Mira DS

Product manual

8.926.8001EN / 2020-12-18

Metrohm

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Mira DS

Firmware version 8.0.1.136 or higher

Product manual

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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, the Mira spectrometers are the only handheld Raman spectrometers currently on the market with Orbital Raster Scan (ORS) technology.

1.2 Model versions

Mira DS instruments are available in the following versions:

Table 1 Model versions

2.926.0010	Mira DS Basic Mira DS Basic is a starter package that contains the basic components required for operating Mira DS. Check *Metrohm Website* for included parts.	Laser class 3B
2.926.0020	Mira DS Advanced Mira DS Advanced includes a wide range of attachments suitable for standard applications in the field of first responders, military and security officials. Check *Metrohm Website* for included parts.	Laser class 3B
2.926.0030	Mira DS Flex Mira DS Flex includes the basic components needed to operate Mira DS without sampling attachments. Check *Metrohm Website* for included parts.	Laser class 3B

NOTICE

To purchase additional *Accessories (see chapter 1.6.1, page 5)*.

1.3 Mira Cal software

Mira Cal DS software

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

Table 2 Model versions

6.06071.020	Mira Cal DS USB Stick

To download the latest version of Mira Cal DS software and firmware, click on the following link:

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

Mira Cal M mobile app

In order to analyze and manage samples acquired on a **Mira DS** instrument, the **Mira Cal M** mobile app can be installed on an Android™ device optionally.

To install the latest version of the Mira Cal M mobile app, *see "Installing Mira Cal M for Android", page 19*.

1.4 Third party software

HazMasterG3® software

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.).

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

Table 3 Model 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

1.5 About the documentation

NOTICE

Please read through this documentation carefully before putting the product into operation.

The document contains important safety information and warnings which you must follow in order to ensure safe operation of the instrument. Metrohm is not responsible for damages and safety hazards that occur from using the instrument in a manner that is not specified in the user manual.

Symbols and conventions

The following icons and formatting may appear in this documentation:

*(5-**12**)*	**Cross-reference to figure legend** The first number refers to the figure number, the second to the product part in the figure.
1	**Instruction step** Carry out these steps in the sequence shown.
Method	Designations for names of parameters, menu items, tabs and dialog windows in the software.
File ▶ New	Menu or menu item
Work area / Properties	Menu paths in order to arrive at a particular position in the software.
[Next]	**Button** or **key**

Proprietary information statement

Continuous improvements

To remain the leader of the industry, Metrohm Raman, Inc. has a policy of continuous improvement of its products. As such, all products, product specifications, data and operating instructions are subject to change without notice.

Liability disclaimer

Metrohm Raman, Inc. and its affiliates take steps to assure that their published specifications and manuals are correct. Nevertheless, errors do occur. Metrohm Raman, Inc. and its affiliates reserve the right to correct any such errors and disclaim all liability resulting therefrom. The equipment described in this manual is warranted in accordance with the terms of Metrohm Raman, Inc.'s warranty. However, actual performance of such equipment is dependent upon factors such as system configuration, customer data and operator control. Since implementation by customers of the equipment may vary, the suitability of specific equipment configurations and applications must be determined by the customer and is not warranted by Metrohm Raman, Inc. or its affiliates.

Export control statement

These items are controlled by the U.S. Government and authorized for export only to the country of ultimate destination for use by the ultimate consignee or end-user(s) identified on the invoice. They may not be resold, transferred, or otherwise disposed of, to any other country or to any person other than the authorized ultimate consignee or end-user(s), either in their original form or after being incorporated into other items, without first obtaining approval from the U.S. Government or as otherwise authorized by U.S. law and regulations.

No liability for certain damages

Metrohm Raman, Inc., its affiliates, and anyone else involved in the design, manufacture, or delivery of the accompanying product (including hardware and software) shall not be liable, under any circumstances, for any loss of profits or any special, incidental, consequential, exemplary, or punitive damages whatsoever (including, without limitation, damages resulting from cost of replacement, loss of use, loss of data, loss of royalties, loss of profits, loss of revenue, loss of business, loss of prospective economic advantage, or failure or delay in performance) arising out of the use of or inability to use such product, even if Metrohm Raman, Inc. or its affiliates have been notified of the possibility of such damages.

1.6 Additional Information – Software tutorials

Refer to following software tutorials for more information:

- Mira Cal DS software tutorial: 8.105.8069EN
- Mira Cal M mobile app tutorial: 8.0105.8023EN

1.6.1 Accessories

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

Downloading the accessories list

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

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

The search result is displayed.

3 Click on the product.

Detailed information regarding the product is shown on various tabs.

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

The PDF file with the accessories data is created.

NOTICE

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

2 Safety

2.1 Product safety

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

2.2 Hazard levels

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

DANGER

Immediate danger of life

Irreversible injuries that will result in death.

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

Lists measures to avoid hazard.

WARNING

Severe health hazards

Serious injuries that could result in death.

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

Lists measures to avoid hazard.

CAUTION

Health hazards or severe property damage

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

Lists measures to avoid hazard.

2.3 Intended use

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

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

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

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

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

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

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

2.4 Residual risks

2.4.1 General dangers at the workplace

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

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

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

If they are not followed, this may result in:

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

WARNING

General dangers at workplace

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

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

2.4.2 Danger from electrical potential

WARNING

Electric shock from electrical potential

A considerable danger 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.

2.4.3 Laser safety

NOTICE

NOHD

The following information refers to NOHD for Mira DS instruments in accordance with EN 60825-1, "Safety of laser products".

The nominal ocular hazard distance (NOHD) is listed in the technical specifications of Mira DS *(see page 89)*.

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 89)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

You can purchase protective laser glasses (6.7560.010) from Metrohm AG *Accessories (see chapter 1.6.1, page 5)*.

Laser Classification depending on Smart Tips

Attached Smart Tip	Laser Class 1	Laser Class 3B
Right Angle Attachment		**X**
Universal Attachment		**X**
Intelligent Universal Attachment		**X**
Stand-off Attachment		**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**

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

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- SERS Attachment (6.07506.040) does not have an interlock mechanism.
  Laser light can emerge from the laser aperture when the door is open.
- Please use caution and ensure that the instrument is powered off before opening this door for decontamination.

2.4.4 Warning stickers on the instrument

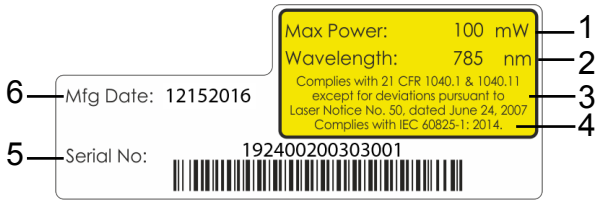
The instrument is equipped with stickers that warn of potential hazards. These warning stickers are listed and explained below.

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

Emergence of laser

- Laser aperture

Laser specifications



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

Laser class

The following laser classification is used for all Mira instruments.

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

2.5 Responsibility of the operator

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

2.6 Personnel requirement

Only qualified personnel may operate the present product.

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

3 Functional description

3.1 Overview of the instrument

Front

Figure 1 Mira DS – Front

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

Rear

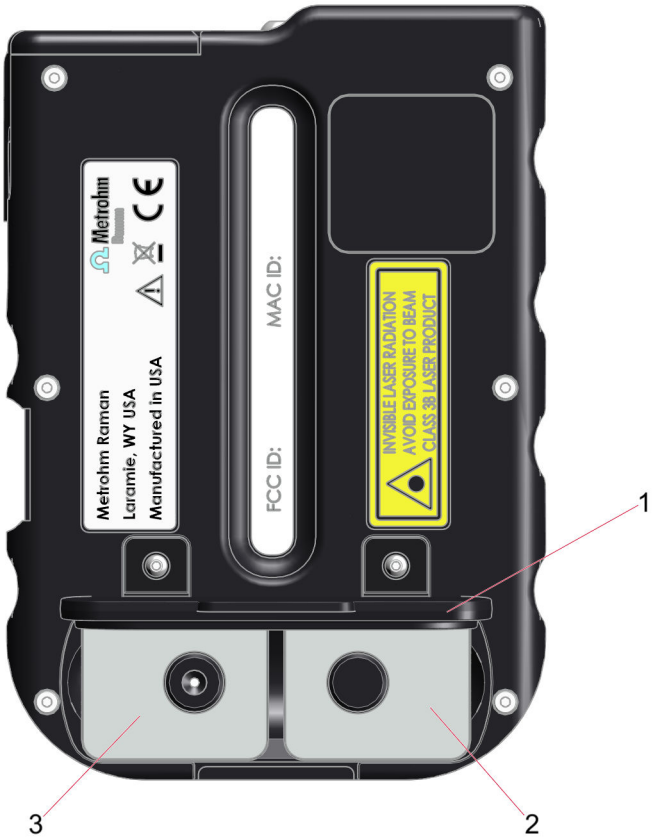


Figure 2 Mira DS – Rear

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

4 Transport and storage

4.1 Checking the delivery

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

4.2 Storing the packaging

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

4.3 Storage

NOTICE

Always remove batteries if the instrument is not in use.

