Mira P

Product manual

Ω Metrohm

Mira P

Product manual

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Table of contents

1 Overview

1.1 Instrument description

Metrohm Instant Raman Analyzers (Mira) are handheld, high-power Raman spectrometers designed for the rapid, nondestructive identification and verification of chemical and pharmaceutical samples, both liquid and solid. Barely larger than a smartphone, the Mira spectrometers are the only handheld Raman spectrometers currently on the market with Orbital Raster Scan (ORS) technology.

1.2 Model versions

Mira P instruments are available in the following versions:

Table 1   Model versions

2.927.0010	Mira P Basic	Laser class 3B
	Mira P Basic is a starter package that contains the basic components required for operating Mira P.	
	Check *Metrohm Website* for included parts.	
2.927.0020	Mira P Advanced	Laser class 3B
	Mira P Advanced includes an attachment lens for analyzing materials directly or through containers (laser class 3b), as well as a vial holder attachment for analyzing samples contained in glass vials (laser class 1).	
	Check *Metrohm Website* for included parts.	
2.927.0030	Mira P Flex	Laser class 3B
	Mira P Flex includes the basic components needed to operate Mira P without sampling attachments.	
	Check *Metrohm Website* for included parts.	

> **ℹ NOTICE**
>
> To purchase additional *Accessories (see chapter 1.5.1, page 4)*.

1.3 Mira Cal Software

In order to configure a **Mira P** instrument, the following software is needed:

Table 2 Model versions

6.06071.010	Mira Cal P USB Stick

To download the latest version of Mira Cal P software, click on the following link:

https://www.metrohm.com/en/support-and-service/software-center/mira-cal/

1.4 About the documentation

> **ℹ NOTICE**
>
> Please read through this documentation carefully before putting the product into operation.
>
> The document contains important safety information and warnings which you must follow in order to ensure safe operation of the instrument. Metrohm is not responsible for damages and safety hazards that occur from using the instrument in a manner that is not specified in the user manual.

Symbols and conventions

The following icons and formatting may appear in this documentation:

*(5-**12**)*	**Cross-reference to figure legend**
	The first number refers to the figure number, the second to the product part in the figure.
1	**Instruction step**
	Carry out these steps in the sequence shown.

Method	Designations for names of parameters, menu items, tabs and dialog windows in the software.
File ▶ New	Menu or menu item
Work area / Properties	Menu paths in order to arrive at a particular position in the software.
[Next]	**Button** or **key**

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1.5 Additional information - Software tutorials

Refer to following software tutorials for more information:

- Mira Cal P tutorial: 8.0105.8004EN

1.5.1 Accessories

Up-to-date information on the scope of delivery and optional accessories for your product can be found on the Internet. You can download this information using the article number as follows:

Downloading the accessories list

1 Enter *https://www.metrohm.com/* into your Internet browser.

2 Enter the article number of the product (e.g. **2.1001.0010**) into the search field.

The search result is displayed.

3 Click on the product.

Detailed information regarding the product is shown on various tabs.

4 On the **Included parts** tab, click **Download the PDF**.

The PDF file with the accessories data is created.

> **NOTICE**
>
> When you receive your new product, we recommend downloading the accessories list from the Internet, printing it out and keeping it for reference purposes.

2 Safety

2.1 Product safety

This product exhibited no flaws in terms of technical safety at the time it left the factory. To preserve this status and ensure non-hazardous operation of the product, the following instructions must be observed carefully.

2.2 Hazard levels

The following warning messages indicate the severity of the danger and its possible effects.

⚠️ **DANGER**

Immediate danger of life

Irreversible injuries that will result in death.

Warns of dangerous situations or unsafe actions that will most certainly cause severe injuries or death.

Lists measures to avoid hazard.

⚠️ **WARNING**

Severe health hazards

Serious injuries that could result in death.

Warns of dangerous situations or unsafe actions that could result in serious injuries or death.

Lists measures to avoid hazard.

⚠️ **CAUTION**

Health hazards or severe property damage

Warns of dangerous situations or unsafe actions that could result in moderate injuries or considerable property damage.

Lists measures to avoid hazard.

2.3 Intended use

Metrohm products are used for the analysis and handling of chemicals and other materials.

Usage therefore requires the user to have basic knowledge and experience in handling chemicals. Knowledge with respect to the application of the fire prevention measures prescribed for laboratories is also mandatory. Be sure to take proper safety precautions when working with chemicals

Adherence to this technical documentation and compliance with the maintenance specifications make up an important part of intended use.

Any utilization in excess of or deviating from the intended use is regarded as misuse.

Specifications regarding the operating values and limit values of individual products are contained in the "Technical specifications" section, if relevant.

Exceeding and/or not observing the mentioned limit values puts people and components at risk. The manufacturer assumes no liability for damage due to non-observance of these limit values.

The EU declaration of conformity loses its validity if modifications are carried out on the instruments and/or the components.

