNYMO-LC	37 mm low current	Ne	Quartz	10	6	313,3
		3QNYMO	37 mm Standard	Ne	Quartz	15	12	
		3QNYMO-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYMO-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYMO-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNMO	50 mm Standard 9 pin	Ne	Quartz	40	30	
		5QNMO-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	40	30	
Neodymium	Nd	3BAXND-LC	37 mm low current	Ne	Borosilicate	10	8	492,5
		3BAXND	37 mm Standard	Ne	Borosilicate	15	12	
		3BAXND-V	37 mm Varian Coded	Ne	Borosilicate	15	12	
		3BAXND-U	37 mm Thermo Coded	Ne	Borosilicate	15	12	
		3BAXND-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QAND	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QAND-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Nickel	**Ni**	3QNYNI-LC	37 mm low current	Ne	Quartz	10	4	232,0
		3QNYNI	37 mm Standard	Ne	Quartz	15	12	
		3QNYNI-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYNI-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYNI-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNNI	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNNI-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Niobium	**Nb**	3QAYNB	37 mm Standard	Ar	Quartz	15	12	334,4
		3QAYNB-V	37 mm Varian Coded	Ar	Quartz	15	12	
		3QAYNB-U	37 mm Thermo Coded	Ar	Quartz	15	12	
		3QAYNB-Self Reversal	37 mm Self Reversal	Ar	Quartz			
		5QANB	50 mm Standard 9 pin	Ar	Quartz	40	40	
		5QANB-A	50 mm PE coded AAnalyst (Lumina)	Ar	Quartz	40	40	
Osmium **	**Os**	3QNYOS	37 mm Standard	Ne	Quartz	10	8	290,9
		3QNYOS-V	37 mm Varian Coded	Ne	Quartz	10	8	
		3QNYOS-U	37 mm Thermo Coded	Ne	Quartz	10	8	
		3QNYOS-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNOS	50 mm Standard 9 pin	Ne	Quartz	10	8	
Palladium	**Pd**	3QNYPD-LC	37 mm low current	Ne	Quartz	10	6	247,6
		3QNYPD	37 mm Standard	Ne	Quartz	15	12	
		3QNYPD-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYPD-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYPD-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNPD	50 mm Standard 9 pin	Ne	Quartz	25	20	
		5QNPD-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	25	20	
Phosphorous	**P**	3QNYP-LC	37 mm low current	Ne	Quartz	15	6	213,6
		3QNYP	37 mm Standard	Ne	Quartz	10	8	
		3QNYP-V	37 mm Varian Coded	Ne	Quartz	10	8	
		3QNYP-U	37 mm Thermo Coded	Ne	Quartz	10	8	
		3QNYP-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNP	50 mm Standard 9 pin	Ne	Quartz	25	20	
		5QNP-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	25	20	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Platinum	**Pt**	3QNYPT-LC	37 mm low current	Ne	Quartz	10	5	265,9
		3QNYPT	37 mm Standard	Ne	Quartz	15	12	
		3QNYPT-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYPT-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYPT-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNPT	50 mm Standard 9 pin	Ne	Quartz	25	20	
		5QNPT-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	25	20	
Potassium	**K**	3BNXK-LC	37 mm low current	Ne	Borosilicate	8	2	766,5
		3BNXK	37 mm Standard	Ne	Borosilicate	8	6	
		3BNXK-V	37 mm Varian Coded	Ne	Borosilicate	8	6	
		3BNXK-U	37 mm Thermo Coded	Ne	Borosilicate	8	6	
		3BNXK-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QNK	50 mm Standard 9 pin	Ne	Quartz	12	10	
		5QNK-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	12	10	
Praseodymium	**Pr**	3BNXPR-LC	37 mm Standard	Ne	Borosilicate	15	12	495,1
		3BNXPR-V	37 mm Varian Coded	Ne	Borosilicate	15	12	
		3BNXPR-P	37 mm Thermo Coded	Ne	Borosilicate	15	12	
		3BNXPR-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QNPR	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNPR-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Rhenium	**Re**	3QAYRE	37 mm Standard	Ar	Quartz	15	12	346,1
		3QAYRE-V	37 mm Varian Coded	Ar	Quartz	15	12	
		3QAYRE-U	37 mm Thermo Coded	Ar	Quartz	15	12	
		3QAYRE-Self Reversal	37 mm Self Reversal	Ar	Quartz			
		5QARE	50 mm Standard 9 pin	Ar	Quartz	30	25	
		5QARE-A	50 mm PE coded AAnalyst (Lumina)	Ar	Quartz	30	25	
Rhodium	**Rh**	3QAYRH-LC	37 mm low current	Ne	Quartz	6	6	343,5
		3QAYRH	37 mm Standard	Ar	Quartz	15	12	
		3QAYRH-V	37 mm Varian Coded	Ar	Quartz	15	12	
		3QAYRH-U	37 mm Thermo Coded	Ar	Quartz	15	12	
		3QAYRH-Self Reversal	37 mm Self Reversal	Ar	Quartz			
		5QARH	50 mm Standard 9 pin	Ar	Quartz	30	25	
		5QARH-A	50 mm PE coded AAnalyst (Lumina)	Ar	Quartz	30	25	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Rubidium **	**Rb**	3BNXRB-LC	37 mm low current	Ne	Borosilicate	6	4	780,0
		3BNXRB	37 mm Standard	Ne	Borosilicate	10	8	
		3BNXRB-V	37 mm Varian Coded	Ne	Borosilicate	10	8	
		3BNXRB-U	37 mm Thermo Coded	Ne	Borosilicate	10	8	
		3BNXRB-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QNRB	50 mm Standard 9 pin	Ne	Quartz	10	8	
Ruthenium	**Ru**	3QAYRU-LC	37 mm low current	Ne	Quartz	8	5	349,9
		3QAYRU	37 mm Standard	Ne	Quartz	15	12	
		3QAYRU-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QAYRU-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QAYRU-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QARU	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QARU-V	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Samarium	**Sm**	3QNYSM	37 mm Standard	Ne	Quartz	15	12	429,7
		3QNYSM-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYSM-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYSM-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNSM	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNSM-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Scandium	**Sc**	3QNYSC	37 mm Standard	Ne	Quartz	15	12	391,2
		3QNYSC-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYSC-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYSC-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNSC	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNSC-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz			