5 Installation

5.1 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 6.0 to 9.0.

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

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

2. Click on the white bar at the top of the page to bring up the keyboard. Type: **Mira Cal M**

3. Click on the **Mira Cal M** app.

4. Click on **[Install]**.

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

   When prompted, grant the requested permissions.

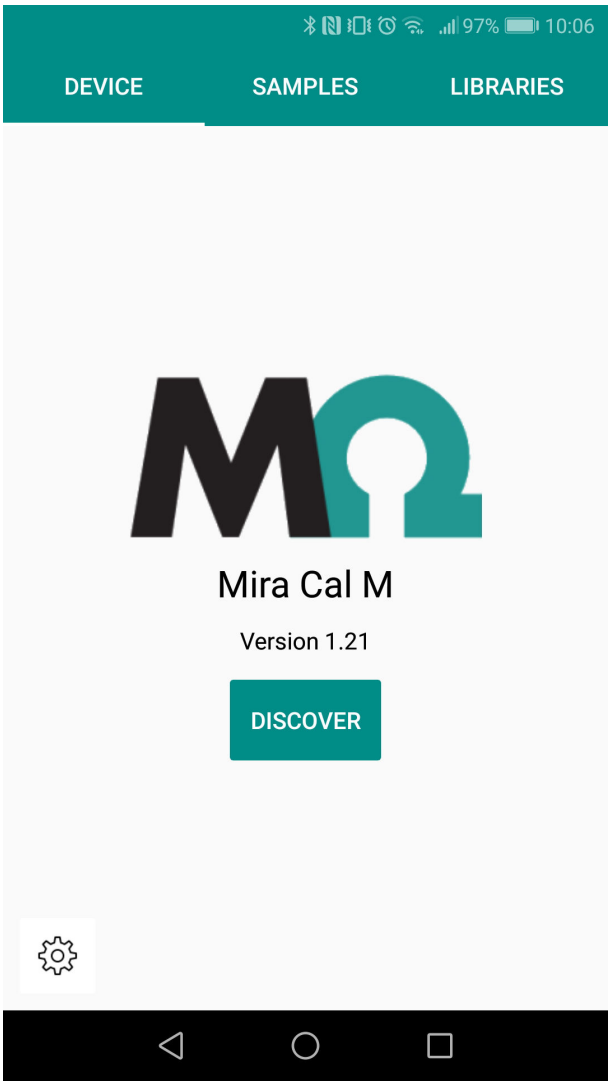


Figure 3 Mira Cal M home screen

NOTICE

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	Charge status
	Full
	Almost full
	Half full
	Yellow battery warning We recommend to change 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.

NOTICE

Power save mode

If you use the Mira DS with batteries, you can configure a shutdown delay to save power *(see "Shutdown Delay", page 79)*.

An optional **Mira PowerPack** is available for up to 9 hours of operation. See *Energy supply with Mira PowerPack (see chapter 5.3.2, page 24)*.

Changing batteries

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

NOTICE

Battery type

We recommend to use AA Energizer® Ultimate Lithium™ batteries. We also support rechargeable NiMH Panasonic eneloop pro™ batteries.

Open the battery compartment

Pull the lever.

Push the lateral cover upwards.

Open the lateral cover.

Open the top cover.

The battery compartment is now open.

Close the battery compartment

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

Close the top cover.

Hook the lateral cover on the top cover.

Push the lateral cover down to the limit.

The battery compartment is now closed.

5.3.2 Energy supply with Mira PowerPack

The optional **Mira PowerPack** is a Li-Ion battery pack. The PowerPack can be attached to the Mira DS and power the instrument for up to 9 hours of operation.

NOTICE

During the operation with PowerPack, we recommend to insert batteries in the Mira DS as a backup.

During the operation with PowerPack, the shutdown delay is disabled.

Mira PowerPack Front

Figure 4 Mira PowerPack – Front

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

Mira PowerPack Rear

Figure 5 Mira PowerPack – Rear

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

NOTICE

Do not bend the cable.

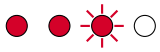
Charging instructions

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

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

The charge indicator will flash briefly while the PowerPack negotiates the charge voltage.

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

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

NOTICE

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

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

Installing the PowerPack

Remove the lanyard from the lanyard pins.

- Facing the front of Mira DS and Mira PowerPack, hook the PowerPack's right latch onto the instrument's right lanyard pin.
- Press and hold the lock button.
- Rotate the 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 PowerPack state of charge

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

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

PowerPack state of charge	
● ● ● ●	75% - 100%
● ● ● ○	50% - 75%
● ● ○ ○	25% - 50%
● ○ ○ ○	<25%
✳ ○ ○ ○	<5%, No output

5.4 USB connection

NOTICE

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

Energy supply

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

NOTICE

Battery charging function

The instrument has no charging function for rechargeable batteries.

You must replace drained batteries.

Synchronization

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

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

Refer to the Mira Cal DS software tutorial for further steps *Additional Information – Software tutorials (see chapter 1.6, page 5)*.

5.5 Safe shutdown

NOTICE

To prevent unexpected behavior in the instrument, always perform a safe shutdown.

A **safe shutdown** is performed in the following cases:

- The on/off switch is pressed.
- The battery is low.
- A battery-powered instrument is not in use for the duration specified in the shutdown delay.

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

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

6 Initial configuration

NOTICE

Configuration

Use **Mira Cal DS** software to change instrument settings. Use **Mira Cal DS** software to install spectral libraries.

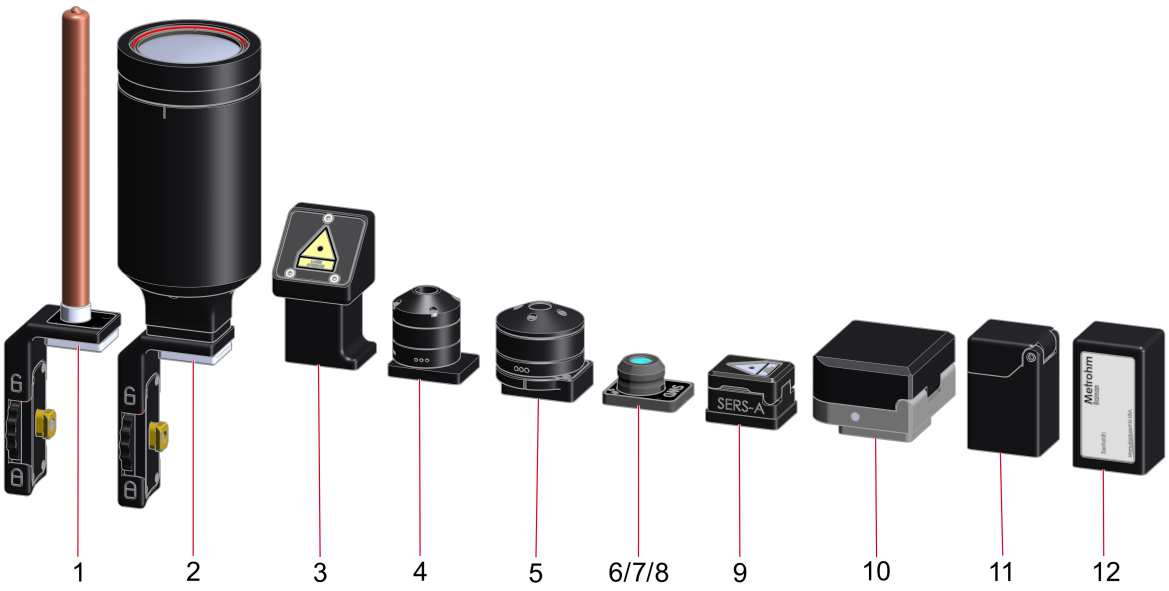
Refer to **Mira Cal DS** software tutorial for detailed information *Additional Information – Software tutorials (see chapter 1.6, page 5)*.

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 design, Smart Tips will not allow operation of Mira DS when seated in an incorrect position.

The following Smart Tips are available.



1 **Contact Ball-Probe (6.07506.030)**

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

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

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

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

Class 3B laser operation.

2 **Stand-off Attachment (6.07506.020)**

The Stand-off Attachment allows to collect data from a distance of **0.25 m to 1.5 m**.

The Stand-off Attachment can be used to identify 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 or in brightly lit rooms. It is designed for use in low light situations.

Class 3B laser operation.

