

Mira – Metrohm Instant Raman Analyzer



Always ready to measure

Robust and handy materials identification

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The **M**etrohm **I**ntant **R**aman **A**nalyzers (Mira) are handheld, high-performance Raman spectrometers for rapid, non-destructive analysis of chemical and pharmaceutical samples, be they liquid or solid. The handheld Mira spectrometers run on commercially available AA batteries and may be used anywhere: in the warehouse, in the process, in the field, and – of course – in the laboratory.

The only Raman spectrometers with ORS technology

Barely larger than a smartphone, the Mira spectrometers are the only handheld Raman analyzers available with dual-core processor and Orbital-Raster-Scan (ORS)

technology. This highly reproducible averaging technique extends the scope of possible samples to heterogeneous and sensitive materials that may not be analyzed with conventional Raman analyzers.

Ease of use: point-and-shoot mode or vials

- Point-and-shoot adapters enable close-range analysis of powders, granulates, and liquids in their original containers.
- Alternatively, samples can be provided in small vials that are then simply inserted into the Mira spectrometers allowing laser-shielded operation.

Mira: A great choice for ...

- performing rapid, non-destructive analysis of chemical and pharmaceutical samples
- analyzing heterogeneous and temperature sensitive substances
- unambiguous identification of unknown samples
- identifying substances in solid and liquid forms
- testing the authenticity/purity of products
- analyzing mixtures

	Fluorescent samples	Measurements in vials	Measurements in containers (using point-and-shoot adapters)	Laser-shielded operation
Mira M-1 Basic Package		✓		✓
Mira M-1 Advanced Package		✓	✓	
Mira M-2 Basic Package*	✓	✓		✓
Mira M-2 Advanced Package*	✓	✓	✓	



Highlights

- Instantly ready to use in any place
- Light, compact, and handy – single-handed operation
- Direct analysis without any sample preparation – results within seconds
- Point-and-shoot identification – measurements can be taken through packaging of different thicknesses (including plastic and amber glass)
- Orbital-Raster-Scan technology – reproducible measurements, even of temperature sensitive and heterogeneous samples
- Safe – the Basic Package can be used without any additional safety measures required (laser protection class 1)
- Wide Range of applications – from temperature sensitive samples to any kind of fluorescent samples
- Maximum flexibility – comprehensive spectral libraries
- Automatic calibration in critical applications

Key features

- Handheld Raman spectrometers with dual-core processor and Orbital-Raster-Scan technology for chemical and pharmaceutical analysis
- Available with 785 nm or 1064 nm laser* (for fluorescent materials)
- Operation with conventional AA batteries
- Robust design (aluminum housing) ensures a long instrument lifetime
- Resistive touch screen: safe operation and compliance with the strictest user safety regulations (for personal protection equipment or PPE)
- Laser class 1 in the Basic Package version (no additional safety measures required)
- Laser class 3B in the Advanced Package version (featuring point-and-shoot adapters)

Maximum Flexibility – comprehensive spectral libraries

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Metrohm provides an extensive collection of Raman spectra for the Mira spectrometers. These are suitable for not only identifying unknown Raman spectra, but also characterizing a whole range of different materials. The spectral library comprises more than **9000** Raman spectra which have been measured at the National Institute of Advanced Industrial Science and Technology (AIST) in Japan and by scientists at S.T. Japan, Inc. in Tokyo. This complete library is subdivided into 21 sub-libraries, which can be combined as required.

Mira spectrometers give you the option of capturing your own spectra and using them to generate a full-fledged library. You can add to your library as necessary and transfer it to any number of Mira spectrometers. Thus, you can adapt the library as effectively as possible to meet particular analytical challenges. This «open library» principle affords you maximum flexibility when designing your libraries.

Library specification

- Maximum sample purity
- All spectra are validated regularly
- Name, CAS number, molecular formula, and detailed accompanying information for most spectra
- 21 sub-libraries make it possible to put together a customized library
- Best possible identification of unknown substances
- The efficient search algorithm enables rapid searches within the database and provides analysis results as quickly as possible
- «Open library» principle affords maximum flexibility when designing libraries



Orbital-Raster-Scan (ORS) technology – for always accurate and reproducible results

In conventional handheld Raman spectrometers, the laser is focused on a tiny spot. As a result, they are only able to capture a very small section of the sample. In practice, this can compromise the quality of the measuring results or even lead to incorrect ones – particularly when it comes to heterogeneous substances.

