

MIRA XTR C1D2



2.926.0150

Manual

8.0926.8009EN / v2 / 2025-07-28



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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 and verification of chemical and pharmaceutical samples, both liquid and solid. The MIRA spectrometers are the only handheld Raman spectrometers currently on the market with Orbital Raster Scan (ORS) technology.

The **MIRA XTR C1D2** is intended for operation in a **Class I Division 2** hazardous location.

1.2 MIRA XTR C1D2

MIRA XTR C1D2 instruments are available in the following versions:

Table 1 Product versions

Article number	Designation	Version feature
2.926.0150	MIRA XTR C1D2	Includes instrument, C1D2 enclosure, Calibration Standard and USB Mini Cable. Without sampling attachments.

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

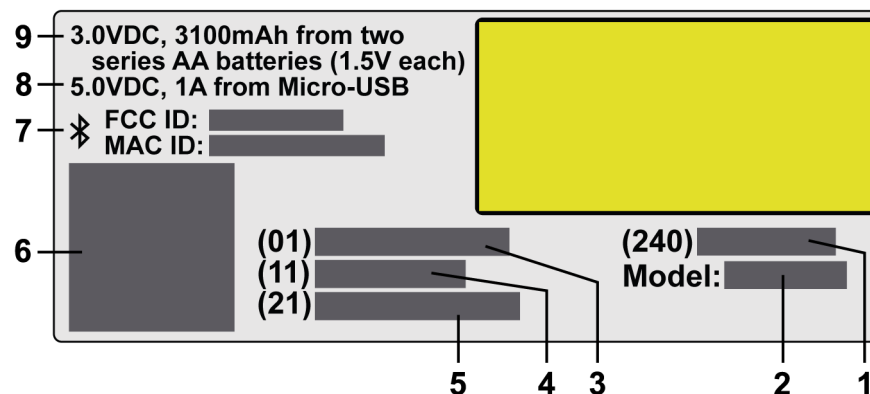


Figure 1 Instrument label at the bottom of the instrument

1	(240) = Metrohm article number	2	Instrument model
3	(01) = Global Trade Item Number (GTIN) in accordance with GS1 standard	4	(11) = Manufacturing date: month, year

1.3 Software

1.3.1 MIRA software and firmware

MIRA Cal DS software

In order to configure MIRA XTR C1D2, the following software is needed:

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://go.metrohm.com/s/uZsT4>


1.3.2 Software tutorials

Refer to the following manuals for information about the software:

- Tutorial MIRA Cal DS: 8.105.8069EN

Enter the product number (without the language code) in the search field on <https://www.metrohm.com> to search for the tutorial.


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

Possible depictions in the documentation:

Depiction	Meaning
<i>(5-12)</i>	Cross-reference to figure legend (Figure number - <i>Element in the figure</i>)
1	Instruction step
Method	Parameters, menu items, tabs, and dialogs
File ▶ New	Menu path
[Continue]	Button or key
	Supplementary information to the descriptive text

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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 into the search field and press **[Enter]**.
 - Article number: see *MIRA XTR C1D2, chapter 1.2, page 1*
- In the result list, click on the desired product.


Detailed information regarding the product is displayed.

2 Displaying accessories

- Scroll down (accessories subject to availability):
 - Included parts
 - Optional parts

3 Download accessories list (included and optional parts)

- Click on  to download the accessories list as a PDF.

 Metrohm recommends keeping the downloaded PDF for reference purposes.

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 hazardous conditions

The instrument is equipped with a C1D2 enclosure that must be mounted at all times when working in a hazardous location. USB access is intended solely for use in non-hazardous environments. Any attempt to access or use the USB port in a hazardous location may compromise intrinsic safety and violate regulatory compliance.

Explosion hazard

Risk of death or serious injury by fires and explosions

- The **MIRA XTR C1D2** is only allowed to be used in a **Class I, Division 2** hazardous location if it is equipped with a C1D2 sampling attachment and a properly mounted C1D2 enclosure.
- Do not operate if the C1D2 enclosure, the attachment or the instrument is cracked or damaged.
- Do not attempt to open the C1D2 enclosure or to connect to the USB port or to change batteries while in a hazardous location.
- Use only **AA Energizer® L91 Ultimate Lithium™** batteries.
- **Cleaning**
Deposits on the surfaces can lead to electrostatic charging. Flames or sparks may occur during discharge.
 - Remove deposits from the surfaces of the C1D2 enclosure, the attachment and the instrument.
 - To avoid a build-up of electrostatic charge, the non-metallic parts may only be cleaned with a damp cloth.
- Observe the national explosion protection regulations.

Risque d'explosion

Mort ou blessures graves par incendie ou explosion

- Le **MIRA XTR C1D2** ne peut être utilisé dans une zone dangereuse de **Classe I, Division 2**, que s'il est équipé d'un accessoire de mesure C1D2 et d'un boîtier C1D2 correctement monté.
- Ne pas utiliser si le boîtier C1D2, l'accessoire ou l'instrument est fendu ou endommagé.
- Ne pas tenter d'ouvrir le boîtier C1D2, de le connecter au port USB ou de changer les piles dans une zone dangereuse.
- Utilisez uniquement des piles **AA Energizer® L91 Ultimate Lithium™**.
- **Nettoyage**
Les dépôts sur les surfaces peuvent entraîner une charge électrostatique. Des flammes ou des étincelles peuvent survenir lors de la décharge.
 - Enlevez les dépôts des surfaces de l'enceinte C1D2, de l'attache et de l'instrument.
 - Pour éviter l'accumulation de charge électrostatique, les pièces non métalliques ne peuvent être nettoyées qu'avec un chiffon humide.
- Respectez la réglementation nationale sur la protection contre les explosions.

2.4.1.1 Hazardous location warning sticker

A warning sticker on the back of the C1D2 enclosure provides information on operation in hazardous locations.

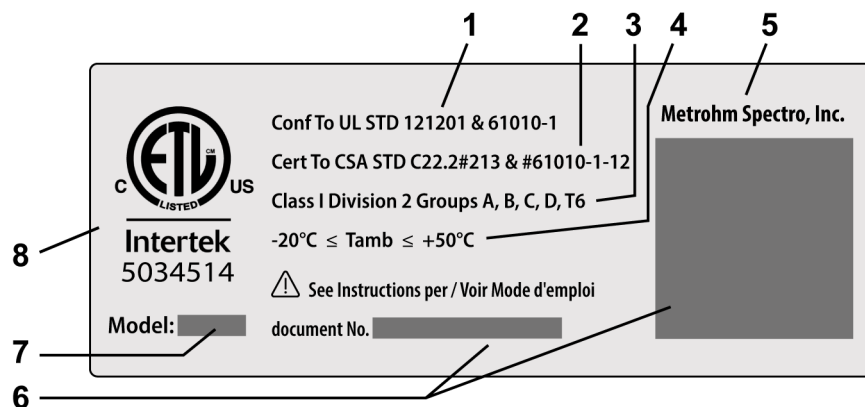


Figure 2 Warning sticker on the back of the C1D2 enclosure

1	Conforms to UL STD 121201 & 61010-1	2	Certified to CSA STD C22.2#213 & #61010-1-12
3	Class I Division 2 Groups A, B, C, D, T6	4	Allowable ambient temperature



5	Manufacturer	6	See instructions per: Document number, revision number and QR code for downloading the document
7	Instrument model	8	ETL / Intertek Certification

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 C1D2 in accordance with EN 60825-1 (Safety of laser products), [\(see page 65\)](#).

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 manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used [page 65](#). 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 Raman [\(see "Displaying accessories", chapter 1.5, page 5\)](#).