3 **Right Angle Attachment (6.07506.000)**
The Right Angle Attachment allows to collect data by placing the substance on a surface and laying the Mira DS down next to the substance with the Right Angle Attachment covering the substance.

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

Class 3B laser operation.

4 **Universal Attachment (6.07506.010)**
The Universal Attachment is an attachment with 3 different sampling distances.

Use position 1 for focusing through bottles. The focal point is approximately **5 mm** from the end of the attachment.

Use position 2 for thin plastic bags. The focal point is approximately **3 mm** from the end of the attachment.

Use position 3 for direct contact. The focal point is approximately **<1.0 mm** from the end of the attachment.

Class 3B laser operation.

5 **iUA – Mira intelligent Universal Attachment (6.07506.060)**
The iUA provides the flexibility of an universal attachment with the intelligence of the Mira Smart Attachment feature.

Use position 1 for direct contact. The focal point is approximately **<1.0 mm** from the end of the attachment.

Use position 2 for thin plastic bags. The focal point is approximately **4 mm** from the end of the attachment.

Use position 3 for focusing through bottles. The focal point is approximately **8 mm** from the end of the attachment.

In combination with the Content ID operating procedure, the iUA will display the container material and the internal contents in an easy to understand display.

Class 3B laser operation.

6 **Short Working Distance Attachment Lens (SWD) (6.07505.010)**
A short distance lens for point and shoot measurement with class 3B laser operation.

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

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

7 **Long Working Distance Attachment Lens (LWD) (6.07505.000)**
A long distance lens for point and shoot measurement with class 3B laser operation.

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

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

8 **Extra Long Working Distance Attachment Lens (XLWD) (6.07505.020)**
An extra long distance lens for point and shoot measurement with class 3B laser operation.

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

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

9 **SERS Attachment (6.07506.040)**
The SERS Attachment accommodates proprietary SERS substrates.

Class 3B laser operation.

10 **Tablet Holder (6.07504.000)**
The Tablet Holder is used for different tablet or capsule shapes. A spring-loaded holder helps to mount and position the sample.

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

11 **Vial Holder (6.07502.000)**
The Vial Holder is used for samples in glass vials.

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

12 **Calibration Standard (6.07501.010)**
The Calibration Standard is needed for the calibration of the instrument. The Calibration Standard contains an ASTM 1840 reference sample. The Calibration Standard is in the scope of delivery.

7.2 Attaching Smart Tips

Using Calibration Standard

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

Using Attachment Lenses

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 89)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

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

Using Universal Attachment

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 89)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

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

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

The spots indicate the position of the Universal Attachment.

Using intelligent Universal Attachment

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 89)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

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

The intelligent Universal Attachment has 3 positions. Rotate the attachment to change the position.

The spots indicate the position of the intelligent Universal Attachment.

Using Vial Holder

Closing the lid prevents laser radiation from emerging.

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

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

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

Using Right Angle Attachment

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 89)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

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

Using Contact Ball-Probe

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 89)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

Attach the Smart Tip.

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

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

Using Stand-off Attachment

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 89)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

Attach the Smart Tip.

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

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

Manually adjust the adjustment ring to the desired Stand-off distance and acquire the data.

NOTICE

It is recommended to use a tripod when using the stand-off attachment.

Using SERS Attachment

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- Follow the safety measures and instructions.
- Instruments must be used by trained personnel only.
- Instruments of the laser class 3B must be used in protected and labeled rooms only.
- Appropriate protective glasses according to the technical specifications *(see page 89)* must be used when working with open laser beams (Smart Tips of the laser class 3B).
- Observe the nominal ocular hazard distance (NOHD).
- Follow the provisions of the IEC 60825-1 standard "Safety of laser products" and the regulations for the use of laser systems in your country.

WARNING

Risk of injury by laser radiation

Serious eye injuries by laser radiation.

- SERS Attachment (6.07506.040) does not have an interlock mechanism.
  Laser light can emerge from the laser aperture when the door is open.
- Please use caution and ensure that the instrument is powered off before opening this door for decontamination.

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 at the optimal depth.

Remove the attachment from the instrument or power down the instrument.

Open the hinged door of the attachment.

Remove the strip.

Wipe down interior surfaces with a kimwipe or swab. Use ethanol or isopropanol to clean the attachment.

NOTICE

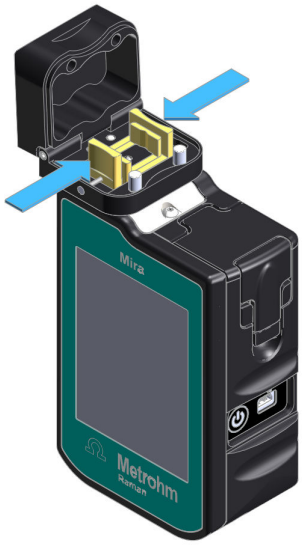
Cleaning is intended to remove residues from previous substrates, rather than for polishing the window.

Using Tablet Holder

Closing the lid prevents laser radiation from emerging.

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

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



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

Release the levers to fix the sample.

7.3 Acquiring data

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

NOTICE

Default pincode of the instrument is **1234**. Additional pin codes have to be defined and synchronized beforehand on Mira Cal DS Software. User preferred operating procedures need to be created beforehand using instrument settings or Mira Cal DS software.

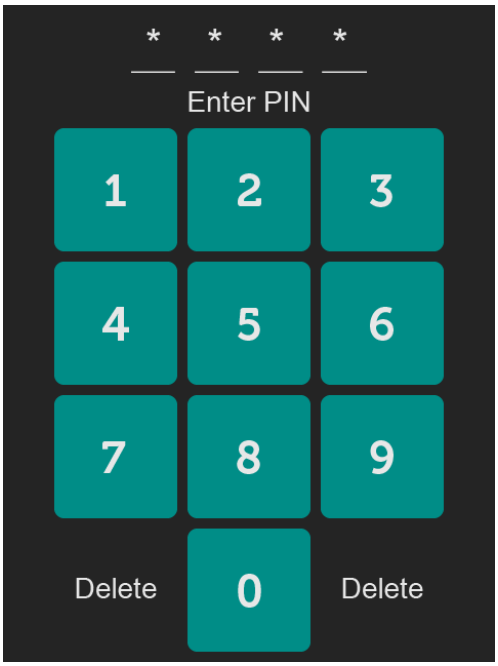
Starting the instrument

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

1 Switching on the instrument

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

2 Pincode



Enter **1234** (default pincode) or a user configured pin code.

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

3 Calibrating the System Prompt Screen

- To calibrate the system, click on **[Calibrate Device]** and follow *Calibrate Device section (see chapter 7.5.2, page 67)*.
- To skip the calibration and move to the home screen, click on **[Skip]**.

Acquiring Data

1 Attaching smart tip

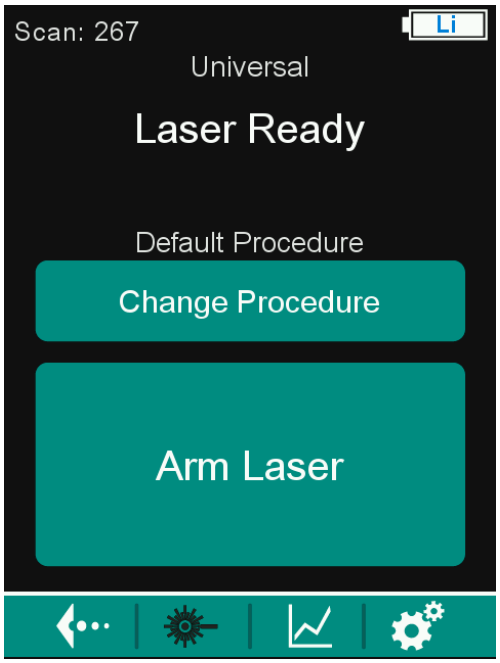
If not already done, attach the correct smart tip to the instrument *Attaching Smart Tips (see chapter 7.2, page 36)*.

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 DS 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 DS matching algorithms. Click on **[Change Procedure]** and select an operating procedure from the drop-down menu.

NOTICE

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 automatically adjust laser power and integration time.

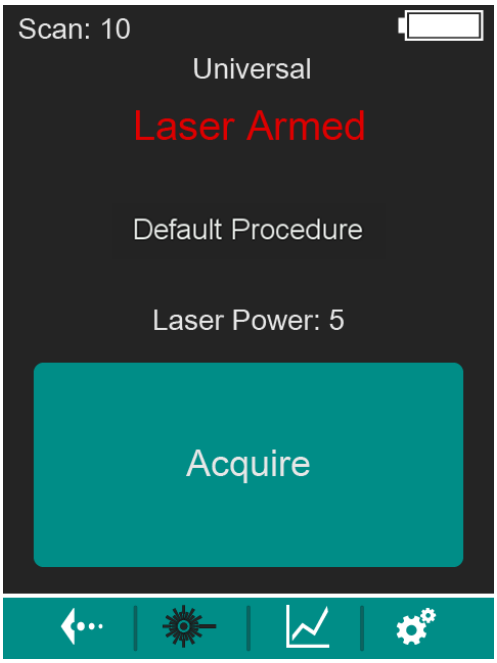
The SERS Attachment automatically enables a specialized **SERS operating procedure**. The SERS operating procedure optimizes acquisition parameters and references specific SERS libraries.

