



Water analysis  
spectrophotometers

### More Focus • More Knowledge • More Choice

Spectronic Unicam is a company dedicated to the manufacture, sale and support of Visible and UV-Visible spectrophotometers. Formed from the integration of two long established spectroscopy companies, Spectronic Unicam's unique focus gives customers access to premium quality technical support and knowledgeable applications advice. More focus means we also provide a greater choice of customer driven products and accessories. By choosing Spectronic Unicam our customers will have chosen a spectrophotometer that exactly matches their requirements.



The apparatus described in this document has been designed as far as possible to meet high international safety standards when installed and operated in accordance with accepted procedure and with the safety precautions detailed in the User Manual. We reserve the right to alter the specification of the equipment described in the document without prior notice.

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AccuVac is a registered trademark of the Hach Company.

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FM 41499  
ISO9001



0521

Calibration  
No. 0521.  
Accreditation  
applies to  
wavelength and  
Absorbance  
filters.

Our quality management system is registered to the ISO9001 standard.

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Contact Spectronic Unicam (Europe, Middle East and Africa)

A Thermo Electron Company



i m p r o v e y o u r w o r k f l o w



## The versatile water analysis spectrophotometer you can trust

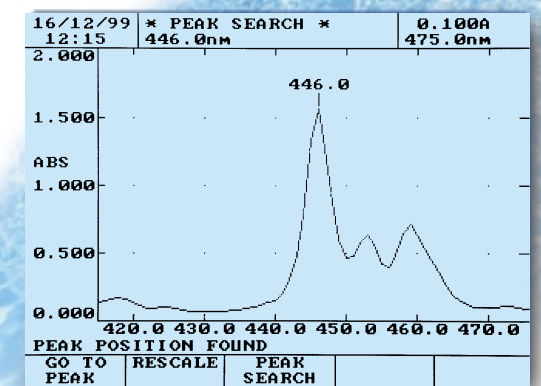
- Optical performance previously unheard of in a water analysis spectrophotometer
- Ready, out of the box, to run test kits from all the leading manufacturers
- Simple operation for non-scientific users
- Versatile functionality for experienced scientists
- Unique calibration validation tools verify instrument performance

Today's industry has to satisfy increasing environmental legislation and regulation, but control costs in the face of global competition. That's why we've made AquaMate powerful enough to handle all your water analyses, yet simple enough to be used by non-scientific users. Whether you are optimising your cost of analysis using test kits, searching for unknowns or troubleshooting a problem, you can trust AquaMate to provide the most versatile, cost-effective solution.

### The heart of the system

AquaMate is available in two versions, both with a class leading, high-resolution 2nm bandwidth monochromator. A Visible version provides a wavelength range of 325-1100nm while the extended 190-1100nm range of the UV-Visible version provides additional flexibility to analyse detergents and screen for organics.

AquaMate provides optical performance previously unheard of in a water analysis spectrophotometer. The 2nm bandwidth optical system means AquaMate has the analyte selectivity and sensitivity to handle a wide range of environmental applications other than just water analysis using test kits. For example, AquaMate is probably the only water analysis spectrophotometer capable of retrieving useful information from the sharp peaks found in chlorophyll spectra or from organic contaminants that absorb in the ultraviolet region of the spectrum. Superb linearity, stability and signal-to-noise ratio also means you can trust AquaMate to take stable measurements from highly absorbing or light scattering samples.



# m o r e c h o i c e

Choose kits from suppliers who offer **you** the best combination of speed, sensitivity, selectivity and cost for **your** type of analysis



AquaMate is ready, out of the box, to use test kits from all the leading manufacturers, so there is no need to change the way you work when you replace your existing photometer or spectrophotometer. AquaMate is pre-programmed with the most common tests, for example, Nitrate, Phosphate and Chloride. It is also supplied with floppy disks containing more than 300 methods and calibrations from all the leading test kit manufacturers. Many of these are equivalent to DIN, ISO and APHA.AWWA.WPCF methods. AquaMate's built-in disk drive makes it easy to load these methods and calibrations into AquaMate's non-volatile memory. You can load methods and calibrations from one kit manufacturer or from several kit manufacturers to make sure you get the best combination of speed, sensitivity, selectivity and low cost of analysis. AquaMate is supplied with detailed instructions for all these methods so you can be operational immediately.

