MIRA XTR

2.926.01XX / 6.07506.070 / 6.2133.030

Product manual

8.0926.8005EN / v2 / 2023-11-30

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Raman

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MIRA XTR

2.926.01XX / 6.07506.070 / 6.2133.030

Firmware version 8.0.3.40 or higher

Product manual

8.0926.8005EN / v2 /
2023-11-30

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1 Overview

1.1 Instrument description

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

1.2 Instrument versions

1.2.1 MIRA XTR

MIRA XTR instruments are available in the following versions:

Table 1 Instrument versions

2.926.0110	MIRA XTR Basic MIRA XTR Basic is a starter package that contains the basic components required for operating MIRA XTR. Check *Metrohm Website* for parts included in the scope of delivery.	Class 3B laser product
2.926.0120	MIRA XTR Advanced MIRA XTR Advanced includes a wide selection of attachments suitable for standard applications in the fields of first responders, military and security officials. Check *Metrohm Website* for parts included in the scope of delivery.	Class 3B laser product

The article number and serial number for identification of the product can be found on the type label:

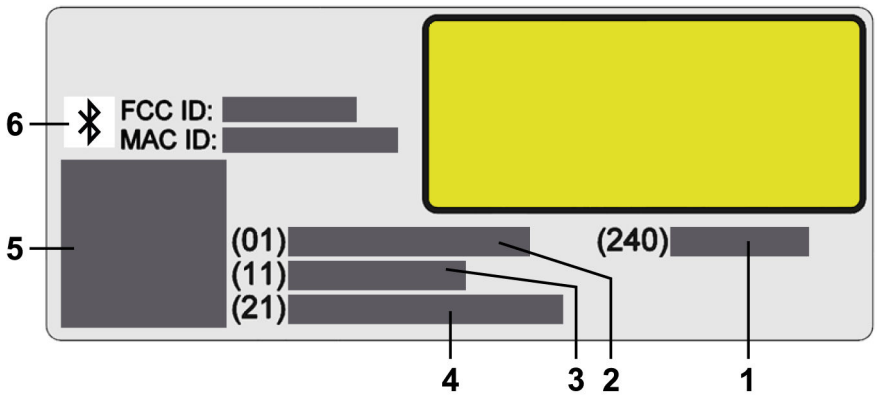

Figure 1 Sticker at the bottom of the instrument

1	**(240) = Metrohm article number**	**2**	**(01) = Article number in accordance with GS1 standard**
3	**(11) = Manufacturing date: month, year**	**4**	**(21) = Serial number**
5	**QR code**	**6**	**Bluetooth logo; FCC ID number (Federal Communications Commission); MAC address of the instrument**

1.2.2 Autofocus Stand-off Attachment (AFSO)

The **Autofocus Stand-off Attachment** is available in the following versions:

Table 2 Versions

6.07506.070	Autofocus Stand-off Attachment (AFSO)	Wavelength: 515 nm: Class 2 laser product Wavelength: 850 nm: Class 1 laser product

The instrument laser (**Class 3B**) is used for sample measurements with the Autofocus Stand-off Attachment. In addition, the Autofocus Stand-off Attachment uses the following lasers:

- A Class 2 green aiming laser to help target the sample.
- A Class 1 laser rangefinder for autofocus.

The article number and serial number for identification of the product can be found on the type label:

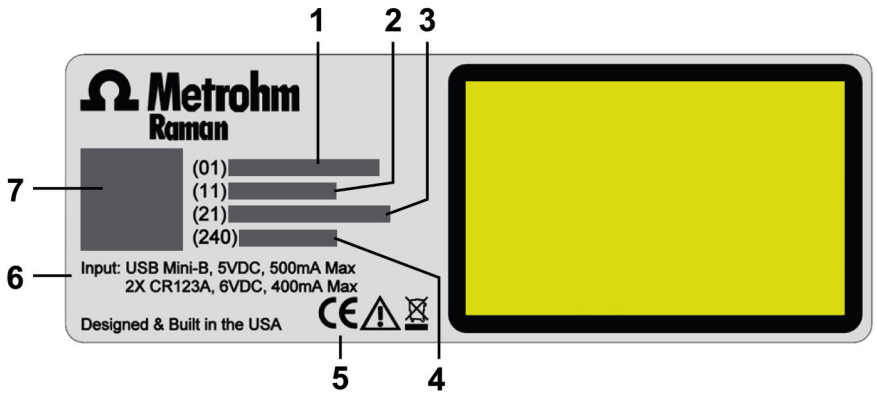

Figure 2 Sticker on the Autofocus Stand-off Attachment

1	**(01) = Article number in accordance with GS1 standard**	**2**	**(11) = Manufacturing date: month, year**
3	**(21) = Serial number**	**4**	**(240) = Metrohm article number**
5	**Certification**	**6**	**Connection specifications**
7	**QR code**		

1.2.3 MIRA PowerPack

MIRA PowerPack is available in the following versions:

Table 3 Versions

6.2133.030	MIRA PowerPack

The article number and serial number for identification of the product can be found on the type label:

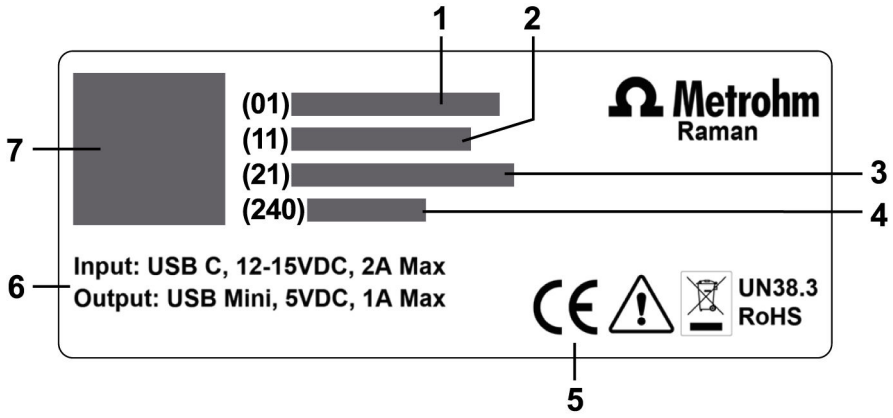

Figure 3 Sticker on MIRA PowerPack

1	**(01) = Article number in accordance with GS1 standard**	**2**	**(11) = Manufacturing date: month, year**
3	**(21) = Serial number**	**4**	**(240) = Metrohm article number**

1.3 Software

1.3.1 MIRA software and firmware

MIRA Cal DS software

In order to configure MIRA XTR, the following software is needed:

Table 4 Instrument versions

6.06071.020	MIRA Cal DS USB flash drive

To download the latest versions of MIRA Cal DS software (including firmware), click on the following link:

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

MIRA Cal M mobile app

MIRA Cal M allows the user to analyze, manage, or release samples acquired with MIRA XTR. MIRA Cal M mobile app can be optionally installed on an Android™ device (*see "Installing MIRA Cal M for Android", page 20*).

1.3.2 Software tutorials

Refer to the following manuals for information about the software:

- Tutorial MIRA Cal DS: 8.105.8069EN
- Tutorial MIRA Cal M: 8.0105.8023EN

Insert the product number into the search field on *https://www.metrohm.com* to find the manuals.

1.3.3 Third-party software

HazMasterG3® Software

HazMasterG3 is a CBRNE/IED and HME investigative tool for use in traditional incident response situations. The software delivers essential insights and important guidance for 167,000+ chemical agents (toxic industrial chemicals (TICs), toxic industrial materials (TIMs), chemical warfare agents (CWAs), precursors, trade names, etc.).

HazMasterG3 is compatible with MIRA XTR sample data and can be optionally installed on an Android or Windows® device.

Table 5 Instrument versions

6.6071.640	HazMasterG3 Software

The HazMasterG3 software is optional. To purchase the HazMasterG3 software, click on the following link:

https://www.metrohm.com/en-us/products-overview/66071640

1.4 About the documentation

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 Displaying accessories

Up-to-date information on the scope of delivery and on optional accessories can be found on the Metrohm website.

1 Searching for a product on the website

- Go to *https://www.metrohm.com*.
- Click on 🔍.
- Enter the article number of the product (e.g. **2.1001.0010**) into the search field and press **[Enter]**.

The search result is displayed.

2 Displaying product information

- To display the products matching the search term, click on **Product models**.
- Click on the desired product.

Detailed information regarding the product is displayed.

3 Displaying accessories and downloading the accessories list

- To display the accessories, scroll down to **Accessories and more**.
  - The **scope of delivery** is displayed.
  - Click on **[Optional parts]** for the optional accessories.
- To download the accessories list, click on **[Download accessories PDF]** under **Accessories and more**.

Metrohm recommends keeping the accessories list for reference purposes.

2 Safety

2.1 Intended use

MIRA XTR

MIRA XTR is a portable Raman spectrometer. The instrument is suitable for outdoor use. It enables contactless and non-destructive analysis of liquids, solids and powders.

MIRA XTR was developed to provide rapid information on unknown or illegal materials in critical situations, especially for law enforcement, military or other defence and security professionals.

Depending on the intended use, the instrument is equipped with a suitable sampling attachment (Smart Tip). The nominal ocular hazard distance (NOHD) applicable to the respective Smart Tip must be taken into account at all times.

The **Stand-off Attachment** and the **Autofocus Stand-off Attachment** are not meant to be used outdoors. They may be operated only in a defined and monitored laser area.

MIRA XTR can be used in combination with a location-exploration robot.

Autofocus Stand-off Attachment (AFSO)

The AFSO may be operated only together with MIRA XTR or MIRA DS.

The AFSO may be operated only in a defined and monitored laser area.

The AFSO enables working from a distance.

MIRA PowerPack

MIRA PowerPack may only be operated together with MIRA XTR, MIRA DS or MIRA P.

MIRA PowerPack is an external rechargeable battery designed to extend the time of operation.

2.2 Responsibility of the operator

The operator must ensure that the basic regulations on occupational safety and accident prevention are observed. The operator has the following responsibilities:

- Identify the hazards to the safety and health of its personnel and implement the necessary protective measures and precautions.
- Instruct personnel in the safe handling of the product.
- Train personnel in the use of the product according to the user documentation (e.g. install, operate, clean, eliminate faults).
- Train personnel on basic occupational safety and accident prevention regulations.
- Provide personal protective equipment (e.g. protective glasses, gloves).
- Provide suitable tools and equipment to carry out the work safely.
- Ensure compliance with applicable laws, regulations and standards.

The product may be used only when its status is perfect. The following measures are required to ensure the safe operation of the product:

- Check the status of the product before use.
- Remedy defects and malfunctions immediately.
- Maintain and clean the product regularly.

2.3 Requirements for operating personnel

Only qualified personnel may operate the product. Qualified personnel are persons who meet the following requirements:

- Basic regulations on occupational safety and accident prevention are known and complied with.
- Knowledge of handling hazardous chemicals is present. Personnel have the ability to recognize and avoid potential dangers.
- Knowledge regarding the application of fire prevention measures is present.
- Safety-relevant information is communicated and understood. The personnel can operate the product safely.
- The user documentation has been read and understood. Personnel operate the product according to the instructions in the user documentation.
  CAUTION – Operations, settings or procedures other than those specified in the user documentation may result in hazardous radiation exposure.

2.4 Safety instructions

2.4.1 Danger from electrical potential

A considerable risk of injury exists in connection with touching live parts.

- Never open the housing of the instrument when the power cord is connected. You can not service or replace any parts inside the housing.
- Only personnel who have been issued Metrohm qualification may perform service and repair work on electric and electronic parts.
- The electrical safety of the instrument is ensured as part of the international standard IEC 61010.

2.4.2 Laser safety

Nominal ocular hazard distance (NOHD)

The following information refers to the nominal ocular hazard distance (NOHD) for the instrument MIRA XTR in accordance with EN 60825-1 (Safety of laser products), *see chapter 10.5, Operating specifications, page 93*.

Risk of injury by laser radiation

Laser radiation can cause serious eye damages.

- Instruments must be used by trained personnel only. Follow the safety measures and instructions.
- Avoid exposure to laser radiation and specular reflections. Do not point the instrument at people.
- When working with open laser beams (3B laser classification of the complete device), **appropriate protective glasses** must be used, see Operating specifications chapter in the MIRA device manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used (*see chapter 10.5, Operating specifications, page 93*). This distance defines the danger zone.
- Observe national laws.
  If there is no specific safety standard or safety regulation for the working area, observe the standard ANSI Z136.1 or supplement IEC 60825.14 for guidance on the safe use of lasers.

You can purchase protective laser glasses (6.7560.010) from Metrohm AG *(see "Displaying accessories", chapter 1.5, page 7)*.

Laser classification of the MIRA XTR

The laser classification of the complete device depends on the Smart Tip used.

Attached Smart Tip	Complete device classification	
	Laser Class 1	Laser Class 3B
Right Angle Attachment		X
Universal Attachment		X
Intelligent Universal Attachment		X
Stand-off Attachment		X
Autofocus Stand-off Attachment (AFSO)		X
Contact Ball-Probe		X
Calibration Standard	X	
Vial Holder	X	
Tablet Holder	X	
Short Working Distance Attachment Lens (SWD)		X
Long Working Distance Attachment Lens (LWD)		X
Extra Long Working Distance Attachment Lens (XLWD)		X
SERS Attachment		X

Interlock mechanism

Tablet Holder, Vial Holder and Calibration Standard have an interlock mechanism for measurement. This mechanism prevents laser radiation from emerging. Laser stops immediately if:

- The covering of the Smart Tip is opened.
- The attached Smart Tip is disconnected from the instrument.

Risk of injury when working with the SERS Attachment

The **SERS Attachment** (6.07506.040) does **not** have an interlock mechanism. When the flip-top lid is open, laser light can escape from the laser aperture and cause serious eye damage.

- Remove the SERS Attachment from the device or switch off the device before opening the flip-top lid for decontamination.

