Q-POD® Element Unit

Ultrapure water for trace elemental analysis

Main Features & Benefits

- The Q-POD® Element unit provides ultrapure water with extremely low levels of elemental contamination (single ppt or sub-ppt level).

- Water quality and reproducibility have been validated by independent laboratories specialized in ultra trace elemental analysis (experimental reports available on request).

- A footswitch allows water delivery, reducing the risks of external contamination, as scientists do not need to remove their hands from a laminar flow hood.

- Water delivery is provided at a flow rate adapted to the user's needs (up to 1.5 L/min). This eliminates the need of water storage and the associated contamination risks.

- There are no metallic parts in the system delivering water in the laminar flow hood.

- The unit's volumetric water delivery function is easily accessible and adapted to regular laboratory plasticware.

- Essential water quality information is clearly visible from a color backlit display – audible alarm available if required.

- Easy and infrequent maintenance (twice a year).

- The Q-POD® Element unit is an accessory adapted to the Milli-Q® Advantage and Milli-Q® Integral systems. There is no need to buy a specific system to move from the sub ppb to the ppt and sub-ppt detection level.

ULTRAPURE WATER FOR TRACE ELEMENT ANALYSIS

Recent advancements in measuring techniques and detection technologies have dramatically improved the sensitivity of modern analytical instrumentation. Trace elements can now be measured at ppt and sub-ppt levels using techniques such as ICP-MS.

These low detection levels allow new applications, such as elemental fingerprinting, to be employed in such diverse fields as forensic science, the food and beverage industry and astrogeology.
Low detection levels mean that special care must be taken with the instrumentation, operators, laboratory environment and any sample containers used—all of which can impact experimental results.

This is equally true for ultrapure water used in the analytical process. Due to the dissolution and dilution processes required in sample preparation, high-purity water typically constitutes over 90 % of a sample analyzed by these sensitive techniques. High-purity water is also used for cleaning sample containers, washing plastics and preparing blanks and standard solutions.
Laboratories performing trace analysis must have a reliable source of ultrapure water with consistently low elemental concentrations.

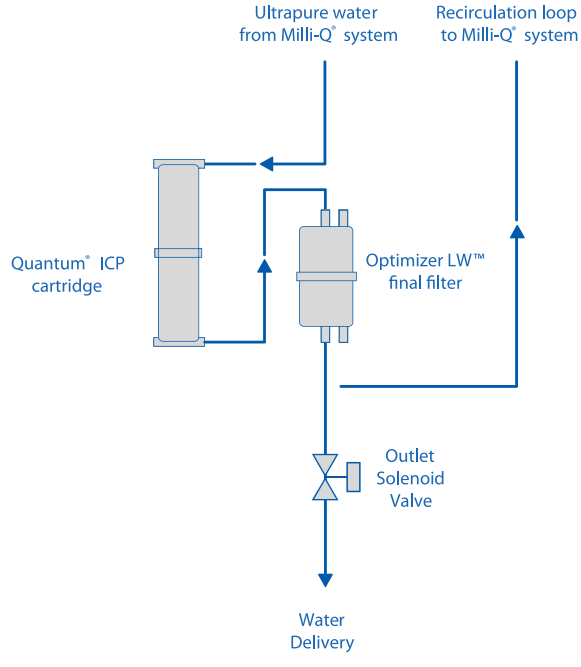
The Q-POD® Element unit was specifically designed to achieve this purpose when combined with a Milli-Q® Integral or Milli-Q® Advantage ultrapure water purification system. The Q-POD® Element unit's design was developed by scientists conversant with trace analysis methods such as IC, ICP-MS and GF-AAS.1 below. There was no peak higher than 0.006AU at 210nm and no peak higher than 0.002AU at 254 nm.

Q-POD® Element Unit

Reliable, efficient and economic delivery of ultrapure water suitable for elemental analysis—in the quantities you need.
The Q-POD® Element unit employs ultra-clean materials and a succession of optimized water purification technologies to produce 18.2 MΩ.cm resistivity ultrapure water (at 25 °C), ideal for trace analysis methods. Foot-pedal activation is included to allow hands-free delivery in a clean area, which eliminates the need to touch the unit, and thus further reduces the possibility of contamination.
A built-in display provides information on all water purification system key parameters.