## Stay current

The combination of built-in disk drive and intelligent programming allows you to keep your AquaMate current with the very latest kit technologies and chemistries. There are no more lengthy delays waiting for your instrument supplier to provide you with the latest calibrations. We can send you the latest calibrations on disk, via e-mail or you can enter the calibrations yourself. The floppy disk drive can also be used to archive your results or transfer them to a PC for further processing or statistical analysis.





h i g h s a m p l e

t h r o u g h p u t

Sample throughput is made fast and easy using the low price MiniSipper and built-in printer options

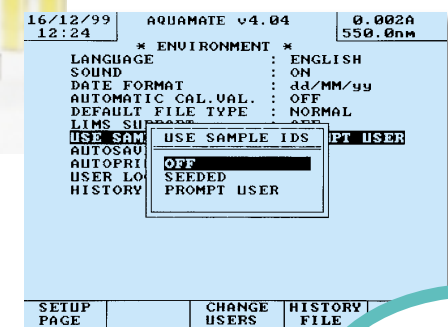


As part of the standard package AquaMate is supplied with sample accessories to accommodate tubes, vials, ampules, 1" square cells and cuvettes of 1-50mm pathlength.

Optional sample handling accessories provide even more flexibility and productivity. Long pathlength cuvette holders up to 100mm deal with low analyte concentrations and small sample volumes can be measured with the 50uL cuvette option. A low price, 7-position automatic carousel allows you to automate the generation of calibration curves. The MiniSipper is ideal when you want to quickly process large batches of samples. This peristaltic pump based sample introduction system is available with 1mm, 10mm, 20mm and 40mm glass or quartz flowcells. The MiniSipper improves productivity by processing up to 300 samples per hour.

### It's so simple

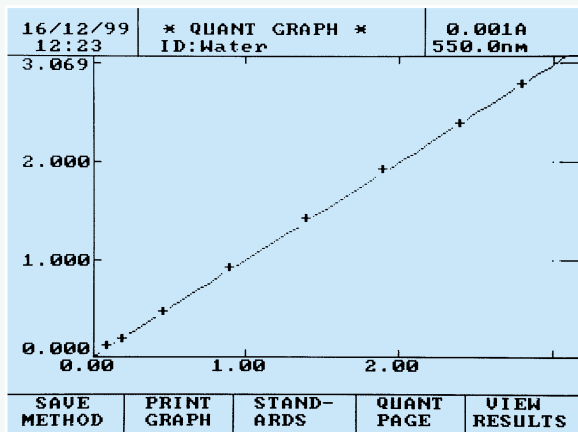
We've made working with AquaMate simple because we know that is what your operators will demand and expect. They will simply select a method or calibration from a list on the graphical display, put a cuvette, tube, vial, cell or ampule in the sample compartment holder, enter an alphanumeric sample ID and press run. The sample results and calibration curve will be displayed graphically and, if selected, automatically printed and archived to disk.



# c o n t r o l l e d f u n c t i o n a l i t y

16/12/99 12:26		0.002A 550.0nm	
* CURRENT USERS *			
NAME	PASSWORD	PRIVILEGES E C F I H L	
ADMIN	ADMIN	✓	✓
LORD	ANALYSIS	✓	✓
GRONKIEWICZ	SCIENCE	✓	✓
MORENO	CHEMISTRY	✓	✓
-----	-----	-----	-----
-----	-----	-----	-----
-----	-----	-----	-----
-----	-----	-----	-----
E=EDIT METHODS	H=HISTORY FILE		
C=CALIBRATIONS	L=RESET LIFETIMES		
F=DELETE FILES			
I=INITIALISATIONS			
CANCEL	ACCEPT	USERS	
		11-20	

Log on...



...run/load a calibration ...