Risk of injury when measuring thermally sensitive materials

Measuring a thermally sensitive sample that is in a tightly sealed vessel can lead to a pressure increase and subsequent explosion of the vessel.

2.4.3 Laser warning signs

2.4.3.1 MIRA XTR

The instrument is equipped with laser warning stickers, which are explained below.

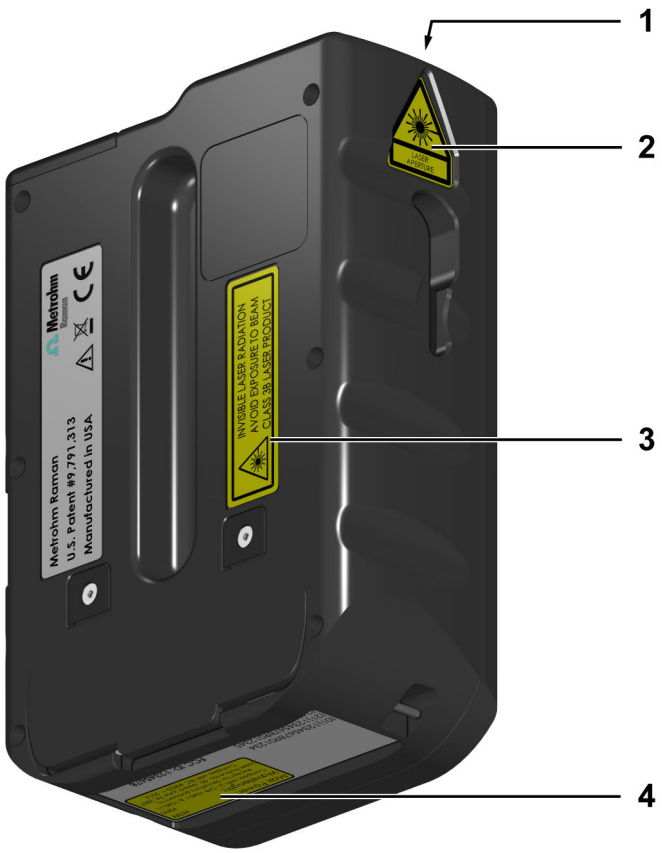


Figure 4 Warning stickers on the instrument

1	**Laser aperture** Emergence of laser	**2**	**Laser aperture sticker**
3	**Laser classification of the instrument** **Class 3B** laser product *Invisible laser radiation* *Avoid exposure to beam*	**4**	**Laser specifications**

Laser specifications

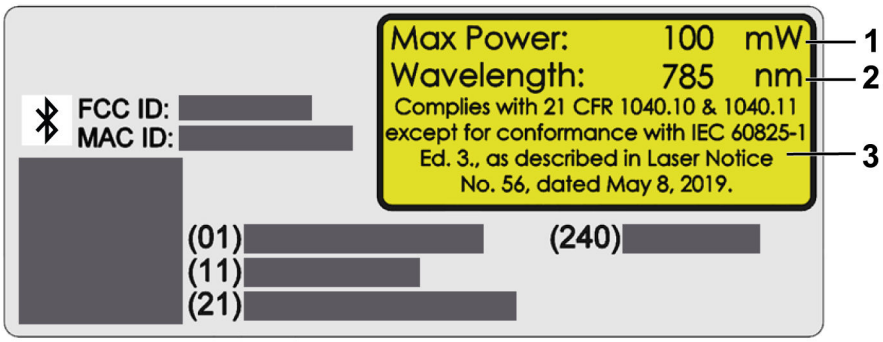
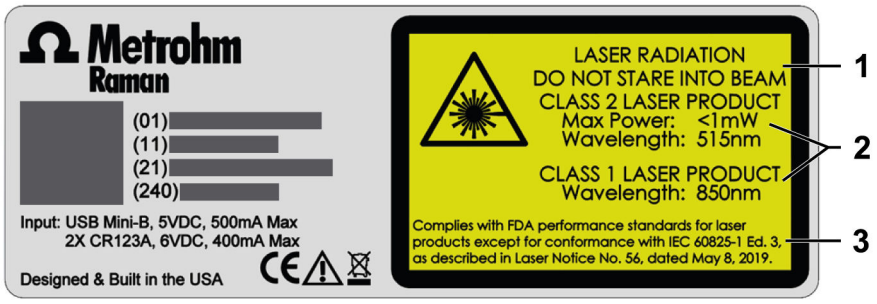


Figure 5 Sticker at the bottom of the instrument

1	**Max Power: 100 mW**
2	**Wavelength: 785 nm**
3	**Compliance** Complies with 21 CFR 1040.10 & 1040.11 except for compliance with IEC 60825-1 Ed.3, as described in the Laser Notice No. 56, dated May 8, 2019.

2.4.3.2 Autofocus Stand-off Attachment (AFSO)



1	**Laser radiation** **Do not look into the beam**
2	**Laser classification** Wavelength 515 nm: **Class 2 laser product** Wavelength 850 nm: **Class 1 laser product**
3	**Compliance** Complies with FDA performance standards for laser products except for compliance with IEC 60825-1 Ed.3 as described in the Laser Notice No. 56, dated May 8, 2019.

The instrument laser (**Class 3B**) is used for sample measurements with the Autofocus Stand-off Attachment. In addition, the Autofocus Stand-off Attachment uses the following lasers:

- A Class 2 green aiming laser to help target the sample.
- A Class 1 laser rangefinder for autofocus.

2.5 Warning messages

Structure

1. Severity of the danger (signal word)
2. Type and source of danger
3. Consequences of disregarding the danger
4. Avoidance (measures for averting the danger)

Hazard levels

Signal color and signal word designate the hazard level.

DANGER

Indicates an immediate danger. It will result in serious injuries or death if not avoided.

WARNING

Indicates a potential danger. Failure to avoid the danger may result in death or serious injury.

CAUTION

Indicates a potential danger. If not avoided, it may result in light or minor injuries.

NOTICE

Indicates a potentially damaging situation. If not avoided, the product or something in the surrounding area could be damaged.

2.6 Meaning of warning signs

This documentation uses the following warning signs:

Table 6 Warning sign according to ISO 7010

Warning sign	Meaning
	General warning sign
	Warning of electrical voltage
	Warning of hand injuries
	Warning of sharp object
	Warning of hot surface
	Warning of biological hazard
	Warning of toxic materials
	Warning of flammable materials
	Warning of corrosive substances
	Warning of optical radiation
	Warning of laser beams

Depending on the intended use of the product, the corresponding warning sign stickers must be placed on the product.

3 Functional description

3.1 Overview of the instrument

Figure 6 MIRA XTR – Front

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

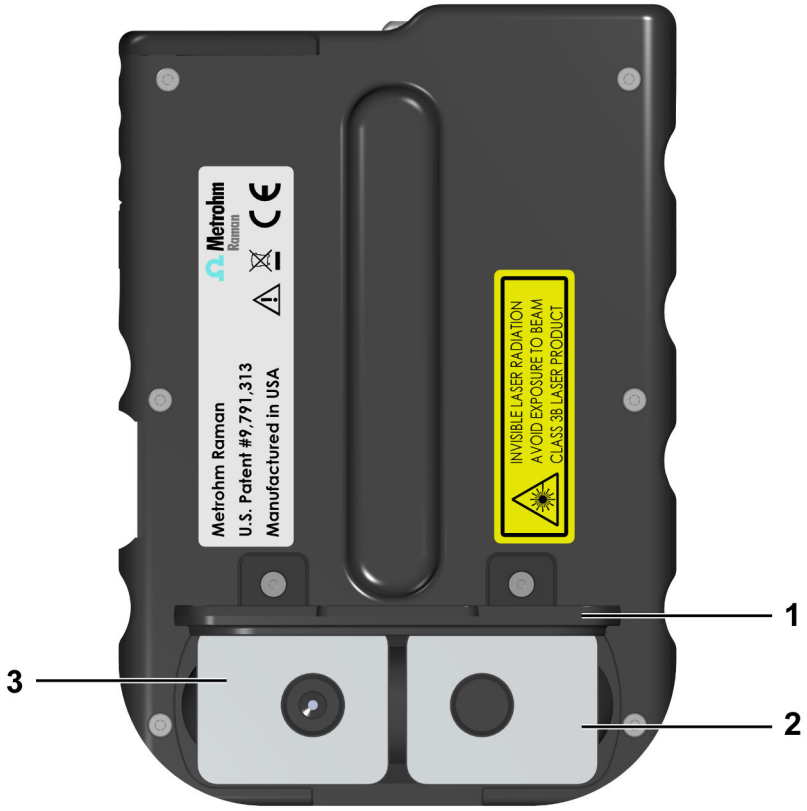


Figure 7 MIRA XTR – Rear

1	**Accessories covering**
2	**Long Working Distance Attachment Lens (LWD) or Extra Long Working Distance Attachment Lens (XLWD) Storage**
3	**Short Working Distance Attachment Lens (SWD) Storage**

4 Delivery and storage

4.1 Delivery

Inspect the delivery immediately upon receipt:

- Check the delivery against the delivery note to ensure completeness.
- Check the product for damage.
- If the delivery is incomplete or damaged, contact your regional Metrohm representative.

4.2 Packaging

The product and accessories are supplied in protective special packaging. Keep this packaging to ensure safe transportation of the product. If a transport locking device is present, keep this as well for future reuse.

4.3 Storage

Always remove batteries if the instrument is not in use.

5 Installation

5.1 Installing HazMasterG3 app for Android

The installation of HazMasterG3 is optional (6.6071.640).

HazMasterG3 is a CBRNE/IED and HME investigative tool for use in traditional incident response situations. It delivers insights and guidance for 167,000+ chemical agents (toxic industrial chemicals (TICs), toxic industrial materials (TIMs), chemical warfare agents (CWAs), precursors, trade names, etc.).

Install app from USB flash drive

1. Plug the USB flash drive into the Android device. Use the adapter if necessary.
2. USB flash drive files may automatically open when plugged in. If they do not, navigate on the Android device to **Files**.
3. Look for the HazMasterG3 app. InstallMe_1st.apk Select the app.
4. You will be asked if you want to install. Click **Next** ▶ **Install**.

   You may have to turn off the security on the phone to install the app.
5. A message will display that the app has been installed.
6. On the Android device, navigate to **Apps** and select **HazMaster**.

   When prompted, grant the requested permissions.

   Refer to the HazMasterG3 manual for help with the application.

5.2 Installing MIRA Cal M for Android

The installation of MIRA Cal M is optional.

With MIRA Cal M you can conveniently store, manage and exchange data acquired on a MIRA instrument. The app allows not only to activate or deactivate purchased libraries, but also to transfer data between the MIRA instrument and MIRA Cal M.

Getting the app on Google Play™

MIRA Cal M was developed for Android version 8.0 to 11.0.

1. On the Android device, open the Google Play Store app.

   Alternatively, you can also go to *play.google.com*.

2. Select the white bar at the top of the page to bring up the keyboard. Type: **MIRA Cal M**

3. Select the **MIRA Cal M** app.

4. Select **[Install]**.

5. Once download and installation are completed, open the **MIRA Cal M** app.

   When prompted, grant the requested permissions.

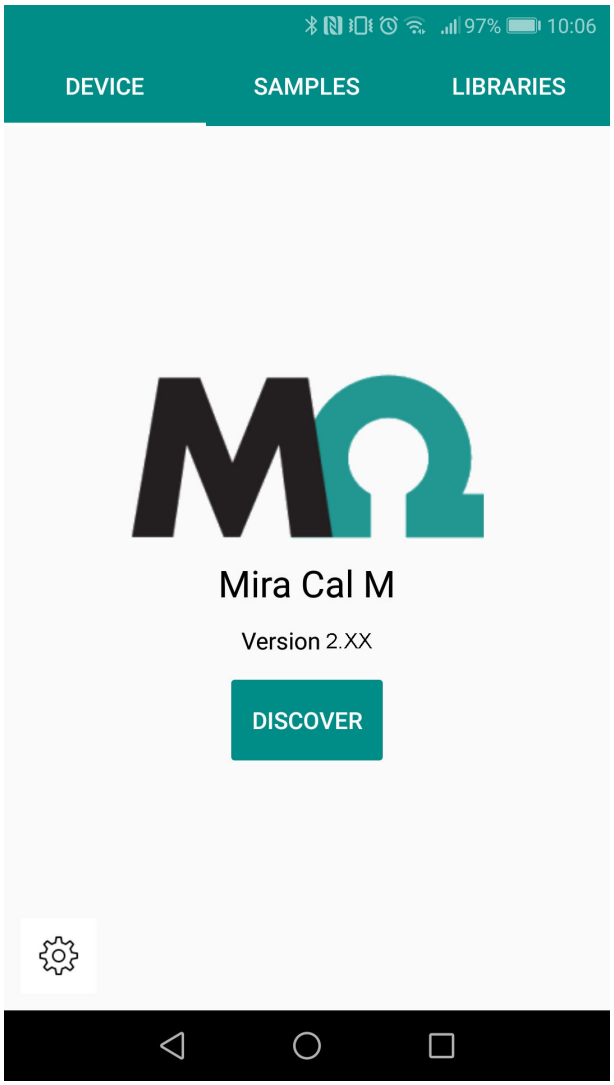


Figure 8 MIRA Cal M home screen

When MIRA Cal M is launched, libraries are downloaded in the background. For a successful download, the app has to be open and the Android device has to be connected to the internet. This process can take a few minutes.

5.3 Energy supply

5.3.1 Energy supply with batteries

Battery indicator	State of charge
	Full
	Almost full
	Half-full
	Yellow battery warning Metrohm recommends replacing the batteries when the battery indicator changes color from yellow to red.
	Red battery warning The instrument will give a low battery warning and then shut down.

Power save mode

You can configure an automatic shutdown to save battery life (*see "System Settings menu", page 72*).

An optional MIRA PowerPack is available for 9+ hours operating time (*see "Energy supply with MIRA PowerPack", page 24*).

Changing batteries

The instrument uses two replaceable or rechargeable batteries of the AA 1.5 V DC type.

