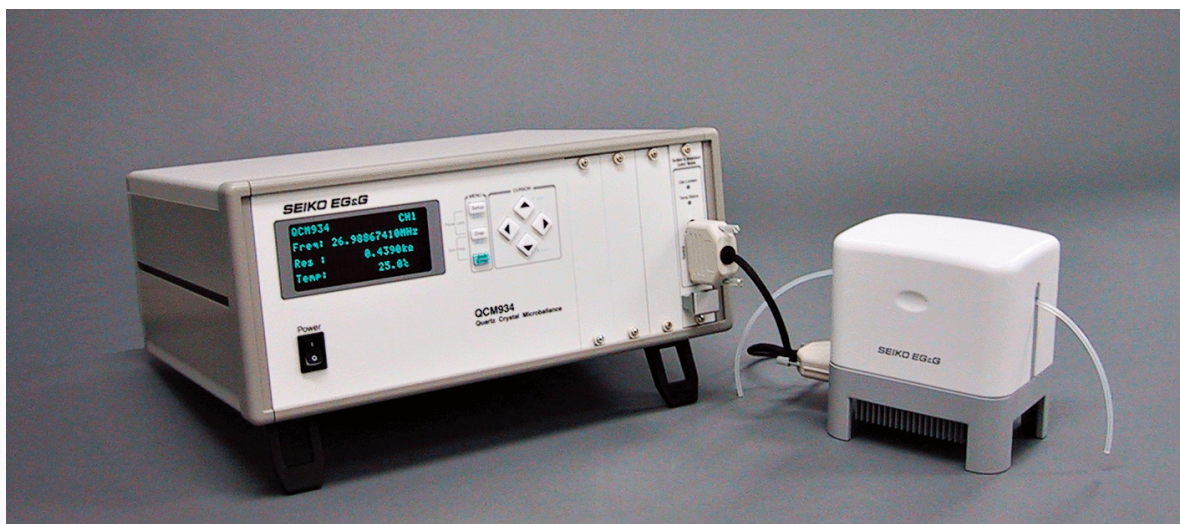


QCM934

Quartz Crystal Resonator Biosensing System



The QCM934 is a Quartz Crystal Microbalance that measures a minute mass change on the surface of a quartz crystal resonator as a resonance frequency change. Sensitivity is higher than traditional QCM devices and it is more suitable for use in the bio-sensing field.

- Excellent sensitivity and resolution
- Specially designed oscillation circuit for added stability
- Simultaneous measurement of resonance frequency, resonance resistance, and temperature
- Expandable up to 4 channels
- Meets various measurement needs
- Works with flow cells, well cells, and dip cells
- Computer control and data collection via USB interface

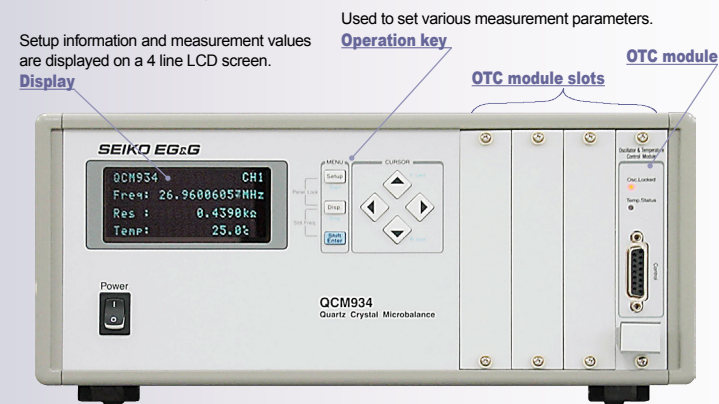
QCM934

Quartz Crystal Microbalance Main Unit

QCM934-000

The front panel is equipped with an LCD screen that displays measurement values. The operation key is used to access a setup menu that allows the user to configure the system independent of the control software.

Up to 4 OTC modules with oscillation and temperature control can be installed in the unit and computer control and data collection is provided via a USB interface connector on the rear panel.



Expandable up to 4 channels with simultaneous measurement capability

It is possible to expand up to 4 channels by inserting each OTC module in a slot and connecting to the QCM934-500 with the cable provided. An independent measurement is made simultaneously in each channel.