16/12/99 12:28		AQUAMATE v4.04		0.001A 530.0nm	
* DISK *					
TYPE	ID	FILENAME			
M FIXED	HACH C1 F	1480(F)	.FXD		
M FIXED	HACH C1 T	1480(T)	.FXD		
M FIXED	HACH C1 FHR	1470(F)	.FXD		
M FIXED	HACH C1 THR	1470(T)	.FXD		
M FIXED	H C102 HR	1500	.FXD		
M FIXED	H C102 MR	1510	.FXD		
M FIXED	H C102 HR	1520	.FXD		
M FIXED	HACH Cr3+	1550	.FXD		
M FIXED	H COLOR	1670	.FXD		
M FIXED	H COLOR	1680	.FXD		
M FIXED	HACH Ni AC	2350	.FXD		
M FIXED	H N NITRATE	2500	.FXD		
M FIXED	H O DISS LR	2650	.FXD		
94% DISK SPACE REMAINING					
HIGHLIGHT A FILE AND PRESS ENTER					
COPY ALL	PRINT DIR	FORMAT DISK	READ DISK	VIEW LIBRARY	

choose a method...

16/12/99 12:21		* FIXED RESULTS *		0.001A 220.0nm	
2	Boiler Feed				
	ABS		ABS		
	λ1: 3.376		λ2: 0.659		
	CONC220=17.2160 mg/L		PASS		
	CONC275=3.3624 mg/L		PASS		
LIMS EXPORT	PRINT LIST	SAVE DATA	FIXED PAGE	CLEAR RESULTS	

...display, print and save results

In multi-user environments or those with non-scientific operators you can control operator access to your AquaMate. In this mode authorised operators are required to log on and enter a password, which assigns them privileges based on their job function and experience.

For example, you can prevent operators editing methods, calibrations, QC pass-fail limits and calculations etc. These may be privileges you want to reserve for senior operators or the system administrator only. You may also decide that fundamental instrument parameters such as re-setting instrument lamp hours are the privilege of the administrator only.

If you want to set up your own methods or modify your test kit supplier's calibration you'll find AquaMate has all the functionality you'll ever need.

You can run calibrations using up to 20 standards, each with 3 replicates and choose from 4 curve fits. You can also program up to 20 different wavelengths. Built-in procedural timers allow you to control events, such as the time required for the sample color to develop. You can enter QC limits that generate an on-screen and hard copy PASS or FAIL. You can apply calculations to your raw data to change the reported units or correct for different sample weights, volumes or dilutions.

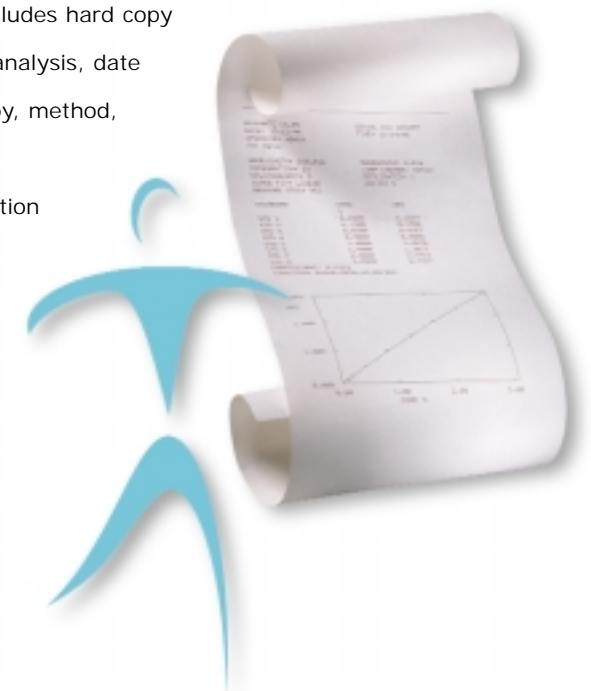
If you don't know the analyte wavelength AquaMate will find it for you and show the peak profile and peak wavelength on the graphical display.

## Reporting results

AquaMate provides a comprehensive choice of print options to satisfy regulatory requirements for detailed hard copy results. An optional, built in 110mm (4 3/8") graphics printer is ideal for environments with limited space or where transportability is required.

AquaMate also has built-in drivers for LaserJet, DeskJet and dot matrix printers for environments that require a full size hard copy, colour hard copy or where you wish to utilise an existing printer.