Battery type recommendation

Use AA Energizer® Ultimate Lithium™-type batteries. Metrohm recommends as well rechargeable NiMH Panasonic eneloop pro™ batteries.

1

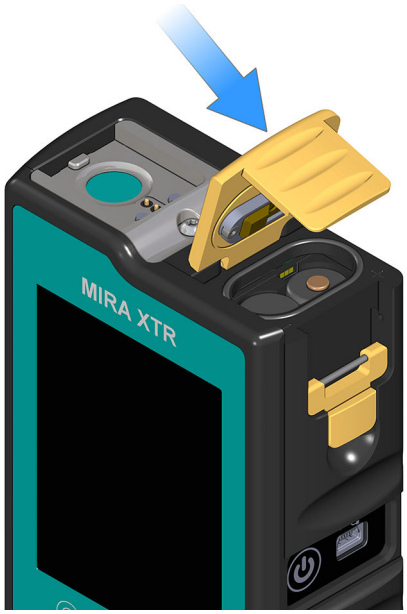
Pull the lever.

2

Open the top lid.

Replace the batteries. Refer to the plus and minus signs on the housing.

3



Close the lid.

4

Push the lid downwards until it lock release mechanism engages.

5.3.2 Energy supply with MIRA PowerPack

MIRA PowerPack is an optional external Li-ion battery pack. MIRA PowerPack can be attached to operate the instrument for 9+ hours.

During operation with MIRA PowerPack, automatic shutdown is disabled. Metrohm recommends inserting batteries into the instrument for safety.

If both internal AA batteries and MIRA PowerPack are installed, the following applies:

- MIRA PowerPack is discharged before the internal batteries.
- MIRA PowerPack can be replaced during operation.

Figure 9 MIRA PowerPack – Front

1 **Charge indicator** 4 LED indicator lights show the state of charge.	**2** **Check button** The check button lights up the charge indicator.
3 **Lock button** The lock button is used for mounting MIRA PowerPack onto the instrument.	**4** **USB Mini-B plug** The USB Mini-B plug connects MIRA PowerPack with the instrument.

Figure 10 MIRA PowerPack – Rear

1 USB-C connector
USB connector for charging MIRA PowerPack.

Do not bend the cable.

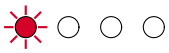
Charging instructions

MIRA PowerPack is shipped at <25% charge, in accordance with IATA regulations. Please charge MIRA PowerPack fully before first use.

1 Plug the power charger to the power grid and connect the USB-C plug to MIRA PowerPack USB-C connector.

The charge indicator will flash briefly while MIRA PowerPack determines the charge voltage.

After a few seconds, the charge indicator will display the current state of charge.

Charging procedure	
	0%–25%
	25%–50%
	50%–75%
	75%–100%
	100%
Red lights progressing from 1 to 4	Charging procedure paused due to temperature.

If no LED lights up after 30 minutes of charging procedure, press Ω for 10 seconds.

2 As soon as MIRA PowerPack is fully charged (all 4 LEDs are green), disconnect the power charger from the power grid.

Installing MIRA PowerPack

Remove the lanyard from the lanyard pins.

- Holding the MIRA XTR and MIRA PowerPack with the front side facing forward, hook MIRA PowerPack's right latch onto the instrument's right lanyard pin.
- Press and hold down the lock button.
- Rotate MIRA PowerPack's left latch onto the instrument's left lanyard pin.
- Release the lock button.

Connect the USB Mini-B plug to the instrument.

Checking the MIRA PowerPack state of charge

1 To check the state of charge, press the Check button Ω.

MIRA PowerPack charge indicator will light for approximately 3 seconds. 4 LED indicator lights show the state of charge.

MIRA PowerPack state of charge	
● ● ● ●	75%–100%

MIRA PowerPack state of charge	
● ● ● ○	50%–75%
● ● ○ ○	25%–50%
● ○ ○ ○	<25%
✳ ○ ○ ○	<5%, No output

5.4 USB connection

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.

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 initiates an instrument start-up.

5.5 Safe shutdown

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.

6 Initial configuration

Configuration

Use MIRA Cal DS software to change instrument settings and to install spectral libraries.

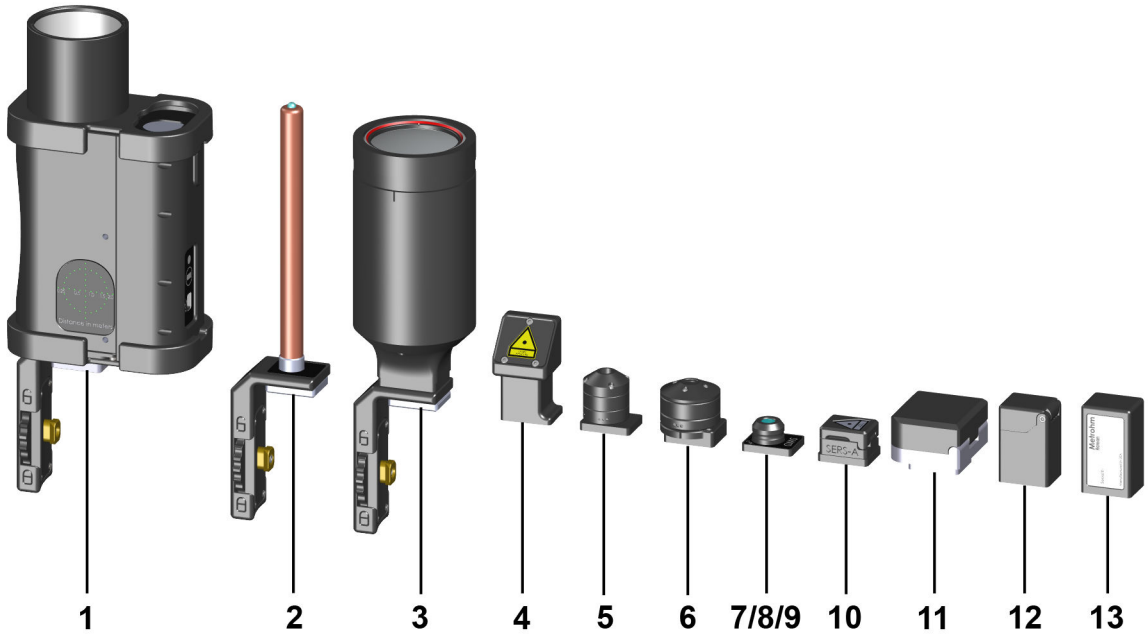
Refer to MIRA Cal DS software tutorial for detailed information ().

7 Operation and control

7.1 Smart Tips – Overview

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 its design, Smart Tips will not allow operation of the instrument when seated in an incorrect position.

The scope of delivery depends on the instrument version (*see "MIRA XTR", page 1*). You can purchase other attachments separately from Metrohm AG (*see "Displaying accessories", page 7*). The following Smart Tips are available:



1	**Autofocus Stand-off Attachment (6.07506.070)**	**2**	**Contact Ball-Probe (6.07506.030)**
3	**Stand-off Attachment (6.07506.020)**	**4**	**Right Angle Attachment (6.07506.000)**
5	**Universal Attachment (6.07506.010)**	**6**	**iUA – MIRA intelligent Universal Attachment (6.07506.060)**
7	**Short Working Distance Attachment Lens (SWD) (6.07505.010)**	**8**	**Long Working Distance Attachment Lens (LWD) (6.07505.000)**

9	**Extra Long Working Distance Attachment Lens (XLWD) (6.07505.020)**
10	**SERS Attachment (6.07506.040)**
11	**Tablet Holder (6.07504.000)**
12	**Vial Holder (6.07502.000)**
13	**Calibration Standard (6.07501.010)**

1	The **Autofocus Stand-off Attachment (AFSO)** allows the data collection from a distance of 0.3 m to 2.0 m. The Autofocus Stand-off Attachment uses a Class 2 green aiming laser to help target the sample. It then automatically obtains the distance to the target and adjusts the Raman collection lenses to obtain high quality data. Perfect for mounting on a robot. The Autofocus Stand-off Attachment is not meant to be used outdoors. It is designed for use in low-light situations. Laser class 3B operation.
2	The **Contact Ball-Probe** allows to collect data on a sample with no concern of proper focus. Simply contact the substance with the probe to acquire the data. The 6” (15.3 cm) length of the 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 with liquids and solids. Sleeves are available to prevent contamination of the Contact Ball-Probe. Laser class 3B operation.
3	The **Stand-off Attachment** enables data collection from a manually adjustable distance of 0.25 m to 1.5 m. The Stand-off Attachment can be used for the determination of the contents in a 55-gallon drum/barrel or scan a container from across the room. The Stand-off Attachment is not meant to be used outdoors. It is designed for use in low-light situations. Laser class 3B operation.
4	The **Right Angle Attachment** allows the collection of data by placing the substance on a surface and laying the MIRA XTR down next to the substance with the Right Angle Attachment covering the substance. Ideal for a baggie on the hood of a squad car. Laser class 3B operation.

5	The **Universal Attachment** is an attachment with 3 different sampling distances: ▪ Use position ● for focusing through bottles. The focal point is approximately **5 mm** from the end of the attachment. ▪ Use position ●● for thin plastic bags. The focal point is approximately **3 mm** from the end of the attachment. ▪ Use position ●●● for direct contact. The focal point is approximately **1.0 mm** from the end of the attachment. Laser class 3B operation.
6	The **iUA** provides the flexibility of a universal attachment with the intelligent mode of operation of the MIRA Smart Tips. ▪ Use position ● for direct contact. The focal point is approximately **1.0 mm** from the end of the attachment. ▪ Use position ●● for thin plastic bags. The focal point is approximately **4 mm** from the end of the attachment. ▪ Use position ●●● for focusing through bottles. The focal point is approximately **8 mm** from the end of the attachment. In connection with the Content ID operating procedure, the iUA will display the container material and the internal contents in an easy-to-understand display. Laser class 3B operation.
7	**Short Working Distance Attachment Lens (SWD)** for point and shoot measurement at short distance with laser class 3B. The focal point is approximately **1.0 mm** from the top of the lens. The Short Working Distance Attachment Lens (SWD) is used for samples with direct contact or in thin plastic bags.
8	**Long Working Distance Attachment Lens (LWD)** for point and shoot measurement at long distance with laser class 3B. The focal point is approximately **8 mm** from the top of the lens. The LWD attachment lens is used for samples in thick-walled bottles.
9	The **Extra Long Working Distance Attachment Lens (XLWD)** is used for point and shoot measurements. The focal point is approximately **18 mm** from the top of the lens. The Extra Long Working Distance Attachment Lens (XLWD) is used for samples in very thick containers as for example glass bottles. Laser class 3B operation.
10	The **SERS Attachment** accommodates proprietary SERS substrates. Laser class 3B operation.

11	The **Tablet Holder** is used for different tablet or capsule shapes. A spring-loaded holder helps to mount and position the sample. The interlock mechanism allows measurement with laser class 1. The laser stops if the housing is opened.
12	The **Vial Holder** is used for samples in glass vials. The interlock mechanism allows measurement with laser class 1. The laser stops if the housing is opened.
13	The **Calibration Standard** is needed for the calibration of the instrument. The Calibration Standard contains an ASTM 1840 check sample. The Calibration Standard is in the scope of delivery.

7.2 Attaching and using Smart Tips

Calibration Standard

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

Short Working Distance Attachment Lens (SWD), Long Working Distance Attachment Lens (LWD), Extra Long Working Distance Attachment (XLWD)

WARNING

Eye damage from laser radiation

Laser radiation can cause serious eye damages.

- Instruments must be used by trained personnel only. Follow the safety measures and instructions.
- Avoid exposure to laser radiation and specular reflections. Do not point the instrument at people.
- When working with open laser beams (3B laser classification of the complete device), **appropriate protective glasses** must be used, see Operating specifications chapter in the MIRA device manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used. This distance defines the danger zone.
- Observe national laws.

  If there is no specific safety standard or safety regulation for the working area, observe the standard ANSI Z136.1 or supplement IEC 60825.14 for guidance on the safe use of lasers.

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

Intelligent Universal Attachment (iUA), Universal Attachment

WARNING

Eye damage from laser radiation

Laser radiation can cause serious eye damages.

- Instruments must be used by trained personnel only. Follow the safety measures and instructions.
- Avoid exposure to laser radiation and specular reflections. Do not point the instrument at people.
- When working with open laser beams (3B laser classification of the complete device), **appropriate protective glasses** must be used, see Operating specifications chapter in the MIRA device manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used. This distance defines the danger zone.
- Observe national laws.

  If there is no specific safety standard or safety regulation for the working area, observe the standard ANSI Z136.1 or supplement IEC 60825.14 for guidance on the safe use of lasers.

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

The attachment has 3 positions. Rotate the attachment to change the position.

The dots indicate the position of the attachment.

	Intelligent Universal Attachment (iUA)	**Universal Attachment**
Dots on attachment	Position ● = Surface (direct contact) Position ●● = Plastic bag Position ●●● = Bottle	Position ● = Bottle Position ●● = Plastic bag Position ●●● = Surface (direct contact)
On screen indication	**IUA-1** = Surface **IUA-2** = Bag **IUA-3** = Bottle	Universal

Vial Holder

Closing the covering prevents laser radiation from emerging.

The covering contains a safety feature which cancels the measurement and stops the laser if the lid is opened.

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

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

Right Angle Attachment

WARNING

Eye damage from laser radiation

Laser radiation can cause serious eye damages.

- Instruments must be used by trained personnel only. Follow the safety measures and instructions.
- Avoid exposure to laser radiation and specular reflections. Do not point the instrument at people.
- When working with open laser beams (3B laser classification of the complete device), **appropriate protective glasses** must be used, see Operating specifications chapter in the MIRA device manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used. This distance defines the danger zone.
- Observe national laws.

  If there is no specific safety standard or safety regulation for the working area, observe the standard ANSI Z136.1 or supplement IEC 60825.14 for guidance on the safe use of lasers.