Q-POD® Flow Schematics

In the Q-POD® Element unit, water enters the base of the Q-POD® unit, then flows through the Quantum ICP cartridge and the Optimizer LW final filter. If the outlet solenoid valve is closed, water leaves the Q-POD® base and is recirculated to the Milli-Q® water purification system.



Q-POD® Element Design

All materials used for the production of the Q-POD® Element unit were selected and evaluated to minimize the risks of elemental contamination. Special care was taken for the materials in contact with water such as the ion-exchange resin and outlet O-ring of the Quantum® ICP cartridge, the Optimizer LW end filter and the outlet solenoid valve, where water is in contact only with PVDF and perfluoro rubber.

Q-POD® Element Validation

In order to verify the quality of water provided by the Q-POD® Element unit, analytical tests were performed in independent laboratories.

In one laboratory, the tests were performed in parallel, using the new Q-POD® Element unit and the Milli-Q® Element system formerly available from Merck Millipore. These tests certified that the new design delivers water quality that is equal to or superior to that of the former design, meaning that results formerly obtained with the previous Milli-Q® Element system can be transposed to the new Q-POD® Element unit.

The results presented in Table 1 are excerpts from this report (the full text of the report, including the description of experimental protocols, is available on request).

Element	Symbol	Isotope	Q-POD® Element BEC (ppt or ng/l) (*)
Aluminium	Al	27	1.473
Antimony	Sb	121	0.136
Arsenic	As	75	0.078
Barium	Br	138	0.043
Beryllium	Be	9	0.367
Bismuth	Bi	209	0.009
Cadmium	Cd	114	0.011
Calcium	Ca	40	0.581
Cerium	Ce	140	0.005
Cesium	Cs	133	0.003
Chromium	Cr	52	0.330
Cobalt	Co	59	0.054
Copper	Cu	63	0.745
Gallium	Ga	71	0.008
Germanium	Ge	74	1.162
Gold	Au	197	0.013
Iridium	Ir	193	0.121
Iron	Fe	56	0.843
Lead	Pb	208	0.183
Lithium	Li	7	1.230
Magnesium	Mg	24	0.406
Mercury	Hg	202	0.067
Molybdenum	Mo	98	0.346
Nickel	Ni	60	0.109
Niobium	Nb	93	0.016
Platinum	Pt	195	0.116
Potassium (**)	K	39	14.496
Rhenium	Re	187	0.669
Rubidium	Rb	85	0.012
Ruthenium	Ru	102	0.105
Scandium	Sc	45	1.153
Selenium	Se	82	0.980
Silver	Ag	109	0.869
Sodium(**)	Na	23	3.770
Tantalum	Ta	181	0.322
Thallium	Tl	205	0.596
Tin	Sn	120	0.929
Tungsten	W	186	0.016
Uranium	U	238	0.014
Vanadium	V	51	0.068
Zinc	Zn	66	0.192

Values obtained on Perkin Elmer® Elan 6100 DRC (Dynamic Reaction Cell).

(*) BEC in ppt or ng/L obtained using Q-POD® Element unit fed with water produced by a Milli-Q® Integral system.