Laser classification of the MIRA XTR C1D2

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
Immersion Probe C1D2		X
LWD 5 cm C1D2 Attachment		X
LWD 15 cm C1D2 Attachment		X
XLWD 5 cm C1D2 Attachment		X
XLWD 15 cm C1D2 Attachment		X

Attached Smart Tip	Complete device classification	
	Laser Class 1	Laser Class 3B
Manual Stand-off C1D2		X
Calibration Standard	X	

Interlock mechanism

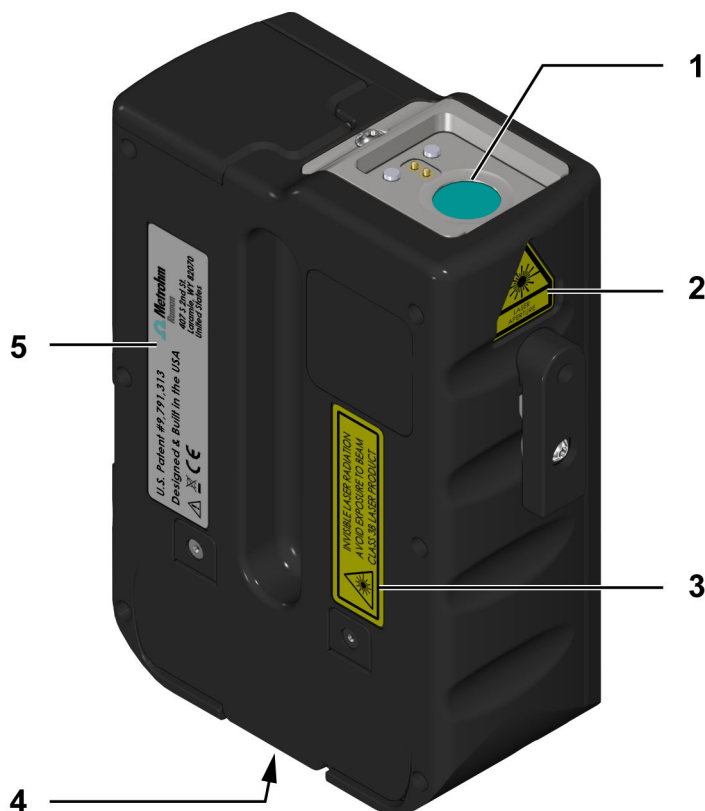
The Calibration Standard has an interlock mechanism. This mechanism prevents laser radiation from emerging. The laser stops immediately if the Calibration Standard is disconnected from the instrument.

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.

2.4.2.1 Laser warning stickers on the instrument

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



1 Laser aperture

2 Laser aperture sticker



3 Laser class

4 Laser specification / serial number (bottom of instrument)

5 Type label

Emergence of laser



Laser aperture

Laser specifications

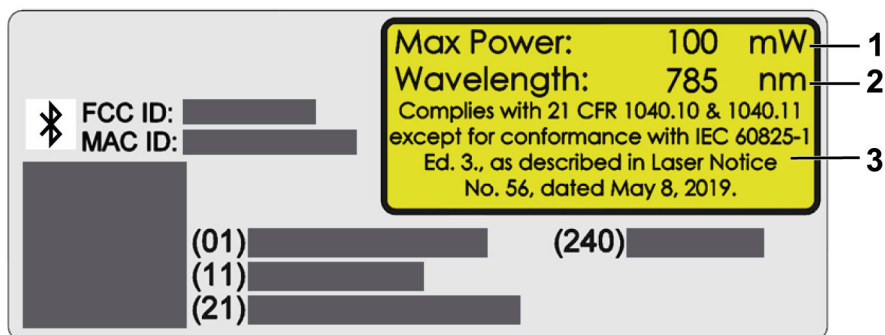


Figure 3 Sticker at the bottom of the instrument

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.

Laser class

The following laser classification is used for all MIRA instruments.



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

2.4.3 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.

2.5 Design of warning messages

The present documentation uses warning messages as follows.

Structure

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

Warning signs on the product or in the documentation indicate potential dangers or draw attention to certain behaviors in order to avoid accidents or damage.

Depending on the application purpose, the operating company attaches additional warning signs to the product. The corresponding instructions of the operator must be followed.

Table 3 Warning signs according to ISO 7010 (examples)

Warning signs / meaning	Warning signs / meaning
 General warning sign	 Warning of hot surface
 Warning of sharp object (cut/puncture)	 Warning of hand injuries (crushing)
 Warning of electrical voltage	 Warning of corrosive substances
 Warning of optical radiation	 Warning of a laser beam
 Warning of flammable materials	 Warning of biological hazard
 Warning of toxic materials	

3 Functional description

3.1 Overview of the instrument



Figure 4 MIRA XTR C1D2 – Front

1 Magnetic Smart Tip fixture / laser aperture

2 Touch screen

3 C1D2 mounting adapter

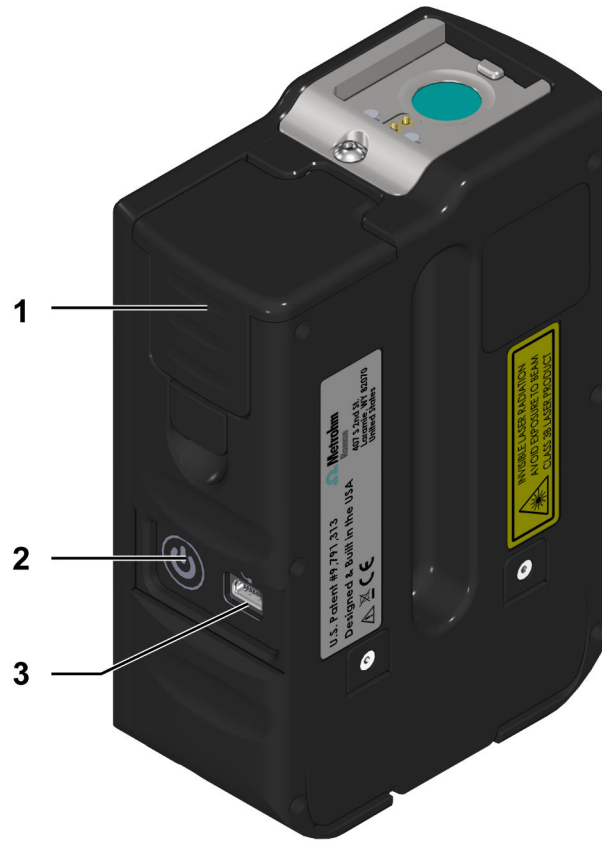


Figure 5 MIRA XTR C1D2 – Rear

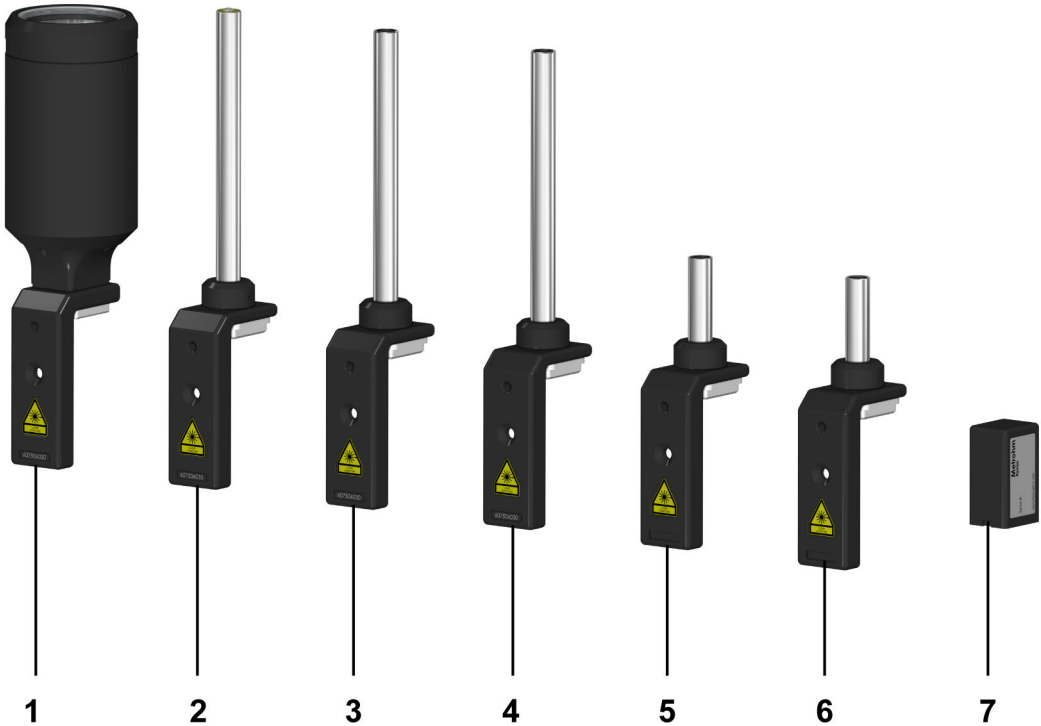
- | | |
|------------------------------------|------------------------|
| 1 Battery compartment | 2 On/off switch |
| 3 Type B mini USB connector | |

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

The C1D2 Smart Tips are secured in place with a screw.