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

Contact Ball-Probe

WARNING

Eye damage from laser radiation

Laser radiation can cause serious eye damages.

- Instruments must be used by trained personnel only. Follow the safety measures and instructions.
- Avoid exposure to laser radiation and specular reflections. Do not point the instrument at people.
- When working with open laser beams (3B laser classification of the complete device), **appropriate protective glasses** must be used, see Operating specifications chapter in the MIRA device manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used. This distance defines the danger zone.
- Observe national laws.

  If there is no specific safety standard or safety regulation for the working area, observe the standard ANSI Z136.1 or supplement IEC 60825.14 for guidance on the safe use of lasers.

Attach the Smart Tip.

Seat the brass knob into the recess on the left side of the instrument.

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

Stand-off Attachment

WARNING

Eye damage from laser radiation

Laser radiation can cause serious eye damages.

- Instruments must be used by trained personnel only. Follow the safety measures and instructions.
- Avoid exposure to laser radiation and specular reflections. Do not point the instrument at people.
- When working with open laser beams (3B laser classification of the complete device), **appropriate protective glasses** must be used, see Operating specifications chapter in the MIRA device manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used. This distance defines the danger zone.
- Observe national laws.

  If there is no specific safety standard or safety regulation for the working area, observe the standard ANSI Z136.1 or supplement IEC 60825.14 for guidance on the safe use of lasers.

The **Stand-off Attachment** and the **Autofocus Stand-off Attachment** are not meant to be used outdoors. They may be operated only in a defined and monitored laser area.

Attach the Smart Tip.

Seat the brass knob into the recess on the left side of the instrument.

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

Manually adjust the adjustment ring to the desired Stand-off distance and perform the measurement.

Metrohm recommends using a tripod in connection with the Stand-off Attachment.

Autofocus Stand-off Attachment (AFSO)

WARNING

Eye damage from laser radiation

Laser radiation can cause serious eye damages.

- Instruments must be used by trained personnel only. Follow the safety measures and instructions.
- Avoid exposure to laser radiation and specular reflections. Do not point the instrument at people.
- When working with open laser beams (3B laser classification of the complete device), **appropriate protective glasses** must be used, see Operating specifications chapter in the MIRA device manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used. This distance defines the danger zone.
- Observe national laws.

  If there is no specific safety standard or safety regulation for the working area, observe the standard ANSI Z136.1 or supplement IEC 60825.14 for guidance on the safe use of lasers.

The **Stand-off Attachment** and the **Autofocus Stand-off Attachment** are not meant to be used outdoors. They may be operated only in a defined and monitored laser area.

Attach the Smart Tip.

Seat the brass knob into the recess on the left side of the instrument.

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

Metrohm recommends using a tripod in connection with the Autofocus Stand-off Attachment.

Follow the on-screen instruction to turn on the aiming laser and obtain the distance to the target.

SERS Attachment

WARNING

Risk of injury with SERS Attachment!

Serious eye damage.

- The **SERS Attachment** (6.07506.040) does **not** have an interlock mechanism.
  Laser light can escape from the laser aperture when the flip-top lid is open.
- Remove the SERS Attachment from the device or switch off the device before opening the flip-top lid for decontamination.

WARNING

Eye damage from laser radiation

Laser radiation can cause serious eye damages.

- Instruments must be used by trained personnel only. Follow the safety measures and instructions.
- Avoid exposure to laser radiation and specular reflections. Do not point the instrument at people.
- When working with open laser beams (3B laser classification of the complete device), **appropriate protective glasses** must be used, see Operating specifications chapter in the MIRA device manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used. This distance defines the danger zone.
- Observe national laws.

  If there is no specific safety standard or safety regulation for the working area, observe the standard ANSI Z136.1 or supplement IEC 60825.14 for guidance on the safe use of lasers.

Attach the Smart Tip.

Slide the SERS paper substrate, **printed side down**, into the slot on the side of the attachment. Insert the strip until resistance is met. The attachment accommodates the strip up to the optimal depth.

WARNING

Risk of injury with SERS Attachment!

Serious eye damage.

- The **SERS Attachment** (6.07506.040) does **not** have an interlock mechanism. Laser light can escape from the laser aperture when the flip-top lid is open.
- Remove the SERS Attachment from the device or switch off the device before opening the flip-top lid for decontamination.

1. **Remove the attachment from the instrument** or switch off the instrument.
2. Open the flip-top lid of the attachment.
3. Remove the strip.
4. Wipe down interior surfaces with a Kimwipe or swab. Use ethanol or isopropanol to clean the attachment.

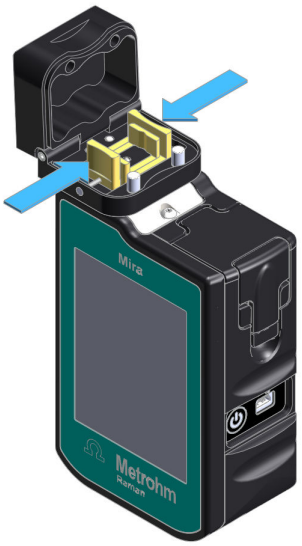
Cleaning is intended to remove residues from previous substrates, rather than for polishing the window.

Tablet Holder

Closing the covering prevents laser radiation from emerging.

The covering contains a safety feature which cancels the measurement and stops the laser if the lid is opened.

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



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

Release the levers to fix the sample in place.

7.3 Acquiring data

The following steps show how to acquire spectra with the instrument.

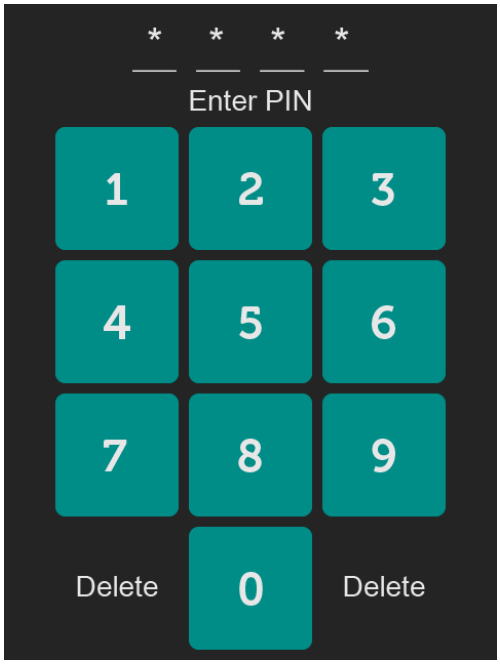
Default PIN code of the instrument is **1234**. Additional PIN codes have to be defined and synchronized beforehand on MIRA Cal DS software. User-defined operating procedures need to be created beforehand via either the instrument settings or the MIRA Cal DS software.

Starting the device

Prerequisites:

The instrument is connected to the power supply or has battery power.

1 Switch on the instrument by using the on/off switch.

2 

Enter **1234** (default PIN code) or a user-configured PIN code.

After the PIN code is entered, a prompt screen for calibration will appear.

3 To calibrate the system, select **[Calibrate Device]** (*see "Calibrating the instrument", page 70*).

To skip the calibration and move to the home screen, select **[Skip]**.

Acquiring data

1 Attaching a Smart Tip

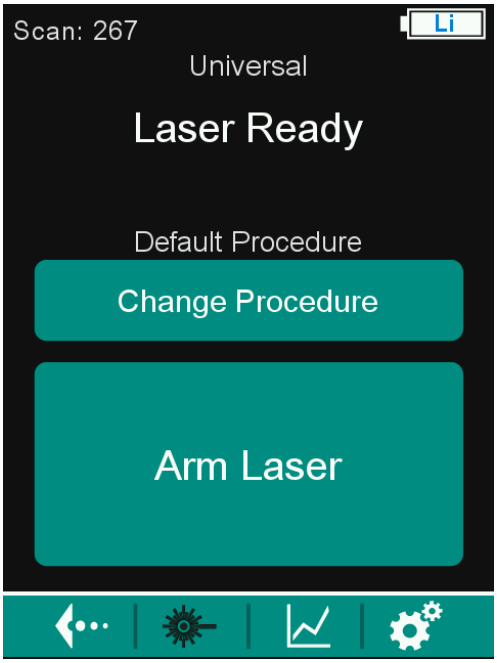
If not already done, attach the correct Smart Tip to the instrument (*see "Attaching and using Smart Tips", page 35*).

The display indicates:

- The attached Smart Tip (e.g. Universal)
  None = No attachment found. The Arm Laser button is not active.
- **Laser Ready**: The laser is ready to be armed.

2 Changing the operating procedure

The display shows the current procedure, e.g.: **Default Procedure**.



MIRA XTR is designed to be used with the default procedure. If one wishes to build and use a user procedure, be aware that this might affect the performance of the MIRA XTR matching algorithms. Select **[Change Procedure]** and select an operating procedure from the drop-down menu.

The **Default procedure** will match the scanned sample to all of the enabled libraries present on the instrument. The default procedure enables Smart Acquire to perform an automatic setting of the laser power and integration time.

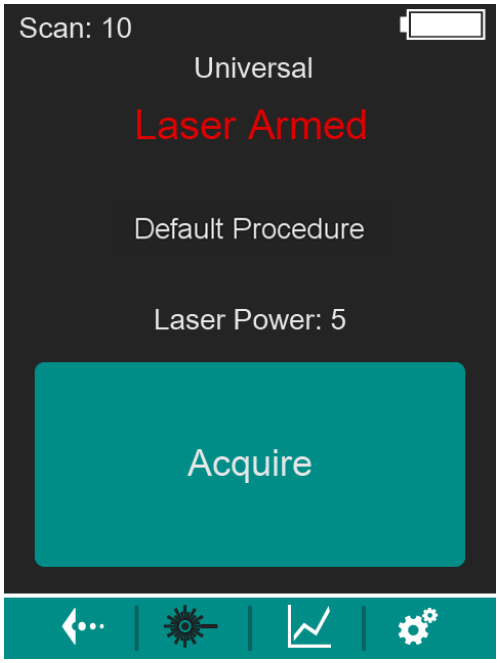
The SERS Attachment automatically unlocks a specialized **SERS operating procedure**. The SERS operating procedure optimizes acquisition parameters and references specific SERS libraries.

The intelligent Universal Attachment (iUA) automatically unlocks the specialized **Content ID operating procedure**. The Content ID operating procedure optimizes the identification of contents in polymer or glass containers (*see "Acquiring data with the iUA", page 57*).

3 Arming the laser

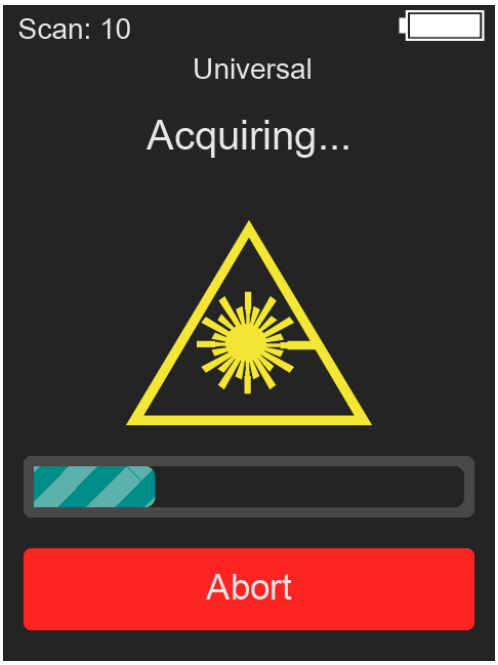
Select **[Arm Laser]**.

The display indicates: **Laser Armed**

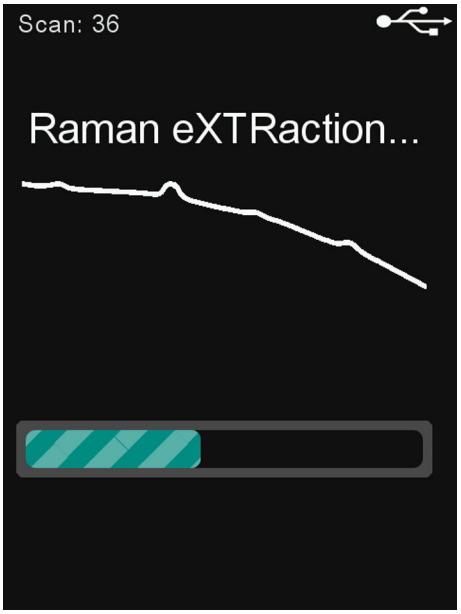


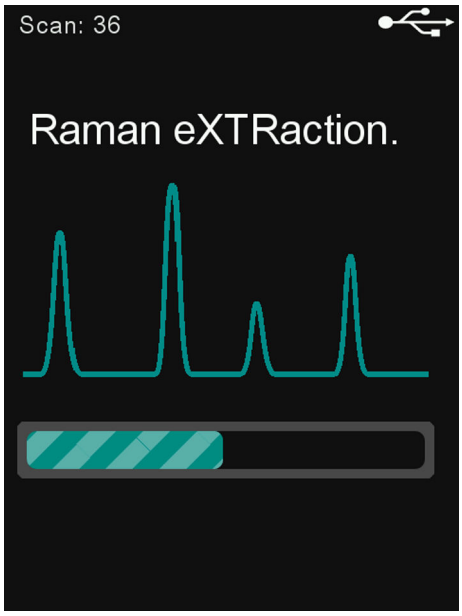
4 Measuring the sample

Start the measurement with **[Acquire]**.



The status screen will indicate the progress of the Smart Acquire. You can cancel the acquisition only during the actual data collection. Once the matching starts, the process cannot be canceled.