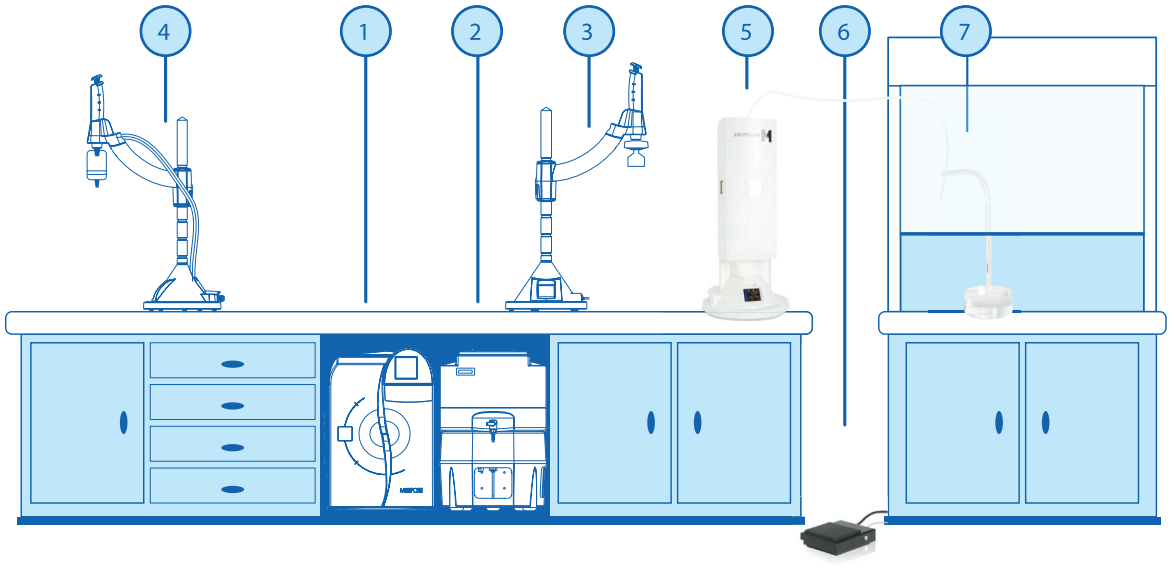
BEC (Background Equivalent Concentration) is calculated as : BEC = Intensity corrected by the background / calibration slope Calibration slope (obtained from the analysis of 10 standards from 10 ng/L to 500 ng/L (intensity is background corrected)).

The background was obtained from signal acquisition without any nebulisation of the solution The obtained limit is an absolute limit: the BEC.

(**) For potassium and sodium lower BEC values are obtained with more suitable analytical conditions (such as trace ion chromatography).

Q-POD® Element Installation

The drawing below shows a typical Milli-Q® Integral water purification system installation with a Q-POD® Element unit



1. Milli-Q® Integral water purification system purifies tap water to pure (Type II) and ultrapure (Type I) water. Designed for bench integration to save laboratory space; patented Merck Millipore Elix® technology minimizes operating costs.

2. Polyethylene reservoir with vent filter combining several air purification technologies provides the best conditions for storage of pure (Type II) water and minimizes contamination risks.

3. E-POD® unit for delivery of pure water from the reservoir at a high flow rate (up to 2 L/min), with automatic volume dispense when required—ideal for filling large vessels such as carboys.

4. Q-POD® unit for delivery of ultrapure (Type I) water for critical applications such as HPLC, UPLC or cell culture. A range of poin-tof-use purifiers is available to match the requirements of specific applications. The Q-POD® design is adapted for automatic filling of all glassware typically used in a laboratory.

5. Q-POD® Element unit for the production of ultrapure water suitable for ultra trace elemental analysis (ppt and sub-ppt detection limits).

6. Footswitch for hands-free delivery of water suitable for ultra trace elemental analysis (spares the user from removing hands from the laminar flow hood environment).

7. Delivery of ultrapure water for trace elemental analysis (Plexiglas® support and high-grade validated polyethylene tubing).

Installation Specifications	
System dimensions (H x W x D)	527 x 148 x 231 mm
	20.75 x 5.83 x 9.09 inches
System operating weight	8.8 kg
	19.40 lb

The systems and accessories shown in this illustration are available independently.

Q-POD® Element Ordering Information

Description	Catalogue Number
Q-POD® Element unit, including the Q-POD® unit, polysulfone POD cover to protect the base from projection of strong acids, footswitch with a 5 m cable and Plexiglas tubing support.	ZMQSP0DE1
Quantum® ICP cartridge for removal of ultra trace ionic contamination	QTUM00ICP
Optimizer LW 0.1 µm polyethylene final filter built to semi-conductor industry standards	MPPVICPK1

Lit. No. DS1069EN00