The following Smart Tips are available:



- | | | | |
|----------|---|----------|--|
| 1 | Manual Stand-off C1D2 (6.07506.540) | 2 | Immersion Probe C1D2 (6.07506.500) |
| 3 | XLWD 15 cm C1D2 Attachment (6.07506.550) | 4 | LWD 15 cm C1D2 Attachment (6.07506.530) |
| 5 | XLWD 5 cm C1D2 Attachment (6.07506.510) | 6 | LWD 5 cm C1D2 Attachment (6.07506.520) |
| 7 | Calibration Standard (6.07501.010) | | |

Tip	Description
1	<p>The Manual Stand-off C1D2 enables data collection from a manually adjustable distance of 0.5 m to 1.5 m.</p> <p>The Manual Stand-off C1D2 can be used to determine the contents in a 55-gallon drum/barrel or to scan a container from a distance.</p> <p>The Manual Stand-off C1D2 is not meant to be used outdoors. It is designed for use in low-light situations.</p> <p>Laser class 3B operation.</p>



Tip	Description
2	<p>The Immersion Probe C1D2 allows data collection on a sample without focus adjustment. Simply contact the substance with the probe to acquire the data.</p> <p>The 6" (15.3 cm) length of the stainless steel construction allows for easy cleaning.</p> <p>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.</p> <p>Sleeves are available to prevent contamination of the probe.</p> <p>Laser class 3B operation.</p>
3	<p>The Extra Long Working Distance lenses XLWD 15 cm C1D2 Attachment (length 6" / 15.3 cm) and XLWD 5 cm C1D2 Attachment (length 2" / 5.1 cm) are used for extra long distance point and shoot measurements for samples in very thick containers such as glass bottles.</p> <p>The focal point is approximately 18 mm from the top of the lens.</p> <p>Laser class 3B operation.</p>
5	
4	<p>The Long Working Distance lenses LWD 15 cm C1D2 Attachment (length 6" / 15.3 cm) and LWD 5 cm C1D2 Attachment (length 2" / 5.1 cm) are used for point and shoot measurements at long distances, typically for samples in thick-walled bottles.</p> <p>The focal point is approximately 8 mm from the top of the lens.</p> <p>Laser class 3B operation.</p>
6	
7	<p>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.</p>



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.



AVERTISSEMENT

Risque d'explosion

Mort ou blessures graves par incendie ou explosion

- Le **MIRA XTR C1D2** ne peut être utilisé dans une zone dangereuse de **Classe I, Division 2**, que s'il est équipé d'un accessoire de mesure C1D2 et d'un boîtier C1D2 correctement monté.
- Ne pas utiliser si le boîtier C1D2, l'accessoire ou l'instrument est fendu ou endommagé.
- Ne pas tenter d'ouvrir le boîtier C1D2, de le connecter au port USB ou de changer les piles dans une zone dangereuse.
- Utilisez uniquement des piles **AA Energizer® L91 Ultimate Lithium™**.

Nettoyage

Les dépôts sur les surfaces peuvent entraîner une charge électrostatique. Des flammes ou des étincelles peuvent survenir lors de la décharge.

- Enlevez les dépôts des surfaces de l'enceinte C1D2, de l'attache et de l'instrument.
- Pour éviter l'accumulation de charge électrostatique, les pièces non métalliques ne peuvent être nettoyées qu'avec un chiffon humide.
- Respectez la réglementation nationale sur la protection contre les explosions.



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 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.

Initial start-up

Prerequisite:








- The instrument is not in a hazardous location.
- The **MIRA Cal DS** software is installed (*see "MIRA Cal DS software", page 3*).
Refer to the MIRA Cal DS software tutorial for detailed information (*see "Software tutorials", chapter 1.3.2, page 3*).

Required accessories:

- 3 mm Allen key (6.2621.100)
- 1** Insert batteries (*see "Changing batteries", page 23*).
 - 2** Switch on the instrument using the on/off switch.
 - 3** Carry out the following steps using the **MIRA Cal DS** software:
 - Configure the instrument settings.
 - Install spectral libraries.
 - Calibrate the instrument using the Calibration Standard:
 - Attaching the Calibration Standard (*see "Attaching the Calibration Standard", page 25*).
 - Calibrating the instrument (*see "Calibrating the instrument", chapter 6.3.2, page 50*).
 - 4** Attach a C1D2 sampling attachment (*see "Attaching C1D2 attachments", page 26*).
 - 5** Mount the C1D2 enclosure (*see "C1D2 enclosure assembly and disassembly", chapter 5.4, page 30*).

5.2 Energy supply with batteries

Battery indicator	Charge status
	Full
	Almost full
	Half full
	Yellow battery warning Metrohm recommends replacing the batteries when the battery indicator changes color from yellow to red.

Battery indicator	Charge status
	<p>Red battery warning</p> <p>The instrument will give a low battery warning and then shut down.</p>

Automatic shutdown

You can configure an automatic shutdown to save battery life ([see "System Settings menu", chapter 6.3.4, page 52](#)).

Changing batteries

WARNING

Explosion hazard

Death or serious injury by fires and explosions

- Batteries must only be changed in an area free of ignitable concentrations.
- Use only **AA Energizer® L91 Ultimate Lithium™** batteries.

AVERTISSEMENT

Risque d'explosion

Mort ou blessures graves par incendie ou explosion

- Les piles ne doivent être changées que dans une zone exempte de concentrations inflammables.
- Utilisez uniquement des piles **AA Energizer® L91 Ultimate Lithium™**.

1 Preparations:

- Remove the instrument from the hazardous location.
- Dismount the C1D2 enclosure from the instrument ([see "C1D2 enclosure assembly and disassembly", chapter 5.4, page 30](#)).
- Unscrew and detach the present Smart Tip.

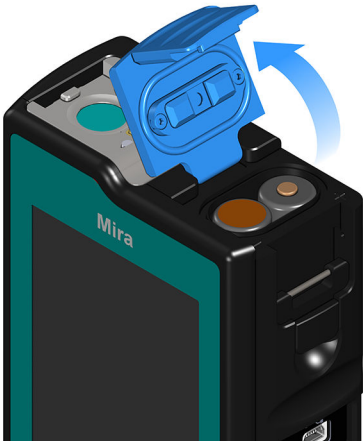


2



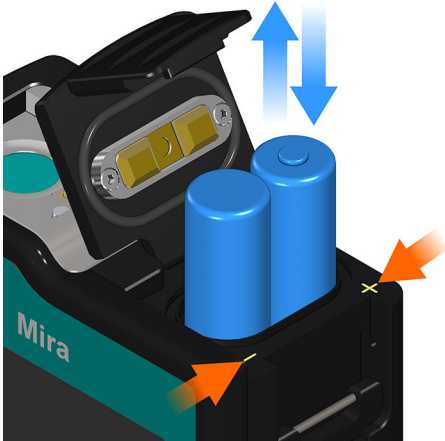
- Pull the lever.

3



- Open the top lid.

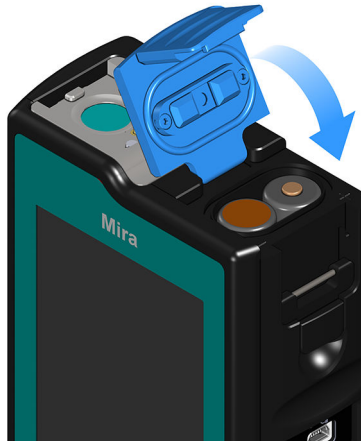
4



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

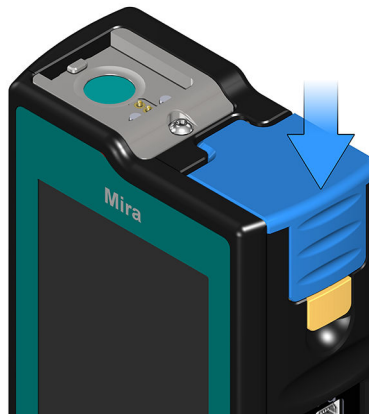


5



- Close the lid.