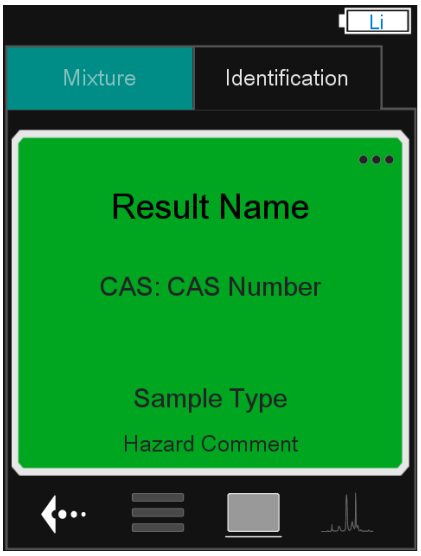
If MIRA XTR detects fluorescence, the **Raman eXTRaction** screen automatically appears. Once the extraction is complete the data will be matched to the enabled libraries.

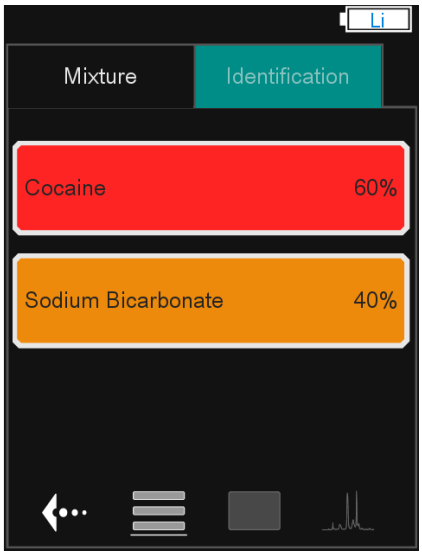
When the measurement is finished, the result appears as specified in the operating procedure.

5 Checking the result

The results are displayed in 2 tabs: **Mixture** and **Identification**. Select the different tabs to see the identification and mixture results.

The active tab is black.
Both tabs may be empty if no identification is found.





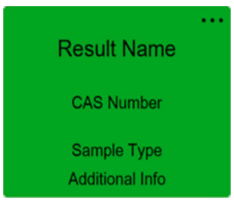
Select the 3 dots in the upper right corner to see GHS data or the HQI.

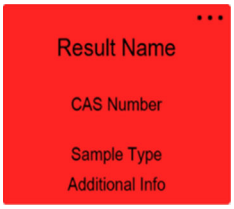
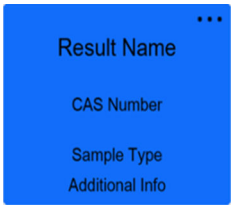
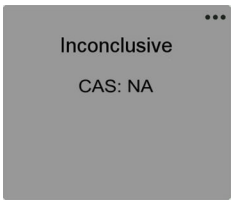
6 Measuring the next sample

Select the **[Back]** button to return to the **Laser Ready** screen.

Select **[Acquire]** to start the measurement.

Identification screens

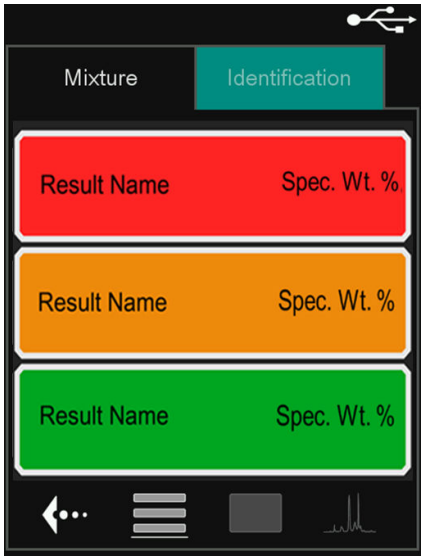
Identification screen	Color code	Hazard Level
	Green	**Safe** This indicates the material is common or a material that poses no or minimal direct threat to the user.
	Orange	**Caution** This indicates the material is either a cutting agent or a pre-cursor of a dangerous material.

Identification screen	Color code	Hazard Level
	Red	**Danger** This indicates the material is a direct threat to the user. Use caution when handling the material.
	Blue	**No information** The material has an entry in the library, but the metadata is limited or missing.
	Gray	**Inconclusive** For example, because of a weak signal. Explore different procedures.

Identification screens for mixtures

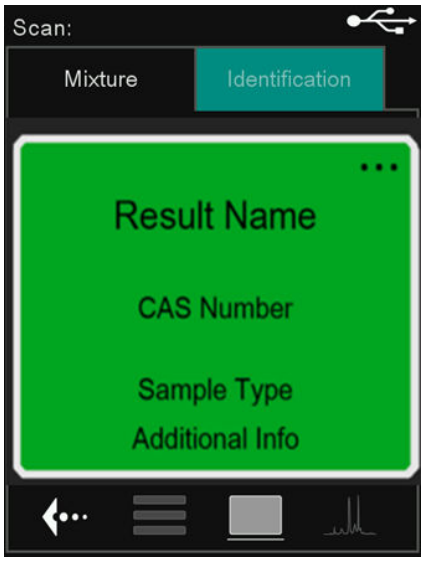
Result list 

If it is a mixture, the Result list button shows a list of all components. To view the details of a component, select the respective component.



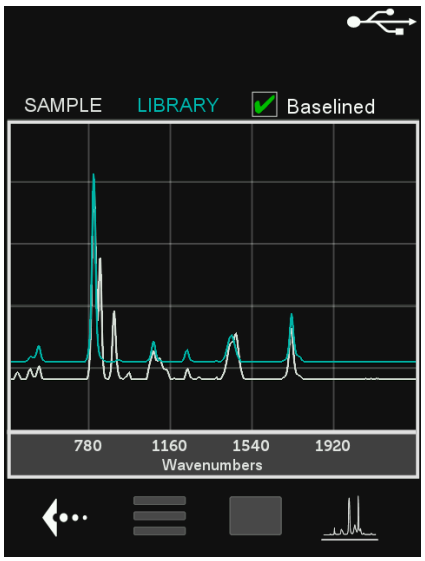
Result name 

After acquisition is complete, the color-coded Result Name screen is shown automatically.



Spectrum 

The spectrum button shows the spectrum of the current sample. It will be overlaid with a spectrum from the library if available.



Select **SAMPLE** or **LIBRARY** above the spectral viewing window to hide the corresponding spectrum.

Enable **Baselined** to see the unprocessed raw spectrum.

7.3.1 Acquiring data with the iUA

The following steps show how to acquire spectra with the **intelligent Universal Attachment (iUA)**.

With the iUA attached, rotate the iUA to the 3 different positions. The display shows the optimum use of the set position:

- 1 = Surface, focal point in approximately <1 mm distance
- 2 = Bag, focal point in approximately 4 mm distance
- 3 = Bottle, focal point in approximately 8 mm distance

The intelligent Universal Attachment (iUA) automatically unlocks the specialized **Content ID operating procedure**. The Content ID operating procedure optimizes the identification of contents in polymer or glass containers.

The Content ID operating procedure is only available on the instrument, not in MIRA Cal DS or in the mobile app.

1 Attaching the iUA

If not already done, attach the intelligent Universal Attachment (iUA) to the instrument (*see "Attaching and using Smart Tips", page 35*).

2 Changing the operating procedure

To change the operating procedure, select **[Change Procedure]**.

In the following instructions we assume that the **Content ID operating procedure** is loaded.

The display indicates:

- The attached iUA and its position, e.g. for position 1: **IUA-1**
- **Laser Ready**: The laser is ready to be armed.
- An instruction, e.g. **Rotate To IUA-3**

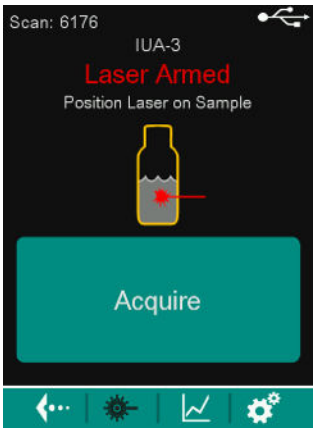
3 Follow the instruction on the display, e.g. **Rotate To IUA-3**: Rotate the iUA to position 3.

The display shows the set position, e.g.: **IUA-3**.

4 Arming the laser

Select **[Arm Laser]**.

The display indicates: **Laser Armed**



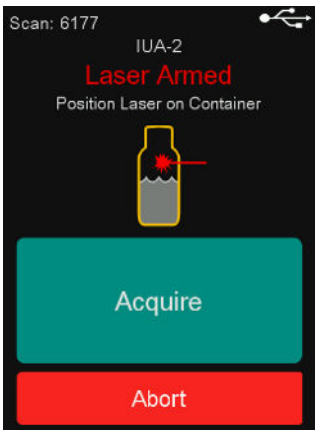
5 Measuring the sample

Follow the instruction on the display, e.g. **Position Laser on Sample**.

Start the measurement with **[Acquire]**.

When the sample measurement is finished, the instrument is ready for the container measurement.

6 Measuring the container



Follow the instruction on the display, e.g. **Position Laser on Container**.

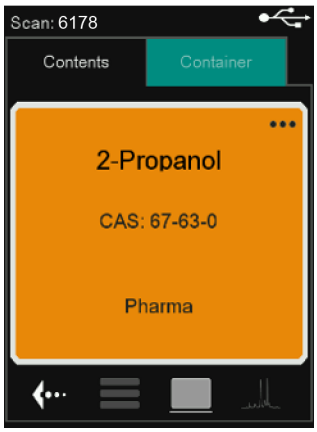
Start the measurement with **[Acquire]**.

When the measurement is finished, the result appears as specified in the operating procedure.

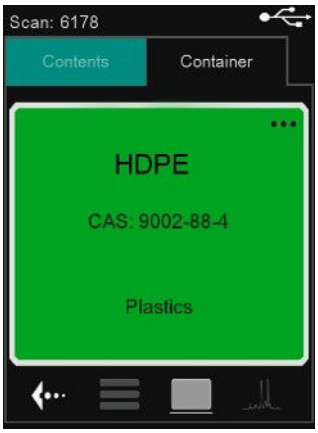
7 Examining the result

The results are displayed in 2 tabs: **Contents** and **Container**. Select the different tabs to see the respective result.

Contents result



Container result



Select the three dots in the upper right corner to see GHS data or the HQI.

8 Measuring the next sample

Select the **[Back]** button to return to the **Laser Ready** display.

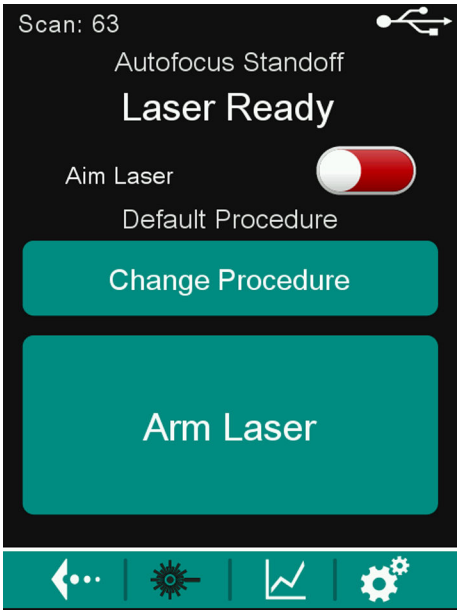
To start the measurement, follow the instruction on the display.

7.3.2 Acquiring data with the AFSO

The following steps show how to acquire spectra with the Autofocus Stand-off Attachment (AFSO).

1 Attaching the AFSO

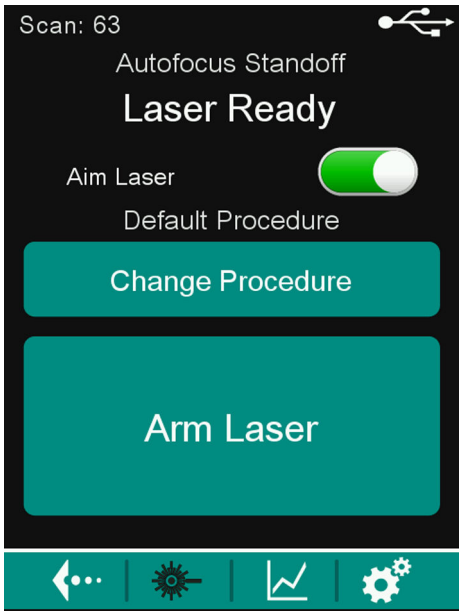
Attach the Autofocus Stand-off Attachment to the instrument (*see "Attaching and using Smart Tips", page 35*).



- The **[Aim laser]** on/off switch automatically appears on the top of the **Arm Laser** screen.
- The selected operating procedure appears and can be changed by the **[Change Procedure]** button.
- The laser is ready to be armed.

2 Arming the laser

- Switch the aiming laser on or off.
- Select **[Arm Laser]**.



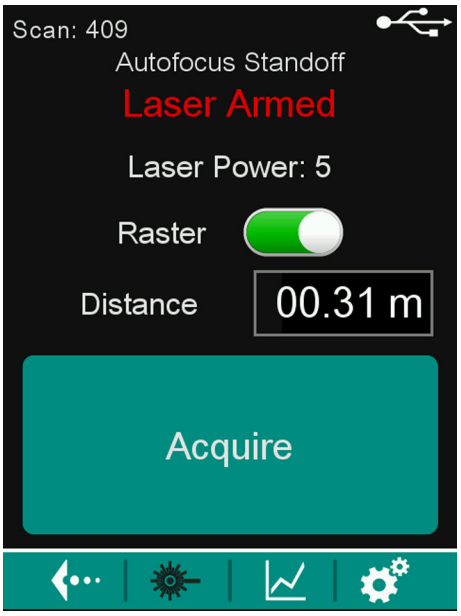
- **[Aiming laser]** on: A class 2 green aiming laser helps to aim at the target.
- **[Aiming laser]** off: The aiming laser is shut off.

The aiming laser is a 515 nm Class 2 laser.