2.4 Residual risks

2.4.1 General dangers at the workplace

Generally, the regulations and provisions of the regulatory institutions and authorities in the field of work apply.

The instructions regarding the following areas have to be followed when using the products:

- Work safety
- Handling mechanical installations
- Handling electricity
- Handling hazardous and environmentally damaging substances
- Handling hazardous and environmentally damaging liquids
- Disposing hazardous and environmentally damaging substances

If they are not followed, this may result in:

- Disturbing, injuring and/or killing of people
- Malfunction and/or damage to instruments and infrastructure
- Damage and/or contamination of the environment

⚠️ **WARNING**

General dangers at workplace

If the safety measures are not followed, working in a laboratory bears a high risk of injury, which can endanger life and health.

- Only professionally trained and qualified specialist personnel may operate the products.
- Follow the applicable provisions concerning work safety and all regulations on wearing protective clothing.
- Use suitable tools to perform your work.
- Check the fill level of waste bottles or waste canisters and analysis vessels, and make sure they do not overflow.
- Use protective grounding when working with highly flammable substances and gases.

2.4.2 Danger from electrical potential

⚠️⚡ **WARNING**

Electric shock from electrical potential

Risk of injury by touching live components or through moisture on live parts.

- Never open the housing of the product.
- Protect live parts (e.g. power supply unit, power cord, connection sockets) against moisture.
- If you suspect that moisture has gotten into the product, disconnect the product from the energy supply. Then notify Metrohm Service.
- Only personnel who have been issued Metrohm qualification may perform service and repair work on electrical and electronic components.

2.4.3 Laser safety

ℹ️ **NOTICE**

NOHD

The following information refers to NOHD for Mira P instruments in accordance with the international standard IEC 60825-1, "Safety of laser products".

The nominal ocular hazard distance (NOHD) is listed in technical specifications *(see page 48)*.

> ⚠ **WARNING**
>
> **Risk of injury by laser radiation**
>
> Serious eye injuries by laser radiation.
>
> - Follow the safety measures and instructions.
> - Instruments must be used by trained personnel only.
> - Instruments of the laser class 3B must be used in protected and labeled rooms only.
> - Appropriate protective glasses according to the technical specifications *(see page 48)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
> - Observe the nominal ocular hazard distance (NOHD).
> - Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

You can purchase protective laser glasses (6.7560.010) from Metrohm AG *Accessories (see chapter 1.5.1, page 4)*.

Laser classification depending on Smart Tips

Attached Smart Tip	Laser Class 1	Laser Class 3B
Right Angle Attachment		X
Contact Ball-Probe		X
Calibrate/Verify Attachment (CVA)	X	
Vial Holder	X	
Short Working Distance Attachment Lens (SWD)		X
Long Working Distance Attachment Lens (LWD)		X
Extra Long Working Distance Attachment Lens (XLWD)		X
Tablet Holder	X	

Vial Holder, Tablet Holder and CVA have an interlock mechanism for measurement. This mechanism prevents laser radiation from emerging.

Laser stops immediately if:

- The lid of the Smart Tip is opened.
- Attached Smart Tip is disconnected from the instrument.

2.4.4 Warning stickers on the instrument

The instrument is equipped with stickers that warn of potential hazards. These warning stickers are listed and explained below.

1	**Laser aperture**	**2**	**Laser aperture sticker**
3	**Laser specification / serial number (bottom of instrument)**	**4**	**Laser class**
5	**Type plate**	**6**	**Bluetooth label**

Emergence of laser

- Laser aperture

Laser specifications
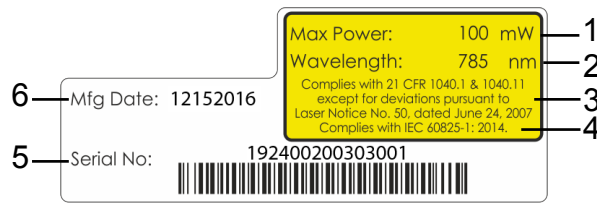
1	Max Power: 100 mW	2	Wavelength: 785 nm
3	Complies with 21 CFR 1040.1 & 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007	4	Complies with IEC 60825-1:2014
5	Serial number	6	Manufacturing date: month / day / year

Laser class

The following laser classification is used for all Mira instruments.

- Invisible laser radiation
- Avoid exposure to beam
- Class 3B laser product

2.5 Responsibility of the operator

- Eliminate defects or damage which impair operating safety without delay.
- Eliminate malfunctions which could impair safety without delay.
- The rules, regulations and instructions listed in the present document are not the only valid ones. Comply with the applicable statutory rules, government agency directives and regulations.
- Unauthorized modification of the products excludes any and all liability on the part of the manufacturer for any damage resulting from this as well as for any consequential damage. No modifications, attachments or conversions which could impair safety may be carried out on the products without the approval of the manufacturer.
- Spare parts must meet the technical requirements established by the manufacturer. Original spare parts always meet these requirements.
- Personnel must be familiar with this safety-relevant information and it must be available for consultation at all times.