The intelligent Universal Attachment (iUA) automatically enables 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 (see chapter 7.4, page 58)*.

3 **Arming laser**

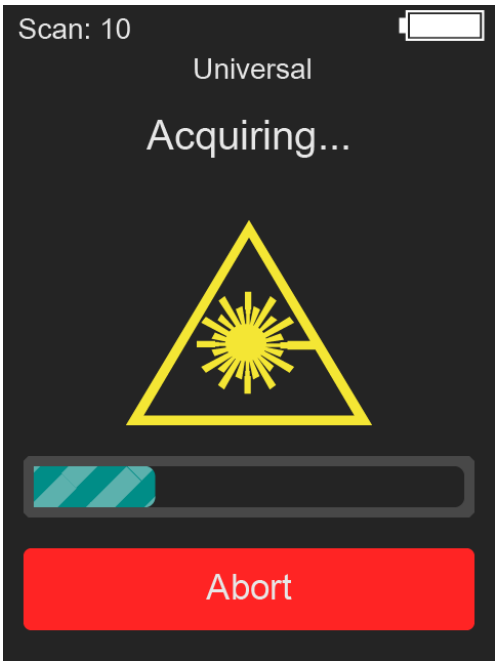
Click on **[Arm Laser]**.

The display indicates: **Laser Armed**



4 Measuring the sample

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

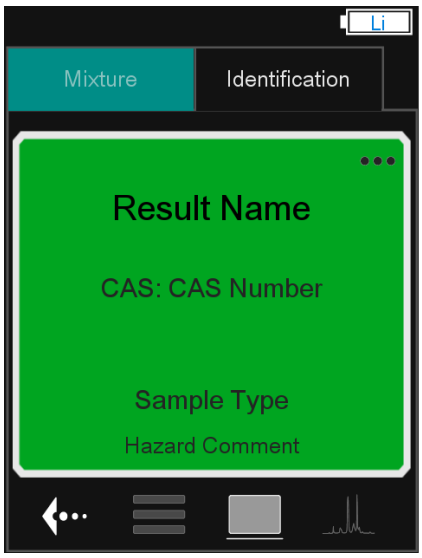


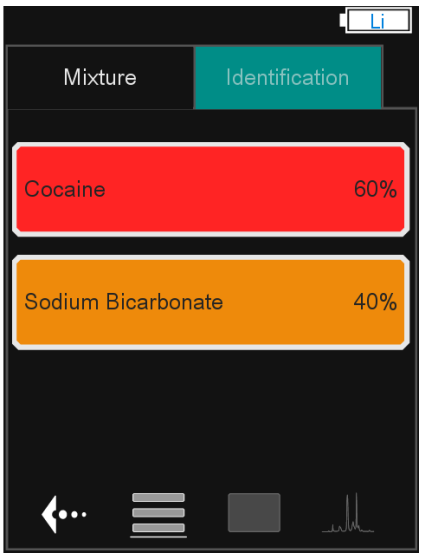
The status screen will indicate the stage of the smart acquire. You can abort the acquisition only during the actual data collection. Once the matching starts, the process cannot be aborted.

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

5 Examining the result

The results are displayed in 2 tabs: **Mixture** and **Identification**. Click on the different tabs to see the identification and mixture results. Note: Both tabs may be empty if no mixture or no identification is found.





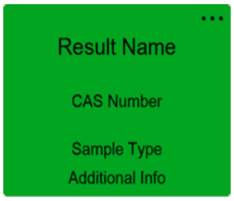
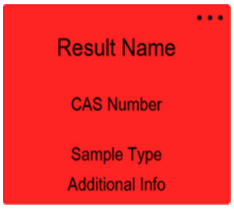
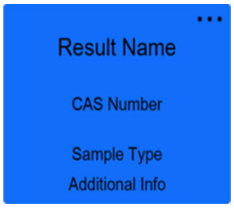
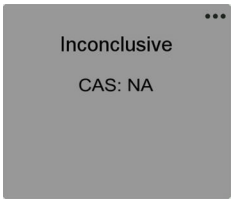
Click on the three dots in the upper right corner to see GHS data or the HQI.

6 **Measuring the next sample**

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

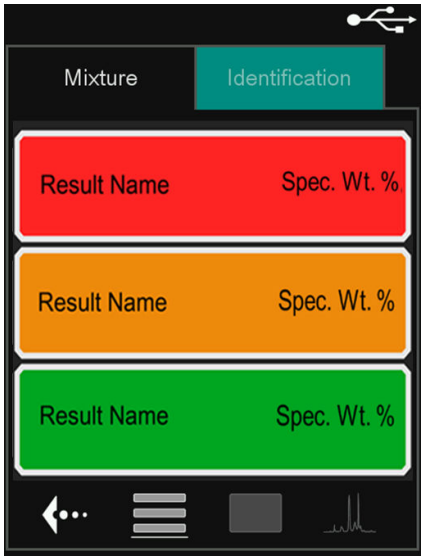
Click on **[Acquire]** to start the measurement.

Identification screens

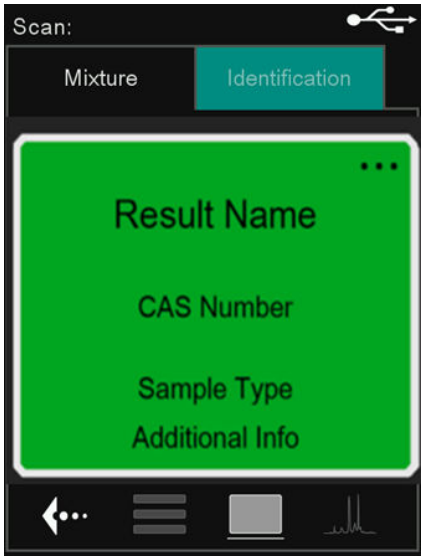
Identification screen	Color code	Hazard level
	Green	**Safe**
	Orange	**Caution**
	Red	**Danger**
	Blue	**No information**
	Grey	**Inconclusive** For example, because of a low signal. Explore different techniques.

Identification screens for mixtures

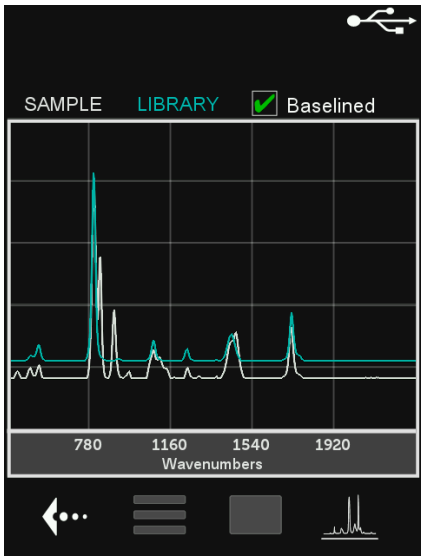
- **Result list** 
  If it is a mixture, the result list button shows a list of all components. To view the details of a component, click on the respective component.



- **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.



  Press on **SAMPLE** or **LIBRARY** above the spectral viewing window to hide the corresponding spectrum.
  Activate **Baselined** to see the unprocessed raw spectrum.

7.4 Acquiring data with the iUA

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

The intelligent Universal Attachment (iUA) automatically enables 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 Mira DS, not in Mira Cal DS or in the mobile app.

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

Acquiring data with the iUA

1 Attach the iUA

If not already done, attach the intelligent Universal Attachment (iUA) to the instrument *Attaching Smart Tips (see chapter 7.2, page 36)*.

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**

2 Changing the operating procedure

To optimize the identification of contents in polymer or glass containers, click on **[Change Procedure]** and load the **Content ID operating procedure**.

NOTICE

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

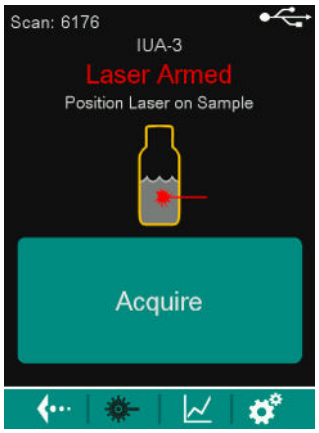
3 Follow the instruction on the display, e.g. **Rotate To IUA-3**: Rotate the iUA to position 3.