6



- Push the lid downwards until the lock release mechanism engages.

5.3 Attaching Smart Tips

Attaching the Calibration Standard

1 Preparations:

- Remove the instrument from the hazardous location.
- Dismount the C1D2 enclosure from the instrument (*see "C1D2 enclosure assembly and disassembly", chapter 5.4, page 30*).
- Unscrew and detach the present Smart Tip.



2



- 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.



Attaching C1D2 attachments

Only C1D2 attachments may be used (*see "C1D2 sampling attachments", chapter 1.2.1, page 2*).

Required accessories:

- 3 mm hex key (6.2621.100)

 **WARNING****Explosion hazard**

Death or serious injury by fires and explosions

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- Do not operate if the C1D2 enclosure, the attachment or the instrument is cracked or damaged.
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- Use only **AA Energizer® L91 Ultimate Lithium™** batteries.
- **Cleaning**

Deposits on the surfaces can lead to electrostatic charging. Flames or sparks may occur during discharge.

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- 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 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.

1 Preparations:

- Remove the instrument from the hazardous location.

- Dismount the C1D2 enclosure from the instrument (*see "C1D2 enclosure assembly and disassembly", chapter 5.4, page 30*).
- Unscrew and detach the present Smart Tip.

2 Slide the Smart Tip down and connect it to the mounting point.



3 Secure the Smart Tip to the C1D2 mounting adapter with a screw. Use the hex key.



4 Mount the C1D2 enclosure to the instrument (*see "C1D2 enclosure assembly and disassembly", chapter 5.4, page 30*).

5.4 C1D2 enclosure assembly and disassembly

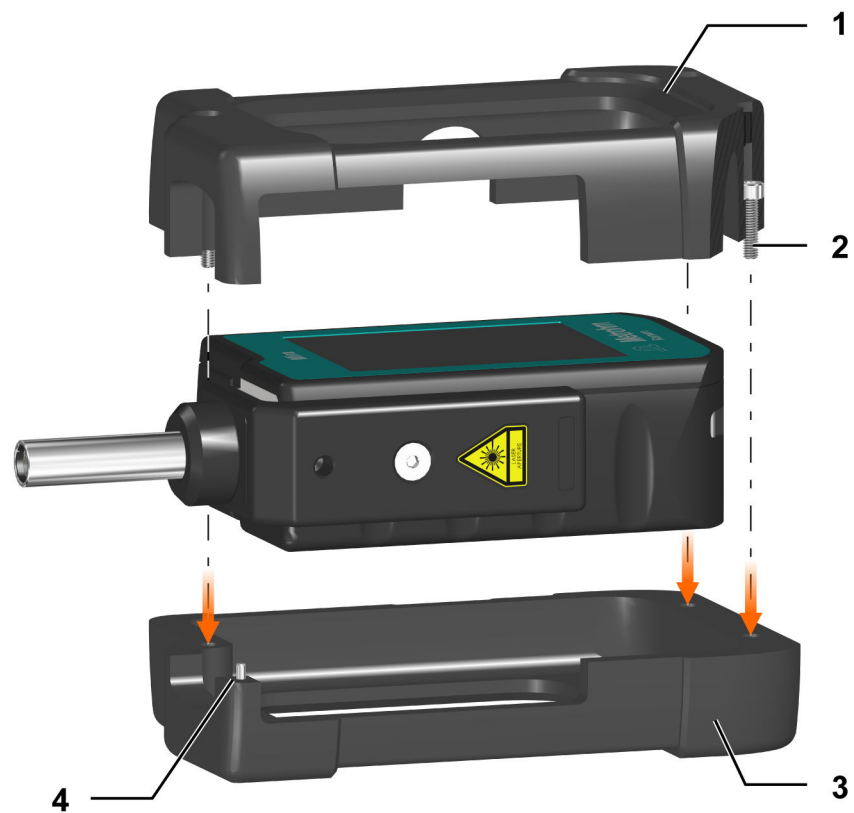


Figure 6 Instrument and C1D2 enclosure

1	Front cover	2	Captive screw (within the front cover)
3	Rear cover	4	Pin

Mounting the C1D2 enclosure

Prerequisite:

- The instrument is not in a hazardous location.

Required accessories:

- 3 mm hex key (6.2621.100)

- 1** Place the rear cover (**3**) on a table.
- 2** Place the instrument into the rear cover.

- 3** Place the front cover (1) over the instrument, joining it to the pin (4) and the rear cover.
- 4** Tighten the 3 captive screws (2) with the hex key to secure the front cover to the rear cover (see orange arrows).

Dismounting the C1D2 enclosure

Prerequisite:

- The instrument is not in a hazardous location.

Required accessories:

- 3 mm hex key (6.2621.100)

- 1** Place the instrument on a table.
- 2** Unscrew the 3 captive screws (2) with the hex key.
- 3** Detach the front cover (1) from the rear cover (3).
- 4** Remove the instrument from the rear cover.


5.5 USB connection

WARNING

Explosion hazard

Death or serious injury by fires and explosions

- The USB port must only be used in an area free of ignitable concentrations.

 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.

Refer to the **Tutorial MIRA Cal DS** for further steps (*see "Software tutorials", chapter 1.3.2, page 3*).

6 Operation and control

6.1 Safe shutdown

i 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.

6.2 Acquiring data

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

i 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 instrument

WARNING

Explosion hazard

Death or serious injury by fires and explosions

- The **MIRA XTR C1D2** is only allowed to be used in a **Class I, Division 2** hazardous location if it is equipped with a C1D2 sampling attachment and a properly mounted C1D2 enclosure.
- Do not operate if the C1D2 enclosure, the attachment or the instrument is cracked or damaged.
- Do not attempt to open the C1D2 enclosure, or to connect to the USB port, or to change batteries while in a hazardous location.
- Use only **AA Energizer® L91 Ultimate Lithium™** batteries.

▪ **Cleaning**

Deposits on the surfaces can lead to electrostatic charging. Flames or sparks may occur during discharge.

- Remove deposits from the surfaces of the C1D2 enclosure, the attachment and the instrument.
 - To avoid a build-up of electrostatic charge, the non-metallic parts may only be cleaned with a damp cloth.
- Observe the national explosion protection regulations.



AVERTISSEMENT

Risque d'explosion

Mort ou blessures graves par incendie ou explosion

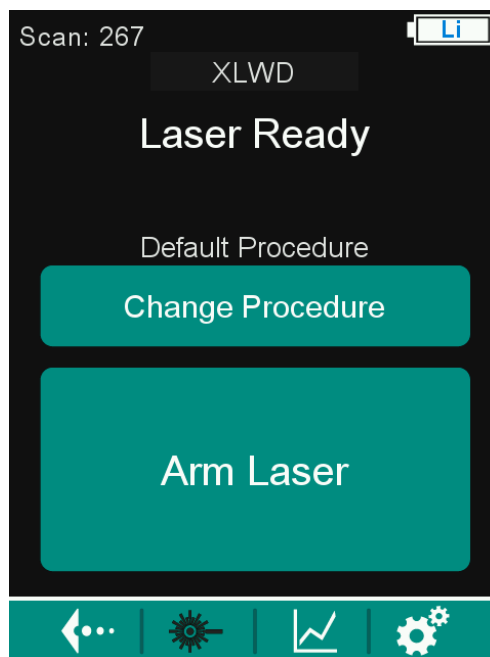
- Le **MIRA XTR C1D2** ne peut être utilisé dans une zone dangereuse de **Classe I, Division 2**, que s'il est équipé d'un accessoire de mesure C1D2 et d'un boîtier C1D2 correctement monté.
- Ne pas utiliser si le boîtier C1D2, l'accessoire ou l'instrument est fendu ou endommagé.
- Ne pas tenter d'ouvrir le boîtier C1D2, de le connecter au port USB ou de changer les piles dans une zone dangereuse.
- Utilisez uniquement des piles **AA Energizer® L91 Ultimate Lithium™**.
- **Nettoyage**

Les dépôts sur les surfaces peuvent entraîner une charge électrostatique. Des flammes ou des étincelles peuvent survenir lors de la décharge.