2.6 Personnel requirement

Only qualified personnel may operate the present product.

Qualified personnel are people authorized by the safety responsible to carry out the necessary operations. They are capable of recognizing and avoiding possible dangers. These people are qualified due to their professional training, experience and/or instruction. They know the relevant standards, laws, provisions, accident prevention regulations and the company conditions.

3 Functional description

3.1 Overview of the instrument

Front

Figure 1   Mira P - Front

1	**Magnetic smart tip fixture/ laser aperture**	**2**	**Touch screen**
3	**Battery compartment**	**4**	**Type B mini USB connector**
5	**On/off switch**		

Rear
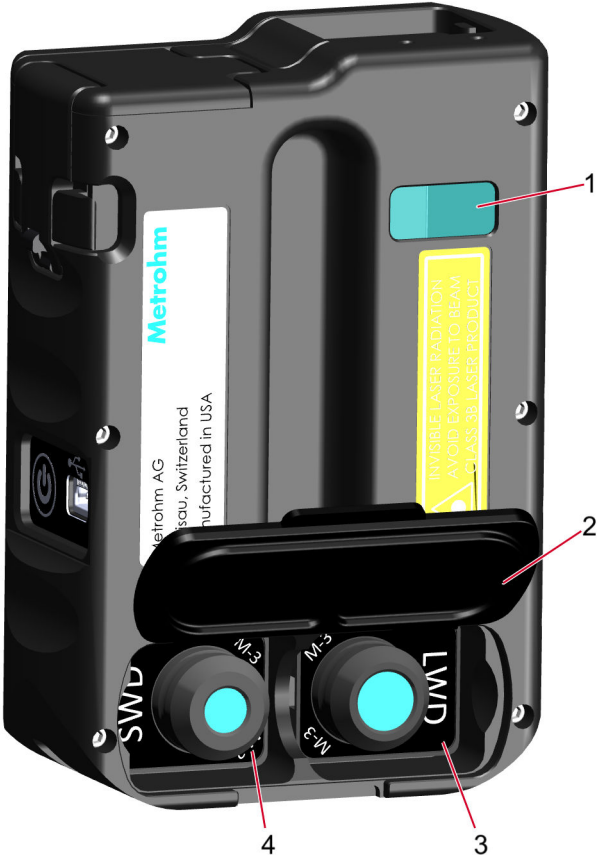
Figure 2   Mira P - Rear

1	**Barcode reader**	**2**	**Accessories covering**
3	**Long Working Distance Attachment Lens (LWD) Storage**	**4**	**Short Working Distance Attachment Lens (SWD) Storage**

Case

The instrument and attachments are delivered in a case.
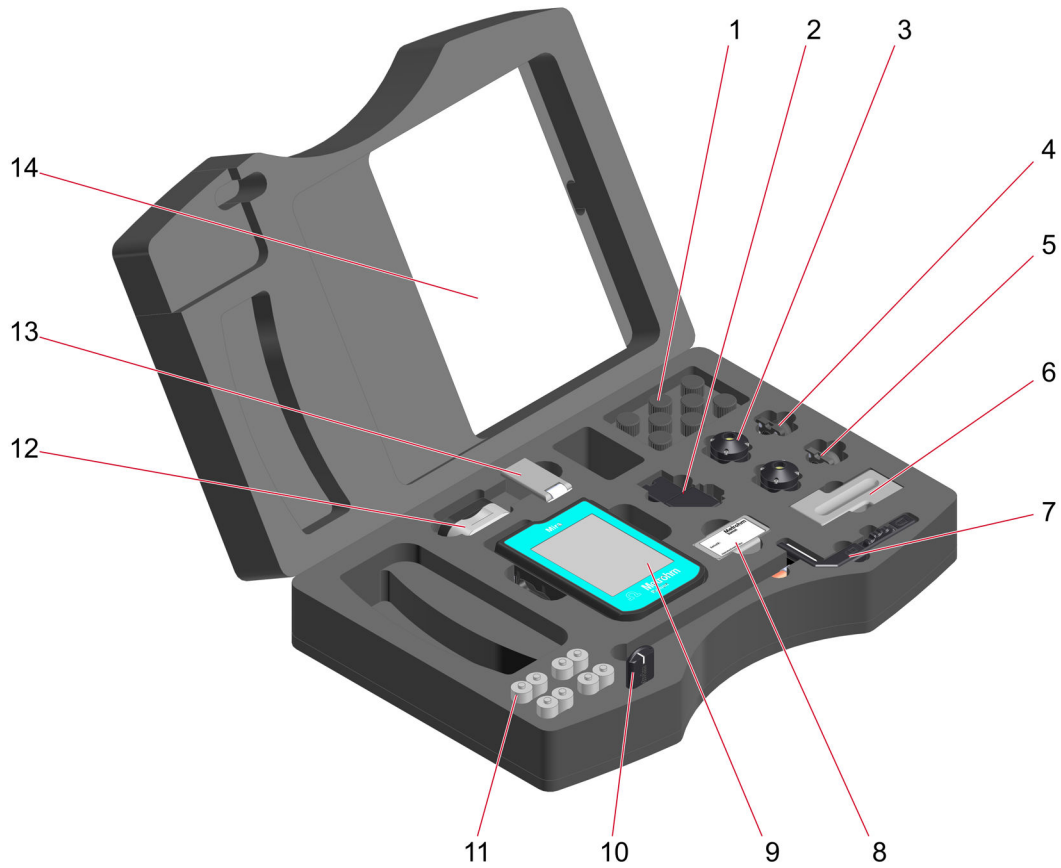
Figure 3   Mira P - Case