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

4 Arming laser

Click on **[Arm Laser]**.

The display indicates: **Laser Armed**



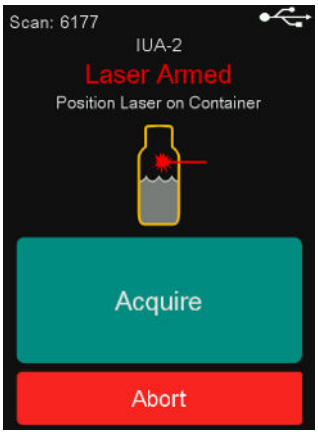
5 Measuring the sample

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**.

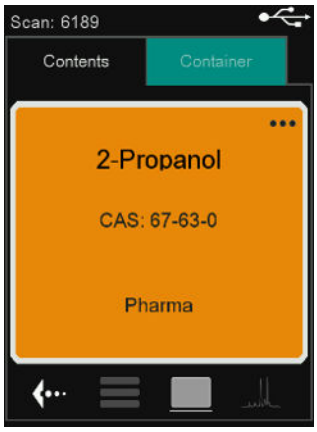
Start the measurement with **[Acquire]**.

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

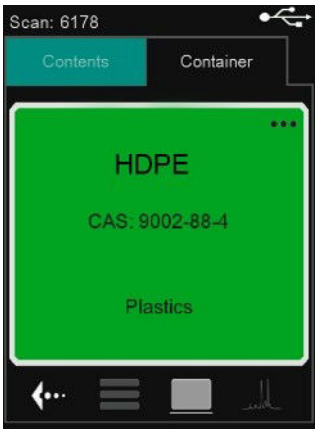
7 **Examining the result**

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

Contents result



Container result



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

8 **Measuring the next sample**

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

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

7.5 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 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 Click on  .

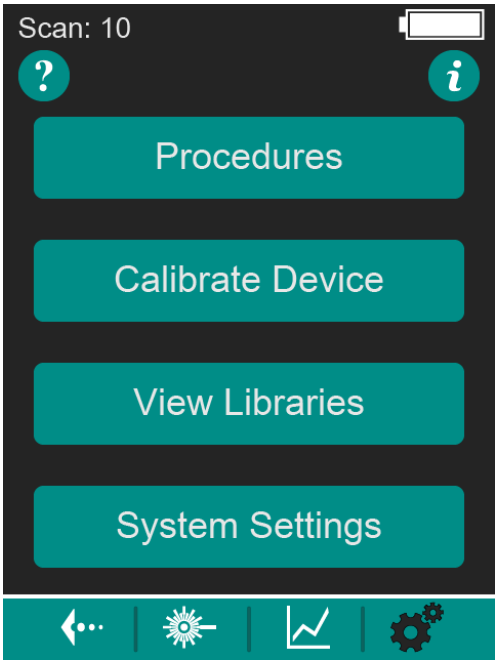


Figure 6 Settings menu

The menu offers the following settings.

- Procedures: *Operating Procedures menu (see chapter 7.5.1, page 63)*
- Calibrate Device: *Calibrate Device section (see chapter 7.5.2, page 67)*
- View Libraries: *View Libraries menu (see chapter 7.5.3, page 69)*
- System Settings: *System Settings menu (see chapter 7.5.4, page 70)*

2 **Info screen**

To view the info screen, click on  .

The shown information includes:

- Time: HH:MM:SS UTC
- Date: YYYY-MM-DD
- Device Name
- Serial #
- Device Model: Mira DS
- 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

7.5.1 Operating Procedures menu

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

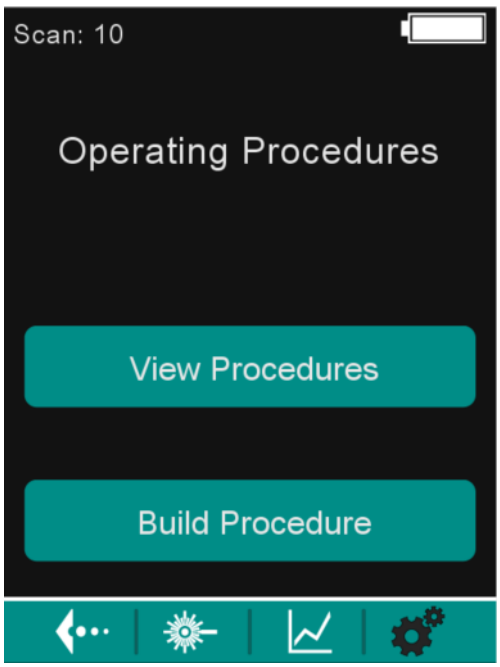


Figure 7 Operating Procedures menu

The menu offers the following options.

- View Procedures and their parameters, delete procedures *(see "Viewing or deleting operating procedures", page 64)*
- Build Procedure *(see "Building operating procedure", page 64)*

Viewing or deleting operating procedures

1 Click on  , then **Procedures ▶ View Procedures**.

The instrument displays the stored operating procedures.

2 To view the procedure settings, click on the name of the corresponding procedure.

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

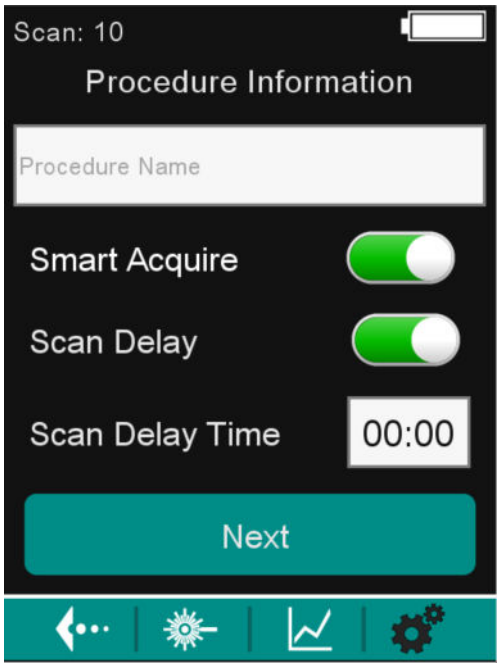
Building operating procedure

NOTICE

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

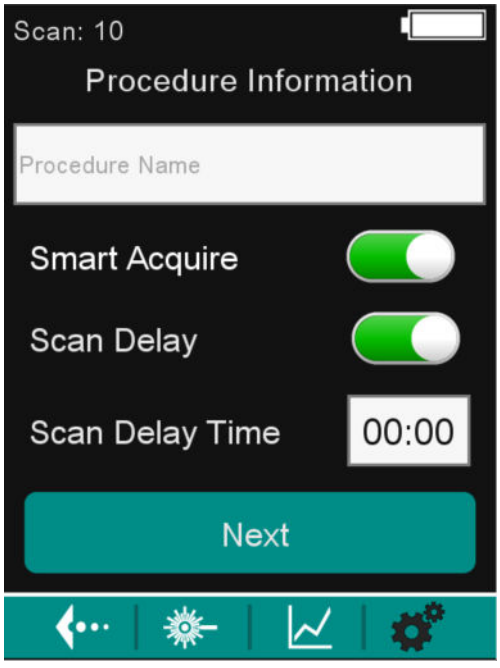
1 Click on  , then **Procedures ▶ Build Procedure**.

2 Naming procedure



The procedure must be named. Click on 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**

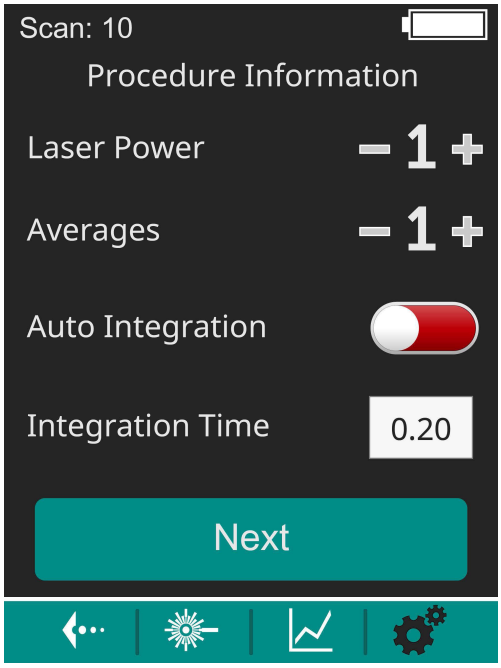
Either enable or disable Smart Acquire.

- **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**

Click on **[Next]**.



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

Click on **[Next]**.