- Enlevez les dépôts des surfaces de l'enceinte C1D2, de l'attache et de l'instrument.
- Pour éviter l'accumulation de charge électrostatique, les pièces non métalliques ne peuvent être nettoyées qu'avec un chiffon humide.
- Respectez la réglementation nationale sur la protection contre les explosions.

Make sure the instrument has battery power.

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



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.

i 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.



2 Arming the laser

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 manuals.
- Observe the nominal ocular hazard distance (NOHD) for the Smart Tip used. This distance defines the danger zone.
- Observe national laws.

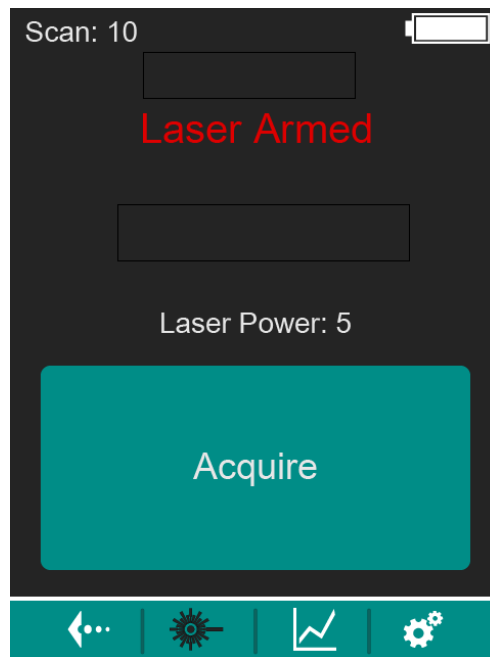
If there is no specific safety standard or safety regulation for the working area, observe the standard ANSI Z136.1 or supplement IEC 60825.14 for guidance on the safe use of lasers.

The display indicates:

- **Laser Ready:** The laser is ready to be armed.

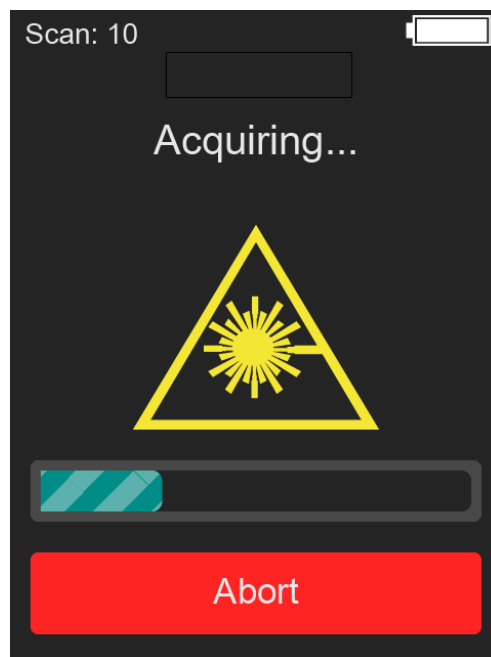
Select **[Arm Laser]**.

The display indicates: **Laser Armed**

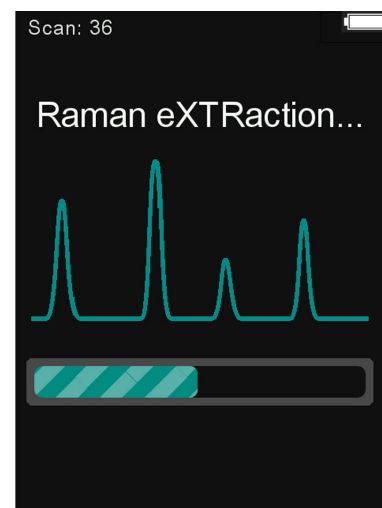
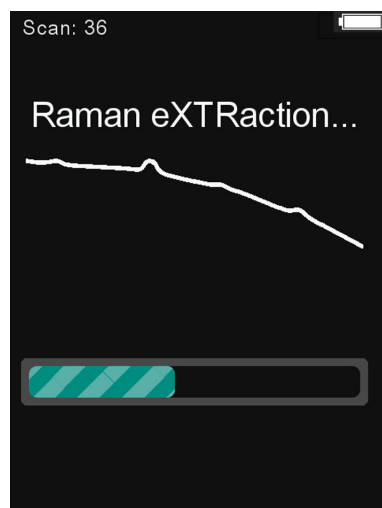


3 Measuring the sample

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

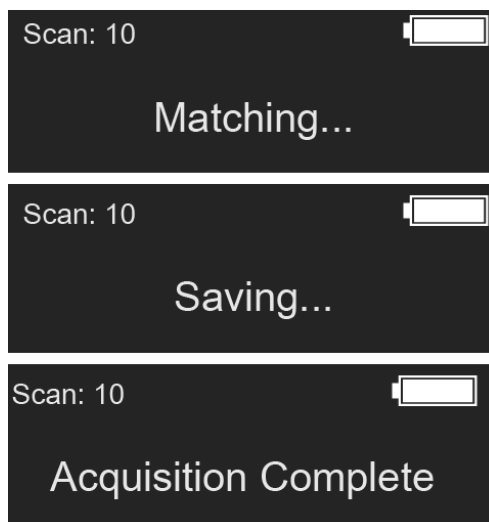


The status screen will indicate the progress of the Smart Acquire. You can cancel the acquisition only during the actual data collection. Once the matching starts, the process cannot be canceled.



If MIRA XTR C1D2 detects fluorescence, the **Raman eXTRaction** screen automatically appears.

Once the extraction is complete the data will be matched to the enabled libraries.



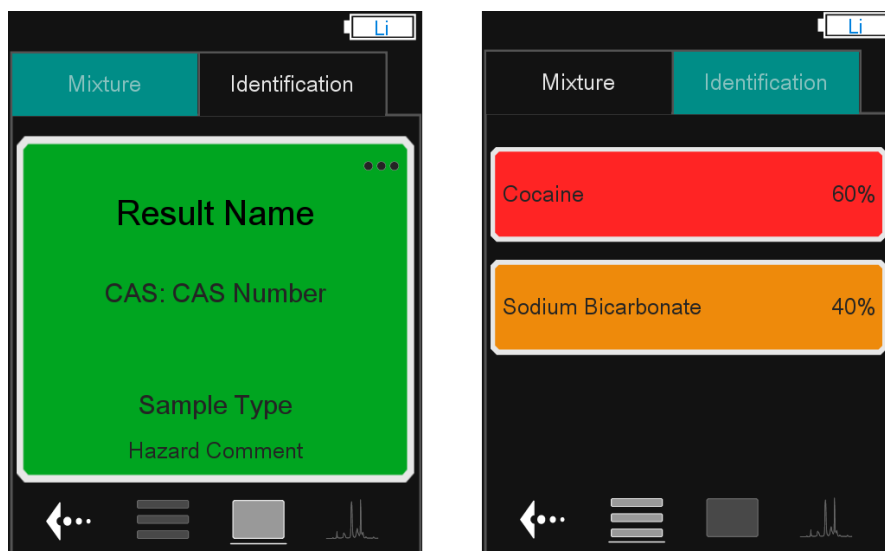
When the measurement is finished, the result appears as specified in the operating procedure.

4 Checking the result

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

i The active tab is black.

Both tabs may be empty if no identification is found.



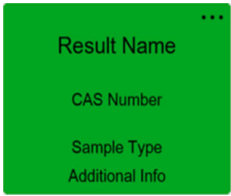
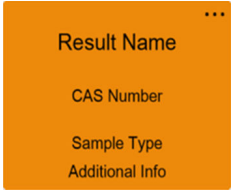
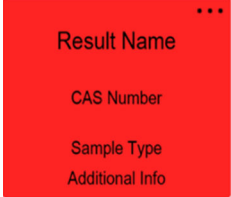
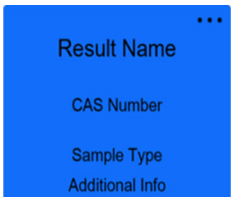
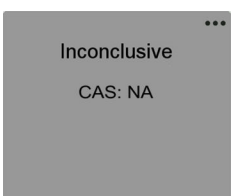
Select the 3 dots in the upper right corner to see GHS data or the HQI.