1	**Vials**	**2**	**Right Angle Attachment**
3	**Universal Attachment**	**4**	**Extra Long Working Distance Attachment (XLWD)**
5	**Extra Long Working Distance Attachment (XLWD)**	**6**	**Calibrate/Verify Attachment (CVA)**
7	**Contact Ball-Probe**	**8**	**Calibration Standard**
9	**Mira P**	**10**	**Stick with Mira Cal P**
11	**Batteries**	**12**	**Tablet Holder**
13	**Vial Holder**	**14**	**Manual**

> **ℹ NOTICE**
>
> The following attachments are optional:
>
> - Contact Ball-Probe
> - Right Angle Attachment
> - Tablet Holder
> - XLWD

4 Transport and storage

4.1 Checking the delivery

Immediately upon arrival of the merchandise, check the shipment against the delivery note to ensure completeness and absence of damage.

4.2 Storing the packaging

The product is supplied in extremely protective packaging together with the separately packed accessories. Keep this packaging, as only this ensures safe transportation of the product.

4.3 Storage

NOTICE

Always remove batteries if the instrument is not in use.

5 Installation

5.1 Energy supply with batteries

> **ℹ NOTICE**
>
> **Power save mode**
>
> If you use the Mira P with batteries, you can configure a shutdown delay to save power *(see "Shutdown Delay", page 40)*.

Changing batteries

The instrument uses exchangeable or rechargeable batteries of type AA 1.5Vdc x 2.

> **ℹ NOTICE**
>
> **Battery type**
>
> We recommend to use AA Energizer® Ultimate Lithium™ batteries. We also support rechargeable NiMH Panasonic eneloop pro™ batteries.

Open the battery compartment

Pull the lever.

Push the lateral cover upwards.

Open the lateral cover.

Open the top cover.

The battery compartment is now open.

Close the battery compartment

When inserting the batteries, refer to the plus and minus signs on the housing.

Close the top cover.

Hook the lateral cover on the top cover.

Push the lateral cover down to the limit.

The battery compartment is now closed.

5.2 USB connection

> **NOTICE**
>
> We do not recommend to use third party USB cables, only use the
> provided Metrohm USB Mini-B cable (order number 6.215.1110).

Energy supply

For stationary use in the laboratory, you can operate the instrument with
the USB interface which is connected to a powered USB hub. The USB
hub also allows data transfer.

> **NOTICE**
>
> **Battery charging function**
>
> The instrument has no charging function for rechargeable batteries.
>
> You must replace drained batteries.

Synchronization

Connect the instrument to the Windows PC that uses the USB Mini-B
cable.

If the instrument is off, connecting the USB cable to a Windows PC ini-
tiates an instrument start-up.

Refer to the Mira Cal P software tutorial for further steps *Additional infor-mation - Software tutorials (see chapter 1.5, page 4)*.

5.3 Safe shutdown

> **ℹ NOTICE**
>
> To prevent unexpected behavior in the instrument, always perform a safe shutdown.
>
> A **safe shutdown** is performed in the following cases:
>
> - The on/off switch is pressed.
> - The battery is low.
> - A battery-powered instrument is not in use for the duration speci-fied in the shutdown delay.

An **unsafe shutdown** is performed in the following cases:

- The on/off switch is pressed and held for 3 seconds or longer.
- The battery door is opened while running on batteries only.
- The USB is unplugged while running on USB only.

6 Initial configuration

> **i** **NOTICE**
>
> **Configuration**
>
> Use **Mira Cal P** software to change instrument settings or to install spectral libraries.
>
> Refer to **Mira Cal P** software tutorial for detailed information *Additional information - Software tutorials (see chapter 1.5, page 4)*.

7 Operation and control

7.1 Smart Tips – Overview

The following Smart Tips are available.

Smart Tips are attached to the instrument with magnetic connectors. The Smart Tips contain a memory chip so that the instrument can identify them. Due to design, Smart Tips will not allow operation of Mira P when seated in an incorrect position.