Selenium	**Se**	3QNYSE-LC	37 mm low current	Ne	Quartz	10	5	196,0
		3QNYSE	37 mm Standard	Ne	Quartz	15	15	
		3QNYSE-V	37 mm Varian Coded	Ne	Quartz	15	15	
		3QNYSE-U	37 mm Thermo Coded	Ne	Quartz	15	15	
		3QNYSE-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNSE	50 mm Standard 9 pin	Ne	Quartz	15	15	
		5QNSE-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	15	15	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Silicon	Si	3QNYSI-LC	37 mm low current	Ne	Quartz	15	8	251,6
		3QNYSI	37 mm Standard	Ne	Quartz	15	12	
		3QNYSI-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYSI-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYSI-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNSI	50 mm Standard 9 pin	Ne	Quartz	40	35	
		5QNSI-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	40	35	
Silver	Ag	3QAYAG-LC	37 mm low current	Ne	Quartz	5	2	328,1
		3QAYAG	37 mm Standard	Ar	Quartz	4	3	
		3QAYAG-V	37 mm Varian Coded	Ar	Quartz	4	3	
		3QAYAG-U	37 mm Thermo Coded	Ar	Quartz	4	3	
		3QAYAG-Self Reversal	37 mm Self Reversal	Ar	Quartz			
		5QAAG	50 mm Standard 9 pin	Ar	Quartz	10	5	
		5QAAG-A	50 mm PE coded AAnalyst (Lumina)	Ar	Quartz	10	5	
Sodium	Na	3QNYNA	37 mm low current	Ne	Borosilicate	10	2	589,0
		3QNYNA	37 mm Standard	Ne	Quartz	8	6	
		3QNYNA-V	37 mm Varian Coded	Ne	Quartz	8	6	
		3QNYNA-U	37 mm Thermo Coded	Ne	Quartz	8	6	
		3QNYNA-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNNA	50 mm Standard 9 pin	Ne	Quartz	10	8	
		5QNNA-U	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	10	8	
Strontium	Sr	3BAXSR-LC	37 mm low current	Ne	Borosilicate	10	4	460,7
		3BAXSR	37 mm Standard	Ar	Borosilicate	12	12	
		3BAXSR-V	37 mm Varian Coded	Ar	Borosilicate	12	12	
		3BAXSR-U	37 mm Thermo Coded	Ar	Borosilicate	12	12	
		3BAXSR-Self Reversal	37 mm Self Reversal	Ar	Borosilicate			
		5QASR	50 mm Standard 9 pin	Ar	Borosilicate	20	15	
		5QASR-A	50 mm PE coded AAnalyst (Lumina)	Ar	Borosilicate	20	15	
Tantalum	Ta	3QNYTA-LC	37 mm low current	Ne	Quartz	15	8	271,5
		3QNYTA	37 mm Standard	Ne	Quartz	15	12	
		3QNYTA-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYTA-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYTA-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNTA	50 mm Standard 9 pin	Ne	Quartz	40	30	
		5QNTA-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	40	30	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Tellurium	**Te**	3QNYTE-LC	37 mm low current	Ne	Quartz	10	4	214,3
		3QNYTE	37 mm Standard	Ne	Quartz	15	15	
		3QNYTE-V	37 mm Varian Coded	Ne	Quartz	15	15	
		3QNYTE-U	37 mm Thermo Coded	Ne	Quartz	15	15	
		3QNYTE-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNTE	50 mm Standard 9 pin	Ne	Quartz	30	30	
		5QNTE-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	30	
Terbium	**Tb**	3BNXTB	37 mm Standard	Ne	Borosilicate	15	12	432,7
		3BNXTB-V	37 mm Varian Coded	Ne	Borosilicate	15	12	
		3BNXTB-U	37 mm Thermo Coded	Ne	Borosilicate	15	12	
		3BNXTB-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QNTB	50 mm Standard 9 pin	Ne	Borosilicate	30	25	
		5QNTB-U	50 mm PE coded AAnalyst (Lumina)	Ne	Borosilicate	30	25	
Thallium	**Tl**	3QNYTL-LC	37 mm low current	Ne	Quartz	10	3	276,8
		3QNYTL	37 mm Standard	Ne	Quartz	10	8	
		3QNYTL-V	37 mm Varian Coded	Ne	Quartz	10	8	
		3QNYTL-U	37 mm Thermo Coded	Ne	Quartz	10	8	
		3QNYTL-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNYTL	50 mm Standard 9 pin	Ne	Quartz	10	8	
		5QNYTL-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	10	8	
Thulium	**Tm**	3QNYTM	37 mm Standard	Ne	Quartz	15	12	371,8
		3QNYTM-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYTM-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYTM-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNTM	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNTM-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Tin	**Sn**	3QNYSN-LC	37 mm low current	Ne	Quartz	15	6	224,6
		3QNYSN	37 mm Standard	Ne	Quartz	15	12	
		3QNYSN-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYSN-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYSN-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNSN	50 mm Standard 9 pin	Ne	Quartz	30	30	
		5QNSN-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	30	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Titanium	Ti	3QNYTI-LC	37 mm low current	Ne	Quartz	8	6	365,4
		3QNYTI	37 mm Standard	Ne	Quartz	15	12	
		3QNYTI-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYTI-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYTI-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNTI	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNTI-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Tungsten	W	3QNYW-LC	37 mm low current	Ne	Quartz	15	8	255,1
		3QNYW	37 mm Standard	Ne	Quartz	15	12	
		3QNYW-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYW-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYW-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNW	50 mm Standard 9 pin	Ne	Quartz	40	30	
		5QNW-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	40	30	
Vanadium	V	3QNYV-LC	37 mm low current	Ne	Quartz	8	6	318,5
		3QNYV	37 mm Standard	Ne	Quartz	15	12	
		3QNYV-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYV-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYV-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNV	50 mm Standard 9 pin	Ne	Quartz	40	30	
		5QNV-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	40	30	
Ytterbium	Yb	3QNYYB	37 mm Standard	Ne	Quartz	15	12	398,8
		3QNYYB-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYYB-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYYB-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNYB	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNYB-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	