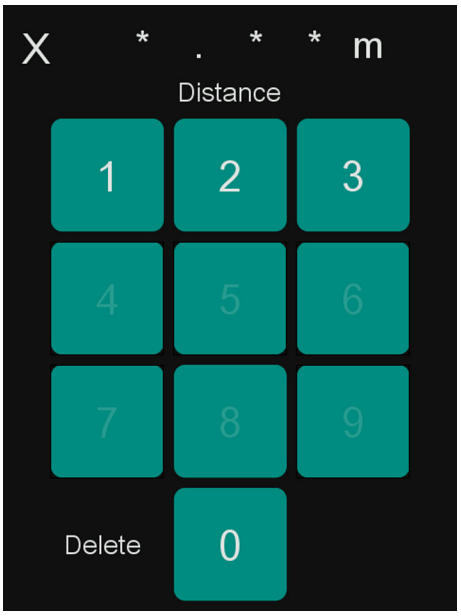
The device will automatically obtain a distance to the target and report it in the **Acquire** screen.

3 Entering the distance manually

To enter the distance manually, select the distance window by pressing on the **Distance** display field. Enter the distance and select **[Next]**.

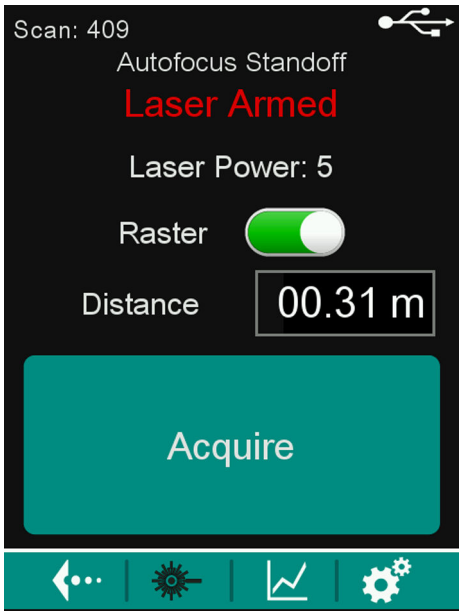


The range of the autofocus is 0.3 to 2.0 meters. In manual mode you cannot input values outside of this range. For best results, keep the distance to the sample between 0.3 and 0.4 meters.



4 Measuring the sample

Start the measurement with **[Acquire]**.



5 **Checking the result**

See "Acquiring data", page 49.

7.4 Settings

Brightness setting

1 Swipe the upper edge of the screen down.

2 Adjust the brightness in the popping down window.

3 Swipe up to close the brightness adjustment tool.

Menubar

In the Menubar, you can access several sections.

- Back to previous screen 
- Home screen / Arm laser 
- Scan log 

- Settings 

Open settings

1 Select  .

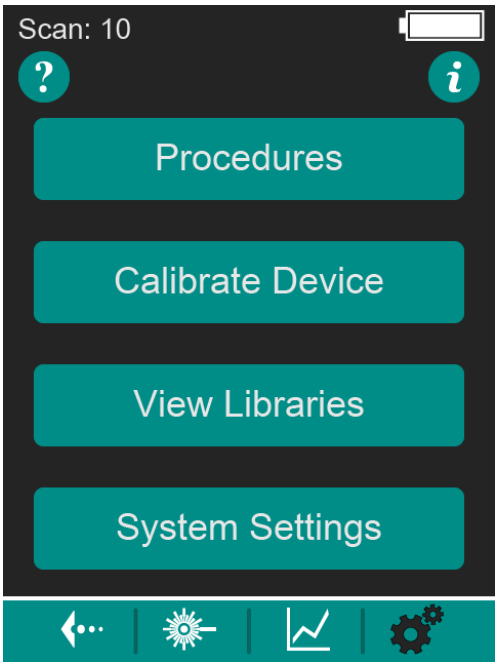


Figure 11 Settings menu

The menu offers the following settings.

- **[Procedures]**: *see "Operating Procedures menu", page 65*
- **[Calibrate Device]**: *see "Calibrating the instrument", page 70*
- **[View Libraries]**: *see "Viewing, enabling and disabling libraries", page 72*
- **[System Settings]**: *see "System Settings menu", page 72*

2 **Info screen**

To view the info screen, select  .

The shown information includes:

- Time: HH:MM:SS UTC
- Date: YYYY-MM-DD
- Device Name
- Serial #
- Device Model
- PKG Version

- Language PKG
- Range: 400–2300 cm^{-1}
- Wavelength: 785 nm
- Cal Date: YYYY-MM-DD HH:MM:SS UTC
- Disc Space
- Temperature
- Voltage
- Board Rev
- FCC ID
- MAC ID

7.4.1 Operating Procedures menu

The **Operating Procedures** menu opens with  , then **Procedures**

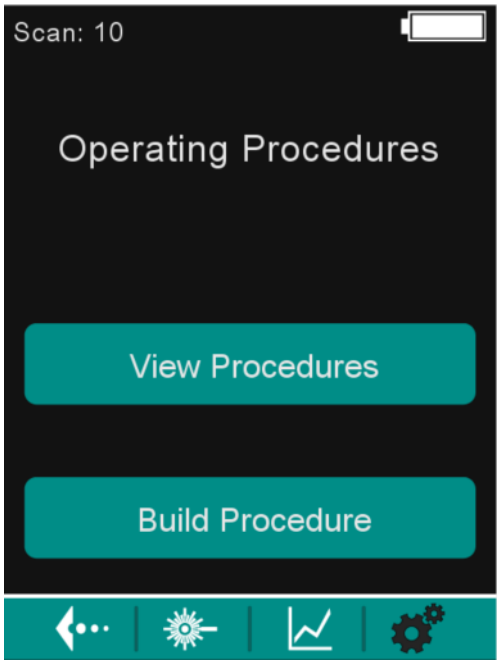


Figure 12 Operating Procedures menu

The menu offers the following options.

- **[View Procedures]** and their parameters, delete procedures: *see "Viewing or deleting operating procedures", page 65*
- **[Build Procedure]**: *see "Building operating procedure", page 66*

Viewing or deleting operating procedures

1 Select  , then **Procedures** ▶ **View Procedures**.

The instrument displays the stored operating procedures.

2 To view the procedure settings, select the name of the corresponding procedure.

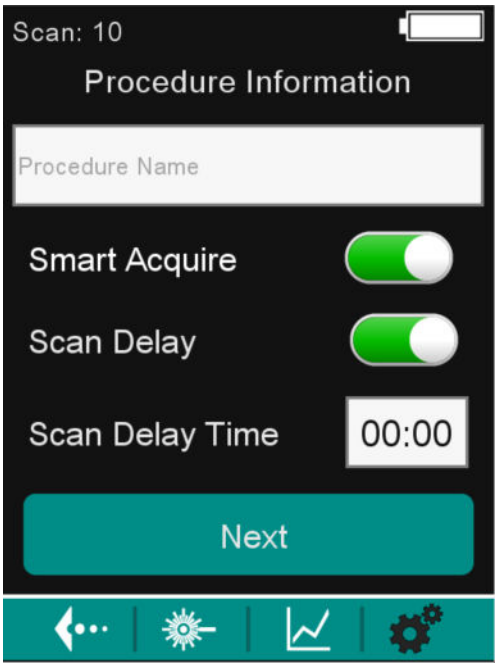
3 To delete a procedure, select  . Confirm with **[Delete]**.

Building operating procedure

Procedures created on the instrument cannot be edited on the instrument or in MIRA Cal DS.

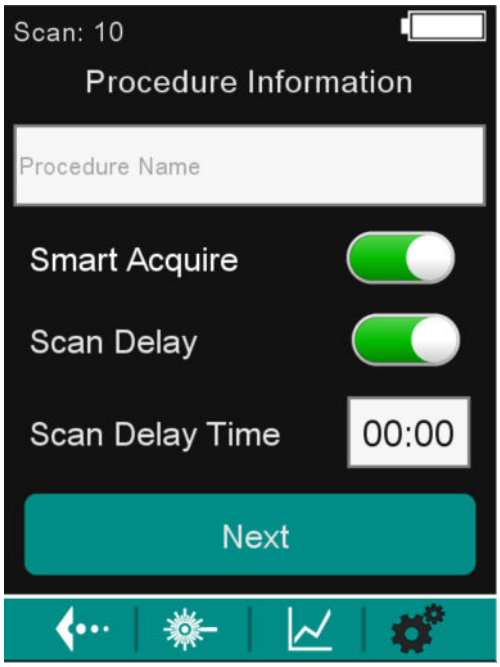
1 Select  , then **Procedures** ▶ **Build Procedure**.

2 **Naming procedure**



The procedure must be named. Select the Procedure Name input field. Enter the name on the keyboard. Confirm with **[Enter]**.

3 Scan Delay



To set a delay before the start of a scan, enable **Scan Delay** and set the scan delay time.

4 Smart Acquire

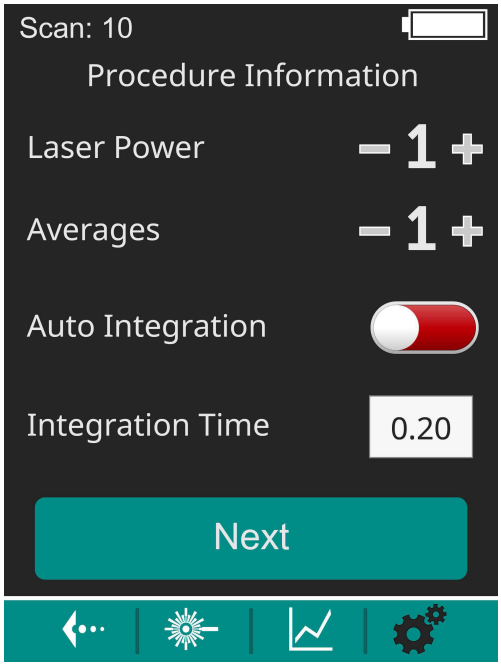
Either enable or disable Smart Acquire.

- **Enabling Smart Acquire**

Enabling **Smart Acquire** on a custom operating procedure will run samples through the smart acquire noise and fluorescence rejection routines before matching against the enabled libraries.

- **Disabling Smart Acquire**

Select **[Next]**.

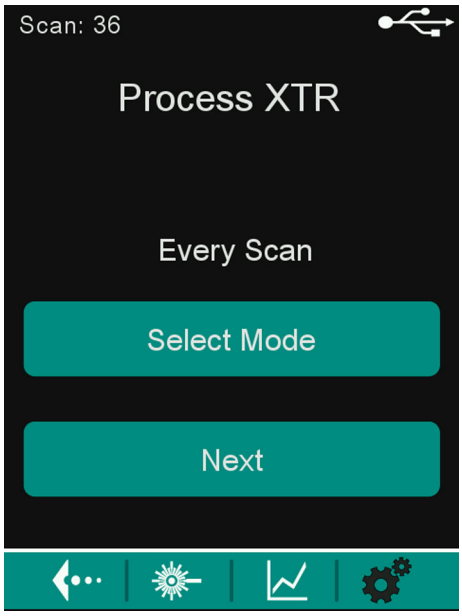


Define the **Laser Power** (1 - 5) and the number of **Averages**. Activate **Auto Integration**, or deactivate **Auto Integration** and set an **Integration Time**.

Select **[Next]**.

5 **Processing XTR**

Select the **[Select Mode]** button.



Choose the XTR Mode and select **[Next]**.

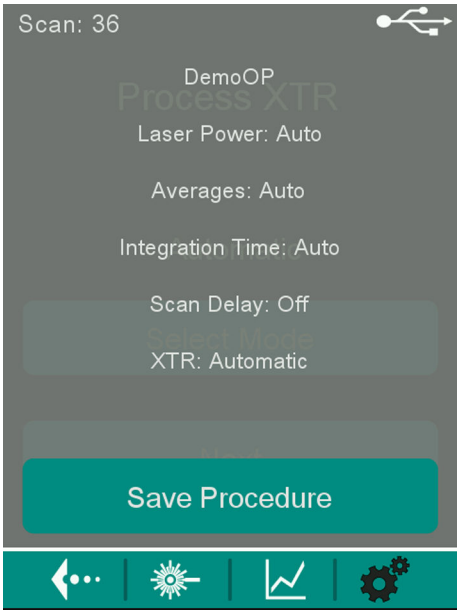
- **[Every Scan]** will always process the data using XTR algorithm regardless if fluorescence is detected or not.
- **[Automatic]** will automatically process the data using XTR algorithm when fluorescence is detected.
- **[Prompted]** prompts the user if florescence is detected.
- **[Never]** will never process the data using XTR algorithm.

6 Matching libraries

Matching will be performed against the enabled libraries.

If no libraries are enabled, it will always give an inconclusive result.

7 **Saving procedure**



Review the procedure settings and select **[Save Procedure]**.

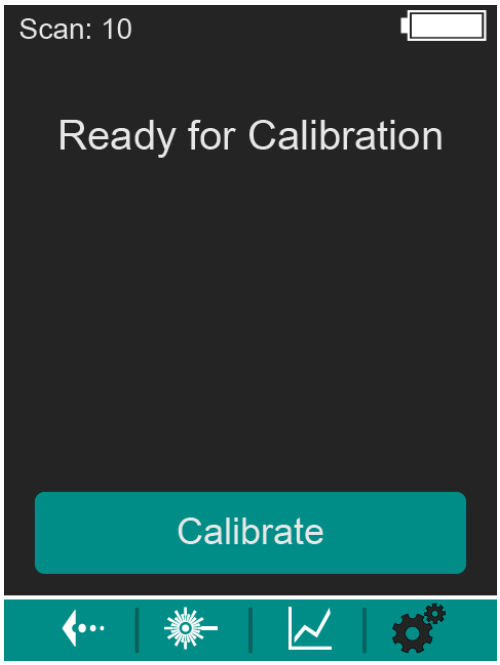
7.4.2 Calibrating the instrument

Instrument calibration can also be done in MIRA Cal DS software with a connected instrument.

1 Attach a Metrohm provided Calibration Standard (*see "Attaching and using Smart Tips", page 35*).

Place the instrument upright.