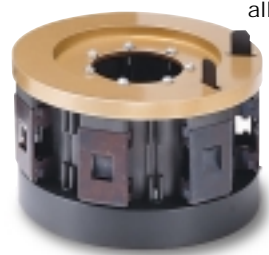
The hard copy report is the same regardless of print option. It includes hard copy of date and time of analysis, date and time of hard copy, method, operator and sample identification, calibration curve, instrument parameters, software version and serial number. Plus the results!



# performance

## Performance verification

Test kit manufacturers go to great lengths to validate the ruggedness and reliability of their kit chemistries and methodologies but only Spectronic Unicam pay the same degree of attention to the validation and calibration of the spectrophotometer. AquaMate's unique Calibration Validation Carousel (CVC) verifies



all aspects of spectrophotometer

performance as shown in the

table on the right. The CVC

automatically runs these

tests and generates a hard

copy report and disk based

electronic archive. The tests run unattended

so your operators won't view calibration

validation as a chore and it frees them up to

perform other duties. Validating other

spectrophotometers requires a skilled

scientist, but with the CVC anyone can

generate consistent, error free proof of

spectrophotometer performance.

The wavelength and Absorbance filters in the

CVC are secondary reference materials traceable

to NPL or NIST primary reference materials.

The traceability path is preserved through an

accredited ISO/IEC Guide 25 calibration

process allowing AquaMate to pass the most

detailed internal or regulatory body audit.

## CVC TEST RESULTS

WAVELENGTH ACCURACY				
ACTUAL	MEASURED	RESULT	TOLERANCE	DIFFERENCE
279.5 nm	278.6 nm	PASS	1.3 nm	-0.9 nm
361.1 nm	361.0 nm	PASS	1.3 nm	-0.1 nm
453.7 nm	453.0 nm	PASS	1.3 nm	-0.7 nm
656.1 nm	656.0 nm	PASS	1.0 nm	-0.1 nm

ABSORBANCE ACCURACY				
ACTUAL	MEASURED	RESULT	TOLERANCE	DIFFERENCE
0.9470 A	0.9461 A	PASS	0.0070 A	-0.0009 A

UV ABSORBANCE ACCURACY				
ACTUAL	MEASURED	RESULT	TOLERANCE	DIFFERENCE
0.8043 A	0.8073 A	PASS	0.0200 A	0.0030 A
0.9256 A	0.9202 A	PASS	0.0250 A	-0.0054 A
0.3314 A	0.3360 A	PASS	0.0250 A	0.0046 A
0.6921 A	0.6897 A	PASS	0.0250 A	-0.0024 A

STRAY LIGHT				
WAVELENGTH	STRAY LIGHT	RESULT	SPECIFICATION	DIFFERENCE
220.0 nm	3.7932 A	PASS	3.3 A	0.4932 A
340.0 nm	3.3979 A	PASS	3.3 A	0.0979 A

BANDWIDTH				
SPECIFICATION	BANDWIDTH	RESULT	DIFFERENCE	
< 2.2 nm	2.0 nm	PASS	-0.2 nm	

NOISE				
ABS	NOISE PK-PK	RESULT	SPECIFICATION	DIFFERENCE
0.0 A	0.0001 A	PASS	0.0001 A	0.0000 A
1.0 A	0.0002 A	PASS	0.0030 A	0.0028 A

DRIFT				
WAVELENGTH	MEASURED	RESULT	SPECIFICATION	DIFFERENCE
500.0 nm	0.0010 A/HR	PASS	0.0010 A/HR	0.0000 A/HR

## Sharing our expertise

Calibration and validation is an increasingly important requirement for many laboratories, factories and institutions. That's why we've also taken the filters from the CVC and turned them into boxed sets of filters. They can be used to validate the calibration of any well-designed spectrophotometer, so even your existing spectrophotometers can benefit from Spectronic Unicam's calibration expertise.