5 Measuring the next sample

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

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

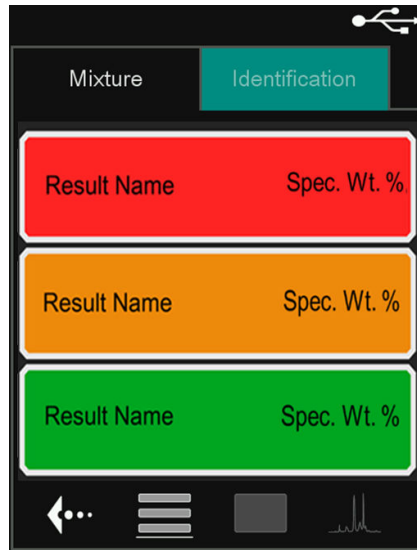
Identification screens

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 precursor of a dangerous material.
	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

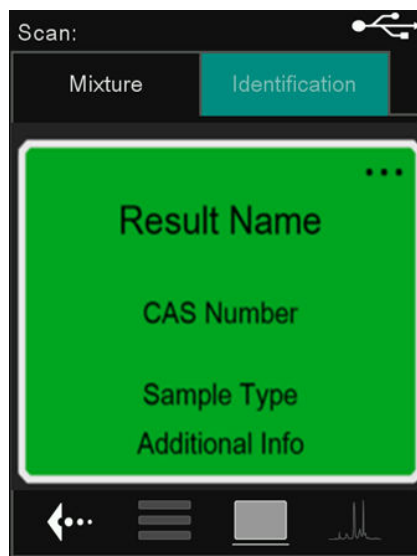
If it is a mixture, the Result list button shows a list of all components. To view the details of a component, select the respective component.



Result name



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

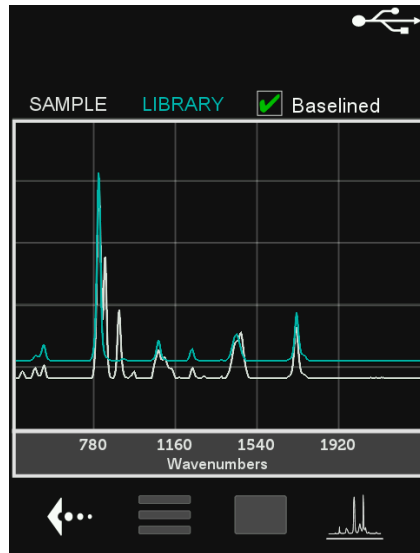


Spectrum



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.

6.3 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.

Menu bar



In the menu bar, you can access several sections.

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

Open settings

1  Select .

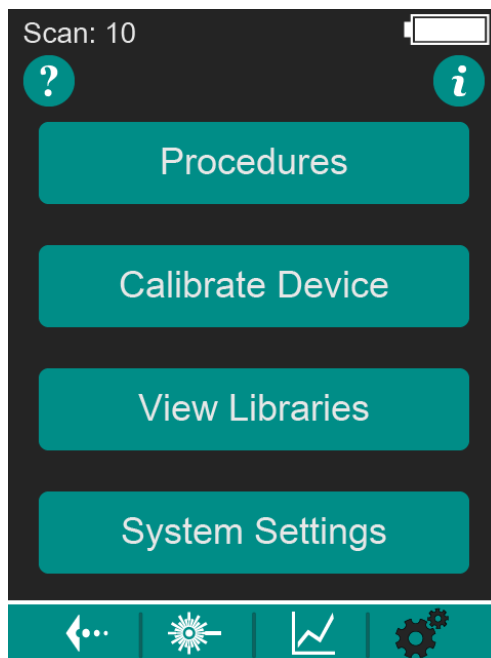


Figure 7 Settings menu

The menu offers the following settings.

- **[Procedures]:** *see "Operating Procedures menu", page 45*
- **[Calibrate Device]:** *see "Calibrating the instrument", page 50*
- **[View Libraries]:** *see "Viewing, enabling and disabling libraries", page 52*
- **[System Settings]:** *see "System Settings menu", page 52*

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

6.3.1 Operating Procedures menu

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

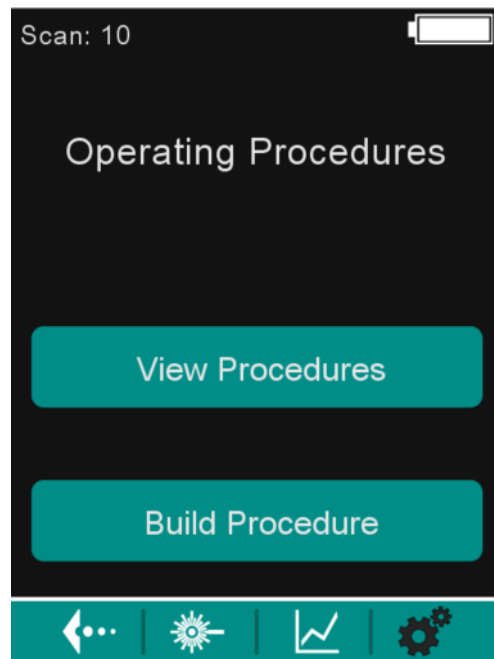


Figure 8 Operating Procedures menu

The menu offers the following options.

- **[View Procedures]** and their parameters, delete procedures: *see "Viewing or deleting operating procedures", page 45*
- **[Build Procedure]**: *see "Building operating procedure", page 46*

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.

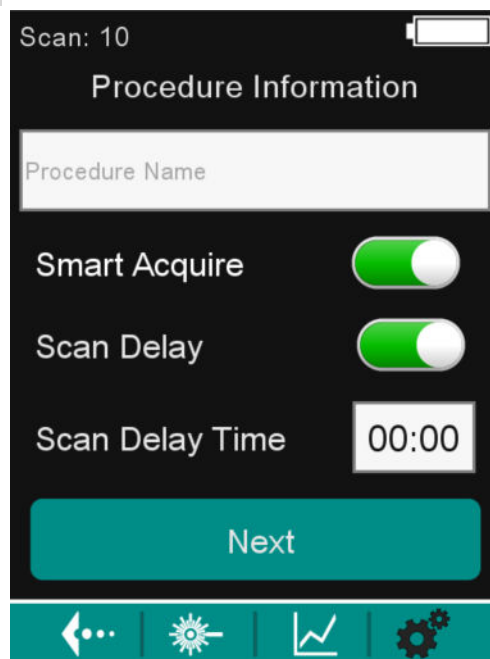
3 To delete a procedure, select . Confirm with **[Delete]**.

Building operating procedure

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

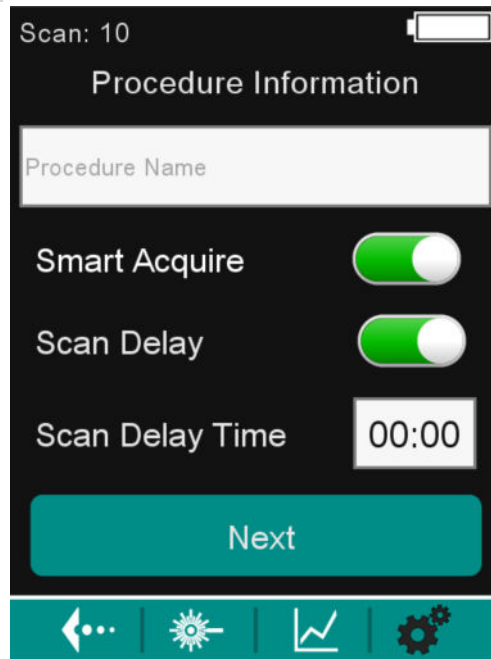
1 Select , then **Procedures** ► **Build Procedure**.