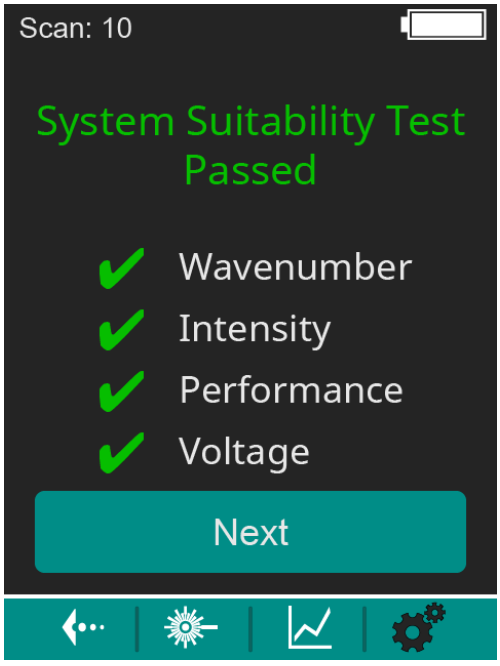
2 Select  , then **[Calibrate Device]**.



3 With the Calibration Standard attached and the instrument placed upright, select **[Calibrate]**.

4 Ensure that the calibration is successful.

Once the calibration is complete, a screen with the system suitability test will indicate if the system passed or failed.



5 Select **[Next]**.

The home screen appears.

7.4.3 Viewing, enabling and disabling libraries

1 Select  , then **[View Libraries]**.

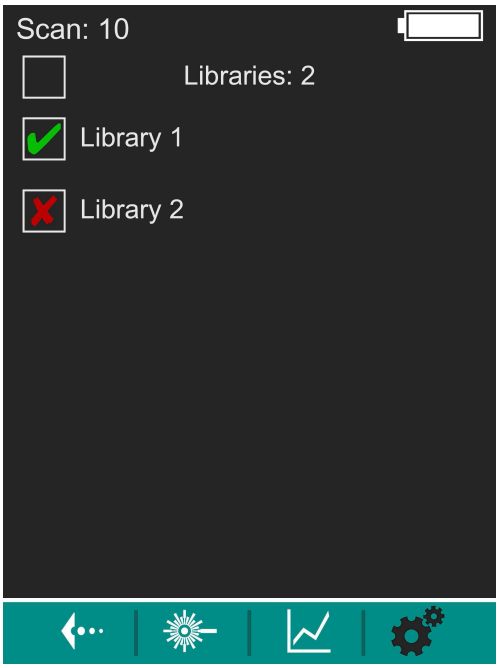


Figure 13 View Libraries screen

The instrument shows the installed libraries.

2 Enable or disable the libraries for matching.

3 To add libraries to the instrument, use the MIRA Cal DS Software.

7.4.4 System Settings menu

Select  , then **[System Settings]**.

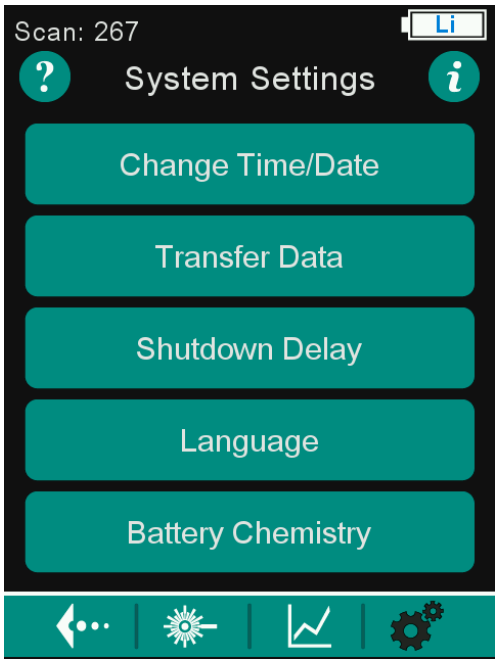


Figure 14 System Settings menu

The menu offers the following system settings:

- **[Change Time/Date]**: *see "Changing the time and date", page 73*
- **[Data transmission]**: *see "Data transmission: Mount the instrument as Storage Device", page 74*, *see "Data transmission: Bluetooth ® wireless technology", page 75*
- **[Automatic Shutdown]**: *see "Automatic Shutdown", page 82*
- **[Language]**: *see "Language", page 82*
- **[Battery type]**: *see "Battery type", page 84*

Changing the time and date

1 Select  , then **System Settings** ▶ **Change Time/Date**.

2 Set the time. Select **[Next]**.

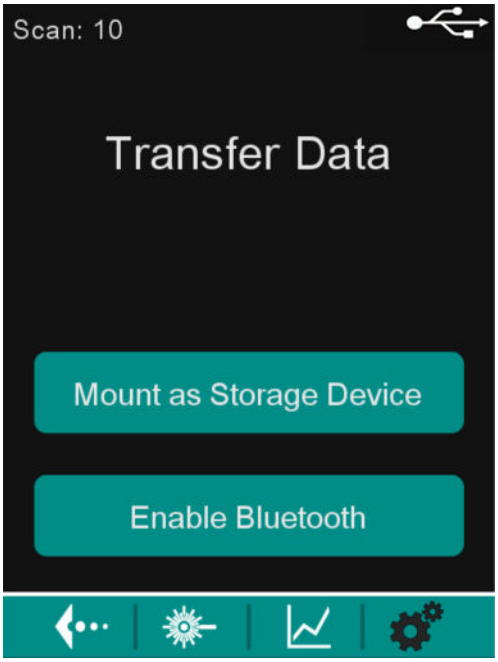
3 Set the date. Select **[Save]**.

Data transmission: Mount the instrument as Storage Device

Spectral data can be transferred to the Windows PC using **Mount as Storage Device** mode.

1 Select  , then **System Settings** ▶ **Data Transmission**.

2 Plug in the instrument to a Windows PC using the provided USB cable.

3 

Select **[Mount as Storage Device]**.

The instrument will undergo a setup to install device drivers onto the Windows PC.

When connecting to a PC, a window pops up asking if you want to **[Scan and Fix]** or **[Continue without Scanning]**. Select **[Continue without Scanning]** to avoid issues with the device, the software and/or the PC.

The instrument will show up on the Windows PC as a storage device, i.e. as above as User (E).

4 Importing sample files into MIRA Cal DS

For example, you can import sample files into MIRA Cal DS:

- Open MIRA Cal DS.
- Select **[Advanced]**.
- Select **File** ▶ **Open** ▶ **Samples**.
- Navigate to the mounted Android device. Open **Scan number**.
- Select one or more ***.rmnb** files. Select **[Open]**.

The sample files are now in the MIRA Cal DS database.

5 Copying files to the Windows PC

Files in the Scan Number folder can be copied directly to the Windows PC for later viewing or release.

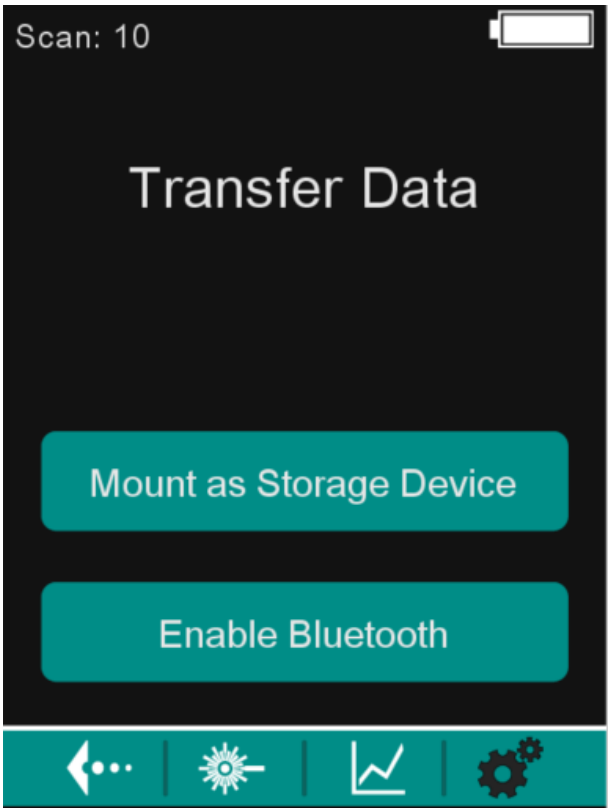
6 To disconnect, select **[Disconnect Storage Device]**.

Data transmission: Bluetooth® wireless technology

Spectral data can be transferred to an Android device via Bluetooth® wireless technology. The instrument needs to be within 10 m of the Android device, either tablet or cell phone.

1 Enabling Bluetooth on the instrument

Select  , then **System Settings** ▶ **Data Transmission**.

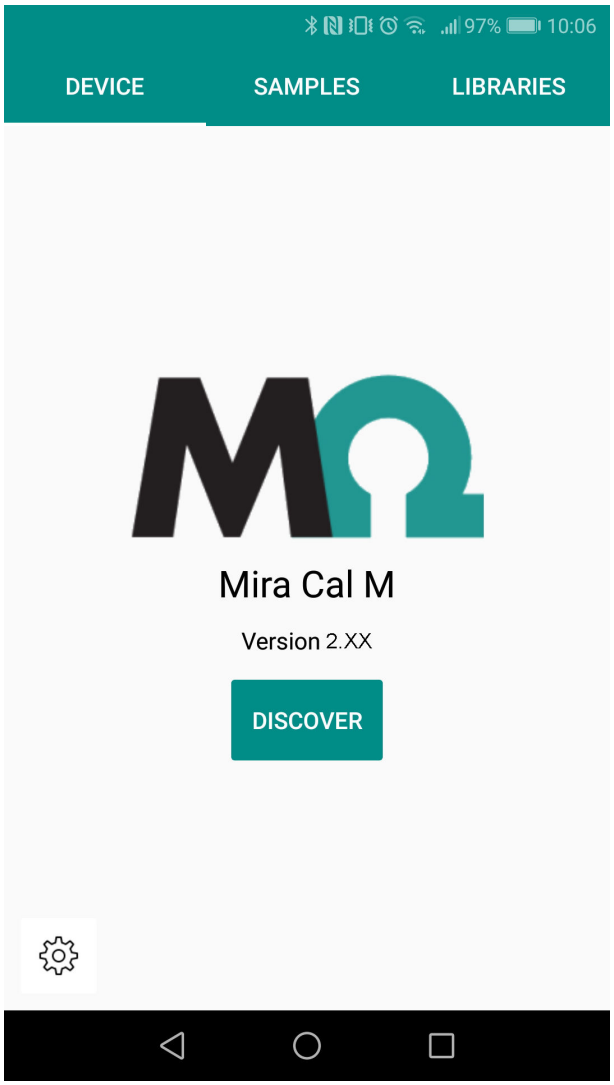


Select **[Enable Bluetooth]**.

The instrument indicates: **Bluetooth Mode**.

2 Locking and connecting

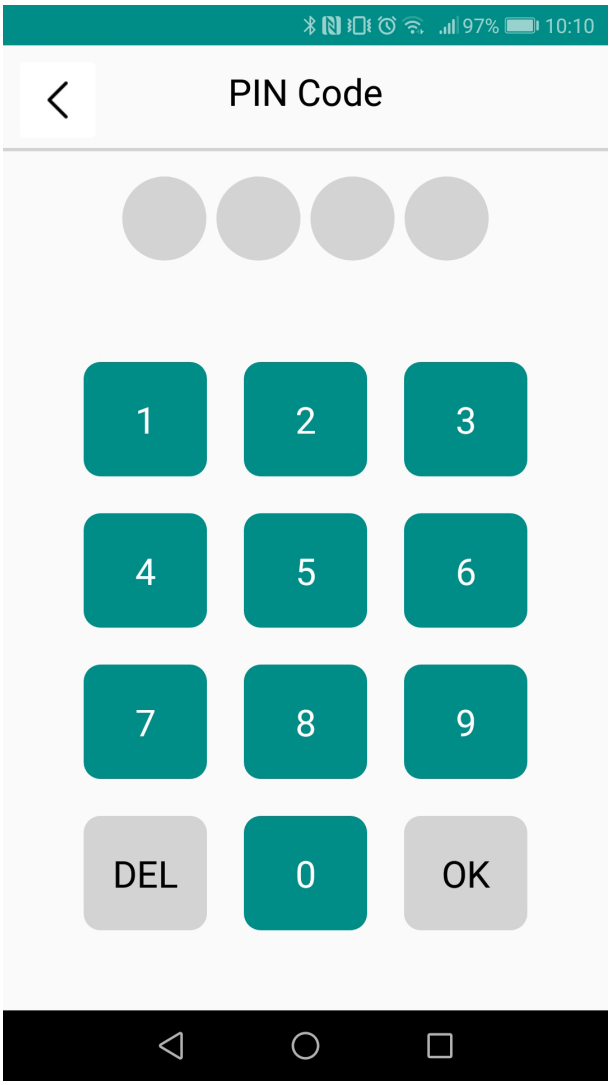
On the Android device, open MIRA Cal M.



Select **Discover**.

The instrument will appear in the list of available devices with the model name followed by the serial number.
Example: MIRA XTR 192600200020300000
If no devices are detected, ensure that Bluetooth is enabled on the Android device.