5 **Matching libraries**

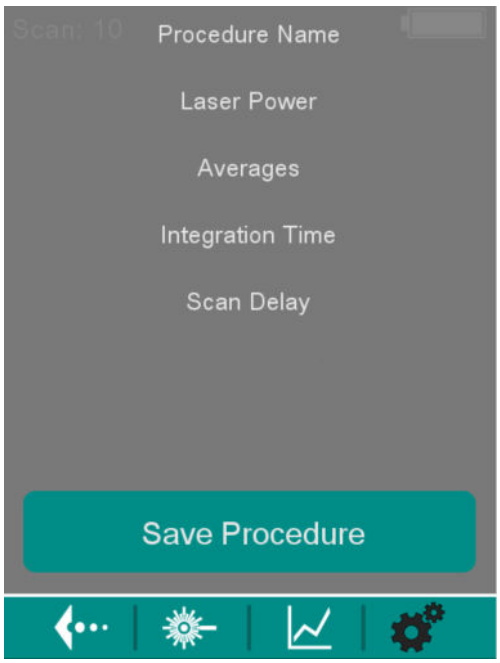
Matching will be performed against the enabled libraries.

NOTICE

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

6 **Saving procedure**

Review the procedure settings.



Click on **[Save Procedure]**.

7.5.2 Calibrate Device section

NOTICE

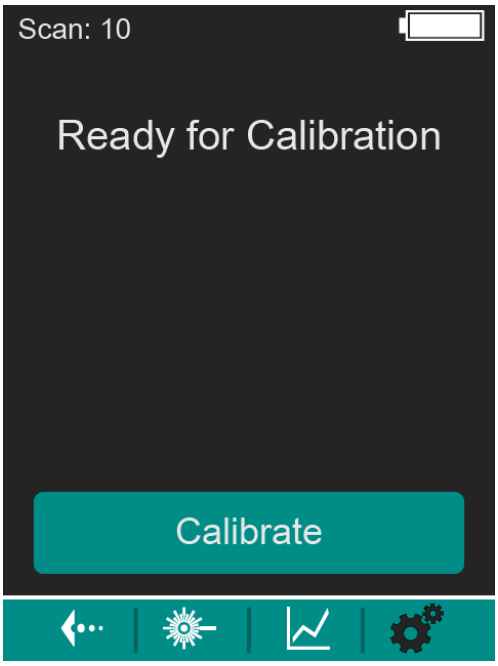
Instrument calibration can also be done in Mira Cal DS software with a connected instrument.

Calibrating the instrument

1 Attach a Metrohm provided Calibration Standard *Attaching Smart Tips (see chapter 7.2, page 36)*.

Place the instrument upright.

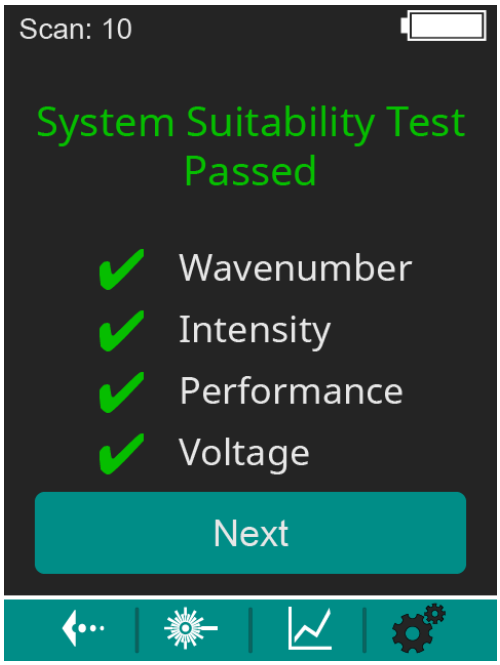
2 Click on  , then **Calibrate Device**.



3 With the Calibration Standard attached and the instrument placed upright, click on **[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 Click on **[Next]**.

The home screen appears.

7.5.3 View Libraries menu

Viewing, enabling and disabling libraries

1 Click on  , then **View Libraries**.

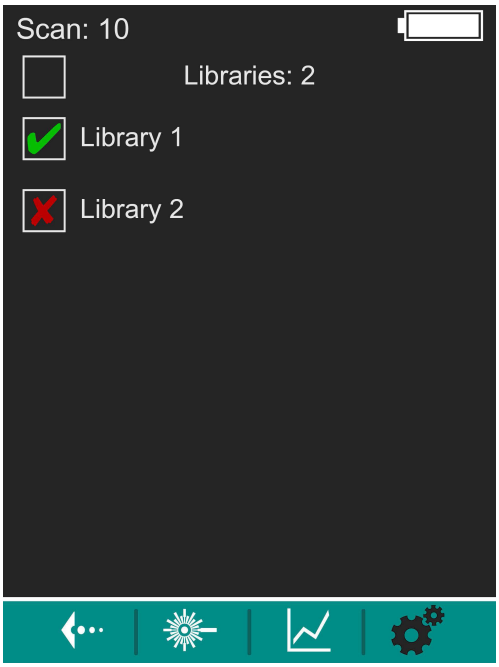


Figure 8 View Libraries screen

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.

7.5.4 System Settings menu

The System Settings menu opens with  , then select **System Settings**

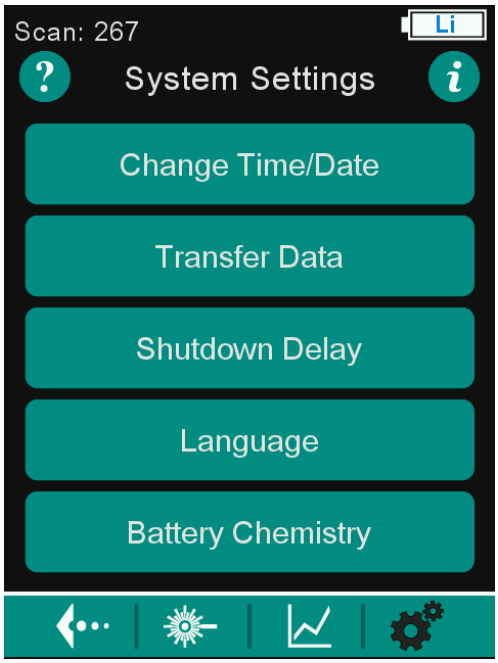


Figure 9 System Settings menu

The menu offers the following system settings:

- Change Time/Date *(see "Change Time and Date", page 71)*
- Transfer Data *(see "Transfer Data", page 71, 73, 79)*
- Shutdown Delay *(see "Shutdown Delay", page 79)*
- Language *(see "Language", page 80)*
- Battery Chemistry *(see "Battery Chemistry", page 80)*

Change Time and Date

1 Click on , then **System Settings ► Change Time/Date**.

2 Adjust the time. Click on **[Next]**.

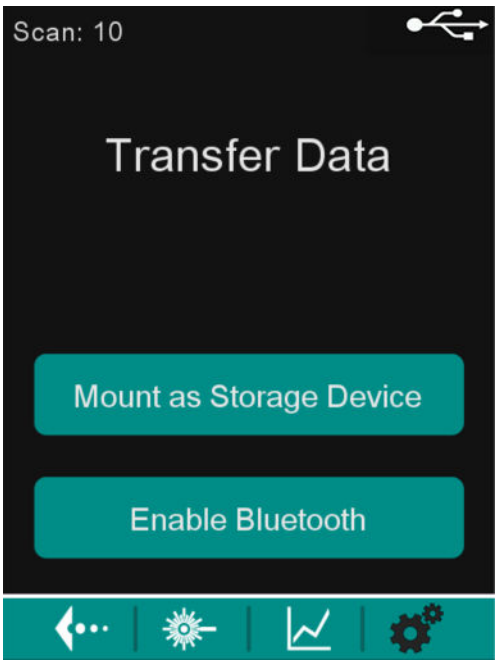
3 Adjust the date. Click on **[Save]**.

Transfer Data: Mount Mira DS as Storage Device

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

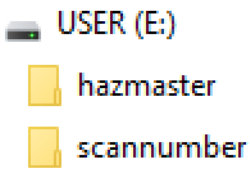
1 Click on , then **System Settings ► Transfer Data**.

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

3 

Click on **[Mount as Storage Device]**.

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



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

4 **Importing sample files into Mira Cal DS**

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

- Open Mira Cal DS. Click on **[Advanced]**.
- Open **File ► Open ► Samples**.
- Navigate to the mounted Android device. Open **scannumber**.
- Select one ore more ***.rmnb** files. Click on **Open**.

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

5 **Copying files to the Windows PC**

Files in the scannumber folder can be copied directly to the Windows PC for later viewing or sharing.