Sensitive, High Resolution Measurement

By using the third overtone of 9 MHz crystal, sensitivity is increased by a factor of 3 and an excellent resolution of 0.01 Hz is achieved. The QCM934 is more sensitive than past versions and thus is more suitable for biosensing applications.

Simultaneous Measurement of Resonance Frequency, Resonance Resistance and Temperature

Mass change is obtained from the measurement of the resonance frequency and the material viscosity change is obtained from the measurement of the resonance resistance. A very accurate mass measurement is made by determining resonance resistance, resonance frequency and temperature simultaneously. Also, a viscoelasticity measurement can be made from just the measurement of the resonance frequency and the resonance resistance.

USB Control

QCM934 can be easily connected to a personal computer via the rear panel USB connector.

Cells

<Cells for Biosensing>

These cells are installed in the QCM934-500.

A sample solution can be injected or sucked by combining the pump or the syringe. Moreover, it is also possible to connect it with the QCM934-300.

Flow Cell [QCM934-510]

A sample solution is poured into the cell (capacity 90 μ l). Because the structure is very simple, detaching from the measurement chamber and the exchange of quartz crystal resonator are easy.

Micro Flow Cell Holder [QCM934-600]

Micro Flow Cell (with Au electrode) [QCM934-610]

The QCM934-610 is installed in the QCM934-600, and a sample solution is poured into the reactive cell part (capacity approx. 1 μ l).

Because the quartz crystal resonator is built into the QCM934-610, the time of the exchange can be saved.

The reactive cell part of the QCM934-610 can be observed from the window of the holder.



<Cells of QA-CL Series>

These cells install the quartz crystal resonator, and are used in conjunction with the QCM934-300.

There are a cell of an excellent fluoroplastics material in chemical resistance and a cell that can transparently confirm the sample.

Dip Cell [QA-CL3]

The cell is immersed in a sample solution.

Well Cell [QA-CL4]

The cell is filled with a sample solution (750 μ l or less).

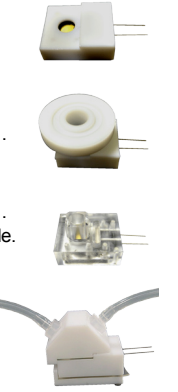
Well Cell [QA-CL5]

The cell is filled with a sample solution (250 μ l or less). The sample solution can be confirmed from the outside.

Flow Cell [QA-CL6/CL7]

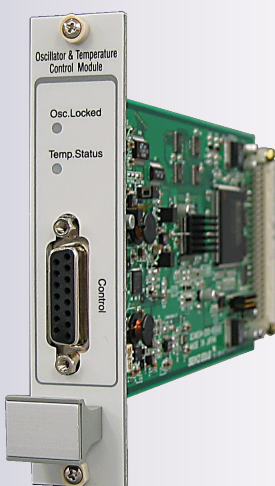
A sample solution is poured into the cell (capacity 90 μ l).

QA-CL7 is transparent in this type.



Oscillator & Temperature Control Module

QCM934-200



QCM934-200 is a module board with a built-in oscillation and temperature controller.

The OTC module is installed in a slot of the main unit and connected to either the measurement chamber (QCM934-500) or oscillation circuit unit (QCM934-300).

It measures oscillation frequency and resonance resistance of the quartz crystal resonator, and controls & monitors the temperature in the cell.

Note: The measurement chamber is necessary for the temperature control.

Expandable up to 4 channels

Based on your measurement needs, up to 4 OTC channels can be added to a main unit.

High-Resolution Frequency Measurement

The frequency resolution is 0.01 Hz.

Temperature control function

Addition of the QCM934-500 Measurement Chamber allows accurate temperature control and shielding for the most sensitive applications.