Single Elements

Element	Symbol	Lamp Type	Version	Gas	Window	Max Current	Rec Current	W/Length Principle
Yttrium	**Y**	3QNYY	37 mm Standard	Ne	Borosilicate	15	12	410,2
		3QNYY-V	37 mm Varian Coded	Ne	Borosilicate	15	12	
		3QNYY-U	37 mm Thermo Coded	Ne	Borosilicate	15	12	
		3QNYY-Self Reversal	37 mm Self Reversal	Ne	Borosilicate			
		5QNY	50 mm Standard 9 pin	Ne	Quartz	30	25	
		5QNY-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25	
Zinc	**Zn**	3QNYZN-LC	37 mm low current	Ne	Quartz	8	3	213,9
		3QNYZN	37 mm Standard	Ne	Quartz	10	8	
		3QNYZN-V	37 mm Varian Coded	Ne	Quartz	10	8	
		3QNYZN-U	37 mm Thermo Coded	Ne	Quartz	10	8	
		3QNYZN-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNZN	50 mm Standard 9 pin	Ne	Quartz	20	15	
		5QNZN-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	15	
Zirconium	**Zr**	3QNYZR-LC	37 mm low current	Ne	Quartz	10	8	360,1
		3QNYZR	37 mm Standard	Ne	Quartz	15	12	
		3QNYZR-V	37 mm Varian Coded	Ne	Quartz	15	12	
		3QNYZR-U	37 mm Thermo Coded	Ne	Quartz	15	12	
		3QNYZR-Self Reversal	37 mm Self Reversal	Ne	Quartz			
		5QNZR	50 mm Standard 9 pin	Ne	Quartz	40	30	
		5QNZR-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	40	30	
Deuterium	**D2**	3QDYD2	37 mm Standard, Kontinuum (180-380nm)	D2	Quartz	25		Continuum
		3QDYD2-U	37 mm Thermo Coded	D2	Quartz	25		
		3QDYD2-V	37 mm Varian Coded	D2	Quartz	25		

Hollow Cathode Lamps
Multi Elements

Two Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Aluminium Al	**Ca**	3QNYALCA	37 mm Standard	Ne	Quartz	10	8
		5QNALCA	50 mm Standard 9 pin	Ne	Quartz	20	15
	Mg	3QNYALMG	37 mm Standard	Ne	Quartz	10	8
		3QNYALMG-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNALMG	50 mm Standard 9 pin	Ne	Quartz	20	15
	Si	3QNYALSI	37 mm Standard	Ne	Quartz	15	12
		3QNYALSI-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNALSI	50 mm Standard 9 pin	Ne	Quartz	20	16
	Ti	3QNYALTI	37 mm Standard	Ne	Quartz	15	12
		3QNYALTI-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNALTI	50 mm Standard 9 pin	Ne	Quartz	20	16
Barium Ba	**Sr**	3QNYBASR	37 mm Standard	Ne	Quartz	15	12
		3QNYBASR-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNBASR	50 mm Standard 9 pin	Ne	Quartz	15	12
Cadmium Cd	**Zn**	3QNYCDZN	37 mm Standard	Ne	Quartz	8	6
		3QNYCDZN-U	37 mm Thermo Coded	Ne	Quartz	8	6
		5QNCDZN	50 mm Standard 9 pin	Ne	Quartz	8	6
Calcium Ca	**Ba**	3QNYCABA	37 mm Standard	Ne	Quartz	15	12
		3QNYCABA-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNBACA	50 mm Standard 9 pin	Ne	Quartz	15	12
	Mg	3QNYCAMG	37 mm Standard	Ne	Quartz	6	5
		3QNYCAMG-U	37 mm Thermo Coded	Ne	Quartz	6	5
		3QNYCAMG-V	37 mm Varian Coded	Ne	Quartz	6	5
		5QNCAMG	50 mm Standard 9 pin	Ne	Quartz	20	15
		5QNCAMG-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	15
	Si	3QNYCASI	37 mm Standard	Ne	Quartz	15	12
		3QNYCASI-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNCASI	50 mm Standard 9 pin	Ne	Quartz	20	15
	Sr	3QNYCASR	37 mm Standard	Ne	Quartz	15	12
		3QNYCASR-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNCASR	50 mm Standard 9 pin	Ne	Quartz	15	12
	Zn	3QNYCAZN	37 mm Standard	Ne	Quartz	10	8
		3QNYCAZN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCAZN	50 mm Standard 9 pin	Ne	Quartz	20	15
		5QNCAZN-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	15