The following Smart Tips are within scope of delivery of Mira P Basic:

- Calibrate/Verify Attachment (CVA)
- Long Working Distance Attachment Lens (LWD)

The following Smart Tips are within scope of delivery of Mira P Advanced:

- Calibrate/Verify Attachment (CVA)
- Short Working Distance Attachment Lens (SWD)
- Long Working Distance Attachment Lens (LWD)
- Vial holder

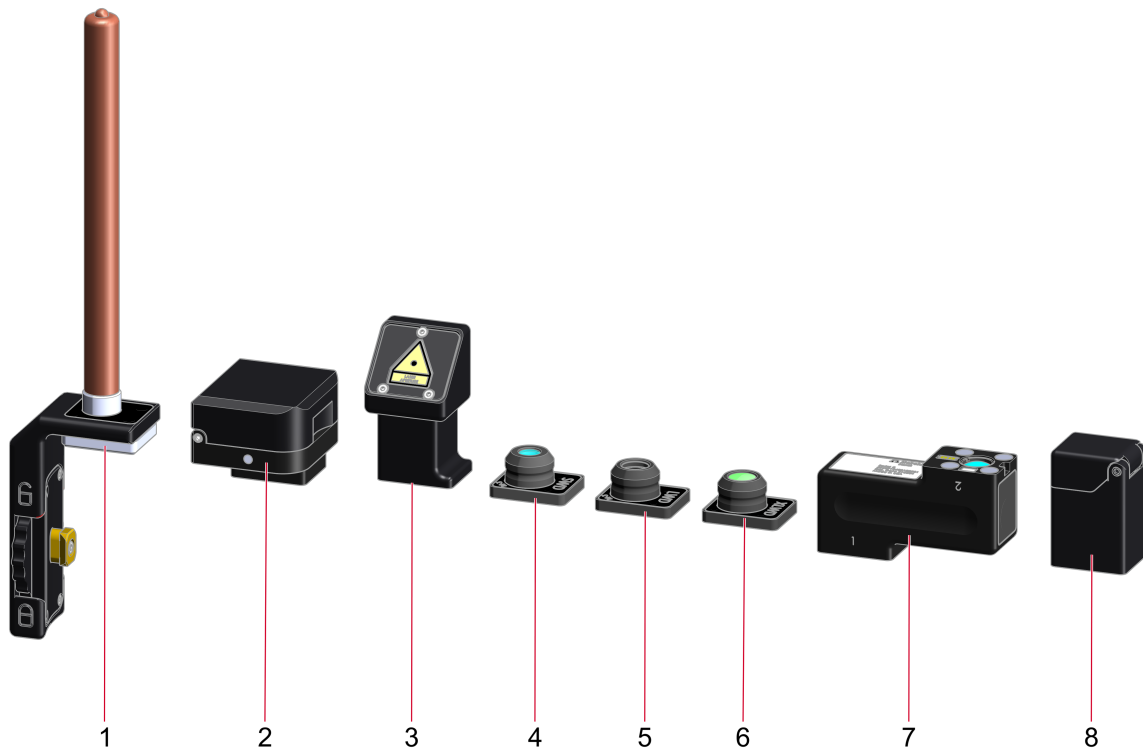The following Smart Tips are within scope of delivery of Mira P Flex:

- Calibrate/Verify Attachment (CVA)

> ### ℹ NOTICE
>
> A Smart Tip for the acquiring of samples must be purchased with Mira P Flex package to operate the device.

You can purchase other Smart Tips separately from Metrohm AG *Accessories (see chapter 1.5.1, page 4).*

1 2 3 4 5 6 7 8

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1 Contact Ball-Probe (6.07506.030)

The Contact Ball-Probe is an optional attachment.

The Contact Ball-Probe allows to collect data from a substance with no concern of proper focus. Simply contact the substance with the probe to acquire the data.

The 6″ (15.3 cm) stainless steel construction allows for easy cleaning.

The focal point on the probe is 400 microns from the tip of the lens. This means the probe will not perform well on substances through a bag. The probe is designed for direct contact of liquids and solids.

Sleeves are available to prevent contamination of the Contact Ball-Probe.

Class 3B laser operation.

2 Tablet Holder (6.07504.000)

The Tablet Holder is an optional attachment.

The Tablet Holder is used for different tablet or capsule shapes. A spring-loaded holder helps to mount and position the sample.

Interlock mechanism allows measurement with class 1 laser operation. The laser stops if the housing is opened.

3   Right Angle Attachment (6.07506.000)

The Right Angle Attachment is an optional attachment.

The Right Angle Attachment allows to collect data by placing the substance on a surface and laying the Mira P down next to the substance with the right angle tip covering the substance.

Ideal for a baggie on the hood of a squad car.

Class 3B laser operation.

4   Short Working Distance Attachment Lens (SWD) (6.07505.010)

A short distance lens for point and shoot measurement with class 3B laser operation.

The focal point is approximately **0.85 mm** from the top of the lens.

The SWD attachment lens is used for samples with direct contact or in thin plastic bags.

5   Long Working Distance Attachment Lens (LWD) (6.07505.000)

A long distance lens for point and shoot measurement with class 3B laser operation.

The focal point is approximately **8 mm** from the top of the lens.

The LWD attachment lens is used for samples in moderately thick-walled bottles.