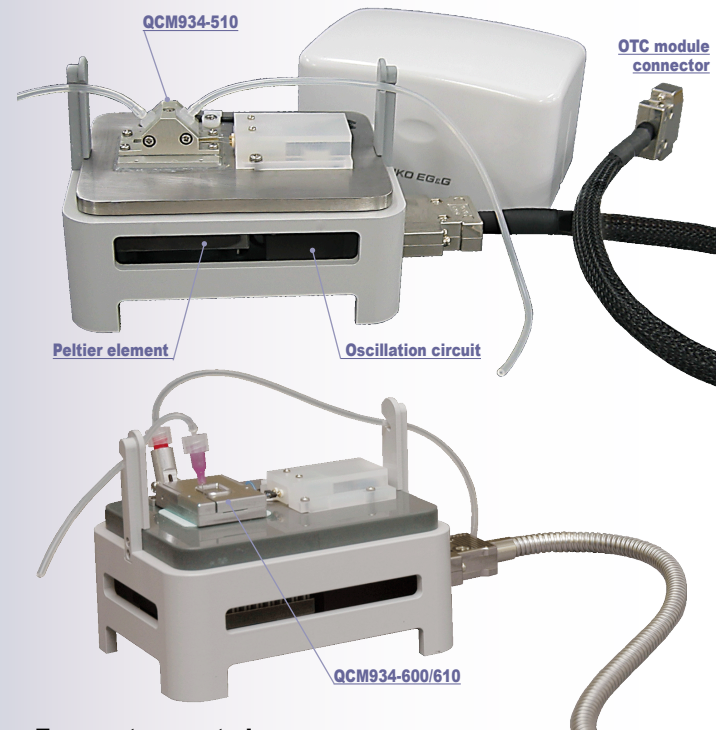
Measurement Chamber

QCM934-500

The QCM934-500 is a measurement chamber equipped with an oscillation circuit unit (QCM934-300).

The chamber is designed for use with the QCM934-510 or QCM934-600/610.

The cell temperature is adjusted and maintained using a Peltier element.



Temperature control

Quartz crystal resonator is adjusted by a peltier element at the temperature by the accuracy of ± 0.03 °C.

Note: The temperature cannot be controlled with the QCM934-500 alone. It must be connected to a QCM934-200.

Small size

The small size of the measurement chamber allows it to be used in a temperature controlled bath for even greater temperature control.

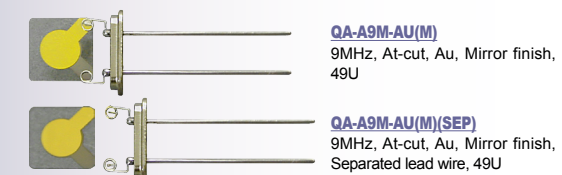
Note: Please acknowledge the photographs published in this catalog may differ from the final product.

Quartz Crystal Resonator 9MHz AT-cut

In the QCM934, the third overtone of a 9MHz AT-cut quartz crystal resonator is used and mass change can be detected with high sensitivity and resolution.

There are many options available for the quartz crystal resonator design, including 14 different electrode materials (such as gold and platinum), rectangular or round shape, specular finish and separation type.

Note: Custom designs available, please contact factory for more information.



WinQCM Software

PS-P600/W32EA

WinQCM is a software package designed to control the QCM and collect and analyze data.

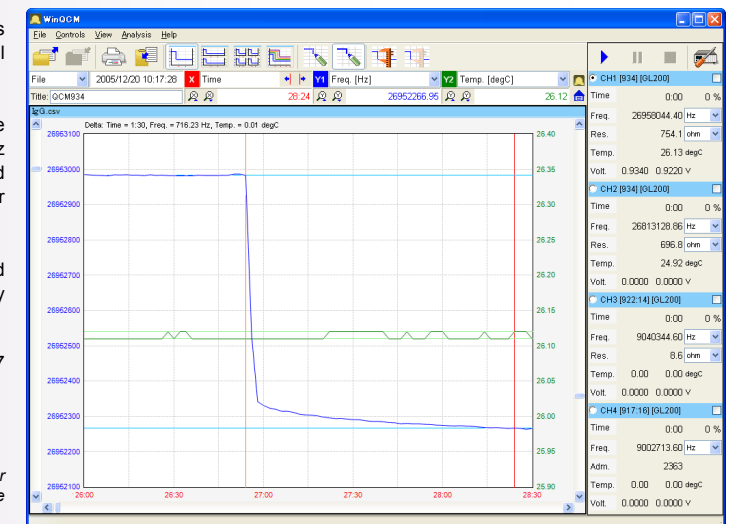
QCM device and various data loggers can be connected with one personal computer by four channels or less.

Resonance frequency/resonance resistance/temperature of the quartz crystal resonator of the QCM device and temperature/voltage of the data logger are displayed graphically in real time.