Two Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Chromium Cr	Co	3QNYCRCO	37 mm Standard	Ne	Quartz	10	8
		5QNCRCO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu	3QNYCRCU	37 mm Standard	Ne	Quartz	10	8
		3QNYCRCU-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCRCU	50 mm Standard 9 pin	Ne	Quartz	30	25
	Fe	3QNYCRFE	37 mm Standard	Ne	Quartz	10	8
		5QNCRFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mn	3QNYCRMN	37 mm Standard	Ne	Quartz	10	8
		3QNYCRMN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCRMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mo	3QNYCRMO	37 mm Standard	Ne	Quartz	15	12
		3QNYCRMO-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNCRMO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Ni	3QNYCRNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCRNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCRNI	50 mm Standard 9 pin	Ne	Quartz	30	25
Cobalt Co	Cu	3QNYCOCU	37 mm Standard	Ne	Quartz	10	8
		3QNYCOCU-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCOCU	50 mm Standard 9 pin	Ne	Quartz	30	25
	Fe	3QNYCOFE	37 mm Standard	Ne	Quartz	10	8
		3QNYCOFE-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCOFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mn	3QNYCOMN	37 mm Standard	Ne	Quartz	10	8
		3QNYCOMN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCOMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mo	3QNYCOMO	37 mm Standard	Ne	Quartz	10	8
		3QNYCOMO-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCOMO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Ni	3QNYCONI	37 mm Standard	Ne	Quartz	10	8
		3QNYCONI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCONI	50 mm Standard 9 pin	Ne	Quartz	30	25

Two Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Copper Cu	**Fe**	3QNYCUFE	37 mm Standard	Ne	Quartz	10	8
		3QNYCUFE-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCUFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mn	3QNYCUMN	37 mm Standard	Ne	Quartz	10	8
		3QNYCUMN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCUMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mo	3QNYCUMO	37 mm Standard	Ne	Quartz	10	8
		5QNCUMO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Ni	3QNYCUNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCUNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCUNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Zn	3QNYCUZN	37 mm Standard	Ne	Quartz	10	8
		3QNYCUZN-V	37 mm Varian Coded	Ne	Quartz	10	8
		3QNYCUZN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCUZN	50 mm Standard 9 pin	Ne	Quartz	20	15
Gold Au	**Cu**	3QNYAUCU	37 mm Standard	Ne	Quartz	10	8
		3QNYAUCU-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNAUCU	50 mm Standard 9 pin	Ne	Quartz	15	12
	Ni	3QNYAUNI	37 mm Standard	Ne	Quartz	10	8
		3QNYAUNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNAUNI	50 mm Standard 9 pin	Ne	Quartz	15	12
	Pt	3QNYAUPT	37 mm Standard	Ne	Quartz	10	8
		3QNYAUPT-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNAUPT	50 mm Standard 9 pin	Ne	Quartz	15	12
	Ag	3QNYAUAG	37 mm Standard	Ne	Quartz	10	8
		3QNYAUAG-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNAUAG	50 mm Standard 9 pin	Ne	Quartz	20	15
		5QNAUAG-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	15
Iron Fe	**Mn**	3QNYFEMN	37 mm Standard	Ne	Quartz	10	8
		3QNYFEMN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNFEMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mo	3QNYFEMO	37 mm Standard	Ne	Quartz	10	8
		5QNFEMO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Ni	3QNYFENI	37 mm Standard	Ne	Quartz	10	8
		3QNYFENI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNFENI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Zn	3QNYFEZN	37 mm Standard	Ne	Quartz	10	8
		3QNYFEZN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNFEZN	50 mm Standard 9 pin	Ne	Quartz	20	15