6   Extra Long Working Distance Attachment Lens (XLWD) (6.07505.020)

An extra long distance lens for point and shoot measurement with class 3B laser operation.

The focal point is approximately **18 mm** from the top of the lens.

The XLWD attachment lens is used for samples in very thick containers as for example glass bottles.

7   Calibrate/Verify Attachment (CVA) (6.06071.040)

The CVA contains a toluene-acetonitrile calibration standard and a polystyrene verification sample.

The CVA is needed for the calibration of the instrument.

8   Vial Holder (6.07502.000)

The Vial Holder is used for samples in glass vials.

Interlock mechanism allows measurement with class 1 laser operation. The laser stops if the housing is opened.

7.2   Attaching Smart Tips

Using Calibrate/Verify Attachment

⚠️ **WARNING**

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 48)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

ℹ️ **NOTICE**

The CVA has 2 positions. Attaching the Smart Tip works the same way for both positions.

Attach the Smart Tip by engaging the bottom left corner of the tip into the left edge of the mounting point. Rotate the tip into position.

Side 1 of the CVA contains a toluene-acetonitrile standard for calibration.

Side 2 of the CVA contains a polystyrene sample for verification.

Using attachment lenses

⚠️ **WARNING**

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 48)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

Attach the Smart Tip by engaging the bottom left corner of the tip into the left edge of the mounting point. Rotate the tip into position.

Using Vial Holder

Closing the lid prevents laser radiation from emerging.

The lid contains a safety feature which cancels the measurement and stops the laser if you open the lid.

Attach the Smart Tip by engaging the bottom left corner of the tip into the left edge of the mounting point. Rotate the tip into position.

Open the Vial Holder and insert a vial to measure its contents.

Using Right Angle Attachment

> ⚠️ **WARNING**
>
> **Risk of injury by laser radiation**
>
> Serious eye injuries by laser radiation.
>
> - Follow the safety measures and instructions.
> - Instruments must be used by trained personnel only.
> - Instruments of the laser class 3B must be used in protected and labeled rooms only.
> - Appropriate protective glasses according to the technical specifications *(see page 48)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
> - Observe the nominal ocular hazard distance (NOHD).
> - Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

Attach the Smart Tip by engaging the bottom left corner of the tip into the left edge of the mounting point. Rotate the tip into position.

Using Contact Ball-Probe

> ⚠ **WARNING**
>
> **Risk of injury by laser radiation**
>
> Serious eye injuries by laser radiation.
>
> - Follow the safety measures and instructions.
> - Instruments must be used by trained personnel only.
> - Instruments of the laser class 3B must be used in protected and labeled rooms only.
> - Appropriate protective glasses according to the technical specifications *(see page 48)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
> - Observe the nominal ocular hazard distance (NOHD).
> - Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

Attach the Smart Tip.

Seat the brass knob into the recess on the left side of the Mira P.

Tighten using the brass knob on the attachment. Do not over tighten.

Using Tablet Holder

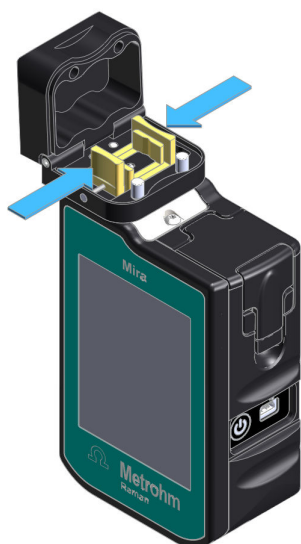Closing the lid prevents laser radiation from emerging.

The lid contains a safety feature which cancels the measurement and stops the laser if you open the lid.

Attach the Smart Tip by engaging the bottom left corner of the tip into the left edge of the mounting point. Rotate the tip into position.

Open the Tablet Holder. Push the levers and position the sample in the middle.

Release the levers to fix the sample.

7.3   Data acquisition

The following steps show how samples can be acquired with the instrument.

> ℹ **NOTICE**
>
> Operating procedures and users have to be defined and synchronized beforehand in Mira Cal P. Refer to Mira Cal P software tutorial for more information *Additional information - Software tutorials (see chapter 1.5, page 4)*

Make sure the instrument is connected to the power supply or has battery power.

1 **Switching on the instrument**

Switch on the instrument using the on/off switch.

2 **Login**

Select your user name from the dropdown list, enter your password and click on **[Login]**.

3 | **Attach smart tip**

If not already done, attach the correct smart tip to the instrument *Attaching Smart Tips (see chapter 7.2, page 28)*

Within an operating procedure a certain smart tip type may be required. A data acquisition will only be possible when the instrument recognizes the correct smart tip.