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**

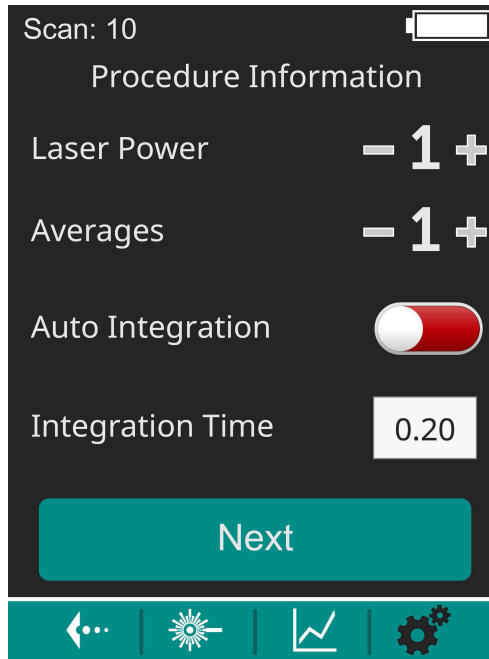


Enabling **Smart Acquire** on a custom operating procedure will run samples through the smart acquire noise and fluorescence rejection routines before matching against the enabled libraries.

- **Disabling Smart Acquire**



Select **[Next]**.

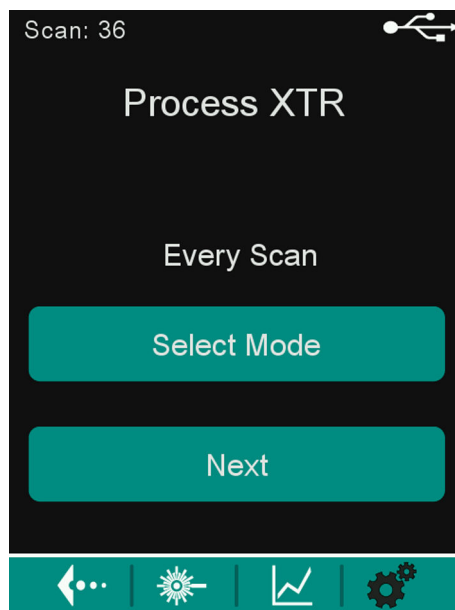


Define the **Laser Power** (1 - 5) and the number of **Averages**.
Activate **Auto Integration**, or deactivate **Auto Integration** and set an **Integration Time**.

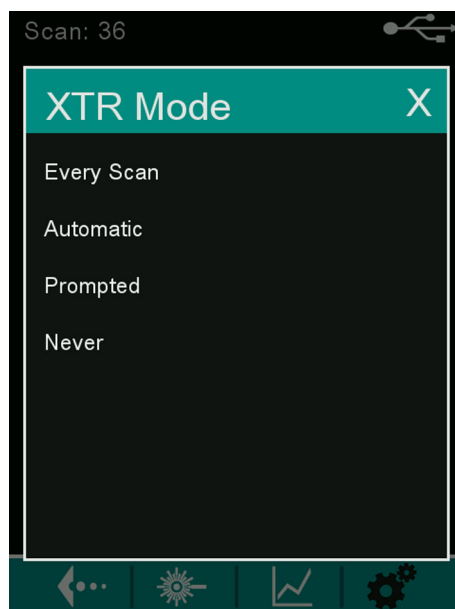
Select **[Next]**.

5 Processing XTR

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



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



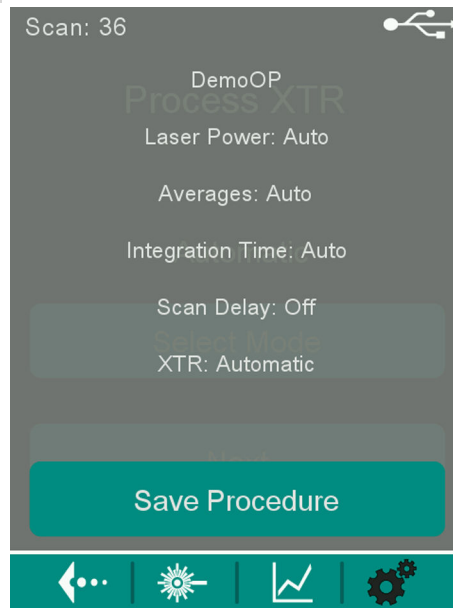
- **[Every Scan]** will always process the data using XTR algorithm regardless if fluorescence is detected or not.
- **[Automatic]** will automatically process the data using XTR algorithm when fluorescence is detected.
- **[Prompted]** prompts the user if fluorescence is detected.
- **[Never]** will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

6 Matching libraries

Matching will be performed against the enabled libraries.

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

7 Saving procedure



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

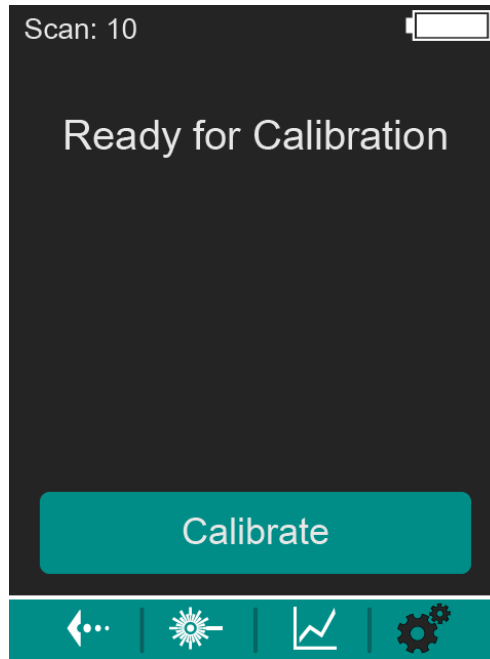
6.3.2 Calibrating the instrument

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

1 Attach a Metrohm provided Calibration Standard (*see "Calibration Standard (6.07501.010)", page 17*).

Place the instrument upright.

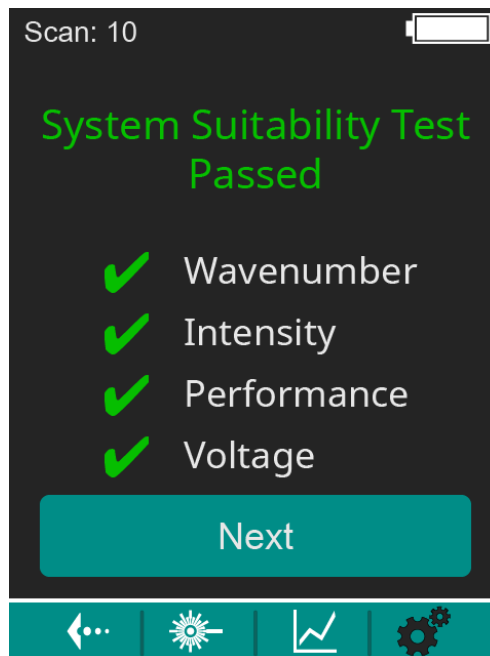
2 Select , then **[Calibrate Device]**.



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.

6.3.3 Viewing, enabling and disabling libraries

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

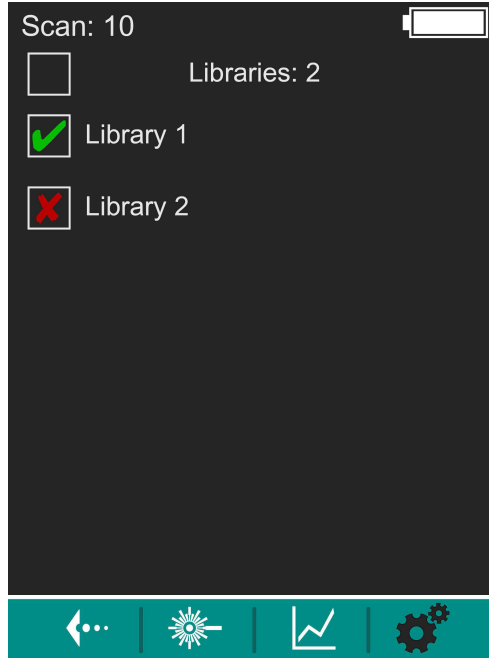


Figure 9 View Libraries screen

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.