## Technical specifications

### Optical system

Single beam with high energy 2nm bandwidth monochromator and Quartz coated optics

### Wavelength range

190-1100nm or 325-1100nm

### Bandwidth

2nm

### Stray light

<0.05% @ 220nm and 340nm

### Absorbance accuracy @ 1A

+/- 0.005A

### Absorbance repeatability @ 1A

+/- 0.002A

### Wavelength accuracy

1nm

### Wavelength repeatability

+/- 0.2nm

### Stability

<0.002A/hr

### Noise

<0.0001A

### Display

1/4 VGA Graphics LCD

### Computer interface

RS232C

### Printer interface

Centronics parallel

### Method & data storage

Up to 30 methods, calibrations or results files in non-volatile memory. Plus, built-in industry standard 1.44Mb disk drive for unlimited method, calibration and results storage. Each disk stores up to 200 methods/calibrations etc. Also used for electronic archiving, transfer of results to a PC and for upgrading instrument applications software

### Sample handling accessories supplied with AquaMate

Combination test tube/cuvette holder: accommodates tubes up to 125mm high (4<sup>7</sup>/<sub>8</sub>" ) and 18mm diameter (1<sup>1</sup>/<sub>6</sub>" ) and 10mm pathlength glass or quartz cuvettes. Variable pathlength cell holder: accommodates glass or quartz cuvettes from 1-50mm pathlength. Cell holder for Hach 1" square cells and AccuVac® ampules

### Optional accessories

Built-in 110mm (4<sup>3</sup>/<sub>8</sub>" ) wide, 60 character graphics printer (factory fit only). MiniSipper automated sample introduction system. 7 position, thermostat ready, automatic carousel. Sample holders for 100mm pathlength rectangular and cylindrical cuvettes. Calibration Validation Carousel (CVC)

### Main software functionality

Peak search capability. Simple λ: Absorbance, %T or Conc Factor. Multi λ: up to 20 wavelengths. Serial λ: up to 9 wavelengths. Quantitation: 1-20 standards with 1-3 replicates; 4 curve fits and display of calibration equation and coefficient; ability to re-measure or delete standards. User log-on: ability to set privileges for multiple users. Sample identification: 11 character alphanumeric sample i.d. via user prompt or incremental seeding. Printers: software selection of InkJet, LaserJet, dot matrix and built-in printers. Timers: 4 user selectable procedural timers. Auto-print and Auto-save results. History file: online, lifetime user maintenance and service maintenance log. Menu selection of English, French, German, Spanish and Italian languages

### On-board calculator

Applies 1 to 4 equations to each sample measurement. Each equation supports up to 20 typed characters and 9 operands comprising + - x / ( ) functions and incorporating Absorbance values at multiple wavelengths, fixed or variable factors/constants and PASS/FAIL criteria

### Water analysis methods

Supplied with over 300 methods on 3 floppy disks. Methods can be run from disk or selected methods loaded into non-volatile memory

### Dimensions

455 x 395 x 215mm; (18 x 15.5 x 8.5")

### Mass (Weight)

10Kg (22lbs) excluding accessories

### Electrical requirements

100-240V 50/60Hz

## Ordering information

### 9423 AQA 2500E

AquaMate Visible spectrophotometer

### 9423 AQA 2700E

AquaMate (with built-in printer) Visible spectrophotometer

### 9423 AQA 2000E

AquaMate UV-Visible spectrophotometer

### 9423 AQA 2200E

AquaMate (with built-in printer) UV-Visible spectrophotometer

### 9423 UV6 4270E

MiniSipper including tubing kit

### 9423 UV6 4280E

Spare tubing kit for MiniSipper

### 9423 UV5 3400E

7 cell carousel for AquaMate

### 9423 UV6 1400E

CVC for AquaMate (NPL)

### 9423 UV6 1460E

CVC for AquaMate (NIST)

### 4401 161 00391

Paper for built-in printer on Aquamate (1 roll)

### 9423 168 14601

10mm compact UV Silica flow cell for MiniSipper

### 9423 168 14591

Compact glass 10mm flowcell for MiniSipper

### 9423 168 14351

10mm std UV Silica flow cell for MiniSipper

### 9423 168 11301

10mm Glass stoppered cell

### 9423 168 11321

10mm UV Silica stoppered cell

### 9423 UV5 1240E

100mm pathlength rectangular cell holder

### 9423 UV5 1210E

100mm pathlength cylindrical cell holder

### 4013 172 82111

9W-9W AquaMate to PC cable

### 4013 172 59551

Parallel printer cable

### 9423 UV9 0002E

Spare D2 lamp for AquaMate UV-Vis

### 9423 UV9 0004E

Spare Tungsten lamp for AquaMate