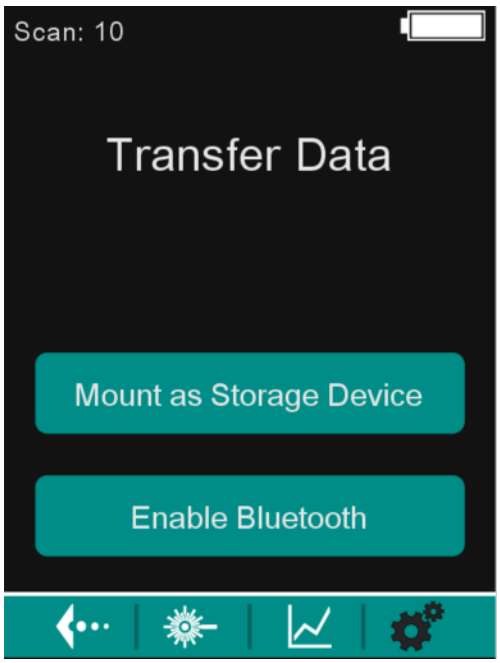
6 To disconnect, on the Mira DS instrument click on **[Disconnect Storage Device]**.

Transfer Data: Bluetooth® wireless technology

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

1 **Enabling Bluetooth on Mira DS**

On Mira DS, click on  , then **System Settings ▶ Transfer Data**.

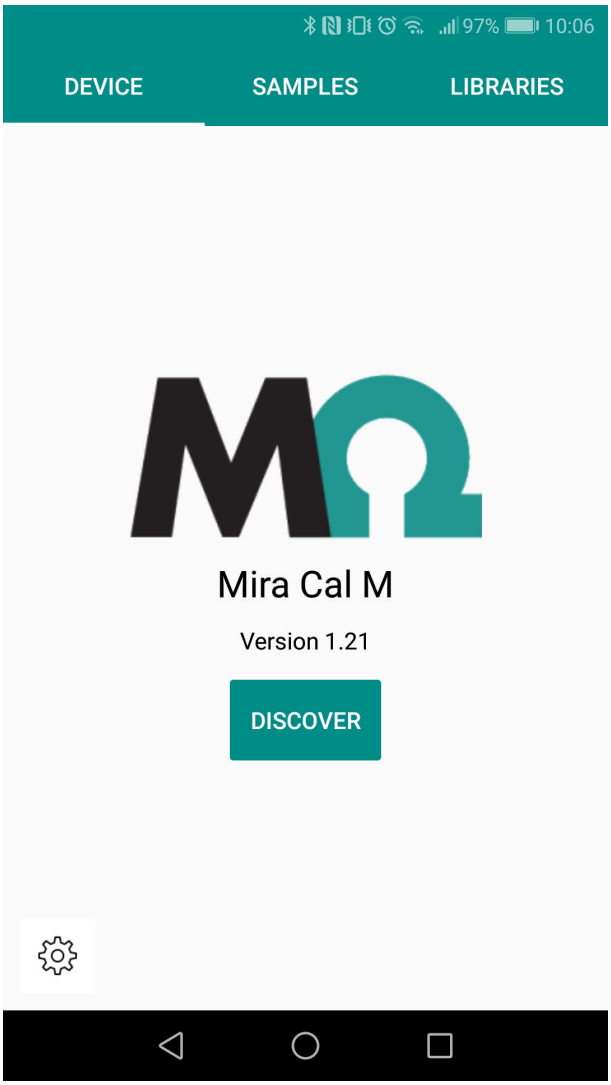


Click on **[Enable Bluetooth]**.

Mira DS indicates: **Bluetooth Mode**.

2 **Pairing and connecting**

- On the Android device, open Mira Cal M.



- Click on **Discover**.

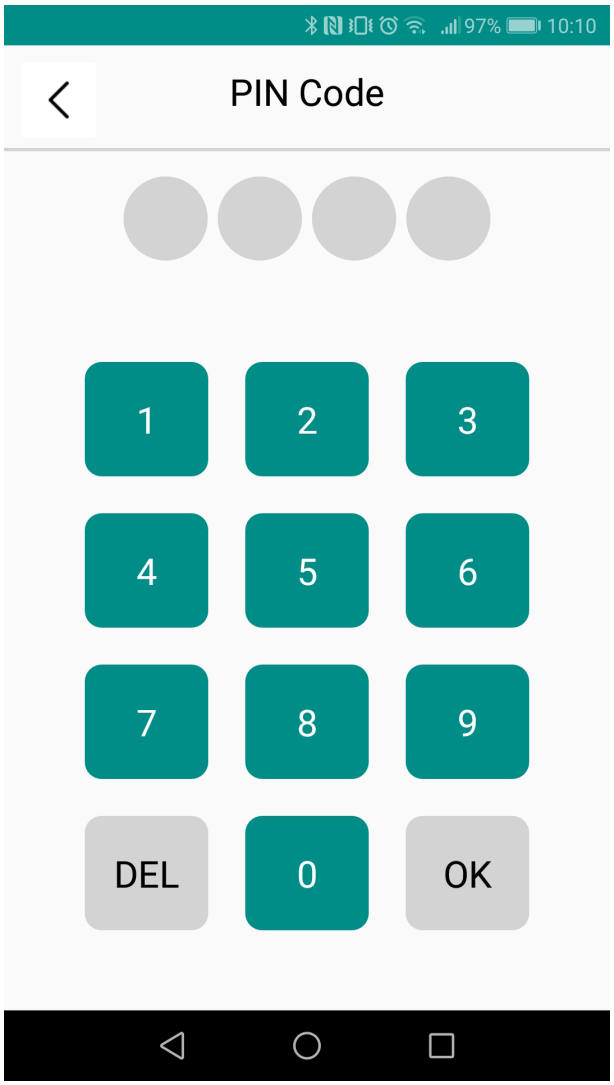
NOTICE

The Mira DS will appear in the available devices with the model name followed by the serial number.

Example: Mira DS 192600200020300000

If no devices are detected, ensure that Bluetooth is enabled on the Android device.

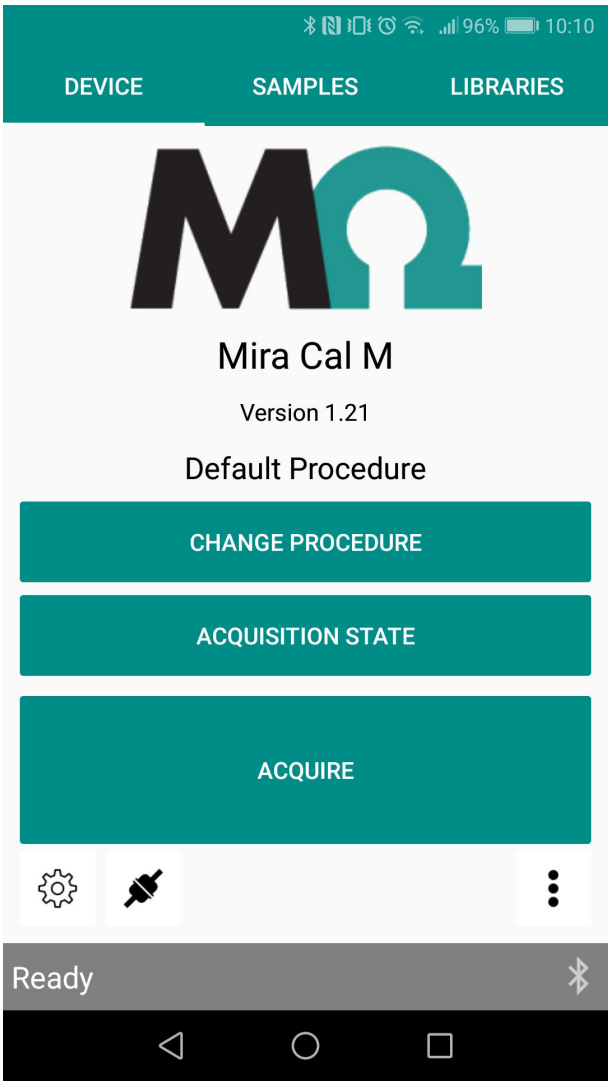
3 - On the Android device, click on Mira DS 1926xxxxxxxxxxxxx.



- Enter the PIN code **9999**. Click on **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 state, and acquiring a spectrum.

5 Operating procedure

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

Mira DS 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 DS matching algorithms. Click on **[Change Procedure]** and select an operating procedure from the drop-down menu.

NOTICE

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 automatically adjust laser power and integration time.

NOTICE

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

The intelligent Universal Attachment (iUA) automatically enables 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 click on **[Acquire]**.