4 | **Selecting an operating procedure**
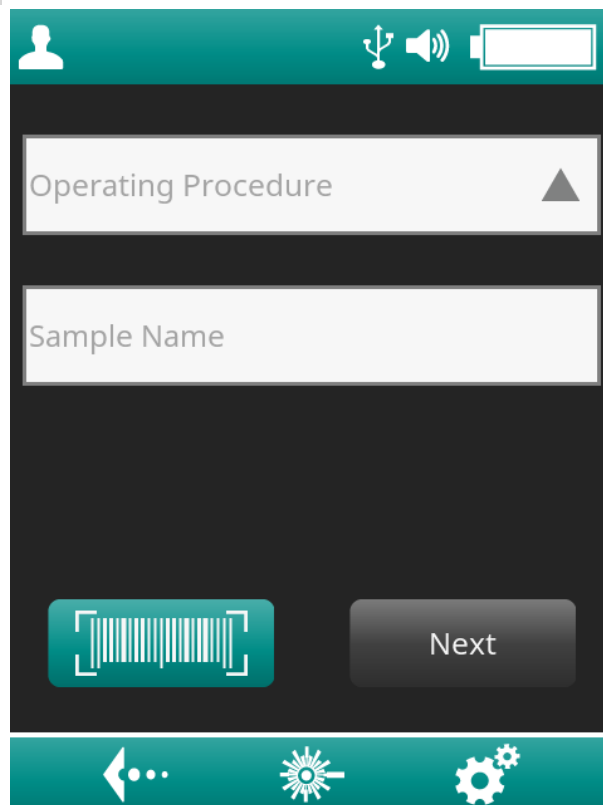
Select an operating procedure from the dropdown list.

5 | **Read a barcode**

Click on to use the barcode reader instead of typing in by hand.

Barcode functionality and behavior is defined in the operating procedure.

Click on **[Next]**.

6 **Enter Batch ID, Lot ID, Container**

Enter the Batch ID, Lot ID and Container by hand or use the barcode reader.

Click on **[Next]**.

7 **Arm laser**

Click on **[Arm laser]**.

Laser armed display is displayed.

8 **Measuring the sample**

- Click on **[Acquire]** to start the measurement.

When the measurement is finished, a spectrum is displayed with information according to definitions within the operating procedure.

9 **Measuring the next sample**

Click on **[Next]** to start the next measurement.

7.4 Calibrate an instrument

Calibration

1 Attach the CVA.

2 Click on the instrument settings icon ![gear icon].

3 Click on **[Calibrate Instrument]**.

4 Click on **[Calibrate]**.

> **ℹ NOTICE**
>
> Instrument calibration can also be done in Mira Cal P with a connected instrument.

System suitability test (SST)

1 Attach the CVA.

2 Click on the instrument settings icon ⚙.

3 Click on **System Suitability Test**.

4 Click on **Run SST**.

7.5 Configuration

Open Settings

1 Click on ⚙ to go to the settings section.

Speaker

Enable or disable the internal speaker. This will activate an acoustic signal when the barcode reader is used.

Calibrate Instrument

Calibrate the instrument *(see "Calibration", page 39)*.

System Suitability Test

Conduct a system suitability test *(see "System suitability test (SST)", page 39)*.

Shutdown Delay

> **ℹ NOTICE**
>
> The shutdown delay will only affect battery-powered instruments.
>
> For an instrument connected with a power supply, the shutdown delay is disabled.

By default, no shutdown delay is configured.

Define a shutdown time to conserve battery charge.

For example if you enter value "3": A battery-powered instrument will automatically shutdown after 3 minutes not in use.

Battery Chemistry

There are many different types of AA batteries. For an accurate battery life indicator, it is important to choose the battery chemistry that is being used in the device. The two chemistries that are supported are Li and NiMH.

Set the battery chemistry:

1 In the Settings section, click on **[Battery Chemistry]**.

2 Select the battery type:
- Lithium
- NiMH

The change will be reflected by the text in the battery indicator. This setting is persistent.

> ## ℹ NOTICE
>
> We recommend to change the batteries when the battery indicator changes color from white to yellow, orange or red.

7.6   Safe shutdown

> ## ℹ NOTICE
>
> To prevent unexpected behavior in the instrument, always perform a safe shutdown.
>
> A **safe shutdown** is performed in the following cases:
> - The on/off switch is pressed.
> - The battery is low.
> - A battery-powered instrument is not in use for the duration specified in the shutdown delay.

An **unsafe shutdown** is performed in the following cases:
- The on/off switch is pressed and held for 3 seconds or longer.
- The battery door is opened while running on batteries only.
- The USB is unplugged while running on USB only.

8 Maintenance

8.1 Maintenance agreement

Maintenance of the product is best carried out as part of an annual service performed by specialist personnel from Metrohm. Shorter maintenance intervals may be necessary if you frequently work with caustic and corrosive chemicals. Metrohm Service personnel are properly trained in procedures for safely repairing the instrument.

Routine cleaning of the instrument can be done using non-corrosive cleansers such as water, ethanol, or acetone.

Metrohm Service offers every form of technical advice for maintenance and service of all Metrohm products.

8.2 Checking and replacing product parts

To guarantee the flawless functioning and operation of the products as well as of their functional units, all parts must be regularly checked and replaced if needed.