Two Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Magnesium Mg	Si	3QNYMGSI	37 mm Standard	Ne	Quartz	15	12
		3QNYMGSI-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNMGSI	50 mm Standard 9 pin	Ne	Quartz	20	15
	Zn	3QNYMGZN	37 mm Standard	Ne	Quartz	15	12
		5QNMGZN	50 mm Standard 9 pin	Ne	Quartz	20	15
Manganese Mn	Mo	3QNYMNMO	37 mm Standard	Ne	Quartz	10	8
		5QNMNMO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Ni	3QNYMNNI	37 mm Standard	Ne	Quartz	10	8
		3QNYMNNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Zn	3QNYMNZN	37 mm Standard	Ne	Quartz	10	8
		3QNYMNZN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNMNZN	50 mm Standard 9 pin	Ne	Quartz	20	15
Platinum Pt	Ag	3QNYPTAG	37 mm Standard	Ne	Quartz	10	8
		3QNYPTAG-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNPTAG	50 mm Standard 9 pin	Ne	Quartz	15	12
Silicon Si	Ti	3QNYSITI	37 mm Standard	Ne	Quartz	15	12
		3QNYSITI-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNSITI	50 mm Standard 9 pin	Ne	Quartz	20	16
Silver Ag	Cr	3QNYAGCR	37 mm Standard	Ne	Quartz	10	8
		3QNYAGCR-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNAGCR	50 mm Standard 9 pin	Ne	Quartz	20	16
	Cu	3QNYAGCU	37 mm Standard	Ne	Quartz	10	8
		3QNYAGCU-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNAGCU	50 mm Standard 9 pin	Ne	Quartz	25	16
	Cd	3QNYAGCD	37 mm Standard	Ne	Quartz	10	8
Sodium Na	K	3QNXNAK	37 mm Standard	Ne	Quartz	8	6
		3QNXNAK-U	37 mm Thermo Coded	Ne	Quartz	8	6
		3QNXNAK-V	37 mm Varian Coded	Ne	Quartz	8	6
		5QNNAK	50 mm Standard 9 pin	Ne	Quartz	12	10
		5QNNAK-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	12	10

Three Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Aluminium Al	Ca+Mg	3QNYALCAMG	37 mm Standard	Ne	Quartz	10	8
		5QNALCAMG	50 mm Standard 9 pin	Ne	Quartz	20	15
		5QNALCAMG-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	15
	Si+Ti	3QNYALSITI	37 mm Standard	Ne	Quartz	15	12
		3QNYALSITI-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNALSITI	50 mm Standard 9 pin	Ne	Quartz	20	16
Antimony Sb	As+Bi	3QNYSBASBI	37 mm Standard	Ne	Quartz	15	12
		5QNSBASBI	50 mm Standard 9 pin	Ne	Quartz	20	16
Calcium Ca	Ba+Sr	3QNYCABASR	37 mm Standard	Ne	Quartz	15	12
		3QNYCABASR-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNCABASR	50 mm Standard 9 pin	Ne	Quartz	20	15
	Mg+Si	3QNYCAMGSI	37 mm Standard	Ne	Quartz	15	12
		3QNYCAMGSI-U	37 mm Thermo Coded	Ne	Quartz	15	12
		5QNCAMGSI	50 mm Standard 9 pin	Ne	Quartz	20	15
	Mg+Zn	3QNYCAMGZN	37 mm Standard	Ne	Quartz	10	8
		5QNCAMGZN	50 mm Standard 9 pin	Ne	Quartz	20	20
		5QNCAMGZN-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	20
Chromium Cr	Cu+Co	3QNYCRCUCO	37 mm Standard	Ne	Quartz	10	8
		5QNCRCUCO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Fe	3QNYCRCOFE	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Mn	3QNYCRCOMN	37 mm Standard	Ne	Quartz	10	8
	Co+Ni	3QNYCRCONI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCONI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Fe	3QNYCRCUFE	37 mm Standard	Ne	Quartz	10	8
		5QNCRCUFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Mn	3QNYCRCUMN	37 mm Standard	Ne	Quartz	10	8
		5QNCRCUMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Ni	3QNYCRCUNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCRCUNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCRCUNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Fe+Mn	3QNYCRFEMN	37 mm Standard	Ne	Quartz	10	8
		5QNCRFEMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Fe+Ni	3QNYCRFENI	37 mm Standard	Ne	Quartz	10	8
		5QNCRFENI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mn+Ni	3QNYCRMNNI	37 mm Standard	Ne	Quartz	10	8

Three Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Gold Au	**Cu+Ni**	3QNYAUCUNI	37 mm Standard	Ne	Quartz	10	8
		3QNYAUCUNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNAUCUNI	50 mm Standard 9 pin	Ne	Quartz	15	12
	Pt+Ag	3QNYAUPTAG	37 mm Standard	Ne	Quartz	10	8
		3QNYAUPTAG-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNAUPTAG	50 mm Standard 9 pin	Ne	Quartz	15	12
Cobalt Co	**Cu+Fe**	3QNYCOCUFE	37 mm Standard	Ne	Quartz	10	8
		3QNYCOCUFE-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCOCUFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Mn	3QNYCOCUMN	37 mm Standard	Ne	Quartz	10	8
		5QNCOCUMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mn+Ni	3QNYCOMNNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCOMNNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCOMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
Copper Cu	**Fe+Mn**	3QNYCUFEMN	37 mm Standard	Ne	Quartz	10	8
		3QNYCUFEMN-U	37 mm Thermo Coded	Ne	Quartz	10	8
	Fe+Mo	3QNYCUFEMO	37 mm Standard	Ne	Quartz	10	8
		5QNCUFEMO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Fe+Ni	3QNYCUFENI	37 mm Standard	Ne	Quartz	10	8
		5QNCUFENI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Fe+Zn	3QNYCUFEZN	37 mm Standard	Ne	Quartz	10	8
		3QNYCUFEZN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCUFEZN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mn+Ni	3QNYCUMNNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCUMNNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCUMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mn+Zn	3QNYCUMNZN	37 mm Standard	Ne	Quartz	10	8
		3QNYCUMNZN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCUMNZN	50 mm Standard 9 pin	Ne	Quartz	20	15
Iron Fe	**Mn+Ni**	3QNYFEMNNI	37 mm Standard	Ne	Quartz	10	8
		3QNYFEMNNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNFEMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Mn+Zn	3QNYFEMNZN	37 mm Standard	Ne	Quartz	10	8
		3QNYFEMNZN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNFEMNZN	50 mm Standard 9 pin	Ne	Quartz	20	15