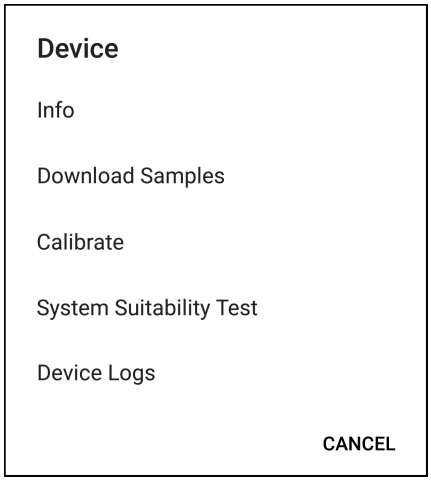
Mira Cal M indicates that the acquiring is in progress and the laser is active:

The Mira DS warns that the laser is active:

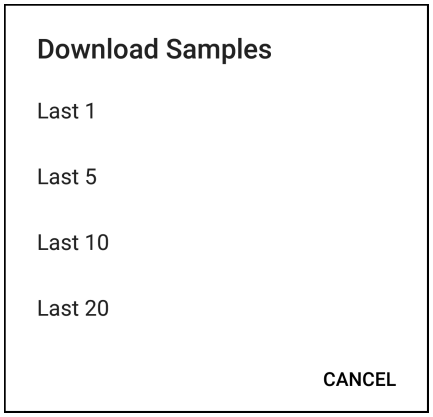
Figure 10 Warning symbol: Laser active

7 Downloading data from Mira DS

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



- Click on **[Download Samples]**.



- Select the number of scans to download.

Mira Cal M downloads the samples from the Mira DS.

8 Exporting data

- In Mira Cal M, click on **Samples**, ⋮, **[Export]**.
- Choose the information to be shared. **[External Data]**.
- Choose the scans to be exported.

The exported data can be found in the Android internal storage or memory card: **MetrohmRaman ► MiraCalM ► 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 with **File ► Open ► Samples**.

9 Emailing data

- In Mira Cal M, click on **Samples**, ⋮, **[Export]**.
- Choose the information to be shared. **[Email]**.
- Choose the scans to be sent. Select the desired mail client or messenger and send the files.

10 Disconnecting

In Mira Cal M, click on .

On the Mira DS, click on **[Disconnect Bluetooth]**.

Viewing HazMasterG3 information

1 Open the HazMasterG3 app.

2 Click on the top menu bar. Select **DataFusion ▶ Sensor Import**.

The sample will display in the import.

Shutdown Delay

By default, no shutdown delay is configured.

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

1 Click on , then **System Settings ▶ Shutdown Delay**.

2 Set the shutdown delay time.

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

Click on **[Save]**.

NOTICE

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

Language

1 Click on  , then **System Settings ► Language**.

2 Choose your preferred language.

Mira DS supports the follwing languages:

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

NOTICE

English is always the top button.

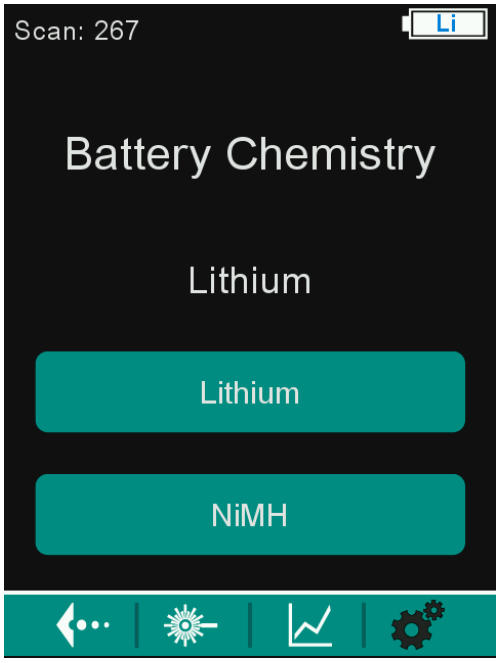
Battery Chemistry

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

Set the battery chemistry:

1 Click on  , then **System Settings ► Battery Chemistry**.

2



Select the battery type:

- Lithium
- NiMH

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

NOTICE

We recommend to change the batteries when the battery indicator changes color from yellow to red.

7.6 Samples

Scan log

Scan log

View the saved spectra in the **Scan Log**.

1

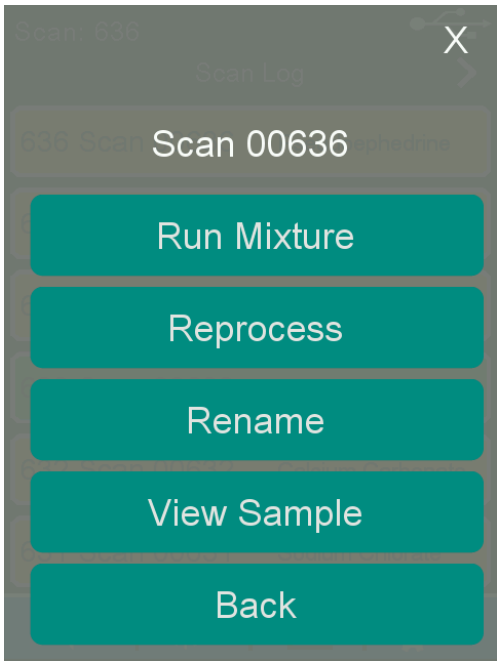
Figure 11 Scan Log with saved spectra

The samples are color-coded:

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

2 **View sample**

To open the sample menu, click on a scan number button.



3 Run Mixture

To run the mixture matching routine against all enabled libraries on the instrument, click on **[Run Mixture]**. 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 Rename

To rename the sample, click on **[Rename]**. Enter the new name. Confirm with **[Enter]**.

6 View Sample

To view the spectrum, the match name and the CAS# of an already acquired sample, click on **[View sample]**.

7 Back

To go back to **Scan Log**, click on **[Back]**.

8 Maintenance

8.1 Maintenance agreement

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

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

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

8.2 Cleaning the product

WARNING

Danger of poisoning and chemical burns from chemical hazardous substances

Poisoning and/or chemical burns by contact with aggressive chemical substances.

- Use only detergents that do not cause any unwanted side reactions with the materials to be cleaned.
- Clean contaminated surfaces.
- Wear protective equipment.
- Use exhaust equipment when working with vaporizing hazardous substances.
- Dispose of chemically contaminated materials (e.g. cleaning material) properly.

WARNING

Electric shock from electrical potential

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

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

Cleaning the surfaces of the product

Prerequisites

- The product is disconnected from the power grid.

1 Clean the surfaces with a damp cloth.

NOTICE

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

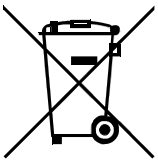
NOTICE

Water or ethanol can be used as a cleaning medium.

NOTICE

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

9 Disposal



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

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

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

10 Technical specifications

10.1 Ambient conditions

Mira DS		
Nominal function range	–20 to +50 °C	at max. 93% relative humidity, noncondensing
Storage and Transport	–20 to +70 °C	at max. 93% relative humidity, noncondensing
Mira PowerPack		
Nominal function range	–20 to +50 °C	at max. 93% relative humidity, noncondensing
Charging	0 to +30 °C	at max. 93% relative humidity, noncondensing
Storage	0 to +35 °C at 25–50% Charge	at max. 93% relative humidity, noncondensing
Transport	max. 1 week, –20 to +70 °C	at max. 93% relative humidity, noncondensing

10.2 Interfaces

USB connector	Type A/B mini USB connector (USB 2.0) with the following functions:	
		Power supply
		Data transmission
		with USB cable (6.2151.110)

10.3 Energy Supply

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

10.4 Dimensions and materials

Dimensions	
Width	88.2 mm
Depth	45.3 mm
Height	125.5 mm
Display	3.7'' TFT LCD Display, glove compatible
Samples for Vial Holder	
Vial Holder	Vials 15 mm x 26 mm

Weight	705 g
Material	
Housing	Aluminum anodized
Accessories covering	Thermoplastic elastomers (TPE-E)
IP Rating (according to EN 60529)	IP67
Ruggedization	MIL-STD-810G Method 514.6C-1, C-2, C-3 Category 4
	MIL-STD-810 Method 516.6 Procedure IV
	MIL-STD-810G Method 516.6 Procedure VI
	MIL-STD-810G Method 512.5 Procedure I
	IEC 60529 Dust

10.5 Operating specifications

Laser wavelength	785 nm± 0.5 nm
Laser output power	≤ 100 mW
Wavenumber range	400–2,300 cm^{-1}
Spectral resolution	8–10 cm^{-1} (FWHM)
Collection optics	NA = 0.50, 1 mm and 7.6 mm working distance; 0.042–2.5 mm measuring spot size

Beam divergence	2 degrees
Temporal emission structure	CW
Detection technique	Orbital Raster Scan (ORS™) to average over the sample
Laser class according to EN 60825-1	Class 3B
Protection Level of protective glasses (according to EN 207)	D LB5775–795 nm

NOHD – Nominal Ocular Hazard Distance

Contact Ball-Probe	34.5 cm
Standoff Attachment at 0.25 m setting	12 m
Standoff 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