6.3.4 System Settings menu

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

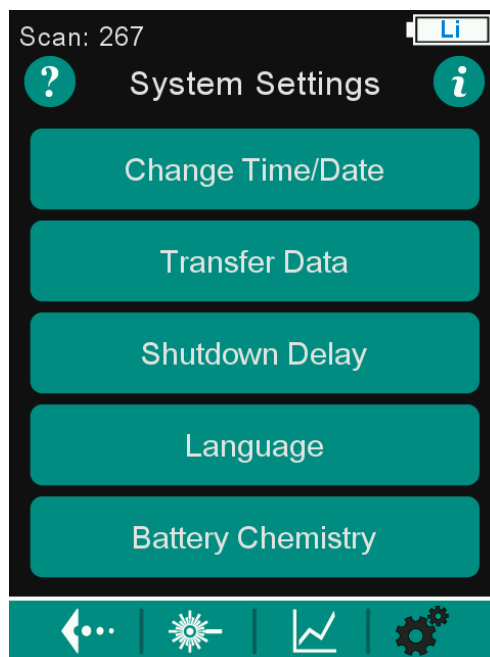




Figure 10 System Settings menu

The menu offers the following system settings:

- **[Change Time/Date]:** *see "System Settings menu", page 52*
- **[Data transmission]:** *see "System Settings menu", page 52*
- **[Automatic Shutdown]:** *see "System Settings menu", page 52*
- **[Language]:** *see "System Settings menu", page 52*
- **[Battery type]:** *see "System Settings menu", page 52*

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.

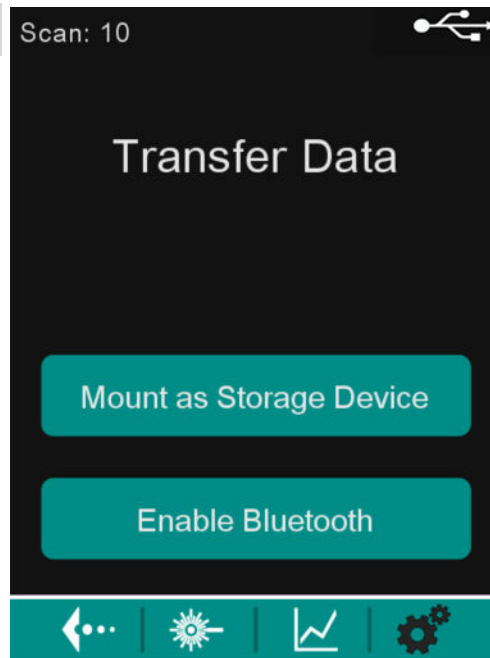
- 1  Select , then **System Settings** ► **Data Transmission**.

2  **WARNING****Explosion hazard**

Death or serious injury by fires and explosions


- The USB port must only be used in an area free of ignitable concentrations.

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.

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 instrument. 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]**.

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 **System Settings** ► **Automatic Shutdown**.

- 2 Set the automatic shutdown time.

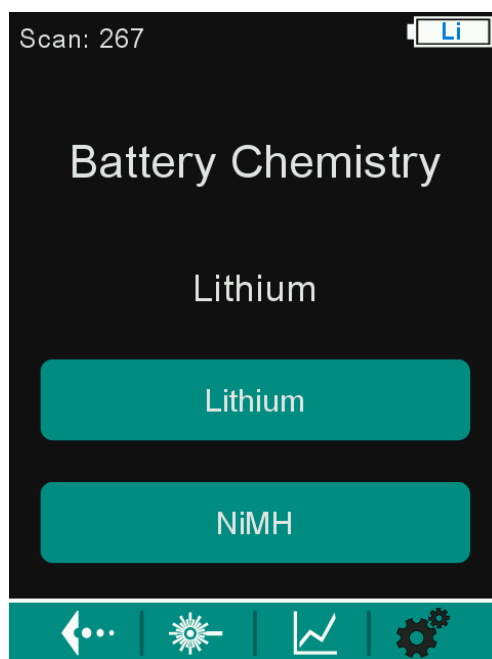
Example: With the automatic shutdown time **3**, a battery-powered instrument will automatically shut down after 3 minutes of being not in use.

Select **[Save]**.

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

Language

- 1 Mount the instrument as Storage Device (*see "System Settings menu", chapter 6.3.4, page 52*).
- 2 On <https://go.metrohm.com/s/uZsT4>, navigate to MIRA XTR and download the current software version.
- 3 Unpack the downloaded file and navigate to the appropriate language pack.
- 4 Save the GZ file to your MIRA device folder.



2 Select the battery type:

- Lithium

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

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

6.4 Viewing and editing samples in the scan log

1 Accessing the scan log



Select  to view the saved spectra in the [Scan Log](#).

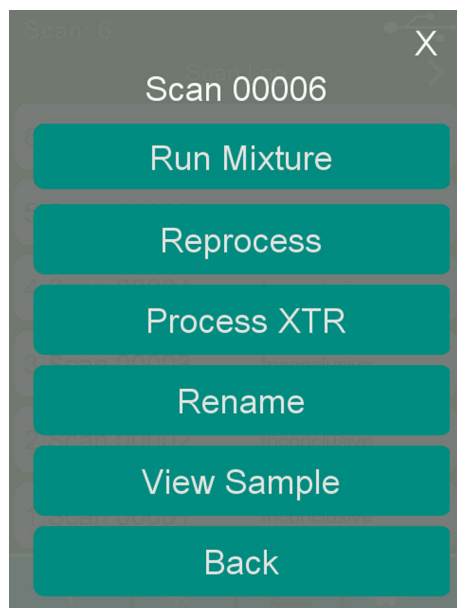
The samples are listed as color-coded buttons:



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 Maintenance

Deposits on the surfaces can lead to electrostatic charging. Flames or sparks may occur during discharge.

- Remove deposits from the surfaces of the C1D2 enclosure, the attachment and the instrument.
- To avoid a build-up of electrostatic charge, the non-metallic parts may only be cleaned with a damp cloth.
- Observe the national explosion protection regulations.

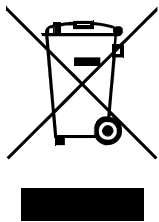
7.1 Maintenance agreement

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 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.

9 Technical specifications

9.1 Ambient conditions

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
NEMA Ratings	NEMA 3 Indoor/outdoor use	
Altitude / Pressure range	0...2,000 m.a.s.l. and 2,000...3,000 m.a.s.l. / min. 700 mbar	
Pollution degree	3 (industrial)	

9.2 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)
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9.3 Energy supply

Battery specifications	2 x 1.5 V, size AA	Use only AA Energizer® L91 Ultimate Lithium™ batteries
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USB Mini-A/B Power specifications

Instrument connected to a powered USB hub

<i>Nominal input voltage</i>	5 V DC
<i>Minimum input current</i>	1 A
<i>Nominal input current</i>	1.3 A
<i>Maximum input current</i>	1.5 A

9.4 Measurements, weight and material

Measurements

<i>With C1D2 enclosure</i>	103 × 62 × 161 mm	Width × Depth × Height
<i>Without C1D2 enclosure</i>	88.2 × 45.3 × 125.5 mm	Width × Depth × Height
<i>Display</i>	3.7" TFT LCD resistive touch display, glove-compatible	

Weight

<i>With C1D2 enclosure</i>	1050 g
<i>Without C1D2 enclosure</i>	705 g

Material

<i>Housing</i>	Aluminum anodized
<i>C1D2 enclosure</i>	Polyurethane



9.5 Ruggedization

(tested without C1D2 enclosure)	MIL-STD-810H Method 514.8 CAT 4	Common Carrier, Packaged
	MIL-STD-810H Method 514.8 CAT 4	Composite 2 Wheeled Trailer, Packaged
	MIL-STD-810H Method 514.8 CAT 4	Composite Wheeled Vehicle, Packaged
	MIL-STD-810H Method 516.8 Procedure IV	Packaged, Logistic Transit Drop Test (Transit Drop, 26 drops from 48 inches to wood backed by con- crete)
	MIL-STD-810H Method 516.8 Procedure VI	Bench Handling

9.6 Operating specifications

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
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