The data format is a comma delimited test file that can open in Excel for easy editing and data management.

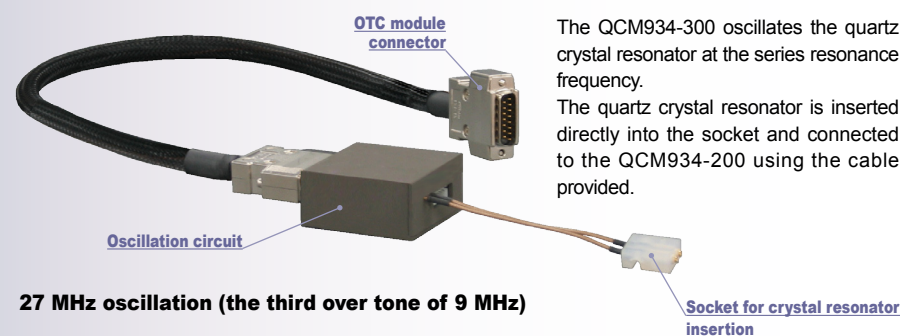
WinQCM can also control the QCA917 and QCA922.

Note: The graph shows the vibration number change in the antibody to the surface of the crystal resonator fixation making process.



Oscillation Circuit Unit

QCM934-300



The QCM934-300 oscillates the quartz crystal resonator at the series resonance frequency.

The quartz crystal resonator is inserted directly into the socket and connected to the QCM934-200 using the cable provided.

27 MHz oscillation (the third over tone of 9 MHz)

Measurements in Air or Liquid

Provides a stable reading in air or liquid.

Works with various cell types

Dip cells, well cells and flow cells are available.

Specifications

■Quartz Crystal Microbalance Main Unit

QCM934-000

Number of channels	Up to 4 OTC modules can be installed
Display	Height 5.0 mm, 20 digits x 4 rows
Operation keys	Three MENU keys and four CURSOR keys
Interface	USB2.0/1.1 conforming (full speed)
Power supply	100/120 V AC, 230/240 V AC, 50-60 Hz
Power consumption	Max. 60 W
Dimensions	320 mm × 280 mm × 133 mm
Weight	Approx. 5.5kg
Ambient temperature	10 to 40 °C

■Oscillator & Temperature Control Module

QCM934-200

Measurements	Resonance frequency, resonance resistance and temperature Note: temperature is measured in the Measurement Chamber - QCM934-500)
Frequency Range	25 MHz to 27 MHz (Resolution: 0.01 Hz)
Resistance Range	Maximum 2 kΩ (Resolution: 0.1 Ω)
Temperature Range	5 °C to 55 °C (Resolution: 0.01 °C)
Gate time	0.1 sec, 1.0 sec, 10.0 sec selectable
Temperature control	Control: On/Off Range of preset temperature: 15 °C to 40 °C (every 1 °C)
External connector	D-Sub connector

■Oscillation Circuit Unit

QCM934-300

Quartz Crystal Resonator	9MHz AT-cut quartz crystal resonator which oscillates at 27MHz (the third overtone).
Oscillation stability level	1Hz/min or less
External connector	D-Sub connector with 10 cm lead length
Cable	50 cm cable for OTC module connection
Dimensions	54 mm × 48 mm × 24 mm (Cable excluded)
Ambient temperature	10 to 40 °C

■Measurement Chamber

QCM934-500

Temperature control element	Peltier element
Temperature control method	PID control
Range of temperature control	15 to 40 °C
Temperature stability	±0.03 °C
Temperature sensor	Thermally sensitive resistor
Oscillation circuit	QCM934-300
External connector	D-Sub connector for OTC module connection
Connected cable	50 cm cable for OTC module connection
Dimensions	136 mm × 102 mm × 124 mm (Cable excluded)
Weight	Approx. 1kg (Cable excluded)
Ambient temperature	10 to 40 °C

■Flow Cell

QCM934-510

Materials	Main body: Aluminum alloy and Polypropylene, O-ring: Viton, Stop screw: Stainless steel
Dimensions	41 mm × 34 mm × 19 mm
Capacity	90μl
Tubing (standard)	Material: Silicon, Inside diameter: 1mm, Outside diameter: 3mm, Length: 1 m
Ambient temperature	10 to 40 °C
Usage	The sample solution is poured into cell.