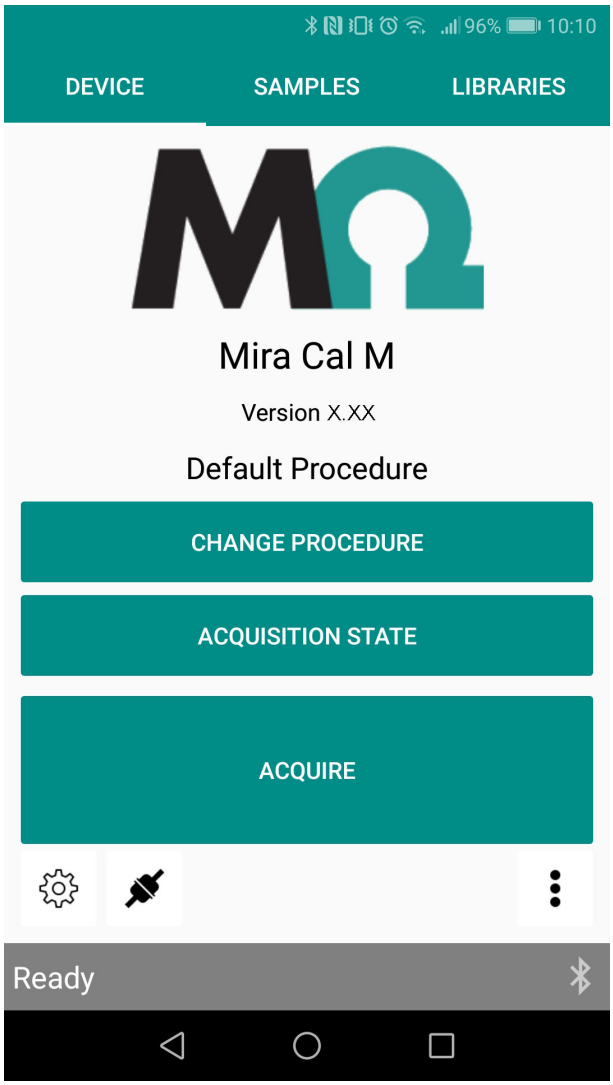
3 On the Android device, select MIRA XTR 1926xxxxxxxxxxxxx.



Enter the PIN code **9999**. Select **OK**.

The Android device is now connected to the instrument. The instrument is ready to transfer data or acquire a spectrum.

4 MIRA Cal M



The DEVICE tab of MIRA Cal M allows changing of the procedure, editing of the acquisition status, and acquisition of a spectrum.

5 Operating procedure

The display shows the current procedure, e.g.: **Default Procedure**.

The instrument is designed to be used with the default procedure. If one wishes to build and use a user-defined procedure, be aware that this might affect the performance of the matching algorithms of the instrument. Select **[Change Procedure]** and select an operating procedure from the drop-down menu.

The default procedure will match the scanned sample to all of the enabled libraries present on the instrument. The default procedure enables Smart Acquire to perform an automatic setting of the laser power and integration time.

The SERS Attachment automatically unlocks a specialized **SERS operating procedure**. The SERS operating procedure optimizes acquisition parameters and references specific SERS libraries.

The intelligent Universal Attachment (iUA) automatically unlocks the specialized **Content ID operating procedure**. The Content ID operating procedure optimizes the identification of contents in polymer or glass containers.

6 App-based acquisition

In MIRA Cal M select **[Acquire]**.

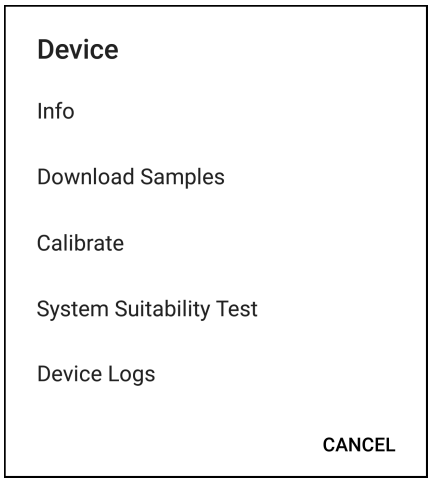
MIRA Cal M indicates that acquisition is in progress and that the laser is active:

The instrument warns that the laser is active:

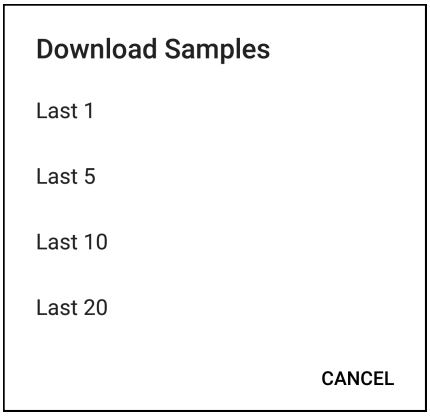
Figure 15 Warning sign: Laser active

7 Downloading data from the instrument

- In the home screen of MIRA Cal M, open the menu ⋮.



- Select **[Download Samples]**.



- Select the number of scans to download.

MIRA Cal M downloads the samples from the instrument.

8 Exporting data

- In MIRA Cal M, select **Samples**, ⋮, **[Export]**.
- Select the information to be shared. **[External Data]**.
- Select the scans to be exported.

The exported data can be found in the internal storage or memory card of the device: **MetrohmRaman** ▶ **MIRA-CalM** ▶ **Exports** ▶ **Samples**

For example, you can connect the Android device to a Windows PC and access the exported data from the PC. Samples can be imported in MIRA Cal DS via **File** ▶ **Open** ▶ **Samples**.

9 E-mailing data

- In MIRA Cal M, select **Samples**, ⋮, **[Export]**.
- Select the information to be shared. **[e-mail]**.
- Select the scans to be sent. Select the desired e-mail client or messenger and send the files.

10 Disconnecting

In MIRA Cal M, select .

Select **[Disconnect Bluetooth]**.

Displaying HazMasterG3 information

1 In MIRA Cal M, highlight the sample and select **Samples** ▶ **HazMaster Export**.

2 Open the HazMasterG3 app.

3 Select the top menu bar.

4 Select **DataFusion** ▶ **Sensor Import**.

The sample will display in the import.

Automatic Shutdown

By default, no automatic shutdown is configured.

To conserve battery charge, an automatic shutdown can be specified. A battery-powered instrument will automatically shut down after the specified time.

1 Select  , then **System Settings** ▶ **Automatic Shutdown**.

2 Set the automatic shutdown time.

Example: With the automatic shutdown time **3**, a battery-powered instrument will automatically shut down after 3 minutes of being not in use.

Select **[Save]**.

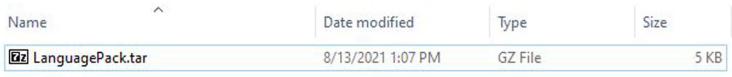
The automatic shutdown will affect only battery-powered instruments. For an instrument connected to a power supply, to MIRA PowerPack or to a PC, the automatic shutdown is disabled.

Language

1 Mount the instrument as Storage Device *(see "Data transmission: Mount the instrument as Storage Device", page 74)*.

2 Select the appropriate language pack from *https://www.metrohm.com/en/support-and-service/software-center/* and download the file.

3 Save the file to your MIRA device folder.



4 Restart the device.

Select  , then **System Settings** ▶ **Language**.

The new language will appear in the language screen.

5 Select your preferred language.

The instrument supports the following languages:

- English
- German
- French
- Spanish
- Portuguese
- Chinese
- Italian
- Turkish
- Czech
- Hungarian

English is always the top button.
Only English and one other language are supported on the device.

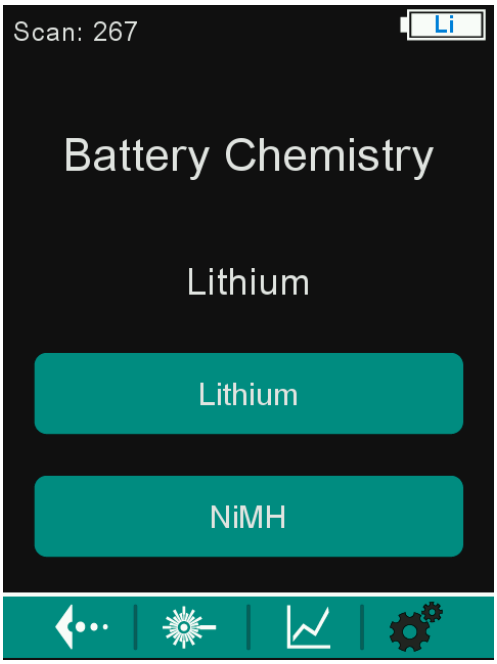
Battery type

There are many different types of AA batteries. For an accurate display of the battery service life, it is important to choose the battery type that is being used in the instrument. The supported battery types are Li and NiMH.

Set the battery type:

1 Select  , then **System Settings** ▶ **Battery Type**.

2



Select the battery type:

- Lithium
- NiMH

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

Metrohm recommends replacing the batteries when the battery indicator changes color from yellow to red.

7.5 Viewing and editing samples in the scan log

1 Accessing the scan log

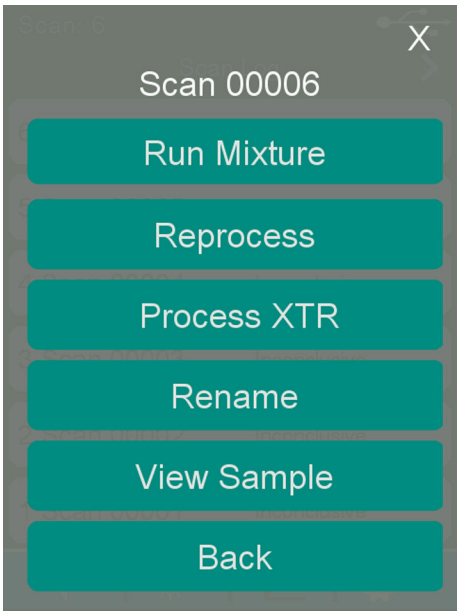
Select  to view the saved spectra in the **Scan Log**.

The samples are listed as color-coded buttons:

Color code	Hazard level
Green	Safe
Orange	Caution
Red	Danger
Blue	No information
Grey	Inconclusive or Calibration

2 Accessing the sample menu

Select a scan number button to access the sample menu.



The sample menu appears as a list of buttons.

3 Run Mixture

Select **[Run Mixture]** to run the mixture matching routine against all enabled libraries on the instrument. Match name and spectra can be viewed.

4 Reprocess

A sample can be re-processed to match to a different enabled library. The function **[Reprocess]** uses the original operating procedure settings that were used to collect the data. Reprocessing may give different match score results. A new scan number will be assigned to the new match results. The match name and spectrum can be viewed.

5 Process XTR

A sample that was not processed using XTR data extraction can be post processed to show the results of the extraction. Once data is processed it can not be reprocessed with XTR extraction, the button will be grayed out.

6 Rename

Select **[Rename]** to rename a sample. Enter the new name. Confirm with **[Enter]**.

7 View Sample

Select **[View sample]** to view the spectrum, the match name and the CAS# of an acquired sample.

8 Back

Select **[Back]** to go back to the **Scan Log**.

7.6 Safe shutdown

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

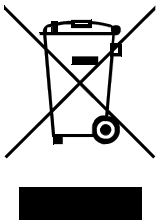
8.1 Maintenance agreement

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.

9 Disposal



Properly dispose of chemicals and of the product to reduce negative effects on the environment and public health. Local authorities, waste disposal companies or dealers provide more detailed information on disposal. Observe the WEEE EU directive (WEEE = Waste Electrical and Electronic Equipment) for the proper disposal of waste electronic equipment within the European Union.

10 Technical specifications

10.1 Ambient conditions

MIRA XTR		
Nominal function range	–20 to +50 °C	at max. 93% relative humidity, non-condensing
Storage and Transport	–20 to +70 °C	at max. 93% relative humidity, non-condensing
MIRA PowerPack		
Nominal function range	–20 to +50 °C	at max. 93% relative humidity, non-condensing
Charging	0 to +30 °C	at max. 93% relative humidity, non-condensing
Storage	0 to +35 °C at 25–50% Charge	at max. 93% relative humidity, non-condensing
Transport	max. 1 week, –20 to +70 °C	at max. 93% relative humidity, non-condensing

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

MIRA XTR

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.	

MIRA PowerPack

Input	12 VDC … 15 VDC, 2 A (USB-C)
Output	5 VDC, 1 A (USB Mini B)
Capacity	25.2 Wh

10.4 Dimensions and materials

MIRA XTR

Dimensions

Width	88.2 mm
Depth	45.3 mm
Height	125.5 mm
Display	3.7'' TFT LCD resistive touch 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)
Degree of protection (according to EN 60529)	IP67

Ruggedization

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

MIL-STD-810G Method 516.6 Procedure IV

MIL-STD-810G Method 516.6 Procedure VI

MIL-STD-810G Method 512.5 Procedure I

IEC 60529 Dust

Autofocus Stand-off Attachment (AFSO)

Material

Housing	Aluminum anodized

Accessories covering	Thermoplastic elastomers (TPE-E)
Degree of protection (according to EN 60529)	IP67

Ruggedization	MIL-STD-810G Method 514.6 C-1, C-2, C-3 Category 4
	MIL-STD-810G Method 516.6 Procedure IV
	MIL-STD-810G Method 516.6 Procedure VI
	MIL-STD-810G Method 512.5 Procedure I
	IEC 60529 Dust

MIRA PowerPack

Dimensionen	
Width × Depth × Height	90 × 45 × 50 mm
MIRA XTR & MIRA PowerPack	90 × 45.3 × 170 mm
Weight	319 g
MIRA XTR & MIRA PowerPack	<1100 g

10.5 Operating specifications

MIRA XTR

Laser wavelength	785 nm ± 0.5 nm
Laser output power	100 mW, 50 mW for the sample, 5 adjustable laser powers down to 10 mW
Wave number 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
Temporal emission structure	CW
Sampling technique	Orbital Raster Scan (ORS™) to average over the sample
Laser class according to EN 60825-1	Class 3B
Protection class of protective glasses (according to EN 207)	D LB5 775– 795 nm

NOHD – Nominal Ocular Hazard Distance

Contact Ball-Probe	34.5 cm
Stand-off Attachment at 0.25 m setting	12 m
Autofocus Stand-off Attachment at 0.3 m setting	12 m
Stand-off Attachment or Autofocus Stand-off Attachment at 1.5 m setting	125 m
Right Angle Attachment	34 cm± 5 cm
Universal Attachment	34 cm ± 5 cm
iUA - intelligent Universal 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
SERS Attachment	34 cm ± 5 cm

Autofocus Stand-off Attachment (AFSO)

Aiming laser

Laser wavelength	515 nm ± 5 nm
Laser output power	≤ 1 mW
Temporal emission structure	CW
Laser class according to EN 60825-1	Class 2

Laser rangefinder

Laser wavelength	850 nm
Laser class according to EN 60825-1	Class 1