> **ℹ NOTICE**
>
> The following points must always be observed:
>
> - The product is switched off.
> - The product is disconnected from the power grid.

In the following paragraphs you will find an explanation of how the product parts can be checked individually and what has to be taken into account. The procedure for replacing the parts is then described step-by-step where necessary.

> ⚠️ **WARNING**
>
> **Electric shock from electrical potential**
>
> Risk of injury by touching live components or through moisture on live parts.
>
> - Never open the housing of the product.
> - Protect live parts (e.g. power supply unit, power cord, connection sockets) against moisture.
> - If you suspect that moisture has gotten into the product, disconnect the product from the energy supply. Then notify Metrohm Service.
> - Only personnel who have been issued Metrohm qualification may perform service and repair work on electrical and electronic components.

8.3 Cleaning the product

> ⚠️ **WARNING**
>
> **Danger of poisoning and chemical burns from chemical hazardous substances**
>
> Poisoning and/or chemical burns by contact with aggressive chemical substances.
>
> - Use only detergents that do not cause any unwanted side reactions with the materials to be cleaned.
> - Clean contaminated surfaces.
> - Wear protective equipment.
> - Use exhaust equipment when working with vaporizing hazardous substances.
> - Dispose of chemically contaminated materials (e.g. cleaning material) properly.

⚠ WARNING

Electric shock from electrical potential

Risk of injury by touching live components or through moisture on live parts.

- Never open the housing of the product.
- Protect live parts (e.g. power supply unit, power cord, connection sockets) against moisture.
- If you suspect that moisture has gotten into the product, disconnect the product from the energy supply. Then notify Metrohm Service.
- Only personnel who have been issued Metrohm qualification may perform service and repair work on electrical and electronic components.

Cleaning the surfaces of the product

Prerequisites

- The product is disconnected from the power grid.

1 Clean the surfaces with a damp cloth.

ℹ NOTICE

If the suspicion arises that liquids have found their way into the product, disconnect the product from the power grid and contact your Metrohm Service.
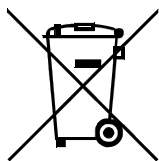
ℹ NOTICE

Water or ethanol can be used as a cleaning medium.

ℹ NOTICE

The connectors at the rear of the product must only be cleaned with a dry cloth.

9 Disposal

This product is covered by European Directive, WEEE – Waste Electrical and Electronic Equipment.

The correct disposal of your old product will help to prevent negative effects on the environment and public health.

More details about the disposal of your old product can be obtained from your local authorities, from waste disposal companies or from your local dealer.

10 Technical specifications

10.1   Ambient conditions

Nominal function range	−20 to +50 °C	(At a maximum of 93% humidity)
Storage and Transport	−20 to +70 °C	(At a maximum of 93% humidity)

10.2   Interfaces

USB connector	Type A/B mini USB connector (USB 3.0) with the following functions:	
	Power supply	
	Data transmission	
	with USB cable (6.2151.110)	

10.3   Energy Supply

Battery specifications	2 x 1.5 V, size AA	up to 3.5 hours
Nominal input voltage	5 V DC	
Power consumption	1,300 mA max.	
USB Mini-A/B Power Requirements		instrument connected to a powered USB hub
Input voltage	5 V DC	
Nominal input current	1,500 mA max.	

10.4   Dimensions and materials

Dimensions

Width	88.2 mm
Depth	45.3 mm
Height	125.5 mm
Display	3.7'' TFT LCD Display, glove compatible

Samples for Vial Holder

Vial Holder	Vials 15 mm x 26 mm

Weight   705 g

Material

Housing	Aluminum anodized
Accessories covering	Thermoplastic elastomers (TPE-E)
IP Rating (according to EN 60529)	IP67

Ruggedization   MIL-STD-810G Method 514.6C-1, C-2, C-3 Category 4

MIL-STD-810 Method 516.6 Procedure IV

MIL-STD-810G Method 516.6 Procedure VI

MIL-STD-810G Method 512.5 Procedure I

IEC 60529 Dust

10.5   Operating specifications

Laser wavelength	785 nm± 0.5 nm
Laser output power	≤ 100 mW
Wavenumber range	400–2,300 cm $^{-1}$
Spectral resolution	8–10 cm^{-1} (FWHM)
Collection optics	NA = 0.50, 1 mm and 7.6 mm working distance; 0.042–2.5 mm measuring spot size
Beam divergence	2 degrees
Detection technique	Orbital Raster Scan (ORS) to average over the sample
Laser class according to EN 60825-1	Class 3B
Protection Level of protective glasses (according to EN 207)	D LB5775–795 nm

NOHD – Nominal Ocular Hazard Distance

Contact Ball-Probe	34.5 cm
Right Angle Attachment	34 cm± 5 cm
Short Working Distance Attachment Lens (SWD)	34 cm ± 5 cm
Long Working Distance Attachment Lens (LWD)	34 cm± 5 cm
Extra Long Working Distance Attachment Lens (XLWD)	66 cm± 5 cm