Three Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Molybdenum Mo	Cr+Co	3QNYMOCRCO	37 mm Standard	Ne	Quartz	10	8
		5QNMOCRCO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cr+Cu	3QNYMOCRCU	37 mm Standard	Ne	Quartz	10	8
		5QNMOCRCU	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cr+Fe	3QNYMOCRFE	37 mm Standard	Ne	Quartz	10	8
		5QNMOCRFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cr+Mn	3QNYMOCRMN	37 mm Standard	Ne	Quartz	10	8
		5QNMOCRMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Cu	3QNYMOCOCU	37 mm Standard	Ne	Quartz	10	8
		5QNMOCOCU	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Mn	3QNYMOCOMN	37 mm Standard	Ne	Quartz	10	8
		5QNMOCOMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Fe	3QNYMOCOFE	37 mm Standard	Ne	Quartz	10	8
		5QNMOCOFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Fe	3QNYMOCUFE	37 mm Standard	Ne	Quartz	10	8
		5QNMOCUFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Mn	3QNYMOCUMN	37 mm Standard	Ne	Quartz	10	8
		5QNMOCUMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Fe+Mn	3QNYMOCUMN	37 mm Standard	Ne	Quartz	10	8
		5QNMOCUMN	50 mm Standard 9 pin	Ne	Quartz	30	25
Silver Ag	Cr+Cu	3QNYAGCRCU	37 mm Standard	Ne	Quartz	10	8
		3QNYAGCRCU-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNAGCRCU	50 mm Standard 9 pin	Ne	Quartz	25	20
	Cu+Ni	3QNYAGCUNI	37 mm Standard	Ne	Quartz	10	8
		5QNAGCUNI	50 mm Standard 9 pin	Ne	Quartz	25	20

Four Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Aluminium Al	Ca+Fe+Mg	3QNYALCAFEMG	37 mm Standard	Ne	Quartz	15	12
		5QNALCAFEMG	50 mm Standard 9 pin	Ne	Quartz	20	16
	Ca+Li+Mg	3QNYALCALIMG	37 mm Standard	Ne	Quartz	10	8
		5QNALCALIMG	50 mm Standard 9 pin	Ne	Quartz	20	16
	Ca+Fe+Ti	5QNALCAFETI	50 mm Standard 9 pin	Ne	Quartz	20	16
Barium Ba	Ca+Mg+Sr	3QNYBACAMGSR	37 mm Standard	Ne	Quartz	15	12
		5QNBACAMGSR	50 mm Standard 9 pin	Ne	Quartz	20	15

Four Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
ChromiumCr	**Co+Cu+Fe**	3QNYCRCOCUFE	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOCUFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Cu+Mn	3QNYCRCOCUMN	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOCUMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Cu+Ni	3QNYCRCOCUNI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOCUNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Fe+Mn	3QNYCRCOFEMN	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOFEMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Fe+Ni	3QNYCRCOFENI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOFENI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Mn+Ni	3QNYCRCOMNNI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Fe+Mn	3QNYCRCUFEMN	37 mm Standard	Ne	Quartz	10	8
		5QNCRCUFEMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Fe+Ni	3QNYCRCUFENI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCUFENI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Mn+Ni	3QNYCRCUMNNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCRCUMNNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCRCUMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Ni+Ag	3QNYCRCUNIAG	37 mm Standard	Ne	Quartz	10	8
		5QNCRCUNIAG	50 mm Standard 9 pin	Ne	Quartz	20	16
		5QNCRCUNIAG-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	16
	Fe+Mn+Ni	3QNYCRFEMNNI	37 mm Standard	Ne	Quartz	10	8
		5QNCRFEMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
Cobalt Co	**Cu+Fe+Mn**	3QNYCOCUFEMN	37 mm Standard	Ne	Quartz	10	8
		3QNYCOCUFEMN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCOCUFEMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Fe+Ni	3QNYCOCUFENI	37 mm Standard	Ne	Quartz	10	8
		5QNCOCUFENI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Mn+Ni	3QNYCOCUMNNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCOCUMNNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCOCUMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Fe+Mn+Ni	3QNYCOFEMNNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCOFEMNNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCOFEMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25

Four Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Copper Cu	**Fe+Mn+Ni**	3QNYCUFEMNNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCUFEMNNI-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCUFEMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Fe+Mn+Zn	3QNYCUFEMNZN	37 mm Standard	Ne	Quartz	10	8
		3QNYCUFEMNZN-U	37 mm Thermo Coded	Ne	Quartz	10	8
		5QNCUFEMNZN	50 mm Standard 9 pin	Ne	Quartz	20	15
		5QNCUFEMNZN-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	15
	Fe+Ni+Ag	3QNYCUFENIAG	37 mm Standard	Ne	Quartz	10	8
		5QNCUFENIAG	50 mm Standard 9 pin	Ne	Quartz	20	16
Molybdenum Mo	**Co+Cu+Fe**	3QNYMOCOCUFE	37 mm Standard	Ne	Quartz	10	8
		5QNMOCOCUFE	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Cu+Mn	3QNYMOCOCUMN	37 mm Standard	Ne	Quartz	10	8
		5QNMOCOCUMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Fe+Mn	3QNYMOCOFEMN	37 mm Standard	Ne	Quartz	10	8
		5QNMOCOFEMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Fe+Mn	3QNYMOCUFEMN	37 mm Standard	Ne	Quartz	10	8
		5QNMOCUFEMN	50 mm Standard 9 pin	Ne	Quartz	30	25