■Micro Flow Cell Holder

QCM934-600

Materials	Aluminum
Dimensions	38 mm × 45 mm × 11 mm
Tubing (standard)	Material: Silicon, Inside diameter: 1mm, Outside diameter: 3mm, Length: 1 m
Ambient temperature	10 to 40 °C

■Micro Flow Cell (with Au electrode)

QCM934-610

Quartz Crystal Resonator	9MHz, AT-cut, Rectangular, Au(Electrode area:3mmΦ)
Materials	Silicone resin, Olefin resin
Dimensions	24 mm × 32 mm × 5 mm
Capacity	Approx. 1μl
Ambient temperature	10 to 40 °C
Usage	The sample solution is poured into the reactive cell part.

■WinQCM Software

PS-P600/W32EA

OS	Windows 2000/XP		
System requirements	.NET Framework 1.1		
Compatible QCM	QCM934	QCA922	QCA917
Communication interface	USB2.0/1.1	GPB	GPB
Number of measurement channels	Max 4 CH/Equipment	1 CH	1 CH
Measurements	Resonance freq. (every 0.01Hz) Resonance res. (every 0.1Ω) Temperature (every 0.01 °C)	Resonance freq. (every 0.1Hz) Resonance res. (every 0.1Ω)	Resonance freq. (every 0.1Hz) Admittance (index)
Functions	Various measurement condition settings, data measurements, graphical representations, file preservation/reading, and data analysis, etc.		
Main unit control	Measurement start, pause, stop, and various measurement condition settings, etc.		
Sampling interval	Selection of gate time base or value at mean value/moment		
	Gate time	Sampling interval	
	0.1sec	0.1sec, 0.2sec, 0.5sec, 1sec	
	1sec	1sec, 2sec, 5sec, 10sec	
	10sec	10sec, 20sec, 30sec, 60sec	
Sampling frequency	10 to 1,080,000 (12.5 days or less of one sampling interval second)		
Graphical features	<ul style="list-style-type: none">- Data is graphically displayed in real time.- Up to 4 graphs from a single file or a single graph from 4 different files can be displayed on one screen.- Hover box that displays the data values at the cursor position- Data can be displayed in line or symbol format.- Displays the amount of the change (Δ) from the start of the measurement- Displays the calculated results for the amount of change (Δ) between two set points		
File types	Can read either comma delimited ASCII files from WinQCM and WinEchem or binary files from WinEchem		

Note: The specification of QCA922 and QCM922 is the same.

■Dip Cell

QA-CL3

■Well Cell

QA-CL4, QA-CL5

■Flow Cell

QA-CL6, QA-CL7

Materials	[QA-CL3 & CL4] Main body: Teflon, O-ring: Viton, Stop screw: Stainless steel [QA-CL5] Main body: Chloridization vinyl, O-ring: Viton, Stop screw: Stainless steel [QA-CL6] Main body: Teflon, O-ring: Viton, Stop screw: Stainless steel [QA-CL7] Main body: Chloridization vinyl, O-ring: Viton, Stop screw: Stainless steel
Dimensions	[QA-CL3] 25.5 mm × 20 mm × 12 mm [QA-CL4] 25.5 mm × 20 mm × 22 mm [QA-CL5] 25.5 mm × 20 mm × 17 mm [QA-CL6 & CL7] 28.0 mm × 20 mm × 22 mm
Capacity	[QA-CL4] Max. 750μl [QA-CL5] Max. 250μl [QA-CL6 & CL7] 90μl
Usage	[QA-CL3] Liquid or air [QA-CL4 & CL5] Cell is filled with sample solution [QA-CL6 & CL7] The sample solution is poured into the cell.

Note: These cells can also be used with the QCA922.

■Quartz Crystal Resonator

QA-A9M series

Resonance frequency	9 MHz
Cut type	AT-cut
Electrode materials	14 kinds such as Au, Pt, SUS, ITO and SiO ₂ 300 nm of electrode material is sputtered onto a Ti film groundwork.
Electrode area	5mmΦ: 0.196cm ²
Ambient temperature	-20 °C to 70 °C

Note: Sold in packages of 50 or 25 resonators.

Specifications are subject to change without prior notice.

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