Moreover, as the intensity of the laser light in conventional Raman spectrometers increases, there is a risk of devices heating up or the sample decomposing. ORS technology solves both of these challenges:

- ORS technology «magnifies» the measuring spot, as the laser sweeps over an extended area of the sample surface taking measurements at several points and averaging them. This significantly boosts the accuracy, reproducibility, and, therefore, the reliability of the measurement.
- ORS technology reduces the average intensity of the laser light on the sample surface. This extends the scope of samples to sensitive materials.

Technical Specifications

	Mira M-1	Mira M-2*
Laser (excitation wavelength)	785 nm	1064 nm
Laser output power	Max. 75 mW at sample	Max. 400 mW at sample
Wavelength range	400 to 2300 cm	400 to 2300 cm
Spectral resolution	12 to 14 cm ⁻¹ (FWHM) across range	12 to 14 cm ⁻¹ (FWHM) across range
Collection optics	NA = 0.50, working distance 1.0 mm and 7.6 mm; 0.2 to 2.5 mm spot size	NA = 0.50, working distance 1.0 mm and 7.6 mm; 0.2 to 2.5 mm spot size
Measuring technique	Orbital-Raster-Scan (ORS) to average over the sample	Orbital-Raster-Scan (ORS) to average over the sample
Exposure	Automatic mode (10 ms minimum)	Automatic mode (10 ms minimum)
Battery	2 AA batteries (11 hours of operation with lithium batteries)	4 AA batteries (6 hours of operation with lithium batteries)
External power supply	Replaceable batteries, USB power supply unit available	Replaceable batteries or 12 V external power supply
Weight	0.54 kg (1.2 lbs)	0.82 kg (1.81 lbs)
Size	12.5 × 8.5 × 3.9 cm (5 × 3.35 × 1.5")	14.4 × 9.3 × 6.4 cm (5.7 × 3.7 × 2.5")
Operating temperature	-20 °C to +40 °C (continuous)	-20 °C to +40 °C (continuous)
Protection	Dustproof and waterproof	Dustproof and waterproof
Display	High visibility, glove-compatible, color touch screen	High visibility, glove-compatible, color touch screen
Security login	PIN code	PIN code
Measurement accessories	Vial holder, point-and-shoot	Vial holder, point-and-shoot
Safety	Laser safety class 1 with vials	Laser safety class 1 with vials
	Laser safety class 3B with point-and-shoot	Laser safety class 3B with point-and-shoot
Compliance	CE certification	CE certification

Ordering information

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2.923.0010 Mira M-1, Basic Package (laser class 1)

Consists of:

1.923.0010	Mira M-1 hand-held device with integrated vial holder
6.7502.000	Vial set
6.2133.000	AA batteries
6.2151.110	USB cable (Mini-B)
6.2166.000	USB power supply unit 5 V 1 A
6.7550.000	ABS/TiO ₂ calibration standard
8.923.8001DE	Manual (German)
8.923.8001EN	Manual (English)

2.923.0020 Mira M-1, Advanced Package (laser class 3B)

Consists of:

1.923.0020	Mira M-1 hand-held device with point-and-shoot option
6.7502.000	Vial set
6.7502.100	M-1 vial holder
6.7520.000	M-1 point-and-shoot adapter (SWD)
6.7520.010	M-1 point-and-shoot adapter (LWD)
6.7560.010	Laser safety glasses (785 nm)
6.2133.000	AA batteries
6.2151.110	USB cable (Mini-B)
6.2166.000	USB power supply unit 5 V 1 A
6.7550.000	ABS/TiO ₂ calibration standard
8.923.8001DE	Manual (German)
8.923.8001EN	Manual (English)

2.923.0110 Mira M-2, Basic Package (laser class 1)*

Consists of:

1.923.0110	Mira M-2 hand-held device with integrated vial holder
6.7502.000	Vial set
6.2133.000	AA batteries
6.2151.110	USB cable (Mini-B)
6.7530.000	USB power supply unit 12 V 2.5 A
6.7550.000	ABS/TiO ₂ calibration standard
8.923.8002DE	Manual (German)
8.923.8002EN	Manual (English)

2.923.0120 Mira M-2, Advanced Package (laser class 3B)*

Consists of:

1.923.0120	Mira M-2 hand-held device with point-and-shoot option
6.7502.000	Vial set
6.7502.110	M-2 vial holder
6.7520.100	M-2 point-and-shoot adapter (SWD)
6.7520.110	M-2 point-and-shoot adapter (LWD)
6.7560.110	Laser safety glasses (1064 nm)
6.2133.000	AA batteries
6.2151.110	USB cable (Mini-B)
6.7530.000	Power supply unit 12 V 2.5 A
6.7550.000	ABS/TiO ₂ calibration standard
8.923.8002DE	Manual (German)
8.923.8002EN	Manual (English)

Optional PC software

6.6071.000	MiraCal
8.105.8020DE	MiraCal manual (German)
8.105.8020EN	MiraCal manual (English)

Sampling accessories/options

6.7502.000	Vial set
6.7550.000	ABS/TiO ₂ calibration standard
6.7560.010	Laser safety glasses (785 nm)
6.7560.110	Laser safety glasses (1064 nm)*
6.7502.100	M-1 vial holder
6.7502.110	M-2 vial holder*
6.7520.000	M-1 point-and-shoot adapter (SWD)
6.7520.010	M-1 point-and-shoot adapter (LWD)
6.7520.100	M-2 point-and-shoot adapter (SWD)*
6.7520.110	M-2 point-and-shoot adapter (LWD)*
6.5869.100	M-1 point-and-shoot upgrade
6.5869.110	M-2 point-and-shoot upgrade*

*Expected to be available from early 2015



Spectral libraries

- 6.6071.601 Complete collection of Raman spectra (> **8690** spectra)
- 6.6071.602 Raman spectra of active substances and auxiliary materials that are relevant to the pharmaceutical industry and medical research (> **1170** spectra)
- 6.6071.603 Raman spectra of solvents (> **460** spectra)
- 6.6071.604 Raman spectra of polymers, polymer additives, plastics, plasticizers, and packaging materials (> **920** spectra)
- 6.6071.605 Raman spectra of aliphatic and aromatic aldehydes and ketones (> **1070** spectra)
- 6.6071.606 Raman spectra of alcoholic and phenolic compounds (> **890** spectra)
- 6.6071.607 Raman spectra of esters, lactones, and anhydrides (> **2930** spectra)
- 6.6071.608 Raman spectra of hydrocarbons and halogenated hydrocarbons (> **560** spectra)
- 6.6071.609 Raman spectra of chemical substances that are used in the semiconductor industry (> **370** spectra)
- 6.6071.610 Raman spectra of selected hazardous substances that are listed in the «EPA Cameo Database for Chemical Emergencies and Responders» and the «USCG CHRIS Hazardous Chemicals Database» (> **1360** spectra)
- 6.6071.611 Raman spectra of selected hazardous substances that are listed in the «EPA Cameo Database for Chemical Emergencies and Responders», «USCG CHRIS Hazardous Chemicals Database», and «NIOSH Guide to Chemical Hazards Databases», as well as chemicals that are regulated by the «Toxic Substances Control Act» (> **3030** spectra)
- 6.6071.612 Raman spectra of substances that are relevant for forensic analysis (> **740** spectra)
- 6.6071.613 Raman spectra of pesticides, insecticides, herbicides, fungicides, algicides, and similar agricultural chemicals (> **460** spectra)
- 6.6071.614 Raman spectra of selected dyes, colorants, pigments, and indicators (> **300** spectra)
- 6.6071.615 Raman spectra of sulfur and phosphorus compounds (> **970** spectra)
- 6.6071.616 Raman spectra of substances with a high production volume, as listed in the «HPV Challenge Program Chemical List» (> **690** spectra)
- 6.6071.617 Raman spectra of minerals and inorganic materials (> **1410** spectra; **not included in the complete library (6.6071.601)**)
- 6.6071.618 Raman spectra of minerals (> **450** spectra; **extracted from database 6.6071.617**)
- 6.6071.619 Raman spectra of inorganic materials (> **960** spectra; **extracted from database 6.6071.617**)
- 6.6071.620 Raman spectra of food additives, including FDA-controlled substances. Additionally, spectra of indirect food additives and substances that come into contact with foodstuffs, such as packaging materials and associated processing chemicals (> **1070** spectra)
- 6.6071.621 Raman spectra of biochemicals, including vitamins, resins, starches, glycerins, fatty acids, sugars, carbohydrates, proteins, and peptides (> **1900** spectra)
- 6.6071.622 Raman spectra of flavors, scents, and other substances that are used for manufacturing cosmetics and fragrances (> **1030** spectra)

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