Five Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Chromium Cr	**Co+Cu+Fe+Mn**	3QNYCRCOCUFEMN	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOCUFEMN	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Cu+Fe+Ni	3QNYCRCOCUFENI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOCUFENI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Cu+Mn+Ni	3QNYCRCOCUMNNI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOCUMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
		5QNCRCOCUMNNI-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25
	Co+Fe+Mn+Ni	3QNYCRCOFEMNNI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOFEMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Fe+Mn+Ni	3QNYCRCUFEMNNI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCUFEMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
	Cu+Fe+Ni+Ag	3QNYCRCUFEAGNI	37 mm Standard	Ne	Quartz	10	8
		5QNCRCUFEAGNI	50 mm Standard 9 pin	Ne	Quartz	20	16
		5QNCRCUFEAGNI-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	20	16

Five Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Cobalt Co	**Cu+Fe+Mn+Mo**	3QNYCOCUFEMNMO	37 mm Standard	Ne	Quartz	10	8
		5QNCOCUFEMNMO	50 mm Standard 9 pin	Ne	Quartz	30	25
		5QNCOCUFEMNMO-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25
	Cu+Fe+Mn+Ni	3QNYCOCUFEMNNI	37 mm Standard	Ne	Quartz	10	8
		5QNCOCUFEMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25

Six Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Chromium Cr	**Co+Cu+Fe+Mn+Mo**	3QNYCRCOCUFEMNMO	37 mm Standard	Ne	Quartz	10	8
		5QNCRCOCUFEMNMO	50 mm Standard 9 pin	Ne	Quartz	30	25
	Co+Cu+Fe+Mn+Ni	3QNYCRCOCUFEMNNI	37 mm Standard	Ne	Quartz	10	8
		3QNYCRCOCUFEMNNI-V	37 mm Varian Coded	Ne	Quartz	10	8
		5QNCRCOCUFEMNNI	50 mm Standard 9 pin	Ne	Quartz	30	25
		5QNCRCOCUFEMNNI-A	50 mm Perkin Elmer AAnalyst (Lumina)	Ne	Quartz	30	25

Seven Elements

Element	Additional Element	Lamp Type	Version	Gas	Window	Max Current	Rec Current
Aluminium Al	**Ca+Cu+Fe+Mg+Si+Zn**	3QNYALCACUFEMGSIZN	37 mm Standard	Ne	Quartz	15	15
		5QNALCACUFEMGSIZN	50 mm Standard 9 pin	Ne	Quartz	30	25
		5QNALCACUFEMGSIZN-A	50 mm PE coded AAnalyst (Lumina)	Ne	Quartz	30	25

Heraeus Hollow Cathode Lamps

The right element for sensitive metals analysis

Group / Period	Ia	IIa	IIIb	IVb	Vb	VIb	VIIb	VIII	
1	1.008 Hydrogen **H**								
2	6.940 Lithium **Li** 670.8 323.3 10 (10)	9.012 Beryllium **Be** 234.9 – 15 (15)							
3	22.990 Sodium **Na** 589.0 330.3 8 (8)	24.305 Magnesium **Mg** 285.2 202.6 4 (6)							
4	39.098 Potassium **K** 766.5 404.4 8 (8)	40.080 Calcium **Ca** 422.7 – 6 (6)	44.956 Scandium **Sc** 391.2 408.2 15 (25)	47.900 Titanium **Ti** 364.3 399.0 15 (30)	50.942 Vanadium **V** 318.4 385.5 15 (30)	51.996 Chromium **Cr** 357.9 429.0 12 (12)	54.938 Manganese **Mn** 279.5 403.1 12 (20)	55.847 Iron **Fe** 248.3 372.0 15 (30)	58.933 Cobalt **Co** 240.7 304.4 15 (30)
5	85.468 Rubidium **Rb** 780.0 794.8 10 (10)	87.620 Strontium **Sr** 460.7 – 12 (12)	88.906 Yttrium **Y** 410.2 362.1 15 (25)	91.220 Zirconium **Zr** 360.1 351.9 15 (30)	92.906 Niobium **Nb** 334.4 358.0 15 (30)	95.940 Molybdenum **Mo** 313.3 390.3 15 (30)	98.906 Technetium **Tc**	101.070 Ruthenium **Ru** 349.9 392.5 15 (20)	102.906 Rhodium **Rh** 343.5 365.8 15 (15)
6	132.905 Caesium **Cs** 852.1 455.5 10 (10)	137.330 Barium **Ba** 553.6 350.1 15 (25)	138.906 Lanthanum **La** 550.1 418.7 15 (25)	178.490 Hafnium **Hf** 307.3 298.8 15 (25)	180.948 Tantalum **Ta** 271.5 277.6 15 (30)	183.850 Tungsten **W** 255.1 400.9 15 (30)	186.207 Rhenium **Re** 346.0 345.2 15 (25)	190.200 Osmium **Os** 290.9 301.8 10 (10)	192.220 Iridium **Ir** 208.9 264.0 15 (20)
7	223 Francium **Fr**	226.025 Radium **Ra**	227 Actinium **Ac**	260 Rutherfordium **Rf**	Hahnium **Ha**				

Element
Element Symbol
Alternative Wavelength nm
Maximum current mA for 37 mm lamps

24.305 Atomic Weight
Magnesium
Mg
285.2 Recommended Wavelength nm
202.6
4 (6) Maximum DC current mA for 50 mm Perkin Elmer lamps*

* In the case of Perkin Elmer instruments, if the AAS displays modulated current rather than Continuous current then the lamp should be operated at approximately half the quoted maximum lamp current.

Lanthanides	140.120 Cerium **Ce** 520.0 569.7 15 (20)	140.908 Praseodymium **Pr** 495.1 492.5 15 (25)	144.240 Neodymium **Nd** 492.5 490.2 15 (25)	145 Promethium **Pm**	150.400 Samarium **Sm** 429.5 476.0 15 (25)	151.960 Europium **Eu** 459.4 333.4 12 (20)	157.250 Gadolinium **Gd** 368.4 419.1 15 (25)	158.925 Terbium **Tb** 432.7 431.9 15 (25)	
Actinides	232.038 Thorium **Th** 371.9 – 15 (25)	231.036 Protactinium **Pa**	238.029 Uranium **U** 358.5 351.5 15 (25)	237.048 Neptunium **Np**	244 Plutonium **Pu**	243 Americium **Am**	247 Curium **Cm**	247 Berkelium **Bk**	

	Ib	IIb	IIIa	IVa	Va	VIa	VIIa	0
								4.002 Helium **He**
			10.810 Boron **B** 249.8 – 15 (25)	12.011 Carbon **C**	14.007 Nitrogen **N**	15.100 Oxygen **O**	18.998 Fluorine **F**	20.179 Neon **Ne**
			26.982 Aluminium **Al** 309.3 394.4 10 (20)	28.086 Silicon **Si** 251.6 350.7 15 (25)	30.974 Phosphorus **P** 213.6 – 10 (10)	32.060 Sulphur **S**	35.453 Chlorine **Cl**	39.948 Argon **Ar**
58.710 Nickel **Ni** 232.0 305.1 15 (30)	63.546 Copper **Cu** 324.8 327.4 5 (10)	65.380 Zinc **Zn** 213.9 307.6 10 (10)	69.735 Gallium **Ga** 287.4 403.3 15 (15)	72.590 Germanium **Ge** 265.2 269.1 15 (20)	74.992 Arsenic **As** 193.7 197.2 12 (15)	78.960 Selenium **Se** 196.0 204.0 15 (15)	79.904 Bromine **Br**	83.800 Krypton **Kr**
106.400 Palladium **Pd** 244.8 / 247.6 340.5 15 (20)	107.868 Silver **Ag** 328.1 338.3 4 (5)	112.410 Cadmium **Cd** 228.8 326.1 8 (8)	114.820 Indium **In** 303.9 451.1 5 (10)	118.690 Tin **Sn** 224.6 / 233.4 300.9 12 (12)	121.750 Antimony **Sb** 206.8 / 217.6 231.1 12 (25)	127.600 Tellurium **Te** 214.3 225.9 6 (15)	126.905 Iodine **I**	131.300 Xenon **Xe**
195.090 Platinum **Pt** 265.9 299.8 15 (20)	196.997 Gold **Au** 242.8 267.6 10 (10)	200.590 Mercury **Hg** 253.6 – 6 (6)	204.370 Thallium **Tl** 276.8 377.6 10 (10)	207.200 Lead **Pb** 217.0 / 283.3 283.3 10 (15)	208.980 Bismuth **Bi** 223.1 306.8 12 (12)	209 Polonium **Po**	210 Astatine **At**	222 Radon **Rn**

Hollow Cathode lamps of these elements are available from Heraeus

162.500 Dysprosium **Dy** 421.2 416.8 15 (25)	164.930 Holmium **Ho** 410.4 417.3 15 (25)	167.260 Erbium **Er** 400.8 408.8 15 (25)	168.934 Thulium **Tm** 371.8 375.2 15 (25)	173.040 Ytterbium **Yb** 398.8 264.4 15 (25)	174.967 Lutetium **Lu** 336.0 337.7 8 (20)
251 Californium **Cf**	254 Einsteinium **Es**	257 Fermium **Fm**	258 Mendelevium **Md**	259 Nobelium **No**	260 Lawrencium **Lr**

The Heraeus hollow cathode lamp product range comprises 70 single-element lamps and more than 120 multi-element lamps of the most varied designs to cover almost all appliances.

Use our replacement lamp search engine at **www.heraeus-noblelight.com/en/_technik/hclampfinder.aspx** to find the right hollow-cathode lamp for your appliance.

Safety information: Hollow cathode lamps used in normal atomic absorption applications and to instrument manufacturers' specification provide very little risk, however the lamps are under reduced pressure, can emit UV light and may contain toxic metals. For this reason each lamp has a safety label. These labels are attached to the lamp and contain each hazard associated with that particular lamp. Each user should carry out specific risk assessment before use in accordance with their national safety law.

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